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Elektronsko pobiranje pristojbin - Komunikacija za potrditev skladnosti avtonomnih sistemov (ISO/DIS 12813:2018)

Electronic fee collection - Compliance check communication for autonomous systems (ISO/DIS 12813:2018)

Elektronische Gebührenerhebung - Kommunikation zur Übereinstimmungsprüfung für autonome Systeme (ISO/DIS 12813:2018)

Perception du télépéage - Communication de contrôle de conformité pour systèmes autonomes (ISO/DIS 12813:2018)

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35.240.60	Uporabniške rešitve IT v prometu	IT applications in transport

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Electronic fee collection — Compliance check communication for autonomous systems

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

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Foreword

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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

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This third edition replaces the International Standard ISO 12813:2015, which has been technically revised. This third edition incorporates the following main modifications compared to the previous:

- 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 bytes while adding a new attribute named 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
- Clarified the relationship between the LLLL element in VehicleClass and the LocalVehicleClassId (imported from ISO 17575-3)

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

- Clarified 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 elemet within VehicleClass

- Updated Annex C by adding the attributes VehicleCurrentMaxTrainWeight, Altitude and AttributeUpdateInterval to the information in virtual memory according to ETSI/ES 200 674-1 communication stack usage for CCC applications

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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 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. See Figure 1.

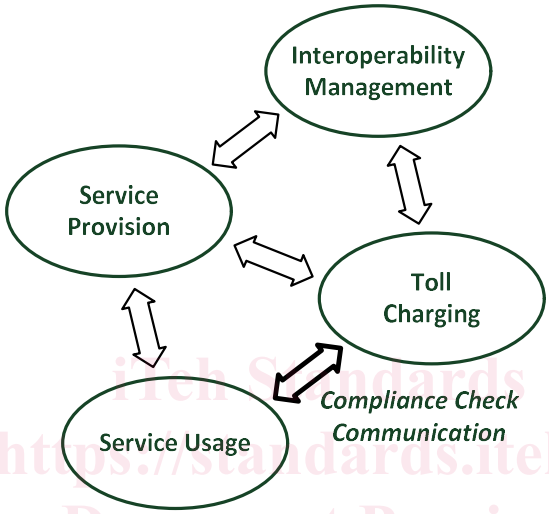

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Figure 1 — Compliance check communication in EFC architecture as per ISO 17573

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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 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

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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 applie 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 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" 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 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 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 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 document 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

[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.

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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.

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.

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Electronic fee collection — Compliance check communication for autonomous systems

1 Scope

This document defines 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 outside interrogator (road-side mounted equipment, mobile device 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. The CCC permits identification of the OBE, vehicle and contract, and verification of whether the driver has fulfilled his 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 defines data syntax and semantics, but does not define a communication sequence. All the attributes defined herein are required in any OBE claimed to be compliant with this document, even if some values are set to “not defined” in cases where certain functionality is not present in an OBE. The interrogator is free to choose which attributes are read, 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 defined in ISO 14906 wherever useful.

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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 and ARIB DSRC as alternatives to the CEN-DSRC. The attributes and functions defined are for compliance checking by means of the DSRC communication services provided by DSRC layer 7, with the CCC attributes and functions made available to the CCC applications at the road-side equipment (RSE) and OBE. The attributes and functions are defined on the level of application data units (ADU).

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 are given in Annex A, protocol implementation conformance statement (PICS) proforma

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

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