TECHNICAL SPECIFICATION

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Intelligent transport systems — Cooperative systems — Classification and management of ITS applications in a global context

Systèmes intelligents de transport — Classification et gestion des applications de systèmes intelligents de transport dans un contexte global

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Foreword

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ISO/TS 17419 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Intelligent transport systems*, in collaboration with ISO Technical Committee ISO/TC 204, *Intelligent transport systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Introduction

Classification and management of ITS applications in a global context covers more than just the ITS applications themselves. It also covers elements of the environment in which ITS applications are instantiated.

Intelligent Transport Systems (ITS) provide ITS services to users by execution of ITS applications which typically requires communications between ITS station application processes residing in ITS station units (ITS-SU). Communications includes exchange of messages dedicated to ITS applications, and exchange of messages from ITS message sets.

ITS applications and ITS application classes are referred to as ITS application objects. ITS application objects are uniquely identified by the registered “ITS Application Identifier” (ITS-AID) specified in this Technical Specification.

NOTE An ITS application class groups ITS applications together that provide the same type of service, e.g. “Electronic Fee Collection” (EFC), but operate in different contexts. The definition of ITS application classes is based on the concept of the DSRC Application entity as introduced in Reference [4], which is identified by a DSRCApplicationEntityID.

In Reference [17] ITS message sets were referred to as ITS application objects. This definition is not adopted in this Technical Specification due to the fundamentally different nature of ITS message sets and ITS application objects. ITS message sets are uniquely identified by the registered “ITS Message Set Identifier” (ITS-MsgSetID) specified in this Technical Specification.

This Technical Specification is an extension towards more general and global applicability of Reference [17]. This Technical Specification introduces the term “ITS-S object” as a general reference to ITS application objects, ITS message sets and other objects that may require globally unique identification and registration.

NOTE Examples of other ITS-S objects are ITS-S communication protocols and ITS-S security protocols.

Management of ITS-S objects is specified in the ISO 24102 series of International Standards [6][7][8][9][10][11] and in the Technical specification ISO/TS 17423. This Technical Specification focuses on some management aspects related to authorized and controlled operation of ITS-S objects which requires considerations of ITS-S object identifiers, i.e. ITS-AID, ITS-MsgSetID, ITS-SUID, ITS-SCUID, addresses and protocol identifiers used in the communication protocol stack of an ITS-S, and others.

Intelligent transport systems — Cooperative systems — Classification and management of ITS applications in a global context

1 Scope

This Technical Specification illustrates and specifies “Global Classification and Management of ITS Applications” (GCMA). It

— is based on the ITS station and communication architecture described in ISO 21217,

— describes and specifies globally unique addresses and identifiers (ITS-S object identifiers) which are both internal and external to ITS stations and are used for ITS station management,

— describes how ITS-S object identifiers and related technical parameters are used for classification, registration and management of ITS applications and ITS application classes,

— describes how ITS-S object identifiers are used in the ITS communication protocol stack,

— introduces an organizational framework for registration and management of ITS-S objects, and

— defines and specifies management procedures at a high functional level.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/TS 17423, *Intelligent transport systems — Cooperative systems — ITS application requirements and objectives for selection of communication profiles*

ISO 21217, *Intelligent transport systems — Communications access for land mobiles (CALM) — Architecture*

ISO/IEC 8825-2:2008, *Information technology — ASN.1 encoding rules: Specification of Packed Encoding Rules (PER) — Part 2*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21217 and the following apply.

3.1
authorization
prescription that a particular behaviour shall not be prevented

Note 1 to entry: Unlike *permission* (3.22), an authorization is an empowerment.

3.2
ITS application
instantiation of an ITS service that involves an association of two or more complementary ITS-S application processes

3.3
ITS application class
group of *ITS applications* (3.2) that provide the same type of service, e.g. Electronic Fee Collection (EFC), where each application operates in a different context

3.4
ITS application identifier
ITS-AID
globally unique, registered number identifying an *ITS application object* (3.5)

3.5
ITS application object
ITS application (3.2) or *ITS application class* (3.3) identified by a globally unique *ITS application identifier* (3.4)

3.6
ITS message
message designed for an ITS-related purpose

3.7
ITS message set
set of uniquely identified ITS messages

3.8
ITS message set identifier
globally unique, registered number identifying an *ITS message set* (3.7)

3.9
ITS registration authority
entity authorized to register *ITS-S object* (3.17) identifiers

3.10
ITS service
functionality provided to users of intelligent transport systems designed, e.g. to increase safety, sustainability, efficiency, and comfort

3.11
ITS trusted authority
entity authorized to issue *ITS-S object* (3.17) security credentials

3.12
ITS-S application process
element in an ITS station that performs information processing for a particular application and uses ITS-S services to transmit and receive information

3.13
ITS-S application process provisioner
functionality in an ITS-SU offering *ITS-S application processes* (3.12) for download and installation to other ITS-SUs

3.14
ITS-S communication protocol
protocol used in a communication protocol stack of an ITS-S

3.15
ITS-S communication protocol stack
set of ITS-S communication protocols, which may be identified by a registered globally unique reference number, enabling communications between an ITS-SCU and other nodes

3.16
ITS-SCU configuration management centre
entity that retains information about capabilities of ITS-SCUs, status of objects in ITS-SCUs, and supports management and update of this information

3.17
ITS-S object
entity used in ITS that may require a globally unique identifier

EXAMPLE ITS-SU, ITS-SCU, ITS application object, ITS message set, ITS-S communication protocol, ITS flow type.

3.18
ITS-S object identifier
identifier of an *ITS-S object* (3.17)

3.19
ITS-S object owner
entity responsible for the specification (design), maintenance and registration of an *ITS-S object* (3.17)

3.20
ITS-S service
communication functionality of an ITS-S that provides the capability to connect to other nodes

3.21
ITS-S unit
implementation of an ITS station

3.22
permission
rule that a particular behaviour is allowed to occur

3.23
policy
set of rules related to a particular purpose, expressed as an obligation, an *authorization* (3.1), *permission* (3.22) or a *prohibition* (3.24)

3.24
prohibition
prescription that a particular behaviour shall not occur

3.25
registration
assignment of an unambiguous name to an object in a way which makes the assignment available to interested parties

3.26
registration authority
entity such as an organization or an automated facility that performs *registration* (3.25) of one or more types of objects

3.27
regulation
<document>written instrument containing rules having the force of law

3.28
regulation
<process>process of the promulgation, monitoring, and enforcement of rules defined in *regulation* (3.27), established by primary and/or delegated legislation

3.29
regulator
agency responsible for exercising autonomous authority over some area of human activity

3.30
violation
behaviour contrary to a rule

4 Abbreviated terms

ARCP	Application Requirements for selection of Communication Profiles
BSMD	Bounded Secured Managed Domain
CEN	Commission Européenne de Normalisation
C-ITS	Cooperative Intelligent Transport Systems
ETSI	European Telecommunications Standards Institute
GCMA	Global Classification and Management of ITS Applications
IANA	Internet Assigned Numbers Authority
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
ISO	International Standards Organisation
ITS	Intelligent Transport Systems
ITS-AID	ITS Application Identifier
ITS-AOOID	Application Object Owner (designer) Identifier
ITS-FlowTypeID	ITS Flow Type Identifier
ITS-LCH	ITS Logical Channel
ITS-LCHID	ITS Logical Channel Identifier
ITS-MsgSetID	ITS Message Set Identifier
ITS-MSOID	Message Set Owner Identifier
ITS-NTSDU	ITS Station Networking & Transport layer Service Data Unit
ITS-PN	ITS Port Number
ITS-PR	ITS policy region
ITS-PRID	ITS-PR Identifier
ITS-RR	ITS Regulatory Region
ITS-RRID	ITS Regulatory Region Identifier
ITS-S	ITS Station
ITS-S-APDID	ITS-S Application Process Developer Identifier

ITS-S-APP	ITS-S Application Process Provisioner
ITS-S-APPID	ITS-S Application Process Provider Identifier
ITS-S-CPID	ITS-S communication profile Identifier
ITS-SCU	ITS Station Communication Unit
ITS-SCU-CMC	ITS-SCU Configuration Management Centre
ITS-SCU-CMCID	ITS-SCU-CMD Identifier
ITS-SCUID	ITS-SCU Identifier
ITS-SecAlgID	ITS Security Algorithm Identifier
ITS-SEMID	ITS Station Equipment Manufacturer Identifier
ITS-S-FSID	ITS-S Facilities layer Service Identifier
ITS-SU	ITS Station Unit
ITS-SUID	ITS-SU Identifier
ITS-SU-UID	ITS-SU User Identifier
LDM	Local dynamic map

5 Application management

This is an informative clause.

5.1 Introduction

In this Technical Specification, application management refers to objects and procedures, both internal and external to the platforms on which the applications are installed, that are used to ensure the efficacy and authenticity of these applications and these platforms. Platforms in this context are ITS station communication units[1)] (ITS-SCUs) and applications are ITS-S application processes as specified in ISO 21217. Distinction is made between authorized applications and permitted applications. Application management procedures involve protocols for exchanging information between the various entities involved in application management, and these procedures are described at a functional level in this Technical Specification. These procedures are to be used for authorizing and authenticating the use of ITS-S application entities over communication networks. The architecture of this network described in ISO 21217 and in 5.2.

Entities related to ITS application management in the global context and their roles identified and / or specified in this Technical Specification are listed in Table 1.

Table 1 — Entities and their roles

Entity	Role
ITS-S object	Entity used in ITS related to ITS-S management that may be identified by a globally unique identifier. EXAMPLE ITS application objects, ITS message sets, ITS-S communication protocols, ITS-S units, ITS-S communication units.

1) An ITS-SU may consist of several physical units called ITS-SCUs as specified in ISO 21217.

Table 1 *(continued)*

Entity	Role
ITS-S object owner	Entity which is responsible for the specification (design), maintenance and registration of ITS-S objects EXAMPLE Standards development organizations, industry special interest groups such as the "Society of Automotive Engineers" (SAE).
ITS application object	Entity that provides an ITS service to the user as specified in ISO 21217. EXAMPLE ITS applications and ITS application classes.
ITS message set	Set of ITS messages designed for an ITS-related purpose as specified in ISO 21217.
ITS-S communication protocol	Protocol used in a communication protocol stack of an ITS-S
ITS-S unit (ITS-SU)	Physical instantiation of an ITS station specified in ISO 21217. An ITS-SU may consist of one single ITS-SCU, or several ITS-SCUs interconnected via an ITS station internal network. An ITS-SU is also referred to as "Bounded Secured Managed Entity" as specified in ISO 21217.
ITS-S communication unit (ITS-SCU)	Physical unit in an ITS-SU containing a part or all of the functionality of an ITS-S as specified in ISO 21217.
ITS-S equipment manufacturer	Manufacturer of ITS-SUs or ITS-SCUs.
ITS-S application process developer	Developer (manufacturer) of ITS-S application processes for usage in ITS-SUs.
ITS-S application process provisioner	Entity that offers ITS-S application processes for download to an ITS-SCU.
ITS-SCU configuration management centre	Entity that retains information about the capabilities of ITS-SUs, status of objects in ITS-SUs, and supports management and update of this information.
Certification authority (Certification laboratory)	Entity in charge of checking ITS-SCUs, implementations of ITS-S communication protocols, and ITS-S application processes for compliance to standards or specifications defined in an ITS release.
ITS registration authority	Entity in charge of registering ITS-S objects referenced by globally unique identifiers.
ITS trusted authority	Entity in charge of providing ITS-S object security credentials such as keys and certificates for hardware and software.

5.2 ITS communications architecture

As illustrated in Figure 1, regardless of the complexity of the networks employed, communication between "ITS station units" (ITS-SUs), and between ITS-SUs and other types of ITS communication nodes, is on a peer-to-peer basis. The distinguishing feature of ITS-SUs is that of trust and authentication as discussed in 5.5.1. The need for trust and authentication arises from the deployment of critical safety-of-life and property applications. This leads to the definition of an ITS station as a "Bounded Secured Managed Domain" (BSMD) as specified in ISO 21217, and the requirement for a "Public Key Infrastructure" (PKI) for trust assertion and certificate management.

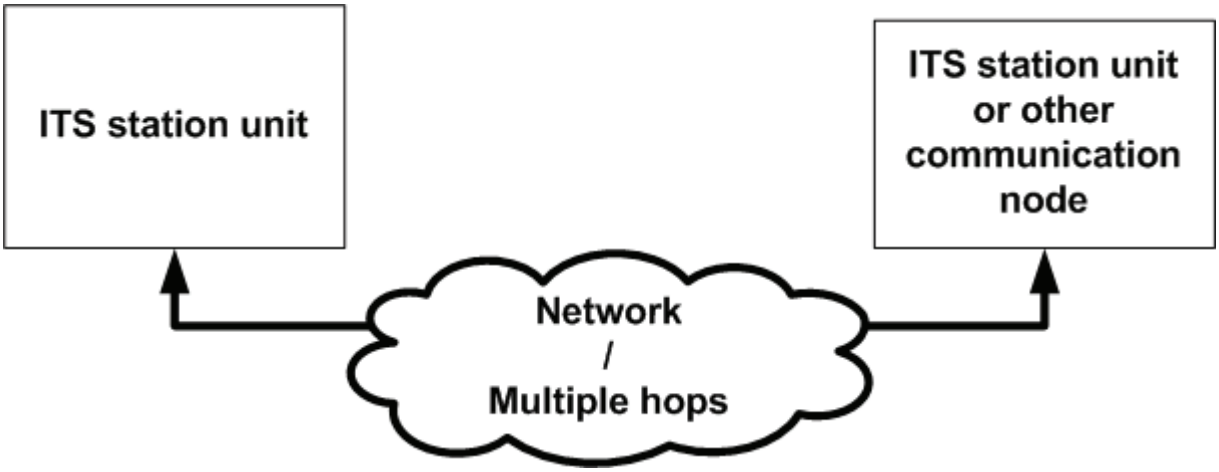

Figure 1 — Simplified ITS peer-to-peer communication architecture

5.3 PKI architecture

A public-key infrastructure (PKI) is a system for the creation, storage, distribution and revocation of digital certificates which are used to verify that a particular public key and associated rights belong to a certain entity. A PKI creates digital certificates which map public keys to entities and their rights. It securely stores these certificates in a central repository and revokes them if needed.

5.4 Regulations and policies

Application management procedures must comply with applicable regulation and use applicable policies. A policy is a set of rules related to a particular purpose. Such a rule can be expressed as an obligation, an authorization, a permission, or a prohibition. A regulation is an enforceable policy. Regulations apply to a specific regulatory domain and are produced and maintained by regulators. Policies apply to a specific policy domain.

The need and applicability for regulations and policies in ITS is identified in this Technical Specification for the following purposes:

— radio frequency allocation and usage;

— privacy issues;

— road traffic circulation;

— communication networks.

A regulatory region is uniquely identified by an ITS Regulatory Region Identifier ITS-RRID.

A policy region is uniquely identified by an ITS Policy Region Identifier ITS-PRID.

5.5 ITS station

5.5.1 ITS station architecture

The architecture of the ITS station (ITS-S) specified in ISO 21217 is illustrated in Figure 2.