Irish Standard
I.S. EN ISO 12813:2019

Electronic fee collection - Compliance check communication for autonomous systems (ISO 12813:2019)

I.S. EN ISO 12813:2019

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):

NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.

This document is based on:	*Published:*
EN ISO 12813:2019	2019-12-04

This document was published under the authority of the NSAI and comes into effect on:	ICS number:
2019-12-23	03.220.20 35.240.60 NOTE: If blank see CEN/CENELEC cover page

NSAI	T +353 1 807 3800	Sales:
1 Swift Square,	F +353 1 807 3838	T +353 1 857 6730
Northwood, Santry	E standards@nsai.ie	F +353 1 857 6729
Dublin 9	W NSAI.ie	W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

National Foreword

I.S. EN ISO 12813:2019 is the adopted Irish version of the European Document EN ISO 12813:2019, Electronic fee collection - Compliance check communication for autonomous systems (ISO 12813:2019)

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

For relationships with other publications refer to the NSAI web store.

Compliance with this document does not of itself confer immunity from legal obligations.

In line with international standards practice the decimal point is shown as a comma (,) throughout this document.

This page is intentionally left blank

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 12813

December 2019

ICS 03.220.20; 35.240.60

Supersedes EN ISO 12813:2015

English Version

Electronic fee collection - Compliance check communication for autonomous systems (ISO 12813:2019)

Perception de télépéage - Communication de contrôle de conformité pour systèmes autonomes (ISO 12813:2019)

Elektronische Gebührenerhebung - Kommunikation zur Übereinstimmungsprüfung für autonome Systeme (ISO 12813:2019)

This European Standard was approved by CEN on 5 October 2019.

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

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

Contents

Page

European foreword **3**

European foreword

This document (EN ISO 12813:2019) has been prepared by Technical Committee ISO/TC 204 "Intelligent transport systems" in collaboration with Technical Committee CEN/TC 278 “Intelligent transport systems” the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2020, and conflicting national standards shall be withdrawn at the latest by June 2020.

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

This document supersedes EN ISO 12813:2015.

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

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

Endorsement notice

The text of ISO 12813:2019 has been approved by CEN as EN ISO 12813:2019 without any modification.

This page is intentionally left blank

I.S. EN ISO 12813:2019

INTERNATIONAL STANDARD

ISO 12813

Second edition
2019-11

Electronic fee collection — Compliance check communication for autonomous systems

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

Reference number
ISO 12813:2019(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **v**

Introduction ..... **vii**

1 Scope **1**

2 Normative references **2**

3 Terms and definitions **3**

4 Abbreviated terms **4**

5 Application interface architecture **5**
5.1 General 5
5.2 Services provided 5
5.3 Attributes 6
5.4 Toll context 6
5.5 Use of lower layers 6
5.5.1 Supported DSRC communication stacks 6
5.5.2 Use of the CEN-DSRC stack 7

6 Functions **7**
6.1 Functions in detail 7
6.1.1 General 7
6.1.2 Initialise communication 7
6.1.3 Data retrieval 8
6.1.4 Authenticated data retrieval 8
6.1.5 Driver notification 8
6.1.6 Terminate communication 8
6.1.7 Test communication 8
6.2 Security 8
6.2.1 General 8
6.2.2 Authentication/non-repudiation 9
6.2.3 Access credentials 9

7 Attributes **9**
7.1 General 9
7.2 Data regarding identification 11
7.3 Data regarding status 11
7.4 Data regarding vehicle 18

8 Transaction model **20**
8.1 General 20
8.2 Initialisation phase 20
8.2.1 Initialisation request 20
8.2.2 CCC application-specific contents of BST 20
8.2.3 CCC application-specific contents of VST 21
8.3 Transaction phase 21

Annex A (normative) **CCC data type specifications** **22**

Annex B (normative) **PICS proforma** **23**

Annex C (informative) **ETSI ES 200 674-1 communication stack usage for CCC applications** **31**

Annex D (informative) **Using the IR DSRC communication stack (CALM IR) for CCC applications** **34**

Annex E (informative) **Using the ARIB DSRC communication stack for CCC applications** **35**

Annex F (informative) **Using the WAVE communication stack for CCC applications** **37**

Annex G (informative) **Example CCC transaction** **40**

Annex H (informative) **Security considerations** **42**

Annex I (informative) **Use of this document for the EETS** **47**
Bibliography **49**

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation 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*.

This second edition cancels and replaces the first edition (ISO 12813:2015), which has been technically revised. It also incorporates the Amendment ISO 12813:2015/Amd 1:2017.

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

— inclusion of the changes of ISO 12813:2015/Amd 1:2017(E), i.e. it defines the electronic fee collection compliance check communication using the WAVE communication stack as defined in IEEE;

— reverting the length of attribute GnssStatus back to 23 octets and removing the data element of type Altitude;

— allowing a maximum of two instances of AID = 20 in the ApplicationList in the VST;

— adding values goSuspicion (5) and noGoPaymentMeans (4) to the data element statusIndicator as well as updating and clarifying the semantic definitions of all statuses and when they change;

— updating the OBEStatusHistory – timeWhenChanged and ExtendedOBEStatusHistory -timeWhenChanged/timeWhenChangedToPrevious based on the updated sematic definition of statusIndicator;

— clarifing the relationship between the LLLL element in VehicleClass and the LocalVehicleClassId (imported from ISO 17575-3);

— clarifing that ExtendedOBEStatusHistory - timeWhenChangedToPrevious shall be set to zero in case no previous value is available;

— clarifing that VehicleWeightHistory – timeWhenChangedToCurrentValue changes not only due to changes in the attribute VehicleCurrentMaxTrainWeight but also changes in the assignment of the LocalVehicleClassId or the LLL element within VehicleClass;

— adding the EFC attributes ExtendedOBUStatusHistoryPart1, ExtendedOBUStatusHistoryPart2 and UserConfirmation;

— updating Annex C by adding the attributes VehicleCurrentMaxTrainWeight and AttributeUpdateInterval to the information in virtual memory according to ETSI ES 200 674-1 communication stack usage for CCC applications.

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

Introduction

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 defines 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.

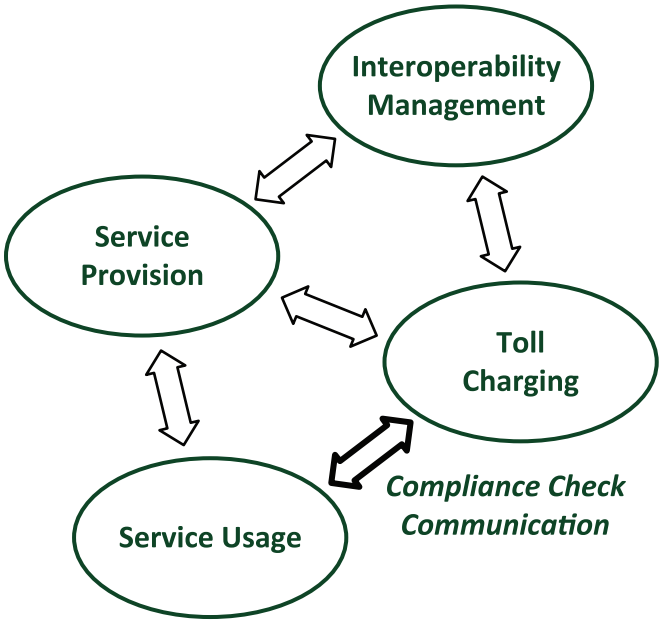

Figure 1 — Compliance check communication in EFC architecture according to ISO 17573-1

Toll chargers have the need to check whether 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 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, standardised at the time of personalisation of the OBE, are present in the OBE such that an operator of an interrogator essentially can read the same data from all OBE independent of 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 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.).

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 interrogator is to check whether the user has fulfilled his obligations, especially:

— 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 to the user correct operational status ("green"), the service provider 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 ("red") — either set by the central system of the service provider (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 has to use alternative means of toll declaration or payment until the problem is remedied and the OBE is "green" again[1)].

Ultimately, the policy of when to signal "green" or "red" is defined by the service provider in accordance with the requirements defined by the toll charger(s).

In the case where the OBE status turns "red", the user has to take action, declare road usage subject to fees or pay by some alternative means as soon as practicable. Until he does, the user is in a potentially non-compliant situation. In order 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, there is no notion of toll context as far as possible (see especially 5.4). It is within the responsibility of the service provider 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 might 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 standardised way are quite limited. This document contains some provisions for this task (e.g. the attributes CommunicationStatus, GnssStatus, DistanceRecordingStatus), but otherwise assumes that toll chargers monitor correct recording by comparing observed traffic (e.g. with cameras) with usage data received from service providers.

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

---

1) 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.

A test suite for checking an OBE or RSE implementation for compliance with this document is defined in the corresponding edition of ISO 13143-1 and ISO 13143-2.