INTERNATIONAL STANDARD

ISO 24102-1

Second edition
2018-11

Intelligent transport systems — ITS station management —

Part 1: Local management

Systèmes intelligents de transport — Gestion des stations ITS —

Partie 1: Gestion locale

Reference number
ISO 24102-1:2018(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 24102-1:2013) which has been technically revised. It also incorporates the Amendment ISO 24102-1:2013/Amd1:2017.

A list of all parts in the ISO 24102 series can be found on the ISO website.

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

NOTE The former ISO 24102-5 has been converted into a separate standard ISO 22418, as it is not a station management standard.

Introduction

This document is part of a series of International Standards for communications in Intelligent Transport Systems (ITS) based on the ITS station and communications architecture specified in ISO 21217:2014 and illustrated in Figure 1.

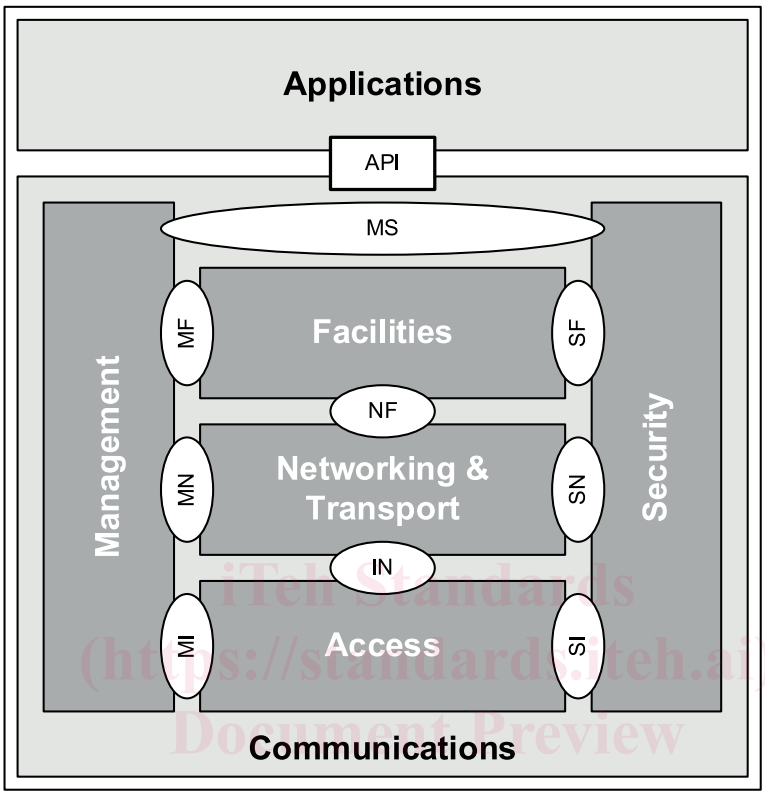

Figure 1 — ITS station reference architecture with named interfaces

This document is part 1 of a multi-part document which determines the intelligent transport systems (ITS) local station management that is architecturally located in the ITS station management entity.

The ITS station management entity provides functionality related to the management of communication protocol layers (Access, Networking & Transport, Facilities), the Security entity, and the ITS Applications entity introduced in ISO 21217:2014 and presented in Figure 1.

ITS station management is specified as a distributed process, where no supervisory entity is employed.

Intelligent transport systems — ITS station management —

Part 1: Local management

1 Scope

This document provides specifications for intelligent transport systems (ITS) station management to be in conformance with the ITS station reference architecture.

Local ITS station management protocols are specified by means of management processes, and data that are exchanged between the station management entity and

— the ITS Applications entity above the API,

— the Security entity, and

— the various communication protocol layers:

  — access;

  — networking & transport;

  — facilities.

of the ITS station architecture specified in ISO 21217:2014 and illustrated in Figure 1.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 17419:2018, *Intelligent transport systems — Identifiers — Part 1: Globally unique identification*

ISO 17423:2018, *Intelligent transport systems — Cooperative systems — Application requirements and objectives*

ISO/TS 17429:2017, *Intelligent transport systems — Cooperative ITS — ITS station facilities for the transfer of information between ITS stations*

ISO 18750:2018, *Intelligent transport systems — Cooperative systems — Local dynamic map*

ISO 21217:2014, *Intelligent transport systems — Communications access for land mobiles (CALM) — Architecture*

ISO 21218:2018, *Intelligent transport systems — Hybrid communications — Access technology support*

ISO 22418, *Intelligent transport systems — Fast service announcement protocol (FSAP)*

ISO 24102-2:2018, *Intelligent transport systems — ITS station management — Part 2: Remote management of ITS-SCUs*

ISO 24102-3:2018, *Intelligent transport systems — ITS station management — Part 3: Service access points*

ISO 24102-4:2018, *Intelligent transport systems — ITS station management — Part 4: Station-internal management communications*

ISO 24102-6:2018, *Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management — Part 6: Path and flow management*

ISO/IEC 8824-1:2015, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation — Part 1*

ISO/IEC 8825-2:2015, *Information technology — ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)*

ETSI TS 102 792 V1.2.1 (2015-06), *Intelligent Transport Systems (ITS); Mitigation techniques to avoid interference between European CEN Dedicated Short Range Communication (CEN DSRC) equipment and Intelligent Transport Systems (ITS) operating in the 5 GHz frequency range*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17419:2018, ISO 17423:2018, ISO 18750:2018, ISO 21217:2014, ISO 21218:2018, ISO 22418, ISO 24102-2, ISO 24102-3, ISO 24102-4, ISO 24102-6:2018 and the following apply.

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

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

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

3.1
regulatory information
set of regulatory requirements for radio wave emission

3.2
ITS-S communication unit
addressable instance of the ITS station reference architecture comprising as a minimum the ITS-S router functionality

3.3
ITS-S path
part of a communication path between a source node and an anchor node being uniquely identified by a LinkID (identifying a CI in the source node and the next hop node) and by the anchor node

4 Symbols and abbreviated terms

For the purposes of this document, the abbreviated terms given in ISO 17419:2018, ISO 17423:2018, ISO 18750:2018, ISO 21217:2014, ISO 21218:2018, ISO 22418, ISO 24102-2:2018, ISO 24102-3:2018, ISO 24102-4:2018, ISO 24102-6 and the following apply.

ITS-SCU	ITS Station Communication Unit
ITS-SSI	ITS Station State Information
LDM	Local Dynamic Map
n.a.	not applicable

PDUs	Protocol Data Units
QoS	Quality of Service
RI	Regulatory Information

5 Introduction

The ITS station management entity provides functionality specified in the various parts of this multi-part document:

1) The functionality of local ITS station management specified in this document (ISO 24102-1).
2) The functionality of remote ITS station management is specified in ISO 24102-2.
3) The functionality of management service access points specified in ISO 24102-3.
4) The functionality of ITS station-internal management communications specified in ISO 24102-4.
5) The functionality of the "path and flow management specified in ISO 24102-6.

Detailed mandatory requirements are specified in the following clauses of this document.

— Clause 6 provides general requirements.
— Clause 7 specifies basic management procedures related to communication interfaces.
— Clause 8 specifies interference protection mechanisms.
— Clause 9 specifies regulatory information management issues.
— Clause 10 introduces issues of congestion control.
— Clause 11 specifies management of networking & transport layer forwarding information.
— Clause 12 describes the concept of flow and path management.
— Clause 13 specifies management of "Legacy CIs".
— Clause 14 introduces neighbour lists.
— Clause 15 specifies management data elements.
— Clause 16 presents dynamic data issues.
— Clause 17 specifies conformance declaration.
— Clause 18 specifies test methods.
— The normative Annex A provides ASN.1 specifications.
— The normative Annex B specifies management parameters.

6 General requirements

6.1 Basics

Functionality of local ITS station management specified in this document builds on the ITS station and communication architecture specified in ISO 21217:2014, and uses the management service access points:

— MI-SAP: ITS-S management entity ↔ ITS-S access layer;

— MN-SAP: ITS-S management entity ↔ ITS-S networking & transport layer;

— MF-SAP: ITS-S management entity ↔ ITS-S facilities layer;

— MA-SAP: ITS-S management entity ↔ ITS-S applications entity;

— MS-SAP: ITS-S management entity ↔ ITS-S security entity;

specified in ISO 24102-3, see Figure 1. The MA-SAP is part of the API presented in Figure 1.

NOTE Although SAPs and the related service primitives specified in ISO 24102-3 cannot be tested and are not mandatory, in the context of this document, the elements of the service primitives can be an integral part of PDUs exchanged between physical entities (ITS-SCUs) in an ITS station using "ITS station-internal management communications" specified in ISO 24102-4. As PDUs are testable, those elements of service primitives that are part of a PDU become testable.

Functionality of local ITS station management is specified by means of procedures architecturally allocated in the ITS-S management entity, and by data and commands exchanged via the management service access points.

In implementations of ITS station units (ITS-SUs) consisting of several ITS station communication units (ITS-SCUs), exchange of management information (data and commands) between different ITS-SCUs via the ITS station-internal network may be needed. Such ITS station-internal management communications allows remote access to management SAPs. ITS station-internal management communication is specified in ISO 24102-4.

Means to secure the access to management functionality shall be specified within the global context of the ITS station unit as a Bounded Secured Managed Entity (BSME) specified in ISO 21217:2014. Security details are outside the scope of this document.

Management task in general may involve several ITS-S layers and ITS-S entities.

6.2 Security management

Security management covers procedures and data to manage security protocols architecturally allocated in the ITS-S security entity.

So far no procedures for security management are identified.

6.3 Privacy management

Privacy regulations may require unlinking private data from traceable address elements and identifiers contained in wireless messages sent by an ITS-SU. Such unlinking can be done by means of pseudonyms. In order to properly unlink private data from all such address elements and identifiers, simultaneous change of all of these address elements and identifiers is needed. Dependent on applicable regulations and intended usage of an ITS-SCU, the ITS station management shall provide an "ID Change Service" that

performs such simultaneous changes upon request to change pseudonym. Examples of such address elements and identifiers are

— addresses in the ITS-S access layer such as well-known registered MAC address,

— addresses in the ITS-S networking & transport layer such as well-known registered IP address,

— addresses in the ITS-S facilities layer such as "ITS Station Unit Identifier", and

— identifiers in the ITS-S application entity.

Requirements on how often or when to change pseudonyms are out of scope of this document. The ID Change Service may be a non-standardized service.

6.4 Application management

Application management covers procedures and data to manage ITS-S applications, i.e. ITS-S application processes architecturally allocated in the ITS-S applications entity. ITS-S application processes are introduced in ISO 21217:2014 and specified further in ISO 17419:2018.

Management of ITS-S applications includes the following tasks:

— Registration of ITS-S application processes and collection of their functional requirements for communications (exchange of APDUs with peer entities) shall be as specified in ISO 17423:2018.

— Support of registration of ITS-S application processes at a local dynamic map (storage for time-referenced and location referenced information) shall be as specified in ISO 18750:2018.

— Remote secure installation, update, and removal of ITS application processes by an ITS-SCU Configuration Management Centre (ITS-SCU-CMC) shall be as specified in ISO 24102-2.

— Management of flow identifiers and flows shall be as specified in ISO 24102-6.

— Registration of ITS-S application processes for service advertisement shall be as specified in ISO 22418.

This list may be extended by further application management tasks specified in other standards.

6.5 Facilities management

Facilities management covers procedures and data to manage ITS-S facilities architecturally allocated in the ITS-S facilities layer.

Management of ITS-S facilities includes the following tasks:

— Registration of local dynamic maps (storage for time-referenced and location referenced information) at the ITS station management shall be as specified in ISO 18750:2018.

— Remote secure installation, update, and removal of ITS facilities by an ITS-SCU Configuration Management Centre (ITS-SCU-CMC) shall be as specified in ISO 24102-2.

— Management of flow identifiers, paths and flows shall be as specified in ISO 24102-6.

— Support of identifying applicable regulations and policies shall be as specified in Clause 9.

— Support of congestion control management shall be as specified in Clause 10.

— Registration for message and data support shall be as specified in ISO TS 17429:2017.

— Support of identifying applicable regulations and policies shall be as specified in Clause 9.

— Provision of kinematics information on the ITS-SCU by means of a position, time, and velocity service, e.g. ISO 21176[1)][4].

This list may be extended by further application management tasks specified in other standards.

6.6 Networking & transport management

Networking & transport management covers procedures and data to manage protocols architecturally allocated in the ITS-S networking & transport layer.

Management of ITS-S networking & transport layer protocols includes the following tasks:

— Management of flow identifiers, paths and flows shall be as specified in ISO 24102-6.

— Support of management of forwarding tables of networking & transport protocols shall be as specified in Clause 11.

— Support of identifying applicable regulations and policies shall be as specified in Clause 9.

— Support of congestion control management shall be as specified in Clause 10.

This list may be extended by further application management tasks specified in other standards.

6.7 Access technology management

Access technology management covers procedures and data to manage communication interfaces (CIs) and their virtual instantiations (VCIs) architecturally allocated in the ITS-S access layer.

Management of CIs and VCIs includes the following tasks:

— Management of flow identifiers, paths and flows shall be as specified in ISO 24102-6.

— Support in identifying applicable regulations and policies shall be as specified in Clause 9.

— Station-internal self-interference management shall be as specified in Clause 8.

— Interference mitigation management shall be as specified in Clause 8.

— Congestion control management shall be as specified in Clause 10.

This list may be extended by further application management tasks specified in other standards.

7 CI basic management

7.1 General

CI basic management shall be as specified in ISO 21218:2018.

Change of statuses of a CI/VCI shall be reported to all ITS-SCUs with the ITS-SCU Management command "Mcmd.VCI-update" specified in ISO 24102-4, if applicable for a given implementation. Reception of such a notification shall not be acknowledged.

Management communications with CIs/VCIs in other ITS-SCUs are with the ITS station-internal management communication PDUs "MI-rcmd", "MI-rreq", "MI-rget" and "MI-rset" specified in ISO 24102-4.

The ITS station management maintains information on the status of all CIs and VCIs, e.g. in a VCI list.

1) Currently at step 20.00: New project proposed

7.2 CI status

7.2.1 CI state machine

Figure 2 shows the CI state machine specified in ISO 21218:2018.

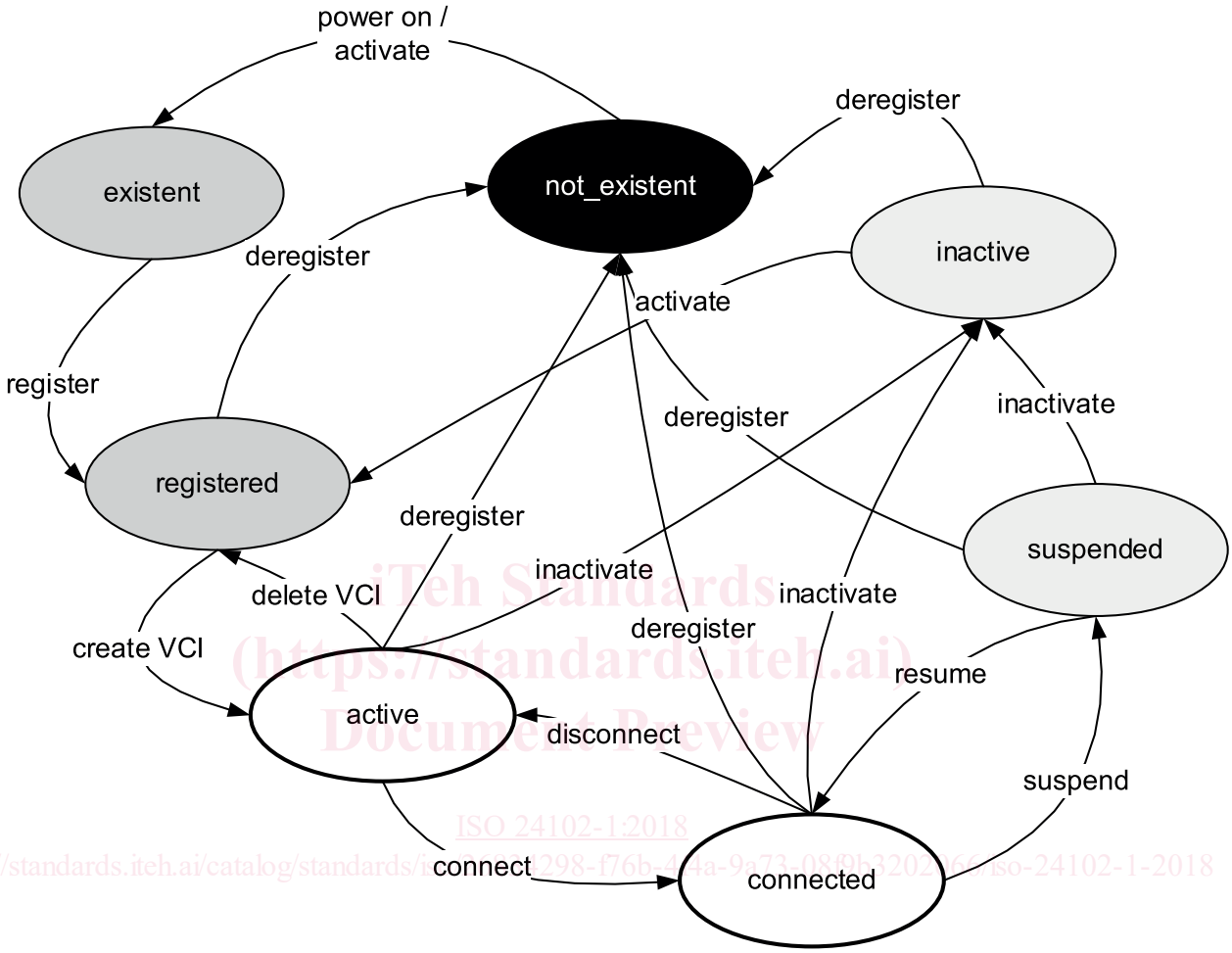

Figure 2 — CI state machine specified in ISO 21218

7.2.2 Registration

Registration of a CI at the ITS station management is the process to make the CI known to the ITS station management, and to make it addressable via a unique Link-ID. Registration of a CI shall be done as specified in ISO 21218.

Upon successful registration of a CI, the ITS station management shall create an entry in the VCI list with the values specified in Table 1.

Table 1 — Entry in VCI list upon registration of CI

Link-ID		Medium	CI Status	ConnectMode
LocalCIID	RemoteCIID			
Identifying the CI as specified in ISO 21218	Not applicable. Value identifying a specific destination as specified in ISO 21218	I-Parameter "MedType" as specified in ISO 21218	I-Parameter CIstatus equal to "registered", see ISO 21218.	I-parameter "Connect".

7.2.3 VCI creation

Creation of a VCI may be done

— upon request of the ITS station management, or

— by the CI on its own.

Creation of a VCI shall be done as specified in ISO 21218.

Upon successful creation of a VCI the ITS station management shall create an entry in the VCI list with the values specified in Tables 2, 3 and 4, as applicable.

Table 2 — Entry in VCI list indicating an active CI (not yet connected)

Link-ID		Medium	CI Status	ConnectMode
LocalCIID	RemoteCIID			
Identifying the CI as specified in ISO 21218	Not applicable. Value identifying a specific destination as specified in ISO 21218	Set equal to I-parameter "Medium". See ISO 21218.	"Active"; see ISO 21218.	Set equal to I-parameter "Connect". See ISO 21218.

Table 3 — Entry in VCI List upon creation of a broadcast VCI

Link-ID		Medium	CI Status	ConnectMode
LocalCIID	RemoteCIID			
Identifying the CI as specified in ISO 21218	Value identifying broadcast communication as specified in ISO 21218	Set equal to I-parameter "Medium". See ISO 21218.	"Active"; see ISO 21218.	Set equal to I-parameter "Connect". See ISO 21218.

Table 4 — Entry in VCI List upon creation of a multicast VCI

Link-ID		Medium	CI Status	ConnectMode
LocalCIID	RemoteCIID			
Identifying the CI as specified in ISO 21218	Value identifying a multicast group as specified in ISO 21218	Set equal to I-parameter "Medium". See ISO 21218.	"Active"; see ISO 21218.	Set equal to I-parameter "Connect". See ISO 21218.

7.2.4 Deregistration

Deregistration of a CI at the ITS station management is the process reversal to the registration process. Successful deregistration is a prerequisite to remove a CI from the system during operation.