TECHNICAL SPECIFICATION

ISO/TS 14816

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Road transport and traffic telematics — Automatic vehicle and equipment identification — Numbering and data structure

Télématique de la circulation et du transport routier — Identification automatique des véhicules et équipements — Codification et structure des données

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Foreword

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

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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

1. an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;

2. an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed every three years with a view to deciding whether it can be transformed into an International Standard.

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

ISO/TS 14816 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee TC 204, *Transport information and control systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European pre-Standard..." to mean "...this Technical Specification...".

Annexes A and B form a normative part of this Technical Specification. Annex C is for information only.

TABLE OF CONTENTS

FOREWORD

This European Prestandard has been prepared by Technical Committee CEN/TC 278 "Road transport and traffic telematics ", the secretariat of which is held by NNI**,** in collaboration with Technical Committee ISO/TC 204 "Transport information and control systems".

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

INTRODUCTION

This Standard specifies a data structure that enables upwards integration and expansion from the simplest low cost AVI/AEI system to more complex functions. The structure is designed to be flexible and enabling rather than prescriptive.

This Standard has been designed to provide for the differing requirements of AVI and AEI by the use of separate application specific . By retaining these differing requirements within one supervisory document the interoperability is maximised, particularly in the case where both AVI and AEI are required at the same time in the Road Environment.

In order to support systems using both active and passive OBEs, the basic data structures have been minimised. This enables any manufacturer/operator with an OBE with a user addressable memory of only 56 bits to be able to conform a full core identification according to this Standard.

Abstract Syntax Notation One (ASN.1) is widely applied. Its usage provides maximum interoperability and conformance to existing Standards, and meets the specifically defined requirements for a generic Standard model for RTTT in that it:

- Uses existing standard Syntax Notation and Encoding Rules
- Is adaptable and expandable
- Does not include unnecessary information for a specific system
- Incurs a minimum of overhead in storage and transmission.

Readers who are unfamiliar with ASN.1 are advised to read ANNEX C before reading the main body of this preStandard. Readers are also advised to read ISO/IEC 8824:1998, ISO/IEC 8825-1:1998, ISO/IEC 8825-2:1998 and ISO/IEC DIS 8825-3:1992 and other published work on ASN.1 before reading the main body of this preStandard.

ENV 12314-1 provides a Reference Architecture Model for AVI/AEI systems.

Sections 4.1 - 4.6 of ENV ISO 14816 provide a standardised yet flexible and interoperable framework for Numbering Schemes. A structure for AVI/AEI unambiguous identification and several Numbering Schemes associated with AVI/AEI systems are determined in this preStandard.

The core AVI/AEI Numbering Scheme, central to the effective use of many of the constructs, is a structure to provide unambiguous identification. Section 4.7 of this preStandard provides a data element coding for Automatic Vehicle and Equipment Identification (AVI/AEI) in RTTT applications. This coding provides a structure with the possibility of 2^{56} (in excess of 72 million billions) unique identifiers, provided within a 56 bit code structure when ISO/IEC 8825-2 (PER) is used, i.e. no overhead is incurred.

1. SCOPE

1.1 OVERALL NUMBERING SCHEME

This Standard establishes a common framework data structure for unambiguous identification in RTTT/TICS systems. The Standard excludes any physical aspects such as interfaces. It is neither frequency nor air interface protocol specific.

Data elements that form part of transmission or storage protocols such as headers, frame markers and checksums are thus excluded.

The specifications for protecting against changes, classifying and qualifying security aspects of the data structure elements are not included within this Standard.

The principles of data element structure and description determined in ISO/IEC 8824:1998, ISO/IEC 8825-1:1998, ISO/IEC 8825-2:1998 and ISO/IEC DIS 8825-3:1992 have been adopted to provide an interoperable architecture within a Standard framework according to guidelines from CEN TC278 as well as ISO TC204.

This Standard defines data structures based on the ISO/IEC 8824-1 ASN.1 `UNIVERSAL CLASS` types that may be directly `IMPORTED` to other application standards that would need only subsets of the full `APPLICATION CLASS` types. These `UNIVERSAL CLASS` and `APPLICATION CLASS` types are uniquely defined as an ASN.1 module in Annex B. This module may be directly linked into an application data definition.

This Standard defines default encoding for simple AVI/AEI applications where no other relevant application standard exists. This definition forms Section 4.

1.2 AVI/AEI NUMBERING SCHEME

The principal registered schemes for AVI/AEI are determined in 4.7 and 4.8 of this preStandard. Other relevant and interoperable schemes are detailed in the subsequent Sections.

The structures defined in this Standard provide interoperability, not only between simple AVI/AEI and more complex RTTT/TICS functions, but also with pre-existing Standards (e.g. ISO 10374 Freight containers - Coding, identification and marking)

There will be one Central Registration Authority that will administer the AVI Numbering Scheme according to the rules of CEN and ISO (See Annex A (normative):).

The issuer may choose to operate its structure, amongst others :

- for simple identification, in which case the separate identities may be openly available, at the discretion of the issuer or nation state,
- on an alias basis, in which case the “identities” will be known, but secured under provisions of data protection to maintain privacy and therefore not available,
- as dynamically encrypted identities in an anonymous system.

2. NORMATIVE REFERENCES

This Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ENV12314-1	Road Transport and Traffic Telematics – Automatic Vehicle and Equipment Identification – Part 1: Reference Architectures and Terminology
ISO 3166	Codes for the representation of names of countries and their subdivisions
ISO 3779 :1983	Road vehicles - Vehicle identification number (VIN)- Content and structure
ISO 3780 :1983	Road vehicles - World manufacturer identifier (WMI) code
ISO 6346 :1997	Freight containers - Coding, identification and marking
ISO/IEC 8824-1:1998	Information technology - Abstract Syntax Notation One (ASN.1) - Part 1: Specification of the basic notation
ISO/IEC 8824-2:1998	Information technology - Abstract Syntax Notation One (ASN.1) - Part 2: Information object specification
ISO/IEC 8824-3:1998	Information technology - Abstract Syntax Notation One (ASN.1) - Part 3: Constraint Specification
ISO/IEC 8824-4:1998	Information technology - Abstract Syntax Notation One (ASN.1) - Part 4: Parameterization of the ASN.1 specifications
ISO/IEC 8825-1:1998	Information technology - ASN.1 encoding rules - Part 1: 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 - Part 2: Specification of Packed Encoding Rules (PER)
ISO/IEC DIS 8825-3:1992	Information technology - ASN.1 encoding rules – Part 3: Distinguished canonical encoding rules
ISO 8859-1:1987	Information - 8- bit single-byte coded graphic character sets - Part 1: Latin alphabet No.1
ISO 8859-2:1987	Information - 8- bit single-byte coded graphic character sets - Part 2: Latin alphabet No. 2
ISO 8859-3:1987	Information - 8- bit single-byte coded graphic character sets - Part 3: Latin alphabet No. 3
ISO 8859-4:1987	Information - 8- bit single-byte coded graphic character sets - Part 4: Latin alphabet No. 4
ISO 8859-5:1987	Information - 8- bit single-byte coded graphic character sets - Part 5: Latin/Cyrillic alphabet
ISO 8859-6:1987	Information - 8- bit single-byte coded graphic character sets - Part 6: Latin/Arabic alphabet
ISO 8859-7:1987	Information - 8- bit single-byte coded graphic character sets - Part 7: Latin/Greek alphabet
ISO 8859-8:1987	Information - 8- bit single-byte coded graphic character sets - Part 8: Latin/Hebrew alphabet

ISO 8859-9:1987	Information - 8- bit single-byte coded graphic character sets - Part 9: Latin alphabet No. 5
ISO 8859-10:1987	Information - 8- bit single-byte coded graphic character sets - Part 10: Latin alphabet No. 6
ISO 10374:1991	Freight containers - Automatic identification
ISO 14813-3	Transport information and control systems – Reference model architecture(s) for the TICS sector – Part 3: Example elaboration
ITU-T Rec. S.1:1993	International Telegraph Alphabet No. 2
ISO 10646-1:1993	Information Technology - Universal Multiple-Octet Coded Character Set (UCS) - Part 1: Architecture and Basic Multilingual Plane.

3. DEFINITIONS

For the purpose of this Standard the definitions in ENV 12314-1 apply. The term **Issuer** applies to any of the coding schemes CS1, CS2 and CS8 .

Numerical notations are represented as follows:

- Decimal ("normal") notation will have no subscript
  Example: 127
- Hexadecimal numbers will be noted by subscript 16
  Example: $7F_{16}$
- Binary numbers will be noted by subscript 2
  Example: 01111111_{2}

Characters are represented as follows :

- Characters will have no subscript or quotes
  Example: ABC5EFD

4. REQUIREMENTS

4.1 OVERALL CODING STRUCTURE

The AVI/AEI Coding Structure determined in this Standard:

- is unambiguous and flexible enough to include relevant transport related Numbering Schemes
- follows relevant Standards, available at the time of writing
- provides an exact coding of the data elements
- is extendible to enable future expansion
- is able to accommodate private structures.

4.2 GENERAL REQUIREMENTS

The coding structure determined in this preStandard is an "enabling" structure. It is designed to accommodate, within its framework, coding structures for a variety of RTTT/TICS systems from simple AVI/AEI to more complex transactions with a wide variety of uses, and to allow combinations of data elements to be used in a composite data construct. It is designed to allow as much interoperability of the data elements within an EDI/EDT environment as is possible, and provide capability for a significant expansion of the number of RTTT/TICS applications in the future.

This preStandard takes cognisance of, and accommodates, the operation of systems of different capability. It will enable, within its structure, the interoperability of one On Board Equipment in any country so long as there is a common air interface and protocol, even though the operator systems themselves may be significantly different. Even where information has to be collected by a separate interrogator because air interface compatibility does not exist, the data, once collected, is in a commonly interoperable format, and may thus be used accurately and effectively within an EDI/EDT environment.

The data structures defined in this Standard enable "tree and branch" or "cascade" structures with the ability to build complex data element constructs.

The preStandard has been optimised for ISO/IEC 8825-2 as recommended by ISO 14813-3.

The preStandard uses ISO/IEC 8824-1 in all its syntax descriptions.

By adopting the ISO/IEC 8824:1998, ISO/IEC 8825-1:1998, ISO/IEC 8825-2:1998 and ISO/IEC DIS 8825-3:1992 Abstract Syntax Notation (ASN.1), the flexibility is provided for data elements of any length and combination to be supported. Also this data structure prStandard is itself given a migration path so that, as technological developments allow further capabilities, subsequent Standards may provide additional data fields for use in all, or some, sector specific applications, whilst maintaining the upwards compatibility from and to this preStandard.

The ASN.1 Encoding Rules enable the chaining of multiple data elements from different application sectors to build complex data element constructs. (See examples in.Annex C)

4.3 DATA STRUCTURE

The data structuring requirements as defined in ISO/IEC 8824:1998, ISO/IEC 8825-1:1998, ISO/IEC 8825-2:1998 and ISO/IEC DIS 8825-3:1992 apply and in particular ISO 14813-3.

4.4 RESIDENCY OF DATA

The data construct is designed to be free standing and independent of the media. It will therefore normally reside in the On Board Equipment.

In specific cases, such as the standardised European DSRC 5.8 GHz link, where part of the message is already known because of L7 services, the use of ASN.1 PER proposed within this Standard enables only the unknown part of the message to be transferred, thus minimum redundancy is achieved.

The examples given in the remainder of this document assume the use of ASN.1 Packed Encoding Rules (PER). Where Basic Encoding Rules are used, there will be additional overhead as defined in ISO/IEC 8825-1. See Annex C for implementation examples.

4.5 TABLE OF CODING STRUCTURE IDENTIFIERS

Table 4-1: Coding structure identifiers

Coding Structure Identifier (CSI) Number	RTTT/TICS Coding Structure
0	Reserved for CEN/ISO
1	AVI/AEI for use in RTTT applications
2	RTTT Manufacturer Serial Number
3	RTTT Validity Limitation (Time and Place)
4	Licence Plate
5	Vehicle (VIN) Chassis Number
6	Reserved for CEN/ISO
7	Freight Container Numbering
8	Tax Authority Code
9	Reserved for CEN/ISO
...	...
30	Reserved for CEN/ISO
31	Reserved for CEN/ISO (Extension)

4.6 CODING STRUCTURE DATA ELEMENTS (AVI/AEI APPLICATIONS)

Table 4-2shows the seven defined CS in a short form table detailing the primitive elements (`UNIVERSAL TYPES`). The definitions are made in 4.7 and Annex C.

Note: The overhead of each coding structure data field is excluded from the table. The numbers of bits in the data fields are only indications when using PER as the coding rules.

Table 4-2: Minimum size of data elements

CSI	Length	Coding Structure Data Field			
1	7 Octets / 56 bits	Country Code	Issuer Identifier	Service Number	
		10	14	32	
2	6 Octets / 48 bits	Manufacturer Identifier		Service Number	
		16		32	
3	22 Octets / 176 bits	Start Time	Stop Time	Geographic Limit	Application Limit
		80	80	8	8
4	Variable	Country Code	Alphabet Indicator	Licence Plate Number	
		10	8	Not defined	