INTERNATIONAL STANDARD

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Intelligent transport systems (ITS) — Data exchange involving roadside modules communication —

Part 1: General principles and documentation framework of application profiles

Systèmes intelligents de transport (SIT) — Échange de données impliquant la communication de modules en bordure de route —

Partie 1: Principes généraux et cadre documentaire des profils d'application

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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.

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 15784-1 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

ISO 15784 consists of the following parts, under the general title *Intelligent transport systems (ITS) — Data exchange involving roadside modules communication*:

— *Part 1: General principles and documentation framework of application profiles*

— *Part 3: Application profile-data exchange (AP-DATEX)*

Introduction

The functional requirements for communication between a traffic management centre and roadside modules used for traffic management are varied because internationally there are many kinds of roadside modules for traffic management, such as signal controllers, dynamic message signs and vehicle detectors. In the development of standards for data exchanges between a traffic management centre and roadside modules used for traffic management, ISO/TC 204/WG9 agreed that the concept of a single standard for all countries and devices might not be appropriate, but a set of standards for different types of roadside module might be more appropriate.

As a result, ISO/TC 204/WG9 adopted the philosophy of producing profile documents to specify how data should be exchanged.

In the development of this part of ISO 15784, reference was made to the existing standards about profiles, specifically NTCIP 8003 which is the US standard for a profile framework, and ISO/IEC TR 10000, which is a series of Technical Reports under the general title *Information technology — Framework and taxonomy of International Standardized Profiles*.

The purpose of a profile is to specify the use of one or more base standards to provide a requested function. Because there are multiple functional requirements to data exchange between a centre and the roadside modules, ISO 15784 defines multi-part profiles.

This part of ISO 15784 defines only the application profile. End application data is defined in the data-registry. Each country should define lower layer profiles based on the internationally standardized protocols because each country has its own circumstance on communication infrastructure.

This part of ISO 15784 has been prepared in order to explain the principles of profile and documentation rules of application profile and to classify multiple application profiles as options to use for data exchange between traffic management centres and roadside modules for traffic management.

Intelligent transport systems (ITS) — Data exchange involving roadside modules communication —

Part 1: General principles and documentation framework of application profiles

1 Scope

The purpose of this part of ISO 15784 is to provide principles and documentation rules of application profiles used to exchange data and messages between a traffic management centre and roadside modules used for traffic management.

The application profiles specified in this part of ISO 15784 are used to exchange data and messages in the following cases.

a) Between a traffic management centre and roadside modules for traffic management.

b) Between roadside modules used for traffic management.

The scope of this part of ISO 15784 does not include the communication between roadside modules and on-board units, in-vehicle communication, incabinet communication and motion video transmission from a camera or recorded media.

2 Normative references

The following referenced documents are indispensable for the application of this part of ISO 15784. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC TR 10000-1:1998, *Information technology — Framework and taxonomy of International Standardized Profiles — Part 1: General principles and documentation framework*

ISO/IEC TR 10000-2:1998 *Information technology — Framework and taxonomy of International Standardized Profiles — Part 2: Principles and Taxonomy for OSI Profiles*

3 Terms and definitions

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

3.1
application layer
layer containing all functions needed for the distributed applications not already provided by the presentation service

NOTE The application layer constitutes layer 7 of the OSI model.

3.2
base standard
approved international standard or a related authoritative standard

3.3
centre
computer or network that is required to meet a standardized communications interface over a fixed-point communications network, regardless of whether it is the only system within the building or just one of many, or even if it is located in the field

3.4
client
computer or application which requests and accepts data from a server computer or application using some kind of protocol

3.5
compatibility
capability of two or more items or components of equipment or material to exist and/or function in the same system or environment without modification, adaptation or mutual interference

3.6
data
information before it is interpreted

3.7
data packet
entity of data that can be sent between end-application systems in order to exchange information

NOTE A data packet relates to the application layer of the OSI stack and may be broken into several pieces by lower layer protocols.

3.8
encoding rules
rules which specify the representation during transfer of the values of ASN.1 types

NOTE Encoding rules also enable the values to be recovered from the representation, given knowledge of the type.

3.9
end-application
process or program using the communications stack

3.10
message
set of data grouped together for transmission

3.11
OSI
open systems interconnection
reference model developed by ISO to enable different or similar systems to dialogue with one another

NOTE This model constitutes a reference framework for describing data exchanges. Each layer performs a service at the request of the adjacent higher layer, and in turn, requests more basic services from the lower layers. It is described in 7 layers.

3.12
presentation layer
layer that converts data using different syntax

NOTE The presentation layer constitutes layer 6 of the OSI model.

3.13
profile
standard that defines rules by only combining requirements of other standards

NOTE An application profile is a profile that specifies the application, presentation, and session layers by referencing a group of other standards.

3.14
protocol
formal definition of a transition process

NOTE A set of rules governing the flow of information in a communications system.

3.15
roadside modules
terminal units controlled or monitored by a traffic management centre

NOTE Roadside modules are usually installed at the roadside arena.

3.16
server
computer or application which receives and responds to requests for data from client computers or applications using some kind of protocol

3.17
session layer
layer that manages the dialogue between end-user application processes including restart, termination, and checkpointing

NOTE The session layer constitutes layer 5 of the OSI model.

3.18
transport profile
set of services which are responsible for providing a virtually error-free, point to point connection so that host-A can send data packets to host-B and they will arrive uncorrupted

NOTE Connection-oriented transport profiles can also ensure that the data packets arrive in the correct order.

4 Abbreviated terms

AP Application Profile

ASN.1 Abstract Syntax Notation 1 (ISO 8824)

BER Basic Encoding Rules (ISO 8825-1)

ISO International Organization for Standardization

NTCIP National Transportation Communications for ITS Protocol

OSI Open Systems Interconnect

TCP Transmission Control Protocol (RFC 793)

TMP Transportation Management Protocols

TR Technical Report

UDP User Datagram Protocol (RFC 768)

5 Principle and framework of profiles

5.1 Concept of profile

5.1.1 General

Profiles combine base standards or other profiles and identify them with definitions of appropriate classes, conforming subsets, options and parameters which are necessary to support a class of applications.

5.1.2 Relationship to base standards

Some base standards provide options, anticipating the needs of a variety of applications of the functionality described. Profiles promote integration of base standards by defining how to use a combination of base standards for a given function and environment. In addition to the selection of base standards, a choice is made of permitted options for each base standard and of suitable value for parameters left unspecified in the base standards.

Profiles shall not contradict base standards but shall make a specific choice where options and ranges of values are available. The options should be chosen so that the objectives of the profiles can be achieved in the most effective way.

5.1.3 Principles of profile content

5.1.3.1 General rules of reference

Profiles refer base standards in order to use the function and interface already defined in them. The general rules of reference to the base standards are as follows.

a) Profiles restrict the choice of base standards' options to the extent necessary to maximise the probability of achieving the objective of the profiles.

b) Profiles shall not specify any requirements that would contradict or cause non-conformance to the base standards.

c) Profiles may contain conformance requirements which are more specific and limited in scope than those of the base standards. Profiles may exclude some valid options permitted in the base standards.

5.1.3.2 Elements of a profile

A profile consists of the following elements.

a) Concise definition of the scope of the functionality that the profile is intended to meet.

b) Scenario within which the profile is applicable.

c) Normative reference to a single set of base standards and profiles.

d) Specification of the application of each reference base standard with choice of options or ranges of parameter values, etc.

e) Statement defining the requirements to be observed by the systems claiming conformance to the profile.

5.1.4 Meaning of conformance to a profile

The purpose of a profile is to specify the use of standards or sets of standards to provide clearly defined functionality. Thus conformance to a profile specification always implies conformance to the referenced standards. There can also be conformance requirements for the combined use of base standards which are distinct from any requirements associated with those base standards in isolation.

Conformance requirements may be

a) mandatory, or

b) optional.

Conformance requirements may also be specified as

c) unconditional, or

d) conditional.

Conformance requirements may also be stated

e) positively – they state what is required to be done, or

f) negatively – they state what is required not to be done.

5.1.5 Conformance requirements of profiles

The conformance requirements of a profile relate to those of base standards in the following ways.

— Unconditional mandatory requirements in the base standards remain mandatory in the profile.

— Unconditional options in the base standards may remain optional or may be changed to:

  — mandatory;

  — conditional;

  — not applicable;

  — prohibited.

— If the conditions of those requirements are fully elaborated, conditional requirements in the base standards may remain conditional or be modified to:

  — mandatory;

  — unconditional;

  — not applicable;

  — prohibited.

5.2 Principles defining format and content

The following requirements for content and format of profiles are based on those defined in ISO/IEC TR 10000-1.

a) Profiles shall be directly related to base standards. Conformance to a profile shall imply conformance to reference base standards.

b) Standardized profiles are intended to be concise documents and shall not repeat the text of the referenced documents. The reliance on reference to base standards and the use of registered names are thus essential for the production of concise standardized profiles.

c) Profiles making identical use of particular base standards shall be consistent.

d) The definition of one profile may include a reference to the definition of another profile in part or in total.

5.3 ISO/IEC profile standards

ISO/IEC TR 10000-2 defines the following four classes of OSI profiles.

a) Transport profiles define the use of protocol standards from OSI layers 1 to 4, to provide the OSI transportation service.

b) Relay profiles define the use of standards from OSI layers 1 to 4, to provide relaying function between OSI transport profiles.

c) Application profiles define the use of protocol standards from OSI layers 5 to 7, to provide the information exchange mechanism between end-application.

d) Interchange format and representation profiles define the structure and content of the information exchanged by application profiles.

6 Requirements

6.1 Standardized profiles for centre to roadside communication

Based upon the ISO/IEC profile model defined in ISO/IEC TR 10000-2, these standards shall specify application profiles as standardized profiles for data exchange between traffic management centre and roadside modules for traffic management.

The rules for drafting and presentation of standardized profiles are described in Annex A.

6.2 Application profiles

All the application profiles defined in ISO 15784 combine to meet the functional requirements for data and message exchange between traffic management centres and roadside modules for traffic management.