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

**Part 6:
Data presentation in ASN.1**

iTeh STANDARD PREVIEW
*Systemes intelligents de transport (ITS) — Architecture(s) de modèle de
référence pour le secteur ITS —
(standards.iteh.ai)
Partie 6. Présentation de données dans ASN.1*

[ISO 14813-6:2009](https://standards.iteh.ai/catalog/standards/sist/fa1c0666-54e7-4754-81d6-e287af140880/iso-14813-6-2009)

[https://standards.iteh.ai/catalog/standards/sist/fa1c0666-54e7-4754-81d6-
e287af140880/iso-14813-6-2009](https://standards.iteh.ai/catalog/standards/sist/fa1c0666-54e7-4754-81d6-e287af140880/iso-14813-6-2009)



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

**iTeh STANDARD PREVIEW
(standards.iteh.ai)**

ISO 14813-6:2009

<https://standards.iteh.ai/catalog/standards/sist/fa1c0666-54e7-4754-81d6-e287af140880/iso-14813-6-2009>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2009

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction.....	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Requirements.....	4
4.1 General requirements	4
4.2 ASN.1 syntax.....	5
4.3 Determining context.....	5
4.4 Using ASN.1 to define ITS data concepts	6
4.5 Module definition using ASN.1	7
Annex A (informative) Simplified context negotiation	10
Annex B (informative) Examples	11
Bibliography.....	15

ITeH STANDARD PREVIEW
(standards.iteh.ai)

ISO 14813-6:2009

<https://standards.iteh.ai/catalog/standards/sist/fa1c0666-54e7-4754-81d6-e287af140880/iso-14813-6-2009>

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 14813-6 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

This first edition of ISO 14813-6 cancels and replaces ISO/TR 14813-6:2000.

ISO 14813 consists of the following parts, under the general title *Intelligent transport systems — Reference model architecture(s) for the ITS sector*.

- *Part 1: ITS service domains, service groups and services* ISO 14813-6:2009
<https://standards.iteh.ai/catalog/standards/sist/fa1c0666-54e7-4754-81d6-e287af140880/iso-14813-6-2009>
- *Part 2: Core TICS reference architecture* [Technical Report]
- *Part 3: Example elaboration* [Technical Report]
- *Part 4: Reference model tutorial* [Technical Report]
- *Part 5: Requirements for architecture description in ITS standards*
- *Part 6: Data presentation in ASN.1*

Introduction

This part of ISO 14813 is one of a series of documents to provide a form and structure to the reference architectures for intelligent transport systems (ITS). Specifically, this part of ISO 14813 is intended to enable conformance with a resolution of ISO/TC 204, a determination for the consistent use and elaboration of Abstract Syntax Notation One [ASN.1 (ISO/IEC 8824-1, ISO/IEC 8824-2, ISO/IEC 8824-3 and ISO/IEC 8824-4)] within ITS International Standards.

ISO/TR 14813-6:2000 was developed following the decision of the ISO Technical Committee ISO/TC 204 to adopt ASN.1 as its normal syntax notation for data definitions within ITS International Standards and to provide instructions and rules to facilitate interoperability and mobility of data. This part of ISO 14813 represents a revision of ISO/TR 14813-6:2000, clarifying and updating it by setting the use of ASN.1 in context with the use of other notations within ITS International Standards.

To be explicit, the ISO/TC 204 decision does not *require* that all ITS International Standards and systems shall use ASN.1 as their only means of encoding and transfer. In many cases other methods will be used because of industry practices or efficiency in certain situations. The ISO/TC 204 decision requires only that

- where data is defined within an ITS International Standard or data registry, it is elaborated in a consistent form within all ITS International Standards as an ASN.1 module to promote interoperability and reuse, and
- where ASN.1 is the chosen method for encoding, that it is consistently defined according to ISO/IEC 8825.

ASN.1 and its encoding rules provide a means of achieving interoperability of otherwise incompatible data concepts. In order to achieve this, levels of identification are required to precede certain data elements, to enable the comprehension of data messages.

Within the ASN.1 data definition there may be a requirement to use other notations or encoding rules in the transfer of information within a system specified within an ITS International Standard.

ISO 14817 defines the format of data dictionaries and data registries and is consistent to this document in requiring the definition of data according using ASN.1.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 14813-6:2009

<https://standards.iteh.ai/catalog/standards/sist/fa1c0666-54e7-4754-81d6-e287af140880/iso-14813-6-2009>

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

Part 6: Data presentation in ASN.1

1 Scope

This part of ISO 14813 provides an 'enabling' structure for use in the ITS sector. It provides a formal means to enact the ISO/TC 204 decision by resolution to use ASN.1 for data definitions within ITS International Standards. This provides a common message form to enable interoperability and reuse. It provides consistency of use so that where other aspects of ASN.1 (defined within ISO/IEC 8824 and ISO/IEC 8825), such as transfer rules, are selected to be used, they are used in a common and consistent way in order to maximize interoperability and reuse.

It is important to note that this part of ISO 14813 does not require the use of ASN.1 for anything other than providing a common and flexible form of data definition and this document makes specific provision for the support of use of other extant standardized syntax notations (EDIFACT, XML, etc.) whilst maintaining interoperability and reuse by defining these practices within an ASN.1 data definition.

Specific implementation requirements, other than those determined in the syntax notations identified above, are beyond the scope of this document.

This part of ISO 14813 also provides a means where particular ITS sector requirements, or existent International Standards, that require particular message forms and procedures that are expressed in other notations (EDIFACT, XML, etc.), may be referenced and reused by other ITS applications. Thus it presents an unambiguous system for identifying all the different data types and describing them in ITS International Standards in a common way.

2 Normative references

The following referenced documents are indispensable for the application 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 8824-1:2002, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO/IEC 8824-2, *Information technology — Abstract Syntax Notation One (ASN.1): Information object specification*

ISO/IEC 8824-3, *Information technology — Abstract Syntax Notation One (ASN.1): Constraint specification*

ISO/IEC 8824-4, *Information technology — Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications*

ISO/IEC 8825-1, *Information technology — ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

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

ISO/IEC 8825-3, *Information technology — ASN.1 encoding rules: Specification of Encoding Control Notation (ECN)*

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

ISO/IEC 9834-1, *Information technology — Open Systems Interconnection — Procedures for the operation of OSI Registration Authorities: General procedures and top arcs of the ASN.1 Object Identifier tree*

ISO 14817, *Transport information and control systems — Requirements for an ITS/TICS central Data Registry and ITS/TICS Data Dictionaries*

3 Terms and definitions

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

3.1

ASN.1 type

ASN.1 type definition

definition of a type that conforms to ISO/IEC 8824

NOTE This is a data type, type definition (or type for short) that represents in a formalized way a class of information (for example, numerical, textual, still image or video information). The representation is conformant to definitions given in ISO/IEC 8824-1.

3.2

associated ASN.1 type

type which is used only for defining the value and subtype notation for a type

NOTE Associated types are defined when it is necessary to make it clear that there may be a significant difference between how the type is defined in ASN.1 and how it is encoded. Associated types do not appear in user specifications.

3.3

data element

some single unit of information of interest (such as a fact, proposition, observation, etc.) about some (entity) class of interest (e.g. a person, place, process, property, concept, association, state, event, etc.) considered to be indivisible in a particular context

[ISO 14817:2002, definition 4.7]

3.4

data frame

data concept; grouping of data elements primarily for the purpose of referring to the group with a single name and thereby efficiently reusing groups of data elements that commonly appear together (e.g. ASN.1 SEQUENCE, SEQUENCE OF, SET OF or CHOICE) in a message specification

[ISO 14817:2002, definition 4.9]

3.5

data primitive

data element that cannot be further subdivided meaningfully within the context of ASN.1

3.6

(data) type

named set of values

[ISO/IEC 8824-1:2002, definition 3.6.74]

3.7**EDI****electronic data interchange**

passing of a message, or series of messages, between computers and/or between different software systems

NOTE Within this context an EDI message is normally compatible with the form specified in ISO/IEC 9897 [4].

3.8**EDIFACT****electronic data interchange for administration, commerce and transport**

specific message format for the sector in question as specified in ISO 9735 [3]

3.9**information object**

instance of some information object class, being composed of a set of fields which conform to field specification of the class

[ISO/IEC 8824-2:2002, definition 3.4.9]

3.10**information object class**

set of fields, forming a template for the definition of a potentially unbounded collection of information objects, the instances of the class

[ISO/IEC 8824-2:2002, definition 3.4.10]

3.11**interface dialogue**

bi-directional communication sequence between two parties in accordance with predetermined protocols and sequences

3.12**level of identification**

position within ASN.1 OBJECT IDENTIFIER (ISO/IEC 9834-1)

3.13**message**

information in a defined form sent from a source to a receiver; data concept, grouping of data elements and/or data frames, as well as associated message metadata, that is used to convey a complete unit of information

NOTE Adapted from ISO 14817.

3.14**module**

one or more instances of the use of the ASN.1 notation for type, value, value set, information object class, information object, and information object set (as well as the parameterized variant of those), encapsulated using the ASN.1 module notation

[ISO/IEC 8824-1:2002, definition 3.6.43]

3.15**module identifier**

instance of an object identifier type which relates to an associated module

NOTE In ISO/IEC 8824 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. No defined value may be used in defining the object identifier value.

3.16

non-ASN.1 type

type definition that does not conform to ISO/IEC 8824

3.17

object identifier

globally unique value associated with an object to unambiguously identify it

[ISO/IEC 8824-1:2002, definition 3.6.47]

3.18

object identifier type

simple type whose values are the set of all object identifiers allocated in accordance with the rules of the ISO/IEC 9834 series

[ISO/IEC 8824-1:2002, definition 3.6.48]

3.19

simple (data) type

type defined by directly specifying the set of its values

[ISO/IEC 8824-1:2002, definition 3.6.66]

3.20

value domain

data concept; expression of a specific and explicit representation of some information about something of the interest within the ICT/ITS domain

[ISO 14817:2002, definition 4.29]

ITih STANDARD PREVIEW
(standards.iteh.ai)
ISO 14813-6:2009
<https://standards.iteh.ai/catalog/standards/sist/fa1c0666-54e7-4754-81d6-e287af140880/iso-14813-6-2009>

4 Requirements

4.1 General requirements

ISO/TC 204 has resolved to use Abstract Syntax Notation.1 (ASN.1), as defined in ISO/IEC 8824-1, ISO/IEC 8824-2, ISO/IEC 8824-3 and ISO/IEC 8824-4, where there is a requirement to elaborate syntax notation of data definitions within ITS International Standards. This ITS International Standard provides a normative means to achieve this objective.

This requirement is particularly important for data reuse and interoperability now that ISO 14817 is approved and countries and regions are beginning to implement data registries and data dictionaries according to its requirements.

The requirement affects only

- data definitions in ITS International Standards, and
- the method of use of ASN.1 where ASN.1 has been selected for other syntax notation aspects (such as data transfer).

Where extant practice or desirability to achieve interoperability with other (non ITS) systems has caused an ITS International Standard to use other notations to transfer or format data, there is no limitation on this whatsoever and there is no requirement to use ASN.1 transfer encodings, etc. The sole requirement is that data definition within the ITS International Standard provides conversion to data module definitions in ASN.1. Annex B provides examples for ASN.1 type definitions.

4.2 ASN.1 syntax

As stated in its defining document (ISO/IEC 8824-1), 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 as it relates to the exchange of information regarding ITS is its ability to enable separation of the specification of message content (e.g. data elements, data frames) from the specification of the encoding or syntax of messages (e.g. EDI, EDIFACT, XML).

As presented in Reference [7], "the following advantages of formal and separate definitions can be cited.

- 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".

4.3 Determining context

The general open system interconnection scheme provides for the communicating parties to negotiate the transfer context for the protocol at connection set-up time and before the actual data interchange occurs. When using devices such as microwave beacons (dedicated short range communications), there may be a very limited time budget to complete the negotiation, hence simplified schemes have to be elaborated (see Figure 2). Initialization of a sample system working with simplified context negotiation, is illustrated in Annex A. It is possible to define ITS application environments where the context is predetermined and the exact sequence and content of the negotiation is known in advance. For these cases, the use of data encoding according to this International Standard and the rules given in ISO/IEC 8825-1 or ISO/IEC 8825-2 may not apply.

Where an ITS International Standard determines that a message is to be encoded or transferred using ASN.1, ISO/IEC 8824 and ISO/IEC 8825 shall be complied with, using the "Packed Encoding Rules (aligned or unaligned variants)".

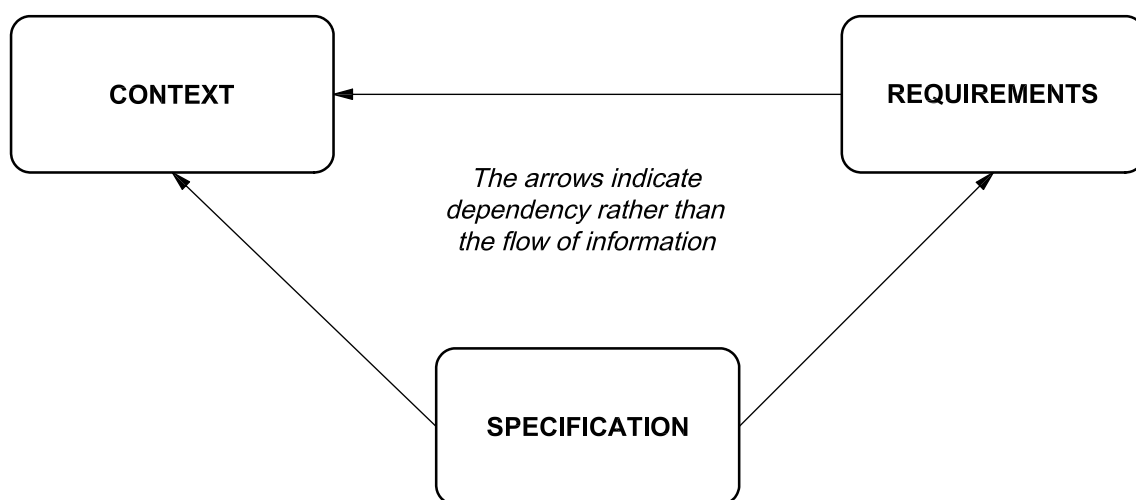


Figure 1 — Context negotiation