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Electronic fee collection — Application interface definition for autonomous systems —

Part 3: Context data

Perception du télépéage — Définition de l'interface d'application pour les systèmes autonomes —

Partie 3: Données du contexte

Reference number
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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).

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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 17575-3 cancels and replaces ISO/TS 17575-3:2011, which has been technically revised. The following changes have been made:

— conversion from a Technical Specification to an International Standard;

— amendments to reflect changes to the underlying base standards, especially ISO 14906;

— major changes regarding

  — integration of functionalities for the support of complex toll domains that consist of more than one partition from ISO/TS 17575-2:2010,

  — changes in the security scheme details,

  — introduction of protocol version identification,

  — harmonization of the identification of toll contexts amongst the parts of ISO 17575,

  — improvement of the possibility to use rounding rules,

  — enabling the use of a second alternative currency in tariffs,

  — adaptation of the charge reporting configuration to changes in ISO 17575-1:2016,

  — enabling the use of toll context partitions which may be present in one single toll context,

  — support of optional geographic data files (GDF) based description of toll liable networks (embracing such data definitions from ISO 12855:2012,

  — revised terms and definitions (Clause 3), and

  — editorial and formal corrections as well as changes to improve readability.

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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.

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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 such as bridges and tunnels, distance-based charging, and parking fees.

Further introductory explanations of autonomous systems in EFC and, in particular, the considerations with respect to business and technical architecture that form the base for interfaces within such system and their interoperable specification are provided in ISO 17575-1:2016.

0.2 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 1). For every toll scheme, the Back End will send context data, i.e. a description of the toll scheme 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.

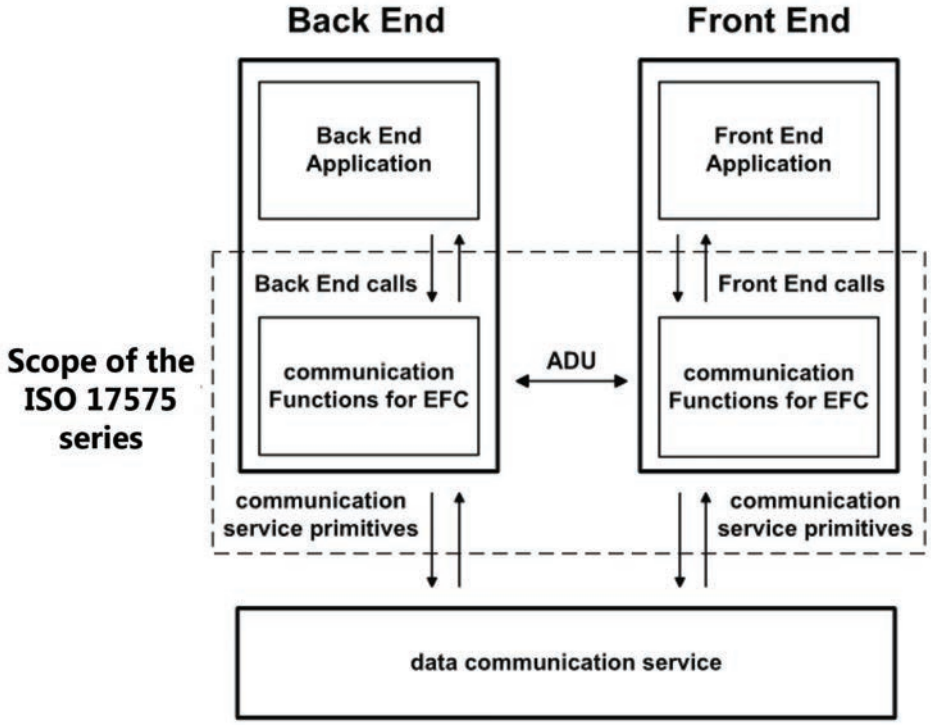


Figure 1 — Scope of ISO 17575

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0.3 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.

0.4 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 toll schemes, and
- supports the provision of trust guarantees by the service provider to the toll charger for the data originated from the Front End.

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Electronic fee collection — Application interface definition for autonomous systems —

Part 3: Context data

1 Scope

This part of ISO 17575 defines the content, semantics and format of the data exchange between a Front End (OBE plus optional proxy) and the corresponding Back End in autonomous toll systems. It defines the data elements used to specify and describe the toll context details. Context data are transmitted from the Back End to the Front End to configure it for the charging processes of the associated toll context.

In ISO 17575, context data is the description of the properties of a single instance of an electronic fee collection (EFC) context. This single instance of an EFC context operates according to one of the basic tolling principles such as

— road section charging,

— area charging (according to travelled distance or duration of time), and

— cordon charging.

EFC context data comprise a set of rules for charging, including the description of the charged network, the charging principles, the liable vehicles and a definition of the required contents of the charge report. This set of rules is defined individually for each EFC context according to local needs.

The following data and associated procedures are defined in this part of ISO 17575:

— data providing toll context overview information;

— data providing tariff information (including definitions of required tariff determinants such as vehicle parameters, time classe, etc.);

— data providing context layout information;

— data providing reporting rules information.

This part of ISO 17575 also provides the required definitions and data specifications to be applied when one single toll context is spilt inot more than one toll context partitions. This is applicable to cases where one EFC scheme and the rules applied cannot be described with a single set of context data.

Annex A provides the data type specification using ASN.1 notation.

The protocol implementation conformity statements (PICS) proforma are provided in Annex B.

Annex C provides a graphical presentation of the structure of the toll context data.

Annexes D, E and F contain further information and descriptions, which may support the understanding and the implementation of the rules specified in this part of ISO 17575.

Annex G provides information how this part of ISO 17575 can be used in a European Electronic Toll Service (EETS) environment, with reference to EU Decision 2009/750.

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2 Normative references

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

ISO 612, *Road vehicles — Dimensions of motor vehicles and towed vehicles — Terms and definitions*

ISO 1176, *Road vehicles — Masses — Vocabulary and codes*

ISO 4217, *Codes for the representation of currencies and funds*

ISO/IEC 8824-1:2008, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation — Part 1*

ISO/IEC 8825-2:2008, *Information technology — ASN.1 encoding rules: Specification of Packed Encoding Rules (PER) — Part 2*

ISO 12813:2015, *Electronic fee collection — Compliance check communication for autonomous systems*

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

ISO 17575-1:2016, *Electronic fee collection — Application interface definition for autonomous systems — Part 1: Charging*

EN 15509:2014, *Electronic fee collection — Interoperability application profile for DSRC*

NIMA TR8350.2, Third Edition — Amendment 1, January 2000, Department of Defense — *World Geodetic System 1984, Its Definition and Relationships With Local Geodetic Systems, issued by National Imagery and Mapping Agency (NIMA)*, US Department of Defense

3 Terms and definitions

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

3.1
area charging
charging based on road usage within a given area

[SOURCE: ISO 17575-1:2016, 3.1]

3.2
attribute
addressable package of data consisting of a single data element or structured sequences of data elements

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

3.3
authenticator
data, possibly encrypted, that is used for authentication

[SOURCE: EN 15509:2014, 3.3]

3.4
Back End
part of a back office system interfacing to one or more *Front Ends* (3.11)

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

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3.5
charge object
geographic or road related object for the use of which a charge is applied

[SOURCE: ISO 17575-1:2016, 3.5]

3.6
charge report
information containing road usage and related information originated at the *Front End* (3.11)

[SOURCE: ISO 17575-1:2016, 3.6]

3.7
cordon
border line of an area

[SOURCE: ISO 17575-1:2016, 3.7]

3.8
cordon charging
charging for the crossing of a *cordon* (3.7)

[SOURCE: ISO 17575-1:2016, 3.8]

3.9
data element
coded information, which might itself consist of lower level information structures

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

3.10
data set
logical set of *data elements* (3.9) with a semantic relation

Note 1 to entry: Data set is used only for better understanding and is fully independent from implementation solutions.

3.11
Front End
part of a tolling system consisting of an *OBE* (3.13) and possibly a *proxy* (3.14) where road tolling information and usage data are collected and processed for delivery to the *Back End* (3.4)

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

Note 1 to entry: The Front End comprises the *on-board equipment* (3.13) and an optional *proxy* (3.14).

3.12
layout
technical description of the location of tolled objects including their borders

3.13
on-board equipment
OBE
all required equipment on-board a vehicle for performing required EFC functions and communication services

3.14
proxy
optional part of a *Front End* (3.11) that communicates with external equipment and processes the data received into an agreed format to be delivered to the *Back End* (3.4)

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

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3.15
road section charging
tolling principle where the fee is due if predefined sections of roads are used

[SOURCE: ISO 17575-1:2016, 3.14]

3.16
toll
charge, tax or duty levied in connection with using a vehicle in a *toll domain* (3.20)

[SOURCE: ISO/TS 19299:2015, 3.42, modified — "any" has been deleted from before "charge".]

Note 1 to entry: The definition is the 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 also includes fees regarded as an (administrative) obligation, e.g. a tax or a duty.

3.17
tolled area
geographic area where a *toll* (3.16) is charged for road usage

3.18
toll context
logical view as defined by *attributes* (3.2) and functions of the basic elements of a toll scheme consisting of a single basic tolling principle, a spatial distribution of the *charge objects* (3.5) and a single behaviour of the related *Front End* (3.11)

[SOURCE: ISO 17575-1:2016, 3.17]

3.19
toll context data
information defined by the responsible toll charger as necessary to establish the *toll* (3.16) due for using a vehicle on a particular *toll context* (3.18) and to conclude the toll transaction

[SOURCE: ISO 12855:2015, 3.15]

3.20
toll domain
area or part of a road network where a certain *toll regime* (3.21) is applied

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

3.21
toll regime
set of rules, including enforcement rules, governing the collection of *toll* (3.16) in a *toll domain* (3.20)

[SOURCE: ISO 17573:2010, 3.20]

3.22
toll scheme
organizational view of a *toll regime* (3.21), including the actors and their relationships

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

ADU	Application data unit (ISO 14906)
ASN.1	Abstract Syntax Notation One (ISO/IEC 8824-1)
CCC	Compliance check communication (ISO 12813)

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