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Transport information and control systems — Reference model architecture(s) for the TICS sector —

Part 6:
Data presentation in ASN.1

Systèmes de commande et d'information des transports — Architecture(s) du modèle de référence du secteur TICS —

Partie 6: Présentation de données dans ASN.1

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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 main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when a technical committee has collected data of different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

Technical Reports are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Attention is drawn to the possibility that some of the elements of this part of ISO TR 14813 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 14813-6, which is a Technical Report of type 2, was prepared by Technical Committee ISO/TC 204, *Transport Information and Control Systems*.

This document is being issued in the Technical Report (type 2) series of publications (according to subclause G.3.2.2 of Part 1 of the ISO/IEC Directives, 1995) as a "prospective standard for provisional application" in the field of transport information and control systems because there is an urgent need for guidance on how standards in this field should be used to meet an identified need.

This document is not to be regarded as an "International Standard". It is proposed for provisional application so that information and experience of its use in practice may be gathered. Comments on the content of this document should be sent to the ISO Central Secretariat.

A review of this Technical Report (type 2) will be carried out not later than three years after its publication with the options of: extension for another three years; conversion into an International Standard; or withdrawal.

ISO/TR 14813 consists of the following parts, under the general title *Transport information and control systems — Reference model architecture(s) for the TICS sector*:

— *Part 1: TICS fundamental services.* This document presents the definition of 32 TICS fundamental services that are the informational products or services or applications areas provided to a TICS user.

— *Part 2: Core TICS reference architecture.* This document describes an abstract object-oriented system architecture based on the TICS fundamental services.

— *Part 3: Example elaboration.* This document refines the core TICS reference architecture (part 2) with some emphasis on traffic management.

— *Part 4: Reference model tutorial.* This document describes the basic terms, graphical representations and modelling views exploited in the object-oriented definition of the architecture development of parts 2 and 3.

— *Part 5: Requirements for architecture description in TICS standards.* This document describes the terminology and form to be used when documenting or referencing aspects of architecture description in TICS standards.

— *Part 6: Data presentation in ASN.1.* This document establishes the use of ASN.1 as the normal syntax notation to be used in standards for the TICS sector and a common message form for such ASN.1 based data elements.

Annexes A and B of this part of ISO/TR 14813 are for information only.

Introduction

This Technical Report was developed by ISO TC204 WG1, Systems Architecture, Taxonomy and Terminology. It is one of a series of documents to provide a form and structure to the Reference Architecture for the Transport Information and Control Systems (TICS). Specifically in this document, a determination for the use and elaboration of Abstract Syntax Notation One (ASN.1) is provided, and in particular, the specification of a standardised interpretation and use of the ASN.1 defined in ISO/IEC 8824-1 through ISO/IEC 8824-4.

This document has been developed as one of several to make effective the decision of the ISO Technical Committee 204 (TC204) to adopt ASN.1 as its normal syntax notation, and to provide instructions and rules to facilitate interoperability and mobility of data.

The use of ASN.1 data element constructs is now widely accepted and adopted by many Technical Committees and Working Groups of ISO and CEN. ISO TC204 has resolved that ASN.1 shall be the normal syntax notation used in syntax and encoding rule elaboration in Standards in the TICS sector.

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

Excluding transfers in a pre-defined context, the first level of identification required in an ASN.1 message identifies the context of the message. This document determines that, in the TICS Sector, this is achieved by using an OBJECT IDENTIFIER which shall be determined in accordance with an arc as specified in Annex B of ISO/IEC 9834-1.

The objective of this document is therefore to establish a basis where the message can always be identified simply by reference to the relevant Standard and without the requirement of central registration authorities (except where those are specifically required in the referenced Standard).

A later document in this series will collate a generic standard data dictionary for the TICS sector from the Standards determined in the Sector. This will provide a reference work for the sector, to provide for situations where data elements/primitives determined in one Standard are to be used within another Standard, and to avoid duplication and minimise the number of definitions in use in the sector.

Transport information and control systems — Reference model architecture(s) for the TICS sector — Part 6: Data presentation in ASN.1

1 Scope

1.1 This document establishes the requirement that ASN.1 shall be the normal syntax notation to be used in Standards in the TICS Sector, and to provide a common message form for such ASN.1 based data elements, such that reference to the relevant TICS ISO Standard may be achieved. This Standard provides guidance as to the usage of ASN.1 within the TICS Sector, and makes provision for other extant Standardised syntax notations (such as EDIFACT).

1.2 This document is designed to provide an 'enabling' structure for use in the TICS/RTTT sector. It enables users of ASN.1 structures to reference specific Standards wherein specific data messages (and their syntax notation) are determined. The use of a Standard form of notation is designed to allow interoperability between different commercial systems, and to allow migration of data to other systems, and to later generations of systems.

1.3 This standard notation provides methods of identification of the relevant Standard in which a TICS message, expressed in ASN.1 notation, is described, and thereby enables understanding and interpretation of the message.

1.4 Vision statement. This document envisions a low overhead and minimum maintenance means of identifying the Standard of all ASN.1 message structures in an interoperable environment within the TICS Sector.

1.5 Mission statement. This document is to provide guidance to identify the relevant Standard wherein a particular ASN.1 message may be understood and used.

1.6 This document is procedural in nature affecting data presentation in ASN.1. As such it is concerned only with data architecture, and the whole content of the document falls into this category. Consideration of other architectural aspects as such, are therefore not appropriate in this document.

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

This document also provides a means where particular sector requirements, or existent Standards, that require particular message forms that have traditionally been expressed in other notations (e.g. EDIFACT), may be referenced, with the purpose of actual usage from a TICS Sector application. Thus it presents an unambiguous system for identifying all the different data types that, in such a way that it may easily be interpreted to/from other notations where appropriate.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/TR 14813. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/TR 14813 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 8824-1:1998, *Information technology – Abstract Syntax Notation One (ASN.1) – Specification of basic notation.*

ISO/IEC 8824-2:1998, *Information technology – Abstract Syntax Notation One (ASN.1) – Information object specification.*

ISO/IEC 8824-3:1998, *Information technology – Abstract Syntax Notation One (ASN.1) – Constraint specification.*

ISO/IEC 8824-4:1998, *Information technology – Abstract Syntax Notation One (ASN.1) – Parameterization of ASN.1 specifications.*

ISO/IEC 8825-1:1998, *Information technology – ASN.1 encoding rules – Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER).*

ISO/IEC 8825-2:1998, *Information technology – ASN.1 encoding rules – Specification of Packed Encoding Rules (PER).*

ISO/IEC 9834-1:1993, *Information technology – Open Systems Interconnection – Procedures for the operation of OSI Registration Authorities: General Procedures.*

3 Terms and definitions

For the purposes of this part of ISO/TR 14813, the following terms and definitions apply. For convenience some of the definitions from the normative references are also given here.

3.1
ASN.1
Abstract Syntax Notation One.

3.2
ASN.1 type
data type (or type for short) that represents in a formalised 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.

3.3
associated ASN.1 type
ASN.1 type which is used to represent a non-ASN.1 type in an ASN.1 module.

3.4
data element
one or a group of data primatives.

3.5
data primative
data element that cannot be further subdivided meaningfully within the context of ASN.1

3.6
(data) type
named set of values.

[ISO/IEC 8824-1:1998, 3.8.63]

3.7
Electronic Data Interchange (EDI)
passing of a message, or series of messages, between computers and/or between different software systems. Within this context an EDI message is normally compatible with the form specified in ISO/IEC 9897 "Freight Containers - Container equipment data exchange (CEDEX).

3.8
Electronic Data Interchange For Administration, Commerce and Transport (EDIFACT)
specific message format for the sector in question as specified in ISO 9735.

3.9
EN
European Standard.

3.10
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 :1998, 3.4.7]

3.11
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: 1998, 3.4.8]

3.12
module
collection of ASN.1 types, values, information objects, etc., encapsulated using the ASN.1 module notation.

3.13
module identifier
instance of an object identifier type which relates to an associated module.

3.14
non-ASN.1 type
type which is not conformant to ISO/IEC 8824.

3.15
object identifier
value (distinguishable from all others) which is associated with an object.

[ISO/IEC 8824-1: 1998, 3.8.46]

3.16
object identifier type
simple type whose distinguished values are the set of all object identifiers allocated in accordance with the rules of ISO/IEC 9834-1 and ISO 14813-6.

NOTE - The rules of ISO/IEC 8824-1:1995 permits a wide range of authorities to independently associate object identifiers with objects.

[ISO/IEC 8824-1: 1998, 3.8.36]

3.17
simple (data) types
Types defined by directly specifying the set of its values.

[ISO/IEC 8824-1: 1998, 3.8.49]

4   Requirements

4.1   General requirements

Abstract Syntax Notation.1 (ASN.1), as defined in ISO/IEC 8824-1 through ISO/IEC 8824-4, shall normally be used in TICS Standards where there is a requirement to elaborate syntax notation. ISO/IEC 8825-2 shall normally be used in TICS standards as encoding rules used in encoding messages defined in ASN.1.

In order to achieve interoperability and to enable the comprehension of data messages, levels of identification shall precede certain data elements. The first level of identification required in a formal ASN.1 message definition shall identify the context of the message. For messages defined by other standardisation committees and external organisations (even proprietary message formats), the use of OBJECT IDENTIFIER is mandatory in the formal ASN.1 message definition.

4.2   Identification requirements

4.2.1   The syntactical description of data constructs shall conform to ISO/IEC 8824-1 through ISO/IEC 8824-4.

4.2.2   With the exception of transfers in a predetermined context (e.g. EDIFACT, CORBA, DATEX etc. for which see 4.3 below):

4.2.2.1   All ASN.1 messages in TICS International Standards shall commence with an OBJECT IDENTIFIER. This identifier shall be determined in accordance with the arc iso (1) standard (0) and is described in the form:

{iso(1) standard(0) standard-number(xxxxx) module-number(yyy) type-id(zzz)}

The component "iso(1)" defines the identifier as originating from ISO/IEC. The component "standard(0)" defines the identifier as an ISO standard assigned by the ISO/IEC Central Secretariat. The component "standard-number(xxxxx)" further defines the particular standard and is assigned by the ISO/IEC Central Secretariat to an organisation that acts as the registration authority for all OBJECT IDENTIFIER values that start with {iso(1) standard(0) standard-number(xxxxx). The component "module-number(yyy)" identifies an ASN.1 module within the standard and is assigned by the registration authority. The component "type-id(zzz)" ,along with the other arcs in the object identifier value, identifies a particular message, it is assigned by the editor of the standard.

4.2.2.2   Data elements produced by other 'identified organisations' shall start with an OBJECT IDENTIFIER, which shall be determined in accordance with the arc iso(1) followed by the arc "identified organisation(3)" followed by the "organisation-identity(yyy)" followed by the reference to the "standard-number(xxxxx) and finally by "dataunit(zzz)."

{iso(1) identified-organisation(3) organisation-identity(yyy) standard-number(xxxxx) dataunit(zzz)}

Sample definitions according to this rule are:

Sample 1: All CEN TC278 (RTTT) Standards that are not also International Standards.

The defined data elements shall all start with an OBJECT IDENTIFIER which shall be determined in accordance with the arc iso (1) followed by the arc identified-organisation(3) followed by an identification of the 'identified organisation' (CENnumber), followed by the standard-number(xxxxx), and then by "dataunit(zzz)."

{iso(1) identified-organisation(3) cen(yyy) standard-number(xxxxx) dataunit(zzz)}

Sample 2:   EDIFACT messages

When these are used in a TICS environment they shall be preceded by an OBJECT IDENTIFIER, which shall be determined in accordance with the arc iso (1) identified organisation (3) and shall be described in the form

{iso(1) identified-organisation(3) edifact-board(yyy) . . .}

Where arc 1 determines the first node as being an ISO/IEC arc, arc 3 identifying an 'identified organisation', and yyy being the allocated identification for the EDIFACT Board.

This is followed by the body of data encoded as an OCTET STRING type.

4.2.2.3 Where no International, CEN or EDIFACT Standard exists, ASN.1 data conforming to National Standards may be determined as follows:

All TICS relevant messages conforming to National Standards shall commence with an OBJECT IDENTIFIER, which shall be determined in accordance with the arc iso (1) member-body (2) member body-identification (bbb)) and shall be described in the form

{iso(1) member-body(2) member-body-identification(bbb) . . .}

Where arc iso(1) determines the first node as being an ISO/IEC arc, arc member-body(2) indicating a member body and bbb providing the identification for the Standardisation body (as an ISO/IEC 3166 country code identifier)

This is followed by information determined by the Member Body.

4.2.2.4 Identifying data elements

The words "AUTOMATIC TAGS" shall be put in all module headers so as to increase readability of the ASN.1 type definitions and to eliminate the possibility of certain types of errors.

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. This is described herein. Initialisation of a sample system, working with simplified context negotiation, is illustrated in Annex A. It is possible to define TICS application environments where the context is predetermined. For these cases the use of data encoding according to this Standard and the rules given in ISO/IEC 8825-1 or 8825-2 may not apply

Where data is to be made available to any party whatsoever outside of the predetermined context, Packed Encoding Rules (aligned variant) shall apply.

4.4 Module definition using ASN.1

4.4.1 General description

Whilst the formal ASN.1 module definition in a Standard shall always include the ASN.1 type module OBJECT IDENTIFIER in the definition, the encoding rules defined in the module definition (e.g. EDIFACT Module, CORBA Module etc.) shall determine whether or not the ASN.1 OBJECT IDENTIFIER is included in the transfer of data.

If the Module definition is not explicit in this respect, identifiers for the specific message (Application Data Unit Identifiers), shall precede the message itself.

The script given below states formally (using ASN.1) the correct use of Application Data Unit Identifiers; it defines protocol and the corresponding application, and provides an example of how to apply it.

4.4.2 Module definition

4.4.2.1 A module definition is used to define one or more TICS messages. A module definition conforming to this Standard shall commence with an OBJECT IDENTIFIER as specified in subclause 4.4.2.4.

4.4.2.2 A TICS message may be either an ASN.1 type or a non-ASN.1 type.

A TICS message, which is an ASN.1 type to be used in conformance to this Standard, may be one of two cases:

a) The TICS message shall be imported from the ASN.1 module where the ASN.1 type is defined. The import mechanism is defined in ISO/IEC 8824-1.

b) The TICS message shall be defined in the module where it is to be used.

NOTE   A TICS message may be an EDIFACT message and therefore a non-ASN.1 type; however, it is possible to define EDIFACT messages in ASN.1 such that they can be handled as ASN.1 types.

4.4.2.3 A TICS message, which is a non-ASN.1 type to be used in conformance to this Standard, shall have a unique association between its related OBJECT IDENTIFIER and its associated ASN.1 type. This association shall be done through use of the TYPE-IDENTIFIER information object class as defined in ISO/IEC 8824-2, Annex A.

4.4.2.4 The association of the TICS messages and their ASN.1 types shall be defined in an ASN.1 module. This ASN.1 module shall be identified through an OBJECT IDENTIFIER and shall use an information object specification as defined in ISO/IEC 8824-2.

Annex A
(informative)

Simplified context negotiation

A.1 Simplified context negotiation

As presented in Figure A.1, communication starts with the Master A_1 downloading a message to the slave A_2, referring to a predetermined context defined by (Protocol and Application). The slave confirms that it understands the protocol and application by starting the transmission.
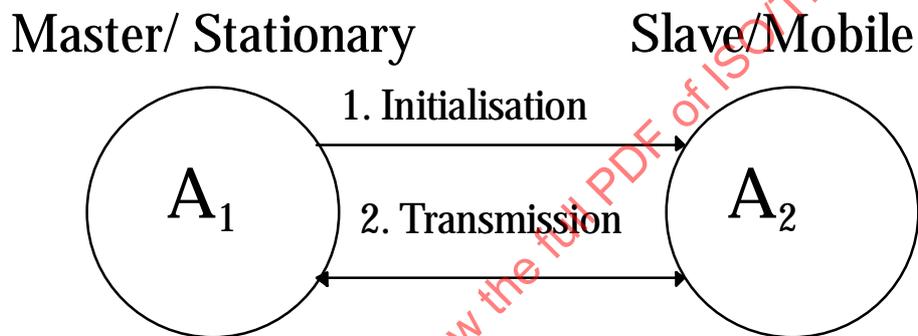
Master/ Stationary   Slave/Mobile

1. Initialisation

A_1 2. Transmission A_2

Figure A1 – Simplified context negotiation (typical of a DSRC environment)

Annex B
(informative)

Examples

This annex comprises three examples of how to construct ASN.1 modules taking into account the fact that the modules will have to use both information available in ASN.1 types and non-ASN.1 types.

B.1 Module definition using ASN.1 types

The example below comprises an ASN.1 module, which is based on using ASN.1 types as defined in ISO/TS 14816. These are imported as required in section 4.4.2.2.

In this example it shall be noted that the use of the ASN.1 OBJECT IDENTIFIER is to identify which ASN.1 types are in the import mechanism only and the OBJECT IDENTIFIER will consequently not be encoded.

```
TICS {iso(1) standard(0) iso14813(14813) tics(1)} DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
--EXPORTS everything;
--Export statement reminds that all ASN.1 types available for importing by other ASN.1 modules

IMPORTS CS1, CS2, CS3, CS4, CS5 FROM ISO14816 {iso(1) standard(0) iso14816(14816)};
--Imports statement in order to make the ASN.1 types defined in ISO14816 available in this
--module.
TicsMessage ::= CHOICE {
    cs1 CS1,
    cs2 CS2,
    cs3 CS3,
    cs4 CS4,
    cs5 CS5,
    ...
    }
--A Choice type is defined to make it possible for the TicsMessage to be a choice between one
-of the five imported types from ISO14816.

END
```

B.2 Module definition using non-ASN.1 types

The example below comprises an ASN.1 module, which shows how to handle non-ASN.1 types. The ASN.1 module itself must create an association between an ASN.1 type and a message. Using TYPE-IDENTIFIER as required in sub-clause 4.4.2.3, makes this association. Compared to example B1, the use of an OBJECT IDENTIFIER is done to identify the origin of the non-ASN.1 type and will also be included as a header when the associated ASN.1 types in this module are to be encoded. The example below uses fictitious EDIFACT messages named "msg0" and "msg1". Their object identifiers are fictitious as well.

```
EDIFACTEXAMPLE {iso(1) identified-organization(3) edifactboard(15) edifactexample (10)}
DEFINITIONS AUTOMATIC TAGS::= BEGIN
--EDIFACTEXAMPLE is the name of the ASN.1 module
--EXPORTS Everything;
--Export statement reminds that all ASN.1 types available for importing by other ASN.1 modules

edifactid0 OBJECT IDENTIFIER ::= {iso(1) identified-organization(3) edifactboard(15) msg0 (0)}
--OBJECT IDENTIFIER for a fictitious EDIFACT message, msg0

edifactid1 OBJECT IDENTIFIER ::= {iso(1) identified-organization(3) edifactboard(15) msg1 (1)}
--OBJECT IDENTIFIER for a fictitious EDIFIACT message, msg1
```

```
ediFactMsg0 TYPE-IDENTIFIER ::= {OCTET STRING IDENTIFIED BY edifactid0}
--Type association is done through use of TYPE-IDENTIFIER where the EDIFACT msg0 is
--associated with the ASN.1 type OCTET STRING

ediFactMsg1 TYPE-IDENTIFIER ::= {BIT STRING IDENTIFIED BY edifactmsg1}
--Type association is done through use of TYPE-IDENTIFIER where the EDIFACT msg1 is
--associated with the ASN.1 type BIT STRING

Objset TYPE-IDENTIFIER ::= { ediFactMsg0 | ediFactMsg1 }
--OBJECT SETS can be defined in order to make an association table of several messages (msg0
and msg1).

EdifactMessage ::= INSTANCE OF TYPE-IDENTIFIER({Objset})
--INSTANCE OF type is used to make the type associated within the object set visible for the
--ASN.1 Encoder. The INSTANCE OF type is a SEQUENCE type, which is defined as follows :
--INSTANCE OF DefinedObjectClass ::= SEQUENCE {
--          type-id <DefinedObjectClass>.&id,
--          value  [0] <DefinedObjectClass>.&Type
--}
END
```

B.3 Module definition using both ASN.1 types and non-ASN.1 types

The example below comprises an ASN.1 module which illustrates that both ASN.1 types and non-ASN.1 types may be combined in the same module. This example also shows how the encoding may be for specific values of the different ASN.1 types and non-ASN.1 types.

```
TICS-Sample {iso(1) standard(0) iso14813(14813) tics(1) sample(1)} DEFINITIONS AUTOMATIC TAGS
::= BEGIN
--EXPORTS Everything;
IMPORTS CS1, CS2, CS3, CS4, CS5
            FROM ISO14816{iso(1) standard(0) iso14816(14816)}
        edifactid0, edifactid1, ediFactMsg0, ediFactMsg1
            FROM TICS {iso(1) standard(0) iso14813(14813) tics(1)};

CS ::= CHOICE {
    cs1 CS1,
    cs2 CS2,
    cs3 CS3,
    cs4 CS4,
    cs5 CS5,
    ...
    }
UsefulType ::= CHOICE {
                smallint INTEGER(0 .. 255),
                cs       CS
    }
interIndustryDataObjectId OBJECT IDENTIFIER ::= { iso(1) standard(0) iso7816(7816) part6(6) }

interIndustryDO TYPE-IDENTIFIER ::= {OCTET STRING IDENTIFIED BY interIndustryDataObjectId}

Objset TYPE-IDENTIFIER ::= { ediFactMsg0 | ediFactMsg1 | interIndustryDO }

TicsMessage ::= CHOICE {
    usefulType UsefulType,
    anObject   INSTANCE OF TYPE-IDENTIFIER({Objset})
    }

END
```

From this module the resulting encoding is included for the three different types (smallint, cs: CS2 and edifactmsg0) in annex B4.1, B4.2 and B4.3.

B.4 Encoding examples

B.4.1 Small integer

The TICS message is a small integer "smallint" as defined in the module above. "smallint" is assigned the value 10.

value TicsMessage ::= usefulType : smallint : 10

B.4.1.1   BER DEFINITE-Length encoding

```
TicsMessage CHOICE
  usefulType : tag =  constructed; length = 5
    UsefulType CHOICE
      smallint : tag = [0] constructed; length = 3
        INTEGER: tag = [UNIVERSAL 2] primitive; length = 1
          10

Hexadecimal Representation (length of 7 octets):
A0 05 A0 03 02 01 0A

Binary Representation (length of 7 octets):
10100000 00000101 10100000 00000011 00000010 00000001 00001010
```

B.4.1.2   PER ALIGNED encoding

```
TicsMessage CHOICE [index = 0]
  usefulType UsefulType CHOICE [index = 0]
    smallint INTEGER [length (not encoded) = 1.0]
      10

Total PDV length = 2.0

Hexadecimal Representation (length of 2 octets):
00 0A

Binary Representation (length of 2 octets):
00000000 00001010
```

B.4.2 CS2

The TICS message is CS2 as defined in ISO14816 and which comprises a structure of the manufacturer identifier (1000) and a service number (825373492 = '31323334'H).

```
value TicsMessage ::= usefulType : cs : cs2 :
      {
        issuerIdentifier 1000,
        serviceNumber '31323334'H
      }
```

B.4.2.1   BER DEFINITE-Length encoding

```
TicsMessage CHOICE
  usefulType : tag = [0] constructed; length = 15
    UsefulType CHOICE
      cs : tag = [1] constructed; length = 13
        CS CHOICE
          cs2 CS2 SEQUENCE: tag = [UNIVERSAL 16] constructed; length = 11
```