

DIN EN ISO 17575-4

ICS 03.220.20; 35.240.60

Entwurf

Einsprüche bis 2014-03-10
Vorgesehen als Ersatz für
DIN CEN ISO/TS 17575-4
(DIN SPEC 70663):2011-10

**Elektronische Gebührenerhebung –
Definition der Anwendungsschnittstelle für autonome Systeme –
Teil 4: Roaming (ISO/DIS 17575-4:2013);
Englische Fassung prEN ISO 17575-4:2013**

Electronic fee collection –
Application interface definition for autonomous systems –
Part 4: Roaming (ISO/DIS 17575-4:2013);
English version prEN ISO 17575-4:2013

Perception du télépéage –
Définition de l'interface d'application pour les systèmes autonomes –
Partie 4: Itinérance (ISO/DIS 17575-4:2013);
Version anglaise prEN ISO 17575-4:2013

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Dieser Norm-Entwurf mit Erscheinungsdatum 2014-01-10 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

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Nationales Vorwort

Dieses Dokument (prEN ISO 17575-4:2013) wurde vom Technischen Komitee ISO/TC 204 „Intelligent Transport Systems“ in Zusammenarbeit mit dem Technischen Komitee CEN/TC 278 „Intelligente Verkehrssysteme“, dessen Sekretariat vom NEN (Niederlande) gehalten wird, erarbeitet.

Das zuständige deutsche Normungsgremium ist der Gemeinschaftsarbeitsausschuss NA 052-02-71 GA „Straßenverkehrstelematik“ des Normenausschusses Automobiltechnik (NAAutomobil) im DIN.

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

Dieser Teil der ISO 17575 definiert funktionale Details sowie Datenelemente, die benötigt werden, um mit mehreren EFC-Regimes parallel arbeiten zu können. Die Gebiete dieser EFC-Regimes können sich dabei überlappen. Die Abbuchungsregeln sich überlappenden EFC-Regimes können dabei verbunden werden, z. B. könnten sie Regeln beinhalten, die festlegen, dass ein Gebietspreisschema nicht belastet wird, wenn bei Benutzung einer sich überlappenden Straße bereits bezahlt wurde.

Änderungen

Gegenüber DIN CEN ISO/TS 17575-3 (DIN SPEC 70663):2011-10 wurden folgende Änderungen vorgenommen:

- a) Überführung in eine DIN-EN-ISO-Norm;
- b) Adaption verschiedener Normenreferenzen auf die neueste Version;
- c) kleinere technische und editorische Verbesserungen;
- d) Revision der Begriffe;
- e) Anhang D ergänzt.

Nationaler Anhang NA (informativ)

Begriffe

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe.

3.1

Attribut

(en: attribute)

adressierbares Datenpaket, welches entweder aus einem einzelnen Datenelement oder einer strukturierten Sequenz von Datenelementen besteht

[ISO 14906:2011]

3.2

Authentifizierung

(en: authentication)

Sicherungsmaßnahme, dass eine beanspruchte Charakteristik einer Einheit richtig ist

[ISO 27000]

3.3

authentifizierendes Merkmal

(en: authenticator)

wenn möglich verschlüsselte Daten, die zur Authentifizierung verwendet werden

[ISO 14906:2011]

3.4

Back End

Rechner- oder Kommunikationseinheiten des Akteurs (z. B. Mauterheber oder Maut Dienstanbieter) zum Datenaustausch mit einem Front- oder Back End

[ISO 14906:2011]

3.5

vereinbarter EFC-Inhalt

(en: contracted EFC context)

EFC-Inhalt, für den ein Nutzer die Einverständniserklärung hat, dass ihr oder sein Front End interoperabel ist

3.6

Front End

Teile eines Mautsystems, mit dem Straßenbenutzungsdaten eines individuellen Straßenbenutzers gesammelt, verarbeitet und an die ‚Back-End‘-Einheit übermittelt werden

[ISO 14903-2:2012]

3.7**Interoperabilität**

(en: interoperability)

Fähigkeit eines Systems, Informationen auszutauschen und dabei vielfältigen Gebrauch der Information macht, die ausgetauscht wurde

[CEN/TR 16092:2011]

3.8**On-Board Einheit**

(en: on-board equipment)

Ausrüstung innerhalb eines Fahrzeuges inklusive mobiler Endgeräte zum Austausch von Informationen mit externen Systemen

[ISO 14906:2011]

3.9**Vertreter**

(en: proxy)

optionale Einheit des Front Ends, welches mit externen Einrichtungen kommuniziert und empfangene Daten in ein abgestimmtes Format verarbeitet und an das Back-End übermittelt

[ISO/TS 17575-1:2010]

3.10**Straßenrand Einrichtung**

(en: road-side equipment)

Einrichtungen entlang der Straße, die entweder fest installiert oder mobil sind

[ISO 17574:2009]

3.11**Dienstanbieter****Maut-Dienstanbieter**

(en: service provider

toll service provider)

legale Einrichtung, die Mautdienste in einem oder mehreren Mautgebieten anbietet

[CEN/TR 16092:2011]

3.12**Maut**

(en: toll)

Abgabe, Steuer, Gebühr oder Verpflichtung in Verbindung einer Fahrzeugbenutzung innerhalb einer Maut-domäne

[CEN/TR 16092:2011]

3.13**Mauterheber**

(en: toll charger)

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

[CEN/TR 16092:2011]

3.14

Mautbereich

(en: toll cluster)

Gruppe von Mautschemata, die unter einem gemeinsamen Abkommen arbeiten, um für Straßennutzer Interoperabilität zur Verfügung zu stellen, die einen Vertrag mit einem Dienstanbieter haben und Teil des Bereiches sind

[ISO/TS 17575-1:2010]

3.15

Mautinhalt

(en: toll context)

logischer Blick auf ein Mautschema, welches aus Grundelementen von Attributen und Funktionen festgelegt ist und aus einem einzelnen Grundprinzip zur Maut besteht, sowie eine räumliche Verteilung des Gebührenobjektes und das einzelne Verhalten des relevanten Front-Ends charakterisiert

[ISO/TS 12813:2009]

3.16

Mautdomain

(en: toll domain)

Bereich oder Teil eines Straßennetzwerks, in dem ein bestimmtes Mautregime angewendet wird

[CEN/TR 16092:2011]

3.17

Mautregime

(en: toll regime)

Menge von Regeln inklusive Vollstreckungsregeln zur Regelung von Mauteinnahmen in einem Mautgebiet

[ISO 17573:2011]

3.18

Mautübersicht

(en: toll scheme)

organisatorischer Blick auf ein Mautregime, welcher die Akteure sowie deren Beziehungen beinhaltet

[ISO/TS 17575-3:2011]

3.19

Transaktion

(en: transaction)

Ganzheit des Austausches von Informationen zwischen zwei, physikalisch separat kommunizierenden, Einrichtungen

[ISO 14906:2011]

3.20

Transaktionsmodell

(en: transaction model)

funktionales Modell, welches die Transaktionsstruktur der elektronischen Bezahlung beschreibt

[ISO 14906:2011]

— Leerseite —

Contents

Page

Foreword	v
Introduction.....	vi
1 Scope	1
2 Normative References.....	1
3 Terms and definitions	1
4 Abbreviated terms	4
5 Basic concept	4
5.1 General	4
5.2 Overview.....	5
6 Data elements	6
6.1 General	6
6.2 Elements of the roaming rules attribute	7
6.2.1 The roaming rule identifier	7
6.2.2 The list of relevant EFC contexts.....	7
6.2.3 The list of EFC contexts which are grouped using a single charge report.....	9
6.2.4 House keeping data elements.....	9
7 Communicating the roaming rules attribute.....	10
7.1 Requesting an update of the roaming rules attribute.....	10
7.2 Responding to a roaming rules download request	10
7.3 ASN1 coding rules.....	10
Annex A (normative) EFC data type specifications	11
Annex B (normative) Protocol implementation conformance statement (PICS) proforma	14
B.1 General	14
B.2 General	14
B.3 Purpose and structure	14
B.4 Instruction for completing the PICS Proforma	14
B.4.1 Definition of support	14
B.4.2 Status column.....	15
B.4.3 Support column	15
B.4.4 Item reference numbers	15
B.5 PICS proforma for the Front End	16
B.5.1 Identification of the implementation.....	16
B.5.2 Identification of the standard	17
B.5.3 Global statement of conformance	17
B.5.4 PICS proforma tables	17
B.6 PICS proforma for the Back End.....	20
B.6.1 Identification of the implementation.....	20
B.6.2 Identification of the standard	21
B.6.3 Global statement of conformance	21
B.6.4 PICS proforma tables	22
Annex C (informative) How to assemble and use roaming data	24
C.1 General	24
C.2 First to decide on the required different sets of roaming data.....	24
C.3 Next to assemble specific context data sets.....	25
C.4 Next to combine EFC contexts to EFC regimes	25
C.5 Finally to assign groups of Users to single sets of roaming rules	25

Annex D (informative) Use of this standard for the EETS.....27

D.1 General.....27

D.2 Overall relationship between European standardisation and the EETS.....27

D.3 European standardisation work supporting the EETS.....27

D.4 Correspondence between this standard and the EETS.....28

Bibliography.....29

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 17575-4 was prepared by Technical Committee ISO/TC 204, *Intelligent Transport Systems*, Subcommittee SC , and by Technical Committee CEN/TC 278, *Intelligent Transport Systems* in collaboration.

This second/third/... edition cancels and replaces the first/second/... edition (), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

This second edition cancels and replaces the first edition (ISO/TS 17575 Part 4:2011) which has been technically revised. The main changes comprise

- *upgrade of the first edition from a Technical Specification to an International Standard*
- *editorial and formal corrections as well as changes to improve readability*

ISO 17575 consists of the following parts, under the general title *Electronic fee collection — Application interface definition for autonomous systems*:

- *Part 1: Charging*
- *Part 2: Communication and connection to the lower layers*
- *Part 3: Context data*
- *Part 4: Roaming*

Introduction

Autonomous systems

This part of ISO 17575 is part of a series of four specifications defining the information exchange between the Front End and the Back End in Electronic Fee Collection (EFC) based on autonomous on-board equipment (OBE). EFC systems automatically collect charging data for the use of road infrastructure including motorway tolls, zone-based fees in urban areas, tolls for special infrastructure like bridges and tunnels, distance-based charging, and parking fees.

NOTE 1 The Front End comprises the on-board equipment and an optional proxy.

NOTE 2 The OBE does not need to include payment means.

Autonomous OBE operates without relying on dedicated road-side infrastructure by employing wide-area technologies such as Global Navigation Satellite Systems (GNSS) and Cellular Communications Networks (CN). These EFC systems are referred to by a variety of names. Besides the terms autonomous systems and GNSS/CN systems, also the terms GPS/GSM systems, and wide-area charging systems are in use.

Autonomous systems use satellite positioning, often combined with additional sensor technologies such as gyroscopes, odometers and accelerometers, to localize the vehicle and to find its position on a map containing the charged geographic objects, such as charged roads or charged areas. From the charged objects, the vehicle characteristics, the time of day and other data that are relevant for describing road use, the tariff and ultimately the road usage fee are determined.

Some of the strengths of the autonomous approach to electronic fee collection are its flexibility, allowing the implementation of almost all conceivable charging principles, and its independence from local infrastructure, thereby predisposing this technology towards interoperability across charging systems and countries. Interoperability can only be achieved with clearly defined interfaces, which is the aim and justification of ISO 17575.

Business architecture

This part of ISO 17575 complies with the business architecture defined in ISO 17573. According to this architecture, the Toll Charger is the provider of the road infrastructure and, hence, the recipient of the road usage charges. The Toll Charger is the actor associated with the Toll Charging role. See Figure 1.

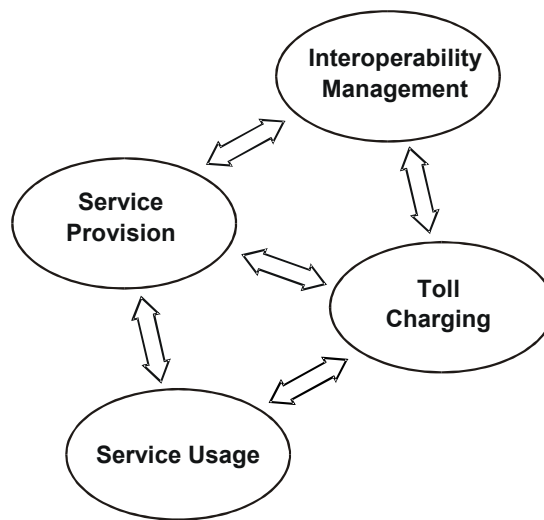


Figure 1 — The rolebased model underlying this International Standard

Service Providers issue OBE to the users of the road infrastructure. Service Providers are responsible for operating the OBE that will record the amount of road usage in all toll charging systems the vehicle passes through and for delivering the charging data to the individual Toll Chargers. In general, each Service Provider delivers charging data to several Toll Chargers, as well as each Toll Charger in general receives charging data from more than one Service Provider. Interoperability Management in Figure 1 comprises all specifications and activities that in common define and maintain a set of rules that govern the overall toll charging environment.

Technical architecture

The technical architecture of Figure 2 is independent of any particular practical realization. It reflects the fact that some processing functionalities can either be allocated to the OBE or to an associated off-board component (Proxy). An example of processing functionality that can be realized either on- or off-board is map-matching, where the vehicle locations in terms of measured coordinates from GNSS are associated to geographic objects on a map that either resides on- or off-board. Also tariffication can be done with OBE tariff tables and processing, or with an off-board component.

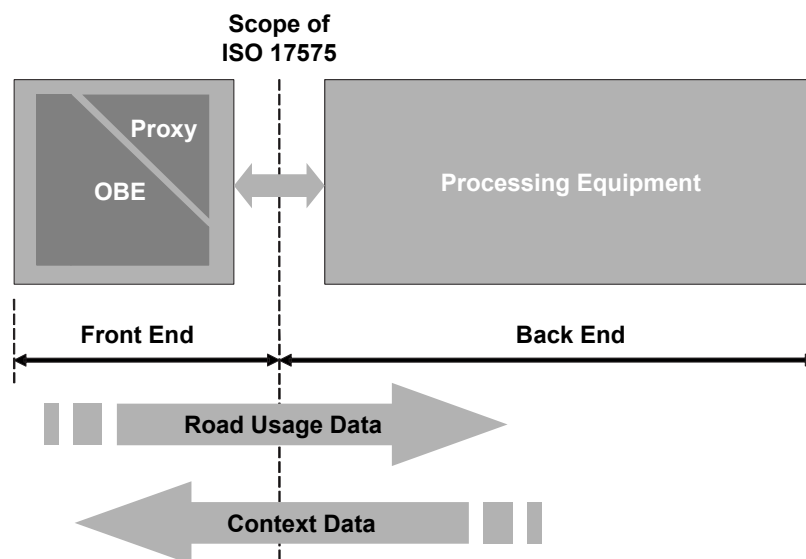


Figure 2 — Assumed technical architecture and interfaces

The combined functionality of OBE and Proxy is denoted as Front End. A Front End implementation where processing is predominately on OBE-side is known as a smart client (or intelligent client, fat client) or edge-heavy. A Front End where processing is mostly done off-board is denoted as thin-client or edge-light architecture. Many implementations between the “thin” and “thick” extremes are possible, as depicted by the gradual transition in the wedges in Figure 2. Both extremes of architectural choices have their merits and are one means where manufacturers compete with individual allocations of functionality between on-board and central resources.

Especially for thin client OBE, manufacturers might devise a wide variety of optimizations of the transfer of localization data between OBE and off board components, where proprietary algorithms are used for data reduction and data compression. Standardization of this transfer is neither fully possible nor beneficial.

Location of the specification interface

In order to abstract from, and become independent of, these architectural implementation choices, the primary scope of ISO 17575 is the data exchange between Front End and Back End (see the corresponding dotted line in Figure 2). For every toll regime, the Back End will send context data, i.e. a description of the toll regime in terms of charged objects, charging rules and, if required, the tariff scheme to the Front End, and will receive usage data from the Front End.

It has to be noted also that the distribution of tasks and responsibilities between Service Provider and Toll Charger will vary individually. Depending on local legal situation, Toll Chargers will require “thinner” or “thicker” data, and might or might not leave certain data processing tasks to Service Providers. Hence, the data definitions in ISO 17575 may be useful on several interfaces.

ISO 17575 also provides for basic media-independent communication services that may be used for communication between Front End and Back End, which might be line-based or an air-link, and can also be used for the air-link between OBE and central communication server.

The parts of ISO 17575

Part 1: Charging, defines the attributes for the transfer of usage data from the Front End to the Back End. The required attributes will differ from one Toll Charger to another, hence, attributes for all requirements are offered, ranging from attributes for raw localization data, for map-matched geographic objects and for completely priced toll transactions.

Part 2: Communication and connection to lower layers, defines basic communication services for data transfer over the OBE air-link or between Front End and Back End.

Part 3: Context Data, defines the data to be used for a description of individual charging systems in terms of charged geographical objects and charging and reporting rules. For every Toll Charger's system, attributes as defined in Part 3 are used to transfer data to the Front End in order to instruct it which data to collect and report.

Part 4: Roaming, defines the functional details and data elements required to operate more than one EFC regime in parallel. The domains of these EFC regimes may or may not overlap. The charge rules of different overlapping EFC regimes can be linked, i.e. they may include rules that an area pricing scheme will not be charged if an overlapping toll road is used and already paid for.

Relations between single EFC schemes can be

- EFC domains that can adjoin each other so that when moving from one EFC domain in the domain of the adjacent EFC regime there may be a zone where the OBE starts to operate according to the rules of the new regime before stopping the operation according to the old regime rules. Within this zone the OBE/Front-End needs to operate according to the rules for both of these schemes at the same time.

- Overlapping EFC contexts that can have dependencies in the charge object definition like overlapping areas where the outer/bigger area will not be charged when in the inner area. Or an area will not be charged when using a sectioned toll-road in the same area.
- Required to combine several usage statements for different EFC schemes in the same charge report.

The data elements (ADUs) required to specify these related properties are defined in this part of ISO 17575.

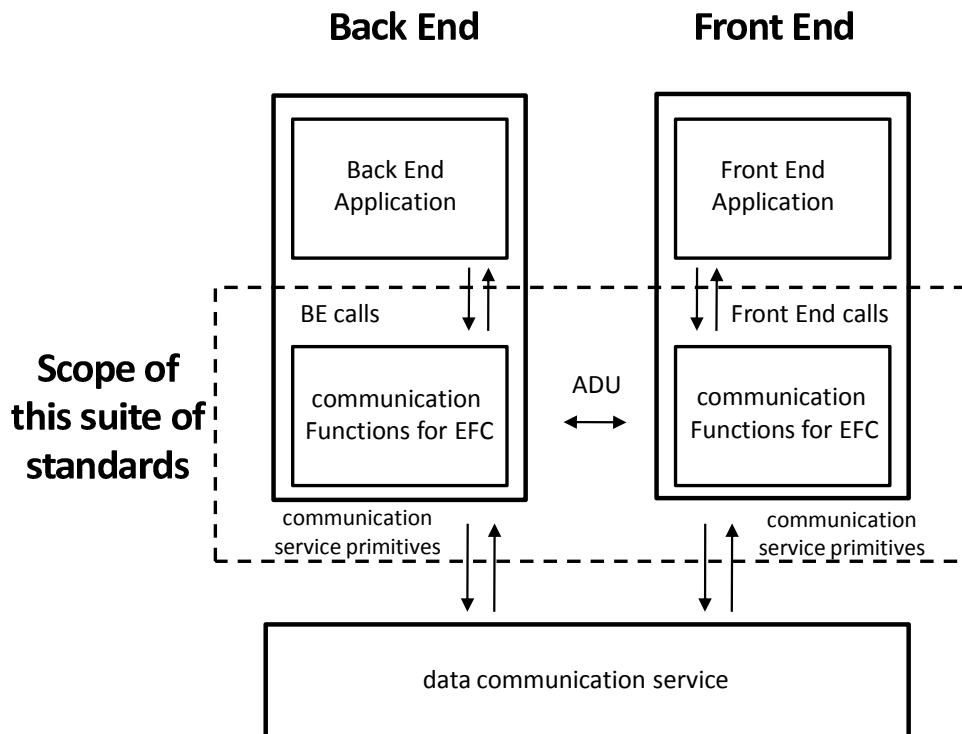


Figure 3 — Scope of ISO 17575

To communicate these ADUs between the Front End and the Back End, the same methodology as for ISO 17575-1 and ISO 17575-3 is applied as illustrated in Figure 3. The use of the communication stack is defined in ISO 17575-2.

Application needs covered by ISO 17575

- The parts of ISO 17575 are compliant with the architecture defined in ISO 17573.
- The parts of ISO 17575 support charges for use of road sections (including bridges, tunnels, passes, etc.), passage of cordons (entry/exit), and use of infrastructure within an area (distance, time).
- The parts of ISO 17575 support fee collection based on units of distance or duration, and based on occurrence of events.
- The parts of ISO 17575 support modulation of fees by vehicle category, road category, time of usage, and contract type (e.g. exempt vehicles, special tariff vehicles, etc.)