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Intelligent transport systems — Roadside modules AP-DATEX data interface —

Part 1: Overview

Systèmes de transport intelligents — Interface de données AP-DATEX pour les modules en bord de route —

Partie 1: Vue d'ensemble

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Foreword

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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).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

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

A list of all parts in the ISO 22741 series series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

0.1 Background

The need for standardized communication with field devices is growing around the world. Several countries have already adopted application profile data exchange (AP-DATEX)-based field device communication standards.

There is a growing opinion, supported by empirical evidence, that standardizing this activity will result in improved intelligent transport service (ITS) performance, reduced cost, reduced deployment time and improved maintainability. The ISO 22741 series extends ISO 15784-3 by defining the management information necessary to monitor, configure and control features of field devices. The data elements defined in all parts of the ISO 22741 series may be used with any protocol, but were designed with an expectation that they would be used with one of the ISO 15784-3 protocols.

By using the approach described in this document, agencies can specify open procurements and systems can be expanded geographically in an open and non-proprietary manner, which reduces the costs, speeds and deployment, and simplifies the integration.

0.2 Overview

The AP-DATEX specified in ISO 15784-3, the International Standard for communication between traffic management centres and field devices for traffic management, is suitable for use in the following cases:

a) Intelligent field devices with advanced functions communicate with the centre system each in equal relation.

b) The exchanged data have a large size and relatively fixed structure.

c) The deterministic real time feature is not required but the efficient data exchange is required.

d) Field devices communicate with not only the centre system but also other field devices simultaneously.

This document defines management information for field devices following the AP-DATEX conventions.

0.3 Document approach and layout

This document defines:

a) terminology and symbols used throughout the various parts of the ISO 22741 series (Clauses 3 and 4);

b) how conformance is defined in subsequent parts of the ISO 22741 series (Clause 5);

c) conventions used throughout the various parts of the ISO 22741 series (Clause 6);

d) the ITS architectural services defined in ISO 14813-1 that are addressed by the ISO 22741 series (Clause 7);

e) the rules used by other parts of the ISO 22741 series in defining the user needs that drive the definition of requirements (Clause 8);

f) the rules used by other parts of the ISO 22741 series in defining requirements and constraints (Clause 9);

g) a set of generic dialogues that are referenced by other parts of the ISO 22741 series (Clause 10);

h) a discussion of security that applies to all devices conforming to the ISO 22741 series (Clause 11);

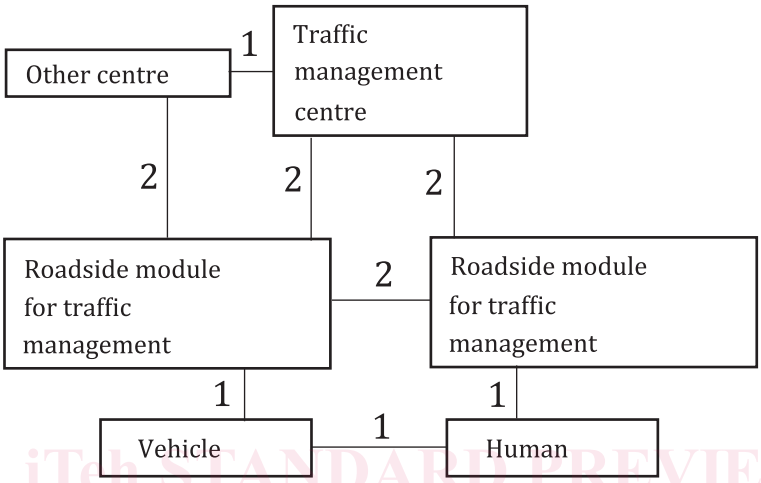
i) the data packet structures for the features defined by this document (Annex A).

0.4 Applicable environment

As depicted in Figure 1, all parts of the ISO 22741 series are intended to address data exchanges between:

1) a management centre (traffic or otherwise) and a field device (roadside module), or

2) two field devices.



Key

1 interface

2 interface in the scope of this document

Figure 1 — Example of this AP-Scenario

Subsequent parts of the ISO 22741 series define needs, requirements and design details for various field device capabilities.

Intelligent transport systems — Roadside modules AP-DATEX data interface —

Part 1: Overview

1 Scope

Field devices are a key component in intelligent transport systems (ITS). Field devices include traffic signals, message signs, weather stations, traffic sensors, roadside equipment for connected ITS (C-ITS) environments, etc.

Field devices often need to exchange information with other external entities. Field devices can be quite complex, necessitating the standardization of many data concepts for exchange. As such, the ISO 22741 series is divided into several individual Parts. This document (Part 1) introduces the ISO 22741 series and provides normative content that applies to the rest of the series.

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 15784-3, *Intelligent transport systems (ITS) — Data exchange involving roadside modules communication — Part 3: Application profile-data exchange (AP-DATEX)*

ISO 14827-2, *Transport information and control systems — Data interfaces between centres for transport information and control systems — Part 2: DATEX-ASN*

3 Terms and definitions

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

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

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

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

3.1
client
computer or application for requesting computers or applications to send data from the AP-DATEX, or receiving the response data

3.2
data element
single unit of information about the class that cannot be divided into contexts Note 1 to entry: Examples of contexts include person, location, procedure, feature, concept and organization.

3.3
message
set of data grouped together for transmission

[SOURCE: ISO 15784-3:2008, 3.15]

3.4
profile
standard that defines rules by only combining requirements of other standards

Note 1 to entry: An application profile is a profile that specifies the application, presentation, and session layers by referencing a group of other standards.

[SOURCE: ISO 15784-3:2008, 3.22]

3.5
server
computer or application receiving a data request from a client computer or application or responding to the request in the AP-DATEX

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

AP	application profile
ASN.1	abstract syntax notation one
DATEX-ASN	data exchange in ASN.1
DTLS	datagram transport layer security
IPsec	security architecture for internet protocol
ITS	intelligent transport systems
OSI	open systems interconnect
TCP	transmission control protocol
TLS	transport layer security
UDP	user datagram protocol

5 Conformance

Conformance to each part of the ISO 22741 series is defined in the conformance section of each part, which is written using the structure defined in this clause.

Conformance is driven by defined user needs. Each part of the ISO 22741 series may define user needs and the design to fulfil the user need. User needs are written from the perspective of a manager for the field device.

NOTE 1 Some parts of the ISO 22741 series do not define any user needs, but only provide reusable design elements that can be referenced by other parts of the series.

Table 1 of each part of the ISO 22741 series (other than this document) identifies the user needs associated with the part and indicates whether they are mandatory or optional for conformance to that part. Each user need is also traced to a set of features. A feature is a high-level, architectural concept that represents a coherent capability of the device that can support multiple user needs.

Table 2 of each part of ISO 22741 (other than this document) traces each feature to the requirements for that feature.

Each user need, feature, and requirement are identified by name and a reference. The reference can be within the same part, a different part or a different document. When references are made to other documents, all details and remaining traceability are defined in the referenced document.

Both tables indicate conformance for an item using one of the following conformance codes:

— M – indicates the item is mandatory when an implementation claims conformance to its parent item.

— O – indicates the item is optional when an implementation claims conformance to its parent item and if no other parent item makes the item mandatory.

Parent items are defined as follows:

a) The part is the parent item of each user need defined within it.

b) Each user need is a parent item for one or more features as shown by the indentation in Table 1. A user need may trace to multiple features and a feature may trace from multiple user needs.

c) Each feature is a parent item for one or more requirements as shown by the indentation in Table 2. A feature may trace to multiple requirements; a requirement may trace from multiple user needs but typically only traces from one feature.

Note that a feature defined in one part of the ISO 22741 series can have a parent defined in another part. Features should not be defined until at least one user need exists for the feature.

A qualifier may precede a conformance code. In such cases, the qualifier shall be a term followed by a colon. The term shall be defined in Table 3 as a reference to a specific clause in a specific document. The meaning of this notation is that the conformance code only applies when the referenced clause is supported by an implementation.

EXAMPLE 1 The code “condition:M” means that the indicated row is “mandatory” if the clause referenced by the term “condition” is supported by the implementation.

An option group expression may follow the “O” conformance code. The option group expression will be of the form “.<group> (<multiplicity>)”, where group shall be a sequential number that groups a number of options together and <multiplicity> shall be a range of integers that indicate the number of options that may be supported by an implementation from the option group.

EXAMPLE 2 The code “O,2 (1..*)” means that the indicated row is optional, but one or more options from option group 2 are to be supported.

The requirements referenced by Table 2 are written as “shall” statements. However, they are only applicable if the conformance table indicates that the feature is required.

NOTE 2 This document defines the rules to be followed by subsequent parts of the ISO 22741 series; it does not define any user needs or features itself and therefore does not contain Tables 1-3.

6 Conventions

This document contains references to and explanations of ASN.1 data concepts within its text. In all cases, the ASN.1 terms are presented in a fixed width font (e.g. `such as this`) to distinguish these terms from normal English.

7 Architecture

7.1 ITS services

The ISO 22741 series defines mechanisms by which field devices can be monitored, configured, and controlled. Field devices may be used to support almost any ITS service defined in ISO 14813-1 with a roadside component.

7.2 ISO 22741 series architecture

All parts of the ISO 22741 series are positioned in the application layer of the standard 7 layered OSI model. Figure 2 depicts how the ISO 22741 series is intended to relate to other International Standards in the case of the ITS Station architecture, as defined in ISO 21217.

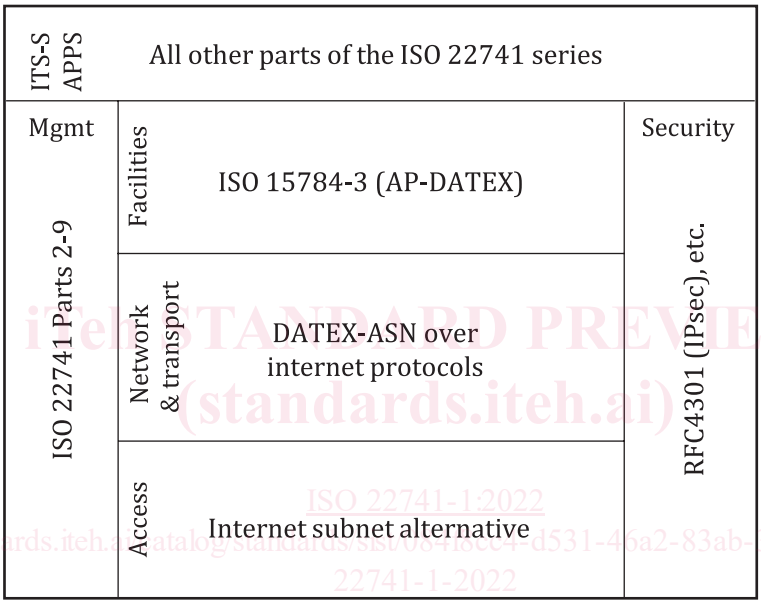


Figure 2 — Typical communications stack

Parts 2-9 of the ISO 22741 series are reserved for features that are the parts of the management plane of an ITS station. These parts do not define end-device functionality; rather they define management services that may support end-device functionality. The management layer will typically also support other data to manage the communications stack as defined by the data registry of AP-DATEX.

Part 10 and above of the ISO 22741 series are intended to address the end-device functionality.

The information defined for management and applications can theoretically be exchanged over any communications stack, but is designed to be exchanged using DATEX-ASN, as described in ISO 14827-2. DATEX-ASN is typically exchanged using well-known Internet protocols, such as UDP/IP or TCP/IP, and can then use IPsec, DTLS , TLS, etc. for security.

8 User needs

Specific user needs are defined in subsequent parts of the ISO 22741 series. Each user need should be written from the perspective of a manager and should provide a definition with a justification for the need. The definition of the user need may be followed with an explanation of how the user need is fulfilled using defined features.