International Standard

ISO 12813

Third edition
2024-02

Electronic fee collection — Compliance check communication for autonomous systems

Perception de télépéage — Communication de contrôle de conformité pour systèmes autonomes

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

Reference number
ISO 12813:2024(en)

© ISO 2024

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

COPYRIGHT PROTECTED DOCUMENT

© ISO 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **v**
Introduction ..... **vi**
1 Scope **1**
2 Normative references **2**
3 Terms and definitions **3**
4 Abbreviated terms **5**
5 Application interface architecture **6**
5.1 General 6
5.2 Services provided 6
5.3 Attributes 7
5.4 Toll context 7
5.5 Use of lower layers 7
5.5.1 Supported DSRC communication stacks 7
5.5.2 Use of the CEN-DSRC stack 8
6 Conformance **8**
6.1 Conformance requirements 8
6.2 Conformance statement 8
6.3 Conformance evaluation and testing 8
7 Functions **8**
7.1 Functional requirements 8
7.1.1 Minimum supported functions 8
7.1.2 Initialise communication 9
7.1.3 Data retrieval 9
7.1.4 Authenticated data retrieval 9
7.1.5 Driver notification 9
7.1.6 Terminate communication 9
7.1.7 Test communication 10
7.2 Security 10
7.2.1 General 10
7.2.2 Authentication/non-repudiation 10
7.2.3 Access credentials 11
8 Data requirements **11**
9 Transaction model **12**
9.1 General 12
9.2 Initialisation phase 13
9.2.1 Initialisation request 13
9.2.2 CCC application-specific contents of BST 13
9.2.3 CCC application-specific contents of VST 13
9.3 Transaction phase 13
Annex A (normative) **CCC data type specifications** **14**
Annex B (normative) **Protocol implementation conformance statement proforma** **32**
Annex C (informative) **ETSI ES 200 674-1 communication stack usage for CCC applications** **41**
Annex D (informative) **Using the IR DSRC communication stack (CALM IR) for CCC applications** **44**
Annex E (informative) **Using the ARIB DSRC communication stack for CCC applications** **45**
Annex F (informative) **Using the WAVE communication stack for CCC applications** **47**
Annex G (informative) **Example CCC transaction** **50**
Annex H (informative) **Security considerations** **53**

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Annex I (informative) **Use of this document for the European Electronic Toll Service (EETS)** **58**
Bibliography **60**

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 278 *Intelligent transport systems,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 12813:2019), which has been technically revised.

The main changes are as follows:

— Clause 6 has been added, concerning conformance requirements;

— Clause 3 has been updated and ISO/TS 17573-2 has been made the primary source for terms and definitions;

— data definitions have been updated, including making reference to ISO 17573-3 as the primary source;

— Annex A has been restructured;

— temporary optional support of legacy encoding in some data types in OBE and RSE in CEN countries has been added;

— a second level of version identifier (i.e. minor version) of the abstract syntax notation one (ASN.1) module has been added in order to provide enhanced support to standards that import data types from this document (imported ASN.1 types are used to be subsequent editions, including all future minor versions).

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.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Introduction

On-board equipment (OBE) that uses satellite-based positioning technology to collect data required for charging for the use of roads operates in an autonomous way (i.e. without relying on dedicated roadside infrastructure). The OBE will record the amount of road usage in all toll charging systems it passes through.

This document specifies requirements for dedicated short-range communication (DSRC) between OBE and an interrogator for the purpose of checking compliance of road use with a local toll regime. It assumes an electronic fee collection (EFC) services architecture according to ISO 17573-1 (see Figure 1).

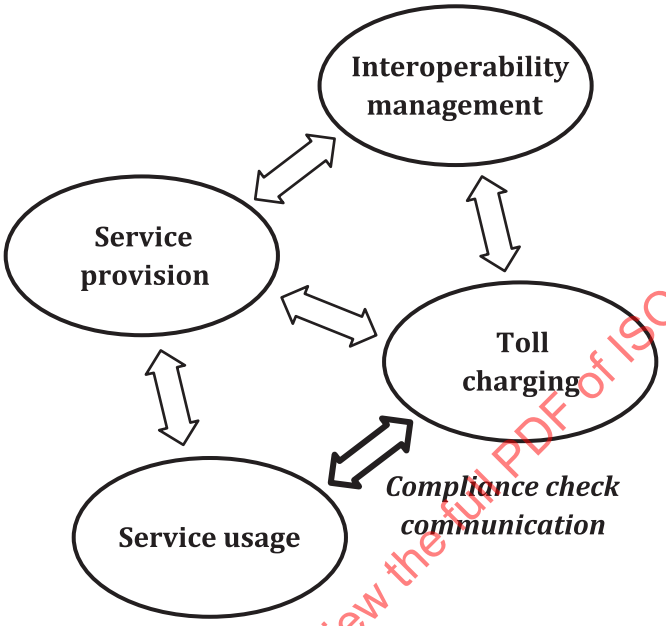


Figure 1 — Compliance check communication in EFC architecture according to ISO 17573-1

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

Toll chargers (TCs) need to check whether or not the road is used in compliance with the rules in the local toll regime. One way of checking compliance is to observe a passing vehicle and to interrogate the OBE. This interrogation happens under control of an entity responsible for toll charging (see Figure 1), accomplished via short-range communication between an interrogator at the roadside or in another vehicle (operated by a competent enforcement agency) and the OBE. In an interoperable environment, it is essential that this interrogation communication be standardized such that every operator of compliance checking equipment can check all passing OBE. For that purpose, this document defines attributes required on all OBE for reading by an interrogator.

This document has been prepared to fulfil the following statements:

a) Collected evidence can be used as court proof. Data is indisputable and secured such that the operator of the compliance checking interrogator can prove the integrity and authenticity of the data in case of dispute.

b) The data required for compliance checking is read only, since the operator of the interrogator does not interfere with the working of the OBE.

c) All attributes, standardized at the time of personalization of the OBE, are present in the OBE such that an operator of an interrogator can essentially read the same data from all OBE, independent of the type and make. In case an attribute does not make sense in a certain OBE implementation, a value assignment for “not applicable” or “not defined” is provided in each case. An OBE compliant to the first edition of this document will not answer with such a response for new attributes introduced in the current edition of this document.

d) The attributes, derived from the individual toll regime are of general importance for all toll system types (motorway tolling, area tolling, tolls for ferries, bridges, tunnels, cordon pricing, etc.).

© ISO 2024 – All rights reserved

e) The attributes apply to all OBE architectures, and especially to both thin (edge-light) and fat (edge heavy) client architectures. The interrogator is intended to receive essentially the same information, irrespective of the type of OBE.

It is assumed that the prime objective of the operator of the compliance checking interrogation is to check whether the user has fulfilled its obligations, in particular:

— whether the OBE is mounted in the correct vehicle;

— whether the classification data transmitted by the OBE are correct; and

— whether the OBE is in operational condition, both in a technical and a contractual sense.

Regarding the last point of the above list, on the operational status of OBE, the following model is assumed.

As long as the OBE signals the correct operational status to the user ("go" / "green"), the toll service provider (TSP) takes full responsibility for the correct operation of the OBE and for the payment by the user. Hence, as long as the OBE signals "green" and the user fulfils its other obligations (e.g. entering correct classification data and not tampering with the OBE), the user can expect the OBE to serve as a valid payment means. As soon as the OBE signals an invalid operational status ("no go" / "red") — either set by the central system of the TSP (e.g. because the user account is negative), by internal mechanisms of the OBE itself (e.g. because of a detected defect or an outdated data set) or a user manipulation with such result — the user knows that the OBE is no longer a valid payment means. The user then uses alternative means of toll declaration or payment until the problem is remedied and the OBE indicates "green" again.

NOTE In this case, "red" and "green" are used in the abstract, symbolic sense, and do not imply any physical implementation. The design of the user interface of the OBE is implementation-dependent, and several methods for signalling "red" or "green" are conceivable.

Ultimately, the policy of when to signal "green" or "red" is specified by the TSP in accordance with the requirements specified by the TC(s).

In the case where the OBE status turns "red", the user takes action, declares road usage subject to fees or pays by some alternative means as soon as practicable. Until the user does this, they are in a potentially non-compliant situation. To allow a judgment to be made as to whether or not a user has taken the appropriate action within an acceptable period of time, information is provided by this document not only on the "green/red" operational status but also on the length of time that the OBE has been in its current status.

Different toll contexts can overlap geographically. A user could be liable in several toll contexts at once, e.g. for a nationwide distance-dependent road tax and a local city access pricing scheme — a fact of which the user might not in all cases be aware. This document builds on the concept that regarding compliance, as far as possible, there is no notion of toll context (see 5.4). It is within the responsibility of the TSP to resolve issues with overlapping toll contexts and to distil all information into a binary "red/green" message to the user.

A secondary objective of the operator of the compliance checking interrogator can be to collect data on the performance of the OBE, e.g. in order to check for the correct technical functioning. Since different OBE can work according to quite different principles, the possibilities for doing this in a standardized way are quite limited. This document contains some provisions for this task (e.g. the attributes `CommunicationStatus`, `GnssStatus`, `DistanceRecordingStatus`), but otherwise assumes that TCs monitor correct recording by comparing observed traffic (e.g. with cameras) with usage data received from TSPs.

This document has been prepared with the intention to be "minimalist" in the sense that it covers what is required by operational and planned systems.

This document is complemented by ISO 13143, which specifies how to evaluate on-board and roadside equipment for conformity to ISO 12813 (this document).

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

Electronic fee collection — Compliance check communication for autonomous systems

1 Scope

This document specifies requirements for short-range communication for the purposes of compliance checking in autonomous electronic fee collecting systems. Compliance checking communication (CCC) takes place between a road vehicle's on-board equipment (OBE) and an interrogator [fixed and mobile roadside equipment (RSE) or hand-held unit] and serves to establish whether the data that are delivered by the OBE correctly reflect the road usage of the corresponding vehicle according to the rules of the pertinent toll regime.

The operator of the compliance checking interrogator is assumed to be part of the toll charging role as defined in ISO 17573-1. The CCC permits identification of the OBE, vehicle and contract, and verification of whether the driver has fulfilled their obligations and the checking status and performance of the OBE. The CCC reads, but does not write, OBE data.

This document is applicable to OBE in an autonomous mode of operation. It is not applicable to compliance checking in dedicated short-range communication (DSRC)-based charging systems.

It specifies data syntax and semantics, but not a communication sequence. All the attributes specified herein are required in any OBE claimed to be compliant with this document, even if some values are set to "not specified" in cases where a certain functionality is not present in an OBE. The interrogator is free to choose which attributes are read in the data retrieval phase, as well as the sequence in which they are read. In order to achieve compatibility with existing systems, the communication makes use of the attributes specified in ISO 17573-3 wherever useful.

The CCC is suitable for a range of short-range communication media. Specific definitions are given for the CEN-DSRC as specified in EN 15509, as well as for the use of ISO CALM IR, the Italian DSRC as specified in ETSI ES 200 674-1, ARIB DSRC, and WAVE DSRC as alternatives to the CEN-DSRC. The attributes and functions specified are for compliance checking by means of the DSRC communication services provided by DSRC application layer, with the CCC attributes and functions made available to the CCC applications at the RSE and OBE. The attributes and functions are specified on the level of application data units (ADUs).

The definition of the CCC includes:

— the application interface between OBE and RSE (as depicted in Figure 2);

— use of the generic DSRC application layer as specified in ISO 15628 and EN 12834;

— CCC data type specifications given in Annex A;

— a protocol implementation conformance statement (PICS) proforma is given in Annex B;

— use of the CEN-DSRC stack as specified in EN 15509, or other equivalent DSRC stacks as described in Annex C, Annex D, Annex E and Annex F;

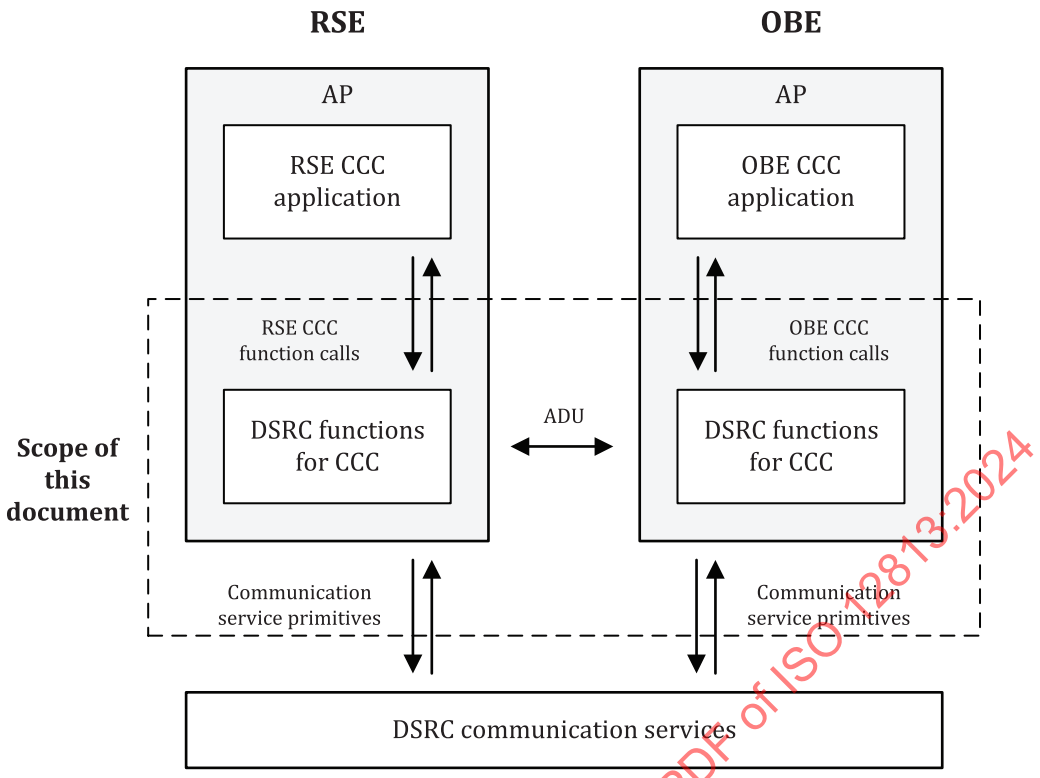
— security services for mutual authentication of the communication partners and for signing of data (see Annex H);

In addition, an example CCC transaction is presented in Annex G and Annex I highlights how to use this document for the European Electronic Toll Service (EETS).

Test specifications are not within the scope of this document.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved



Key

ADU	application data unit
AP	application process
CCC	compliance check communication
DSRC	dedicated short-range communication
OBE	on-board equipment
RSE	roadside equipment

Figure 2 — CCC application interface

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

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.

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

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

ISO 12855, *Electronic fee collection — Information exchange between service provision and toll charging*

ISO 14906:2022, *Electronic fee collection — Application interface definition for dedicated short-range communication*

ISO 15628:2013, *Intelligent transport systems — Dedicated short range communication (DSRC) — DSRC application layer*

ISO 17573-3:2023, *Electronic fee collection — System architecture for vehicle-related tolling — Part 3: Data dictionary*

© ISO 2024 – All rights reserved

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

EN 15509:2023, *Electronic fee collection — Interoperability application profile for DSRC*

NIMA Technical Report TR8350.2 version 3 — *Department of Defense World Geodetic System* 1984, *Its Definition and Relationships With Local Geodetic Systems*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

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

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

3.1
access credentials
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
authentication
security mechanism allowing verification of the provided identity

[SOURCE: EN 301 175 V1.1.1:1998, 3]

3.4
authenticator
data, possibly encrypted, that is used for *authentication* (3.3)

[SOURCE: ISO/TS 17573-2:2020, 3.16]

3.5
back end
part of a back-office system interfacing to one or more *front ends* (3.8)

[SOURCE: ISO/TS 17573-2:2020, 3.22]

3.6
data integrity
property that data has not been altered or destroyed in an unauthorized manner

[SOURCE: ISO 7498-2:1989, 3.3.21]

3.7
fixed roadside equipment
roadside equipment (3.11) located at a fixed position

[SOURCE: ISO/TS 17573-2:2020, 3.81]

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

3.8
front end
part of an electronic fee collection (EFC) system which consists of *on-board equipment (OBE)* (3.10) and possibly of a proxy where road tolling information and usage data are collected and processed for delivery to the *back end* (3.5)

[SOURCE: ISO/TS 17573-2:2020, 3.85]

3.9
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]

3.10
on-board equipment
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]

3.11
roadside equipment
fixed or movable electronic fee collection (EFC) equipment located along or on the road

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

3.12
service primitive
elementary communication service provided by the application layer protocol to the application processes

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

3.13
toll
charge, tax or duty levied in connection to using a vehicle in a *toll domain* (3.16)

[SOURCE: ISO/TS 17573-2:2020, 3.193]

3.14
toll charger
entity which levies *toll* (3.13) for the use of vehicles in a *toll domain* (3.16)

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

3.15
toll context
logical view as defined by *attributes* (3.2) and functions of the basic elements of a toll scheme consisting of a single basic tolling principle, a spatial distribution of the charge objects and a single behaviour of the related *front end* (3.8)

[SOURCE: ISO/TS 17573-2:2020, 3.196]

3.16
toll domain
area or a part of a road network where a certain *toll regime* (3.17) is applied

[SOURCE: ISO/TS 17573-2:2020, 3.201]

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

3.17
toll regime
set of rules, including enforcement rules, governing the collection of *tolls* (3.13) in a *toll domain* (3.16)

[SOURCE: ISO/TS 17573-2:2020, 3.203]

3.18
toll service provider
entity providing toll services in one or more *toll domains* (3.16)

[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]

4 Abbreviated terms

For the purpose of this document, the following abbreviated terms apply.

AC_CR	access credentials
ADU	application data unit
AID	application identifier
ASN.1	abstract syntax notation one
BST	beacon service table
CCC	compliance check communication
CN	cellular network
DSRC	dedicated short-range communication
EFC	electronic fee collection
EID	element identifier
GNSS	global navigation satellite systems
HMI	human-machine interface
IID	invoker identifier
MAC	message authentication code
OBE	on-board equipment
PICS	protocol implementation conformance statement
PSC	provider service context
RSE	roadside equipment
SAM	secure application module
TC	toll charger

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

TSP	toll service provider
VST	vehicle service table
WGS84	World Geodetic System 1984
WSA	WAVE service advertisement

5 Application interface architecture

5.1 General

This clause gives an insight into the CCC architecture. It identifies the services provided to CCC applications and the functions that implement these services. It also defines principles regarding attributes and the use of DSRC communication service primitives. A detailed description of the functions is given in Clause 7, whilst the detailed list of the attributes is given in Clause 8.

The CCC application interface has been designed to make use of the CEN-DSRC communication stack, via the application layer specified in ISO 15628 and EN 12834. For other identified DSRC communication media, detailed mappings to corresponding services are given in annexes.

From a general addressing viewpoint, it should be noted that only one CCC context is used, as compliance checking attributes are independent of context.

5.2 Services provided

The CCC application interface offers the following services to CCC applications:

— retrieval of compliance significant attributes, in order for RSE to assess OBE compliance,

— mutual authentication of RSE and OBE by means of exchange of credentials and authenticators, and

— a command to the OBE to signal to the user the result of the compliance check.

NOTE 1 The policy on whether the result of the compliance check or the fact that a transaction has taken place is signalled to the user is decided by the entity operating the CCC interrogator and is outside the scope of this document.

The above services are realized by means of protocol exchanges performed by means of communication services and transactions as described in Clause 9.

The services are provided by the following functions:

— the “initialise communication” function, which shall be used to establish the CCC communication link between RSE and OBE;

— the “data retrieval” function, which shall be used to retrieve CCC attributes;

— the “authenticated data retrieval” function, which shall be used to retrieve data with an authenticator from the OBE;

— the “driver notification” function, which shall be used to invoke a human-machine interface (HMI) function (e.g. signal “OK” via a buzzer sound);

— the “terminate communication” function, which shall be used to terminate the CCC communication;

— the “test communication” function, which shall be used for testing and localizing the OBE.

NOTE 2 A “write” service is not provided, since the writing of data into the OBE is not foreseen.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

5.3 Attributes

The attributes available on the OBE for a CCC application at roadside for checking the compliance of a vehicle are given in detail in Clause 8.

All attributes specified in this document shall be available on the OBE.

The RSE is free to decide to read any combination of attributes from the OBE. The attributes shall be identified and retrieved using the mechanisms specified in ISO 14906. More specifically, the addressing of the CCC application data implemented by the OBE and RSE shall conform to the rules specified in ISO 14906:2022, 5.3.

Multiple instances of attributes are not supported.

5.4 Toll context

An OBE may be located in more than one tolling contexts at once.

NOTE This can occur, e.g. in situations where a motorway toll geographically overlaps with an area-based charging system.

In these different tolling contexts, the OBE can potentially run different charging applications or several instances of one charging application in parallel.

This document builds on the concept that for compliance checking, there is basically no need to distinguish between tolling contexts. In certain circumstances and in the cases specified in the semantic definition, the toll service provider (TSP) shall ensure that the attribute content complies with the specifications of the toll charger (TC) (e.g. for local vehicle classes).

The OBE should hold only one CCC context, represented by a single element as specified in ISO 14906. However, for backwards compatibility reasons, one additional CCC context, represented by a second element may be used to support ISO 12813:2015, the previous edition of this document (see also 9.2.3).

5.5 Use of lower layers

5.5.1 Supported DSRC communication stacks

The CCC application interface makes use of the CEN-DSRC communication stack as defined in Table 1. Other communication media can be used as listed in Table 1 if an equivalent mapping to corresponding services is provided. Detailed examples are provided in informative annexes.

Table 1 — Supported short-range communication stacks

Medium	Application layer	Lower layers	Detailed specifications
CEN-DSRC	ISO 15628 EN 12834	EN 12795 EN 12253	Specification in 5.5.2
Italian DSRC	ETSI ES 200 674–1 (Clause 11 and Annex D)	ETSI ES 200 674–1 (Clauses 7 to 10 and Annex D)	Implementation example in Annex C
ISO CALM IR	ISO 15628 EN 12834	ISO 21214	Implementation example in Annex D
ARIB DSRC	ARIB STD-T75 ISO 15628	ARIB STD-T75 ITU-R.M1453–2	Implementation example in Annex E
WAVE DSRC	IEEE 1609.11-2010 ISO 15628	IEEE 1609.3-2010 IEEE 1609.4-2016 IEEE 802.11	Implementation example in Annex F
NOTE EN 12795 and EN 12253 have been adopted in ITU-R.M 1453–2.			

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

If more than one communication medium is implemented in an OBE, then the OBE shall respond to RSE interrogations on the same medium that the RSE has initiated the CCC interrogation.

5.5.2 Use of the CEN-DSRC stack

The following requirements apply to the CCC application when used with the CEN-DSRC communication stack.

The OBE shall conform to EN 15509:2023, 6.1.2.

Fixed RSE shall conform to EN 15509:2023, 6.2.2.

Mobile RSE shall conform to EN 15509:2023, 6.2.2, except for *Downlink Parameter D4a* (not applicable to mobile RSE).

NOTE EN 15509 specifies the CEN-DSRC communication stack for fixed RSE only.

6 Conformance

6.1 Conformance requirements

The following requirements apply to OBE and RSE:

— functions (including security functions), as specified in Clause 7;

— application data, as specified in Clause 8 and supplemented by Annex A; and

— transaction model, as specified in Clause 9.

6.2 Conformance statement

A supplier of OBE that claims conformity of its OBE to the requirements specified in this document shall provide a statement of conformance by completing the PICS proforma as provided in B.4.

A supplier of RSE that claims conformity of its RSE to the requirements specified in this document shall provide a statement of conformance to this document by completing the PICS proforma as provided in B.5.

6.3 Conformance evaluation and testing

Suppliers of OBE or RSE claiming conformity of their equipment to this document for the communication medium CEN-DSRC can perform their conformity tests according to specifications laid down in ISO 13143.

NOTE The use of ISO 13143 implies the use of other referenced underlying test standards for evaluation of conformance to this document.

7 Functions

7.1 Functional requirements

7.1.1 Minimum supported functions

All functions specified in Clause 7 shall be available on the OBE.

For CEN-DSRC, the OBE shall provide the following functions:

— INITIALISATION, GET and RELEASE application layer services according to ISO 15628 and EN 12834;

— GET_STAMPED, SET_MMI and ECHO EFC functions according to ISO 14906.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Subclauses 7.1.2 to 7.1.7 specify the functions for CEN-DSRC only. For other supported media, according to 5.5.1, equivalent functionality should be provided (for ETSI ES 200 674-1 5,8 GHz microwave DSRC see Annex C, for CALM Infrared DSRC see Annex D, for ARIB microwave DSRC see Annex E and for WAVE 5,9 GHz microwave DSRC see Annex F).

7.1.2 Initialise communication

The communication between the RSE and the OBE shall be initiated by the RSE, by means of the invocation of an initialisation request by the RSE. After successful initialisation, the function "Initialise communication" shall notify the applications on the RSE and OBE.

The initialisation notification on the OBE shall carry at least the identity of the beacon (e.g. beacon serial number) and absolute time.

The initialisation notification on the RSE shall carry the CCC application identity and shall also carry data required for the security services (e.g. nonce value, key identifier).

The function "Initialise communication" shall be provided by the application layer INITIALISATION services as specified in ISO 15628 and EN 12834. It is specified in Annex A: refer to `CCC-InitialiseComm-Request` and `CCC-InitialiseComm-Response`.

7.1.3 Data retrieval

The function "Data retrieval" shall be provided by the application layer GET service as specified in ISO 15628 and EN 12834. It is specified in Annex A: refer to `CCC-DataRetrieval-Request` and `CCC-DataRetrieval-Response`.

In the GET service primitives, invoker identifier (IID) shall not be used.

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

GET shall always carry access credentials.

7.1.4 Authenticated data retrieval

The function "Authenticated data retrieval" shall be implemented by the EFC function GET_STAMPED as specified in ISO 14906. It is specified in Annex A: refer to `CCC-AuthDataRetrieval-Request` and `CCC-AuthDataRetrieval-Response`.

GET_STAMPED shall always carry access credentials.

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

7.1.5 Driver notification

The function "Driver notification" shall be implemented by the EFC function SET_MMI as specified in ISO 14906. It is specified in Annex A: refer to CCC-Notification-Request and CCC-Notification-Response.

NOTE According to ISO 14906, SET_MMI.request uses EID = 0 and does not carry access credentials.

7.1.6 Terminate communication

The RSE may terminate the communication on the application level with the OBE with the function "Terminate communication", by means of the invocation of a release request by the RSE.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

The function “Terminate communication” shall be provided by the application layer service EVENT-REPORT as specified in ISO 15628 and EN 12834. It is specified in Annex A: refer to `CCC-TerminateComm`.

NOTE According to ISO 15628 and EN 12834, EVENT-REPORT (Release) uses EID = 0 and does not carry access credentials.

7.1.7 Test communication

The function “Test communication” shall be implemented by the EFC function ECHO of ISO 14906, and is specified in Annex A: refer to `CCC-TestComm-Request` and `CCC-TestComm-Response`.

NOTE According to ISO 14906, ECHO uses EID = 0 and does not carry access credentials.

7.2 Security

7.2.1 General

Security is an essential part of CCC applications. This document provides for generic security services. The detailed implementations are media-specific.

This document provides for an authentication service that may serve to prove the identity of the data source and the integrity of the data or to provide for non-repudiation, or both. It contains a mechanism for control of access to the OBE data by means of access credentials. Access protection is also used for protection of user privacy.

It does not provide for an encryption service.

NOTE 1 It is assumed that privacy protection requirements are covered by the access credentials mechanism.

NOTE 2 Transaction counter according to EN 15509 is not supported by the CCC application.

NOTE 3 The security measures specified in the following subclauses fulfil the CCC interface security countermeasures specified in ISO 19299:2020, 7.3.3.

7.2.2 Authentication/non-repudiation

Authenticated reading of data is provided by the function “Authenticated data retrieval”. Authenticators are defined as ASN.1 OCTET STRING type. This only pertains to the ASN.1 syntax; the semantics are media dependent.

When using the CEN-DSRC communication stack:

— the OBE shall be able to calculate authenticators according to security level 1 as specified in EN 15509:2023, 6.1.5.3;

— the RSE shall be able to calculate authenticators to security level 1 as specified in EN 15509:2023, 6.1.5.3;

— the RSE shall request a message authentication code (MAC) by addressing at least the attribute `PaymentMeans`;

— the authentication keys (AuK(k)) stored in the OBE shall be derived from the master authentication keys (MAuK(k)) as specified in ISO 14906:2022, F.4.2, with the following algorithm for computing the input value (VAL):

  VAL = ‘Compact_PersonalAccountNumber || ContractProvider || 00’, where

  Compact_PersonalAccountNumber = [HighDWord32(PAN)] XOR [LowDWord32(PAN)]

NOTE 1 The derived authentication key for a given generation k is computed as follows AuK(k) = ede [MAuK(k)] (VAL), where "ede" is the chained encryption, decryption and encryption of the input value (VAL) using the master authentication key for the given generation k.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

When using one of the other communication stacks described in Annexes C, D, E or F, algorithms and the use of lower communication layer services shall be as specified in the corresponding annex.

Authenticators shall primarily pertain to values and prove the source and the integrity of the data unit. Authenticators shall protect against forgery or provide non-repudiation, or both. Authenticators shall be transmitted from the OBE to the RSE.

NOTE 2 Master authentication keys can be CCC-specific.

7.2.3 Access credentials

Access credentials shall be used to manage access to attributes. Access credentials are mandatory for all attributes specified in this document. The “Data retrieval” and “Authenticated data retrieval” functions shall always carry access credentials.

The OBE shall support calculation of access credentials to security level 1 as specified in EN 15509:2023, 6.1.5.3.

The RSE shall be able to calculate access credentials to security level 1 as specified in EN 15509:2023, 6.1.5.3.

Access credentials are defined as being of ASN.1 type OCTET STRING. This only pertains to the ASN.1 syntax; the semantics are media-dependent.

8 Data requirements

The addressing of the EFC system and application data shall conform to the rules specified in ISO 14906:2022, 5.3.

Within the context of CCC, all attributes given in Tables 2 and 3 shall be available in the OBE.

Table 2 contains attributes which are specified in ISO 14906, EN 15509 and in ISO 17573-3 and are imported from their original source of specification.

Table 2 — CCC attributes as specified in ISO 14906, EN 15509 and ISO 17573-3

AttributeID	Attribute	Length (octets)[a]	Data set
24	EquipmentOBUId	5 (1+4)[c]	Identification
32	PaymentMeans	14[b]	
16	VehicleLicencePlateNumber	13 to 17[c]	Vehicle
17	VehicleClass	1[b, c]	
18	VehicleDimensions	3[b]	
19	VehicleAxles	2[b]	
20	VehicleWeightLimits	6[b]	
22	VehicleSpecificCharacteristics	4[b]	
46	TrailerCharacteristics	5[b]	
55	VehicleCurrentMaxTrainWeight	2[b]	
63	LocalVehicleClassId	2[b]	

[a] Including the length determinant as specified in ISO/IEC 8825-2 (packed encoding rules for ASN.1 is used in this document). In case of discrepancy between the length value specified in this table and in the ASN.1 module, the ASN.1 module specified in Annex A shall take precedence.

[b] According to ISO 17573-3.

[c] According to EN 15509.

Table 3 contains attributes which are introduced and specified in this document.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table 3 — CCC specific attributes

AttributeID	Attribute	Length (octets)[a]	Data set
0	`CccContextMark`	6	Identification
48	`VehicleAxlesHistory`	6	Vehicle
60	`VehicleWeightHistory`	12	
62	`ExtendedVehicleAxlesHistory`	10	
64	`AttributeUpdateInterval`	1	
49	`CommunicationStatus`	8	Status
50	`GnssStatus`	23	
51	`DistanceRecordingStatus`	6	
52	`ActiveContexts`	Variable 1+(*x* *4)[b]	
53	`ObeStatusHistory`	13	
61	`ExtendedObeStatusHistory`	18	
99	`ExtendedObeStatusHistoryPart1`	36	
100	`ExtendedObeStatusHistoryPart2`	28	
101	`UserConfirmation`	13	

[a] Including the length determinant as specified in ISO/IEC 8825-2 (packed encoding rules for ASN.1 is used in this document). In case of discrepancy between the length value specified in this table and in the ASN.1 module, the ASN.1 module specified in Annex A shall take precedence.

[b] Where '*x*' means the number of toll contexts active in the OBE: *x* value is given in the first byte.

Additional requirements that apply for OBE history-related attributes are as follows:

The EFC attribute `ExtendedObeStatusHistoryPart1` provides, compared to the data elements in `ExtendedObeStatusHistory`, additional information about geographical position of the change of the status indicator and the possibility to submit a TSP individual information code. The EFC attribute `ExtendedObeStatusHistoryPart2` provides two additional historic values of the OBE status.

The OBE provides the attributes `ExtendedObeStatusHistory`, `ExtendedObeStatusHistoryPart1` and `ExtendedObeStatusHistoryPart2`.

The RSE shall decide which of those attributes to request, e.g. either

— `ExtendedObeStatusHistory` or

— `ExtendedObeStatusHistoryPart1` or

— `ExtendedObeStatusHistoryPart1` and `ExtendedObeStatusHistoryPart2` or

— none of the three options above.

Attribute requirements that restrict choices or are more specific and limited in scope than those of their original source of specification can be found in A.1. Data type specifications are made available in A.2.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

9 Transaction model

9.1 General

The transaction model related to the CCC application interface for DSRC shall be in accordance with ISO 14906:2022, Clause 6, with the restrictions and amendments specified in the following subclauses for implementations using the CEN-DSRC communication stack. Details on the transaction model and addressing for other communication media are given in the relevant annexes.

The transaction model comprises two phases: initialisation and transaction.

© ISO 2024 – All rights reserved

9.2 Initialisation phase

9.2.1 Initialisation request

Initialisation of the communication shall be initiated by the RSE by means of the function "Initialise Communication". The OBE evaluates the initialisation request in order to decide whether the CCC application is supported. If the OBE does not support the CCC application, it shall not respond to the initialisation request. If the OBE supports the CCC application, it shall respond to the initialisation request.

9.2.2 CCC application-specific contents of BST

The application identifier (AID) = 20 shall be used for the CCC applications.

The RSE shall initialise one instance of AID = 20 in the beacon service table (BST).

NOTE This does not exclude the BST from carrying information related to other applications which can be active at the RSE.

9.2.3 CCC application-specific contents of VST

There shall be a minimum of one instance and a maximum of two instances of AID = 20 in the `ApplicationList` in the VST.

In those instances, the parameter `ApplicationContextMark` shall be as specified in ISO 17573-3:2023, Annex A, corresponding to security level 1, with the first 6 octets containing `CccContextMark` instead of `EfcContextMark`.

The TSP shall make use of the data element `contextVersion` to ensure that the value of the `CccContextMark` corresponds to one unique dated version of this document through a reference table, which is made available to the TC, allowing it to identify to which specific version of the CCC application interface definition the OBE complies.

One instance of the CCC application-specific context shall be present and conform to this document. A second instance is optional and if present should conform to ISO 12813:2015.

NOTE 1 The TSP can use the `CccContextMark` to identify to which specific version of the CCC application interface definition the OBE complies. This can be useful when creating a region of interoperable toll systems to support gradual migration to newer updates of the standard by mandating that the RSE handles not only the most recent application interface definition but also others that are existing within the OBE population.

NOTE 2 To ensure compatibility with all former editions of this document and to limit the number of CCC contexts that need to be handled, the maximum number of instances of CCC applications presented in a VST is set to two.

The RSE shall only carry out a CCC transaction with an OBE that has transmitted a `CccContextMark` valid for the toll context.

9.3 Transaction phase

After completion of the initialisation phase, the RSE application shall be notified.

There are no requirements specific to the transaction phase. The RSE may perform a transaction by using the functions in any sequence as long as the requirements of this document are met. The OBE shall respond to the functions invoked by the RSE and shall not initiate any functions on its side.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Annex A
(normative)

CCC data type specifications

A.1 General

In Tables A.1, A.2. and A.3, CCC attributes are specified in terms of:

— the name of a data attribute;

— the names of the data elements forming the CCC attribute (there are no optional data elements within any one CCC attribute);

— the semantic definition of the data element; and

— remarks, including references to other standards.

The specification of the corresponding data types in ASN.1 is provided in A.2

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.1 — Data regarding identification

CCC Attribute	(Sub-)Data element (if applicable)	Source of specification	Semantics	Usage/Remark
`CccContextMark`	n.a.	According to `EfcContextMark` in ISO 17573-3	Same as in ISO 17573-3 for `EfcContextMark`	Contains the contract provider, type of contract and context version transmitted as part of the VST (vehicle service table).
`EquipmentOBUId`		EN 15509	According to EN 15509	—
`PaymentMeans`		ISO 17573-3	According to ISO 17573-3	Contains personal account number, the payment means' expiry date and usage control (restrictions on the geographic usage and services).

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.2 — Data regarding status

CCC Attribute	(Sub-)Data element	Source of specification	Semantics	Usage/Remark
ActiveContexts	tollContext	This document	Identification of the toll context(s) the OBE has currently loaded. A data content of 00 00 00(hex) shall be used to indicate that a generic context is active (e.g. thin clients). If more than one toll context is listed, then the first entry shall correspond to the CCC context where the last charge object was recognized as being used. The identification type and value of a toll context is the same as for identifying the TC of the context.	Can be used to check if the current context(s) are active in the OBE.
	contextVersion	This document	Version number of the active context. The use of this version number shall correspond to use of VersionId as specified in ISO 12855, although the data types differ. The use and encoding shall be mutually agreed between TSP and TC.	Can include versions of context parameters and maps (if required in that context).
ObeStatusHistory	statusIndicator	This document	The statuses are divided into the two classes "GO" and "NO-GO". If several status conditions from both the "GO" and "NO-GO" class are fulfilled, the status shall be set to one of the statuses of the "NO-GO" class. The condition to set statuses in the "GO" class is specified as: the OBE is functioning correctly, and the user is fulfilling its obligations to cooperate. Statuses and conditions in the "GO" class are:	The data element statusIndicator contains information on the correct functioning of the OBE and the fulfilment of the user's obligations to cooperate with toll scheme requirements. The statusIndicator is not necessarily completely reflected on the user HMI. There are cases where the HMI will report that the user is not allowed to drive the vehicle without the statusIndicator having a "NO-GO" value, for example during OBE upstart.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.2 *(continued)*

CCC Attribute	(Sub-)Data element	Source of specification	Semantics	Usage/Remark
			— `go(1)`: shall be set when the "GO" condition is fulfilled and the status is not set to `goSuspicion(5)`. — `goSuspicion(5)`: may be set when the "GO" condition seems to be fulfilled and there is suspicion of technical manipulation, where the exact definition of what constitutes "suspicion of technical manipulation" shall be specified by the TSP. The condition to set statuses in the "NO-GO" class is specified as: the OBE is not functioning correctly, excluding non-functioning in short time periods (such as during a shutdown followed by immediate upstart, or a reboot, for example) or detection of the user not fulfilling its obligations to cooperate. Statuses in the "NO-GO"-class are:	To evaluate and report suspicious technical behaviour is an OBE option, not a requirement.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.2 *(continued)*

CCC Attribute	(Sub-)Data element	Source of specification	Semantics	Usage/Remark
			— `noGo(0)`: shall be set when the "NO-GO" condition is fulfilled and the status is not set to another status in the "NO-GO" class. — `noGoContractual(2)`: may be set when the "NO-GO" condition is fulfilled due to contractual aspects. — `noGoUserSwitchedOff(3)`: may be set when the "NO-GO" condition is fulfilled and the OBE has been switched off due to user action on the OBE. — `noGoPaymentMeans(4)`: may be set when the "NO-GO" condition is fulfilled due to insufficient payment means, where the exact definition of what constitutes "insufficient payment means " shall be specified by the TSP. NOTE The responsibility for defining "insufficient payment means" can be with a separate payment means provider, or this responsibility can be assumed by the TSP directly.	EXAMPLE An OBE with status `go(1)` is shut down. During the subsequent boot of this OBE the HMI indicates that the vehicle is not allowed to drive for a short time while performing some internal boot checks. After that, it indicates that the user can drive the vehicle. These changes do not modify the contents of `statusIndicator` and `previousStatusIndicator`. In case the automatic tolling function is actively switched off by the user, the data element `statusIndicator` contains `noGoUserSwitchedOff(3)`. Later, the user turns on automatic tolling again, the data element `statusIndicator` switches back to `go(1)`. These changes will lead to changes of the data elements `statusIndicator` and `previousStatusIndicator` with the respective points of time.
`ObeStatusHistory` (cnt'd)	`timeWhenChanged`	This document	Time when GO/NO-GO status was changed to current status.	—

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.2 *(continued)*

CCC Attribute	(Sub-)Data element	Source of specification	Semantics	Usage/Remark
	`timeWhenActivated`	This document	Last time the OBE started to evaluate current time, place and other parameters to determine if any toll context rules apply, and in this case start to operate accordingly.	Used to prevent fraud by incorrect deactivation while in transit. EXAMPLE 1 A specific OBE implementation has a button allowing the user to turn it off. A cheating user keeps this OBE turned off while driving on a tolled road, but turns the OBE on just before a known CCC spotcheck location. Then `timeWhenActivated` is set to the time when the user turns it on. EXAMPLE 2 A specific OBE implementation does not feature any possibility to turn it off causing `timeWhenActivated` to normally be `the` same as time of installation in vehicle. However, a cheating user disconnects the OBE from vehicle power and runs up the battery power, causing a complete shutdown, then reconnects the OBE to vehicle power just before a known CCC spotcheck location. Then `timeWhenActivated` is set to the time when the OBE is operational again. In this case, the value will be very close to or identical to `timeWhenPowered` (depending on the time for boot up sequence, for example).
	`timeWhenObePowered`	This document	Last time the OBE was connected to vehicle power.	

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.2 *(continued)*

CCC Attribute	(Sub-)Data element	Source of specification	Semantics	Usage/Remark
ExtendedObeStatusHistory	statusIndicator	This document	Same as in ObeStatusHistory	
	timeWhenChanged	This document	Same as in ObeStatusHistory	
	previousStatusIndicator	This document	Shall contain the previous value of data element statusIndicator, if this value has changed. However, the OBE can avoid storing changes due to on-off power switching already recorded in the statusIndicator data element.	May be used to detect fraud by manipulation of the OBE status claiming the excuse that it happened recently. Not recording on-off status changes in history means that, for example, NO-GO transitions due to long switch off or parking can fail to be present in the previousStatusIndicator and timeWhenChangedToPrevious. This helps in preventing the occurrence of false positives.
	timeWhenChangedToPrevious	This document	The time of the change of data element previousStatusIndicator. The data element shall be set to 0 and the previousStatusIndicator shall be set to 0 if no previousStatusIndicator is available.	
	timeWhenActivated	This document	Same as in ObeStatusHistory	
	timeWhenObePowered	This document	Same as in ObeStatusHistory	
ExtendedObeStatusHistoryPart1	statusIndicator	This document	Same as in ObeStatusHistory	
	timeWhenChanged	This document	Same as in ObeStatusHistory	

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.2 *(continued)*

CCC Attribute	(Sub-)Data element	Source of specification	Semantics	Usage/Remark
	tspStatus	This document	An information or error code that is specific to the TSP and corresponds to statusIndicator.	This date element can provide additional information about the reasons for a specific statusIndicator. As an example, if statusIndicator is set to noGo(0), the tspStatus can provide additional information on the reason for setting this statusIndicator.
	position	This document	The position of the vehicle when statusIndicator was set. The components gnssLon and gnssLat shall be set to 0 if no corresponding position is available.	
	previousStatusIndicator	This document	The previous value of data element statusIndicator, if this value has changed. The data element shall be set to 0 and the timeWhenChangedToPrevious shall be set to 0 if no previousStatusIndicator is available.	May be used to detect fraud by manipulation of the OBE status using the excuse that it happened recently.
	timeWhenChangedToPrevious	This document	The time of the change of data element previousStatusIndicator. The data element shall be set to 0 and the previousStatusIndicator shall be set to 0 if no previousStatusIndicator is available.	
	previousTspStatus	This document	An information or error code that is specific to the TSP and corresponds to previousStatusIndicator.	

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.2 *(continued)*

CCC Attribute	(Sub-)Data element	Source of specification	Semantics	Usage/Remark
	previousPosition	This document	The position of the vehicle when previousStatusIndicator was set. The components gnssLon and gnssLat shall be set to 0 if no corresponding position is available.	
	timeWhenActivated	This document	Same as in ObeStatusHistory.	
	timeWhenObePowered	This document	Same as in ObeStatusHistory.	
ExtendedObeStatusHistoryPart2	previousStatusIndicator2	This document	The previous value of data element previousStatusIndicator in ExtendedObeStatusHistoryPart1, if this value has changed. The data element shall be set to 0 and the timeWhenChangedToPrevious2 shall be set to 0 if no previousStatusIndicator2 is available.	
	previousTspStatus2	This document	An information or error code that is specific to the TSP and corresponds to previousStatusIndicator2.	
	timeWhenChangedToPrevious2	This document	The time of the change of data element previousStatusIndicator2. The data element shall be set to 0 and the previousStatusIndicator2 shall be set to 0 if no previousStatusIndicator2 is available.	
	previousPosition2	This document	The position of the vehicle when previousStatusIndicator2 was set. The components gnssLon and gnssLat shall be set to 0 if no corresponding position is available.	

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.2 *(continued)*

CCC Attribute	(Sub-)Data element	Source of specification	Semantics	Usage/Remark
	previousStatusIndicator3	This document	The previous value of data element previousStatusIndicator2, if this value has changed. The data element shall be set to 0 and the timeWhenChangedToPrevious3 shall be set to 0 if no previousStatusIndicator3 is available.	
	previousTspStatus3	This document	An information or error code that is specific to the TSP and corresponds to previousStatusIndicator3.	
	timeWhenChangedToPrevious3	This document	The time of the change of data element previousStatusIndicator3. The data element shall be set to 0 and the previousStatusIndicator3 shall be set to 0 if no previousStatusIndicator3 is available.	
	previousPosition3	This document	The position of the vehicle when previousStatusIndicator3 was set. The components gnssLon and gnssLat shall be set to 0 if no corresponding position is available.	
CommunicationStatus	timeOfLastTransmission	This document	Date and time of the end of the last successful data transmission between OBE and the central system.	Can be used to check if the communication is operational (not tampered with).
	pendingSince	This document	Date and time when the last transmission request of the application became pending. pendingSince shall be set to "0" when no transmission is pending.	Such a check done by the RSE depends on the OBE communication possibilities and the details agreed between TC and TSP.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.2 *(continued)*

CCC Attribute	(Sub-)Data element	Source of specification	Semantics	Usage/Remark
GnssStatus [a]	lastGnssFixLon	This document	Latest geographic longitudinal coordinate the GNSS sensor of the OBE has determined. Value in microdegrees.[a] Values > 0 = east, < 0 = west, absolute value shall not exceed 180°.	Can be used to check if GNSS reception is operational (not tampered with). Such a check done by the RSE depends on the OBE GNSS implementation and the details agreed between TC and TSP.
	lastGnssFixLat	This document	Latest geographic latitudinal coordinate the GNSS sensor of the OBE has determined. Value in microdegrees.[a] Values > 0 = north, < 0 = south, absolute value shall not exceed 90°.	
	lastGnssFixTime	This document	Date and time associated to the lastGnssFixLat and lastGnssFixLon.	
	currentHdop	This document	Horizontal Geometric Dilution of Precision of the current used satellite constellation according to NATO STANAG 4294; Number of satellites being tracked.	
	lastLac	This document	Date and time when the last localization augmentation message was received (timeOfLac); identification of the operator of the localization augmentation communication (lacOperator); identifier of the operator's RSE (rseId).	Can be used to check if the localization augmentation communication is operational (not tampered with).
UserConfirmation	timeOfConfirmation	This document	The time when the user confirms an OBE message or indication.	The TSP is free to specify the HMI and the way that the user can confirm a message (e.g. by pushing a button).
	positionOfConfirmation	This document	The position of the vehicle when the user confirms an OBE message or indication. The components gnssLon and gnssLat shall be set to 0 if no corresponding position is available.	

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.2 *(continued)*

CCC Attribute	(Sub-)Data element	Source of specification	Semantics	Usage/Remark
	`tspStatus`	This document	An information or error code that is specific to the TSP and corresponds to the user confirmation.	Can be used to transmit a TSP individual code of the error message that is displayed to the user and which the user needs to confirm.
`DistanceRecordingStatus`	`distRecordingStatus`	This document	Indicates the status of an interface to the vehicle distance measurement (e.g. odometer) and correct reception of a signal	Value range: Distance recording — not present — present and active — present and inactive
	`accumulatedTravelledDistance`	This document	Accumulated travelled distance of the vehicle since OBE installation. Value not relevant if no distance recording present.	Can be used, for example, to check distance recording accuracy using two successive beacons.
	`deviationFromGnss`	This document	Average deviation over one hour between speed measured by GNSS and by odometer in 0,1 % steps. Positive value means that the GNSS measured larger distance. Value not relevant if equal to –12,8 % (–128).	Can be used to check quality of distance recording.
`AttributeUpdateInterval`	`attributeUpdateInterval`	This document	Maximum time between two updates of the CCC attributes stored in the DSRC communication unit in seconds for corresponding attributes that have been changed in the OBE. A zero value indicates that the values are updated during CCC transaction. The maximum value 255 is used also for longer periods than 255 s.	Maximum update delay (age) in seconds of information in attributes in the DSRC communication unit of a changed attribute value in the OBE. If the interval exceeds the maximum time of the attribute, then the value shall be 255.

[a] To translate `lastGnssFixLon` and `gnssLon` (the longitude) and `lastGnssFixLat` and `gnssLat` (the latitude) coordinates to the corresponding real position on Earth or vice-versa, the geodetic datum shall be WGS84(G1150), according to NIMA TR8350.2 version 3, by default, unless another Earth-centred, Earth-fixed, polar coordinate geodetic datum is agreed mutually by the TC and TSP.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Furthermore, by default, any Earth-centred Earth-fixed polar coordinate geodetic datum can be used, as long as the maximum datum displacement relative to the geodetic datum prescribed is acceptable to the TC of the related toll domain.

The maximum tolerated datum displacement, also called datum shift, should not exceed 0,4 m.

NOTE The recommended maximum tolerated displacement allows, for example, for using one of the International Terrestrial Reference Frames (ITRF), the Russian PZ90.2 or one of the European Terrestrial Reference Frames (ETRF) as geodetic datums alternative to the WGS84.

The calculated datum displacement should be determined according to ASME Y14.5.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.3 — Data regarding vehicle

CCC Attribute	(Sub-)Data element (if applicable)	Source of specification	Semantics	Usage/Remark
VehicleLicensePlateNumber		ISO 17573-3, EN 15509	Uses data type Lpn as defined in ISO 17573-3. For countries and regions which do not exclusively use Latin letters and Arabic numbers in licence plates, the data type definition according to ISO 17573-3 applies without additional constraints. In CEN member countries, additional constraints for length and alphabet type as specified in EN 15509 apply.	
VehicleClass		Same as in EN 15509	According to EN 15509. Shall correspond with the first entry of **ActiveContexts**. The LLLL element within the **VehicleClass** shall contain the **LocalVehicleClassId**. If it is not coded, the LLLL element shall be set to 0000'B.	TSP-specific information pertaining to the vehicle. Includes trailer attached, the basic vehicle class and the local vehicle class.
LocalVehicleClassId		ISO 17573-3	According to ISO 17573-3. Shall correspond with the first entry of **ActiveContexts**.	TC-specific definition determined in the front end when evaluating the context data attribute LocalVehicleClassDefinition as specified in ISO 17573-3.
VehicleDimensions		ISO 17573-3	According to ISO 17573-3.	Includes vehicle length overall, vehicle height overall and vehicle width overall according to ISO 612.
VehicleAxles		ISO 17573-3	According to ISO 17573-3.	Includes vehicle first axle height and vehicle axles number (lifted or not).
VehicleAxlesHistory	timeWhenChanged	This document	Date and time of the last change of the value of any data element of the attribute VehicleAxles.	Can be used to check if a change of the declared number of axles occurred during the trip, e.g. just before a CCC.
	previousVehicleAxles	This document	Value of the attribute VehicleAxles before last change.	

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.3 *(continued)*

CCC Attribute	(Sub-)Data element (if applicable)	Source of specification	Semantics	Usage/Remark
ExtendedVehicleAxlesHistory	timeWhenChanged	This document	Date and time of the last change of the value of any data element of the attribute VehicleAxles.	
	previousVehicleAxles	This document	Value of the attribute VehicleAxles before last change.	
	timeWhenChangedToPrevious	This document	Date and time of the previous change of number of vehicle axles.	Can be used to detect fraud by quickly switching the declaration of vehicle axles to reset the history.
VehicleWeightLimits		ISO 17573-3	According to ISO 17573-3.	Includes vehicle maximum laden weight, vehicle train maximum weight and vehicle weight unladen.
VehicleCurrentMaxTrainWeight		ISO 17573-3	According to ISO 17573-3.	This weight may be lower than VehicleTrainMaximumWeight as it represents the current maximum train weight and not the maximum design mass.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table A.3 *(continued)*

CCC Attribute	(Sub-)Data element (if applicable)	Source of specification	Semantics	Usage/Remark
VehicleWeightHistory	timeWhenChangedToCurrentValue	This document	Indicates the most recent time when the value of VehicleCurrentMaxTrainWeight or LocalVehicleClassId or the LLLL element within VehicleClass was changed.	May be used to detect a fraudulently low value of VehicleWeightLimits and changing it just before passing an enforcement RSE.
	previousVehicleWeight	This document	Indicates the settings of the vehicle weight before the last change of the value of VehicleCurrentMaxTrainWeight. The data element shall be set to 0 if no previous weight is available.	
	previousLocalVehicleClassId	This document	Indicates the settings of local vehicle class ID before the last change. The data element shall be set to 0 and the timeWhenChangedToPrevious shall be set to 0 if no previous local vehicle class ID is available.	
	timeWhenChangedToPrevious	This document	Indicates the time when the previous settings were set. The data element shall be set to 0 and the previousLocalVehicleClassId shall be set to 0 if no previous local vehicle class ID is available.	
VehicleSpecificCharacteristics		ISO 17573-3	According to ISO 17573-3.	Includes information on engine fuel type, EURO emission class and CO_2 emission rating, plus reserve.
TrailerCharacteristics		ISO 17573-3	According to ISO 17573-3.	Includes information on the trailers if present, type and weight data.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

NOTE Depending on the layout of an EFC cluster, the actual `VehicleClass` and the `LocalVehicleClassId` can exist in a front end in more than one instance. This will happen if the vehicle is present in more than one overlapping EFC domain and when different EFC domains are using different definitions of local vehicle class identifiers.

A.2 Specification of the data types

A.2.1 General

This clause presents the abstract syntax notation one (ASN.1) definition of the following data types and container types, in accordance with the ASN.1 technique specified in ISO/IEC 8824-1:

— the data types related to the CCC functions specified in Clause 7;

— the data types related to the CCC attributes specified in Clause 8; and

— the ASN.1 container types for the DSRC application layer.

A.2.2 Encoding rules

A.2.2.1 Specification for non-CEN members of ISO

The packed encoding rules given in ISO/IEC 8825-2 with the restrictions specified in ISO 15628:2013, 6.2.7, shall apply.

A.2.2.2 Specification for CEN members of ISO

The packed encoding rules given in ISO/IEC 8825-2 with the restrictions specified in ISO 15628:2013, 6.2.7, shall apply with the following exceptions.

Legacy encoding may be used for the data elements with the data types `Latitude` and `Longitude` where positive values shall be encoded as for an unsigned INTEGER data type, whilst two's complement encoding shall be used for negative values, under the following conditions.

During the transition period (see NOTE 4), RSE and OBE may use legacy encoding as specified above.

After the completion of the transition period (see NOTE 4):

— RSE shall support both the packed encoding rules given in ISO/IEC 8825-2 with the restrictions specified in ISO 15628:2013, 6.2.7 and the legacy encoding rules as specified above (see NOTE 2).

— New OBE placed on the market shall support packed encoding rules given in ISO/IEC 8825-2 with the restrictions specified in ISO 15628:2013, 6.2.7 (see NOTE 3).

NOTE 1 The set of rules contained in this subclause is intended to be discontinued in future editions of this document.

NOTE 2 This RSE requirement enables parallel operation of OBE using the legacy encoding and new OBE using packed encoding rules.

NOTE 3 This requirement does not apply to OBE already placed on the market.

NOTE 4 In several European implementations of ISO 12813:2019 in OBE and RSE, the data types Latitude and Longitude (present in `GnssStatus`, `ExtendedObeStatusHistoryPart1`, `ExtendedObeStatusHistoryPart2` and `UserConfirmation`) were encoded using legacy encoding (two's complement). European TCs and TSPs intend to apply the packed encoding rules also for the data types `Latitude` and `Longitude`, after the update of the relevant equipment and systems, carried out in a transitional phase, has been completed. The transition arrangements are generally determined by TCs in consultation with TSPs. Concerned TCs update their RSE within a defined timeframe to also support the packed encoding rules for Latitude and Longitude data, to ensure the continuous operation of their systems. Once this update is completed, subsequent generations of OBE supporting packed encoding rules for Latitude and Longitude data are introduced and operate in parallel to legacy OBE in these systems.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

A.2.3 ASN.1 module

The ASN.1 module is identified by the Object Identifier {iso(1) standard(0) 12813 version4(4) minorVersion1(1)} that has been assigned in accordance with the requirements of ISO 14813-6.

The actual ASN.1 module is contained in the file "ISO12813(2023)EfcCccV4.1.asn", which can be directly imported in a compiler. This file is available for download via https://standards.iso.org/iso/12813.

The syntax and semantics of the data types in the ASN.1 types in the above-mentioned file that is imported shall comply with ISO 17573-3 and ISO 14906, respectively.

Table A.4 provides the SHA-256 cryptographic hash digest for the referenced file, offering a means to verify the integrity of the file. The SHA-256 algorithm is specified in NIST 180-4.[27]

Table A.4 — SHA-256 cryptographic hash digest

File name	SHA-256 cryptographic hash digest
ISO12813(2023)EfcCccV4.1.asn	7eb9cccec238e3be2eb0940aa64553b971fa7a71d951945fde7b57d1f925c87e

NOTE Pasting the text of the file into one of the hash digest computation pages available on the web can result in a non-matching hash digest due to changes in the underlying coding.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Annex B
(normative)

Protocol implementation conformance statement proforma

B.1 General

In order to evaluate the conformance of a particular implementation, it is necessary to have a statement of those capabilities and options that have been implemented. This is called an implementation conformance statement (ICS) or, more specifically when it covers transactions, a protocol implementation conformance statement (PICS).

This annex presents the (PICS) proforma to be used for the attributes specified in Clause 8 and Annex A, with PICS templates that are to be filled in by the concerned equipment supplier or its representative.

B.2 Guidance for completing the PICS proforma

B.2.1 Purpose and structure

The purpose of this PICS proforma is to provide a mechanism whereby a supplier of an implementation of the CCC specified in this document can provide information about the implementation in a standardized manner.

The PICS proforma is subdivided as follows corresponding to categories of information:

— identification of the implementation;

— identification of the protocol;

— global statement of conformance;

— PICS proforma tables.

B.2.2 Abbreviations and conventions

B.2.2.1 General

The PICS proforma contained in this annex comprises information in tabular form in accordance with the guidelines given in ISO/IEC 9646-7.

B.2.2.2 Item column

The item column contains a number which identifies the item in the table.

B.2.2.3 Item description column

The item description column describes each respective item (e.g. parameters, data element). It implicitly means “is <item description> supported by the implementation?”

B.2.2.4 Status column

The following notations, specified in ISO/IEC 9646-7, shall be used for the status column:

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

m mandatory — the capability is required to be supported.

o optional — the capability may be supported or not.

n/a not applicable — in the given context, it is impossible to use the capability.

x prohibited (excluded) — there is a requirement not to use this capability in the given context.

c.i conditional — the requirement on the capability ("m", "o", "x" or "n/a") depends on the support of other optional or conditional items. "i" is an integer identifying a unique conditional status expression which is specified immediately following the table.

o.i qualified optional — for mutually exclusive or selectable options from a set. "i" is an integer which identifies a unique group of related optional items and the logic of their selection which is specified immediately following the table.

B.2.2.5 Reference column

The reference column refers to this document, except where explicitly stated otherwise.

B.2.2.6 Support column

The support column shall be filled in by the supplier of the implementation. The following common notations, specified in ISO/IEC 9646-7, shall be used for the support column:

Y or y Yes, the item has been implemented.

N or n No, the item has not been implemented.

N/A, n/a or - The item is not applicable.

As stated in ISO/IEC 9646-7, support for a received PDU requires the ability to parse all valid parameters of that PDU. Supporting a PDU while having no ability to parse a valid parameter is non-conformant. Support for a parameter on a PDU means that the semantics of that parameter is supported.

B.2.2.7 References to items

Each line within the PICS proforma which requires that implementation details be entered is numbered at the left-hand edge of the line. This numbering is included as a means of uniquely identifying all possible implementation details within the PICS proforma. This referencing is used both inside the PICS proforma, and for references from other test specification documents.

The means of referencing individual responses is done in the following sequence:

a) a reference to the smallest individual response enclosing the relevant item;

b) a solidus character ("/");

c) the reference number of the row in which the response appears;

d) if more than one response occurs in the row identified by the reference number, implicit labelling of each possible entry as "a", "b", "c", etc., from left to right, with this letter appended to the sequence.

EXAMPLE 1 B.10/4 is the reference to the answer of item 4 in Table B.10.

EXAMPLE 2 B.11/3b is the reference to the second answer (i.e. in the second support column, if present) of item 3 in Table B.11.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

B.3 Instruction for completing the PICS proforma

B.3.1 General

The supplier of the implementation shall complete the PICS proforma in each of the spaces provided. In particular, an explicit answer shall be entered in each of the support or supported column boxes provided, using the notation described in B.2.2.6.

If necessary, the supplier may provide additional comments in space at the bottom of the tables or separately.

B.3.2 Definition of support

A capability is said to be supported if the implementation under test (IUT) can:

— generate the corresponding operation parameters (either automatically or because the end user requires that capability explicitly), and

— interpret, handle and, when required, make available to the end user the corresponding error or result.

A protocol element is said to be supported for a sending implementation if it is able to generate it under certain circumstances (either automatically or because the end user requires relevant services explicitly).

A protocol element is said to be supported for a receiving implementation if it is correctly interpreted and handled and also, when appropriate, made available to the end user.

B.4 PICS proforma for OBE

B.4.1 Identification of the implementation

The following proforma (Tables B.1 to B.5) shall be used to identify the implementation on the OBE side.

Table B.1 — Identification of PICS

Item no.	Question	Response
1	Date of statement (DD/MM/YY)	
2	PICS serial number	
3	System conformance statement cross-reference	

Table B.2 — Identification of the implementation or system or both

Item no.	Question	Response
1	TSP or EFC context name	
2	Version number	
3	Intended deployment within CEN countries (Yes / No)	
4	Other information	

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table B.3 — Identification of the OBE supplier

Item No.	Question	Response
1	Organization name	
2	Contact name(s)	
3	Address	
4	Telephone number	
5	E-mail address	
6	Other information	

Table B.4 — Identification of the OBE

Item No.	Question	Response
1	Brand name	
2	Type, version	
3	Manufacturer ID	
4	Equipment class	
5	Serial numbers of supplied units	
6	Other information	

Table B.5 — Identification of ISO 12813

Item No.	Question	Response
1	Title, reference no., publication date	
2	ISO 12813 edition no.	
3	Implemented addenda	
4	Implementer's guide version no.	
5	Implementation defect reports (ref. no.)	
6	Other information	

B.4.2 Global statement of conformance

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE 1 See 7.2 for a definition of security levels.

NOTE 2 Answering "No" to this question indicates non-conformance with the specification. Non-supported mandatory capabilities are identified in the PICS, with an explanation of why the implementation is non-conforming on pages attached to the PICS.

B.4.3 PICS proforma tables

This part of the PICS proforma (Tables B.6 to B.12) identifies the supported application context, communication services and attributes (ADU) for the OBE side.

Table B.6 — Security requirements

Item no.	Element	Reference	Status	Support (Y/N)
1	Security level 1	EN 15509:2023, 6.1.5.3	m	
2	Authenticator calculation	7.2.2	m	
3	AccessCredentials calculation	7.2.3	m	

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table B.7 — Required DSRC application layer functions

Item no.	Element	Reference	Status	Support (Y/N)
1	INITIALISATION	7.1.2	m	
2	GET	7.1.3	m	
3	GET_STAMPED	7.1.4	m	
4	SET_MMI	7.1.5	m	
5	EVENT_REPORT	7.1.6	m	
6	ECHO	7.1.7	m	

Table B.8 — Encoding rules

Item no.	Element	Reference	Status	Support (Y/N)
1	Packed encoding rules for all data types except for data types `Longitude` and `Latitude`	A.2.2	m	
2	Packed encoding rules for data types `Longitude` and `Latitude`	A.2.2.1, A.2.2.2	c.8.1[a]	
3	Legacy encoding rules for data types `Longitude` and `Latitude`	A.2.2.1, A.2.2.2	c.8.2[b]	

[a] c.8.1: IF (Table B.2/3 AND Period=Transition) THEN o ELSE m

[b] c.8.2: IF (Table B.2/3 AND Period=Transition) THEN o ELSE x

NOTE See A.2.2.2 for the definition of the transition period.

Table B.9 — Implemented DSRC stacks

Item no.	Element	Reference	Status[a]	Support (Y/N)
1	CEN-DSRC	5.5.2	o	
2	Italian DSRC according to ETSI ES 200 674-1	Annex C	o	
3	CALM IR	Annex D	o	
4	ARIB DSRC	Annex E	o	
5	WAVE DSRC	Annex F	o	

[a] One or more DSRC stacks shall be implemented.

Table B.10 — Data requirements regarding identification

Item no.	Element	Reference	Status	Support read protection	Support write protection	Support coding (Y/N)
1	`CccContextMark`	Clause 8	m			
2	`EquipmentOBUId`	Clause 8	m			
3	`PaymentMeans`	Clause 8	m			

Table B.11 — Data requirements regarding status

Item no.	Element	Reference	Status	Support read protection	Support write protection	Support coding (Y/N)
1	`ActiveContexts`	Clause 8	m			
2	`ObeStatusHistory`	Clause 8	m			
3	`ExtendedObeStatusHistory`	Clause 8	m			
4	`CommunicationStatus`	Clause 8	m			
5	`GnssStatus`	Clause 8	m			

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table B.11 *(continued)*

Item no.	Element	Reference	Status	Support read protection	Support write protection	Support coding (Y/N)
6	DistanceRecordingStatus	Clause 8	m			
7	AttributeUpdateInterval	Clause 8	m			
8	ExtendedObeStatusHistoryPart1	Clause 8	m			
9	ExtendedObeStatusHistoryPart2	Clause 8	m			
10	UserConfirmation	Clause 8	m			

Table B.12 — Data requirements regarding the vehicle

Item no.	Element	Reference	Status	Support read protection	Support write protection	Support coding (Y/N)
1	VehicleLicensePlateNumber	Clause 8	m			
2	VehicleClass	Clause 8	m			
3	LocalVehicleClassId	Clause 8	m			
4	VehicleDimensions	Clause 8	m			
5	VehicleAxles	Clause 8	m			
6	VehicleAxlesHistory	Clause 8	m			
7	ExtendedVehicleAxlesHistory	Clause 8	m			
8	VehicleWeightLimits	Clause 8	m			
9	VehicleCurrentMaxTrainWeight	Clause 8	m			
10	VehicleWeightHistory	Clause 8	m			
11	VehicleSpecificCharacteristics	Clause 8	m			
12	TrailerCharacteristics	Clause 8	m			

B.5 PICS proforma for RSE

B.5.1 Identification of the implementation

The following proforma (Tables B.13 to B.17) are to be used to identify implementation on the RSE side.

Table B.13 — Identification of PICS

Item no.	Question	Response
1	Date of statement (DD/MM/YY)	
2	PICS serial number	
3	System conformance statement cross reference	

Table B.14 — Identification of the implementation or system or both

Item no.	Question	Response
1	TSP or EFC context name	
2	Version number	
3	Intended deployment within CEN countries (Yes / No)	
4	Other information	

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table B.15 — Identification of the RSE supplier

Item no.	Question	Response
1	Organization name	
2	Contact name(s)	
3	Address	
4	Telephone number	
5	E-mail address	
6	Other information	

Table B.16 — Identification of the RSE

Item no.	Question	Response
1	Brand name	
2	Type, version	
3	Manufacturer ID	
4	Serial numbers of supplied units	
5	Other information	

Table B.17 — Identification of ISO 12813

Item No.	Question	Response
1	Title, reference no., publication date	
2	ISO 12813 edition no.	
3	Implemented addenda	
4	Implementer's guide version no.	
5	Implementation defect reports (ref. no.)	
6	Other information	

B.5.2 Global statement of conformance

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE 1 See 6.2 and Annex G for a definition of security levels.

NOTE 2 Answering "No" to this question indicates non-conformance with the specification. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conforming on pages attached to the PICS.

B.5.3 PICS proforma tables

This part of the PICS proforma (Tables B.18 to B.24) identifies the supported application context, communication services and attributes (ADU) for the RSE side.

Table B.18 — Security requirements

Item No.	Element	Reference	Status	Support
1	Security level 1	EN 15509:2023, 6.1.5.3	m	
2	Authenticator calculation	7.2.2	m	
3	AccessCredentials calculation	7.2.3	m	

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table B.19 — Required DSRC application layer functions

Item No.	Element	Reference	Status	Support
1	INITIALISATION	7.1.2	m	
2	GET	7.1.3	m	
3	GET_STAMPED	7.1.4	m	
4	SET_MMI	7.1.5	m	
5	EVENT_REPORT	7.1.6	m	
6	ECHO	7.1.7	m	

Table B.20 — Encoding rules

Item No.	Element	Reference	Status	Support
1	Packed encoding rules for all data types except for data types `Longitude` and `Latitude`	A.2.2	M	
2	Packed encoding rules for data types `Longitude` and `Latitude`	A.2.2.1, A.2.2.2	c.20.1[a]	
3	Legacy encoding rules for data types `Longitude` and `Latitude`	A.2.2.1, A.2.2.2	c.20.2[b]	

[a] c.20.1 IF (Table B.14/3 AND Period=Transition) THEN o ELSE m

[b] c.20.2 IF NOT Table B.14/3 THEN x ELSE ((IF Period=Transition) THEN o ELSE m)

NOTE See A.2.2.2 for the definition of the transition period.

Table B.21 — Implemented DSRC stacks

Item No.	Element	Reference	Status[a]	Support
1	CEN-DSRC	5.5.2	O	
2	Italian DSRC according to ETSI ES 200 674-1	Annex C	O	
3	CALM IR	Annex D	o	
4	ARIB DSRC	Annex E	o	
5	WAVE DSRC	Annex F	o	

[a] One or more DSRC stacks shall be implemented.

Table B.22 — Data requirements regarding identification

Item No.	Element	Reference	Status	Support read protection	Support write protection	Support coding
1	`CccContextMark`	Clause 8	m			
2	`EquipmentOBUId`	Clause 8	m			
3	`PaymentMeans`	Clause 8	m			

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table B.23 — Data requirements regarding status

Item No.	Element	Reference	Status	Support read protection	Support write protection	Support coding
1	ActiveContexts	Clause 8	m			
2	ObeStatusHistory	Clause 8	m			
3	ExtendedObeStatusHistory	Clause 8	o[a]			
4	CommunicationStatus	Clause 8	m			
5	GnssStatus	Clause 8	m			
6	DistanceRecordingStatus	Clause 8	m			
7	AttributeUpdateInterval	Clause 8	m			
8	ExtendedObeStatusHistoryPart1	Clause 8	o[a]			
9	ExtendedObeStatusHistoryPart2	Clause 8	o[a]			
10	UserConfirmation	Clause 8	m			

[a] Either ExtendedObeStatusHistory or both elements ExtendedObeStatusHistoryPart1 and ExtendedObeStatusHistoryPart2 shall be supported.

Table B.24 — Data requirements regarding the vehicle

Item No.	Element	Reference	Status	Support read protection	Support write protection	Support coding
1	VehicleLicensePlateNumber	Clause 8	m			
2	VehicleClass	Clause 8	m			
3	LocalVehicleClassId	Clause 8	m			
4	VehicleDimensions	Clause 8	m			
5	VehicleAxles	Clause 8	m			
6	VehicleAxlesHistory	Clause 8	m			
7	ExtendedVehicleAxlesHistory	Clause 8	m			
8	VehicleWeightLimits	Clause 8	m			
9	VehicleCurrentMaxTrainWeight	Clause 8	m			
10	VehicleWeightHistory	Clause 8	m			
11	VehicleSpecificCharacteristics	Clause 8	m			
12	TrailerCharacteristics	Clause 8	m			

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Annex C
(informative)

ETSI ES 200 674-1 communication stack usage for CCC applications

C.1 General

This annex lists the requirements for CCC application using the Italian DSRC communication stack specified in ETSI ES 200 674-1 as the communications medium. It shows how CCC generalized communication functions are mapped onto ETSI ES 200 674-1 protocol directives and specifies how CCC information types can be stored in, and information retrieved from, an ETSI ES 200 674-1-compliant OBE.

Security algorithms and calculations, as well as the transaction model, are specified in ETSI ES 200 674-1 version 2.4.1 (2013-05), Annex D.

C.2 Requirements

Using the ETSI ES 200 674-1 communication stack for transferring CCC data means being conformant to the whole standard, including its Annex D.

C.3 Function correspondences

Table C.1 shows the correspondences between CCC functions and the directives specified in ETSI ES 200 674-1 version 2.4.1 (2013-05), Clause 11. Different directives are used to access data which are located in different memory areas.

After the first interaction to initialise the communication link, a Select-TBA-Id-Rq directive is concatenated to all other requests.

If the compliance check transaction spans a number of DSRC interactions, the RSE should repeat its authentication, as long as there is room for authentication data and primitives in that interaction.

The address of the CCC application (AID parameter) corresponds to the Called AP Invocation Identifier parameter in the `Open-Rq` directive. Table C.1 gives the correspondences between CCC functions and (sequence of concatenated) protocol directives. Refer to C.4 for the meaning of the listed directives.

Table C.1 — Functions correspondences

CCC function	ETSI ES 200 674-1 directive
Initialise communication	`Open-rq`, concatenated with `Get-TBA-Random-Rq`, concatenated with `Get-Master-Record-Rq`
Data retrieval	For Master Core: `Read-Master-Core-Rq` For Master Record: `Get-Master-Record-Rq` For Application Core: `Read-Appl-Core-Rq` For Application Record: `Read-Appl-Record-Rq`
Authenticated data retrieval	Concatenation of: `Set-Credential-Rq`, `Get-Credential-Rq`, and one or more data writing operations as above in this table
Driver notification	`Set-UIF-Rq`
Terminate communication	`Close-Rq`
Test communication	`Select-TBA-Id-Rq`

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

C.4 Data storage and addressing

The main characteristic of OBE data addressing in ETSI ES 200 674-1 is that data are referenced by position, i.e. by specifying their location in the OBE virtual memory. There is a specific virtual memory structure for each application type. This clause describes the OBE virtual memory structure for the CCC application.

The ETSI ES 200 674-1 virtual memory is structured for each and every application into two areas:

1) Master;

2) Application.

The Master area is common to all applications. It is read/only and contains information that is of common use. It is divided into two sub-areas, which can be accessed via specific directives, as specified in the Table C.2.

Table C.2 — Master area — Subareas

Subarea	ETSI ES 200 674–1 directive
Core	`Read-Master-Core-Rq`
Record	`Get-Master-Record-Rq`

The Application area is application-specific, and generally read/write. It is also divided into two subareas that can be accessed via specific directives, as specified in Table C.3.

Table C.3 — Application area — Subareas

Subarea	ETSI ES 200 674–1 directive
Core	`Read-Appl-Core-Rq`, `Write-Appl-Core-Rq`
Record	`Read-Appl-Record-Rq`, `Write-Appl-Record-Curr-Rq`

NOTE Other ETSI ES 200 674–1 directives are available for writing and reading in the Application area, but are not used for CCC applications, and hence are not listed here.

Table C.4 shows where relevant CCC information is stored in the ETSI ES 200 674-1 virtual memory.

Table C.4 — Information in virtual memory

Area	Displacement	Length	Description
Master Core	0	2	`ManufacturerId`
	2	2	`EquipmentClass`
	4	10	Reserved
Master Record	0	2	EFC application. Has the value of `50F0 (Hex)`
	2	2	EFC application sub-identifier. Has the value of `0002 (Hex)` for the CCC application
	4	6	`EfcContextMark` (`CccContextMark`)
	10	2	`AC_CR-KeyReference`
Application Core	0	14	`PaymentMeans`
	14	17	`VehicleLicencePlateNumber`
	31	1	`VehicleClass`
	32	3	`VehicleDimensions`
	35	2	`VehicleAxles`
	37	6	`VehicleWeightLimits`
	43	4	`VehicleSpecificCharacteristics`
	47	5	`TrailerCharacteristics`

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Table C.4 *(continued)*

Area	Displacement	Length	Description
	52	6	VehicleAxlesHistory
	58	8	CommunicationStatus
	66	23	GnssStatus
	89	6	DistanceRecordingStatus
	95	13	ObeStatusHistory
	108	14	VehicleWeightHistory
	122	18	ExtendedObeStatusHistory
	140	10	ExtendedVehicleAxlesHistory
	150	2	VehicleCurrentMaxTrainWeight
	152	2	Altitude
	154	1	AttributeUpdateInterval
	155	1	LocalVehicleClassId
	156	36	ExtendedObeStatusHistoryPart1
	192	28	ExtendedObeStatusHistoryPart2
	220	13	UserConfirmation
Application record	0	4	ActiveContexts

`ActiveContexts` are to be stored in application records. There are as many application records as there are active contexts.

Reading or writing multiple attributes in a single DSRC interaction is possible for attributes which are stored sequentially in the same memory region. This can be accomplished by specifying a displacement corresponding to first attribute to be read or written, and a length equal to the sum of the attributes' lengths.

EXAMPLE Retrieving the `EfcContextMark` (`CccContextMark`) and the `AC_CR-KeyReference` attributes can be accomplished in one interaction by means of an operation like: `Get-Master-Record-Rq` with `offset = 4`, and `length = 8`.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Annex D
(informative)

Using the IR DSRC communication stack (CALM IR) for CCC applications

D.1 General

This annex specifies the use in CCC applications of the CALM (communications access for land mobiles) IR (infrared) stack, as specified in ISO 21214.

D.2 DSRC requirements

The DSRC requirements, in the compatibility mode, are specified in ISO 21214.

NOTE ISO 21214 specifies the physical and data link layer of CALM IR.

D.3 Functions

The CCC specific functions are specified in Clause 6.

D.4 Data requirements

The addressing of the EFC system and application data implemented by the OBE and RSE conforms to the rules given in ISO 14906:2022, 5.3 and Clause 6. For CCC application data, only one context is supported. Multiple instances of attributes are not supported.

The OBE should implement the EFC attributes specified in Clause 8.

The RSE should support any OBE that is otherwise compliant.

D.5 Security requirements

The security requirements are specified in 7.2.

D.6 Transaction requirements

The transaction requirements are specified in Clause 9.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Annex E
(informative)

Using the ARIB DSRC communication stack for CCC applications

E.1 General

This annex specifies the use of the ARIB 5,8 GHz microwave DSRC link for CCC applications.

E.2 DSRC requirements

The DSRC requirements are specified in ARIB STD-T75:2001, section 2, and the DSRC communication stack with ARIB STD-T75:2001, section 4.

E.3 CCC functions

The CCC functions are specified in ARIB T75:2001, 4.4.2.1.2.

The SET service is not supported by the CCC application.

GET and GET_STAMPED always carry AC-CR for secure communication.

E.4 Data requirements

The addressing of the EFC system and application data implemented by the OBE and RSE should conform to the rules specified in ISO 14906:2022, 5.3 and Clause 8. For CCC application data, EID should always be used. Multiple instances of attributes are not supported.

The OBE should implement the EFC attributes specified in Clause 8.

The RSE should support any OBE that is otherwise compliant.

E.5 Security requirements

A security mechanism could be specified independently of ARIB DSRC in the future, in the form of security protection guidelines as in ISO/TS 17574.

E.6 Transaction requirements

E.6.1 General

The EFC transaction model complies with ISO 14906:2022, Clause 6 with the restrictions and amendments given in E.6.2 to E.6.3 in this document.

E.6.2 Initialisation phase

E.6.2.1 CCC application-specific contents of BST

AID = 20 is used for the CCC application. There is only one instance of AID = 20 in the BST.

The CCC application is qualified as a mandatory application.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

E.6.2.2 CCC application-specific contents of VST

There is only one instance of AID = 20 in the `ApplicationList` in the VST. This instance contains the parameter `ApplicationContextMark` as specified in ISO 15628:2013, A.2.

E.6.3 Transaction phase

There are no requirements specific to the transaction phase. The RSE may perform a transaction by using the CCC functions in any sequence as long as the requirements of this document are met.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

Annex F
(informative)

Using the WAVE communication stack for CCC applications

F.1 General

This annex specifies the use of the WAVE system based on the standards IEEE 1609.4, IEEE 802.11-2016, IEEE 1609.0, IEEE 1609.3 and IEEE 1609.11-2010.

F.2 Communication requirements

The communication requirements are specified in IEEE 1609.11-2010, A.2.

The contents of the beacon service table (BST), specified in 9.2.2, along with optional application-specific information, should be transmitted as the Provider Service Context (PSC) of a WAVE service advertisement (WSA) message, as specified in IEEE 1609.11-2010.

F.3 CCC functions

F.3.1 General

The CCC functions are specified in IEEE 1609.11-2010, A.3.1, Table 1. Table F.1 shows the correspondences between the WAVE primitives, the DSRC application layer primitives and the EFC functions.

Table F.1 — CCC functions correspondence

CCC function	DSRC application layer primitive (ISO 15628)	EFC function (ISO 14906)	WAVE primitive(s) (IEEE 1609.3-2010)
Initialise communication	INITIALISATION		`WME-ProviderService.request`, `WME-UserService.request`
Data retrieval	GET		`WSM-WaveShortMessage.request`, `WSM-WaveShortMessage.indication`
n.a.	SET		
n.a.		GET_STAMPED	
n.a.		GET_INSTANCE	
Driver notification		SET_MMI	
Test communication		ECHO	
Secure data retrieval		GET_SECURE	
n.a.		SET_SECURE	
Terminate communication		RELEASE	`WME-ProviderService.request`

The WAVE communication stack provides a CCC function called “Secure data retrieval” as an alternative to “Authenticated data retrieval”.

F.3.2 Secure data retrieval

The function “Secure data retrieval” should be implemented by the EFC function GET_SECURE as specified in ISO 14906 and with additional specification in IEEE 1609.11-2010, A.3.2.

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024

© ISO 2024 – All rights reserved

GET_SECURE should not carry access credentials.

NOTE GET_SECURE according to IEEE 1609.11–2010 carries encrypted application data in the form of an encrypted AttributeList and an authenticator calculated by the recipient over the requested data.

F.4 Data requirements

The addressing of the EFC system and application data implemented by the OBE and RSE should conform to the rules specified in ISO 14906:2022, 5.3 and Clause 8. For CCC application data, EID should always be used. Multiple instances of attributes are not supported.

The OBE should implement the CCC attributes specified in Clause 8.

The RSE should support any OBE that is compliant.

F.5 Security requirements

F.5.1 General

This annex provides for an authentication service that may serve to prove the identity of the data source and the integrity of the data or to provide for non-repudiation, or both. It contains a mechanism for control of access to the OBE data by means of access credentials. Access protection is also used.

It provides for an encryption service that also deals with control of access to the OBE data, for the protection of user privacy.

F.5.2 Authentication/non-repudiation

Authenticated reading of data is provided by the function "Secure data retrieval". Authenticators are defined as being of ASN.1 type OCTET STRING. When using the WAVE communication stack:

— the OBE should be able to calculate authenticators according to IEEE 1609.11-2010, A.5;

— the RSE should able to calculate authenticators according to IEEE 1609.11-2010, A.5;

— the RSE should request a message authentication code (MAC) by addressing at least the `PaymentMeans` attribute.

F.5.3 Encryption

Encryption of payload data should be used to manage access to attributes by the function "Secure data retrieval". Encryption is mandatory for all attributes specified in this document.

The OBE should support encryption as specified in IEEE 1609.11-2010, A.5.

The RSE should support encryption as specified in IEEE 1609.11-2010, A.5.

F.6 Transaction requirements

F.6.1 General

The EFC transaction model complies with ISO 14906:2022, Clause 6, and IEEE 1609.11-2010 A.5, with the restrictions and amendments given in F.6.2 to F.6.3 in this document.

F.6.2 Initialisation phase

F.6.2.1 CCC application-specific contents of BST

As specified in 9.2.2.

© ISO 2024 – All rights reserved

STANDARDSISO.COM : Click to view the full PDF of ISO 12813:2024