



SLOVENSKI STANDARD

oSIST prEN 15509:2021

01-januar-2021

Elektronsko pobiranje pristojbin - Interoperabilnost profila aplikacije za DSRC

Electronic fee collection - Interoperability application profile for DSRC

Elektronische Gebührenerhebung - Anwendungsprofil für DSRC Interoperabilität

Perception de télépéage - Profil d'application d'interopérabilité pour DSRC

Ta slovenski standard je istoveten z: prEN 15509

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35.240.60	Uporabniške rešitve IT v prometu	IT applications in transport

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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Electronic fee collection - Interoperability application profile for DSRC

Perception de télépéage - Profil d'application
d'interopérabilité pour DSRC

Elektronische Gebührenerhebung - Anwendungsprofil
für DSRC Interoperabilität

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 278.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN 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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

European foreword.....	4
Introduction	5
1 Scope.....	7
2 Normative references.....	8
3 Terms and definitions	8
4 Symbols and abbreviations	12
5 Conformance.....	13
5.1 General.....	13
5.2 Base standards.....	13
5.3 Main contents of an EFC-DSRC-IAP	15
5.4 Conformance requirements	16
5.5 Conformation notification	16
5.6 Conformance evaluation and testing	16
5.7 Multiple IAPs.....	16
6 Requirements for EFC-DSRC-IAP 1.....	16
6.1 OBU requirements	16
6.1.1 General.....	16
6.1.2 DSRC requirements	16
6.1.3 DSRC L7 and EFC functions	17
6.1.4 Data requirements.....	17
6.1.5 Security requirements	19
6.1.6 Transaction requirements.....	20
6.2 RSE requirements	20
6.2.1 General.....	20
6.2.2 DSRC requirements	20
6.2.3 DSRC L7 and EFC functions	20
6.2.4 Data requirements.....	20
6.2.5 Security requirements	21
6.2.6 Transaction requirements.....	21
Annex A (normative) Data specification	22
Annex B (normative) Implementation conformance statement proforma.....	26
B.1 General.....	26
B.2 Guidance for completing the ICS proforma.....	26
B.2.1 Purposes and structure.....	26
B.2.2 Abbreviations and conventions	26
B.3 Instructions for completing the ICS proforma.....	28
B.4 ICS proforma for OBU	28
B.4.1 Identification implementation	28
B.4.2 Global statement of conformance	29
B.4.3 ICS proforma for OBU	29
B.4.4 Profile requirements list for OBU	32

B.5	ICS proforma for RSE	35
B.5.1	Identification implementation	35
B.5.2	Identification of the standard	35
B.5.3	Global statement of conformance.....	36
B.5.4	ICS proforma for RSE	36
B.5.5	Profile requirements list for RSE	39
	Annex C (informative) IAP taxonomy and numbering	43
C.1	General	43
C.2	Contents of an Interoperable Application Profile (IAP)	43
C.3	IAP referencing and numbering.....	44
C.3.1	IAP numbering.....	44
C.3.2	Security levels numbering.....	44
C.3.3	Numbering and referencing examples.....	44
	Annex D (informative) Security considerations	45
	Annex E (informative) Interlayer management	46
E.1	General	46
E.2	RSE Interlayer Management guidelines	46
E.3	OBU Inter Layer Management guidelines.....	46
E.4	State Transition Tables.....	46
	Annex F (informative) Mounting guidelines for the OBU.....	52
F.1	General	52
F.2	OBU mounting position	52
	Annex G (informative) Use of this standard for the EETS.....	56
G.1	General	56
G.2	Overall relationship between European standardization and the EETS	56
G.3	European standardization work supporting the EETS	56
G.4	Correspondence between the EETS legislation and this document	57
	Bibliography	58

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prEN 15509:2020 (E)**European foreword**

This document (prEN 15509:2020) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 15509:2014, which has been technically revised. The main changes compared to the previous editions are as follows:

- updated data definitions in order to reflect changes made to the underlying bases standards, notably in EN ISO 14906 (i.e. EN ISO 14906:2018/A1:2020), whilst seeking to ensure backward compatibility with previous editions of this document;
- updated terms, in order to take into account the harmonized terms between electronic fee collection standards, as defined in ISO/TS 17573-2;
- deletion of the normative annex on “Security calculations”, which has been moved to EN ISO 14906;
- updated informative Annex H on the “Use of this document for the European electronic toll service” (EETS), so as to reflect the recast of the EETS legislation (i.e. Directive (EU) 2019/520^[22] and the corresponding Commission Delegated and Implementing Regulations ^[21] ^[24]).

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

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Introduction

CEN/TC 278 has produced a set of standards that supports interoperable dedicated short-range communication (DSRC)-based electronic fee collection (EFC) systems (e.g. EN ISO 14906, a “toolbox” for definition of EFC-DSRC transactions). However, these standards are necessary but not sufficient to ensure technical interoperability between EFC-DSRC-systems.

This document defines an Interoperable Application Profile (IAP) to support EFC-DSRC transactions, a coherent set of requirements. The main objective is to support technical interoperability between EFC-systems within the scope of this document (as defined in Clause 1 below). A basic description of the EFC-service and an EFC System can be found in EN ISO 17573-1.

This document only defines a basic level of technical interoperability for EFC equipment, i.e. on-board unit (OBU) and roadside equipment (RSE) using DSRC. It does not provide a full solution for interoperability, nor does it define other parts of the EFC-system, other services, other technologies and non-technical elements of interoperability.

The elaboration of this document is based on the experiences from a considerable number of implementations and projects throughout Europe. This document makes use of the results from European projects such as CARDME, PISTA and CESARE, as they represent the fruit of European EFC harmonization and have been used as the basis for several national implementations.

The development of a common European electronic toll service (EETS) as a part of the European Directive (2004/52/EC^[20]) also calls for the definition of an interoperable EFC-service. The first edition of this document was referenced as a mandatory element in the service definition of the EETS, in the EC decision 2009/750/EC^[21].

The revision of the EETS legislation (recast in EU legal parlance) resulted in the adoption of Directive 2019/520/EC^[22] on the interoperability of electronic road tolling systems and facilitating cross-border exchange of information on the failure to pay road fees in the Union, which refers to the second edition of this document (EN 15509:2014) as a mandatory element for the EETS. Further technical and procedural characteristics of the EETS were laid down in the associated Commission Delegated Regulation (EU) 2020/203^[24] and Commission Implementing Regulation (EU) 2020/204^[24].

Although there are standards and specifications, there are specific needs that motivate this document:

- Definition of the necessary and sufficient EFC-DSRC requirements to underpin technical interoperability;
- Choice of data elements including vehicle data;
- Extended definition of the use of some data elements, including semantics and coding;
- Clear choices for security implementation;
- It facilitates a complementing test specification (with clear relations between the conformance requirements and evaluation tests);
- The provisions laid down in Directive 2019/520/EC and the associated Commission Regulations;
- Support for procurements.

The Application Profile is described using the concept of “International Standardised Profiles (ISP)” as defined in ISO/IEC/TR 10000-1. The ISP-concept is specifically suited for defining interoperability specifications where a set of base standards can be used in different ways. This is exactly the case in EFC, where a set of base standards allows for different choices that are not interoperable.

prEN 15509:2020 (E)

The principles of the ISP-concept can be summarized as follows:

- An ISP makes references only to base standards or other ISPs;
- The profile restricts the choice of base standard options to the extent necessary to maximize the probability of interoperability (e.g. chosen classes, conforming subsets, options and parameter values of base standards);
- The ISP does not copy content of the base standards (in order to avoid consistency problems with the base standards);
- The profile does not specify any requirements that would contradict or cause non-conformance to the base standards;
- The profile may contain conformance requirements that are more specific and limited in scope than those of the base standards;
- Conformance to a profile implies by definition conformance to a set of base standards, whereas conformance to that set of base standards does not necessarily imply conformance to the profile.

The use of the Application Profiling concept also provides for a flexible framework towards adoption, migration and use of this document. Toll Chargers, Toll Service Providers and Manufacturers may use this IAP as a basis for interoperable use of their equipment, without having to interfere with or otherwise affect any EFC-system used locally.

The general requirements of the IAP are set out in Clause 5, whilst the specific conformance requirements are given in Clause 6. To facilitate easy referencing, testing and look-up, these specific requirements are divided into two parts; on-board unit (OBU) requirements and roadside equipment (RSE) requirements.

In addition, this document also includes various annexes that provide further detailed specifications as well as background, motivation and examples for the conformance requirements. The intention is that these enhance readability and understanding of the document.

This document is complemented by a set of standards defining Conformity Evaluation of the Conformance Requirements.

EN 15876 defines how to evaluate on-board and roadside equipment for conformity to prEN 15509 (this document). EN 15876 consists of the following parts, under the general title "*Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to EN 15509*":

- Part 1: Test suite structure and test purposes;
- Part 2: Abstract test suite.

NOTE EN 15786-1 and EN 15786-2 will be subject of revision to accommodate the changes introduced in this document.

1 Scope

The scope for this document is limited to:

- payment method: Central account based on EFC-DSRC;
- physical systems: on-board unit (OBU), roadside equipment (RSE) and the DSRC interface between them (all functions and information flows related to these parts);
- DSRC-link requirements;
- EFC transactions over the DSRC interface;
- data elements to be used by OBU and RSE used in EFC-DSRC transactions;
- security mechanisms for OBU and RSE used in EFC-DSRC transactions.

It is outside the scope of this document to define:

- contractual and procedural interoperability requirements (including issues related to a memorandum of understanding, MoU);
- conformance procedures and test specifications;
- setting-up of operating organizations (e.g. toll charger, toll service provider, trusted third party, etc.);
- legal issues;
- other payment methods in DSRC-based EFC (e.g. on-board accounts using integrated circuit cards);
- other basic technologies (e.g. GNSS/CN or video registration-based EFC). However, this document may be used for defining the DSRC-EFC parts for the use in applications that implement a mix of different technologies;
- non-EFC transactions over the DSRC interface (e.g. compliance check communication and localization augmentation communication, which are defined in other standards);
- other interfaces or functions in EFC-systems than those specified above (i.e. information flows and data exchange between operators or personalization, initialization and customization of the OBU).

NOTE Some of the issues that are outside the scope of this document are subject of separate standards prepared by CEN/TC 278, ISO/TC 204 and ETSI ERM.

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.

EN 12834, *Road transport and traffic telematics - Dedicated Short Range Communication (DSRC) - DSRC application layer*

EN 13372:2004, *Road Transport and Traffic Telematics (RTTT) - Dedicated short-range communication - Profiles for RTTT applications*

EN ISO 14906:2018, *Electronic fee collection - Application interface definition for dedicated short-range communication*

ETSI/TS 102 486-1-1 V1.1.1 (2006-03), *Electromagnetic compatibility and Radio spectrum Matters (ERM); 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 1: Protocol Implementation Conformance Statement (PICS) proforma specification*

ETSI/TS 102 486-2-1 V1.2.1 (2008-10), *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 1: Protocol Implementation Conformance Statement (PICS) proforma specification*

ISO/IEC 9646-7, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 7: Implementation Conformance Statements*

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 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**base standard**

approved International Standard, Technical Specification or ITU-T Recommendation

Note 1 to entry: This includes but is not limited to approved standard deliverables from ISO, ITU, CEN, CENELEC, ETSI and IEEE

[SOURCE: ISO/TS 17573-2:2020, 3.23]

3.5**data group**

class of closely related *attributes* (3.1)

[SOURCE: ISO/TS 17573-2:2020, 3.54]

3.6**EFC service**

service for electronic payment offered by a payment service provider

[SOURCE: ISO/TS 17573-2:2020, 3.54]

3.7**EFC Element**

coherent set of data and functionality

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Note 1 to entry: The functionality includes, where applicable, the security-related functions and the associated security keys.

Note 2 to entry: EFC Elements are created by the applications and addressed using Element identifiers.

Note 3 to entry: In a given *on-board equipment (OBE)* (3.11), the EID is used to address a toll context, identified by the EFC-ContextMark, in which *attributes* (3.1) can be addressed unambiguously by AttributeIDs inside an EFC Element of the OBE.

[SOURCE: ISO/TS 17573-2:2020, 3.71]

3.8**integrity**

property that data have not been altered or destroyed in an unauthorized manner

[SOURCE: ISO/TS 17574:2009, 3.9]

3.9**international standardized profile****ISP**

internationally agreed-to, harmonized document which describes one or more *profiles* (3.14)

[SOURCE: ISO/TS 17573-2:2020, 3.102]

prEN 15509:2020 (E)**3.10
interoperability**

ability of systems to exchange information and to make mutual use of the information that has been exchanged

[SOURCE: ISO/TS 17573-2:2020, 3.103]

**3.11
mobile roadside equipment**

equipment mounted on a mobile unit or handheld equipment to be used along the road

[SOURCE ISO/TS 17573-2:2020, 3.119]

**3.12
on-board equipment**

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

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

**3.13
on-board unit**

OBU
electronic unit on-board a vehicle for performing specific electronic fee collection (EFC) 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] <https://standards.iteh.ai/catalog/standards/sist/a53de203-d2c5-43f4-8c95-ec0a4b4780ba/osist-pren-15509-2021>

**3.14
profile**

set of requirements and selected options from *base standards* (3.3) or international standardized profiles used to provide a specific functionality

[SOURCE: ISO/TS 17573-2:2020, 3.146]

**3.15
roadside equipment**

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

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

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

**3.16
session**

exchange of information and interaction occurring at a specific EFC station between the *roadside equipment* (3.15) and the user/vehicle

3.17**toll charger**

entity which levies toll for the use of vehicles in a toll domain

[SOURCE: ISO/TS 17573-2:2020, 3.194]

3.18**toll service provider**

entity providing toll services in one or more toll domains

Note 1 to entry: In other documents, the terms issuer or contract issuer may be used.

Note 2 to entry: The Toll Service Provider may provide the OBE OBU or may provide only a magnetic card or a smart card to be used with OBE OBU provided by a third party (like a mobile telephone and a SIM card can be obtained from different parties).

Note 3 to entry: The Toll Service Provider is responsible for the operation (functioning) of the OBE OBU with respect to tolling.

[SOURCE: ISO/TS 17573-2:2020, 3.206]

3.19**transaction**

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

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

3.20**transaction counter**

data value in the on-board unit that is incremented by the roadside equipment at each *transaction* (3.19)

[SOURCE: ISO/TS 17573-2:2020, 3.212]

3.21**transaction model**

functional model describing the general structure of electronic payment *transactions* (3.19)

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

4 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply.

AC_CR	Access Credentials
ADU	Application Data Unit
AP	Application Process (EN ISO 14906)
APDU	Application Protocol Data Unit (EN ISO 14906)
ASN.1	Abstract Syntax Notation One (ISO/IEC 8824-1)
AuK	AuKEY
BST	Beacon Service Table (EN 12834)
CCC	Compliance Check Communication (EN ISO 12813)
DEA	Data Encryption Algorithm
DES	Data Encryption Standard
DSRC	Dedicated Short-Range Communication (EN 12834)
EETS	European Electronic Toll Service
e [key] (value)	encryption of the value using the key
ede [key] (value)	chained encryption, decryption and encryption of the value using the key
EID	Element Identifier (EN 12834)
EFC	Electronic Fee Collection (EN ISO 17573-1)
GNSS	Global Navigation Satellite Systems (EN ISO 14906)
IAP	Interoperable Application Profile
ICS	Implementation Conformance Statement
ISP	International Standardized Profile
IUT	Implementation Under Test
L1	Layer 1 of DSRC (Physical Layer)
L2	Layer 2 of DSRC (Physical Layer)
L7	Layer 7 of DSRC (Application Layer Core of DSRC)
LAC	Localization augmentation communication (EN ISO 13141)
LLC	Logical Link Control (EN 12795)
LID	Logical Link Control identifier (EN 12795)
LSDU	Link Service Data Unit (EN 12834)
MAC	Media Access Control (EN 12795)
MMI	Man-Machine Interface
OBU	On-board Unit
PICS	Implementation Conformance Statement
RL	Requirements List

RSE	Roadside Equipment (EN 12834)
T-APDU	Transfer-Application Protocol Data Unit (EN 12834)
VST	Vehicle Service Table (EN 12834)

5 Conformance

5.1 General

This clause describes in general terms what it means to be conformant with the profile in this document applicable to the DSRC link between OBU and RSE, as illustrated in Figure 1 as the area within the box delimited with a dotted line.

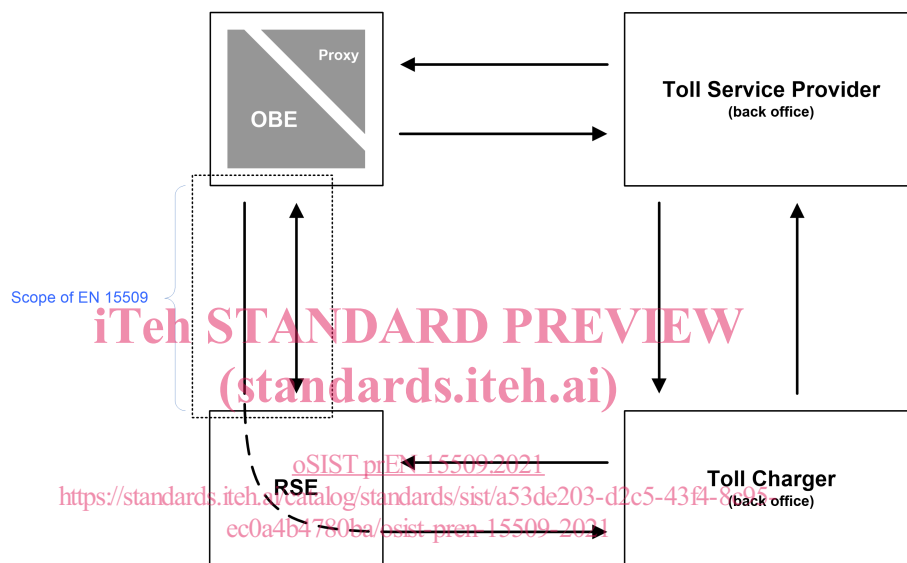


Figure 1 — Scope of this document

5.2 Base standards

This document defines one Application Profile based on the ISP-concept. The base standards that this Application Profiles is based upon are:

- EN ISO 14906 on EFC application interface definition for DSRC

NOTE 1 This implies indirect reference to EN ISO 14816 on “Numbering and data structure”.

- EN 12834 on DSRC application layer (L7),
- EN 13372 on DSRC profiles

NOTE 2 This implies indirect references to EN 12253 (“DSRC L1”), EN 12795 (“DSRC L2”) and EN 12834 (“DSRC L7”).

The relationship and references between base standards and this document are illustrated in Figure 2.