SLOVENSKI STANDARD
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Elektronsko pobiranje pristojbin - Vrednotenje skladnosti opreme v vozilu in v obcestni napravi s standardom EN 15509 - 1. del: Zgradba preskuševalnega niza in namen preskušanja

Electronic fee collection - Conformity evaluation of on-board and roadside equipment to EN 15509 - Part 1: Test suite structure and test purposes

Elektronische Gebührenerhebung - Konformitätsprüfung von Fahrzeuggeräten und straßenseitigen Einrichtungen nach EN 15509 - Teil 1: Struktur und Zweck des Prüfprogramms

Perception de télépéage - Evaluation de conformité de l'équipement embarqué et de l'équipement au sol à la EN 15509 - Partie 1: Structure des suites de tests et intention des tests

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03.220.20	Cestni transport	Road transport
35.240.60	Uporabniške rešitve IT v prometu	IT applications in transport
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SIST EN 15876-1:2017 **en,fr,de**

EUROPEAN STANDARD
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Supersedes EN 15876-1:2010+A1:2012

English Version

Electronic fee collection - Evaluation of on-board and roadside equipment for conformity to EN 15509 - Part 1: Test suite structure and test purposes

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 15876-1:2016) has been prepared by Technical Committee CEN/TC 278 "Intelligent transport systems", the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2017, and conflicting national standards shall be withdrawn at the latest by April 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document supersedes EN 15876-1:2010+A1:2012.

This second edition of EN 15876-1 incorporates the following main modifications compared to the previous one:

— amendment of terms, in order to reflect harmonization of terms across electronic fee collection (EFC) standards;

— addition of a new clause (i.e. Clause 5) on conformance;

— amendments to reflect changes to the underlying base standard, with emphasis on backward compatibility with the first edition of this standard.

For the revision of this European Standard, the following principles have been used:

— take into account the evolution of some of the underlying standard, i.e. EN 15509:2014

— maintain compatibility with the previous edition of this European Standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

CEN/TC 278 has produced a set of standards that support interoperable DSRC-EFC-systems e.g. EN ISO 14906 (a "toolbox" for defining EFC-application transaction) and CEN ISO/TS 14907-2 (EFC application interface conformance tests for On Board Units). However, these standards are only of an enabling nature and do not guarantee unambiguous technical interoperability. Therefore EN 15509, *Electronic fee collection — Interoperability application profile for DSRC* was developed to support technical interoperability between EFC-systems.

This European Standard defines the test suite structure and the test purposes for conformity evaluation of OBUs and RSE designed for compliance with the requirements set up in EN 15509. A test standard for evaluation of conformity of on-board and roadside equipment is a necessary element for coherent, practical and effective appraisal of products' compliance to EN 15509.

This document forms Part 1 of a two-part standard:

— EN 15876-1, *Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to EN 15509 — Part 1: Test suite structure and test purposes*

— EN 15876-2, *Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to EN 15509 — Part 2: Abstract test suites*

Together, the two parts of EN 15876 provide the necessary foundation for implementation of the interoperability requirements as stated in EN 15509:

— industry is provided with an easy-to-use toolbox for product assessment;

— operators can easily assess conformity to EN 15509 and reference to the standard in tendering processes;

— authorities and joint undertakings may reference to the test standard when stating interoperability requirements;

— certification organisations are given an effective tool for certification of products.

1 Scope

The objective of this document is to provide a basis for conformance tests for DSRC equipment (on-board and roadside units) to support interoperability between different equipment supplied by different manufacturers.

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.

EN 15509:2014, *Electronic fee collection — Interoperability application profile for DSRC*

EN ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes (ISO 3166-1)*

EN ISO 14816, *Road transport and traffic telematics — Automatic vehicle and equipment identification — Numbering and data structure (ISO 14816)*

EN ISO 14906:2011, *Electronic fee collection — Application interface definition for dedicated short-range communication (ISO 14906:2011)*

CEN ISO/TS 14907-2, *Electronic fee collection — Test procedures for user and fixed equipment — Part 2: Conformance test for the on-board unit application interface (ISO/TS 14907-2)*

ETSI EN 300 674-1:2004, *Electromagnetic compatibility and Radio spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band; Part 1: General characteristics and test methods for Road Side Units (RSU) and On-Board Units (OBU)*

ETSI/TS 102 486-1-2:2008, *Intelligent Transport Systems (ITS); Road Transport and Traffic Telematics (RTTT); Test specifications for Dedicated Short Range Communication (DSRC) transmission equipment; Part 1: DSRC data link layer: medium access and logical link control; Sub-Part 2: Test Suite Structure and Test Purposes (TSS&TP)*

ETSI/TS 102 486-2-2:2008, *Intelligent Transport Systems (ITS); Road Transport and Traffic Telematics (RTTT); Test specifications for Dedicated Short Range Communication (DSRC) transmission equipment; Part 2: DSRC application layer; Sub-Part 2: Test Suite Structure and Test Purposes (TSS&TP)*

3 Terms and definitions

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

3.1
attribute
addressable package of data consisting of a single data element or structured sequences of data elements

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

3.2
authenticator
data, possibly encrypted, that is used for authentication

[SOURCE: EN 15509:2014, 3.3]

3.3
data group
class of closely related attributes

[SOURCE: ISO 17575-1:2016, 3.10]

3.4
element
DSRC directory containing application information in form of attributes

[SOURCE: EN ISO 14906:2011, 3.11]

3.5
implementation conformance statement
statement of capabilities and options that have been implemented defining to what extent it is compliant with a given specification

3.6
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)

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

3.7
implementation extra information for testing
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 19105:2000, 3.20]

3.8
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)

[SOURCE: ISO/IEC 9646-1:1994, 3.3.42, modified]

3.9
on-board equipment
all required equipment on-board a vehicle for performing required EFC functions and communication services

3.10
on-board unit
minimum component of an *on-board equipment*, whose functionality always includes at least the support of the DSRC interface

[SOURCE: EN ISO 14906:2011, 3.15]

3.11
roadside equipment
equipment located along the road, either fixed or mobile

[SOURCE: EN ISO 14906:2011, 3.17]

3.12
tester
combination of equipment, humans and processes able to perform specified conformance tests

3.13
transaction
whole of the exchange of information between two physically separated communication facilities

[SOURCE: ISO 17575-1:2016, 3.21]

4 Abbreviations

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

APDU	Application Protocol Data Unit (EN ISO 14906)
AP	Application Process
ASN.1	Abstract Syntax Notation One (ISO/IEC 8824-1)
ATS	Abstract Test Suite
BI	Behaviour Invalid (i.e. Invalid Behaviour tests)
BST	Beacon Service Table (EN ISO 14906)
BV	Behaviour Valid (i.e. Valid Behaviour tests)
DSRC	Dedicated Short-Range communication (EN ISO 14906)
DUT	Device Under Test (CEN ISO/TS 14907-2)
EFC	Electronic Fee Collection (ISO 17573)
ICS	Implementation Conformance Statement
LLC	Logical Link Control (EN 12795)
LPDU	LLC Protocol Data Unit (EN 12795)
MAC	Medium Access Control (EN 12795)
PCTR	Protocol Conformance Test Report
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
SCTR	System Conformance Test Report

TP Test Purposes

TSS Test Suite Structure

VST Vehicle Service Table (EN ISO 14906)

5 Conformance

The manufacturer of the OBU and RSE, respectively, is responsible for providing a conformance test report.

The manufacturer of the OBU shall complete the protocol conformance test report (PCTR) for on-board units as defined in Annex C.

The manufacturer of the RSE shall complete the PCTR for roadside equipment as defined in Annex D.

6 Test Suite Structure

6.1 Structure

The table below shows the Test Suite Structure (TSS) including its subgroups defined for the conformance testing.

Table 1 — Test Suite Structure

Group	Type of DUT	Behaviour
Physical layer	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
DLC MAC sublayer	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
DLC LLC sublayer	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
Application layer – Functions	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
Application Layer – Data	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
Application Layer – Security Level 0	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
Application Layer – Security Level 1	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
Application Layer – Transactions	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour

Physical layer tests are to be performed in a radio wave lab. They will not form part of the abstract test suite (ATS).

6.2 Reference to Conformance Specifications

Conformance to a profile standard implies conformance to the related base standards; hence, a number of test cases for the profile standard are exactly the same as the conformance test cases for the related base standards. Other test cases are derived from the base standards conformance test cases, by applying some restrictions or choices in e.g. the parameters values, according to what is stated in the profile standard. Finally, specific conformance test cases for the profile standard are identified for statements contained in the profile standard, which have no equivalence in the base standards. These latter cases cover for example the security algorithms and functions that are described in the profile standard. This document takes into account already defined test purposes for conformance to the base standards by referencing them, so that:

a) For test purposes that are **identical** to those defined in the base standards conformance test cases (see e.g ETSI/TS 102 486-1-2 or ETSI/TS 102 486-2-2) a direct reference is reported. For reader's convenience, the title or a verbal description of the referenced test purpose is given, together with the reference.

b) For test purposes that are **derived** from those defined in the base standards conformance test cases, a direct reference is reported, plus an indication on how the referred test purpose has to be modified for the profile conformance testing.

c) For test purposes that are **specific to the standard profile**, a complete description is given.

An indication on whether a test purpose is **identical**, **derived**, or **specific** is given in each test purpose.

6.3 Test Purposes

6.3.1 TP Definition Conventions

The TPs are defined following the rules shown in Table 2 below.

Table 2 — TP Definition Rules

TP ID according to the TP naming conventions	Title
	Reference
	TP origin
	Initial condition
	Stimulus and expected behaviour

TP ID	The TP ID is a unique identifier. It shall be specified according to the TP naming conventions defined in the sub-clause below.
Title	Short description of Test Purpose objective.
Reference	The reference should contain the references of the subject to be validated by the actual TP (specification reference, clause, and paragraph).
TP origin	Indicates if the TP is **identical** to a TP defined in another test standard, **derived** from a TP defined in another test standard, or **specific** for this standard profile.
Initial condition	The condition defines in which initial state the DUT has to be to apply the actual TP.
Stimulus and expected behaviour	Definition of the events the tester performs, and the events that are expected from the DUT to conform to the base specification.