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Electronic fee collection - Application interface definition for autonomous systems - Part 1: Charging (ISO 17575-1:2016)

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Elektronische Gebührenerhebung - Definition der Anwendungsschnittstelle für autonome Systeme - Teil 1: Abbuchung (ISO 17575-1:2016)

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Perception du télépéage - Définition de l'interface d'application pour les systèmes autonomes - Partie 1: Imputation (ISO 17575-1:2016)

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Perception du télépéage - Définition de l'interface
d'application pour les systèmes autonomes - Partie 1:
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European foreword

This document (EN ISO 17575-1:2016) 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of an identical text or by endorsement, at the latest by August 2016, and conflicting national standards shall be withdrawn at the latest by August 2016.

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INTERNATIONAL
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**Electronic fee collection —
Application interface definition for
autonomous systems —**

**Part 1:
Charging**

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*Perception du télépéage — Définition de l'interface d'application pour
les systèmes autonomes —
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Partie 1: Imputation*

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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 17575-1 cancels and replaces ISO/TS 17575-1:2010, 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;
- adoption of security prescriptions previously located in other standards for specification of authenticated data structures;
- 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.

ISO 17575-1:2016(E)

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. In addition to 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 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 this part of 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.

0.3 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 (depending on 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 toll 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 1: Charging

1 Scope

This part of ISO 17575 defines the format and semantics of the data exchange between a Front End (OBE plus optional proxy) and corresponding Back Ends in autonomous toll schemes. It defines the data elements that are used to generate charge reports containing information about the road usage of a vehicle for certain time intervals, sent from the Front End to the Back End. It also defines the data that can be used to re-configure the ongoing process of gathering charge relevant information in the Front End. The scope is shown in [Figure 1](#).

The constitution of the charge report is dependent on configuration data that are assumed to be present in the Front End. The assembly of charge reports can be configured for each individual toll scheme according to local needs. Charge reports generated in accordance with this part of ISO 17575 are consistent with the requirements derived from the architectural concept defined in ISO 17573:2010.

The definitions in this part of ISO 17575 comprise

- reporting data, i.e. data for transferring road usage data from Front End to Back End, including a response from the Back End towards the Front End,
- data for supporting security mechanisms,
- contract data, i.e. data for identifying contractually essential entities,
- road usage data, i.e. data for reporting the amount of road usage,
- account data for managing a payment account,
- versioning data, and
- compliance checking data, i.e. data imported from ISO 12813:2015, which are required in compliance checking communication.

[Annex A](#) contains the data type specifications 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 data elements described in [Clause 7](#).

[Annex D](#) provides information on how this part of ISO 17575 can be used in EETS environment and how the requirements that are specified in the EU-Decision 2009/750 are addressed by this standard.