

DIN EN ISO 12855

ICS 35.240.60

Einsprüche bis 2013-12-11
Vorgesehen als Ersatz für
DIN EN ISO 12855:2012-05

Entwurf

**Elektronische Gebührenerhebung –
Informationsaustausch zwischen Dienstleistern und
Gebühreneinzugsunternehmen (ISO/DIS 12855:2013);
Englische Fassung prEN ISO 12855:2013**

Electronic fee collection –
Information exchange between service provision and toll charging (ISO/DIS 12855:2013);
English version prEN ISO 12855:2013

Perception du télépéage –
Échange d'informations entre la prestation de service et la perception du péage
(ISO/DIS 12855:2013);
Version anglaise prEN ISO 12855:2013

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2013-10-11 wird der Öffentlichkeit zur Prüfung und
Stellungnahme vorgelegt.

Weil die beabsichtigte Norm von der vorliegenden Fassung abweichen kann, ist die Anwendung dieses
Entwurfes besonders zu vereinbaren.

Stellungnahmen werden erbeten

- vorzugsweise online im Norm-Entwurfs-Portal des DIN unter www.entwuerfe.din.de bzw. für Norm-Entwürfe der DKE auch im Norm-Entwurfs-Portal der DKE unter www.entwuerfe.normenbibliothek.de, sofern dort wiedergegeben;
- oder als Datei per E-Mail an naautomobil@din.de möglichst in Form einer Tabelle. Die Vorlage dieser Tabelle kann im Internet unter www.din.de/stellungnahme oder für Stellungnahmen zu Norm-Entwürfen der DKE unter www.dke.de/stellungnahme abgerufen werden;
- oder in Papierform an den Normenausschuss Automobiltechnik (NAAutomobil) im DIN, 10004 Berlin, Postfach 8 04 62 (Hausanschrift: Behrenstr. 35, 10117 Berlin).

Die Empfänger dieses Norm-Entwurfs werden gebeten, mit ihren Kommentaren jegliche relevanten
Patentrechte, die sie kennen, mitzuteilen und unterstützende Dokumentationen zur Verfügung zu stellen.

Gesamtumfang 108 Seiten

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

Nationales Vorwort

Dieses Dokument (prEN ISO 12855:2013) wurde vom Technischen Komitee CEN/TC 278 „Telematik für den Straßenverkehr und -Transport“ ausgearbeitet, dessen Sekretariat vom NEN (Niederlande) gehalten wird in Verbindung mit dem technischen Komitee ISO/TC 204 „Intelligent transport systems“.

Das zuständige deutsche Normungsgremium ist der Gemeinschaftsarbeitsausschuss NA 052-02-71 GA „Telematik“ des 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.

Da Mautsysteme in Europa weit verbreitet sind, müssen Vorkehrungen für Anwender getroffen werden, die sich in unterschiedlichen Mautgebieten bewegen. Ziel sollte es sein, dass ein Kunde mit nur einem Mautvertrag eines beliebigen Anbieters sich in unterschiedlichen Mautgebieten bewegen kann. Dort, wo für die Fahrzeuge eine fahrzeuginterne Gebühreneinheit benötigt wird, ist es notwendig, dass diese interoperabel mit den verschiedenen Mautsystemen ist. In Europa wurde bereits die Gesetzgebung zur Interoperabilität der Gebührenerhebung mit der Direktive 2004/52 angepasst.

Diese Internationale Norm identifiziert und spezifiziert gemäß den generischen Anforderungen in ISO 17573 notwendige Botschaften für den Austausch zwischen Maut-Dienstanbieter und Mauterheber. Um diese Schnittstellen zu definieren, werden in dieser Norm entsprechende Informationen aus den Unternehmen zur Mautumgebung und deren Interaktionen verwendet.

Der Anwendungsbereich dieser Norm ist:

- a) Schnittstellen zwischen Gebührenerhebungssystemen (EFC) für fahrzeugrelevante Transportdienste wie Straßennutzungsgebühren oder Parken und der Zugriffskontrolle. Diese Norm schließt die Normung von Schnittstellen zu Fahrtkostenerhebungssystemen des öffentlichen Verkehrs aus.
- b) Informationsaustausch zwischen zentralen Einrichtungen der beiden Rollen Dienstbereitstellung und Gebührenerhebung, z. B.:
 - Gebührenrelevante Daten (Mauterklärung, Rechnungsdetails),
 - Administrative Daten,
 - Bestätigungsdaten,
 - Übertragungsmechanismus sowie unterstützende Funktionen,
 - Informationsobjekte, Datensyntax und Semantik,
 - Beispiele zum Datenaustausch.

Änderungen

Gegenüber DIN EN ISO 12855:2012-05 wurden folgende Änderungen vorgenommen:

- a) die Abschnitte 5 und 6, Bilder 1 und 2 sowie Anhänge A, B, E wurden technisch überarbeitet;
- b) Anhang F wurde ergänzt.

Nationaler Anhang NA (informativ)

Begriffe

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe:

3.1

Abrechnungsdetails

(en: billing detail)

alle notwendigen Daten zur Bestimmung und/oder Verifizierung der Gebührenhöhe eines Nutzers für einen gegebenen Transportdienst

ANMERKUNG 1 Wurden die Daten vom Mauterheber (en: toll charger, TC) und dem Maut-Dienstanbieter (en: toll service provider, TSP) angenommen, spricht man abgeschlossenen Abrechnungsdetails welche ggf. zur Ausstellung eines Zahlungsanspruches verwendet werden.

ANMERKUNG 2 Abrechnungsdetails referenzieren einen oder mehrere gültige Mauterklärung(en) für einen gegebenen Transportdienst. Eine gültiges „Abrechnungsdetail“ muss folgende formale Anforderungen erfüllen: Sicherheitsanforderungen, Übereinstimmung zwischen Maut-Dienstanbieter und Mauterheber.

3.2

Abbuchungsbericht

(en: charge report)

Datenstruktur, welche vom „Front-End“ zum „Back-End“ gesendet wird, um Straßenbenutzungsdaten und Zusatzinformationen zu übertragen

ANMERKUNG Im 2009/750/EG Abbuchungsbericht wird eine „Gebührenerklärung“ referenziert.

3.3

Abbuchungsdaten

(en: charging data)

mautrelevante Daten, welche von einer fahrzeuginternen Einheit (OBE) an die Abrechnungsstelle des Maut-Dienstanbieter gesendet wird

3.4

Berechnungsspezifikation

(en: computational specification)

Zerlegung eines Systems in Objekte, welche individuelle Funktionen ausführen und über fest definierte Schnittstellen interagieren

3.5

Kontextdaten

(en: context data)

Informationen die für den verantwortlichen Mauterheber notwendig ist, um die Maut für ein Fahrzeug in einem bestimmten Mautgebiet zu ermöglichen und die Mauttransaktion abzuschließen

[ISO 17573:2010, Definition 3.1]

3.6

Kunde eines Maut-Diensteanbieters

(en: customer of a Toll Service Provider)

Person einer legalen Instanz, die einen Maut-Diensteanbieter in Anspruch nimmt

[ISO 17573:2010, Definition 3.2]

ANMERKUNG Abhängig der örtlichen Situation könnte der Kunde Besitzer, Vermieter, Leasingnehmer, Halter, (Flotten) Betreiber, Eigentümer eines Registrierungszertifikates eines Fahrzeuges, Fahrzeugführer oder irgendeine andere dritte Person sein.

3.7

Fahrer

(en: driver)

Person die ein Fahrzeug führt

[ISO 17573:2010, Definition 3.3]

ANMERKUNG Es wird angenommen, dass der Fahrer die fahrzeuginterne Einheit (OBE) betreibt (nutzt/bedient), z. B. die Eingabe der Achsenanzahl.

3.8

elektronische Gebührenerhebung

EFC

(en: electronic fee collection)

elektronische Mautabbuchung mittels Drahtlosschnittstelle

ANMERKUNG 1 Übernommen aus ISO 17573, Definition 3.4

ANMERKUNG 2 Die eigentliche Bezahlung (Gebührenerhebung) kann außerhalb eines Mautsystems stattfinden.

3.9

Vollstreckung

(en: enforcement)

der Prozess einer zwingenden Gesetzes- oder Regulierungseinhaltung

[ISO 17573:2010, Definition 3.5]

ANMERKUNG In diesem Zusammenhang: Der Prozess zur zwingenden Einhaltung eines Mautregimes.

3.10

Schnittstelle

(en: interface)

Abstraktion eines Objektverhaltens welches aus einer Untermenge von Interaktionen zu diesem Objekt besteht, zusammen mit möglichen Beschränkungen, die auftreten können

[ISO/IEC 10746-2]

3.11

Interoperabilität

(en: interoperability)

Fähigkeit eines Systems, Dienste an andere Systeme zu übertragen und zu empfangen, wobei diese Dienste möglichst effizient zur Nutzung ausgetauscht werden

[ISO 17573:2010, Definition 3.7]

ANMERKUNG Denn Maut-Interoperabilität bezweckt, dass damit Fahrzeuge durch verschiedene Mautgebiete fahren können und dabei nur eine fahrzeuginterne Einrichtung (OBE) mit nur einem Vertrag eines Maut-Diensteanbieters haben.

3.12

fahrzeuginterne Einrichtung

OBE

(en: on-board equipment)

eine für Mautzwecke im- oder außerhalb des Fahrzeugs angepasste Einrichtung

[ISO 17573:2010, Definition 3.9]

ANMERKUNG Die OBE beinhaltet nicht notwendigerweise Bezahlungsmöglichkeiten.

3.13

Mautverantwortliche(r)

(en: one(s) liable for toll)

Person(en) oder legale Instanzen, die innerhalb eines Mautregimes verantwortlich sind, Maut zu bezahlen

[ISO 17573:2010, Definition 3.10]

ANMERKUNG Ein Mautregime darf mehr als eine Person (zusammen und einzeln) für die Entrichtung der Mautverantwortlich machen.

3.14

Zahlungsanspruch

(en: payment claim)

wiederkehrende Aussage bezüglich abgeschlossener Rechnungsdetails, welche dem Maut-Dienstanbieter (TSP) vom Mauterheber zur Verfügung gestellt werden, der die Höhe der Gebühr angibt und bewertet

ANMERKUNG Der Zahlungsanspruch wird vom TSP benutzt, um finanzielle Objekte ihrer Kunden auszustellen (z. B. Rechnung für den Mauterheber, usw.). Ein vorhandener Zahlungsanspruch bezieht sich auf Rechnungsdetails und berücksichtigt spezielle kommerzielle Konditionen die für Fahrzeuge, Fahrzeugflotten, ein Kunde einer TSP und/ oder eine TSP relevant sind. Ein gültiger „Zahlungsanspruch“ muss formalen Anforderungen, wie Sicherheit und Zustimmung zwischen Maut-Dienstanbieter und Mauterheber genügen.

3.15

Straßenrand-Einrichtung

RSE

(en: roadside equipment)

Einrichtung, die entlang einer Fahrbahn installiert ist, zur Kommunikation und Datenaustausch mit fahrzeuginternen Systemen

[ISO 14906, Definition 3.1]

3.16

Dienstnutzer

(en: service user)

siehe **Nutzer** (3.29)

3.17

Tarifübersicht

(en: tariff scheme)

Menge von Regeln zur Gebührenfestsetzung für ein Fahrzeug in einem Mautgebiet für ein Mautobjekt an einem bestimmten Tag und einem bestimmten Zeitpunkt

[ISO 17573:2010, Definition 3.14]

BEISPIEL z. B. eine Tabelle, die Gebühren für verschiedene Fahrzeugklassen zeigt

3.18**Maut**

(en: toll)

Abgabe, Steuer, Gebühr oder Verpflichtung in Verbindung einer Fahrzeugbenutzung innerhalb eines Mautgebiets

[ISO 17573:2010, Definition 3.15]

ANMERKUNG Die Definition ist eine Generalisierung der klassischen Definition der Maut als Abgabe, Steuer oder Pflichtabgabe um eine Grenze übertreten zu dürfen bzw. eine Straße oder Brücke benutzen zu können (usw.). Die Definition beinhaltet außerdem Pflichtgebühren wie Steuer.

3.19**Mauterheber****TC**

(en: toll charger)

legale Instanz zur Mauterhebung, um ein Fahrzeug in einem Mautgebiet zu betreiben

[ISO 17573:2010, Definition 3.16]

ANMERKUNG In anderen Dokumenten könnte der Begriff Maut-Betreiber verwendet werden.

3.20**Mauterklärung**

(en: toll declaration)

Aussage eines Mauterhebers, welche das Vorhandensein eines Fahrzeuges in einem Mautbereich bestätigt, in einem Format, dass zwischen Maut-Dienstanbieter und Mauterheber vereinbart wurde

[ISO 17573:2010, Definition 3.17]

ANMERKUNG eine gültige Mauterklärung muss formalen Anforderungen, wie Sicherheit und Zustimmung zwischen Maut-Dienstanbieter und Mauterheber genügen.

3.21**Mautgebiet**

(en: toll domain)

Bereich oder Teil eines Straßennetzwerks in der ein bestimmtes Mautregime angewendet wird

[ISO 17573:2010, Definition 3.18]

3.22**Mautstelle**

(en: toll point)

Ort innerhalb eines Mautgebietes, in der eine fahrzeuginterne Einrichtung (OBE) eine Mauterklärung ausstellen muss

[ISO 17573:2010, Definition 3.19]

3.23**Mautregime**

(en: toll regime)

Menge von Regeln, einschließlich Betreiberegeln, welche die Erhebung von Mautgebühren Regeln

[ISO 17573:2010, Definition 3.20]

3.24

Mautservice

(en: toll service)

Service, welcher dem Nutzer ermöglicht, mit einem Mautvertrag und einer fahrzeuginternen Einrichtung (OBE) einen oder mehrere Gebührenerhebungsbereiche zu nutzen

[ISO 17573:2010, Definition 3.22]

3.25

Maut-Dienstanbieter

TSP

(en: toll service provider)

legale Instanz, welche ihren Kunden Mautdienste für ein- oder mehrere Mautgebiet(e) und eine- oder mehrere Fahrzeugklasse(n) anbietet

[ISO 17573:2010, Definition 3.23]

ANMERKUNG 1 In anderen Dokumenten könnte der Begriff Vertragsersteller verwendet werden.

ANMERKUNG 2 Der Maut-Dienstanbieter darf entweder eine fahrzeuginterne Einrichtung (OBE) oder nur eine Magnet- oder Smartkarte zusammen mit einer OBE eines Drittanbieters (wie ein Mobiltelefon mit SIM-Karte) zur Verfügung stellen.

ANMERKUNG 3 Der Maut-Dienstanbieter ist für den Betrieb (Funktion) der fahrzeuginternen Einrichtung (OBE) verantwortlich.

3.26

Mautsystem

(en: toll system)

fahrzeugexterne Einrichtungen und andere mögliche Einrichtungen, welche vom Mauterheber zur Mauteinzahlung von Fahrzeugen verwendet werden

ANMERKUNG 1 Die fahrzeuginterne Einrichtung (OBE) ist nicht Teil der Begriffsfestlegung. Wenn nicht, sollte die OBE Teil des Mautsystems sein, für das es verwendet wird.

ANMERKUNG 2 Die eigentliche Bezahlung (Gebühreneinzahlung) darf außerhalb des Mautsystems stattfinden.

3.27

Mautobjekt

(en: tolled object)

unterschiedlicher Teil eines Mautgebietes, für das eine oder mehrere Tarifübersicht(en) gelten

BEISPIEL Ein Mautobjekt kann ein Bereich, alle öffentlichen Straßen innerhalb eines Bereiches, eine Brücke, eine Zone oder Straßenabschnitt (Netzwerk) sein.

3.28

vertrauenswürdige Objekt

(en: trust object)

Informationsobjekt, welches zwischen zwei Einheiten mit gegenseitigem Vertrauen ausgetauscht wird

BEISPIEL Ein vertrauenswürdige Objekt kann z. B. eine elektronische Signatur oder elektronisches Zertifikat sein.

3.29

Nutzer

(en: user)

generischer Begriff für einen Kunden eines Maut-Dienstanbieters, wobei abhängig vom Kontext ein Mautverantwortlicher, ein Fahrzeugbesitzer, ein Flottenbetreiber, ein Fahrer, usw. gemeint sein kann

[ISO 17573:2010, Definition 3.26]

— Leerseite —

Electronic fee collection — Information exchange between service provision and toll charging (ISO/DIS 12855:2013)

Perception du télépéage — Échange d'informations entre la prestation de service et la perception du péage (ISO/DIS 12855:2013)

Elektronische Gebührenerhebung — Informationsaustausch zwischen Dienstleistern und Gebühreneinzugsunternehmen (ISO/DIS 12855:2013)

ICS:

Descriptors:

Document type: European Standard
Document subtype:
Document stage: Parallel Enquiry
Document language: E

Foreword

This document (prEN ISO 12855:2003) has been prepared by Technical Committee CEN/TC 278 “Road transport and traffic telematics”, the secretariat of which is held by NEN, in collaboration with Technical Committee ISO/TC 204 “Transport information and control systems”.

This document is currently submitted to the parallel Enquiry.

This document will supersede EN ISO 12855:2008.

Blanc page

Contents

Page

Foreword.....	v
Introduction	vi
1 Scope	1
2 Normative references	2
3 Terms and definitions	3
4 Symbols and abbreviated terms	7
5 Architectural concept	8
6 Computational specification	17
7 Transfer mechanisms and supporting functions	41
Annex A (normative) Data type specifications	42
Annex B (normative) Implementation Conformance Statement	62
Annex C (informative) How to use road network data attributes coded in GDF format	75
Annex D (informative) Example enforcement process applying standardized message exchanges	78
Annex E (informative) Data flow in a toll domain	84
Annex F (informative) Dealing with rounding differences	88
Bibliography	92

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.

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.

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.

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*, in collaboration with Technical Committee CEN/TC 278, *Road transport and traffic telematics*.

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.

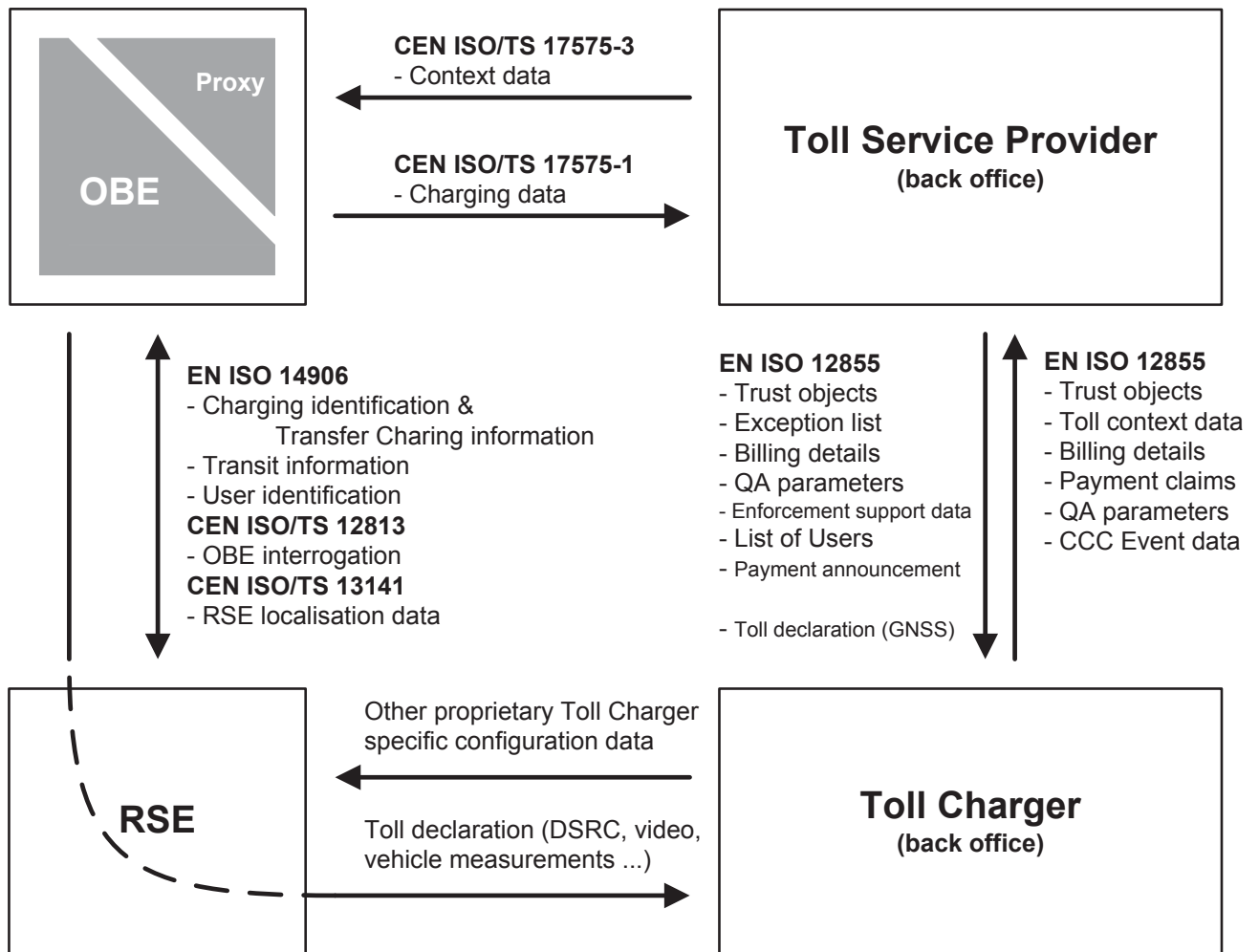


Figure 1 — Scope of EFC related standards

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

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.

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.

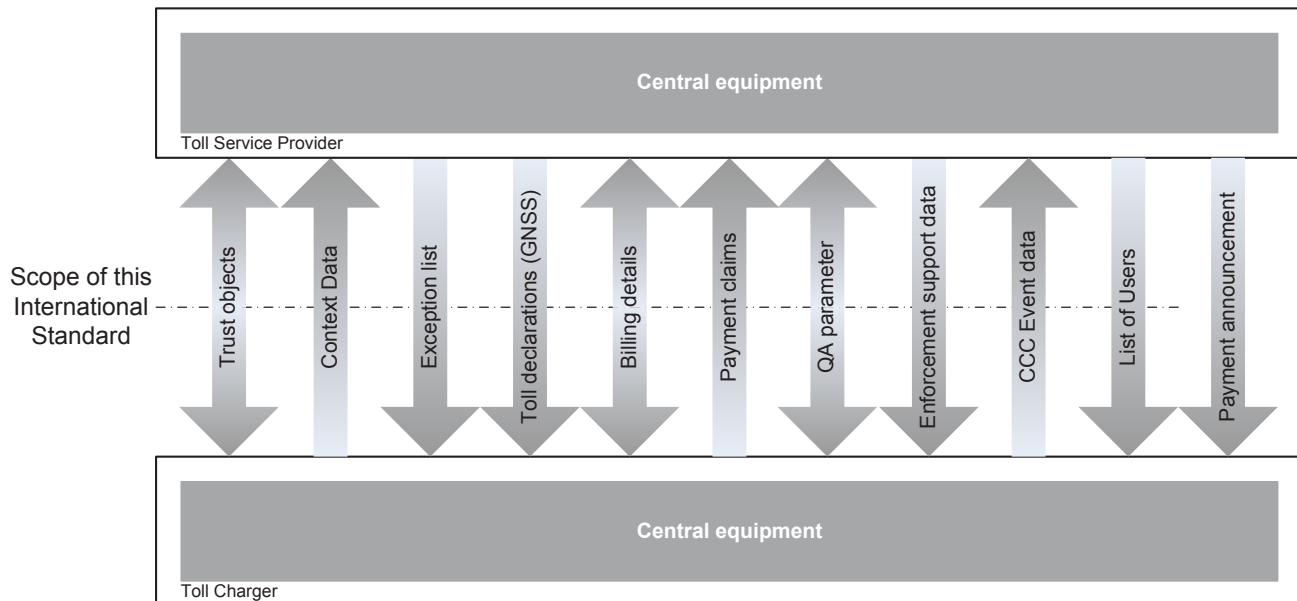


Figure 2 — Scope of this International Standard

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.

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*

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.

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.

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.

3.21

toll domain

area or part of a road network where a toll regime is applied

[ISO 17573:2010, definition 3.18]

3.22

toll point

location within a toll domain where the on-board equipment has to issue a toll declaration

[ISO 17573:2010, definition 3.19]

EXAMPLE A part of a toll plaza for electronic fee collector.

3.23

toll regime

set of rules, including enforcement rules, governing the collection of a toll in a toll domain

[ISO 17573:2010, definition 3.20]

3.24

toll service

service enabling users having only one contract and one set of on-board equipment to use a vehicle in one or more toll domains

[ISO 17573:2010, definition 3.22]

3.25

Toll Service Provider

TSP

legal entity providing to its customers toll services on one or more toll domains for one or more classes of vehicles

[ISO 17573:2010, definition 3.23]

NOTE 1 In other documents the terms “issuer” or “contract issuer” can be used.

NOTE 2 The Toll Service Provider can provide the on-board equipment or can provide only a magnetic card or a smart card to be used with on-board equipment provided by a third party.

NOTE 3 The Toll Service Provider is responsible for the operation (functioning) of the on-board equipment.

3.26

toll system

off-board equipment and possible other provisions used by a Toll Charger for the collection of toll for vehicles

NOTE 1 The on-board equipment is excluded from the definition. On-board equipment should be part of any toll system for which it may be used.

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

3.27

tolled object

distinguished part of a toll domain for which one or more tariff schemata apply

EXAMPLE An area, all public roads within an area, a bridge, a zone, or a stretch of a road (network).

3.28

trust object

information object that is exchanged between entities to ensure mutual trust

EXAMPLE An electronic signature or an electronic certificate.

3.29

user

customer of a Toll Service Provider, one liable for toll, the owner of the vehicle, a fleet operator, a driver etc. depending on the context

[ISO 17573:2010, definition 3.26]

4 Symbols and abbreviated terms

ADU	Application Data Unit
ANPR	Automatic Number Plate Reading
APCI	Application Protocol Control Information
APDU	Application Protocol Data Unit (ISO 14906:2011)
CCC	Compliance Check Communication (ISO/TS 12813)
CRL	Certificate Revocation List
DSRC	Dedicated Short Range Communication (ISO 14906:2011)
EFC	Electronic Fee Collection (ISO 17573:2010)
GNSS	Global Navigation Satellite System
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 14906:2011)
OBU	On-Board Unit
OCSP	Online Certificate Status Protocol
OSI	Open Systems Interconnection
PAN	Personal Account Number (ISO 14906:2011)
ICS	Implementation Conformance Statement
QA	Quality Assurance
RSE	Roadside Equipment (ISO 14906:2011)
SLA	Service Level Agreement
SU	Service User
SUT	System Under Test (ISO/TS 14907-1)
TC	Toll Charger
TSP	Toll Service Provider

5 Architectural concept

5.1 Main roles in the Toll Charging environment

This International Standard is built upon ISO 17573:2010. ISO 17573:2010 defines the four main roles shown in Figure 3.

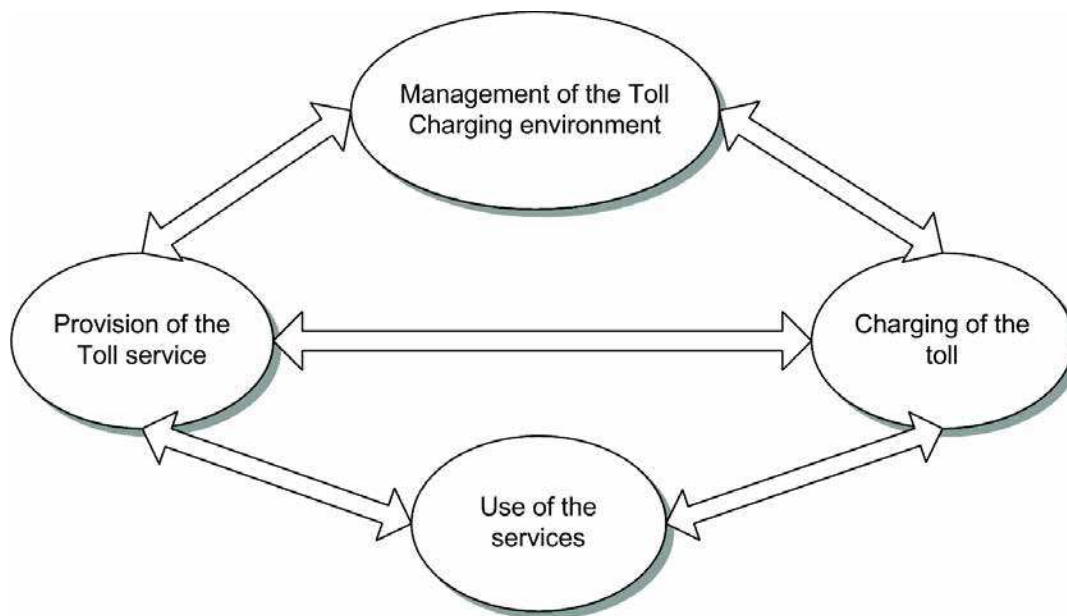


Figure 3 — Roles in the Toll Charging environment

Information exchanges are agreed upon between Toll Charger and Service Provider also taking into account privacy regulations. The information exchanges needed by the Toll Charger and the Toll Service Provider to perform their roles are described in this clause.

5.2 Information exchange between Toll Charging and Provision

5.2.1 General

The information exchange between the Service Provision and the Toll Charging roles supports the provision of the following functionalities, which are based on the EFC system behaviour definitions in ISO 17573:2010:

- Exchange Trust Objects
- Originating and providing EFC context data
- Manage Exception list
- Report Toll declarations
- Report Billing details
- Claim payment for service usage (includes payment announcement)
- Exchange Enforcement data (includes list of users)
- Exchange Quality assurance parameters
-

This International Standard leaves implementers the freedom of defining suitable protocol procedures, i.e. for complex transactions, hence it only defines:

- A basic interaction protocol (request – response) for information exchange
- Basic protocol mechanisms, to be used to build more complex protocol procedures
- The semantics and the format of the messages that are exchanged

The following subclauses describe the functionalities listed above.

5.2.2 Basic interaction protocol

Information exchanges happen by means of Application Protocol Data Unit (APDU) transfers.

Some APDU transfers need to be acknowledged. When this happens, related protocol procedures are specified. This International Standard defines no provisions for complex transfers (transactions), i.e. APDU transfers that cover several APDUs. Instead, this International Standard defines basic protocol mechanisms, to be used by implementations that need to identify transactions.

5.2.3 Basic protocol mechanisms

5.2.3.1 General approach

This International Standard provides the following basic protocol mechanisms, which shall be implemented to exchange information between the Toll Service Provider's and the Toll Charger's central equipment. These basic protocol mechanisms consist of:

- An identification schema for the messages that are exchanged.
- A generic interaction (i.e. not related to any specific functionality) that allows requesting a specific information exchange from the counterpart. This interaction is provided by the "Request" message.
- A generic acknowledge mechanism (i.e. not related to any specific functionality) that allows acknowledging a specific interaction. This mechanism is provided by the "Acknowledge" message.
- A generic status mechanism (i.e. not related to any specific functionality) that allows providing status information for a specific interchange. This mechanism is provided by the "Status" message.

By means of the above mechanisms, an implementation can build more complex protocol procedures, including rollback, recovery, checkpointing or restart.

This International Standard does not specify timings and retry procedures for acknowledgements. Timeouts can be defined as agreements between Toll Charger and Toll Service Provider to cover the case of missing acknowledgments. To handle any lost messages a timeout system can be implemented.

5.2.3.2 Identification schema

Each interaction is performed by means of one or more message exchanges. Each message shall contain a unique identifier in the namespace of the originator of the message. The combination of originator identifier and message identifier ensures that all messages are uniquely identified.

5.2.3.3 Request message

The Request message may be used to:

- Alert the counterpart that one is ready to accept any kind of information exchange.
- Inform the counterpart that one is ready to accept a specific type of message, by indicating the type of message one is ready to accept.

- Request the counterpart to re-issue a specific message, by indicating the type and the identifier of the message.
- Request for information identified by the type and message content.

5.2.3.4 Status message

The “Status” message is used to provide the counterpart general status information on the interface or inform about status on previously transferred information. It may be used to:

- Provide general information on the status of the interface.
- Alert the counterpart that some previously provided information becomes invalid without any new information being currently available.
- Alert the counterpart that the previous information contained an error and has to be recalled.

5.2.4 Exchange Trust Objects

The “Exchange Trust Objects” functionality is derived from the EFC system behaviours “Adding (or excluding) a new Toll Charger” and “Adding (or excluding) a new Service Provider”. Actions performed when executing the above behaviours shall exchange Trust Objects to be used in order to secure their bilateral communication. The functionality may also be used whenever an entity sees the need to update its own Trust Objects or another entity may ask for the update of an already existing Trust Object.

NOTE Examples of Trust Objects are:

- Asymmetric public keys
- Certificates
- Symmetric Keys
- Certificate Revocation Lists

The Exchange Trust Objects functionality can be used by either the Toll Service Provider or Toll Charger.

The initiator of the exchange can request the sending of Trust Objects from the receiver by sending a “Request” message. The “Request” message may contain an optional indicator that specifies already issued Trust Objects. When no indicator is specified, the Trust Objects to be transferred shall be the current ones.

After receiving a “Request” message that asks for Trust Objects, the requested Trust Objects are generated (or retrieved) by the recipient of the request and sent to the requesting party who shall acknowledge the reception by issuing an “Acknowledge” message.

After acknowledgement, the exchanged Trust Objects shall be considered immediately valid unless they contained a validity starting date. The validity period in this last case starts from the time indicated in the Trust Objects.

5.2.5 Originating and providing EFC context data

The “Originating and providing EFC context data” functionality is derived from ISO 17573:2010 as defined in the EFC system behaviour “Adding, modifying or closing a toll regime”.

The usage of the “Originating and providing EFC context data” functionality may be used by a Toll Charger when any change of a toll domain or toll regime occurs, including the start of a new toll domain, by issuing an “EFC Context Data” message.

Any Toll Service Provider may request from any Toll Charger at any time for any reason to send the current or any previous version of the toll context data for a toll domain under its responsibility. This operation is performed by means of a “Request” message.

Reception of an “EFC Context Data” message shall be acknowledged by means of an “Acknowledge” message.

The information describing a toll regime uses one or more sets of EFC Context Data. It is defined through its tolled objects and the rules associated with them. These data elements are defined in detail in ISO/TS 17575-3:2011 and extended in this International Standard for DSRC systems and other extensions.

Other toll regime properties to be configured by the Toll Charger are the interrelations a toll regime may have in relation to others. These rules and configuration parameters are defined in ISO/TS 17575-4:2011 and are addressed within this International Standard as Toll Context interrelations.

5.2.6 Manage Exception list

5.2.6.1 General

The “Manage Exception list” functionality originates from ISO 17573:2010 defined in the EFC system behaviours “Collecting toll information – User billing” and “Collecting charging information (autonomous systems)”.

NOTE 1 To avoid the term of blacklist, which has a different meaning in various existing EFC systems, and to include another list with a similar meaning [e.g. grey list or black list of Personal Account Numbers (PAN, as defined in ISO 14906:2011), list of blocked license plates, white list, etc.], this International Standard uses the term “Exception list” to summarize all possibilities of limiting the usability of an OBE or giving information on the special handling of an OBE in a toll regime. Other standards may still use differing terms, but they are all included in the term “Exception list”.

NOTE 2 The conditions and the periods of time of the acceptance of an OBE within a toll regime are limited, by putting it on the Exception list or removing it. This is solely the responsibility of the Toll Service Provider that issued the OBE. Any information sufficient for the identification of a specific vehicle or OBE by the Toll Charger (e.g. OBE ID, PAN, license plate) may be included in the Exception list as agreed between TC and TSP.

5.2.6.2 Exception list entry requested by a Toll Charger

The “Manage Exception list” functionality may be used by a Toll Charger when it registers violations by a specific Service User or wrong technical behaviour by a specific OBE.

NOTE 1 In this case the Toll Charger may issue a “Report Abnormal OBE” message to request the inclusion of this OBE in the Exception list.

The Toll Service Provider shall acknowledge the decision to include the OBE on the Exception list by means of an “Acknowledge” message.

NOTE 2 This may be due to non-conforming behaviour of the Service User or of a malfunctioning OBE or others.

5.2.6.3 Exception list entry decided by the Toll Service Provider

A Toll Service Provider can unilaterally add, modify or delete items in its Exception list.

The functionality is performed by issuing the “Exception List” message. This offers the Toll Service Provider the opportunity to provide any information about an OBE of a Service User to the Toll Charger.

NOTE 1 The message can include among others one of the following reasons:

- Toll Service Provider has terminated its support/responsibility for a vehicle/OBE
- An OBE was lost or stolen
- The Toll Service Provider has started/accepted its support/responsibility for a vehicle/OBE

- The Toll Charger is informed about the commercial conditions to apply to an OBE (e.g. discount for a group of vehicles)

NOTE 2 The Exception list can be used to provide additional information on a vehicle/OBE for a toll regime (e.g. specific commercial conditions) and/or limit or restrict the acceptance of an OBE within a toll regime operated via the road infrastructure of a Toll Charger, where an exchange of data between Toll Service Provider and Toll Charger is needed.

Upon reception the Toll Charger may semantically check the received Exception list. If an error is detected in the Exception list, the whole Exception list shall be disputed by sending an “Acknowledge” message indicating the detected error.

The Toll Service Provider may then rectify the problem and transmit a new Exception list. Until a valid Exception list is transmitted, the last correct list remains active in the systems of the Toll Charger.

If a new valid Exception list is received by the Toll Charger it shall be acknowledged by sending an “Acknowledge” message.

5.2.7 Report Toll declarations

The “Report Toll declarations” functionality originates from ISO 17573:2010 defined in the EFC system behaviour “Collecting charging information (autonomous systems)”.

NOTE 1 The Charging data generated by an OBE is used to report a Service User entering, moving around in or leaving a toll domain. A Service usage statement with an amount due can be made either by a single tolled object or by a combination of several tolled objects. Any Service usage is reported as Charging data through an exchange of data between an OBE/proxy (Front End system) and the central equipment (Back End system) managed by a Toll Service Provider. This interface between Front End and Toll Service Provider is specified in ISO/TS 17575 Parts 1 to 4 and is not covered by this International Standard.

The gathered Charging data shall be collected in the central system of the Toll Service Provider. If the Toll Service Provider needs to enrich the Charging data in its central equipment, it may do so before sending it as Toll declarations to the Toll Charger who offered the transport service. This optional possibility to enrich the Charging data enables the concept of shared user data, where only limited information may be included in the OBE, while the rest is held centrally at the issuing Toll Service Provider.

The Toll declarations shall contain all information required by the Toll Charger to calculate the amount due for the use of a toll domain or verify the calculation done by the Toll Service Provider. Details about configuration parameters for Toll declarations are defined by the Toll Charger in the EFC context data.

A toll declaration shall be reported to the Toll Charger operating a toll domain, by means of a “Toll Declaration” message.

NOTE 2 The toll declarations may be delivered periodically in an agreed frequency (e.g. weekly, daily, hourly, in real time ...) or upon triggering the delivery and with the quantity of information agreed for a toll regime.

The Toll Charger shall acknowledge the received “Toll Declaration” message by indicating for each toll declaration whether it is accepted or not by means of an “Acknowledge” message. If a toll declaration is not accepted, this has to be handled in a dispute phase, which is a process and thus outside the scope of this International Standard.

If the Toll Charger detects a contradiction between the Toll Declarations provided by the Toll Service Provider and its own data (e.g. CCC data, LPN reading, etc.), it may ask the Toll Service Provider for additional information about the provided Toll Declarations for this specific vehicle or Service User. The Toll Charger may send a “Retrieve specific Toll Declarations” message to the Toll Service Provider to provide any detailed Toll Declarations for a specific Service User and/or a specific period of time.

NOTE 3 This enables the Toll Charger to receive only daily summation records of the use of its toll domain from the Toll Service Provider to produce its Billing details in normal operation without any detailed knowledge about each segment passed by an OBE. When the Toll Charger detects a contradiction in the provided high level Toll Declarations during

comparison with the CCC data it recorded, it may ask the Toll Service Provider for detailed Toll Declarations for this specific vehicle or Service User.

5.2.8 Report Billing details

Depending on its toll system a Toll Charger either acquires the toll declarations directly from the RSE it operates (e.g. DSRC-based systems) or via the Toll Service Provider's central equipment (e.g. autonomous systems), which are then used for the generation of Billing details.

A single Billing detail may refer to one or several Toll declarations. The generation of Billing details is based on the requirements defined for the toll regime. Thus a Billing detail may be built out of:

- an elementary usage of a transport service (e.g. regarding the toll for a road section)
- several usages of a transport service within a given period of time (a day, a week, a month ...)
- several elementary usages of a transport service within a given journey

If some relevant information is missing to build a Billing detail out of Toll declarations, it may be requested from the central equipment of the Toll Service Provider.

NOTE 1 This optional possibility to enrich the Toll declarations enables the concept of shared user data, where only limited information may be included in the OBE, while the rest is held centrally at the issuing Toll Service Provider.

The Toll Charger and Toll Service Provider can agree to aggregate the generated Billing details to reduce the number of lines to be processed in their bookkeeping systems for handling the payment claim between Toll Charger and Toll Service Provider. To avoid any rounding differences between the VAT declarations for the local tax authorities of the Toll Charger and the VAT shown on the invoices to the SUs, the Toll Charger and the Toll Service Provider shall apply the same aggregation methods for the exchanged and acknowledged aggregated Billing details, which need to be bilaterally agreed.

NOTE 2 This can be achieved by one of the following measures among others:

- After generating the Billing details the Toll Charger aggregates any Billing details prior to claiming the payment if this is bilaterally agreed. A unique identifier (Reference number) for each aggregate is generated during aggregation and associated with all Billing details in order to link them to the derived payment claim. By this, the Toll Service Provider is always able to check the consistency of the payment claim with the Billing details they stem from.
- The Toll Charger and Toll Service Provider can agree to use the same aggregation process and aggregate the Billing details independently from each other for the representation on the invoice in their own central equipment to avoid any rounding differences.

See informative Annex F for an example on one possible solution of dealing with the aggregation of Billing details.

The generated Billing details shall be reported by means of a "Billing Detail" message. In a DSRC environment this message is always generated by the Toll Charger, as he collects the toll declarations directly from his RSE, and sent to the Toll Service Provider. In a GNSS environment this message may be either generated by the Toll Charger or the Toll Service Provider depending on the operational model of the Toll Charger.

NOTE 3 The operational model of the Toll Charger in a GNSS environment may require him to generate any Billing details and keep complete control over the usage of his toll domain. This is typically the case for privately operated Toll Chargers or road concessionaires.

If the role of Toll Charger is conducted by a government body on the other hand, it may only want to do spot checks to avoid the operational workload of being a Toll Charger in a GNSS environment. In this case, the Toll Charger may require the Toll Service Provider to generate the Billing details message to be sent to him

The recipient may check the completeness and the conformity of the provided Billing details for a given service usage. Therefore the Billing details may reference any Toll declarations and thus provide information to the Toll Service Provider to check their authenticity [checking the Authenticator(s)].

The recipient shall acknowledge the received “Billing Detail” message by indicating for each Billing detail whether it is accepted or not by means of an “Acknowledge” message.

5.2.9 Claim payment for service usage

The Claim payment for service usage functionality is derived from ISO 17573:2010 defined in the EFC system behaviour “Claiming tolls”.

The claim payment phase starts once the Billing details have been agreed between the Toll Charger and the Toll Service Provider (see 5.2.8). The payment claim is based upon these agreed and possibly aggregated Billing details.

If any specific commercial conditions were agreed (to be applied to the payment claim of a Service User) this may be included directly as discount in the original payment claim or it may be included at a later time in a separate payment claim as a credit note (e.g. when billing details of a whole month define the discount level of a scaled discount scheme).

Any additional claims for other services which do not directly derive from the bilaterally agreed Billing details (e.g. belated payment, reimbursement, penalties ...) may be included as well.

The payment claim shall contain all the legal and fiscal information required according to each toll regime, to be used for invoicing between the Toll Charger, the Toll Service Provider and the Service User.

NOTE 1 The payment claim may be used by the Toll Service Provider to generate invoices to its customers (Service Users) on behalf of the relevant Toll Charger or for its own account (if the Toll Service Provider is buying the toll from the Toll Charger and reselling it to the Service User).

The payment claim shall be put forward to the Toll Service Provider by means of a “Payment Claim” message.

The Toll Service Provider shall acknowledge the received “Payment Claim” message by indicating for each payment claim whether it is accepted or not by means of an “Acknowledge” message.

NOTE 2 Possible reasons for dispute, among others, are: Inconsistency of payment claim with Billing details or non-conformance of Specific Commercial conditions.

5.2.10 Exchange Enforcement data

5.2.10.1 General

The “Exchange Enforcement data” functionality originates from ISO 17573:2010 defined in the EFC system behaviour “Exceptions detection – User and OBE compliance checking”.

The “Exchange Enforcement data” functionality may be used each time when a Toll Charger needs additional information for a compliance checking process. The compliance checking process is concentrated on:

- Verifying if the Service User fulfils its obligation to co-operate
- Gathering facts required for later performance monitoring and/or SLA evaluation

A following off-line process performed by the Toll Charger may:

- Issue toll violation tickets for the Service Users if the Service User was responsible for the wrong toll declaration
- Compare roadside observations with Toll declarations received from the Toll Service Provider and update the performance monitoring parameters with these results

Even if the details on how to perform compliance checking/enforcement Back End processes are left to the Toll Chargers, some basic information exchange shall be supported on both sides.

5.2.10.2 Retrieve User Details

The “Retrieve User Details” message may be used by a Toll Charger to request from Toll Service Provider(s) whether they have a contractual relationship with a given Service User identified in the message and/or to provide additional details on a Service User by specifying the requested details.

This message can either be sent to a specific Toll Service Provider or broadcasted to a group or all Toll Service Providers.

5.2.10.3 Provide User Details

After receiving a “Retrieve User Details” message the Toll Service Provider shall answer the request with a “Provide User Details” message, thus either confirming a contractual relationship or declining it.

As a minimum the Toll Service Provider shall confirm the existence of a contractual relationship with a Service User by providing one of the following data:

- Personal Account Number (PAN, as defined in ISO 14906:2011)
- Contract serial number
- License plate number
- On-Board Equipment Identification (OBE ID)

If additional details on the Service User were requested in the “Retrieve User Details” message the Toll Service Provider shall deliver them.

NOTE The delivery of User Details may be subject to local data protection regulations.

5.2.10.4 Retrieve and Report CCC Event

The Toll Service Provider may send a “Retrieve specific CCC Event” message to the Toll Charger to enquire about the details for any CCC Events for a specific Service User and/or a specific period of time.

The Toll Charger shall answer to a received “Retrieve specific CCC Event” message with a “Report CCC Event” message or may send the “Report CCC Event” message of its own accord to inform the Toll Service Provider about any new CCC Event.

The Toll Service Provider shall acknowledge any “Report CCC Event” message by means of an “Acknowledge” message.

5.2.10.5 List of Users

The List of Users functionality provides support to the Toll Charger in his enforcement activities and to detect potential fraud in particular.

The Toll Charger can send a specific userId to the Toll Service Provider (e.g. a licence plate number) and requesting information on all other userIds (e.g. licence plate numbers) that belong to the same Service User (haulier).

5.2.11 Exchange Quality assurance parameters

The Report Quality assurance parameters functionality is derived from ISO 17573:2010 defined in the EFC system behaviour “Defining rules and monitoring operations”.

In ISO 17573:2010 the Report Quality assurance parameters functionality is used to report and monitor the EFC activities of Toll Chargers and Toll Service Providers. In this International Standard it is used additionally to exchange any information necessary to monitor the quality of operations between the Toll Charger and the Toll Service Provider. One of these quality assurance parameters may be:

- Detection rate: As it is important for both the Toll Charger and the Toll Service Provider that the Detection rate (i.e. the percentage of detected OBE of a given Toll Service Provider in a given toll regime of a Toll Charger) of the Toll Service Provider's OBEs in a Toll regime of a Toll Charger be as high as possible, this may need to be constantly monitored by an SLA level.

Types and ranges of QA parameters are agreed upon between Toll Chargers and Toll Service Providers with bilateral agreements.

The exchange of Quality assurance parameters depends on the initiator of the exchange:

- The Toll Charger may send a Quality assurance parameter by issuing a "Report QA" message.
- The Toll Service Provider may request an update of a Quality assurance parameter by sending a "Request" message. The Toll Charger shall respond to the request by sending a "Report QA" message.
- The Toll Service Provider may send a Quality assurance parameter by issuing a "Report QA" message.
- The Toll Charger may request an update of a Quality assurance parameter by sending a "Request" message. The Toll Service Provider shall respond to the request by sending a "Report QA" message.

The receiver of a "Report QA" message shall acknowledge it by means of an "Acknowledge" message.

5.2.12 Payment announcement

The Payment announce for service usage functionality orientates itself on the Payment Claim functionality but is initiated by the Toll Service Provider or on request from the Toll Charger.

After billing details have been agreed between Toll Charger and the Toll Service Provider, the Toll Service Provider sends a payment announcement to the Toll Charger informing him about an upcoming payment. This payment announcement may include references to Billing Details, Toll Declarations or even single elements of a Chargereport.

The Toll Charger shall acknowledge the received "Payment Announcement" message by indicating for each payment announcement whether it is accepted or not by means of an "Acknowledge" message.

5.2.13 Extended Acknowledge message

The "ExtendedAcknowledge" message is used whenever a specific message in an information exchange needs to be confirmed. The "ExtendedAcknowledge" message indicates the specific message to be acknowledged by specifying its identifier. It may additionally carry an indication of a positive or negative acknowledgment.

In addition to the Acknowledge message it provides more sophisticated means to describe the actual problems in processing messages or specific parts of it.

6 Computational specification

6.1 Overview

This clause specifies the computational objects for the information exchanges between Toll Chargers and Toll Service Providers. Each computational object is identified by:

- A name
- The function(s) it performs
- The Application Protocol Data Units (messages) it is able to generate or accept

For the sake of simplicity, the functionalities identified in previous clauses correspond to computational objects here. This means that the functions performed by each object are already described in previous clauses. A given computational object can be instantiated for the Toll Service Provider or for the Toll Charger role, with the limitations and permissions stated as rules in the previous clauses. The fact that computational objects are modelled here as having one logical interface for message exchange does not put any limits on the number of real interfaces offered in an implementation of this standard..

Table 1 lists the defined computational objects. For each object, the relevant interface messages are listed, together with the limitations, permissions and obligations for each role derived by the rules defined in previous clauses

While a real implementation can choose which computational objects are supported, if any of the computational objects listed in Table 1 are implemented, the defined rules applicable to the Toll Service Provider and the Toll Charger shall be implemented.

The rules are as follows:

- May initiate: An entity is able and allowed to initiate a message exchange
- Shall initiate: An entity is able and has to initiate a message exchange
- Shall be able to receive: An entity shall be able to receive this kind of message
- May respond: An entity is able and allowed to respond to a received Request message
- Shall respond: An entity is able and has to respond to a received Request message

The supplier of an implementation according to this International Standard shall complete the proforma protocol implementation conformance statement as defined in Annex B.

Table 1 — Computational objects and messages

Computational object	Message	Toll Service Provider rules	Toll Charger rules
Exchange Trust Objects	Request	May initiate, shall be able to receive	May initiate, shall be able to receive
	Trust Objects	May initiate, shall be able to receive	May initiate, shall be able to receive
	Acknowledge	Shall initiate, shall be able to receive	Shall initiate, shall be able to receive
	Status	May initiate, shall be able to receive	May initiate, shall be able to receive