TECHNICAL SPECIFICATION

ISO/TS 14907-2

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Road transport and traffic telematics — Electronic fee collection — Test procedures for user and fixed equipment —

Part 2:
Conformance test for the onboard unit application interface

Télématique de la circulation et du transport routier — Perception du télépéage — Modes opératoires relatifs aux équipements embarqués et aux équipements fixes —

Partie 2: Essai de conformité de l'interface d'application de l'unité embarquée

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

— an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;

— an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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.

ISO/TS 14907-2 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

ISO/TS 14907 consists of the following parts, under the general title *Road transport and traffic telematics — Electronic fee collection — Test procedures for user and fixed equipment*:

— *Part 1: Description of test procedures*

— *Part 2: Conformance test for the onboard unit application interface*

Introduction

This CEN/ISO Technical Specification describes tests that verify OBU conformance of implementations of functions and data structures for EFC applications.

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Road transport and traffic telematics — Electronic fee collection — Test procedures for user and fixed equipment —

Part 2:
Conformance test for the onboard unit application interface

1 Scope

This CEN/ISO Technical Specification describes tests that verify OBU conformance of implementations of functions and data structures, as defined in the implementation conformance statement based on ISO 14906, for EFC applications. After the tests of isolated data items and functions (C.1-C.2), an example is given for testing of a complete EFC transaction (C.3).

The scope of this CEN/ISO Technical Specification comprises definitions of OBU conformance assessment tests of:

— Basic DSRC L7 functionality;

— EFC application functions;

— EFC attributes (i.e. EFC application information);

— the addressing procedures of EFC attributes and (hardware) components (e.g. ICC and MMI);

— the EFC transaction model, which defines the common elements and steps of any EFC transaction; and

— the behaviour of the interface so as to support interoperability on an EFC-DSRC application interface level.

1
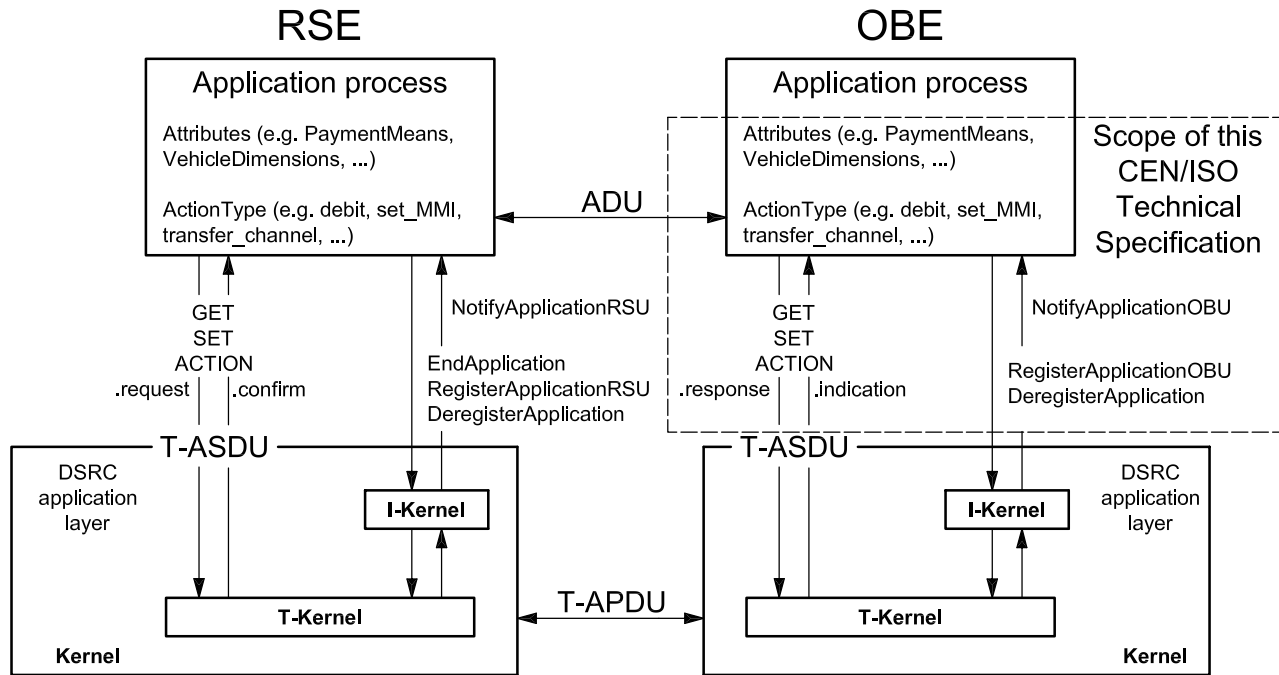
Figure 1 — The EFC application interface

The purpose of this CEN/ISO Technical Specification is to define tests that:

— assess OBU capabilities;

— assess OBU behaviour;

— serve as a guide for OBU 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.

Whereas this Technical Specification defines examples of test cases for DSRC and EFC functionality in Annex C, it does not intend to specify a complete test suite for a certain implementation. To compose a test suite for a specific EFC implementation, the test cases may have to be modified and new test cases may have to be defined and added in order for the conformance test to be complete. It may be useful to take into account the following considerations when defining a complete test suite:

— Small range: "exhaustive testing" of critical interoperability/compatibility features;

— Large range: testing of boundaries and random values;

— Composite types: testing of individual items in sequence or parallel.

Figure 2 shows the overall procedure of conformance testing.

Figure 2 — Conformance testing process

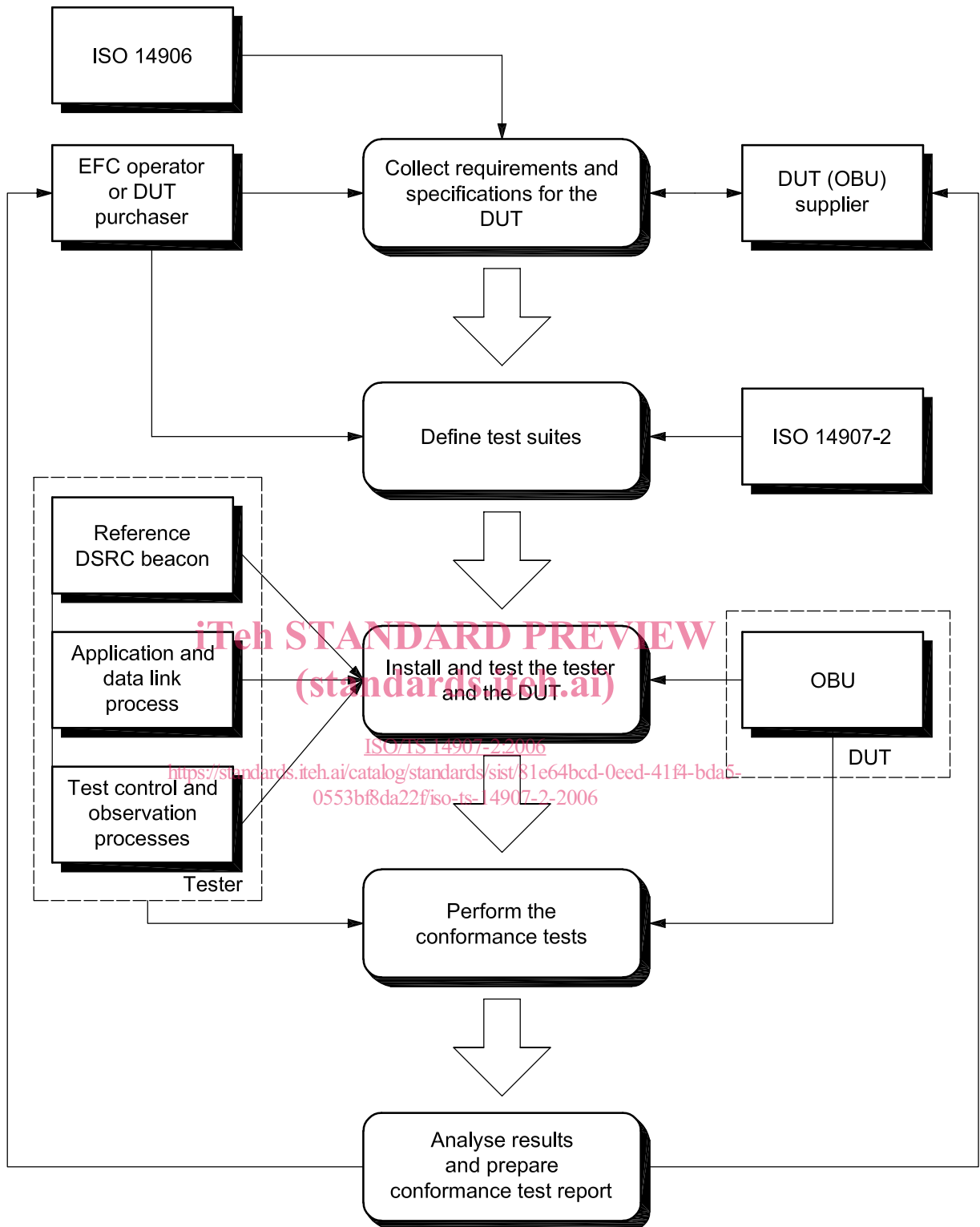Figure 3 gives a more detailed picture of the interface between the entity performing the conformance test and the supplier of the Device Under Test (DUT). By the EFC application specification, the implementation conformance statement pro forma and the implementation extra information for testing pro forma the supplier is requested to provide the DUT (OBU), containing the Implementation Under Test (IUT), as well as the documentation needed to perform the tests. More details on the content of the different documents are given in Clause 5 on OBU and supporting information.

NOTE 1 The Device Under Test contains the Implementation Under Test.

Figure 3 — Documentation DUT supplier

It is outside the scope of this CEN/ISO Technical Specification to define tests that assess:

— performance;

— robustness; and

— reliability of an implementation.

NOTE 2 ISO/TS 14907-1 defines test procedures that are aimed at assessing performance, robustness and reliability of EFC equipment and systems.

NOTE 3 The ISO/IEC 10373 family of International Standards defines test methods for proximity, vicinity, integrated circuits(s) cards and related devices that may be relevant for OBUs that support such cards.

2 Normative references

The following referenced documents are indispensable for the application 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/IEC 8824-1, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO/IEC 8825-2, *Information technology — ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)*

ISO/IEC 9646-1, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 1: General concepts*

ISO 14906:2004, *Road transport and traffic telematics — Electronic fee collection — Application interface definition for dedicated short-range communication*

ISO/TS 14907-1, *Road transport and traffic telematics — Electronic fee collection — Test procedures for user and fixed equipment — Part 1: Description of test procedures*

ISO/TS 17574, *Road transport and traffic telematics — Electronic fee collection (EFC) — Guidelines for EFC security protection profiles*

EN 12253, *Road transport and traffic telematics — Dedicated short-range communication — Physical layer using microwave at 5,8 GHz*

EN 12795, *Road transport and traffic telematics — Dedicated short-range communication (DRSC) — DRSC data link layer: medium access and logical link control*

EN 12834, *Road transport and traffic telematics — Dedicated short-range communication (DRSC) — DRSC application layer*

EN 13372, *Road transport and traffic telematics (RTTT) — Dedicated short-range communication — Profiles for RTTT applications*

3 Terms and definitions

For the purposes of this document, the following definitions apply.

3.1
access credentials
data that is transferred to OBE in order to establish the claimed identity of an RSE application process entity

[ISO 14906]

NOTE   The access credentials carry information needed to fulfil access conditions in order to perform the operation on the addressed element in the OBE. The access credentials can carry passwords as well as cryptographic based information such as authenticators.

3.2
action
function that an application process resident at the RSE can invoke in order to make the OBE execute a specific operation during the transaction

[ISO 14906]

3.3
attribute
application information formed by one or by a sequence of data elements, which is managed by different actions used for implementation of a transaction

[ISO 14906]

3.4
authenticator
data appended to, or a cryptographic transformation of, a data unit that allows a recipient of the data unit to prove the source and/or the integrity of the data unit and protect against forgery

[ISO 14906]

3.5
channel
information transfer path

[ISO/IEC 7498-2 and ISO 14906]

3.6
component
logical and physical entity composing OBE, supporting a specific functionality

[ISO 14906]

3.7
contract
expression of an agreement between two or more parties concerning the use of the road infrastructure

[ISO 14906]

3.8
cryptography
discipline which embodies principles, means and methods for the transformation of data in order to hide its information content, prevent its undetected modification or/and prevent its unauthorized use

[ISO/IEC 7498-2 and ISO 14906]

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3.9
data group
collection of closely related EFC data attributes which together describe a distinct part of an EFC transaction

[ISO 14906]

3.10
data integrity
property that data has not been altered or destroyed in an unauthorized manner

[ISO/IEC 7498-2 and ISO 14906]

3.11
element
in the context of DSRC, a directory containing application information in form of attributes

[ISO 14906]

3.12
implementation conformance statement
statement made by the supplier of an implementation or system claimed to conform to a given specification, stating which capabilities have been implemented

3.13
implementation conformance statement pro forma
document, in the form of a questionnaire, which when completed for an implementation or system becomes an implementation conformance statement

3.14
implementation extra information for testing
statement made by the supplier or an implementer of an IUT which contains or references all of the information (in addition to that given in the implementation conformance statement) related to the IUT and its testing environment, which will enable the test laboratory to run an appropriate test suite against the IUT

3.15
implementation extra information for testing pro forma
document, in the form of a questionnaire, which when completed for an IUT becomes an implementation extra information for testing

3.16
on-board equipment
OBE
equipment located within the vehicle and supporting the information exchange with the RSE, it is composed of the OBU and other sub-units whose presence are considered optional for the execution of a transaction

[ISO 14906]

3.17
on-board unit
OBU
minimum component of an OBE, whose functionality always includes at least the support of the DSRC interface

[ISO 14906]

3.18
roadside equipment
RSE
equipment located at a fixed position along the road transport network, for the purpose of communication and data exchanges with the OBE of passing vehicles

[ISO 14906]

3.19
service (EFC)
road-transport-related facility provided by a service provider, normally a type of infrastructure, the use of which is offered to the user for which the user may be requested to pay

[ISO 14906]

3.20
service primitive (communication)
elementary communication service provided by the application layer protocol to the application processes

[ISO 14906]

NOTE   The invocation of a service primitive by an application process implicitly calls upon and uses services offered by the lower protocol layers.

3.21
service provider (EFC)
operator that accepts the user's payment means and in return provides a road-use service to the user

[ISO 14906]

3.22
session
exchange of information and interaction occurring at a specific EFC station between the RSE and the user/vehicle

[ISO 14906]

3.23
transaction
whole of the exchange of information between the RSE and the OBE necessary for the completion of an EFC operation over the DSRC

[ISO 14906]

3.24
transaction model
functional model describing the general structure of EFC transactions

[ISO 14906]

3.25
tester
combination of equipment and processes which is able to perform conformance tests according to this Technical Specification

3.26
user
entity that uses transport services provided by the service provider according to the terms of a contract

[ISO 14906]

4   Abbreviations

For the purposes of this Technical Specification, the following abbreviations apply throughout the document unless otherwise specified.

4.1
ADU
Application Data Unit

4.2
APDU
Application Protocol Data Unit

4.3
AP
Application Process

4.4
ARIB
Association of Radio Industries and Businesses

NOTE   ARIB (www.arib.or.jp) is based in Japan.

4.5
ASCII
American Standard Code for Information Interchange

4.6
ASN.1
Abstract Syntax Notation One

[ISO/IEC 8824-1]

4.7
ASP
Abstract Service Primitives

[ISO 9646-1]

4.8
AVI
Automatic Vehicle Identification

4.9
B-Kernel
Broadcast Kernel

4.10
BST
Beacon Service Table

4.11
cf
confirm

4.12
DSRC
Dedicated Short-Range Communication

4.13
DUT
Device Under Test

4.14
EID
Element Identifier

4.15
EFC
Electronic Fee Collection

4.16
FTP
File Transfer Protocol

4.17
HDLC
High-level Data Link Control

4.18
ICS
Implementation Conformance Statement

4.19
I-Kernel
Initialization Kernel

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0553bf8da22f/iso-ts-14907-2-2006