TECHNICAL SPECIFICATION

ISO/TS 17262

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2003-06-01

Automatic vehicle and equipment identification — Intermodal goods transport — Numbering and data structures

Identification automatique des véhicules et des équipements — Transport intermodal de marchandises — Structures de données et numérotation

Reference number
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Foreword

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ISO/TS 17262 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 204, *Intelligent transport 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...".

Contents

Foreword

This document (CEN ISO/TS 17262:2003) has been prepared by Technical Committee CEN/TC 278, "Road Transport and Traffic Telematics", the secretariat of which is held by NEN, in collaboration with Technical Committee ISO/TC 204, “Intelligent transport systems”.

This is the second part of a series of Technical Specifications defining Intermodal Goods Transport for AVI/AEI, and is the result from CEN/TC278 Work Item 00278088. The following parts form a series of Standards for AVI/AEI in intermodal goods transport AVI/AEI:

CEN ISO/TS 17261	Architecture and terminology (under preparation)
CEN ISO/TS 17262	Numbering and data structures
CEN ISO/TS 17263	System parameters
CEN ISO/TS 17264	AVI/AEI interfaces (under preparation)

Annex A forms normative part of this Technical Specification. Annexes B and C are informative.

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

Introduction

Within the context of RTTT/TICS, intermodal goods transport AVI/AEI systems have the specific objective of achieving a unique or unambiguous positive identification of equipment, and to make that identification automatically. This Technical Specification defines data to achieve this particular objective.

This Technical Specification specifies data that enable future upward integration and expansion for intermodal goods transport AVI/AEI systems. The standard is thus designed to be flexible and enabling rather than prescriptive.

For the definition of data, Abstract Syntax Notation One (ASN.1) is applied. This usage provides maximum interoperability and conformance to existing Standards within the RTTT/TICS sector.

Readers who want to familiarise themselves with ASN.1 are advised to read ANNEX C before reading the main body of this Standard. Readers may also read ISO/IEC 8824, ISO/IEC 8825 and other publications on ASN.1.

NOTE: A normative annex on data modelling may be added in the final version.

1 Scope

This Technical Specification defines generic numbering and data structures for unambiguous identification of equipment used for Intermodal goods transport. These data are known as Intermodal Goods Transport Numbering and Data Structures.

This Technical Specification defines data independently of the data carrier. The modelling of data is based on Abstract Syntax Notation One (ASN.1) as defined in ISO/IEC 8824. This Technical Specification excludes any physical aspects such as interfaces, dimensions etc. Data that form part of transmission or storage protocols (headers, frame markers and checksums) are excluded.

Data defined in this Technical Specification require a system for control and distribution of number series independent of the different AVI/AEI systems. This is required in order to avoid ambiguity and to provide the necessary level of security where appropriate. For this reason the registration authority defined in ENV ISO 14816 applies for this Technical Specification.

This Technical Specification enables the use of optimised encoding schemes such as ASN.1 Basic Packed Encoding Rules (PER).

This Technical Specification provides interoperability, not only between simple AVI/AEI and more complex RTTT/TICS functions, but also with pre-existing Standards such as container (ISO 10374). Specifications for protecting against changes, classifying and qualifying security aspects of the data are out of scope of this Technical Specification.

This Technical Specification relates to AVI/AEI units, but not to smaller containers and units being transported. For smaller units (pallet loads, trays, parcels etc.) please refer to ISO/IEC SC31 standards, ISO 18000 series. The Numbering Structure defined in this Standard is designed to enable combinations with the data definitions from ISO 18000 series. This combination will be covered in CEN ISO/TS 17264 (under preparation).

This Technical Specification provides the capability to carry application data, associated with the identification, to be carried as part of the AVI/AEI message. Within this Technical Specification this is provided as a “black box” facility. The definition of the structure and contents of such messages are outside the scope of this Technical Specification (examples will be shown in CEN ISO/TS 17264).

2 Normative references

This Technical Specification 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 hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Technical Specification only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 13044		Swap Bodies - Coding, Identification and Marking
ISO/IEC 8824-1		Information processing systems - Open Systems Interconnection - Specification of abstract syntax notation one (ASN.1) - Part 1: Specification of the Basic Notation
ISO/IEC 8824-2		Information processing systems - Open Systems Interconnection - Specification of abstract syntax notation one (ASN.1) - Part 2: Information Object Specification
ISO/IEC 8824-3		Information processing systems - Open Systems Interconnection - Specification of abstract syntax notation one (ASN.1) - Part 3: Constraint Specification
ISO/IEC 8824-4		Information processing systems - Open Systems Interconnection - Specification of abstract syntax notation one (ASN.1) - Part 4: Parameterisation of the ASN.1 Specifications
ISO 10374		Freight containers - Coding, identification and marking
ENV ISO 14816	2000	Road Traffic and Transport Telematics - Automatic Vehicle and Equipment Identification - Numbering and Data Structures (ISO/TR 14816:2000)
ENV ISO 14906	1998	Road Traffic and Transport Telematics - Electronic Fee Collection - Application Interface Definition Using DSRC (ISO/TR 14906:1998)

3 Terms and definitions

For the purposes of this Technical Specification, the following terms and definitions apply:

3.1
AEI Manager
component, which receives data from AEI Readers and compares it with information in a data base. An ok or error message is generated and transferred to the Message Display component.

3.2
AEI reader
complete equipment even if it consists of more than one components required to interrogate, receive and interpret the data in the TAG in order to present the identification.

3.3
AEI System
AEI application in a RTTT/TICS system either as a stand-alone system or as part of a RTTT/TICS application.

3.4
Component
type, class or any other work-product that has been specifically engineered to be reusable. (TAG, Reader, AEI Manager)

3.5
Intermodal Transport
movement of goods in one and the same loading unit or vehicle that uses successively several modes of transport without handling of the goods them-selves when changing modes.

3.6
Load Unit
cargo transportation unit, which may be loaded on a transport means.
Synonym: Package, Container

3.7
Message Display
receives data from AEI Manager, and display the data on a variable message sign to the driver.

3.8
TAG
equipment fitted to the unit, vehicle or item to be identified and containing the unambiguous identification, and if required some further data. For special purposes the TAG can be installed in a fixed position with a mobile reader.

3.9
Terminal Monitoring Point
point administered by the AEI Manager where the monitoring of transport objects is performed. Synonym: Terminal Access Control Point.

3.10
Transport Means
vehicle used for the transport of goods, e.g. vessel, train, truck.

3.11
Transport Object
transport means, load unit or goods item.

4 Symbols and abbreviations

The following abbreviations are used in this Technical Specification:

4.1
AEI
Automatic Equipment Identification

4.2
ASN.1
Abstract Syntax Notation number One

4.3
DSRC
Dedicated Short Range Communication

4.4
RTTT
Road Transport and Traffic Telematics (CEN/TC 278)

4.5
TICS
Transport Information and Control Systems (ISO/TC 204)

5 Components of AVI/AEI for intermodal goods transport

The components, which are involved in the AVI/AEI Intermodal goods transport are the AEI manager, AEI reader, Message Display, Transport Object/TAG. The overview of components are illustrated in figure 1:

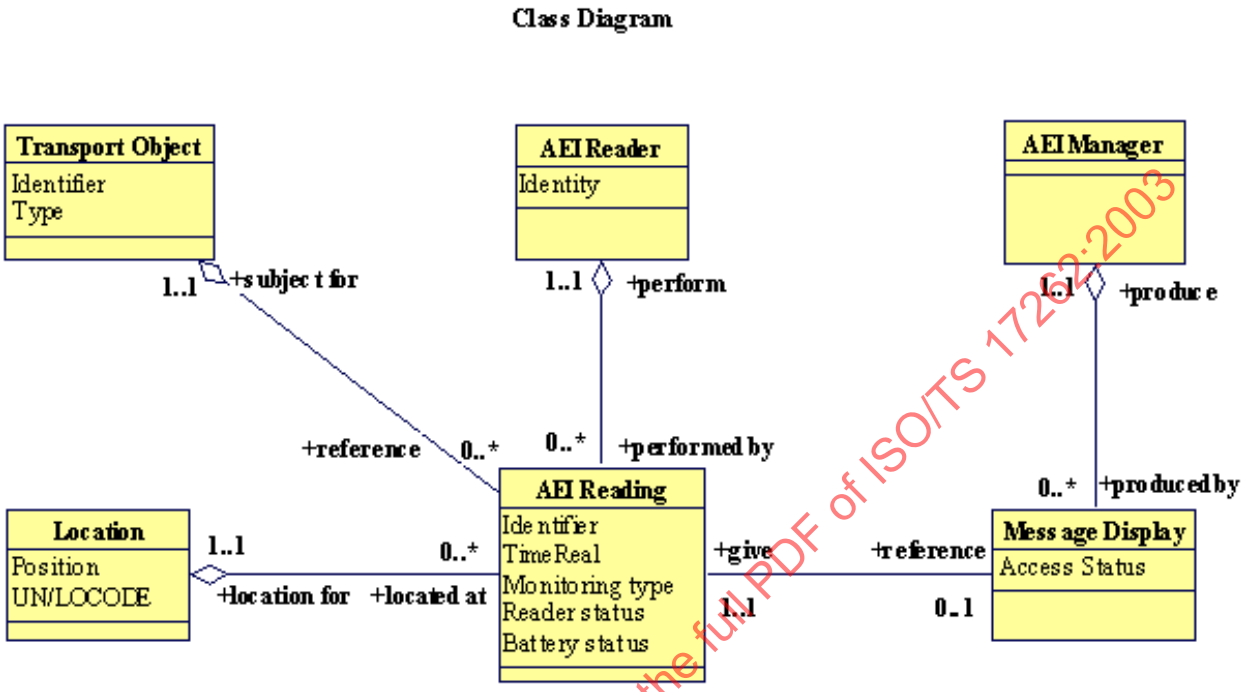

Figure 1 — Components of AVI/AEI for intermodal goods transport

6 Overview of data definitions

This clause contains an overview of the data content of ASN.1 types defined in this Technical Specification.

Access Control Status

— Access OK

— Access denied

— Access pending

AEI Message Type

— TimeReal

— ReaderLocation

— TerminalMonitoringType

— TransportObjectMessageType

Display Message Type

— AccessControlStatus

— TransportObjectMessageType

— MsgInfo

Position

— x co-ordinate

— y co-ordinate

— z co-ordinate

Reader Location

— Readeridentity

— Un/Locode

— Position

— Localidentity

Transport Component Status

— OK

— Malfunction

— Battery low

Terminal Monitoring Type

— Entry

— Exit

— Loading

— Unloading

— Stacking

— Unstacking

— Stuffing

— Stripping

— Registration

Transport Object Type

— Goods item

— Package or load unit

— Transport means

Transport Object Identifier

— Issuer identifier

— Manufacturer identifier

— Licence plate number

— Vehicle identification number

— Freight container number (ISO 10374)

— Tax code

— Swap Body Structure (EN 13044)

TransportObjectMessageType

— Transport object identifier

— Transport object type

— Transport component status

7 Data definitions

7.1 Access Control Status

7.1.1 Description

Access control status is a code issued by the AEI manager to indicate the status of the access control of a transport means, load unit or a goods item to a terminal monitoring point.

7.1.2 ASN.1 Type

```
AccessControlStatus ::= ENUMERATED {
            accessOk (0),
            accessDenied (1),
            accessPending (2)          --"Please Wait" indication
}
```

7.2 AEI Message Type

7.2.1 Description

The AEI Message Type is the complete message, which is transferred from the AEI reader to the AEI manager.

7.2.2 ASN.1 Type

```
AEIMessageType  ::= SEQUENCE {
      TimeReal,                    -- Local time reference (precision in seconds)
      ReaderLocation,
      TerminalMonitoringType,
      TransportObjectMessageType   -- Transport Means, Package, Goods Item
}
```

7.3 CS9 (SwapBodyStructure)

7.3.1 Description

The Swap Body Structure shall be based on EN 13044 and consist of the following:

- owner code, in accordance with EN 13044;
- equipment category identity, in accordance with EN 13044;
- serial number, in accordance with EN 13044;
- check digit, in accordance with EN 13044;
- length (in centimetres);
- height (in centimetres);
- width (in centimetres);
- container type code, in accordance with EN 13044;
- maximum gross mass (in hundreds of kilograms);

– tare mass (in hundreds of kilograms);

7.3.2 ASN.1 Type

```
CS9 ::= SwapBodyStructure ::= SEQUENCE {
            ownerCode             BIT STRING(SIZE(15)),   -- EN 13044
            equipCategoryId       BIT STRING(SIZE(3)),    -- EN 13044
            serialNumber          INTEGER(0 .. 1000000),  -- EN 13044
            checkDigit            INTEGER(0 .. 10),       -- EN 13044
            length                INTEGER(1 .. 2048),     -- cm
            height                INTEGER(1 .. 512),      -- cm
            width                 INTEGER(200 .. 327),    -- cm (7bits)
            containerTypeCode     INTEGER(0 .. 63),       -- EN 13044
            maximumGrossWeight    INTEGER(1 .. 512),      -- 100 kg
            tareWeight            INTEGER(0 .. 63)        -- 100 kg
}
```

7.4 Display Message Type

7.4.1 Description

Display Message Type is a message issued by the AEI manager to a message display to indicate the actual access control and access related information of a transport means, load unit or a goods item to a terminal monitoring point.

7.4.2 ASN.1 Type

```
DisplayMessageType ::= SEQUENCE {
            accessControlStatus       AccessControlStatus,
            transportObjId            TransportObjectIdentifier    OPTIONAL,
            msgInfo                   MsgInfo                      OPTIONAL
}
```

7.5 Message Information

7.5.1 Description

Message information is a data element, which an AEI manager can use to indicate visual information on a display by access control of a transport means, load unit or goods item.

7.5.2 ASN.1 Type

```
MsgInfo ::= VISIBLE STRING
```

NOTE: The Message Information may comprise information resided in the TAG and/or the AEI reader.

7.6 Position

7.6.1 Description

Position is relative to a reference point defined by the AEI manager. The three-dimensional position reference is given in metric precision.

7.6.2 ASN.1 Type

```
Position ::= SEQUENCE {
             xCoordinate      INTEGER,
             yCoordinate      INTEGER,
             zCoordinate      INTEGER
}
```

7.7 Reader Location

7.7.1 Description

Reader location is a unique location reference of the AEI reader administered by the AEI Manager.

The geometrical position of the reader location is relative to a reference point defined by AEI Manager.

7.7.2 ASN.1 Type

```
ReadерLocation ::= SEQUENCE {
       readerIdentity   CS2                 OPTIONAL,      -- Global Manufacturer
                                                           -- Identifier from
                                                           -- ENV ISO 14816
       localIdentity    INTEGER(1..65535)   OPTIONAL,      -- Locally determined
                                                           -- reader identity
       unlocode         UNlocode            OPTIONAL,
       position         Position            OPTIONAL
}
```

7.8 Terminal Monitoring Type

7.8.1 Description

The Terminal monitoring type is the type of monitoring, which the AEI manager uses for the purpose of conducting business processes for control and monitoring transport means, load units and goods items by AEI.

7.8.2 ASN.1 Type

```
TerminalMonitoringType ::= BIT STRING {
             entry (0),
             exit (1),
             loading (2),
             unloading (3),
             stacking (4),
```

```
            unstacking (5),
            stuffing (6),
            stripping (7),
            registration (8) --automatic reading of transport objects
}
```

7.9 Transport Component Status

7.9.1 Description

Transport Component Status is a status code to indicate the operational status of the components (AEI Reader, Transport Object, and Message Display) defined within this Technical Specification.

7.9.2 ASN.1 Type

```
TransportComponentStatus ::= ENUMERATED {
            oK (0),
            malFunction (1),
            batteryLow (2)
}
```

7.10 Transport Object Identifier

7.10.1 Description

The Transport object identifier is the identifier of a transport means, package or goods item.

NOTE: The transport object identifier normally comprises the TAG identity.

7.10.2 ASN.1 Type

```
TransportObjectIdentifier ::= CHOICE {
         CS1,    --imported from ENV ISO 14816:2000, AVIAEI Unambigous identifier
         CS2,    --ditto
         CS4,    --ditto
         CS5,    --ditto
         CS7,    --ditto
         CS8,    --ditto
         CS9,    --ditto
         ,...,   --private defined data can be added here
}
```

7.11 Transport Object Type

7.11.1 Description

The transport object type is a qualifier for the type of unit, which is included in a transport chain.

7.11.2 ASN.1 Type

```
TransportObjectType ::= ENUMERATED {
          goodsItem (0),
          package (1),          --or load unit
          transportMeans (2)
}
```

7.12 Transport Object Message Type

7.12.1 Description

A message comprising the identity, type and, if present the battery status of the transport object.

7.12.2 ASN.1 Type

```
TransportObjectMessageType ::= SEQUENCE
       TransportObjectIdentifier,              -- Depending on the Transport Object
                                               -- Type
       TransportObjectType         OPTIONAL,   -- Transport Means, Package, Goods
                                               -- Item
       TransportComponentStatus    OPTIONAL
}
```

7.13 UN/LOCODE

7.13.1 Description

The UN/Locode specifies the geographical location of the AEI reader or the terminal monitoring point subject to administration from the AEI manager.

7.13.2 ASN.1 Type

```
UNLocode     ::= OCTET STRING       -- UNLocode comprises country code + set of
                                    -- location code(s)
```

Annex A
(normative)

ASN.1 Module for Intermodal Goods Transport Numbering and Data Structures

According to advice from ISO/IEC 8824, and in order to make the data defined within this Technical Specification valid for use in other RTTT/TICS application standards, the definitions below shall be their reference.

```
AVIAEIIntermodalNumberingAndDataStructures
{iso(1) standard(0) iso17262(17262) rev1 (1)} AUTOMATIC TAGS DEFINITIONS ::= BEGIN
--EXPORTS everything;
IMPORTS CS1, CS2, CS4, CS5, CS7, CS8, CS9 FROM ENV ISO 14816; TimeReal FROM ENV ISO
14906

AccessControlStatus ::= ENUMERATED {
      accessOk (0),
      accessDenied (1),
      accessPending (2)
}



AEIMessageType  ::= SEQUENCE {
      TimeReal,                    --Local time reference (precision in seconds)
      ReaderLocation,
      TerminalMonitoringType,
      TransportObjectMessageType ,  --Transport Means, Package, Goods Item
}

CS9 ::= SwapBodyStructure ::= SEQUENCE {
      ownerCode               BIT STRING(SIZE(15)),   -- EN 13044
      equipCategoryId         BIT STRING(SIZE(3)),    -- EN 13044
      serialNumber            INTEGER(0 .. 1000000),  -- EN 13044
      checkDigit              INTEGER(0 .. 10),       -- EN 13044
      length                  INTEGER(1 .. 2048),     -- cm
      height                  INTEGER(1 .. 512),      -- cm
      width                   INTEGER(200 .. 327),    -- cm (7bits)
      containerTypeCode       INTEGER(0 .. 63),       -- EN 13044
      maximumGrossWeight      INTEGER(1 .. 512),      -- 100 kg
      tareWeight              INTEGER(0 .. 63)        -- 100 kg
}

TransportComponentStatus ::= ENUMERATED {
```

```
      oK (0),
      malFunction (1),
      batteryLow (2)
}

DisplayMessageType ::= SEQUENCE {
      AccessControlStatus,
      TransportObjectMessageType    OPTIONAL,
      MsgInfo                       OPTIONAL
}

MsgInfo ::= VISIBLE STRING

Position ::= SEQUENCE {
      xCoordinate       INTEGER,
      yCoordinate       INTEGER,
      zCoordinate       INTEGER
}


ReaderLocation ::= SEQUENCE {
      readerIdentity    CS2                 OPTIONAL,   -- Global Manufacturer
                                                        -- Identifier from
                                                                  ENV ISO 14816
      localIdentity     INTEGER(1..65535) OPTIONAL,   -- Locally determined reader
                                                        -- identity
      unlocode          UNlocode          OPTIONAL,
      position          Position          OPTIONAL
}


TerminalMonitoringType ::= BIT STRING {
      entry (0),
      exit (1),
      loading (2),
      unloading (3),
      stacking (4),
      unstacking (5),
      stuffing (6),
      stripping (7),
      registration (8)  --automatic reading of transport objects
}
```

```
TransportObjectIdentifier ::= CHOICE {
      CS1,  --imported from ENV ISO 14816, AVIAEI Unambigous identifier
      CS2,  --ditto
      CS4,  --ditto
      CS5,  --ditto
      CS7,  --ditto
      CS8,  --ditto
      CS9,  --ditto
      ,..., --private defined data can be added here
}

TransportObjectMessageType ::= SEQUENCE
      TransportObjectIdentifier,              -- Depending on the Transport Object
                                              -- Type
      TransportObjectType          OPTIONAL,  -- Transport Means, Package, Goods
                                              -- Item
      TransportComponentStatus     OPTIONAL
}

TransportObjectType ::= ENUMERATED {
      goodsItem (0),
      package (1),
      transportMeans (2)
}


UNLocode    ::= OCTET STRING


END
```

Annex B
(informative)

Examples Of Intermodal Transport AEI Applications

B.1 Example scenario for division of data between different components

Figure B.1 illustrates one possible instance of data resided in different components defined in this Technical Specification. This means that an AEI application (system) may comprise Transport Object/TAG, Reader, AEI Manager and Message Display that contains only a sub-set of data defined in this Technical Specification.

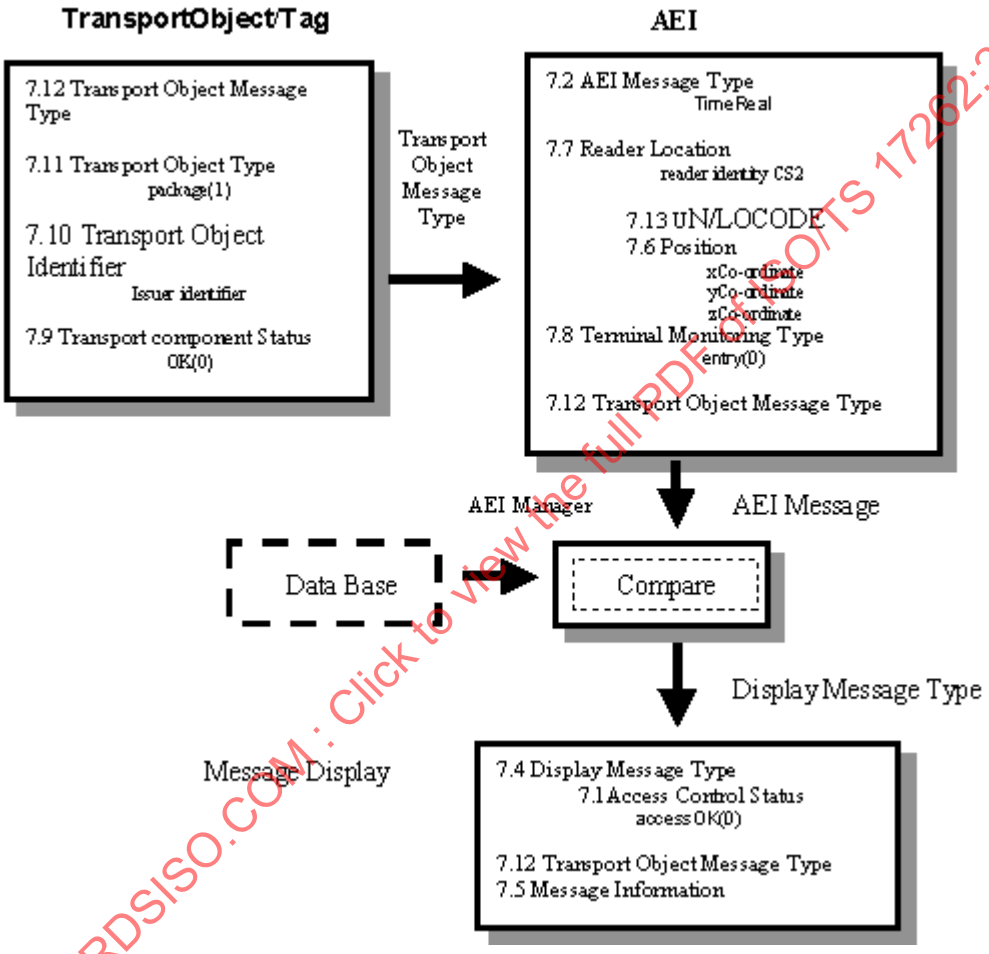

Figure B.1 — Example scenario for division of data between different components

B.2 AEI System architecture based on the European INTERPORT project

The example scenario illustrates how the communication architecture might be for AEI systems.

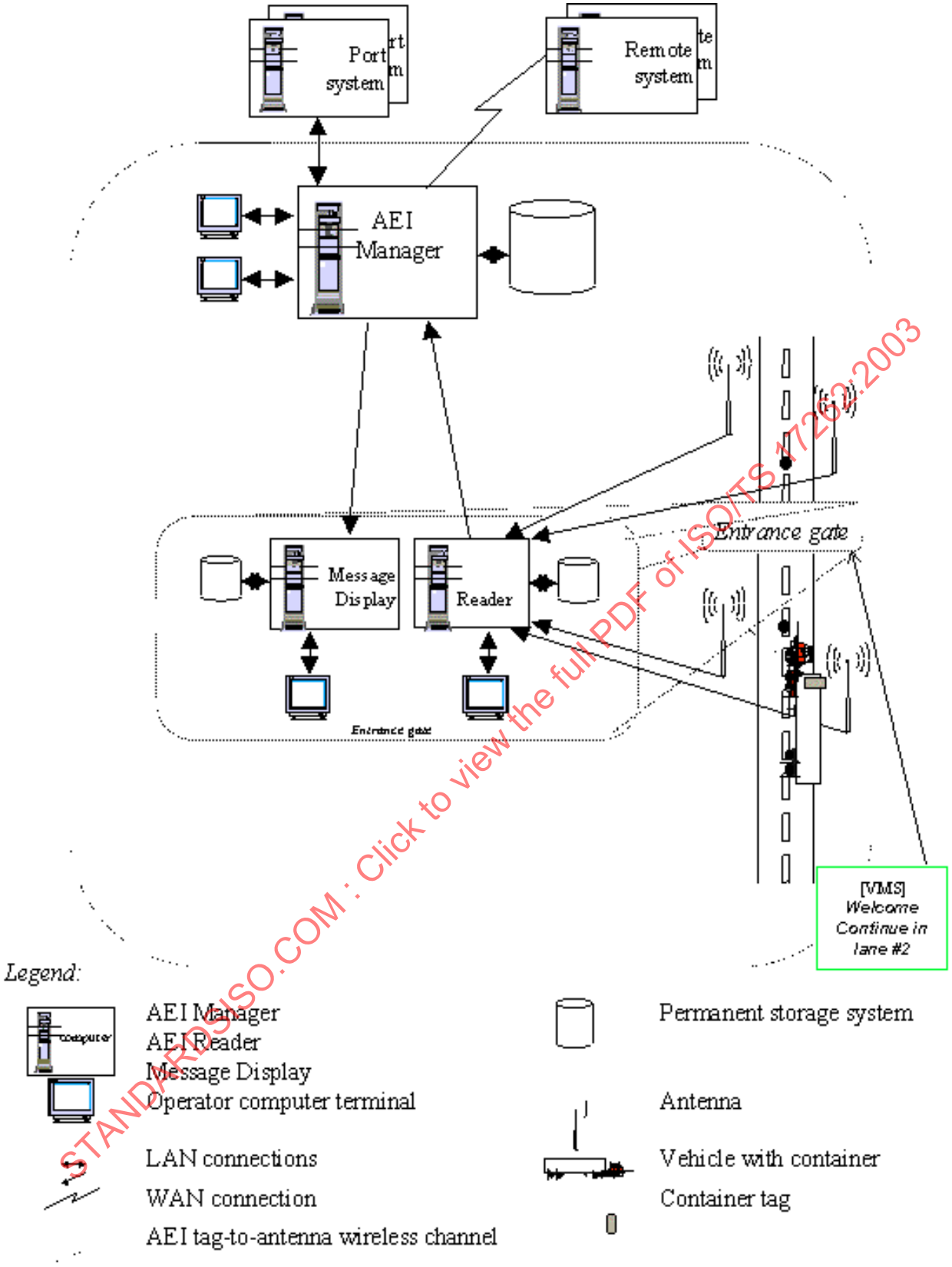

Figure B.2 — System architecture based on the INTERPORT system

The communication architecture shown in figure B.2. is describing the different communication channels between the system components, and reflects the different parts in the INTERPORT system. The AEI reader communicating with the antennas could be regarded as one system component, even though it may consist of several physical units.