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Intelligent transport systems — Reference model architecture(s) for the ITS sector —

Part 6: Use of ASN.1

Systèmes intelligents de transport (ITS) — Architecture(s) de modèle de référence pour le secteur ITS —

Partie 6: Présentation de données dans ASN.1

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).

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 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

This second edition cancels and replaces the first edition (ISO 14813-6:2009), which has been technically revised.

The main changes compared to the previous edition are as follows:

— The requirement to use the aligned variant of the PER ASN.1 encoding rules is relaxed; any set of ASN.1 encoding is now allowed;

— All new messages are now required to include a version number within its structure;

— Additional rules are defined to create unambiguous references to entries within the CIDCR;

— ASN.1 comments are now only allowed for informative text;

— OID assignments are now consistent with the rules defined in ISO 14817-3.

A list of all the parts in the ISO 14813 series, can be found on the ISO website.

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Introduction

This document is part of a series of international standards that provides a form and structure to the reference architectures for intelligent transport systems (ITS). Specifically, this document defines the consistent use of abstract syntax notation one (ASN.1) [ISO/IEC 8824 (all parts)] within ITS International Standards.

The previous versions of this document reflected the best practices at the time that they were written. This revised document clarifies and updates its predecessors by reflecting the current best practices.

ITS International Standards and systems are not required to use ASN.1 as their only means of encoding and transfer. In cases, other methods will be used because of industry practices or efficiency in certain situations. However, ITS International Standards and data concept specifications are required to a) elaborate their data in a consistent form using ASN.1 to promote interoperability and reuse; and b) where ASN.1 is the chosen encoding method, define specific encoding rules based on the ISO/IEC 8825 series of standards.

ASN.1 and its encoding rules provide a means of achieving interoperability of otherwise incompatible data. Within an ASN.1 data stream there may be a requirement to embed information that uses other notations or encoding rules. To achieve this, levels of identification are required to precede certain data elements, to enable the comprehension of data messages.

Users of this document should also be aware that data concepts defined in ITS International Standards should also be fully documented per the rules of the ISO 14817 series of standards.

ASN.1 syntax

As stated in its defining document (ISO/IEC 8824-1), abstract syntax notation one (ASN.1) is a standard notation used for the formal definition of data types, values, and constraints on data types. An important feature of ASN.1 is its ability to enable separation of the specification of the message content, e.g. data structures, from the specification of the encoding of messages, e.g. BER, DER, PER, OER, XER, XML.

ASN.1 provides the following advantages by separating the structure definition from the encoding rules:

— Easy mapping to different syntaxes, including mapping to programming language data structures for easy implementation and mapping to compact binary forms for both security and bandwidth purposes.

— Provision of tools for validation of message syntax and processing of message content, including application-independent encode/decode libraries.

— Automatic generation of test suites.

— Checking for completion and validity.

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Intelligent transport systems — Reference model architecture(s) for the ITS sector —

Part 6:
Use of ASN.1

1 Scope

This document provides a formal means to achieve consistency in the use of ASN.1 when specifying data types that are to be used in ITS International Standards. This is designed to ensure unambiguous and interoperable data exchange while providing consistent documentation of these exchanges. This document provides the necessary specifications to ensure consistent interpretation by providing formal references to several standards and in some cases specifying additional rules to promote greater consistency among standards.

This document does not require the use of ASN.1 for anything other than providing data type definitions in a common and flexible form. This document makes specific provision for the support of:

— Embedding other extant standardised encoding formats, e.g. jpg, while maintaining interoperability and reuse within ITS;

— Allowing alternative representations of data type definitions, e.g. XML schema;

— Allowing alternative encoding of defined data.

The rules presented in this document enable data types to be recorded in a common ITS data registry, and in ITS International Standards, in a common and consistent form.

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/IEC 8824 (all parts), *Information technology — Abstract Syntax Notation One (ASN.1)*

ISO/IEC 8825 (all parts), *Information technology — ASN.1 Encoding Rules*

ISO 14817-1, *Intelligent transport systems — ITS central data dictionaries — Part 1: Requirements for ITS data definitions*

3 Terms and definitions

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

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

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

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

3.1
ASN.1 module
module that conforms to ISO/IEC 8824-1:2015

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3.2
ASN.1 data type
name of a lexical ASN.1 item, typereference, as defined in ISO/IEC 8824-1:2015, 12.2

EXAMPLE MyType

3.3
ASN.1 data type definition
TypeAssignment declaration, as defined in ISO/IEC 8824-1:2015, 16.1

EXAMPLE MyType ::= INTEGER

3.4
aggregate domain
data concept representing a specific syntactic grouping of data elements and/or data frames

3.5
custom extension
customization of a standardised structure to support local, regional, and/or proprietary information

3.6
data concept
abstract entity that generalizes characteristics of interest about information systems and which can be specified using a structured format composed of a set of meta-attributes

Note 1 to entry: ISO 14817-1 defines a structured format for specifying several types of data concepts. The minimum required meta-attributes include a name, a definition, an object identifier, and a data concept type.

Note 2 to entry: Information systems frequently need to exchange messages. The atomic unit of a message is called a data element. A data element is a single property of an object class expressed using a specific (atomic) representation called a value domain. The concepts of "message", "data element", "object class", "property", and "value domain" (among others) are data concepts.

3.7
data element
data concept representing a single property about an object class and which is represented using a specific and atomic value domain, i.e. a representational form that uses a basic ASN.1 data type

3.8
data frame
data concept represented by a specific aggregate domain and that describes information of interest through a useful grouping of more atomic properties about one or more object classes

[SOURCE: ISO 14817-1:2015, 4.18]

3.9
data type
domain of values

Note 1 to entry: This is synonymous with the term "type", as defined in ISO/IEC 8824-1:2015.

3.10
data unit
data structure that is a logical unit of interchange between peer entities

3.11
ITS data concept
any data concept specified or referenced by an ITS International Standard or otherwise managed or stored in the CIDCR

Note 1 to entry: Data concepts are often specified for data exchange, but may also be specified for encoding and local storage, encoding followed by encrypting or hashing, or other purposes.

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3.12
ITS International Standard
any standard developed by ISO/TC 204

3.13
message
data concept that is a grouping of data elements, data frames, or data elements and data frames that is used to convey a complete set of information

[SOURCE: ISO 14817-1:2015, 4.35, modified – the Note 1 to entry is deleted.]

3.14
MIB
Module that conforms to IETF RFC 2578

3.15
module
data concept that contains the formal syntactic definition, and optionally the semantic definition, of a defined set of other data concepts that are all version-controlled as a single unit; a module can be represented in multiple languages (e.g., ASN.1 or XML Schema) and compiled by computer systems

[SOURCE: ISO 14817-1:2015, 4.40]

3.16
module identifier
instance of an object identifier data type used to identify a module

Note 1 to entry: In ISO/IEC 8824-1 a module identifier is defined as:

ModuleIdentifier::=

Modulereference

DefinitiveIdentifier

If the "DefinitiveIdentifier" is not empty, the denoted object identifier value unambiguously and uniquely identifies the module being defined.

3.17
non-ASN.1 data type
data type definition that does not conform to ISO/IEC 8824 (all parts)

3.18
object class
data concept representing a set of objects that share the same properties, relationships, and semantics

3.19
object identifier
ordered list of primary integer values from the root of the international object identifier tree to a node, which unambiguously identifies that node

[SOURCE: ISO/IEC 9834-1:2012, 3.5.11]

3.20
value domain
data concept representing a defined data type

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