SLOVENSKI STANDARD
oSIST prEN ISO 14907-2:2020

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Elektronsko pobiranje pristojbin - Postopki za preskušanje opreme - 2. del: Preskus skladnosti aplikacijskega vmesnika vgrajene enote za elektronsko cestninjenje (ISO/DIS 14907-2:2020)

Electronic fee collection - Test procedures for user and fixed equipment - Part 2: Conformance test for the on-board unit application interface (ISO/DIS 14907-2:2020)

Elektronische Gebührenerhebung - Testverfahren für straßenseitige und fahrzeugseitige Einrichtungen - Teil 2: Konformitätsprüfungen für die Anwendungsschnittstelle der fahrzeugseitigen Einrichtung (EN ISO/TS 14907-2 rev)

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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ICS:

35.240.60	Uporabniške rešitve IT v prometu	IT applications in transport
43.040.15	Avtomobilska informatika. Vgrajeni računalniški sistemi	Car informatics. On board computer systems

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Electronic fee collection — Test procedures for user and fixed equipment —

Part 2:
Conformance test for the on-board unit application interface

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

ICS: 35.240.60; 43.040.15

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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 meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*.

This document cancels and replaces ISO/TS 14907-2:2016, which has been technically revised with the following changes:

— updated references to clauses and annexes in accordance with ISO 14906:2018/Amd1:2020;

— updated Annex D;

The ISO 14907 series consists of the following parts, under the general title *Electronic fee collection — Test procedures for user and fixed equipment*:

— *Part 1: Description of test procedures*

— *Part 2: Conformance test for the on-board unit application interface*

Introduction

This document describes tests that verify on-board unit (OBU) conformance of implementations of functions and data structures for electronic fee collection (EFC) applications.

The purpose of this document 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.

Electronic fee collection — Test procedures for user and fixed equipment — Part 2: Conformance test for the on-board unit application interface

1 Scope

This document describes tests that verify on-board unit (OBU) conformance of implementations of functions and data structures, as defined in the implementation conformance statement based on ISO 14906 for electronic fee collection (EFC) applications.

It defines tests for assessment of OBU conformance in terms of :

— basic dedicated short-range communication (DSRC) L7 functionality,

— EFC application functions,

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

— the addressing procedures of EFC attributes and (hardware) components,

— 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.

After the tests of isolated data items and functions (C.2 to C.4), an example is given for testing of a complete EFC transaction (C.3).

Whereas this document 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 for the conformance test suite to be complete. It can be useful to consider the following when defining a complete test suite:

— small range: “exhaustive testing” of critical interoperability/compatibility features,

— large range: testing of boundaries and random values, and

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

It is outside the scope of this document to define tests that assess

— performance,

— robustness, and

— reliability of an implementation.

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

NOTE 2 The ISO/IEC 10373 series defines test methods for proximity, vicinity, integrated circuit(s) cards and related devices that may be relevant for OBUs that support such cards.

Annex D provides an informative overview of Japanese OBE conformance tests that are based on the ISO 14907 series, in order to illustrate how these can be applied in practice.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14906:2018/Amd1:2020, *Electronic fee collection — Application interface definition for dedicated short-range communication*

EN 12834:2003, *Road transport and traffic telematics — Dedicated short-range communication (DSRC) — DSRC application layer*

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:

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

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

3.1
access credentials
AC_CR
trusted attestation or secure module that establishes the claimed identity of an object or application

[SOURCE: ISO/TS 17573-2:2020, 3.4]

3.2
attribute
addressable package of data consisting of a single data element or structured sequences of data elements

[SOURCE: ISO/TS 17573-2:2020, 3.13]

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

[SOURCE: ISO/TS 17573-2:2020, 3.15]

3.4
channel
information transfer path

[SOURCE: ISO/DTS IEC 7498-2:1989, 3.3.13]

3.5
electronic fee collection
EFC
fee collection by electronic means

Note 1 to entry: Fee and toll are synonyms within the context of standardization of EFC in ISO/TC 204.

[SOURCE: ISO/TS 17573-2:2020, 3.70]

3.6
element
DSRC directory containing application information in the form of *attributes* (3.2)

[SOURCE: ISO 14906:2018, 3.8,]

3.7
implementation conformance statement
ICS
statement of capabilities and options that have been implemented defining to what extent it is compliant with a given specification

[SOURCE: ISO/TS 17573-2:2020, 3.90]

3.8
implementation conformance statement proforma
document, in the form of a questionnaire, which when completed for an implementation or system becomes an *implementation conformance statement* (ICS) (3.7)

[SOURCE: ISO/IEC 9646-1:1994, 3.3.40]

3.9
implementation extra information for testing
IXIT
statement containing all of the information related to the implementation under test (IUT) and its corresponding system under test (SUT) which will enable the testing laboratory to run an appropriate test suite against that IUT

[SOURCE: ISO/IEC 19015:2000, 3.20]

3.10
implementation extra information for testing proforma
document, in the form of a questionnaire, which when completed for an implementation under test (IUT) becomes an implementation extra information for testing (IXIT) (3.9)

[SOURCE: ISO/TS 17573-2:2020, 3.93]

3.11
on-board equipment
OBE
all required equipment on-board a vehicle for performing required *electronic fee collection (EFC)* (3.5) functions and communication services

[SOURCE: ISO/TS 17573-2:2020, 3.126]

3.12
on-board unit
OBU
electronic unit on-board a vehicle for performing specific *electronic fee collection (EFC)* (3.5) functions and for communication with external systems

Note 1 to entry: An OBU always includes, in this context, at least the support of the DSRC interface.

[SOURCE: ISO/TS 17573-2:2020, 3.127]

3.13
roadside equipment
RSE
fixed or movable electronic fee collection (EFC) (3.1) equipment located along or on the road

Note 1 to the entry: Movable RSE can be mounted temporarily along the road or in a vehicle.

[SOURCE: ISO/TS 17573-2:2020, 3.161]

3.14
service primitive
elementary communication service provided by the application layer protocol to the application processes

[SOURCE: ISO/TS 17573-2:2020, 3.173]

3.15
transaction
whole of the exchange of information between two physically separated communication facilities

[SOURCE: ISO/TS 17573-2:2020, 3.211]

3.16
transaction model
functional model describing the general structure of electronic payment *transactions* (3.15)

[SOURCE: ISO/TS 17573-2:2020, 3.213]

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms and variables apply.

AC_CR	Access credentials
ACn	Acknowledged command/response
ADU	Application Data Unit (ISO 14906)
APDU	Application Protocol Data Unit (ISO 14906)
AP	Application Process (ISO 14906)
ARIB	Association of Radio Industries and Businesses

NOTE A Japanese standards development organization. https://www.arib.or.jp/english/

ASCII	American Standard Code for Information Interchange
ASP	Application Service Primitive
AVI	Automatic Vehicle Identification
BST	Beacon Service Table (ISO 14906)
cf	Confirm
DSRC	Dedicated Short-Range Communication
DUT	Device Under Test
EID	Element Identifier
EFC	Electronic Fee Collection (ISO 17573)
FTP	File Transfer Protocol
ICS	Implementation Conformance Statement
I-Kernel	Initialization Kernel
IID	Invoker Identifier
ind	Indication
IUT	Implementation Under Test
IXIT	Implementation eXtra Information for Testing
L1	Layer 1 of DSRC (physical layer)
L2	Layer 2 of DSRC (data link layer)
L7	Application Layer Core of DSRC
LID	Logical Link Control Identifier
LLC	Logical Link Control
LPDU	LLC Protocol Data Unit
LSDU	Link Layer Service Data Unit (EN 12795)
M_a	ManufacturerID (EN 12834)
MAC	Medium Access Control
MMI	Man-Machine Interface
n.a.	Not applicable
NE_OK	Command accepted/Response LSDU not yet available (EN 12795)
OBE	On-board equipment
OBU	On-board unit
ORSE	Organization for Road System Enhancement
$P_{a,b,c,d}$	Profile, example P_0 denotes Profile 0.
PDU	Protocol Data Unit
PoC	Point of Control
PoO	Point of Observation

PPDU	Physical Layer Protocol Data Unit
PrWA	Private Window Allocation (EN 12795)
PrWRq	Private Window Request (EN 12795)
req	Request
rs	Response
RSE	Roadside Equipment
SAM	Secure Application Module
T-APDU	Transfer-Application Protocol Data Unit
T-ASDU	Transfer-Application Service Data Unit
T-Kernel	Transfer Kernel
TTI	Traffic and Traveller Information
VST	Vehicle Service Table

5 OBU and supporting information

5.1 General

The supplier shall provide the OBU, i.e. the DUT, and the associated information, including:

— OBUs personalized to be able to perform tests according to the implementation conformance statement (ICS) and implementation extra information for testing (IXIT) as defined in 5.2 and 5.3, respectively. At least five samples shall be submitted for test. More samples may be needed if several different data structures and data contents are required in the tests;

— user's manual for the OBU, which shall include instructions how to handle the equipment, and may include further detailed information about the protocol functions;

— implementation conformance statement according to 5.2. The ICS shall include statements regarding the following:

  — layer 7 services that are implemented in the OBU;

  — EFC functions (action types) that are implemented in the OBU;

  — whether or not data elements are used;

— implementation extra information for testing according to 5.2. The IXIT shall, if applicable, include:

  — a statement regarding which layer 2 services shall be used to transfer the L7 services (and EFC services);

  — a description of security calculations in the OBU including a specification of the encryption algorithm used;

  — values of the test Master Keys for calculation and verification of OBU security data such as authenticators and access credentials.

The supplier should also provide configuration/personalization equipment for the OBU if that ensures effective testing.

Figure 1 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 proforma and the implementation extra information for testing proforma 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 The Device Under Test contains the Implementation Under Test.

Figure 1 shows the overall procedure of conformance testing. Figure 2 shows the exchange of information between the supplier of the DUT and the test house.