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Electronic fee collection — Information exchange between service provision and toll charging

Perception du télépéage — Échange d'informations entre la prestation de service et la perception du péage

[Revision of first edition (ISO 12855:2012) and ISO 12855:2012/Cor 1:2013]

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This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 12855 was prepared by Technical Committee ISO/TC 204, *Intelligent Transport Systems*, Subcommittee SC , .

This second edition cancels and replaces the first edition (ISO 12855:2012), clause(s) 5 and 6, figures 1 and 2 and annexes A, B, E, F of which have been technically revised.

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ISO 12855 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*, in collaboration with Technical Committee CEN/TC 278, *Road transport and traffic telematics*.

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Introduction

The widespread use of tolling also requires provisions for users of vehicles that are circulating through many different toll domains. Users should be offered a single contract for driving a vehicle through various toll domains. Where those vehicles require a form of on-board equipment (OBE) this should be interoperable with the toll systems in the various toll domains. In Europe, for example, this need has been officially recognized and legislation on interoperability has already been adopted (see Directive 2004/52/EC and Decision 2009/750/EC). There is both a commercial and economic justification in respect to the OBE and the toll systems for standards enabling interoperability.

The system architecture defined in ISO 17573:2010 is the basis for all standards that relate to tolling systems in the toll domain. From this system architecture standard, other standards have consistently reused

— common definitions of terms and concepts and basic system functionalities and structure,

— common terminology, and

— identified interfaces that are or need to be defined.

ISO 17573:2010 uses ISO/IEC 10746-3 for the description of the architecture.

The following Figure 1 shows the scope of the group of electronic fee collection (EFC) related standards based upon the architecture standard.

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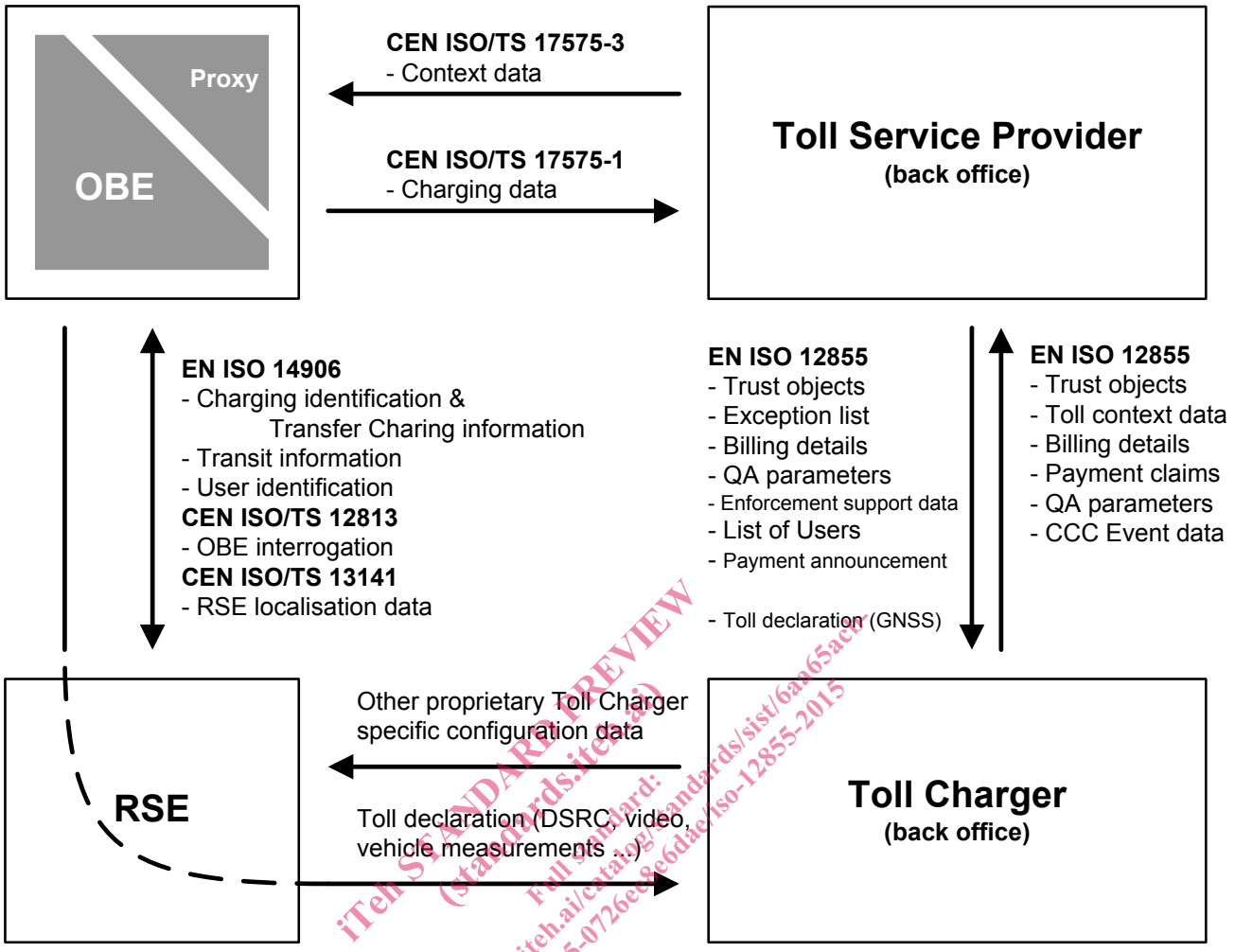

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Figure 1 — Scope of EFC related standards

A given transport service for a given vehicle is fully identified by one or several toll declarations, made available to the Toll Charger. Toll declarations have to be made available according to the rules of the toll regime of the toll domain.

The amount due for a given transport service used by a vehicle liable to toll is concluded by the Toll Charger (TC) with the use of toll declarations (as described above) and calculation is made according to the rules of the toll regime (formula, tariff tables, specific situations rules, traffic conditions, etc.). That means, the Toll Charger has the authority to decide on the amount due, even if he decides to assign the Toll Service Provider the task to calculate the amount due..

The information above, associated with a given transport service, is named billing details; for a given transport service, the billing details are referring to one or several toll declarations.

Depending on the toll regime, billing details are elaborated with information collected by the Toll Charger and/or the relevant Toll Service Provider (TSP); they are concluded by the Toll Charger.

The Toll Charger elaborates and makes the payment claims (or toll payment claims) available to each Toll Service Provider, according to the bilateral agreements it has with each Toll Service Provider, referring to billing details. These payment claims include an amount due taking into account any specific commercial conditions applicable to a vehicle, a fleet of vehicles or a given Toll Service Provider.

This International Standard identifies and specifies the set of messages exchanged between two actors in the roles of Toll Service Provider and Toll Charger as defined in ISO 17573:2010. To specify these interfaces, this International Standard uses the enterprise description of the toll environment, and the interactions defined

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between the named classes of roles, as defined in ISO 17573:2010. This allows for a complete specification of the data that is transferred between those identified entities. In addition to that, a number of computational interfaces are identified, where interactions in terms of sequences of messages are defined.

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Electronic fee collection — Information exchange between service provision and toll charging

1 Scope

This International Standard specifies

— the interfaces between electronic fee collection (EFC) systems for vehicle related transport services, e.g. road user charging, parking and access control; it does not cover interfaces for EFC systems for public transport; an EFC system can include any EFC system, e.g. also systems automatically reading licence plate numbers of vehicles passing a toll point;

— an exchange of information between the central equipment of the two roles of service provision and toll charging, e.g.

  — charging related data (toll declarations, billing details),

  — administrative data, and

  — confirmation data;

— transfer mechanisms and supporting functions;

— information objects, data syntax and semantics;

— examples of data interchanges (see Annexes C, D and E).

This International Standard supports any toll service and any technology used for charging.

It is defined as a toolbox standard of transactions and messages which can be used for the assigned purpose. The detailed definitions of mandatory and optional elements in a real implementation are defined elsewhere. It does not define all communication sequences, communication stacks and timings.

The scope of this International Standard is illustrated in Figure 2. The data types and associated coding related to the data elements described in Clause 6 are defined in Annex A, using the abstract syntax notation one (ASN.1) according to ISO/IEC 8824-1.

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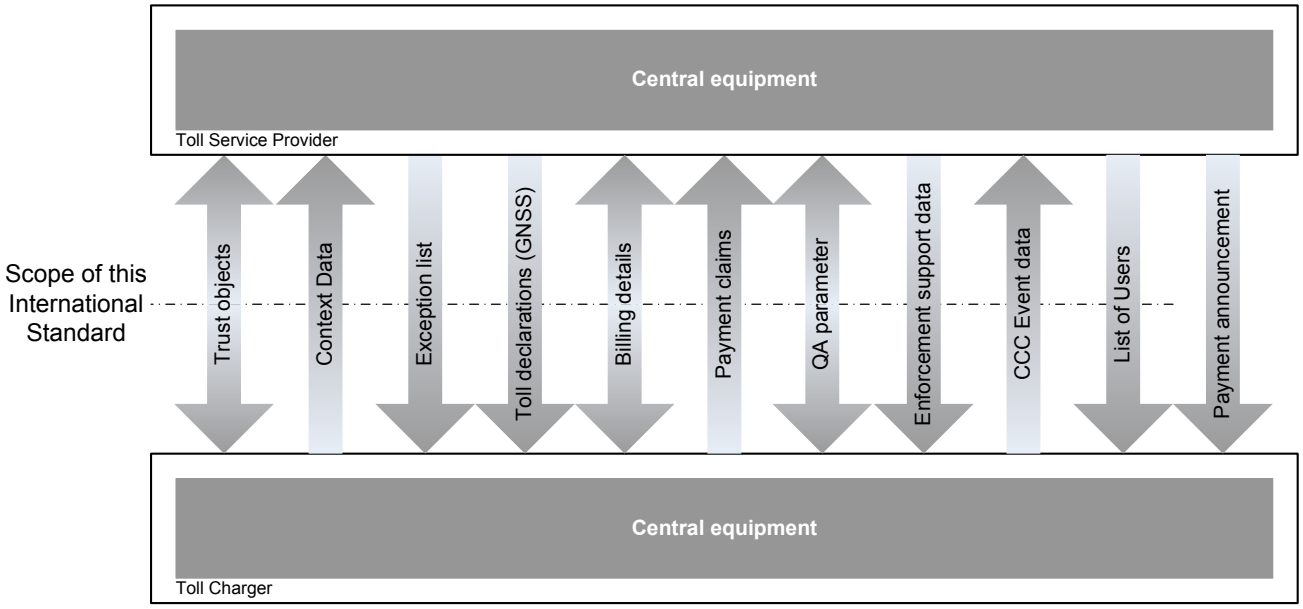

Figure 2 — Scope of this International Standard

Any communication between Toll Charger and/or Toll Service Provider with any other involved party is outside the scope of this International Standard. Any communication between elements of the Toll Charger and the Toll Service Provider which is not part of the back office communication is outside the scope of this International Standard.

The processes regarding the payments and exchanges of fiscal, commercial or legal accounting documents are outside the scope of this International Standard.

The definitions of service communication channels, protocols and service primitive to actually transfer the messages are outside the scope of this International Standard.

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2 Normative references

The following referenced documents are indispensable for the application 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 17573:2010, *Electronic fee collection — System architecture for vehicle-related tolling*

ISO 14816:2005, *Road transport and traffic telematics -- Automatic vehicle and equipment identification -- Numbering and data structure*

ISO 14906:2011, *Electronic fee collection — Application interface definition for dedicated short-range communication*

ISO/TS 17575-1:2010, *Electronic fee collection — Application interface definition for autonomous systems — Part 1: Charging*

ISO/TS 17575-3:2011, *Electronic fee collection — Application interface definition for autonomous systems — Part 3: Context data*

ISO/TS 17575-4:2011, *Electronic fee collection — Application interface definition for autonomous systems — Part 4: Roaming*

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

ISO/IEC 8824-1, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO/IEC 8825-4, *Information technology — ASN.1 encoding rules: XML Encoding Rules (XER)*

ISO 639-1, *Codes for the representation of names of languages — Part 1: Alpha-2 code*

3 Terms and definitions

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

3.1
billing detail
for a given transport service, all necessary data required to determine and/or verify the amount due for the service user

NOTE 1 If the data is accepted by both the Toll Charger and the Toll Service Provider then it is called a concluded billing detail which can be used to issue a payment claim.

NOTE 2 For a given transport service, the billing detail is referring to one or several valid toll declaration(s). A valid billing detail has to fulfil formal requirements, including security requirements, agreed between the Toll Service Provider and the Toll Charger.

3.2
charge report
data structure transmitted from the front end to the Back End to report road usage data and supplementary related information

NOTE In 2009/750/EC charge report is referred to as “toll declaration”.

3.3
charging data
toll relevant data produced by the on-board equipment and sent to the Toll Service Provider's back-office systems

3.4
computational specification
decomposition of a system into objects performing individual functions and interacting at well defined interfaces

3.5
context data
information defined by the responsible Toll Charger necessary to establish the toll due for circulating a vehicle on a particular toll domain and to conclude the toll transaction

[ISO 17573:2010, definition 3.1]

3.6
customer
person or legal entity that uses the service of a Toll Service Provider

[ISO 17573:2010, definition 3.2]

NOTE Depending on the local situation, the customer can be the owner, lessor, lessee, keeper, (fleet) operator, holder of the vehicle's registration certificate, driver of the vehicle, or any other third person.

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3.7
driver
person who drives a vehicle

[ISO 17573:2010, definition 3.3]

NOTE The driver is assumed to operate (use/serve) the on-board equipment (e.g. the setting of the number of axles).

3.8
electronic fee collection
EFC
toll charging by electronic means via a wireless interface

NOTE 1 Adapted from ISO 17573:2010, definition 3.4.

NOTE 2 The actual payment (collection of the fee) may take place outside the toll system.

3.9
enforcement
process of compelling observance of a law, regulation, etc.

[ISO 17573:2010, definition 3.5]

NOTE In this context: the process of compelling observance of a toll regime.

3.10
interface
abstraction of the behaviour of an object that consists of a subset of the interactions of that object together with a set of constraints on when they may occur

[ISO/IEC 10746-2]

3.11
interoperability
ability of systems to provide services to, and accept services from, other systems and to use the services so exchanged to enable them to operate effectively together

[ISO 17573:2010, definition 3.7]

NOTE For tolling, interoperability aims at enabling a vehicle to drive through various toll domains while having only one on-board equipment operating under one contract with a Toll Service Provider.

3.12
on-board equipment
OBE
equipment fitted within or on the outside of a vehicle and used for toll purposes

[ISO 17573:2010, definition 3.9]

NOTE The OBE does not need to include payment means.

3.13
one(s) liable for toll
person(s) or legal entities liable to pay toll under the operation of a toll regime

[ISO 17573:2010, definition 3.10]

NOTE A toll regime can designate more than one person to be (jointly and severally) liable for paying the toll.

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3.14
payment claim
recurring statement referring to concluded billing details made available to the Toll Service Provider by the Toll Charger who indicated and justified the amount due

NOTE The payment claim is used by the Toll Service Provider to issue financial objects to its customers (e.g. invoices on behalf of the Toll Charger). A given toll payment claim is referring to billing details and takes into account any specific commercial conditions applicable to a vehicle, a fleet of vehicles, a customer of a Toll Service Provider and/or a Toll Service Provider. A valid “payment claim” has to fulfil formal requirements, including security requirements, agreed between the Toll Service Provider and the Toll Charger.

3.15
roadside equipment
RSE
equipment located along the road transport network, for the purpose of communication and data exchanges with on-board equipment

[ISO 14906:2011, definition 3.1]

3.16
service user
see **user** (3.29)

3.17
tariff scheme
set of rules to determine the fee due for a vehicle in a toll domain for a tolled object at a certain day and time

[ISO 17573:2010, definition 3.14]

EXAMPLE A table that shows the fee for various classes of vehicles.

3.18
toll
charge, tax, fee, or duty in connection with using a vehicle within a toll domain

[ISO 17573:2010, definition 3.15]

NOTE The definition is a generalization of the classic definition of a toll as “a charge, a tax, or a duty for permission to pass a barrier or to proceed along a road, over a bridge, etc.”. The definition above also includes fees regarded as an (administrative) obligation, e.g. a tax or a duty.

3.19
Toll Charger
TC
legal entity charging toll for using a vehicle within a toll domain

[ISO 17573:2010, definition 3.16]

NOTE In other documents the terms “operator” or “toll operator” can be used.

3.20
toll declaration
statement to a Toll Charger that confirms the presence of a vehicle in a toll domain in a format agreed between the Toll Service Provider and the Toll Charger

[ISO 17573:2010, definition 3.17]

NOTE A valid toll declaration has to fulfil formal requirements, including security requirements, agreed between the Toll Service Provider and the Toll Charger.

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