

DIN EN ISO 12813



ICS 35.240.60

Ersatz für
DIN EN ISO 12813:2016-04

**Elektronische Gebührenerhebung –
Kommunikation zur Übereinstimmungsprüfung für autonome Systeme –
Änderung 1 (ISO 12813:2015 + Amd 1:2017);
Englische Fassung EN ISO 12813:2015 + A1:2017**

Electronic fee collection –
Compliance check communication for autonomous systems –
Amendment 1 (ISO 12813:2015 + Amd 1:2017);
English version EN ISO 12813:2015 + A1:2017

Perception du télépéage –
Communication de contrôle de conformité pour systèmes autonomes –
Amendement 1 (ISO 12813:2015 + Amd 1:2017);
Version anglaise EN ISO 12813:2015 + A1:2017

Gesamtumfang 62 Seiten

DIN-Normenausschuss Automobiltechnik (NAAutomobil)
DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik in DIN und VDE

Nationales Vorwort

Dieses Dokument (EN ISO 12813/A1:2017) wurde vom Technischen Komitee ISO/TC 204 „Intelligent Transport Systems“ in Zusammenarbeit mit dem Technischen Komitee CEN/TC 278 „Intelligente Verkehrssysteme“, dessen Sekretariat von NEN (Niederlande) gehalten wird, erarbeitet.

Das zuständige deutsche Normungsgremium ist der Gemeinschaftsarbeitsausschuss NA 052-02-71 GA „Gemeinschaftsarbeitsausschuss NAAutomobil/DKE: Intelligente Verkehrssysteme“ des DIN-Normenausschusses Automobiltechnik (NAAutomobil).

Das Präsidium des DIN hat mit seinem Beschluss 1/2004 festgelegt, dass von dem in den Regeln der europäischen Normungsarbeit von CEN/CENELEC verankerten Grundsatz, wonach Europäische Normen in den drei offiziellen Sprachen Deutsch, Englisch und Französisch veröffentlicht werden, in begründeten Ausnahmefällen abgewichen und auf die deutsche Sprachfassung verzichtet werden kann.

Die Genehmigung dafür hat die DIN-Geschäftsleitung entsprechend ihren in Anlage 1 zu dem DIN-Rundschreiben A 5/2004 festgelegten Kriterien für die vorliegende Norm auf Antrag des NA 052 NAAutomobil als Ergebnis einer Einzelfallentscheidung erteilt, zumal bereits dieser Norm zugrunde liegende Papiere überwiegend in englischer Sprache auch von den deutschen Marktteilnehmern angewendet werden.

Fahrzeuginterne Einrichtungen (OBE), die auf satellitengestützter Positionierung zur Datensammlung für Gebührenerhebung zur Straßennutzung dienen, werden autonom gegenüber der Straßenrandinfrastruktur betrieben. Die OBE zeichnet dabei die gefahrene Entfernung in einem mautpflichtigen Gebiet auf.

Dieser technische Standard definiert Anforderungen an die DSRC (en: dedicated short-range communication) zwischen OBE und einem Fragesteller zur Einhaltungsprüfung der Straßennutzung in einem Mautregime. Es basiert auf einer Gebührenerhebungsarchitektur nach ISO 17573.

Änderungen

Gegenüber DIN EN ISO 12813:2016-04 wurden folgende Änderungen vorgenommen:

- a) Zeilen in Tabelle 1, Tabelle B.8 und Tabelle B.19 ergänzt;
- b) Korrekturen in den Abschnitten 1, 6.1.1 und 6.2.2;
- c) Neuer Anhang I wurde eingefügt.

Frühere Ausgaben

DIN CEN ISO/TS 12813 (DIN SPEC 91160: 2011-07
DIN EN ISO 12813: 2016-04

Nationaler Anhang NA (informativ)

Begriffe

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe.

3.1

Zugriffsbeglaubigung

(en: access credentials)

vertrauenswürdige Bescheinigung oder sicheres Modul, welches die geforderte Identität eines Objektes oder einer Anwendung schafft

[Quelle: EN 15509:2014, 3.1]

3.2

Attribut

(en: attribute)

adressierbares Datenpaket, welches aus einem einzelnen Datenelement oder strukturierten Sequenzen von Datenelementen besteht

3.3

Authentifizierung

(en: authentication)

Sicherheitsmechanismus, welcher die Überprüfung der bereitgestellten Identität ermöglicht

[Quelle: EN 301 175]

3.4

Authentifikator

(en: authenticator)

möglicherweise verschlüsselte Daten, die zur Authentifizierung verwendet werden

[Quelle: ISO/TS 19299:2015, 3.5]

3.5

Datenintegrität

(en: data integrity)

Eigenschaft, dass Daten nicht in unautorisierter Art und Weise verändert oder vernichtet wurden

[Quelle: ISO/TS 19299:2015, 3.28]

3.6

festе straßenseitige Einrichtung

(en: fixed roadside equipment)

fest installierte straßenseitige Einrichtung

3.7

mobile straßenseitige Einrichtung

(en: mobile roadside equipment)

Einrichtung, die in einer mobilen Einheit montiert ist oder mobile Endgeräte, die entlang der Straße verwendet werden

3.8

fahrzeuginterne Einrichtung

OBE

(en: on-board equipment)

alle erforderlichen Einrichtungen im Fahrzeug, die zur Durchführung notwendiger Kommunikationsdienste benötigt werden

3.9

Straßenrand-Einrichtung

RSE

(en: roadside equipment)

feste oder mobile Einrichtung entlang einer Straße

3.10

Mautdienstanbieter

TSP

(en: toll service provider)

Organisation, die Mautdienste in einem oder mehreren Mautgebieten anbietet

[Quelle: ISO 17573:2010]

3.11

Dienstprimitive

(en: service primitive)

elementarer Kommunikationsdienst, der durch die Anwendungsschnitt der Applikation zur Verfügung gestellt wird

[Quelle: ISO 14906:2011, 3.18 modifiziert]

3.12

Mautkontext

(en: toll context)

logische Sicht, bestehend aus Attributen und Funktionen der Basiselemente eines Mautschemas, die aus einem Mautgrundprinzip, der geografischen Verteilung mautpflichtiger Objekte sowie dem Verhalten des zugeordneten Front-Ends besteht

3.13

Mautregime

(en: toll regime)

Regelwerk, einschließlich Regeln zur Kontrolle, für die Erhebung von Maut in einem Mautgebiet

[Quelle: ISO 17573:2010, 3.20]

3.14

Transaktion

(en: transaction)

Gesamtheit eines Informationsaustausches zwischen zwei physisch getrennten Kommunikationseinheiten

English Version

Electronic fee collection - Compliance check
communication for autonomous systems - Amendment 1
(ISO 12813:2015/Amd 1:2017)

Perception du télépéage - Communication de contrôle
de conformité pour systèmes autonomes -
Amendement 1 (ISO 12813:2015/Amd 1:2017)

Elektronische Gebührenerhebung - Kommunikation
zur Übereinstimmungsprüfung für autonome Systeme -
Änderung 1 (ISO 12813:2015/Amd 1:2017)

This amendment A1 modifies the European Standard EN ISO 12813:2015; it was approved by CEN on 21 May 2017.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

This document (EN ISO 12813:2015/A1:2017) has been prepared by Technical Committee ISO/TC 204 "Intelligent transport systems" in collaboration with Technical Committee CEN/TC 278 "Intelligent transport systems" the secretariat of which is held by NEN.

This Amendment to the European Standard EN ISO 12813:2015 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2017, and conflicting national standards shall be withdrawn at the latest by December 2017.

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Endorsement notice

The text of ISO 12813:2015/Amd 1:2017 has been approved by CEN as EN ISO 12813:2015/A1:2017 without any modification.

English Version

**Electronic fee collection - Compliance check
communication for autonomous systems
(ISO 12813:2015)**

Perception du télépéage - Communication de contrôle
de conformité pour systèmes autonomes
(ISO 12813:2015)

Elektronische Gebührenerhebung - Kommunikation
zur Übereinstimmungsprüfung für autonome Systeme
(ISO 12813:2015)

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

This document (EN ISO 12813:2015) has been prepared by Technical Committee ISO/TC 204 "Intelligent transport systems" in collaboration with Technical Committee CEN/TC 278 "Road transport and traffic telematics" the secretariat of which is held by NEN.

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Foreword

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

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

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Amendment 1 to ISO 12813:2015 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

This amendment defines the electronic fee collection compliance check communication using the WAVE communication stack as defined in IEEE.

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Electronic fee collection — Compliance check communication for autonomous systems

AMENDMENT 1

Page 1

Replace:

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

with:

- use of the CEN-DSRC stack as specified in EN 15509, or other equivalent DSRC stacks as described in Annexes C, D, E and I

Page 6, 5.5.1, Table 1

Add the following row before the last row of Table 1:

WAVE DSRC	IEEE 1609.11-2010 ISO 15628	IEEE 1609.3-2010 IEEE 1609.4-2016 IEEE 802.11	Implementation example in Annex I
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Page 7, 6.1.1

Replace:

Subclauses 6.1.2 to 6.1.7 define the functions for CEN-DSRC only. For other supported media, according to 5.5.1, equivalent functionality should be provided, see Annex C for ETSI/ES 200 674-1 5.8 GHz microwave DSRC, Annex D for CALM Infrared DSRC and Annex E for ARIB microwave DSRC.

with:

6.1.2 to 6.1.7 define the functions for CEN-DSRC only. For other supported media, according to 5.5.1 equivalent functionality should be provided; see Annex C for ETSI/ES 200 674-1 5.8 GHz microwave DSRC, Annex D for CALM Infrared DSRC, Annex E for ARIB microwave DSRC and Annex I for WAVE 5.9 GHz microwave DSRC.

Page 9, 6.2.2

Replace:

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

with:

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

Page 21, Table B.8 and page 24, Table B.19

Add the following row after item number 4 in Table B.8 and in Table B.19:

5	WAVE DSRC	Annex I	o	
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Insert new Annex I after Annex H.

Annex I

(informative)

Using the WAVE communication stack for CCC applications

I.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 (see full references in the Bibliography).

I.2 Communication requirements

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

The contents of the Beacon Service Table (BST), defined in ISO 12813:2015, 8.2.2, along with optional application-specific information, should be transmitted as the Provider Service Context (PSC) of a WAVE service advertisement (WSA) message, as defined in IEEE 1609.11-2010.

I.3 CCC functions

I.3.1 General

The CCC functions are defined in IEEE 1609.11-2010, Clause A3.1, Table 1. [Table I.1](#) shows the correspondences between the WAVE primitives, the DSRC layer 7 primitives and the EFC functions.

Table I.1 — CCC functions correspondence

CCC function	DSRC Layer 7 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,
n.a.	SET		WSM-WaveShortMessage.indica-
n.a.		GET_STAMPED	tion
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”.

I.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.

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.

I.4 Data requirements

The addressing of the EFC system and application data implemented by the OBE and RSE should conform to the rules defined in ISO 14906:2011, 5.3. For CCC application data, EID should always be used. Multiple instances of attributes are not supported.

The OBE should implement the CCC attributes defined in Clause 7.

The RSE should support any OBE that is compliant.

I.5 Security requirements

I.5.1 General

This annex provides for an authentication service that may serve to prove the identity of the data source, the integrity of the data and/or to provide for non-repudiation. 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, both for protection of user privacy

I.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 be 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.

I.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 defined in this document.

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

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

I.6 Transaction requirements

I.6.1 General

The EFC transaction model complies with ISO 14906:2011, Clause 6, and IEEE 1609.11-2010 A.5, with the restrictions and amendments given in I.6.2 to I.6.3.

I.6.2 Initialisation phase

I.6.2.1 CCC application-specific contents of BST

As defined in 8.2.2.

I.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 defined in IEEE 1609.11-2010, A.5.

I.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.

Page 42, Bibliography

Add the following references to the end of the Bibliography:

[23] IEEE 802.11-2016, *IEEE Standard for Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications*

[24] IEEE 1609.0-2013, *IEEE Guide for Wireless Access in Vehicular Environments (WAVE) — Architecture*

[25] IEEE 1609.3-2010, *IEEE Standard for Wireless Access in Vehicular Environments (WAVE) — Networking Services*

[26] IEEE 1609.11-2010, *IEEE Standard for Wireless Access in Vehicular Environments (WAVE) — Over-the-Air Electronic Payment Data Exchange Protocol for Intelligent Transportation Systems (ITS)*

[27] IEEE 1609.4-2016, *IEEE Standard for Wireless Access in Vehicular Environments (WAVE) — Multi-channel Operation*

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Foreword

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The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*.

This first edition replaces the Technical Specification ISO/TS 12813:2009, which has been technically revised. This first edition incorporates the following main modifications compared to the Technical Specification:

- conversion from a Technical Specification to an International Standard;
- new attributes added (TrailerCharacteristics, AttributeUpdateInterval, VehicleCurrentMaxTrainWeight, VehicleWeightHistory, ExtendedOBESStatusHistory, ExtendedVehicleAxlesHistory and LocalVehicleClassId);
- amendment of terms, in order to reflect harmonization of terms across electronic fee collection (EFC) standards;
- amendments to reflect changes to the underlying base standards, in particular ISO 14906 and EN 15509;
- addition of a new informative annex (i.e. [Annex H](#)) on how to use this International Standard for the European electronic toll service;
- editorial and formal corrections as well as changes to improve readability.

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 road side infrastructure). The OBE will record the amount of road usage in all toll charging systems it passes through.

This International Standard 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. See [Figure 1](#).

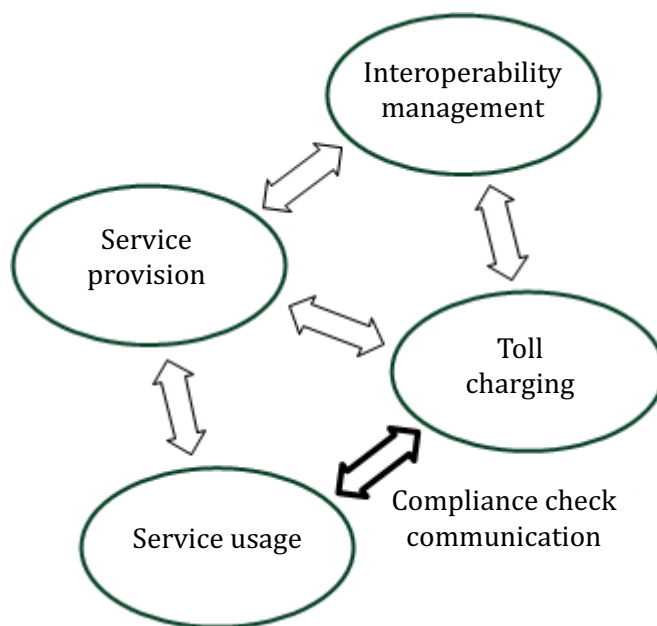


Figure 1 — Compliance check communication in EFC architecture as per ISO 17573

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 road-side 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 International Standard defines attributes required on all OBE for reading by an interrogator.

This International Standard has been prepared considering the prerequisites listed below in a) to e).

- a) Collected evidence must be court proof. Data must be 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 must be read only, since the operator of the interrogator must not interfere with the working of the OBE.
- c) All attributes, standardised at the time of personalisation of the OBE, should be 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 International Standard.

- d) The attributes, derived from the individual toll regime, must be of general importance for all toll system types (motorway tolling, area tolling, tolls for ferries, bridges, tunnels, cordon pricing, etc.).
- e) The attributes must apply to all OBE architectures, and especially to both thin (edge-light) and fat (edge heavy) client architectures. The interrogator must be able to receive essentially the same information irrespective of OBE implementation decisions.

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 working 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 working of the OBE and for the payment by the user. Hence, as long as the OBE signals “green” and the user fulfils his other obligations (such as 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” again¹⁾.

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 quickly as possible. 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 International Standard 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 nation-wide 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 International Standard builds on the concept that regarding compliance, there is no notion of toll context (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 International Standard 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 International Standard 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) Here, “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.