International Standard

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Electronic fee collection — Information exchange between service provision and toll charging

Perception de télépéage — Échange d'informations entre la prestation de service et la perception du péage

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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 document 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).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Intelligent transport systems,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 12855:2022), which has been technically revised.

The main changes are as follows:

— the application data units (ADUs) have been revised;

— the data definitions and semantics have been updated, including making reference to ISO/TS 17573-2 as the primary source;

— the remaining references to the ISO 17575 series in 5.2.7 and in the Bibliography have been removed;

— the `MacKeyObject` has been removed from the `TrustobjectAdu` (see 6.7);

— the ADUs have been adapted to support automatic number plate recognition (ANPR)-based fee collection and enforcement;

— the structure of all major clauses has been harmonized to improve readability.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The widespread use of road tolling requires provisions for users of vehicles that circulate through many different toll domains. Users should be offered a single contract for driving a vehicle through various toll domains. Where vehicles require on-board equipment (OBE) or where tolling is based on automatic number plate recognition (ANPR), these options should be interoperable with the toll systems in the various toll domains. In Europe, this need has been officially recognized and legislation on interoperability has already been adopted (see Directive 2019/520,[7] related Commission delegated regulation 2020/2003[9] and Commission implementing regulation 2020/204[8]). There is both a commercial and an economic justification regarding the OBE and the toll systems for International Standards supporting interoperability.

The system architecture specified in ISO 17573-1 is the basis for all ISO and CEN Standards in the road tolling domain. This document:

— adopts the concepts and basic system functionalities and structure of ISO 17573-1;

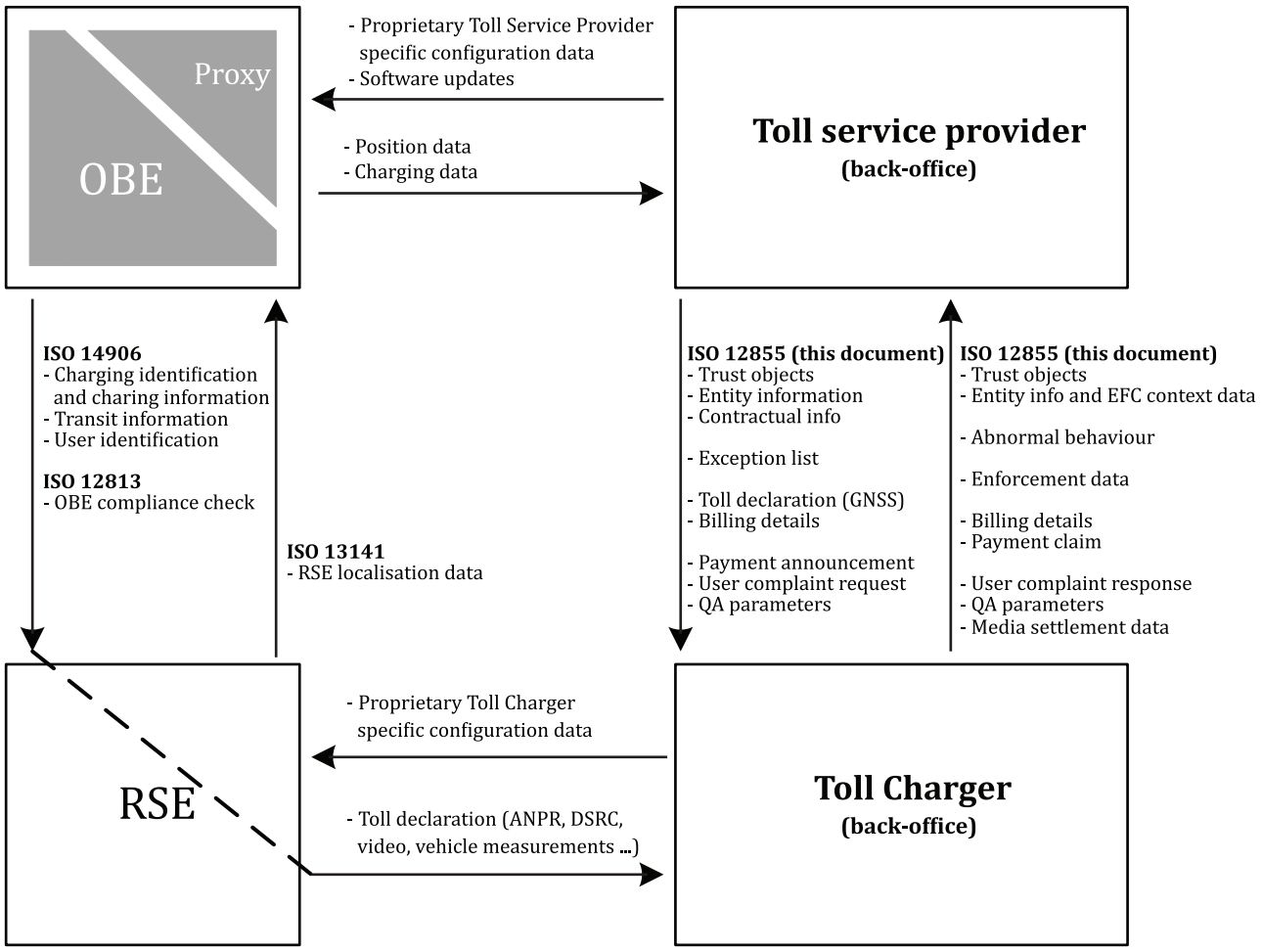
— uses the terminology of ISO 17573-1; and

— specifies the interfaces identified in ISO 17573-1.

ISO 17573-1 uses ISO/IEC 10746-3 for the description of the architecture.

Figure 1 shows the scope of the group of International Standards related to electronic fee collection (EFC) based upon the ISO 17573-1 system architecture.

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Key

ANPR automatic number plate recognition
DSRC dedicated short-range communication
GNSS global navigation satellite system
QA quality assurance
OBE on-board equipment
RSE roadside equipment

Figure 1 — Scope of EFC-related International Standards

A given transport service for a given vehicle is fully identified by one or several toll declarations made available to the toll charger (TC). It is necessary to make toll declarations available according to the rules of the toll regime of the toll domain. These toll declarations can either be acquired on the road-side equipment (RSE) of the TC or acquired by an autonomous OBE and sent to the TC by the toll service provider (TSP).

The amount due for a given transport service used by a vehicle liable to toll is finalized by the TC with the use of the acquired or received toll declarations (as described above) and calculations are made according to the rules of the toll regime (formula, tariff tables, specific situations rules, traffic conditions, etc.). This means that the TC has the authority to decide on the amount due, even if it decides to assign the task of calculating the amount due to the TSP.

The calculated amount due, associated with a given transport service, is referred to as "billing details". For a given transport service, the billing details refer to one or several toll declarations.

Depending on the toll regime, billing details are computed by means of the information collected either by the TC or the relevant TSP, or both. They are finalized by the TC – or by the TSP if the TC has assigned this task to the TSP – and sent to the counterpart.

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The TC derives the payment claims from the billing details and makes them available to each TSP, or requires the TSP to send payment announcements, according to the bilateral agreements it has with each TSP, referring to one or several billing details. These payment claims include an amount due, considering any specific commercial conditions applicable to a vehicle, a fleet of vehicles or a given TSP, if specified for the transport service.

This document specifies a set of interactions in support of technical interoperability between back-office systems of TCs and TSPs. The EFC service and the EFC system model on which this document is based are specified in ISO 17573-1.

This document does not provide a full solution for interoperability and it does not specify other parts of the EFC system, other services, other technologies and non-technical elements of interoperability. It is specified as a toolbox International Standard of an application protocol data unit (APDU), which can be used for the assigned purpose. This APDU may contain different ADUs, which bear the transferred data. The detailed definitions of mandatory and optional elements in a real implementation are specified elsewhere. It does not specify all communication sequences, communication stacks and timings.

The development of a common European Electronic Toll Service (EETS), as a part of the aforementioned European EFC Directive and related Regulation and Implementing acts, also calls for the definition of an interoperable EFC service. EN 16986 specifies interoperable application profiles (IAP), applicable based on this document. These profiles specify a specific coherent set of transactions, triggers, timings, conditions, data elements, transfer mechanisms and supporting functions for an interoperable exchange of data between the back-office system of TCs and TSPs. EN 16986 is consistent with and is intended to provide support for the technical specification of the EETS.

This document identifies and specifies the APDU and a set of ADUs exchanged between two actors in the roles of TSP and TC as specified in ISO 17573-1. To specify these interfaces, this document uses the enterprise description of the toll environment, and the interactions specified between the named classes of roles, as specified in ISO 17573-1. This supports a complete specification of the data that is transferred between those identified entities. In addition, a number of computational interfaces are identified and interactions in terms of sequences of APDUs are specified.

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Electronic fee collection — Information exchange between service provision and toll charging

1 Scope

This document specifies:

— the interfaces between electronic fee collection (EFC) back-office systems for vehicle-related transport services, e.g. road user charging, parking and access control;

— an exchange of information between the back-office system of the two roles of service provision and toll charging, e.g.:

  — charging-related data (toll declarations, billing details, payment claims, payment announcements),

  — administrative data (trust objects, EFC context data, etc.), and

  — confirmation data;

— transfer mechanisms and supporting functions;

— information objects, data syntax and semantics.

This document is applicable for any vehicle-related toll service and any technology used for charging.

The data types and associated coding related to the data elements described in Clause 6 are specified in Annex A, using the abstract syntax notation one (ASN.1) according to ISO/IEC 8824-1.

This document specifies basic protocol mechanisms over which implementations can specify and perform complex transfers (transactions).

This document does not specify, amongst others:

— any communication between TC or TSP with any other involved party;

— any communication between elements of the TC and the TSP that is not part of the back-office communication;

— interfaces for EFC systems for public transport;

— any complex transfers (transactions), i.e. sequences of inter-related ADUs that can possibly involve several APDU exchanges;

— processes regarding payments and exchanges of fiscal, commercial or legal accounting documents;

— definitions of service communication channels, protocols and service primitives to transfer the APDU.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 639, *Code for individual languages and language groups*

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country code*

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ISO 4217, *Codes for the representation of currencies*

ISO/IEC 7812-1, *Identification cards — Identification of issuers — Part 1: Numbering system*

ISO/IEC 7812-2, *Identification cards — Identification of issuers — Part 2: Application and registration procedures*

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

ISO/IEC 8825-4, *Information technology — ASN.1 encoding rules — Part 4: XML Encoding Rules (XER)*

ISO/IEC 8825-8, *Information technology — ASN.1 encoding rules — Part 8: Specification of JavaScript Object Notation Encoding Rules (JER)*

ISO/IEC 9594-8, *Information technology — Open systems interconnection — Part 8: The Directory: Public-key and attribute certificate frameworks*

ISO/IEC 9797-1:2011, *Information technology — Security techniques — Message Authentication Codes (MACs) — Part 1: Mechanisms using a block cipher*

ISO/IEC 10118-3, *IT Security techniques — Hash-functions — Part 3: Dedicated hash-functions*

ISO 11568, *Financial services — Key management (retail)*

ISO/IEC 11770-3, *Information security — Key management — Part 3: Mechanisms using asymmetric techniques*

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

ISO 13141, *Electronic fee collection — Localization augmentation communication for autonomous systems*

ISO/IEC 14888-2:2008, *Information technology — Security techniques — Digital signatures with appendix — Part 2: Integer factorization based mechanisms*

ISO 14906, *Electronic fee collection — Application interface definition for dedicated short-range communication*

ISO/TS 17573-2, *Electronic fee collection — System architecture for vehicle related tolling — Part 2: Vocabulary*

ISO 17573-3, *Electronic fee collection — System architecture for vehicle related tolling — Part 3: Data dictionary*

ISO/IEC 18033-2, *Information technology — Security techniques — Encryption algorithms — Part 2: Asymmetric ciphers*

ISO 19299, *Electronic fee collection — Security framework*

ISO/TS 37444, *Electronic fee collection — Charging performance framework*

IETF RFC 4347, *Datagram Transport Layer Security, April 2006*

IETF RFC 5246, *The Transport Layer Security (TLS) Protocol, August 2008*

IETF RFC 5746, *Transport Layer Security (TLS) Renegotiation Indication Extension, February 2010*

IETF RFC 6040, *Tunnelling of Explicit Congestion Notification, February 2013*

W3C Recommendation *XML Signature Syntax and Processing Version 1.1*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 17573-2 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

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