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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*

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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](http://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](http://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 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*.

This second edition cancels and replaces the first edition (ISO 12855:2012), which has been technically revised. The following changes have been made:

- adding new Application Data Units (ADUs) due to comments received from National Bodies;
- aligning the ASN.1 data definitions with the current versions of EN 14906, and ISO 17575 (all parts);
- moving the ASN.1 module from [Annex A](#) to an external text file, in a format that can be processed by ASN.1 compilers;
- clarifying the semantics of parameters in ADUs;
- aligning the structure of all major clauses in a consistent manner to improve readability.

## Introduction

The widespread use of tolling requires provisions for users of vehicles that circulate 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 is the basis for all standards that relate to tolling systems in the toll domain. With respect to ISO 17573, this International Standard

- adopts its definitions of terms and concepts and basic system functionalities and structure,
- uses its terminology, and
- specifies the interfaces therein identified.

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

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

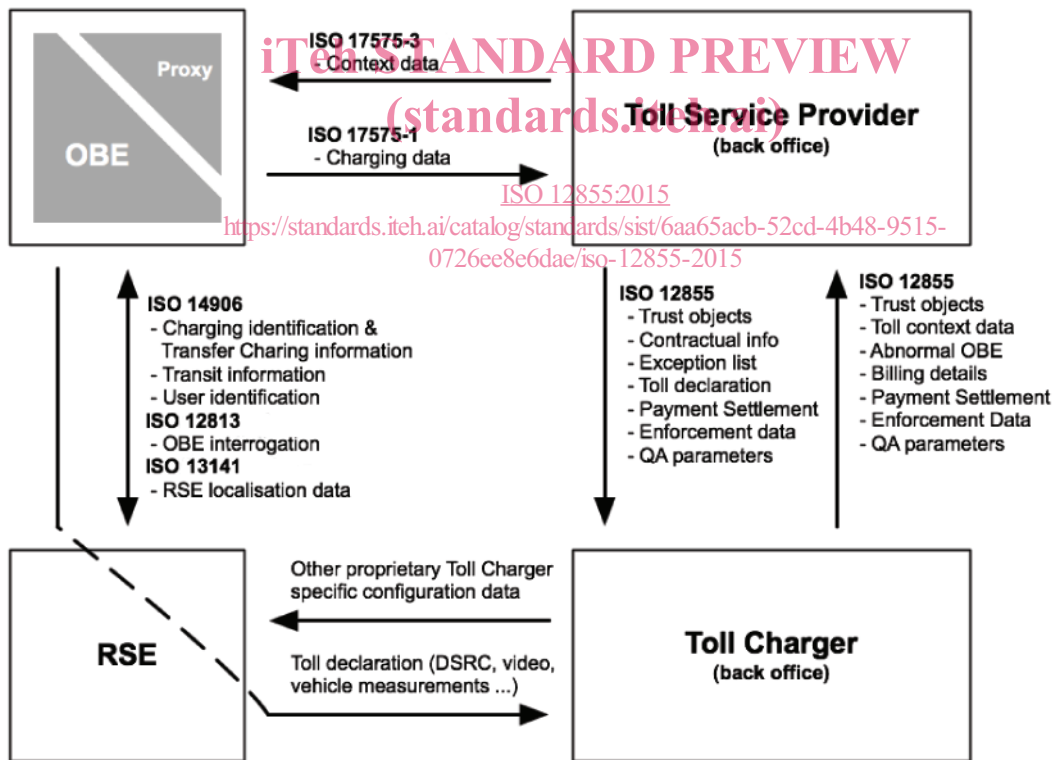


Figure 1 — Scope of EFC related standards

A given transport service for a given vehicle is fully identified by one or several toll declarations made available to the Toll Charger (TC). 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 finalized by the 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 that the

TC has the authority to decide on the amount due, even if it decides to assign the Toll Service Provider (TSP) 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 TC and/or the relevant TSP; they are finalized by the TC.

The TC elaborates and makes the payment claims (or toll payment claims) available to each TSP, according to the bilateral agreements it has with each TSP, 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 TSP.

This International Standard defines a set of interactions in support of technical interoperability between back-office systems of TCs and TSPs. The EFC-service and the EFC System model on which this International Standard is based is defined in ISO 17573.

This International Standard does not provide a full solution for interoperability, and it does not define other parts of the EFC system, other services, other technologies and non-technical elements of interoperability.

The development of a common European Electronic Toll Service (EETS) as a part of the European EFC Directive (2004/52/EC) also calls for the definition of an interoperable EFC service. This International Standard provides for effective support for the work on the definition of EETS. Details on the usage of this International Standard for the EETS are provided in [Annex E](#).

This International Standard identifies and specifies the set of Application Protocol Data Units exchanged between two actors in the roles of Toll Service Provider and Toll Charger as defined in ISO 17573. To specify these interfaces, this International Standard uses the enterprise description of the toll environment, and the interactions defined between the named classes of roles, as defined in ISO 17573. This allows for a complete specification of the data that is transferred between those identified entities. In addition, a number of computational interfaces are identified and interactions in terms of sequences of Application Protocol Data Units are defined.

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

## 1 Scope

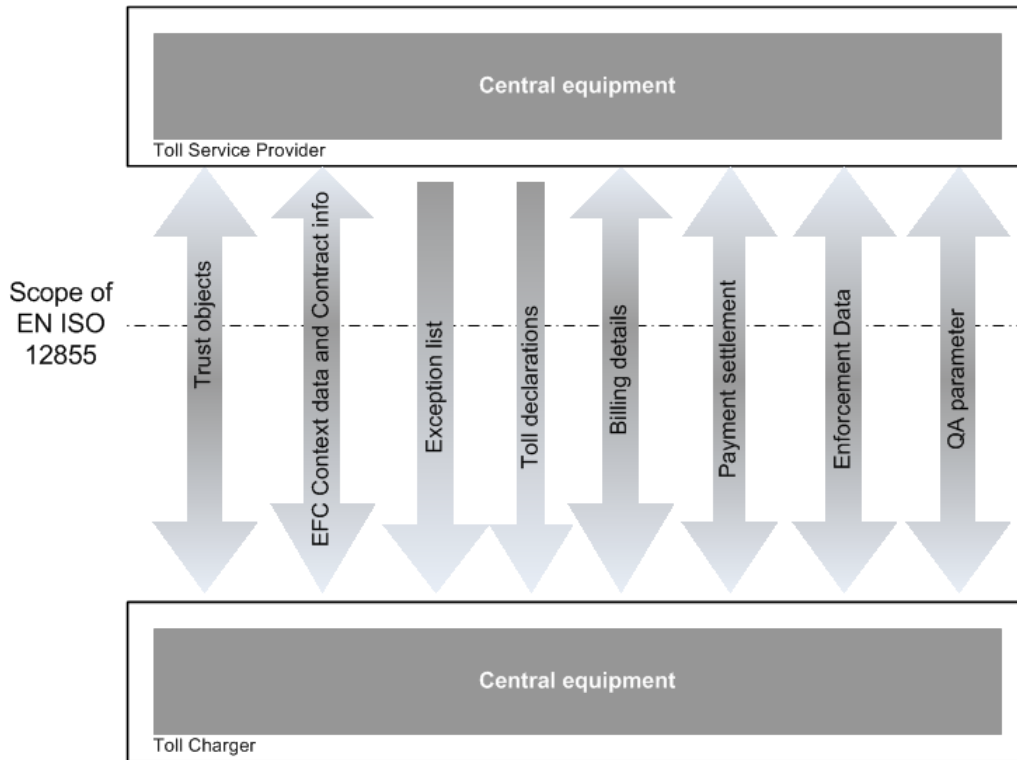
This International Standard specifies

- 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. including systems that automatically read 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 [Annex C](#) and [Annex D](#)), and
- an example on how to use this International Standard for the European Electronic Tolling Service (EETS) (see [Annex F](#)).

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

It is defined as a toolbox standard of transactions and Application Protocol Data Units (APDUs), 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.



**Figure 2 — Scope of this International Standard**  
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This International Standard is not applicable to

- any communication between Toll Charger (TC) or Toll Service Provider (TSP) with any other involved party,
- any communication between elements of the TC and the TSP that is not part of the back office communication,
- processes regarding payments and exchanges of fiscal, commercial or legal accounting documents, and
- definitions of service communication channels, protocols and service primitives to transfer the APDUs.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

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/IEC 9594-8:2014, *Information technology — Open Systems Interconnection — The Directory — Part 8: Public-key and attribute certificate frameworks*

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

ISO/IEC 9797-2:2011, *Information technology — Security techniques — Message Authentication Codes (MACs) — Part 2: Mechanisms using a dedicated hash-function*

ISO/IEC 10118-3, *Information technology — Security techniques — Hash-functions — Part 3: Dedicated hash-functions*

ISO/IEC 11770-3, *Information technology — Security techniques — Key management — Part 3: Mechanisms using asymmetric techniques*

ISO/IEC 14888-2:2008, *Information technology — Security techniques — Digital signatures with appendix — Part 2: Integer factorization based mechanisms*

ISO 14906:2011/Amd1:2015, *Electronic fee collection — Application interface definition for dedicated short-range communication*

ISO 17573, *Electronic fee collection — Systems architecture for vehicle-related tolling*

ISO 17575-1:—<sup>1)</sup>, *Electronic fee collection — Application interface definition for autonomous systems — Part 1: Charging*

ISO 17575-3:—<sup>1)</sup>, *Electronic fee collection — Application interface definition for autonomous systems — Part 3: Context data*

ISO/IEC 18033-2:2006, *Information technology — Security techniques — Encryption algorithms — Part 2: Asymmetric ciphers*

ISO/TS 19299:2015, *Electronic fee collection — Security framework*

IETF RFC 2634, *Enhanced Security Services for S/MIME*, June 1999

IETF RFC 4347, *Datagram Transport Layer Security*, April 2006

IETF RFC 5035, *Enhanced Security Services (ESS) Update: Adding CertID Algorithm Agility*, August 2007

IETF RFC 5246, *The Transport Layer Security (TLS) Protocol*, August 2008

IETF RFC 5746, *Transport Layer Security (TLS) Renegotiation Indication Extension*, February 2010

IETF RFC 6040, *Tunnelling of Explicit Congestion Notification*, February 2013

### 3 Terms and definitions

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

#### 3.1

##### billing detail

information needed to determine or verify the amount due for the usage of a given service

Note 1 to entry: If the data are accepted by both the Toll Charger and the Toll Service Provider then the term used is “concluded billing detail”, which can be used to issue a payment claim.

Note 2 to entry: For a given transport service, the billing detail refers 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.

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1) To be published.

### 3.2

#### **black list**

list of users for which the service provider denies contractual responsibility

Note 1 to entry: The service provider in the context of this International Standard is the Toll Service Provider (TSP).

### 3.3

#### **charge report**

information containing road usage and related information originated at the Front End

Note 1 to entry: In European Decision 2009/750/EC, a charge report is referred to as a “toll declaration”.

[SOURCE: ISO 17575-1:—, 3.6]

### 3.4

#### **charging data**

relevant data on the usage of a certain service

### 3.5

#### **computational specification**

decomposition of a system into objects performing individual functions and interacting at well-defined interfaces

### 3.6

#### **electronic fee collection**

##### **EFC**

fee collection by electronic means

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### 3.7

#### **enforcement**

measures or actions performed to achieve compliance with laws, regulations or rules

Note 1 to entry: In this context: the process of compelling observance of a toll regime.

### 3.8

#### **interoperability**

ability of systems to exchange information and to make mutual use of the information that has been exchanged

Note 1 to entry: 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.

[SOURCE: ISO/IEC TR 10000-1:1998, 3.2.1, modified.]

### 3.9

#### **on-board equipment**

##### **OBE**

all required equipment on-board a vehicle for performing required *EFC* (3.6) functions and communication services

### 3.10

#### **payment claim**

recurring statement referring to concluded *billing details* (3.1) made available to the payer by the payee indicating and justifying the amount due

Note 1 to entry: 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 refers to *billing details* (3.1) 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.

### 3.11 roadside equipment RSE

equipment located along the road, either fixed or mobile

### 3.12 tariff scheme

set of rules to determine the fee due for a vehicle within a *toll domain* (3.17)

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

### 3.13 toll

charge, tax or duty levied in relation with using a vehicle in a *toll domain* (3.17)

Note 1 to entry: 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.

### 3.14 toll charger TC

entity which levies *toll* (3.13) for the use of vehicles in a *toll domain* (3.17)

Note 1 to entry: In other documents the terms “operator” or “toll operator” can be used.

[SOURCE: ISO 17573:2010, 3.16, modified — “legal” has been deleted from before “entity” and “the use of” has been added.]

### 3.15 toll context data

information defined by the responsible *Toll Charger* (3.14) necessary to establish the *toll* (3.13) due for using a vehicle on a particular toll context and to conclude the toll transaction

[SOURCE: ISO 12855:2015, 3.15]

### 3.16 toll declaration

statement to declare the usage of a given *toll* (3.13) service to a *Toll Charger* (3.14)

Note 1 to entry: A valid toll declaration has to fulfil formal requirements, including security requirements, agreed between the *Toll Service Provider* (3.19) and the *Toll Charger* (3.14).

[SOURCE: ISO/TS 19299:2015, 3.44]

### 3.17 toll domain

area or a part of a road network where a certain *toll regime* (3.18) is applied

[SOURCE: ISO 17573:2010, 3.18, modified — “certain” has been added.]

### 3.18 toll regime

set of rules, including *enforcement* (3.7) rules, governing the collection of *toll* (3.13) in a *toll domain* (3.17)

[SOURCE: ISO 17573:2010, 3.20]

### 3.19 toll service provider TSP

entity providing *toll* (3.13) services in one or more *toll domains* (3.17)

Note 1 to entry: In other documents the terms “issuer” or “contract issuer” can be used.

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Note 2 to entry: The *Toll Service Provider* (3.19) can provide the *on-board equipment* (3.9) or can provide only a magnetic card or a smart card to be used with *on-board equipment* (3.9) provided by a third party.

Note 3 to entry: The *Toll Service Provider* (3.19) is responsible for the operation (functioning) of the *on-board equipment* (3.9).

[SOURCE: ISO 17573:2010, 3.23, modified — the definition has been condensed.]

### 3.20

#### trust object

information object that is exchanged between entities to ensure mutual trust

EXAMPLE An electronic signature or an electronic certificate.

[SOURCE: ISO 17573:2010, 3.28]

### 3.21

#### white list

list of users for which the service provider accepts contractual responsibility

Note 1 to entry: The service provider in the context of this International Standard is the *Toll Service Provider* (3.19).

Note 2 to entry: An entry on a white list is independent of entries on a *black list* (3.2).

## 4 Symbols and abbreviated terms

ADU	Application data unit (ISO 14906)
ANPR	Automatic Number Plate Reading
APCI	Application Protocol Control Information <a href="https://standards.iteh.ai/catalog/standards/sist/6aa65acb-52cd-4b48-9515-0726ee8e6dae/iso-12855-2015">ISO 12855:2015</a>
APDU	Application Protocol Data Unit (ISO 14906)
CCC	Compliance Check Communication (ISO 12813)
CRL	Certificate revocation list
DSRC	Dedicated short-range communication (ISO 14906)
DTLS	Datagram Transport Layer Security
EFC	Electronic Fee Collection (ISO 17573)
GNSS	Global Navigation Satellite System
HTTPS	Hyper-Text Transfer Protocol Secure
ICS	Implementation Conformance Statement
IEC	International Electrotechnical Commission
IUT	Implementation Under Test
ITU	International Telecommunication Union
LPN	Licence Plate Number
OBE	On-Board Equipment (ISO 14906)
OBU	On-Board Unit
OCSP	Online Certificate Status Protocol

OSI	Open Systems Interconnection
PAN	Personal Account Number (ISO 14906)
QA	Quality Assurance
RSA	Rivest, Shamir and Adleman (ISO/TS 19299)
RSE	Roadside Equipment (ISO 14906)
SLA	Service Level Agreement
SU	Service User
SUT	System Under Test (ISO/TS 14907-1)
TC	Toll Charger
TLS	Transport Layer Security
TSP	Toll Service Provider
VRM	Vehicle Registration Mark

NOTE RSA is an algorithm for public-key cryptography, also referred to as asymmetrical cryptographic technique.

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### 5 Architectural concepts and information exchanges (standards.iteh.ai)

#### 5.1 Main roles in the toll charging environment

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ISO 17573 defines the four main roles shown in [Figure 3](#).