# TECHNICAL SPECIFICATION

## ISO/TS 17419

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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.<br><br>EXAMPLE    ITS application objects, ITS message sets, ITS-S communication protocols, ITS-S units, ITS-S communication units. |

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

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**Table 1** *(continued)*

| Entity | Role |
|---|---|
| ITS-S object owner | Entity which is responsible for the specification (design), maintenance and registration of ITS-S objects<br><br>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.<br><br>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.
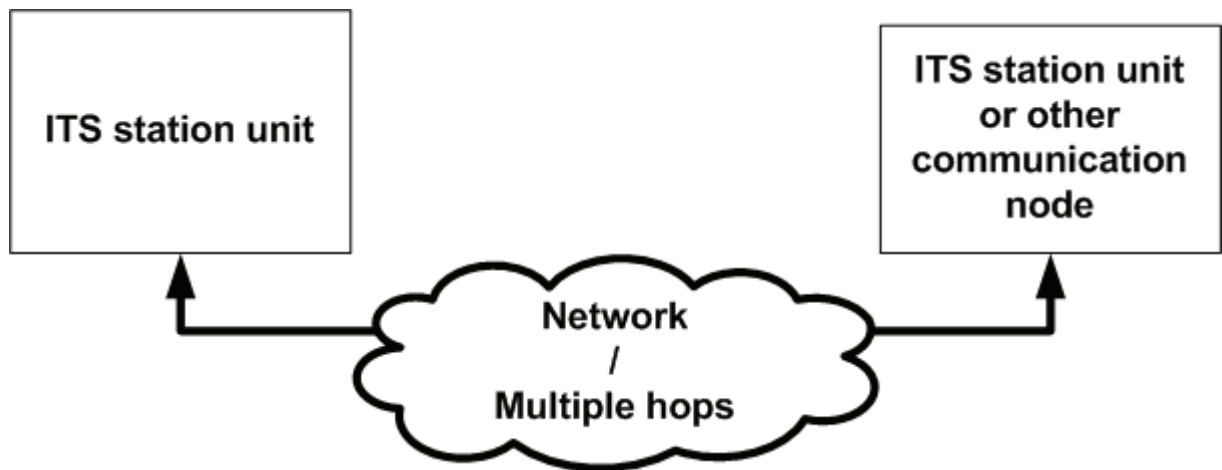
**Figure 1 — Simplified ITS peer-to-peer communication architecture**

## 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.
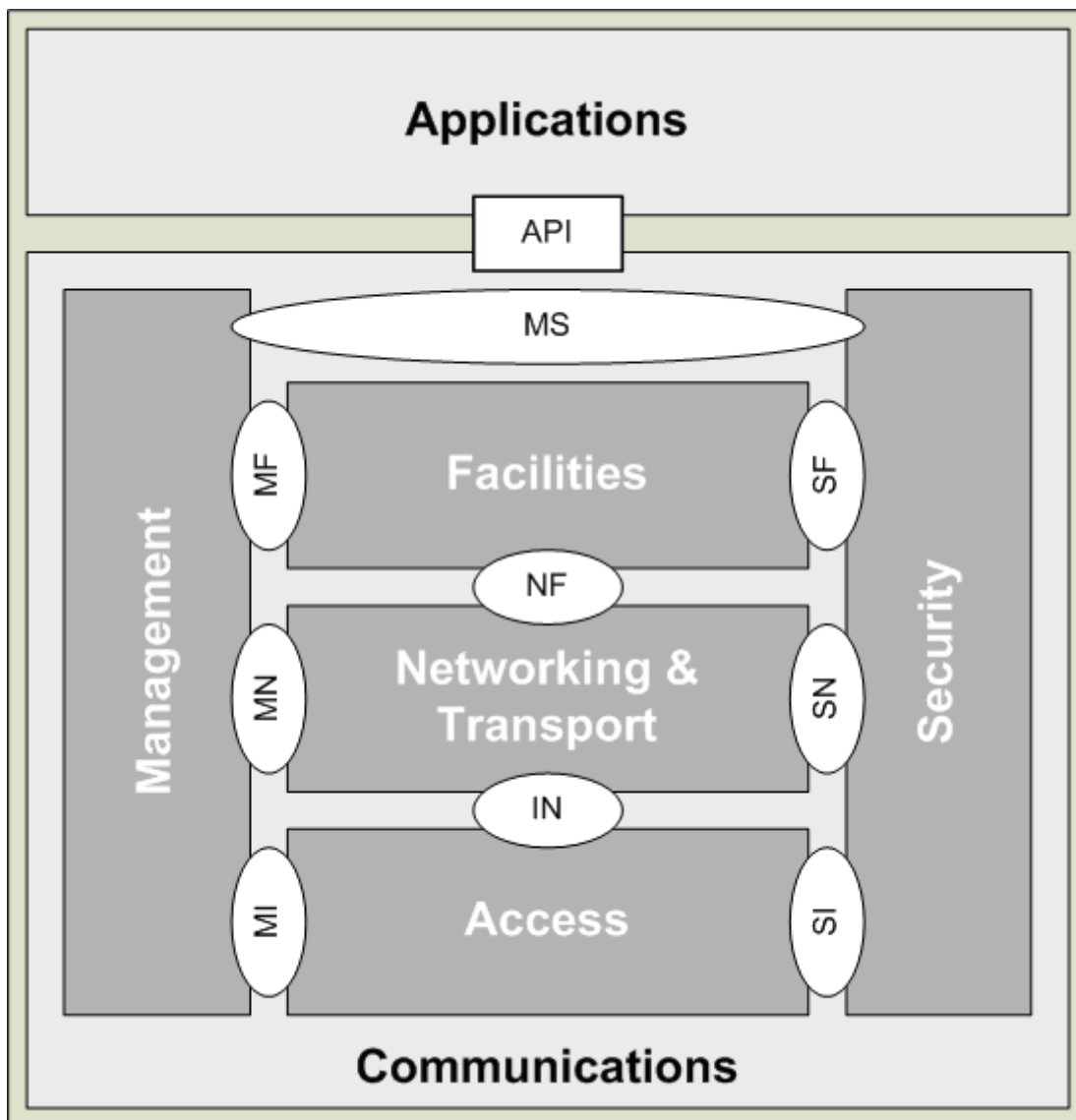
**Figure 2 — ITS station architecture** (from **ISO 21217**)

The term ITS-S refers to functionalities rather than a physical unit. Six functional blocks of an ITS-S are distinguished in [Figure 2](#):

**Applications**

— ITS-S applications

**Communications**

— Data plane

   — "Access": ITS-S access layer, i.e. OSI layers one and two.

   — "Networking & Transport": ITS-S networking & transport layer, i.e. OSI layers three and four.

   — "Facilities": ITS-S facilities layer, i.e. OSI layers five, six and seven.

— Management entity

   — "Management": ITS-S management entity

— "Security": ITS-S security entity

These entities are assumed to interact with each other within a "Bounded Secured Managed Domain" (BSMD). Implementation and maintenance of these entities in a standard compliant manner creates ITS-S objects, ITS-SUs and ITS-SCUs that can be trusted to operate according to the policies and procedures assigned to them by trusted authorities. It is precisely the attribute of trust within the ITS domain that distinguishes ITS-SUs (Bounded Secured Managed Entities, BSMEs) from all other communication nodes. As a managed domain, elements of the ITS-S need to be aware of and interact with the ITS-S management entity. As a secured domain, installation (e.g. "plug-and-play") of an element of an ITS-S such as an ITS-S application, communication interface, or a communication protocol must be performed in a controlled and secure manner, applying the procedures for registration of identifiers of ITS-S objects and the authentication of registered elements at time of installation.

ITS-S applications interact with the "Communications" block via an "Application Programming Interface" (API). This interaction may address either protocols in the ITS-S facilities layer of the data plane, or protocols in the ITS-S management entity or ITS-S security entity.

ITS-S access and ITS-S networking & transport layers are used by ITS-S facilities layer services and ITS-S applications to transmit and receive ITS-NTSDUs as described in ISO 21217.

A specific combination of an ITS-S networking & transport layer protocol (residing in an instantiation of the ITS-S networking & transport layer), a "Communication Interface" (CI) (residing in an instantiation of the ITS-S access layer), an ITS-S facilities layer protocols (optional) and related necessary management and security protocols (optional) is referred to as an ITS-S communication protocol stack specified in ISO/TS 17423. An ITS-S communication profile, which is a parameterized ITS-S communication protocol stack specified in ISO/TS 17423 is associated with a communication path.[11] An ITS-S application process may use more than one ITS-S communication profile, e.g. one ITS-S communication profile for each of its distinct communication sources (flows). Further details on the automatic selection of ITS-S communication profiles are found in ISO/TS 17423.

### 5.5.2   Instantiations of an ITS station

The functionality of an ITS-S may be implemented in one or more "ITS-S Communication Units" (ITS-SCU) as explained in ISO 21217. For example, an ITS-S can be implemented by connecting units containing ITS-S router functionality and ITS-S host functionality using a local network (called an ITS station-internal network). An implementation of an ITS station is referred to as an "ITS-S unit" (ITS-SU).

An ITS-SU is uniquely identified by an ITS-SUID. An ITS-SCU is uniquely identified by an ITS-SCUID. An ITS-SU comprised of more than one ITS-SCU has a master ITS-SCU. The ITS-SUID is derived from the ITS-SCUID of the master ITS-SCU as specified in 7.1.7.

An ITS-SCU is assigned to one "ITS-SCU Configuration Management Centre" (ITS-SCU-CMC). The purpose of the ITS-SCU-CMC is to manage the configuration of ITS-SCUs. Related ITS-S remote management procedures are specified in Reference [7].

### 5.5.3   Owners and users of an ITS station

For lawful intercept, it may be necessary to uniquely identify the owner (user) of an ITS-SU. The identifier assigned to an owner is stored in the ITS-SU-UID data object. Procedures for unique assignment and usage of ITS-SU-UIDs are outside the scope of this Technical Specification.

## 5.6   Applications and messages

### 5.6.1   ITS application

An ITS application is an instantiation of an ITS service that involves an association of two or more complementary ITS-S application processes as defined in ISO 21217. ITS-S application processes may perform information dissemination by implementing groupcast (broadcast or multicast) services, or by exchange of packets with peer ITS-S application processes as part of a communication session.

An ITS application is identified by a globally unique "ITS Application Identifier" (ITS-AID) as specified in this Technical Specification. ITS-AIDs are assigned by a Registration Authority.

An essential feature of the ITS-S reference architecture is that ITS-S application processes need not necessarily concern themselves with the underlying communication protocols. They only need to be able to inform the ITS-S management of their functional requirements for communications as described in ISO/TS 17423.

### 5.6.2 ITS application class

The concept of an ITS application class (cf. DSRCApplicationEntity) as introduced in Reference [4] is based on identifying a set of different protocols that serve the same functional purpose, e.g. Electronic Fee Collection (EFC).

An ITS application class is identified by an ITS-AID, see 5.6.1. The various protocols inside an ITS application class are distinguished by a context which can be identified by a context identifier. Usage of ITS application classes in service advertisements is specified in Reference [10].

NOTE        The term ITS application class is introduced in this Technical Specification primarily for compatibility with legacy systems[4].

### 5.6.3 ITS message sets

An ITS message set is a collection of ITS messages associated with an entity that is responsible for maintenance of the set.

NOTE        The term "ITS message set" is herein synonymous with the term "ITS data dictionary".

Transmission and reception of messages from an ITS-S message set may be performed by ITS-S application processes, e.g. ITS-S applications, ITS-S facility applications.

Messages from ITS message sets may be processed in the ITS-S facilities layer for the purpose of dissemination as specified in References [2] and [3].

An ITS message set is identified by a globally unique "ITS Message Set Identifier" (ITS-MsgSetID) specified in this Technical Specification. ITS-MsgSetIDs are assigned by a registration authority.

## 5.7 Communications

### 5.7.1 Addressing in the communication protocol stack

Packets (network layer data units) exchanged between ITS-SUs need to carry information on the source and the destination (end points) of these packets above the ITS-S networking & transport layer, i.e. in the ITS-S facilities layer. This address information applies at the NF-SAP in Figure 2. The well-known concept of port numbers is used for this purpose.

NOTE        Typically port numbers are dedicated to a specific transport protocol, i.e. the same number may have different meanings in different transport protocols. Port numbers for ITS transport protocols such as FNTP are referred to as "ITS Port Numbers" (ITS-PN).

Source and destination end points may be either globally unique, well-known ITS-PNs as specified in this Technical Specification, or dynamically assigned ITS-PNs.

While globally unique transport protocol identifiers, network protocol identifiers, network addresses, data link layer protocol identifiers are essential ITS communications, they are outside the scope of this Technical Specification. Examples of such identifiers are given in Table 2.

**Table 2 — Addresses and identifiers in communication protocols**

| Identifier or address | Purpose |
|---|---|
| Facility layer service identifier | Registered identifiers for ITS-S facility layer services as specified in Reference [2]. |
| IPv6 prefix | ITS-SUs contain routers that may get a global IPv6 prefix that uniquely identifies the router (and the station-internal network behind such a router) in the Internet. |
| IPv6 addresses | ITS-SCUs (hosts and routers) may get globally unique IPv6 addresses that uniquely identify them in the Internet. |
| DSAP/SSAP addresses | DSAP / SSAP addresses are specified in IEEE 802.2.[15] These are used to select upper layer protocols. |
| Ethertype identifiers | Ethertype identifiers are specified for usage in the length/type field specified in IEEE 802.3.[16] They are used to select upper layer (networking) protocols. |
| MAC addresses | MAC addresses are specified in IEEE 802[14] and are comprised of a global and local sub-space. The global sub-space uniquely identifies a communication interface. |

### 5.7.2 ITS-S management

Although the ITS-S management entity is located inside the block "Communications" in Figure 2, it also manages ITS-S applications residing in the block "Applications" via MX-SAP service primitives.[8]

The set of ITS-S application functional communication requirements and procedures for expressing them to the ITS-S management are described in ISO/TS 17423.

### 5.7.3 ITS-S Security

The ITS-S security entity provides "atomic" security services to the ITS-S. Although functions of the SX-SAP service primitives[8] are generally specified in various standards, detailed mechanisms necessary to achieve security and trust are implementation dependent.

## 5.8 Identifiers and addresses summary

Table 3 illustrates globally unique addresses and identifiers relevant for ITS for which a registry is required. Details of these identifiers and addresses are specified in 7.1.

**Table 3 — Addresses, identifiers and registries**

| Address / identifier | Purpose |
|---|---|
| ITS-AID | An ITS application identifier is used to uniquely identify an ITS application or an ITS application class. It is used to advertise services (cf. the service advertisement specified in Reference [10]), and for secure installation and real-time operation of ITS-S applications in an ITS-SU. ITS-S applications have an ITS-AID assigned to them prior to installation in an ITS-SU. |
| ITS-AOOID | An ITS application object owner identifier is used to uniquely identify an owner of specifications of ITS application objects. |
| ITS-FlowTypeID | An ITS-FlowTypeID is used to uniquely identify an ITS flow type.<br><br>An ITS flow type is a set of communication requirements and objectives specified in ISO/TS 17423 and used by the ITS-S management [11] to select an optimum ITS-S communication profile. |
| ITS-LCHID | An ITS logical channel identifier is used to uniquely identify an ITS logical channel in the ITS-S communication profile selection process specified in ISO/TS 17423. |

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**Table 3** *(continued)*

| Address / identifier | Purpose |
|---|---|
| ITS-MsgSetID | An ITS message set identifier is used to uniquely identify an ITS message set.<br><br>ITS-S applications may construct PDUs using messages from any registered ITS message set, and may also consume such messages through publish/subscribe mechanisms in ITS-SUs[2]. |
| ITS-MSOID | An ITS message set owner identifier is used to uniquely identify an owner of specifications of ITS message sets. |
| ITS-PN | An ITS port number is used in an ITS-SCU to uniquely identify for a given transport protocol such as FNTP,[12] an entity or protocol in the ITS-S facilities layer. |
| ITS-PRID | An ITS policy region identifier is used to uniquely identify an ITS policy region (ITS-PR) in the ITS-S communication profile selection process specified in ISO/TS 17423. Different types of policy regions may be distinguished. |
| ITS-RRID | An ITS regulatory region identifier is used to uniquely identify an ITS regulatory region (ITS-RR) in the ITS-S communication profile selection process specified in ISO/TS 17423. The following types of regulatory regions are identified:<br><br>— radio regulation<br>— security regulation<br>— privacy regulation<br>— traffic regulation |
| ITS-S-APDID | An ITS-S application process developer identifier is used to uniquely identify a developer of ITS-S application processes. |
| ITS-S-APPID | An ITS-S application process provisioner identifier is used to uniquely identify an ITS-S-APP. |
| ITS-S-CPID | An ITS-S communication profile identifier is used to uniquely identify a defined ITS-S communication protocol stack. It is used in the ITS-S communication profile selection process specified in ISO/TS 17423 |
| ITS-SCUID | An ITS station communication unit identifier is used to uniquely identify an ITS-SCU. |
| ITS-SecAlgID | A security algorithm identifier is used to uniquely identify a security algorithm in communications. |
| ITS-SEMID | An ITS-S equipment manufacturer identifier is used to uniquely identify a manufacturer of ITS equipment. |
| ITS-SUID | An ITS station unit identifier is used to uniquely identify an ITS-SU. |
| ITS-SU-UID | A globally unique identifier of a user of an ITS-SU. Usage of this identifier is outside the scope of this Technical Specification. |
| ITS-SCU-CMCID | A globally unique identifier of a user of an ITS-SCU-CMC. Usage of this identifier is specified in Reference [7]. |

# 6    GCMA organizational framework

## 6.1   Overview

The organizational framework of "Global Classification and Management of ITS Applications" (GCMA) involves a number of entities listed in Table 1and the relationships between these entities. The purpose of this framework is to allow for certification and validation of entities uniquely identified by identifiers and addresses, and to enable operation of ITS-S application processes in an ITS-SCU based on the principles of a "Bounded Secured Managed Domain" (BSMD) as specified in ISO 21217. This framework provides the means to instantiate the following services:

a)    Registration of globally unique identifiers presented in Table 3 as illustrated in 6.2.

b) Certification of ITS-S equipment, i.e. ITS-SUs and ITS-SCUs, and issuance of certificates as illustrated in 6.3.

c) Certification of ITS-S application processes [2] as illustrated in 6.4.

d) Issuance of certificates for real-time operation of ITS-S applications as illustrated in 6.5.

e) Installation of ITS-S application processes in an ITS-SCU as illustrated in 6.7.

## 6.2 Registration of globally unique identifiers

Figure 3 shows entities and functional relationships involved in the registration of ITS application objects and their identifiers (ITS-AIDs and optionally port numbers (ITS-PNs)).

NOTE    The numbers (x) in Figure 3 indicate the logical sequence of actions.
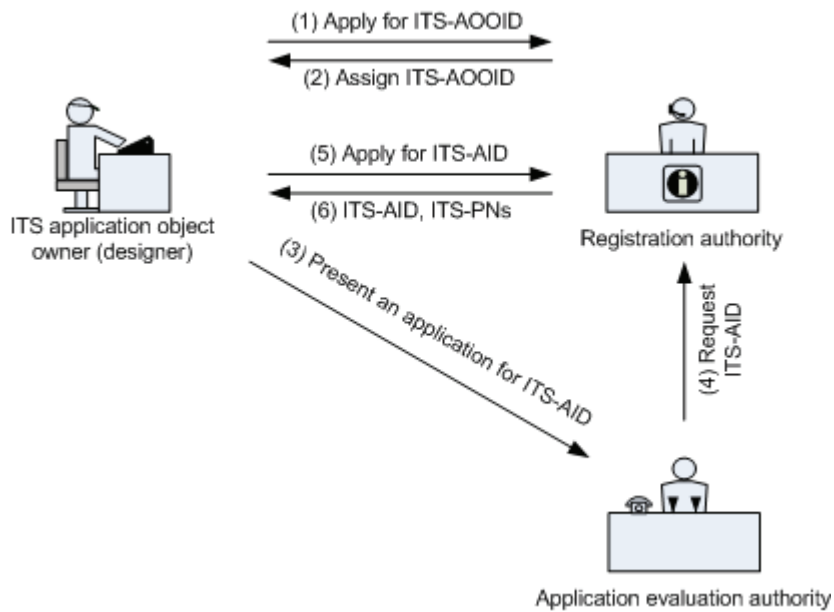


**Figure 3 — Registration of ITS-AID — Functional illustration**

Owners (designers) of ITS applications (and ITS application classes) are uniquely identified by an ITS-AOOID, and all ITS application objects (ITS applications or ITS application classes) are uniquely identified by an ITS-AID. All ITS applications shall be evaluated by an "Application evaluation authority" prior to the issuance of an ITS-AID. Upon acceptance, the application evaluation authority shall notify the registration authority which shall register an ITS-AID with the ITS application owner as the responsible entity.

Figure 4 shows entities and functional relationships involved in the registration of ITS message sets and their identifiers (ITS-MsgSetIDs).

NOTE    The numbers (x) in Figure 4 indicate the logical sequence of actions.

---

2)  While necessary to ensure proper ITS-SU operation, certification of ITS communication protocols is outside the scope of this Technical Specification.
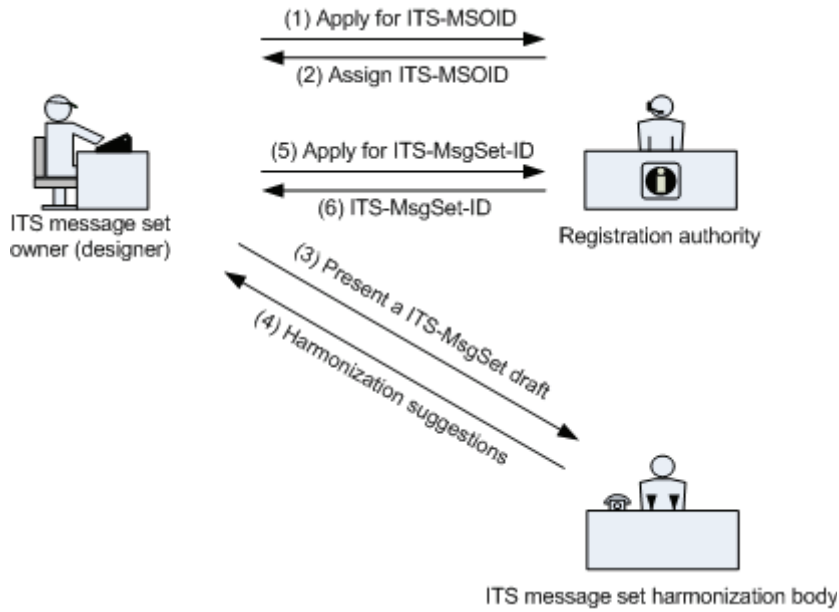
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**Figure 4 — Registration of ITS-MsgSet-ID — Functional illustration**

Owners of ITS message sets are uniquely identified by an ITS-MSOID, and ITS message sets themselves are uniquely identified by an ITS-MsgSetID. Owners of ITS message sets are strongly encouraged to submit their message sets to an appropriate ITS message set harmonization body, e.g. a standards development organisation, to prevent unnecessary duplication and possible conflict in the definition of ITS messages and data objects related thereto. While appropriate incorporation of the suggestions returned by the harmonization body is also strongly encouraged, all valid requests for an ITS-MsgSetID made to an appropriate registration authority shall be granted and an ITS-MsgSetID assigned. The ITS message set owner shall be registered initially as the party responsible for maintenance of the message set. The registration authority shall be notified of any changes in the responsible party.

## 6.3   Certification of ITS-S equipment

Figure 5 shows entities and functional relationships involved in the certification and registration of ITS-SCUs sets and their identifiers (ITS-SCUIDs).

NOTE      The numbers (x) in Figure 5 indicate the logical sequence of actions.
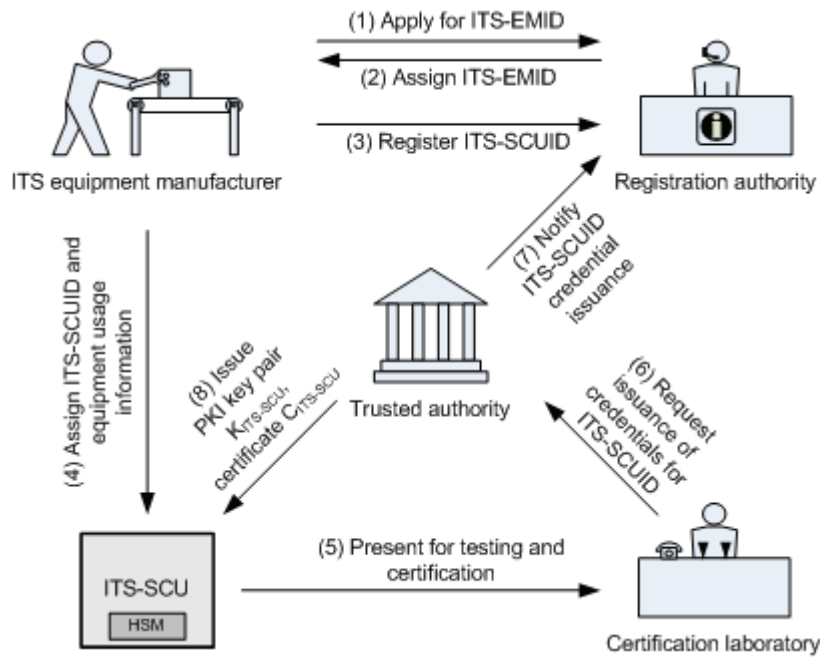
**Figure 5 — Certification of ITS-SCUs — Functional illustration**

ITS-SCUIDs shall be created by the manufacturer of the device as a concatenation of the globally unique ITS equipment manufacturer ID (ITS-SEMID) and a unique serial number assigned by that manufacturer as specified in this Technical Specification. The registration authority is notified of such assignments by the equipment manufacturer. Once the devices passes all conformance tests as prescribed by the certification laboratory, a trusted authority, which may be the certification laboratory itself, issues the requested security credentials (certificates and/or key pairs) and shall notify the appropriate registration authority of the issuance thereof.

An ITS-SU may be composed of one or several ITS-SCUs. ITS-SCUs may become part of an ITS-SU either at time of integration of an ITS-SU, or dynamically as a plug-and-play device. One of the several (or the only one) ITS-SCU of an ITS-SU is referred to as the "Master ITS-SCU". While ITS-SCUs have a globally unique identifier (ITS-SCUID) assigned under the control of the manufacturer of the ITS-SCU, a globally unique identifier (ITS-SUID) of an ITS-SU needs to be assigned by a registration authority. The ITS-SUID is the concatenation of a registered unique serial number with the ITS-SCUID of the "Master ITS-SCU".

## 6.4  Certification of ITS-S application processes

Figure 6 shows the entities and functional relationships involved in the certification and registration of instantiations of ITS-S application processes (ITS-S-APDIDs, ITS-AIDs, and instantiation related information).

NOTE    The numbers (x) in Figure 6 indicate the logical sequence of actions.
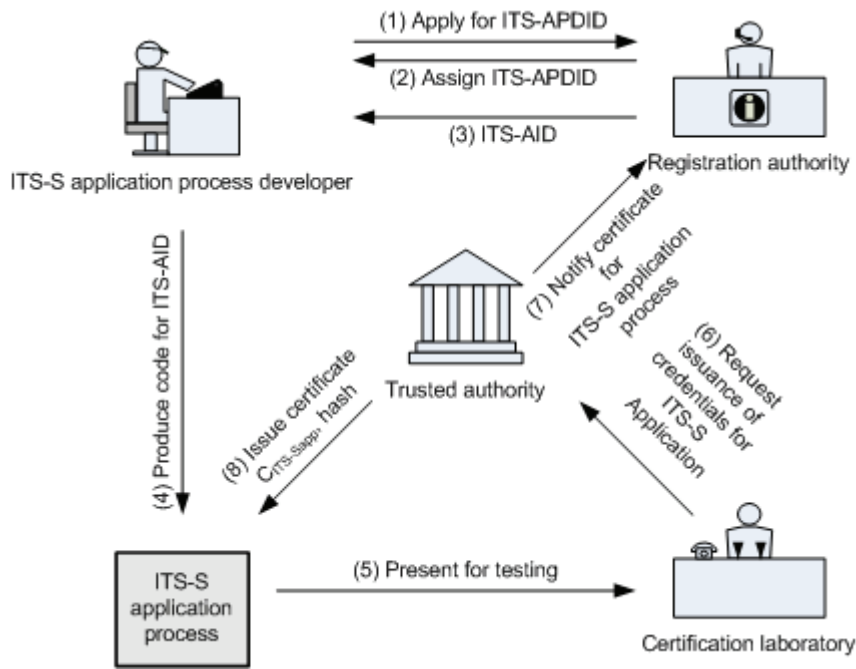
**Figure 6 — Certification of ITS-S applications — Functional illustration**

All ITS-S application processes shall be tested by an appropriate certification laboratory. Once an ITS-S application process has passed all conformance tests as prescribed by the certification laboratory, a trusted authority, which may be the certification laboratory itself, issues the requested security credentials (certificates and hash) and shall notify the appropriate registration authority of the issuance.

NOTE     There may be more than one ITS-S application process with the same ITS-AID in an ITS-SU.

## 6.5   Issuance of ITS-SCU certificates

Figure 7 shows entities and functional relationships involved in the issuance of ITS-SCU credentials.

NOTE     The numbers (x) in Figure 7 indicate the logical sequence of actions.
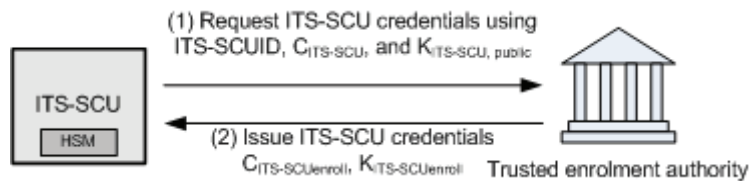


**Figure 7 — Issuance of enrolment certificates — Functional illustration**

ITS-SCUs shall periodically request ITS-SCU credentials from an appropriate trusted enrolment authority. These security credentials are used for the issuance of certificates for real-time operation. ITS-SCUs shall present their ITS-SCU credentials (ITS-SCUID, $C_{ITS-SCU}$, $K_{ITS-SCU,public}$) and requested permissions to the trusted enrolment authority which, upon successful evaluation thereof, shall issue the appropriate security credentials ($C_{ITS-SCUenroll}$, $K_{ITS-SCUenroll}$) to the ITS-SCU. Note that allowing different ITS-SCUs in a single ITS-SU to have different credentials allows these ITS-SCUs to have different permissions and restrictions.

## 6.6   Issuance of certificates for real-time operation

Figure 8 shows entities and functional relationships involved in the issuance of credentials for real-time operations of ITS-S applications and ITS-S facilities layer services.

NOTE       The numbers (x) in Figure 8 indicate the logical sequence of actions.
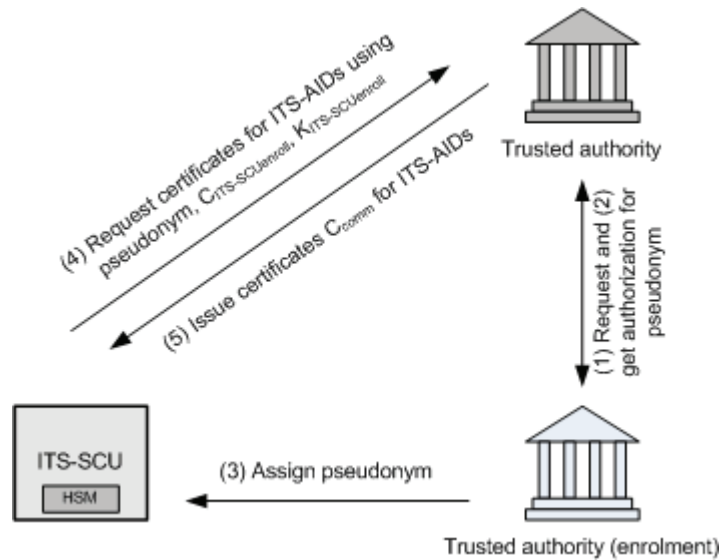


**Figure 8 — Certificates for real-time communications — Functional illustration**

To obtain security credentials necessary for real-time operation and to ensure a certain level of privacy and anonymity, ITS-SCUs may request a pseudonym from an appropriate trusted enrolment authority. This pseudonym is then used along with the ITS-SCU's enrolment credentials and ITS-AIDs and related information such as security-specific permissions to request from a second trusted authority a set of security credentials for real-time operation. Note that allowing different ITS-SCUs in the same ITS-SU to have different credentials allows these SCUs to obtain credentials with different permissions and restrictions.

## 6.7   ITS application repository

Figure 9 shows entities and functional relationships involved in the secure online installation of ITS-S applications.

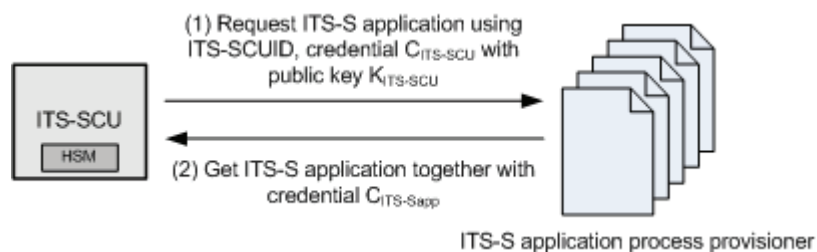NOTE       The numbers (x) in Figure 9 indicate the logical sequence of actions.



**Figure 9 — ITS-S application process provisioning — Functional illustration**

NOTE       An ITS-SCU connects to an ITS-S application process provisioner via its ITS-SCU-CMC.

Secure download of ITS-S application processes may be performed using the remote ITS station management protocol specified in Reference [7].

## 6.8   Secure installation and maintenance of facilities and communication protocols

Similar to the secure download and installation of ITS-S application processes illustrated in 6.7, protocols and related data elements and registries are necessary to support secure installation of ITS-S communication protocols and ITS-S facilities.

## 6.9   Registries

### 6.9.1   General

Registration of an object is the process of assignment of a unique identifier to an object generally with the intent to make the assignment known to all interested parties. Registrations are performed by registration authorities, which are entities such as an organization or an automated facility. This Technical Specification identifies potential registries and the minimum information to be contained in a registry entry.

NOTE      Although Annex A.3 specifies ASN.1 types of registry entries, these specifications are not meant to be complete. The specifications given there are understood as the minimum information to be contained in registries. A complete specification of registry entries is under the responsibility of the respective registration authority and is out of scope of this Technical Specification.

### 6.9.2   ITS application objects

Information contained in a registry for ITS application objects is given by the ASN.1 type ITSapObRegistry specified in A.3. This registry shall contain entries for ITS application objects given by the ASN.1 type ITSapOb specified in A.3 and listed in Table 4. A registration authority may add further information elements to properly identify and support management of ITS application objects.

NOTE      There is a specific ITS-AID reserved for ITS applications which are not registered, i.e. the set of "unknown" ITS applications.

**Table 4 — Registry elements of ITSapOb**

| Element of ITSapOb | Semantics |
|---|---|
| iTSaid | Globally unique identifier ITS-AID of ITS application object |
| iTSapObName | Name of ITS application object |
| iTSapObType | Type of ITS application object. Either class or application |
| iTSapObOwner | Owner (name, type and OID) of the ITS application object. |
| iTSapObCert | Information on certificate status |
| iTSapObInterfaces | Information on RX interfaces (communication sinks) and TX interfaces (communication sources)<br><br>—       Direction of interface: receive (RX) or transmit (TX),<br><br>—       Logical channel for TX,<br><br>—       Port number for RX<br><br>—     well-known registered port number PORT_REG, or<br><br>—     unknown port number PORT_UNK, see Reference [12] |

NOTE      The registry for ITS application objects is referred to as "Service Catalogue Manager" in Reference [1].

### 6.9.3   ITS message sets

Information contained in a registry for ITS message sets is given by the ASN.1 type ITSmsgSetRegistry specified in A.3. This registry shall contain entries for ITS message sets given by the ASN.1 type ITSmsgSet specified in A.3 and listed in Table 5. A registration authority may add further information elements to properly identify and support management of ITS message sets.

**Table 5 — Registry elements of ITSmsgSet**

| Element of ITSmsgSet | Semantics |
|---|---|
| iTSmsID | Globally unique identifier ITS-MsgSetID of ITS message set |
| iTSmsName | Name of ITS message set |
| iTSmsOwner | Owner (name, type and OID) of the ITS message set. |

### 6.9.4 ITS regulatory regions

Information contained in a registry for ITS regulatory regions is given by the ASN.1 type ITSregRegionRegistry specified in A.3. This registry shall contain entries for ITS regulatory regions given by the ASN.1 type ITSregRegion specified in A.3 and listed in Table 6. A registration authority may add further information elements to properly identify and support management of ITS regulatory regions.

**Table 6 — Registry elements of ITSregRegion**

| Element of ITSregRegion | Semantics |
|---|---|
| regID | Globally unique identifier ITS-RRID of ITS regulatory region |
| regAuthority | Regulatory region authority (Name and URL) |
| regArea | Regulatory area definition |

This Technical Specification preliminarily identifies two area definitions. Further area definitions may be added at a later time:

— Areas defined by a country code of ASN.1 type Country Code specified in A.3.

— Areas defined by polygons of ASN.1 type GeoPolygon specified in A.3 with a distinction of

 — areas to be included, identified with the ASN.1 type GeoInclusionAreas specified in A.3,

 — areas to be excluded, identified by the ASN.1 type GeoExclusionAreas specified in A.3.

Regulatory content, i.e. rules, is maintained by the authority identified with regAuthority. This authority may express a rule by means of a "C-ITS authority data set".

### 6.9.5 ITS policy regions

Information contained in a registry for ITS policy region identifiers (ITS-PRID) is given by the ASN.1 type ITSpolRegionRegistry specified in A.3. This registry shall contain entries for ITS policy regions given by the ASN.1 type ITSpolRegion specified in A.3 and listed in Table 7. A registration authority may add further information elements to properly identify and support management of ITS policy regions.

**Table 7 — Registry elements of ITSpolRegion**

| Element of ITSpolRegion | Semantics |
|---|---|
| polID | Globally unique identifier ITS-PRID of ITS policy region |
| polAuthority | Policy region authority (Name and URL) |
| polArea | Policy area definition |

Area definitions identified in this Technical Specification are presented in 6.9.4.

Policy contents, i.e. rules, are maintained by the authority identified with polAuthority.

### 6.9.6 ITS port numbers

Information contained in a registry for ITS ports is given by the ASN.1 type ITSportNumberRegistry specified in A.3. This registry shall contain entries for ITS port numbers given by the ASN.1 type ITSportNumber specified in A.3 and listed in Table 8. A registration authority may add further information elements to properly identify and support management of ITS port numbers. A registration authority shall clearly distinguish the range of well-known registered ITS port numbers and dynamically assigned ITS port numbers.

**Table 8 — Registry elements of ITSportNumber**

| Element of ITSportNumber | Semantics |
|---|---|
| pn | Port number (ITS-PN) |
| ntProt | Applicable ITS-S networking & transport layer protocol |
| itssAp | Information on an interface (communication sink or communication source) of a given ITS application object |

### 6.9.7 ITS flow types

Information contained in a registry for ITS flow types is given by the ASN.1 type ITSflowTypeRegistry specified in A.3. This registry shall contain entries for ITS flow types given by the ASN.1 type ITSflowType specified in A.3 and listed in Table 9. A registration authority may add further information elements to properly identify and support management of ITS flow types. A registration authority shall distinguish the range of well-known registered ITS-FlowTypeIDs and dynamically assigned ITS-FlowTypeIDs.

**Table 9 — Registry elements of ITSflowType**

| Element of ITSflowType | Semantics |
|---|---|
| id | ITS-FlowTypeID |
| req | List of applicable communication service parameters ITSSappCPReqReg as specified in ISO/TS 17423. The communication service parameter CSP_FlowType presenting a value of ITS-FlowTypeID is prohibited in req. The CostObjective used in some communication service parameters is not part of a registered ITS flow type. Thus the value presented in the registry is not relevant. The convention shall be to use the value 255 (maximum relevance). |

### 6.9.8 ITS logical channels

Information contained in a registry for ITS logical channels is given by the ASN.1 type ITSlchRegistry specified in A.3. This registry shall contain entries for ITS logical channels given by the ASN.1 type ITSlch specified in A.3 and listed in Table 10. A registration authority may add further information elements to properly identify and support management of ITS logical channels.

**Table 10 — Registry elements of ITSlch**

| Element of ITSlch | Semantics |
|---|---|
| lchID | Globally unique identifier ITS-LCHID of LCH. |
| lchPurpose | Human readable purpose of LCH |

### 6.9.9 ITS station units

Information contained in a registry for ITS station units is given by the ASN.1 type ITSsuRegistry specified in A.3. This registry shall contain entries for ITS station units given by the ASN.1 type ITSsu specified in A.3 and listed in Table 11. A registration authority may add further information elements to properly identify and support management of ITS station units.

**Table 11 — Registry elements of ITSsu**

| Element of ITSsu | Semantics |
|---|---|
| itssuID | Globally unique identifier ITS-SUID of ITS-SU. Additional information is provided in the globally unique data object of ASN.1 type ITSsuObjID specified in A.3. |

### 6.9.10 ITS station communication units

Information contained in a registry for ITS station communication units is given by the ASN.1 type ITSscuRegistry specified in A.3. This registry shall contain entries for ITS station communication units given by the ASN.1 type ITSscu specified in A.3 and listed in Table 12. A registration authority may add further information elements to properly identify and support management of ITS station communication units.

**Table 12 — Registry elements of ITSscu**

| Element of ITSscu | Semantics |
|---|---|
| itsscuID | Globally unique identifier ITS-SCUID of ITS-SCU. |

### 6.9.11 ITS-S application process provisioner

Information contained in a registry for ITS-S application process provisioner is given by the ASN.1 type ITSSappRegistry specified in A.3. This registry shall contain entries for ITS-S application process provisioners given by the ASN.1 type ITSSapPrPr specified in A.3 and listed in Table 13. A registration authority may add further information elements to properly identify and support management of ITS-S application process provisioners.

**Table 13 — Registry elements of ITSSapPrPr**

| Element of ITSSapPrPr | Semantics |
|---|---|
| itssappID | Globally unique identifier ITS-S-APPID |
| itssapProv | Identity of the ITS-S application process provisioner (Name, address, URL) |

### 6.9.12 ITS-S equipment manufacturers

Information contained in a registry for ITS-S equipment manufacturers is given by the ASN.1 type ITSemRegistry specified in A.3. This registry shall contain entries for ITS equipment manufacturers given by the ASN.1 type ITSem specified in A.3 and listed in Table 14. A registration authority may add further information elements to properly identify and support management of equipment manufacturers.

**Table 14 — Registry elements of ITSem**

| Element of ITSem | Semantics |
|---|---|
| itsemID | Globally unique identifier ITS-SEMID of the ITS-S equipment manufacturer |
| equipManu | Identity of the ITS-S equipment manufacturer (Name, address, URL) |

### 6.9.13 ITS application object owners

Information contained in a registry for ITS application object designers is given by the ASN.1 type ITSaooRegistry specified in A.3. This registry shall contain entries for ITS application object owners given by the ASN.1 type ITSaoo specified in A.3 and listed in Table 15. A registration authority may add further information elements to properly identify and support management of ITS application object owners.

**Table 15 — Registry elements of ITSaoo**

| Element of ITSaoo | Semantics |
|---|---|
| itsaooID | Globally unique identifier ITS-AOOID of the ITS-S application object owner |
| aoo | Identity of the ITS-S application object owner (Name, address, URL) |

### 6.9.14  ITS message set owners

Information contained in a registry for ITS application object designers is given by the ASN.1 type Registry specified in A.3. This registry shall contain entries for ITS message set owners given by the ASN.1 type ITSmso specified in A.3 and listed in Table 16. A registration authority may add further information elements to properly identify and support management of ITS message set owners.

**Table 16 — Registry elements of ITSmso**

| Element of ITSmso | Semantics |
|---|---|
| ITSmso | Globally unique identifier ITS-MSOID of the ITS message set owner |
| mso | Identity of the ITS message set owner (Name, address, URL) |

### 6.9.15  ITS-S application process developers

Information contained in a registry for ITS-S application process developers is given by the ASN.1 type ITSSapdRegistry specified in A.3. This registry shall contain entries for ITS-S application process developers given by the ASN.1 type ITSSapd specified in A.3 and listed in Table 17. A registration authority may add further information elements to properly identify and support management of an ITS-S application process developer.

**Table 17 — Registry elements of ITSSapd**

| Element of ITSSapd | Semantics |
|---|---|
| itssapdID | Globally unique identifier ITS-S-APDID of the ITS-S application process developer |
| ad | Identity of the ITS-S application process developer (Name, address, URL) |

### 6.9.16  ITS-S facility layer services

Information contained in a registry for ITS-S facility layer services is given by the ASN.1 type ITSSfacilityServiceRegistry specified in A.3. This registry shall contain entries for ITS-S facility layer services given by the ASN.1 type ITSSfs specified in A.3 and listed in Table 18. A registration authority may add further information elements to properly identify and support management of an ITS-S facility layer service.

**Table 18 — Registry elements of ITSSfs**

| Element of ITSSfs | Semantics |
|---|---|
| itssfsID | Globally unique identifier ITS-S-FSID of the ITS-S facility layer service |
| fsOwner | Identity of the owner (name, address, URL) of an ITS-S facility layer service |

### 6.9.17  IANA registries

The "Internet Assigned Numbers Authority" (IANA) is responsible for maintaining many of the codes and numbers contained in a variety of Internet protocols. IANA provides this service in coordination with the "Internet Engineering Task Force" (IETF). The registry of port numbers for the transport protocols UDP and TCP are publicly accessible online at:

http://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xml

### 6.9.18  IEEE registries

IEEE offers registration authority programs or registries which maintain lists of unique identifiers under standards and issue unique identifiers to those wishing to register them. The "IEEE Registration Authority" (IEEE-RA) assigns unambiguous names to objects in a way which makes the assignment available to interested parties. Information is publicly accessible online at:

http://standards.ieee.org/develop/regauth/llc/public.html

Registries relevant for ITS are:

— Organizationally unique identifier, also referred to as COMPANY_ID. The registry is publicly accessible online at:

http://standards.ieee.org/develop/regauth/oui/oui.txt

— 36-bit organizationally unique identifier (OUI-36). The registry is publicly accessible online at

http://standards.ieee.org/develop/regauth/oui36/oui36.txt

— Group MAC address

— DSAP/SSAP addresses

— Ethertype identifiers. The registry is publicly accessible online at:

http://standards.ieee.org/develop/regauth/ethertype/eth.txt

— Provider Service Identifier (PSID)[13] 3).

## 6.10  Wrong behaviour reporting

As a consequence of the need for wrong behaviour reporting, revocation lists and related registry procedures are needed. Details are outside the scope of this Technical Specification.

# 7  GCMA technical framework

## 7.1  Addresses and identifiers

### 7.1.1  Overview

A list of addresses and identifiers is presented in Table 3. Details are specified in the following sub-clauses.

### 7.1.2  ITS-AID

Every ITS application and ITS application class operated in a BSMD shall be uniquely identified by a value of the "ITS application identifier" (ITS-AID). ITS-AID shall be of ASN.1 type ITSaid specified in A.3 4) Figure 10 illustrates the format of ITS-AID when unaligned packed encoding rules (unaligned PER) are used. The bits "Length Control" are CHOICE and EXTENSION bits which define the size of the data type. The element "Length indicator N" identifies the number N of octets following this element and containing the value of ITS-AID.

---

3)  PSID and ITS-AID share a common number space.

4)  This ITS-AID specification is identical to those specified in References [13] and in [17].
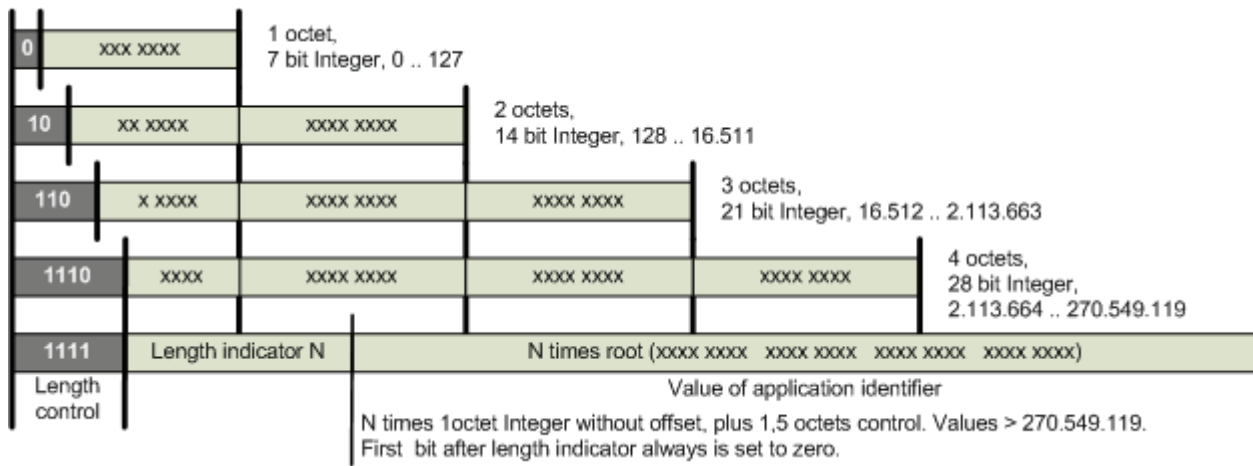
**Figure 10 — PER encoded ASN.1 structure of ITS-AID and ITS-MsgSetID**

A registration authority for ITS-AID is needed. Requirements related to registration of ITS-AID are specified in 6.2 and 6.9.2.

### 7.1.3 ITS-MsgSetID

Every ITS message set designed for usage in a BSMD shall be uniquely identified by a value of the "ITS message set identifier" (ITS-MsgSetID). ITS-MsgSetID shall be of ASN.1 type ITSmsgSetID specified in A.3. Figure 10 illustrates the format of ITS-MsgSetID for ASN.1 unaligned PER. The bits "Length Control" are CHOICE and EXTENSION bits which define the size of the data type. The element "Length indicator N" identifies the number N of octets following this element and containing the value of ITS-MsgSetID.

A registration authority for ITS-MsgSetID is needed. Requirements related to registration of ITS-AIDs are specified in 6.2 and 6.9.3.

### 7.1.4 ITS-PN

Transport protocols developed for ITS, e.g. the ISO "Fast Networking & Transport Protocol" (FNTP) specified in Reference [12], may share a common number space for ITS port numbers (ITS-PN). The Integer number space shall be from zero to 32.767. This number space shall be divided into a space for well-known registered port numbers, and a space for dynamic assignments. Acronyms of well-known port numbers together with expected values are presented in Table 19.

**Table 19 — ITS port numbers**

| ITS-PN | Acronym | Description |
|---|---|---|
| 0 | PORT_SAM | FSAP Groupcast manager specified in Reference [10] |
| 1–127 | PORT_DYN<br>PORT_REG | Sub-division into a number range for static ports (PORT_REG) and for dynamic ports (PORT_DYN) is to be done by a port number registration authority. |
| 128–32716 | PORT_DYN<br>PORT_REG | Sub-division into a number range for static ports (PORT_REG) and for dynamic ports (PORT_DYN) is to be done by a port number registration authority. |
| 32717–32762 | PORT_RES | Reserved for special purposes. |
| 32763 | PORT_RSMP | Port number for ITS remote station management protocol specified in Reference [7]. |
| 32764 | PORT_IICP | Port number for ITS station-internal management communication protocol specified in Reference [9]. |
| 32765 | PORT_RTR | FNTP management port in an ITS-S router specified in Reference [12]. |
| 32766 | PORT_HST | FNTP management port in an ITS-S host specified in Reference [12]. |
| 32767 | PORT_UNK | Unknown / don't care. |

ASN.1 details of ITS-PN depend on the transport protocol using port numbers.

A registration authority for ITS-PN is needed. Requirements related to registration of ITS-PN are specified in 6.2 and 6.9.6.

### 7.1.5 ITS-FlowTypeID

Flow types are part of the requirements for communications to be presented by ITS-S application processes specified in ISO/TS 17423. Management of flows is specified in Reference [11]. Identifiers of well-known flow types (ITS-FlowTypeID) need to be globally unique. There shall be a range of dynamically assignable values of ITS-FlowTypeID.

A registration authority for ITS-FlowTypeID is needed. Requirements related to registration of ITS-FlowTypeID are specified in 6.9.7.

### 7.1.6 ITS-LCHID

Every "ITS logical channel" (ITS-LCH) shall be uniquely identified by a value of the "ITS logical channel identifier" ITS-LCHID. ITS-LCHID shall be of ASN.1 type LogicalChannelType specified in A.4.

A registration authority for ITS-LCHID is needed. Requirements related to registration of ITS-LCHID are specified in 6.9.8.

### 7.1.7 ITS-SUID

Every ITS-SU shall be uniquely identified by a value of the "ITS-SU identifier" (ITS-SUID). ITS-SUID shall be of ASN.1 type ITSsuID specified in A.3. ITSsuID consists of two parts:

The ITS-SUID is used in an identifier of ASN.1 type ITSsuObjID to identify the actual configuration in terms of ITS-SCUs contained in an ITS-SU. Distinction is made between the master ITS-SCU and other ITS-SCUs. The master ITS-SCU is the one ITS-SCU that stores the ITS-SUID. The ITSsuObjID will be stored in the ITS-SCU configuration management centre of the master ITS-SCU.

Whilst the ITS-SUID never changes over the lifetime of an ITS-SU, the actual composition of an ITS-SU may change, i.e. ITS-SCUs may be replaced by new ones.

A registration authority for ITS-SUID is needed. Requirements related to registration of ITS-SUID are specified in 6.2 and 6.9.9.

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### 7.1.8   ITS-SCUID

Every ITS-SCU shall be uniquely identified by a value of the "ITS station communication unit identifier" (ITS-SCUID). ITS-SCUID shall be of ASN.1 type ITSscuID specified in Annex A.2.

A registration authority for ITS-SCUID is needed. Requirements related to registration of ITS-SCUID are specified in 6.2 and 6.9.10.

### 7.1.9   ITS-S-APPID

Every ITS-S application process provisioner shall be uniquely identified by a value of the "ITS-S application process provisioner identifier" (ITS-S-APPID). ITS-S-APPID shall be of ASN.1 type ITSSappid specified in A.3.

A registration authority for ITS-S-APPID is needed. Requirements related to registration of ITS-S-APPID are specified in 6.7 and 6.9.11.

### 7.1.10   ITS-RRID

Every ITS regulatory region shall be uniquely identified by a value of the "ITS regulatory region identifier" (ITS-RRID). ITS-RRID shall be of ASN.1 type ITSrrID specified in A.3.

A registration authority for ITS-RRID is needed. Requirements related to registration of ITS-S-APPID are specified in 6.9.4.

### 7.1.11   ITS-PRID

Every ITS policy region shall be uniquely identified by a value of the "ITS policy region identifier" (ITS-PRID). ITS-PRID shall be of ASN.1 type ITSprID specified in A.3.

A registration authority for ITS-PRID is needed. Requirements related to registration of ITS-PRID are specified in 6.9.5.

### 7.1.12   ITS-SEMID

Every ITS-S equipment manufacturer shall be uniquely identified by a value of the "ITS-S equipment manufacturer identifier" (ITS-SEMID). ITS-SEMID shall be of ASN.1 type ITSemID specified in A.3.

A registration authority for ITS-SEMID is needed. Requirements related to registration of ITS-SEMID are specified in 6.3 and 6.9.12.

### 7.1.13   ITS-AOOID

Every ITS application object owner shall be uniquely identified by a value of the "ITS application object owner identifier" (IITS-AOOID). ITS-AOOID shall be of ASN.1 type ITSaooID specified in A.3.

A registration authority for ITS-AOOID is needed. Requirements related to registration of ITS-AOOID are specified in 6.2 and 6.9.13.

### 7.1.14   ITS-MSOID

Every ITS message set owner shall be uniquely identified by a value of the "ITS message set owner identifier" (ITS-MSOID). ITS-MSOID shall be of ASN.1 type ITSmsoID specified in A.3.

A registration authority for ITS-MSOID is needed. Requirements related to registration of ITS-MSOID are specified in 6.2 and 6.9.14.

### 7.1.15  ITS-S-APDID

Every ITS-S application process developer shall be uniquely identified by a value of the "ITS-S application process developer identifier" (ITS-S-APDID). ITS-S-APDID shall be of ASN.1 type ITSSapdID specified in A.3.

A registration authority for ITS-S-APDID is needed. Requirements related to registration of ITS-S-APDID are specified in 6.4 and 6.9.15.

### 7.1.16  ITS-SecAlgID

Details on an ITS security algorithm identifier, if applicable at all, will be provided in a future version of this Technical Specification.

### 7.1.17  ITS-SU-UID

A description of usage of an ITS-SU user identifier (ITS-SU-UID) is outside the scope of this Technical Specification.

### 7.1.18  ITS-SU-FSID

Every ITS-S facility layer service shall be uniquely identified by a value of the "ITS-S facilities layer identifier" (ITS-S-FSID). ITS-S-FSID shall be of ASN.1 type ITSSfsID specified in A.3.

A registration authority for ITS-S-FSID is needed. Requirements related to registration of ITS-S-APDID are specified in 6.9.16.

## 7.2  Online management

### 7.2.1  Secure installation and maintenance of ITS-S application processes

ITS-S application processes may be installed in an ITS-SCU of an ITS-SU either at time of manufacturing, or in a secured laboratory environment, or with an automated process from an ITS application repository as described in 6.7.

The secure online installation of ITS-S application processes is performed with remote management procedures specified in Reference [7].

Details are outside the scope of this Technical Specification.

### 7.2.2  Secure installation of ITS-S protocols and control functions

ITS-S protocols can be in the ITS-S access layer, the ITS-S networking & transport layer, the ITS-S facilities layer, the ITS-S management entity and the ITS-S security entity. Installation, update and management of such protocols in an ITS-SU require similar procedures as the installation, update and management of ITS-S application processes.

Details are outside the scope of this Technical Specification.

### 7.2.3  Registration of ITS-S application processes with the ITS-S management

Registration of ITS-S application processes with the ITS-S management prior to data flow management and communications is necessary.

Details are specified in various standards, e.g. ISO/TS 17423.[10]

### 7.2.4   Data flow management

Data flow management includes:

— ITS-S communication protocol stack setup for a source of an ITS-S application process and return of FlowID to the ITS-S application process as specified in ISO/TS 17423. This includes consideration of policies and regulation.[5][6]

— Request by ITS-S applications for registration with the service advertisement manager in the ITS-S management as specified in Reference [10].

— Subscription by ITS-S applications to a message / data distribution handler (e.g. LDM) for data elements, messages from ITS message sets, PDUs from an ITS-AID, ... as specified in Reference [2].

— Registration by ITS-S application to a message / data distribution handler for provisioning of data elements, messages from ITS message sets, own PDUs, ... as specified in Reference [2].

### 7.2.5   Management of certificates for real-time communications

Management of certificates for real-time communications is necessary. Details are outside the scope of this Technical specification.

### 7.2.6   Exception reporting

Exception reporting is necessary. Details are outside the scope of this Technical specification.

# Annex A
(normative)

# ASN.1 modules

## A.1 Overview

The following ASN.1 modules are specified in this normative annex:

— CITSapplMgmtIDs {iso(1) standard(0) cits-applMgmt (17419) ids (1) version1 (1)}

   Contains types of numbers.

— CITSapplMgmtApplReg {iso(1) standard(0) cits-applReg (17419) applRegistry (2) version1 (1)}

   Contains definitions related to applications.

— CITSapplMgmtComm {iso(1) standard(0) cits-applReg (17419) comm (3) version1 (1)}

   Contains definitions related to communications.

Updates of this annex will be published on http://standards.iso.org/iso/ts/17419/ and become an integral part of this Technical Specification..

## A.2 Module CITSapplMgmtIDs

Unaligned packed encoding rules (PER) as specified in ISO/IEC 8825-2:2008 shall be applied for the ASN.1 module CITSapplMgmtIDs in case the data elements and value elements are used in an ITS communication link. Encoding rules for usage in a registration authority are outside the scope of the present document.

```
 CITSapplMgmtIDs {iso(1) standard(0) cits-applMgmt (17419) ids (1) version1 (1)}
DEFINITIONS AUTOMATIC TAGS::=BEGIN
IMPORTS
;
-- End of IMPORTS
-- Types
-- Variable length data types
VarLengthNumber::=CHOICE{
      content      [0]    INTEGER(0..127), -- one octet length
      extension    [1]    Ext1
      }
Ext1::=CHOICE{
      content      [0]    INTEGER(128..16511), -- two octets length
      extension    [1]    Ext2
}
Ext2::=CHOICE{
      content      [0]    INTEGER(16512..2113663), -- three octets length
      extension    [1]    Ext3
      }
Ext3::=INTEGER(2113664..270549119,...) -- four and more octets length
VarLengthNumber2::=CHOICE{
      shortNo      [0] INTEGER(0..127),
      longNo [1] INTEGER(0..32767)
      }

-- Values
version INTEGER(0..255)::=1 -- version of this module
/*
The ASN.1 specification has been checked for conformance to the ASN.1
```

```
standards by OSS ASN.1 Syntax Checker, and by OSS ASN-1STEP
*/
END
```

## A.3  Module CITSapplMgmtApplReg

Unaligned packed encoding rules (PER) as specified in ISO/IEC 8825-2:2008 shall be applied for the ASN.1 module CITSapplMgmtApplReg in case the data elements and value elements are used in an ITS communication link. Encoding rules for usage in a registration authority are outside the scope of the present document.

```
CITSapplMgmtApplReg {iso(1) standard(0) cits-applMgmt (17419) applRegistry (2) version1
(1)}
DEFINITIONS AUTOMATIC TAGS::=BEGIN

IMPORTS
VarLengthNumber, VarLengthNumber2 FROM CITSapplMgmtIDs {iso(1) standard(0) cits-applMgmt
(17419) ids (1) version1 (1)}

LogicalChannelType FROM CITSapplMgmtComm {iso(1) standard(0) cits-applMgmt (17419) comm
(3) version1 (1)}

ITSSappCPReqReg FROM CITSapplReq {iso(1) standard(0) cits-applReq (17423) asnm-1 (1)
version1 (1)}

UserPriority, Lat, Lon FROM CALMllsap {iso(1) standard(0) calm-ll-sap(21218) asnm-1 (1)
version1(1)}

PortNumber FROM CALMfntp { iso (1) standard (0) calm-nonip(29281) fntp(1) asnm-1 (1)
version1 (1)}

ITS-scuId FROM CALMmanagement { iso (1) standard (0) calm-management (24102) local (1)
asnm-1 (1) version1 (1)}
;

-- End of IMPORTS

-- Types

-- registration information records for several ITS-SCU-CMCs

-- registry record for the whole set of registration information
ITSSCUcmcRegistry::=SEQUENCE OF ITSSCUcmc

-- for a single ITS-SCU-CMC
ITSSCUcmc::=SEQUENCE{
      itsscucmcID  ItsScuCmcID,
      itsscucmcName ITSObName
      }

-- Unique identifier
ItsScuCmcID::=OBJECT IDENTIFIER -- (Imported by ISO 24102-2)


-- registration information records for several ITS application objects


-- ITS application object registration ITS-AID


-- registry record for the whole set of registration information
ITSapObRegistry::=SEQUENCE OF ITSapOb

-- for a single ITS application object (ITSapOb)
ITSapOb::=SEQUENCE {
      iTSaid ITSaid,       -- ITS-AID
      iTSapObName  ITSObName,   -- name of ITS application object
      iTSapObType  ITSapObType, -- class or application
      iTSapObOwner ITSObOwner,  -- owner of the ITS application
```

```
      iTSapObCert  ITSapObCertificate,  -- information on certificate
      iTSapObInterfaces   ITSapObInterfaces -- info on RX and TX interfaces
      }

ITSapObInterfaces::=SEQUENCE OF ITSapObInterface

ITSapObInterface::=SEQUENCE{
      interfaceNo  InterfaceNo,
      rules ITSapObInterfaceRules
      }

InterfaceNo::=INTEGER(0..255) -- allows for 256 different interfaces per app

ITSapObInterfaceRules::= SEQUENCE OF ITSapObInterfaceRule -- all rules shall be used at
least once per source!

ITSAPOBSR::=CLASS {
      &ruleRef INTEGER(0..255),
      &Rule
      }

ITSapObInterfaceRule::=SEQUENCE{
      ruleNo ITSAPOBSR.&ruleRef({ITSapObRxTxRules}),
      rule   ITSAPOBSR.&Rule({ITSapObRxTxRules}{@ruleNo})
      }

ITSapObRxTxRules ITSAPOBSR::={iTSapObRxTx | iTSapObLch | iTSapObPn, ...}

iTSapObRxTx  ITSAPOBSR::={&ruleRef 0, &Rule PortRxTx} -- RX or TX port
iTSapObLch   ITSAPOBSR::={&ruleRef 1, &Rule LogicalChannelPrio} -- TX LCH allowed
iTSapObPn    ITSAPOBSR::={&ruleRef 2, &Rule PortNumber} -- well-known PortNumber or
indication of unknown port

PortRxTx::=INTEGER{
      rxInterface  (0),
      txInterface  (255)
      } (0..255)

LogicalChannelPrio::=SEQUENCE{
      lch    LogicalChannelType,
      prio   ITSapObPriority
      } -- priority of messages of a source may depend on the LCH.


ITSObName::=UTF8String (SIZE(0..255))

ITSapObType::=INTEGER {
      appClass     (0),
      application  (255)
      } (0..255)

ITSObOwner::=SEQUENCE{
      ownerName    ITSObOwnerName,
      ownerType    ITSObOwnerType,
      ownerOID     OBJECT IDENTIFIER
      }

ITSObOwnerName::=UTF8String (SIZE(0..255))

ITSObOwnerType::=INTEGER{
      standard    (0),
      private     (1)
      } (0..255)

ITSapObPriority::=UserPriority

ITSapObCertificate::=SEQUENCE {
      issuingSA    IssuingSA,
      startDate    CertStartDate,
      endDate      CertEndDate,
      status CertStatus
```

```
        }

IssuingSA::=SEQUENCE {
        name    SAname,
        saOID   OBJECT IDENTIFIER
        }

SAname::=UTF8String (SIZE(0..255))

CertStartDate::=SEQUENCE{
        fill    BIT STRING (SIZE(7)), -- set to zero
        csd     CHOICE {
        inactive    [0] NULL, -- indicates that certificate is not issued
        date  [1] NumericString (SIZE(8)) -- yyyymmdd
        }
        }

CertEndDate::=SEQUENCE{
        fill    BIT STRING (SIZE(6)), -- set to zero
        ced     CHOICE {
        inactive    [0] NULL, -- this shall apply if StartDate is set to [0]
        date  [1] NumericString (SIZE(8)), -- yyyymmdd
        never [2] NULL -- indicates that there is no end date
        }
        }

CertStatus::=SEQUENCE{
        fill    BIT STRING (SIZE(6)), -- set to zero
        cs      CHOICE {
        active [0] NULL, -- certificate is issued
        inactive    [1] NULL, -- certificate is not issued
        testActiv   [2] NULL, -- ITS application object is in test phase
        blocked     [3] CertBlocked -- issued certificate is blocked
        }
        }

CertBlocked::=SEQUENCE {
        date  NumericString (SIZE(8)), -- yyyymmdd
        issuingSA   IssuingSA -- SA who performed black-listing of an ITS-AID
        }


-- ITS message set registration ITS-MsgSetID


-- registry record for the whole set of registration information
ITSmsgSetRegistry::=SEQUENCE OF ITSmsgSet

-- for a single ITS message set (ITSmsgSet)
ITSmsgSet::=SEQUENCE {
        iTSmsID     ITSmsgSetID, -- ITS-MsgSetID
        iTSmsName   ITSObName,   -- human-readable name of ITS message set
        iTSmsOwner  ITSObOwner   -- owner of the ITS message set
        }


-- ITS regulatory region registration


-- registry record for the whole set of registration information
ITSregRegionRegistry::=SEQUENCE OF ITSregRegion
-- for a single regulatory region
ITSregRegion::=SEQUENCE{
        regID ITSrrID,
        regAuthority ITS-RegPolicyAuthority,
        regArea     ITS-RParea
        }

ITS-RegPolicyAuthority::=SEQUENCE{
        name    ITSObOwnerName,
        url     URLreg
```

```
        }

URLreg::=UTF8String (SIZE(0..256))

ITSRPAREA::=CLASS{
        &areaRef INTEGER(0..255),
        &Area
        }

ITS-RParea::=SEQUENCE{
        areaTypeNo    ITSRPAREA.&areaRef({ITS-RPareaTypes}),
        areaType      ITSRPAREA.&Area({ITS-RPareaTypes})
        }

ITS-RPareaTypes ITSRPAREA::={rpAreaCountryCode | rpAreaGeoPolygon,...}

rpAreaCountryCode    ITSRPAREA::={&areaRef 0, &Area CountryCode}
rpAreaGeoPolygon     ITSRPAREA::={&areaRef 1, &Area GeoPolygonArea}

GeoPolygonArea::=SEQUENCE{
        inclusions   GeoInclusionAreas,
        exclusions   GeoExclusionAreas
        }

GeoInclusionAreas::=SEQUENCE (SIZE(0..255)) OF GeoPolygon

GeoExclusionAreas::=SEQUENCE (SIZE(0..255)) OF GeoPolygon

GeoPolygon::=SEQUENCE (SIZE(0..65535)) OF GeoCoordinates

GeoCoordinates::=SEQUENCE{
        lat    Lat, -- from ISO 21218
        long   Lon -- from ISO 21218
        }

CountryCode::=UTF8String (SIZE(3)) -- ISO 3166 Alpha-3 code


-- ITS policy region registration


-- registry record for the whole set of registration information
ITSpolRegionRegistry::=SEQUENCE OF ITSpolRegion
-- for a single policy region
ITSpolRegion::=SEQUENCE{
        polID ITSprID,
        polAuthority ITS-RegPolicyAuthority,
        fill    BIT STRING (SIZE(7)),
        polArea        ITS-RParea
        }


-- ITS port number registration

-- registry record for the whole set of registration information
ITSportNumberRegistry::=SEQUENCE OF ITSportNumber
-- for a single port number
ITSportNumber::=SEQUENCE{
        pn      PortNumber, -- PN used by transport protocol
        ntProt NTprotocol, -- transport protocol identifier
        itssAp ItsAppInfo -- Rx port of ITS application object
        }


ItsAppInfo::=SEQUENCE{
        itsAid ITSaid,
        interfaceID  InterfaceNo,
        direction    PortRxTx
        }

NTprotocol::=SEQUENCE{
```

```
        name   UTF8String (SIZE(0..255)),
        protRef        ProtocolReference
        }

ProtocolReference::=SEQUENCE{
        sdo    UTF8String (SIZE(0..255)),
        docNo  UTF8String (SIZE(0..255))
        }

-- ITS flow type registration

-- registry record for the whole set of registration information
ITSflowTypeRegistry::=SEQUENCE OF ITSflowType
-- for a single flow type
ITSflowType::=SEQUENCE{
        id     FlowTypeID, -- Flow type identifier (well-known Flow type)
        req    ITSSappCPReqReg -- list of requirements
        }

FlowTypeID::=VarLengthNumber2



-- ITS logical channel registration


-- registry record for the whole set of registration information
ITSlchRegistry::=SEQUENCE OF ITSlch
-- for a single LCH
ITSlch::=SEQUENCE{
        lchID  LogicalChannelType, -- reference ID of LCH
        lchPurpose   UTF8String (SIZE(0..255))  -- Purpose of LCH
        }




-- ITS station unit registration


-- registry record for the whole set of registration information
ITSsuRegistry::=SEQUENCE OF ITSsu
-- for a single ITS-SU
ITSsu::=SEQUENCE{
        itssuID        ITSsuID
        }




-- ITS station communication unit registration


-- registry record for the whole set of registration information
ITSscuRegistry::=SEQUENCE OF ITSscu
-- for a single ITS-SCU
ITSscu::=SEQUENCE{
        itsscuID       ITSscuID
        }


-- ITS-S application process provisioner registration


-- registry record for the whole set of registration information
ITSSappRegistry::=SEQUENCE OF ITSSapPrPr
-- for a single ITS-S-APP
ITSSapPrPr::=SEQUENCE{
        itssappID      ITSSappid,
        itssapProv     RegEntryOwner
        }
```

```
RegEntryOwner::=SEQUENCE{
      ownerName    UTF8String (SIZE(0..255)),
      ownerAddress UTF8String (SIZE(0..255)),
      ownerURL     URLreg
      }


-- ITS-S equipment manufacturer registration


-- registry record for the whole set of registration information
ITSemRegistry::=SEQUENCE OF ITSem
-- for a single ITS-S equipment manufacturer
ITSem::=SEQUENCE{
      itsemID      ITSemID,
      equipManu    RegEntryOwner
      }


-- ITS application object owner registration


-- registry record for the whole set of registration information
ITSaooRegistry::=SEQUENCE OF ITSaoo
-- for a single ITS application object owner
ITSaoo::=SEQUENCE{
      itsaooID     ITSaooID,
      aoo   RegEntryOwner
      }


-- ITS message set owner registration


-- registry record for the whole set of registration information
Registry::=SEQUENCE OF ITSmso
-- for a single ITS message set owner
ITSmso::=SEQUENCE{
      iTSmsoID     ITSmsoID,
      mso   RegEntryOwner
      }


-- ITS-S application process developer registration


-- registry record for the whole set of registration information
ITSSapdRegistry::=SEQUENCE OF ITSSapd
-- for a single ITS-S application process developer
ITSSapd::=SEQUENCE{
      itssapdID    ITSSapdID,
      ad    RegEntryOwner
      }


-- ITS-S facilities layer service identifier registration


-- registry record for the whole set of registration information
ITSSfacilityServiceRegistry::=SEQUENCE OF ITSSfs
-- for a single ITS-S facilities layer service
ITSSfs::=SEQUENCE{
      itssfsID     ITSSfsID,
-- details on service to be added once TS 17429 is ready
      fsOwner      RegEntryOwner
      }


-- ITS-S protocol provisioner registration
```

```
-- registry record for the whole set of registration information
ITSSppRegistry::=SEQUENCE OF ITSSpPr
-- for a single ITS-S protocol
ITSSpPr::=SEQUENCE{
       itsspID      ITSSpid,
       itsspProv    RegEntryOwner
       }



-- ITS protocol owner registration


-- registry record for the whole set of registration information
ITSpoRegistry::=SEQUENCE OF ITSpo
-- for a single ITS application object owner
ITSpo::=SEQUENCE{
       itspoID      ITSpoID,
       po     RegEntryOwner
       }



-- globally unique ITS-S protocol identifier
-- same structure as ApplicationID in ISO 24102-1

ProtocolID::=SEQUENCE{
       protid ITSprotID,
       itsscu ITS-scuId,
       instance     ProtInstance
       }

ProtInstance::=INTEGER{
       unknown      (0)
       }(0..255) -- value different to zero indicates an implemented instance

-- ID types --

ITSaid::=VarLengthNumber -- used in 24102-5
-- one value of ITSaid identifies the group of unregistered applications

ITSmsgSetID::=VarLengthNumber

ITSemID::=VarLengthNumber2

ITSsuID::=VarLengthNumber

ITSsuObjID::=SEQUENCE{
       suID  ITSsuID, -- globally unique and registered
       mscuID MasterItsSCU, -- of master ITS-SCU
       oscuID SlaveItsSCUs -- of master ITS-SCU
       }

MasterItsSCU::=ITSscuID

SlaveItsSCUs::=SEQUENCE OF ITSscuID

ITSscuID::=SEQUENCE{
       emID   ITSemID, -- manufacturer ID
       serialNo     VarLengthNumber -- serial number
       }

ITSSappid::=VarLengthNumber

ITSrrID::=VarLengthNumber

ITSprID::=VarLengthNumber

ITSaooID::=VarLengthNumber

ITSmsoID::=VarLengthNumber2
```

```
ITSSapdID::=VarLengthNumber

ITSprotID::=VarLengthNumber

ITSSpid::=VarLengthNumber

ITSpoID::=VarLengthNumber

ITSSpdID::=VarLengthNumber

ITSSfsID::=VarLengthNumber2

-- Values

-- OIDs of standards organizations
-- ISO
oidISO OBJECT IDENTIFIER::={iso(1) standard(0)}
-- ETSI
oidETSI OBJECT IDENTIFIER::={itu-t(0) identified-organization(4) etsi(0)}
-- IEEE
oidIEEE OBJECT IDENTIFIER::={iso(1) identified-organization(3) ieee(3)}
-- CEN
oidCEN OBJECT IDENTIFIER::={iso(1) identified-organization(3) cen(162)}

fntpRefNo UTF8String(SIZE(0..255))::="ISO 29281-1"


-- version of this module
version INTEGER(0..255)::=1

/*
   The ASN.1 specification has been checked for conformance to the ASN.1
   standards by OSS ASN.1 Syntax Checker, and by OSS ASN-1STEP
*/

END
```

## A.4  Module CITSapplMgmtComm

Unaligned packed encoding rules (PER) as specified in ISO/IEC 8825-2:2008 shall be applied for the ASN.1 module CITSapplMgmtComm in case the data elements and value elements are used in an ITS communication link. Encoding rules for usage in a registration authority are outside the scope of the present document.

```
CITSapplMgmtComm {iso(1) standard(0) cits-applMgmt (17419) comm (3) version1 (1)}
DEFINITIONS AUTOMATIC TAGS::=BEGIN

IMPORTS
VarLengthNumber, VarLengthNumber2 FROM CITSapplMgmtIDs {iso(1) standard(0) cits-applMgmt
(17419) ids (1) version1 (1)}

;

-- End of IMPORTS

-- Types

LogicalChannelType::=VarLengthNumber2 -- used in 17423, 21218, 24102-1

-- MCgroup::= VarLengthNumber -- used in 17423

ITSprotocolStackID::= VarLengthNumber -- used in 17423


-- Values

version INTEGER(0..255)::=1 -- version of this module
```

```
/*
    The ASN.1 specification has been checked for conformance to the ASN.1
    standards by OSS ASN.1 Syntax Checker, and by OSS ASN-1STEP
*/

END
```

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