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Electronic fee collection — System architecture for vehicle-related tolling —

Part 3: Data dictionary

Perception du télépéage — Architecture de systèmes pour le péage lié aux véhicules —
Partie 3: Dictionnaire de données

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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).

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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).

A list of all parts in the ISO 17573 series can be found on the ISO website.

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.

Introduction

This document is a part of the ISO 17573 series that defines the system architecture for vehicle-related tolling. ISO 17573-1 gives a reference model for the system architecture. ISO/TS 17573-2 provides a collection of terms and definitions within the field of electronic fee collection (EFC) and road user charging that are used in the different documents published in ISO and CEN under the general title, *Electronic fee collection*.

This document (ISO/TS 17573-3) provides a data dictionary that contains the definitions of ASN.1 (data) types and the associated semantics.

The document is intended to be used as a reference by editors of ISO and CEN documents in EFC and in related areas of standardization (such as Intelligent Transport Systems, ITS).

It is foreseen that the library of ASN.1 (data) types contained in this document will be augmented with additional definitions as these become available.

Electronic fee collection — System architecture for vehicle-related tolling —

Part 3: Data dictionary

1 Scope

This document specifies the syntax and semantics of data objects in the field of electronic fee collection (EFC). The definitions of data types and assignment of values are provided in accordance with the abstract syntax notation one (ASN.1) technique, as specified in ISO/IEC 8824-1. This document defines:

— ASN.1 (data) types within the fields of EFC;

— ASN.1 (data) types of a more general use that are used more specifically in standards related to EFC.

This document does not seek to define ASN.1 (data) types that are primarily related to other fields that operate in conjunction with EFC, such as cooperative intelligent transport systems (C-ITS), the financial sector, etc.

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

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

ISO 4217, *Codes for the representation of currencies*

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

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

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

ISO/IEC 8859-1, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

ISO/IEC 8859-2, *Information technology — 8-bit single-byte coded graphic character sets — Part 2: Latin alphabet No. 2*

ISO/IEC 8859-3, *Information technology — 8-bit single-byte coded graphic character sets — Part 3: Latin alphabet No. 3*

ISO/IEC 8859-4, *Information technology — 8-bit single-byte coded graphic character sets — Part 4: Latin alphabet No. 4*

ISO/IEC 8859-5, *Information technology — 8-bit single-byte coded graphic character sets — Part 5: Latin/Cyrillic alphabet*

ISO/IEC 8859-6, *Information technology — 8-bit single-byte coded graphic character sets — Part 6: Latin/Arabic alphabet*

ISO/IEC 8859-7, *Information technology — 8-bit single-byte coded graphic character sets — Part 7: Latin/Greek alphabet*

ISO/IEC 8859-8, *Information technology — 8-bit single-byte coded graphic character sets — Part 8: Latin/Hebrew alphabet*

ISO/IEC 8859-9, *Information technology — 8-bit single-byte coded graphic character sets — Part 9: Latin alphabet No. 5*

ISO/IEC 8859-10, *Information technology — 8-bit single-byte coded graphic character sets — Part 10: Latin alphabet No. 6*

ISO 14816, *Road transport and traffic telematics — Automatic vehicle and equipment identification — Numbering and data structure*

3 Terms and definitions

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

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

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

— IEC Electropedia: available at http://www.electropedia.org/

3.1
`BITSTRING` **type**
simple type (3.14) whose distinguished values are an ordered sequence of zero, one or more bits

[SOURCE: ISO/IEC 8824-1:2021, 3.8.7]

3.2
`CHOICE` **type**
type defined by referencing a list of distinct types; each value of the choice type is derived from the value of one of the *component types* (3.4)

Note 1 to entry: Each value of the choice type is derived from the value of one of the component types.

[SOURCE: ISO/IEC 8824-1:2021, 3.8.14 — modified, Note 1 to entry added.]

3.3
complex data type
one type that has more than *three levels* (3.17)

3.4
component type
one of the types referenced when defining a *CHOICE* (3.2), *SET* (3.12), *SEQUENCE* (3.10), *SET OF* (3.13), or *SEQUENCE OF* (3.11).

[SOURCE: ISO/IEC 8824-1:2021, 3.8.15]

3.5
data type
categorization of an abstract set of possible values, characteristics, and set of operations for an attribute

[SOURCE: ISO/IEC 25012:2008, 4.7 — modified, NOTE removed.]

3.6
`INTEGER` **type**
simple type (3.14) with distinguished values which are the positive and negative whole numbers, including zero (as a single value)

[SOURCE: ISO/IEC 8824-1:2021, 3.8.48]

3.7
object
well-defined piece of information, definition, or specification which requires a name in order to identify its use in an instance of communication

[SOURCE: ISO/IEC 8824-1:2021, 3.8.52]

3.8
`OCTET STRING` **type**
simple type (3.14) whose distinguished values are an ordered sequence of zero, one or more octets, each octet being an ordered sequence of eight bits

[SOURCE: ISO/IEC 8824-1:2021, 3.8.55]

3.9
parent type
type that is being constrained when defining a *subtype* (3.16), and which governs the subtype notation

[SOURCE: ISO/IEC 8824-1:2021, 3.8.58]

3.10
`SEQUENCE` **type**
type defined by referencing a fixed, ordered list of types (some of which can be declared to be optional)

Note 1 to entry: Each value of the sequence type is an ordered list of values, one from each *component type* (3.4).

[SOURCE: ISO/IEC 8824-1:2021, 3.8.67 — modified, new Note 1 to entry added.]

3.11
`SEQUENCE-OF` **type**
type defined by referencing a single *component type* (3.4)

Note 1 to entry: Each value in the sequence-of type is an ordered list of zero, one or more values of the component type.

[SOURCE: ISO/IEC 8824-1:2021, 3.8.68 — modified, Note 1 to entry added.]

3.12
`SET` **type**
type defined by referencing a fixed, unordered, list of types (some of which may be declared to be optional); each value in the set type is an unordered list of values, one from each *component type* (3.4)

Note 1 to entry: Where a component type is declared to be optional, a value of the set type need not contain a value of that component type.

[SOURCE: ISO/IEC 8824-1:2021, 3.8.72]

3.13
`SET-OF` **type**
types defined by referencing a single *component type* (3.4); each value in the set-of type is an unordered list of zero, one or more values of the component type.

[SOURCE: ISO/IEC 8824-1:2021, 3.8.73]

3.14
simple type
type defined by directly specifying the set of their values

[SOURCE: ISO/IEC 8824-1:2021, 3.8.74]

3.15
single-level data type
data type (3.5) which is a *sequence* (3.10) or *sequence-of type* (3.11) defined by referencing a *simple type* (3.14) or a *subtype* (3.16) of a simple type

3.16
subtype (of a parent type)
type whose values are a subset (or the complete set) of the values of some other type (the *parent type*) (3.9)

[SOURCE: ISO/IEC 8824-1:2021, 3.8.76]

3.17
three-level data type
data type (3.5) which is a *choice* (3.2), *sequence* (3.10) or *sequence-of type* (3.11) defined by referencing a *two-level data type* (3.18)

3.18
two-level data type
data type (3.5) which is a *choice* (3.2), *sequence* (3.10) or *sequence-of type* (3.11) defined by referencing *a single-level data type* (3.15)

4 Abbreviated terms

ASN.1	abstract syntax notation one
BCD	binary coded decimal
CO	carbon monoxide
CO_2	carbon dioxide
EFC	electronic fee collection
GNSS	global navigation satellite system
HC	hydrocarbon
ICC	integrated circuit(s) card
LAC	localisation augmentation communication
NO_X	nitrogen oxides
OBU	onboard unit

5 EFC common data object definitions

5.1 General

In this clause, the structure of all EFC common data objects is described. This is formally defined in Annex A in terms of data type definitions. In addition to the structure description, each data object is also given a semantics.

Each one of the common data types defined herein is used by more than one standard in the EFC context. These standards may also define their own data types when no one of the common data types defined herein satisfies their need.

The definitions of the EFC common data types are ordered according to their data type level:

— first subtypes based on simple data types (e.g. INTEGER or OCTET STRING),

— then two-level data types,

— then three-level data types,

— then complex data types.

Data types are ordered alphabetically inside each level.

5.2 Subtypes of simple data types

5.2.1 AccountStatus

The data type `AccountStatus` shall be based on a simple type as described in Table 1.

Table 1 — AccountStatus

Subtype	Parent type	Semantics
-	`INTEGER`	`AccountStatus` provides the status of the user's account. The following values are assigned: — ok, — low, — empty, — negative.

5.2.2 ActualNumberOfPassengers

The data type `ActualNumberOfPassengers` shall be based on a subtype as described in Table 2.

Table 2 — ActualNumberOfPassengers

Subtype	Parent type	Semantics
`Int1Unsigned`		`ActualNumberOfPassengers` represents the actual number of passengers (i.e. human beings) present in the vehicle, incl. the driver. This information can affect the applicability of tolls or the value of the tariff to be applied, e.g. in High Occupancy Tolling or High Occupancy Vehicle lanes.

5.2.3 FutureCharacteristics

The data type `FutureCharacteristics` shall be based on a simple constrained type as described in Table 3.

Table 3 — FutureCharacteristics

Subtype	Parent type	Semantics
-	INTEGER	`FutureCharacteristics` provides information reserved for future use, stored in one octet, that will be defined in future versions of this document. The following values are assigned: — `noEntry`: means information is not available; — `airSuspension`: means the vehicle uses air suspensions;

5.2.4 Altitude

The data type `Altitude` shall be based on a simple type as described in Table 4.

Table 4 — Altitude

Subtype	Parent type	Semantics
Int2Signed		`Altitude` provides the ellipsoidal height (in 0,25 metre units) above or below the WGS84[5] ellipsoid of the geographical point. The range in metres is from -8 192,00 to +8 191,75. NOTE WGS84[5] represents a broadly adopted global geodetic reference system for the Earth for practical applications of mapping, geopositioning and navigation. Other terrestrial reference frames exist, notably the International Terrestrial Reference Frame (ITRF, the latest currently being ITRF2014, with ITRF2020 under preparation). It is possible to convert between the most commonly used terrestrial reference frames and the differences between them are typically in the order of centimetres. The international terrestrial reference frame is becoming increasingly recognized and used as the primary reference frame. All recent and up-to-date Global Navigation Satellite System (GNSS) specific terrestrial reference frames (WGS 84 for GPS, PZ-90 for GLONASS, the GTRF for Galileo, CGCS2000 for BeiDou, and the JGS for QZSS) are aligned to a primary ITRS[6] realization, according to ISO 19161-1:2020, Annex C.

5.2.5 CO2EmissionValue

The data type `CO2EmissionValue` shall be based on a subtype as described in Table 5.

Table 5 — CO2EmissionValue

Subtype	Parent type	Semantics
Int2		`CO2EmissionValue` represents the vehicle's CO_2 emission value according to vehicle registration documents, in g/km.

5.2.6 ContractAuthenticator

The data type `ContractAuthenticator` shall be based on a simple type as described in Table 6.

Table 6 — ContractAuthenticator

Subtype	Parent type	Semantics
-	OCTET STRING	`ContractAuthenticator` is an authenticator calculated by the toll service provider when issuing the contract, to prevent tampering with contract data.

5.2.7 ContractSerialNumber

The data type `ContractSerialNumber` shall be based on a subtype as described in Table 7.

Table 7 — ContractSerialNumber

Subtype	Parent type	Semantics
`Int4Unsigned`		`ContractSerialNumber` is an integer designating the individual contract, assigned at the discretion of the toll service provider.

5.2.8 CopValue

The data type `CopValue` shall be based on a simple type as described in Table 8.

Table 8 — CopValue

Subtype	Parent type	Semantics
-	`INTEGER` NOTE It is of type `ENUMERATED` in ISO 14906.	`CopValue` represents the vehicle's carbon dioxide pollution values as defined in Directive 2003/127/EC.[11] The following values are assigned: — `noEntry`, value not defined; — `co2class1`, for pollution values below 101 g/km; — `co2class2`, for pollution value from 101 to 120. g/km; — `co2class3`, for pollution values from 121 to 140 g/km; — `co2class4`, for pollution values from 141 to 160 g/km; — `co2class5`, for pollution values from 161 to 200 g/km; — `co2class6`, for pollution values from 201 to 250 g/km; — `co2class7`, for pollution values above 250 g/km.

5.2.9 CountryCode

The data type `CountryCode` shall be based on a simple type as described in Table 9.

Table 9 — CountryCode

Subtype	Parent type	Semantics
-	`BITSTRING`	`countryCode` represents a ISO 3166-1 country code. Values are encoded in accordance with the ITA-2 encoding of the ISO 3166-1 country code. EXAMPLE 1 Austria (AT) = 11000 00001. EXAMPLE 2 Belgium (BE) = 10011 10000.

5.2.10 DetectionMode

The data type `DetectionMode` shall be based on a simple type as described in Table 10.