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Ersatz für
DIN CEN ISO/TS 17575-2
(DIN SPEC 70661):2011-08

**Elektronische Gebührenerhebung –
Definition der Anwendungsschnittstelle für autonome Systeme –
Teil 2: Kommunikation und Verbindung mit den unteren Schichten;
(ISO 17575-2:2016);
Englische Fassung EN ISO 17575-2:2016**

Electronic fee collection –
Application interface definition for autonomous systems –
Part 2: Communication and connection to the lower layers (ISO 17575-2:2016);
English version EN ISO 17575-2:2016

Perception du télépéage –
Définition de l'interface d'application pour les systèmes autonomes –
Partie 2: Communications et connexions aux couches basses (ISO 17575-2:2016);
Version anglaise EN ISO 17575-2:2016

Gesamtumfang 42 Seiten

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

Nationales Vorwort

Dieses Dokument (EN ISO 17575-2:2016) 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 „Intelligente Verkehrssysteme“ des Normenausschusses Automobiltechnik (NAAutomobil) im DIN.

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.

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 die Übertragung der in Teil 1 spezifizierten Datenelemente über eine beliebige (bevorzugte) drahtlose Kommunikationsschnittstelle, welche für diese Applikation praktikabel ist. Dabei wird eine abstrakte Schnittstelle (API) zu den unteren Kommunikationsebenen (OSI-Layer) beschrieben.

Änderungen

Gegenüber DIN CEN ISO/TS 17575-2 (DIN SPEC 70661):2011-08 wurden folgende Änderungen vorgenommen:

- a) Überführung in eine DIN-EN-ISO-Norm;
- b) Durchführung von editorischen und formalen Korrekturen sowie der Verbesserung der Lesbarkeit;
- c) kleinere technische Korrekturen;
- d) Anhang F ergänzt.

Frühere Ausgaben

DIN CEN ISO/TS 17575-2 (DIN SPEC 70661): 2011-08

Nationaler Anhang NA (informativ)

Begriffe

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe.

2.1

Attribut

(en: attribute)

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

[QUELLE: ISO 17575-1:2016, 3.2]

2.2

authentifizierendes Merkmal

(en: authenticator)

möglicherweise verschlüsselte Daten, die zur Authentifizierung verwendet werden

[QUELLE: EN 15509:2014, 3.3]

2.3

Back End

BE

Teil eines Backoffice-Systems, welches mit einem oder mehreren *Front End* (2.6) verbunden ist/sind

[QUELLE: ISO 17575-1:2016, 3.4]

2.4

Datenelement

(en: data element)

kodierte Information, welche selbst aus weiteren Basis-Informationsstrukturen bestehen kann

[QUELLE: ISO 17575-1:2016, 3.9]

2.6

Front End

FE

Teil eines Mautsystems bestehend aus einer *On-board Ausrüstung* (2.9) und möglicherweise einem *Vertreter* (2.10) mit dem Straßenmautinformationen und Benutzungsdaten gesammelt, verarbeitet und an das *Back End* (2.3) übermittelt werden

[QUELLE: ISO/TS 19299:2015, 3.17]

Anmerkung 1 zum Begriff: Das Front End umfasst die *On-Board Ausrüstung* (2.9) sowie einen optionalen *Vertreter* (2.9).

2.7

Front End Anwendung

(en: Front End application)

Teil des Front Ends oberhalb der Programmierschnittstelle (en: API)

2.8

Interoperabilität

(en: interoperability)

Systemfähigkeiten, Informationen auszutauschen und die ausgetauschten Informationen dabei mehrfach zu verwenden

[QUELLE: ISO/IEC/TR 10000-1:1998, 3.2.1, modifiziert]

2.9

On-Board Ausrüstung

OBE

(en: on-board equipment)

alle notwendigen Ausrüstungen innerhalb Fahrzeuges, um notwendige Funktionen zur elektronischen Gebührenerhebung (en: EFC) und Kommunikationsdienste durchzuführen

Anmerkung 1 zum Begriff: Weitere Untereinheiten können optional berücksichtigt werden.

2.10

Vertreter

(en: proxy)

optionale Einheit des *Front Ends* (2.6) welches mit externen Einrichtungen kommuniziert und Daten in ein abgestimmtes Format überführt und an das *Back End* (2.3) übermittelt

[QUELLE: ISO 17575-1:2016, 3.13]

2.11

Dienstelement

(en: service primitive)

grundlegender Kommunikationsdienst, welcher vom Anwendungsprotokoll an den Anwendungsprozess übergeben wird

Anmerkung 1 zum Begriff: Der Aufruf eines Dienstelementes über einen Anwendungsprozess nimmt indirekt Dienste der unteren Protokollschichten in Anspruch.

[QUELLE: ISO 17573:2010, 3.18, modifiziert - das Objekt wurde gelöscht]

2.12

Maut Dienstanbieter

(en: toll service provider)

Einrichtung, die ihren Kunden Mautdienste in einem oder mehreren Mautgebieten anbietet

[QUELLE: ISO 17573:2010, 3.23, modifiziert - der Begriff wurde zusammengefasst]

2.13

Maut

(en: toll)

Abrechnung, Steuer, oder Verpflichtungsabgabe in Verbindung einer Fahrzeugbenutzung innerhalb eines Mautgebiets

[QUELLE: ISO/TS 19299:2015, 3.42, modifiziert - „beliebige“ wurde vor „Abrechnung“ gelöscht.]

Anmerkung 1 zum Begriff: Der Begriff ist eine Verallgemeinerung 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.). Der Begriff beinhaltet außerdem (administrative) Pflichtgebühren, z. B. eine Steuer oder eine Pflichtabgabe.

2.14

Mauterhebung

(en: toll charger)

Einheit zur Gebührenerhebung für die Nutzung von Fahrzeugen innerhalb einer Mautdomäne

[QUELLE: ISO 17573:2010, 3.16, modifiziert - „legale“ vor „Einheit“ wurde gelöscht und „für die Nutzung von“ wurde ergänzt.]

— Leerseite —

English Version

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Teil 2: Kommunikation und Verbindung
mit den unteren Schichten
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This European Standard was approved by CEN on 11 December 2015.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

This document (EN ISO 17575-2:2016) has been prepared by Technical Committee ISO/TC 204 “Intelligent transport systems” in collaboration with Technical Committee CEN/TC 278 “Intelligent transport systems” the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2016, and conflicting national standards shall be withdrawn at the latest by August 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN ISO/TS 17575-2:2010.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 17575-2:2016 has been approved by CEN as EN ISO 17575-2:2016 without any modification.

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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).

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).

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 edition of ISO 17575-2 cancels and replaces ISO/TS 17575-2:2010, which has been technically revised. The following changes have been made:

- conversion 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*

In this edition of the ISO 17575-series the contents of ISO/TS 17575-4:2011 were incorporated into ISO 17575-3:2016. ISO/TS 17575-4:2011 will be withdrawn once ISO 17575-3 has been published.

Introduction

0.1 Autonomous systems

ISO 17575 is a series of standards 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.

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

Two 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.

0.2 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).

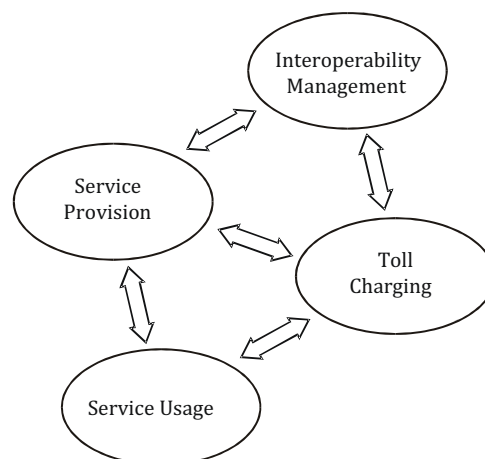


Figure 1 — The role-based model underlying ISO 17575

Service providers issue OBE to the users of the road infrastructure. Service providers are responsible for operating 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 and, in general, each toll charger receives charging data from more than one service provider. Interoperability management, as shown in Figure 1, comprises all specifications and activities that define and maintain a set of rules that govern the overall toll charging environment.

0.3 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 reside on- or off-board. Also, the computation of tariffs can be done with OBE tariff tables and processing, or with an off-board component.

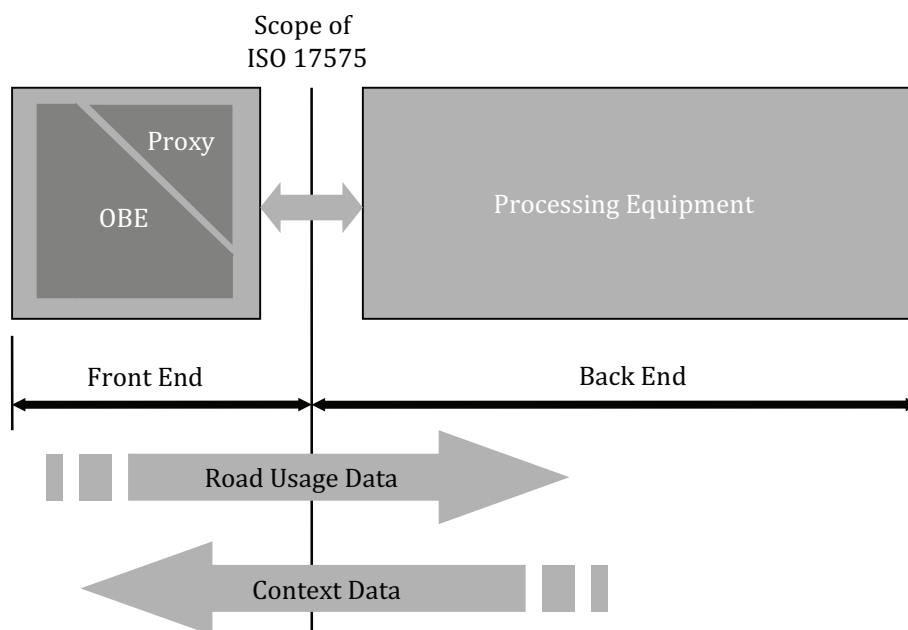


Figure 2 — Assumed technical architecture and interfaces

The combined functionality of OBE and proxy is denoted as Front End. A Front End implementation where processing is predominately on the 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 choice 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.

0.4 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 vertical 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 the 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.

0.5 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 contents of charge reports might vary between toll regimes, 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. A toll regime comprises a set of rules for charging, including the charged network, the charging principles, the liable vehicles and a definition of the required contents of the charge report.

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. The data defined in ISO 17575-1 and ISO 17575-3 can but need not be exchanged using the communication stack as defined in ISO 17575-2.

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 ISO 17575-3 are used to transfer data to the Front End in order to instruct it on which data to collect and report.

0.6 Application needs covered by ISO 17575

The ISO 17575 series of standards

- is compliant with the architecture defined in ISO 17573:2010,
- supports 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),
- supports fee collection based on units of distance or duration, and based on occurrence of events,
- supports modulation of fees by vehicle category, road category, time of usage and contract type (e.g. exempt vehicles, special tariff vehicles, etc.),
- supports limiting of fees by a defined maximum per period of usage,
- supports fees with different legal status (e.g. public tax, private toll),
- supports differing requirements of different toll chargers, especially in terms of
 - geographic domain and context descriptions,
 - contents and frequency of charge reports,
 - feedback to the driver (e.g. green or red light), and
 - provision of additional detailed data on request, e.g. for settling of disputes,
- supports overlapping geographic toll domains,
- supports adaptations to changes in
 - tolled infrastructure,
 - tariffs, and
 - participating regimes, and
- supports the provision of trust guarantees by the service provider to the toll charger for the data originated from the Front End.