BS EN ISO 14906:2018+A1:2020

BSI Standards Publication

Electronic fee collection – Application interface definition for dedicated short-range communication

National foreword

This British Standard is the UK implementation of EN ISO 14906:2018+A1:2020. It is identical to ISO 14906:2018, incorporating amendment 1:2020. It supersedes BS EN ISO 14906:2018, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee EPL/278, Intelligent transport systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 14906:2018+A1

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English Version

Electronic fee collection - Application interface definition for dedicated short-range communication (ISO 14906:2018)

Perception du télépéage - Définition de l'interface d'application relative aux communications dédiées à courte portée (ISO 14906:2018)

Elektronische Gebührenerhebung - Anwendungsschnittstelle zur dezidierten Nahbereich-Kommunikation (ISO 14906:2018)

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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN ISO 14906:2018) has been prepared by Technical Committee ISO/TC 204 "Intelligent transport systems" in collaboration with 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of an identical text or by endorsement, at the latest by June 2019, and conflicting national standards shall be withdrawn at the latest by June 2019.

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

This document supersedes EN ISO 14906:2011.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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Endorsement notice

The text of ISO 14906:2018 has been approved by CEN as EN ISO 14906:2018 without any modification.

Foreword to amendment A1

This document (EN ISO 14906:2018/A1:2020) has been prepared by Technical Committee ISO/TC 204 "Intelligent transport systems" in collaboration with Technical Committee CEN/TC 278 “Intelligent transport systems” the secretariat of which is held by NEN.

This Amendment to the European Standard EN ISO 14906:2018 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2020, and conflicting national standards shall be withdrawn at the latest by October 2020.

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

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Endorsement notice

The text of ISO 14906:2018/Amd 1:2020 has been approved by CEN as EN ISO 14906:2018/A1:2020 without any modification.

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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.

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

This third edition cancels and replaces the second edition (ISO 14906:2011), which has been technically revised. It also incorporates the Corrigendum ISO 14906:2011/Cor1:2013 and the Amendment ISO 14906:2011/Amd1:2015.

The main changes compared to the previous edition are as follows:

— Inclusion of security calculations according to advanced encryption standard, as recommended in CEN/TR 16968 on security mechanisms (revision of Clause 7 and new Annexes F, G, H and I);

— Update of the normative references, terms and definitions and abbreviated terms clauses and the Bibliography;

— Conversion of the ASN.1 module into an electronic insert;

— Revision of Annex C;

— Removal of Annex D (informative) on functional requirements.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document specifies an application interface for electronic fee collection (EFC) systems, which is based on dedicated short-range communication (DSRC). It supports interoperability between EFC systems on an EFC-DSRC application interface level. This document is intended for DSRC charging applications, but specifically the definition of EFC data elements is valid beyond the use of a DSRC charging interface and might be used for other DSRC applications (e.g. compliance checking communication) and/or on other interfaces (e.g. the application interface of autonomous systems).

This document provides specifications for the EFC transaction model, EFC data elements (referred to as attributes) and functions, from which an EFC transaction can be built. The EFC transaction model provides a mechanism that allows handling of different versions of EFC transactions and associated contracts. A certain EFC transaction supports a certain set of EFC attributes and EFC functions as defined in this document. It is not envisaged that the complete set of EFC attributes and functions be present in each piece of EFC equipment, on-board equipment (OBE) or roadside equipment (RSE).

This document provides the basis for agreements between operators, which are needed to achieve interoperability. Based on the tools specified in this document, interoperability can be reached by operators recognising each others' EFC transactions (including the exchange of security algorithms and keys) and implementing the EFC transactions in each others' RSEs, or they can reach an agreement to define a new transaction (and contract) that is common to both. Considerations should also be made by each operator so that the RSE has sufficient resources to implement such additional EFC transactions.

In order to achieve interoperability, operators should agree on issues such as

— which optional features are actually being implemented and used,

— access rights and ownership of EFC application data in the OBE,

— security policy (including encryption algorithms and key management, if applicable),

— operational issues, such as how many receipts may be stored for privacy reasons, how many receipts are necessary for operational reasons (for example as entry tickets or as proof of payment),

— the agreements needed between operators in order to regulate the handling of different EFC transactions.

In this edition of this document, users are faced with issues related to backward compatibility. This issue can be managed by using the following:

— EfcModule ASN.1 module, including a version number;

— Efc-ContextMark (incl. the ContextVersion), denoting the implementation version, provides a means to ensure co-existence of different implementation versions by means of a look-up table and associated appropriate transaction processing. This will enable the software of the RSE to determine the version of the OBE and his capabilty to accept the new features introduced by this edition of ISO 14906.

Annex A provides the normative ASN.1 specifications of the used data types (EFC action parameters and attributes).

Annex B presents an informative example of a transaction based on the CARDME specification, including bit-level specification.

Annex C presents informative examples of EFC transaction types, using the specified EFC functions and attributes.

Annex D presents an informative mapping table from LatinAlphabetNo2 & 5 to LatinAlphabetNo1 to ease for a Service Provider the use of LatinAlphabetNo1 to encode an OBE for data available wiitten with non-Latin1 characters.

Annex E presents an informative mapping table between EFC vehicle data attributes and European registration certificates to ease the task of a service provider in the OBE personalisation with vehicle data.

Annex F presents the security calculations according to the data encryption standard (DES). This annex is based on EN 15509:2014, Annex B.

Annex G presents the security computations examples for DES. This annex is based on EN 15509:2014, Annex E.

Annex H presents the security calculations for advanced encryption standard (AES). This annex is the adaptation of EN 15509:2014, Annex B for the case of AES.

Annex I presents the security computations examples for AES. This annex is the adaptation of EN 15509:2014, Annex E for the case of AES.

This application interface definition can also be used with other DSRC media which do not use a layer 7 according to ISO 15628/EN 12834. Any DSRC medium which provides services to read and write data, to initialise communication and to perform actions is suitable to be used as a basis for this application interface. Adaptations are medium specific and are not further covered here. As Annex B describes in detail a transaction for central account systems, this document can also be used for on-board account systems, in conjunction with ISO 25110, which provides examples of systems based on on-board accounts.

Introduction to Amendment 1

NOTE The syntax of the ASN.1 code in the attached file ISO14906(2020)EfcDsrcApplicationv8.asn or www.itsstandards.eu/index.php/efc#EFCstandards and also at https://standards.iso.org/iso/14906/ed-3/amd/1/en takes precedence to the ASN.1 code included in the main body of this document.

Replace the following text (i.e. lines 248 to 260) in ISO14906(2018)EfcDsrcApplicationv6.asn:

```
EngineCharacteristics::= INTEGER {
noEntry (0),
noEngine (1),
petrolUnleaded (2),
petrolLeaded (3),
diesel (4),
lPG (5),
battery (6),
solar (7),
hybrid (8),
hydrogen (9)
-- (10-255) are reserved for future CEN use
} (0..255)
```

with the following text (i.e. lines 248 to 304) in ISO14906(2020)EfcDsrcApplicationv8.asn:

```
EngineCharacteristics::= INTEGER {
noEntry (0),
noEngine (1),
petrolUnleaded (2),
petrolLeaded (3),
diesel (4),
lPG (5),
battery (6), -- vehicle powered exclusively by battery
solar (7),
hybrid (8), -- kept for legacy compatibility, more differentiated
values are available
hydrogen (9),
multi-fuel (10), -- multi fuel engine
bivalent-petrol-lpg (11), -- bivalent operating engine with petrol
or liquefied petroleum gas
bivalent-petrol-cng (12), -- bivalent operating engine with petrol
or compressed natural gas
combined-petrol-electric (13), -- combined operation with petrol and
electric engine
cng (14), -- compressed natural gas
lng (15), -- liquefied natural gas
combined-diesel-electric (16), -- combined operation of diesel and
electric engine
combined-hydrogen-electric (17), -- combined operation of hydrogen
and electric engine
bivalent-hydrogen-petrol (18), -- bivalent operating engine with
hydrogen or petrol
bivalent-hydrogen-petrol-electric-engine (19), -- bivalent operating
engine with hydrogen or petrol combined with electric engine
fuel-cell-hydrogen (20), -- fuel cell with hydrogen as primary energy
source and electric engine
fuel-cell-petrol (21), -- fuel cell with petrol as primary energy
source and electric engine
fuel-cell-methanol (22), -- fuel cell with methanol as primary energy
source and electric engine
```

```
fuel-cell-ethanol (23), -- fuel cell with ethanol as primary energy
source and electric engine
fuel-cell-diesel (24), -- fuel cell with diesel as primary energy
source and electric engine
combined-multi-fuel-electric-engine (25), -- combined operation of
multi fuel and electric engine
combined-cng-electric-engine (26), -- combined operation with
compressed natural gas and electric engine
combined-lng-electric-engine (27), -- combined operation with
liquefied natural gas and electric engine
petrol-ethanol (28), -- fuel mix of petrol and mainly ethanol, e.g.
E85
combined-lpg-electric-engine (29), -- combined operation of LPG and
electric engine
hybrid-petrol-external-battery (30), -- hybrid drive with petrol and
external rechargeable battery (plug-in hybrid)
hybrid-diesel-external-battery (31), -- hybrid drive with diesel and
external rechargeable battery (plug-in hybrid)
hybrid-lpg-external-battery (32), -- hybrid drive with LPG and
external rechargeable battery (plug-in hybrid)
hybrid-hydrogen-external-battery (33), -- hybrid drive with hydrogen
and external rechargeable battery (plug-in hybrid)
hybrid-multi-fuel-external-battery (34), -- hybrid drive with multi
fuel and external rechargeable battery (plug-in hybrid)
hybrid-cng-external-battery (35), -- hybrid drive with compressed
natural gas and external rechargeable battery (plug-in hybrid)
hybrid-lng-external-battery (36), -- hybrid drive with liquefied
natural gas and external rechargeable battery (plug-in hybrid)
hybrid-bivalent-hydrogen-petrol-external-battery (37), -- hybrid
drive with bivalent operating hydrogen and petrol engine and external
rechargeable battery (plug-in hybrid)
hydrogen-cng (38), -- fuel mix of hydrogen and compressed natural gas
hydrogen-lng (39), -- fuel mix of hydrogen and liquefied natural gas
hybrid-hydrogen-cng-external-battery (40), -- hybrid drive with
hydrogen and compressed natural gas and external chargable battery
(plug-in hybrid)
hybrid-hydrogen-lng-external-battery (41), -- hybrid drive with
hydrogen and liquefied natural gas and external chargable battery
(plug-in hybrid)
ethanol (42), -- ethanol or fuel mix of ethanol and other fuel
(except petrol) or additives, e.g. E95
hybrid-fuel-cell-hydrogen (43), -- hybrid drive with fuel cell
(electric engine) and hydrogen (combustion engine)
hybrid-fuel-cell-hydrogen-external-battery (44), -- hybrid drive with
fuel cell (electric engine) and hydrogen (combustion engine) and
external chargable battery (plug-in hybrid)
dual-fuel-lng-diesel (45), -- dual operation with LNG and diesel
electric-external (46), -- electric engine with external power supply
biogas (47), -- mixture of different gases produced by the breakdown
of organic matter
bioDiesel (48), -- vegetable oil- or animal fat-based diesel fuel
bioPetrol (49), -- petrol fully or partly based on vegetable sources
bivalent-petrol-biogas (50), -- bivalent operating engine with petrol
or biogas
combined-biogas-electric-engine (51), -- combined operation of biogas
and electric engine
dual-fuel-cng-diesel (52), -- dual operation with CNG and diesel
-- (53-254) are reserved for future CEN and ISO use
other (255)
} (0..255)
```

A1

Electronic fee collection — Application interface definition for dedicated short-range communication

1 Scope

This document specifies the application interface in the context of electronic fee collection (EFC) systems using the dedicated short-range communication (DSRC).

The EFC application interface is the EFC application process interface to the DSRC application layer, as can be seen in Figure 1 below. This document comprises specifications of:

— EFC attributes (i.e. EFC application information) that can also be used for other applications and/or interfaces,

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

— EFC application functions, i.e. further qualification of actions by definitions of the concerned services, assignment of associated ActionType values and content and meaning of action parameters,

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

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

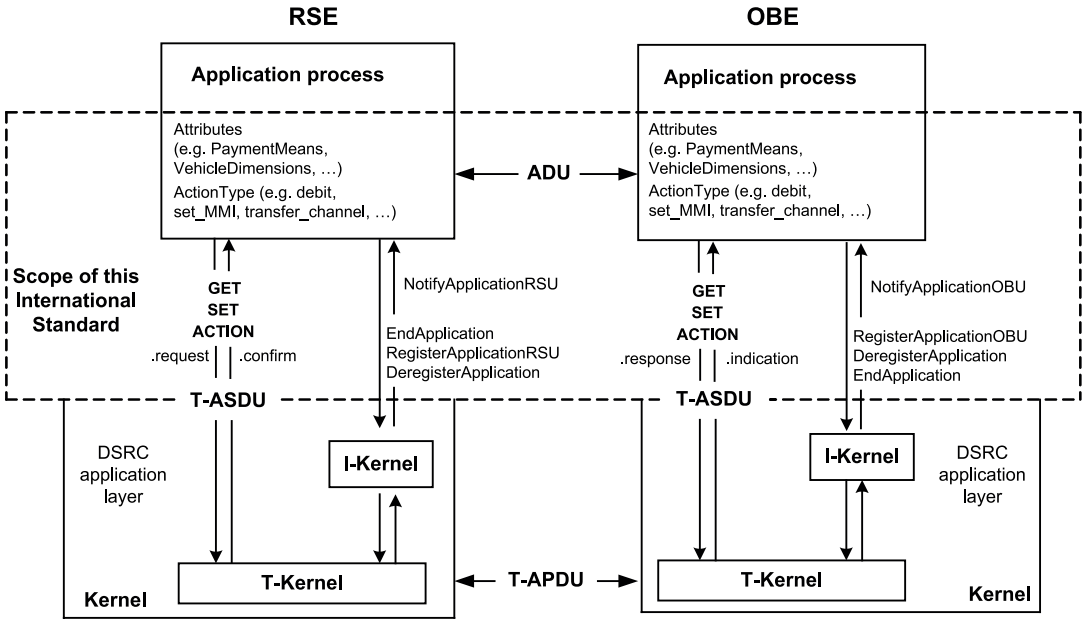

Figure 1 — The EFC application interface

This is an interface standard, adhering to the open systems interconnection (OSI) philosophy (see ISO/IEC 7498-1), and it is as such not primarily concerned with the implementation choices to be realised at either side of the interface.

This document provides security-specific functionality as place holders (data and functions) to enable the implementation of secure EFC transactions. Yet the specification of the security policy (including specific security algorithms and key management) remains at the discretion and under the control of the EFC operator, and hence is outside the scope of this document.