INTERNATIONAL STANDARD

ISO 24102-4

First edition
2013-07-01

Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management —

Part 4:
Station-internal management communications

Systèmes intelligents de transport — Accès aux communicat ions des services mobiles terrestres (CALM) — Gestion des stations ITS —

Partie 4: Communications de gestion interne à la station

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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. www.iso.org/directives

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The committee responsible for this document is ISO/TC 204, *Intelligent transport systems.*

ISO 24102 consists of the following parts, under the general title *Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management*:

— *Part 1: Local management*

— *Part 3: Service access points*

— *Part 4: Station-internal management communications*

— *Part 5: Fast service advertisement protocol (FSAP)*

The following parts are under preparation:

— *Part 2: Remote management*

— *Part 6: Path and flow management*

Introduction

This International Standard is part of a family of International Standards for communications access for land mobiles (CALM). An introduction to the whole set of International Standards is provided in ISO 21217.

This part of ISO 24012 is part 4 of a multipart International Standard which determines the intelligent transport systems (ITS) station management - station-internal management communications.

The ITS station management entity provides functionality related to the management of communication protocol layers and the security entity presented in the ITS station reference architecture specified in ISO 21217 and presented in Figure 1, and in line with the general ITS architecture specified in ISO 21217.
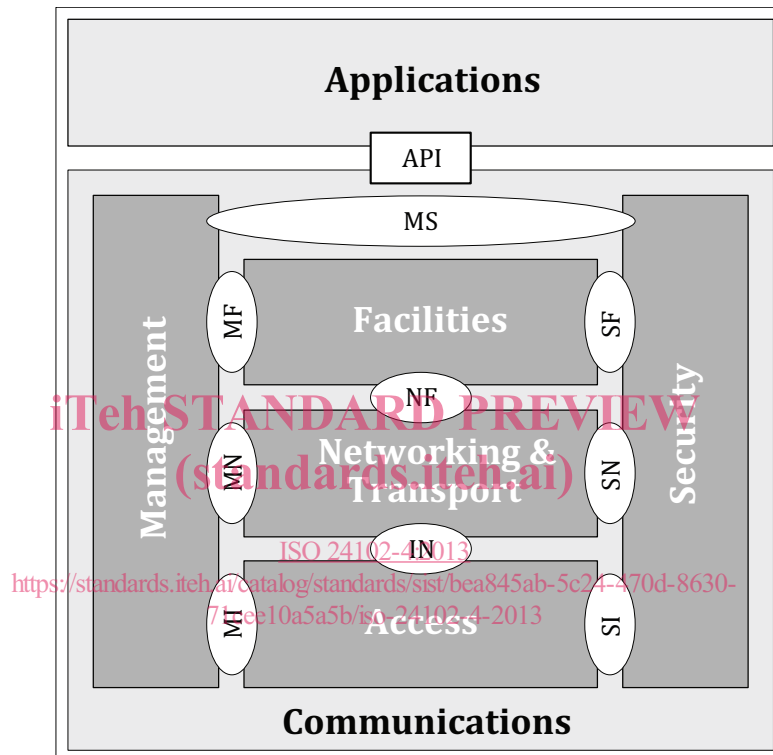

Figure 1 — ITS station reference architecture with named interfaces

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

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Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management —

Part 4:
Station-internal management communications

1 Scope

This part of ISO 24102 provides specifications for secure ITS station-internal management communications.

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

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

ISO 21218, *Intelligent transport systems — Communications access for land mobiles (CALM) — Access technology support*

ISO 24102-1, *Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management — Part 1: Local management*

ISO 24102-3, *Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management — Part 3: Service access points*

ETSI TS 102 797-1, *Intelligent Transport Systems (ITS); Road Transport and Traffic Telematics (RTTT); Test specifications for Intelligent Transport Systems, Communications access for land mobiles (CALM), ITS station management (ISO 24102); Part 1: Protocol Implementation Conformance Statement (PICS) proforma*

ETSI TS 102 797-2, *Intelligent Transport Systems (ITS); Road Transport and Traffic Telematics (RTTT); Test specifications for Intelligent Transport Systems, Communications access for land mobiles (CALM), ITS station management (ISO 24102); Part 2: Test Suite Structure and Test Purposes (TSS & TP)*

ETSI TS 102 797-3, *Intelligent Transport Systems (ITS); Road Transport and Traffic Telematics (RTTT); Test specifications for Intelligent Transport Systems, Communications access for land mobiles (CALM), ITS station management (ISO 24102); Part 3: Abstract Test Suite (ATS) and partial PIXIT information*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21217, ISO 21218, ISO 24102-1, and ISO 24102-3 and the following apply.

3.1
ITS-S communication unit
addressable instance of the ITS station reference architecture comprising as an access to the ITS station-internal network

4 Abbreviated terms

For the purposes of this document, the abbreviated terms given in ISO 21217, ISO 21218, ISO 24102-1, and ISO 24102-3 and the following apply.

ITS-SCU	ITS station communication unit
IIC	ITS-S internal management communications
IICM	IIC Manager
IICA	IIC Agent
IICP	ITS-S internal management communications protocol
n.a.	not applicable

5 ITS station management

The ITS station management includes functionality specified in the various parts of this multipart International Standard:

1) The functionality of local ITS station management specified in ISO 24102-1.

2) The functionality of remote ITS station management specified in ISO 24102-2.

3) The functionality of service access points specified in ISO 24102-3.

4) The functionality of ITS station-internal management communications specified in this part of ISO 24102.

5) The functionality of the "Fast Service Advertisement Protocol" (FSAP) specified in ISO 24102-5.

ITS station-internal management communications interconnects ITS station communication units (ITS-SCUs) of the same ITS station (ITS-S) via the ITS station-internal network illustrated in ISO 21217. This communication is also referred to as "ITS-S internal management communications" (IIC) in this part of ISO 24102. IIC allows remote access to management SAPs specified in ISO 24102-3.

IIC may be secured following the principles of trusted distributed systems.

Detailed mandatory requirements are specified in the following clauses of this part of ISO 24102.

— Clause 6 specifies the IIC reference architecture.

— Clause 7 specifies IIC protocol data units (PDUs).

— Clause 8 specifies communication procedures.

— Clause 9 specifies management procedures.

— Clause 10 specifies security elements and procedures.

— Clause 11 specifies conformance declaration.

— Clause 12 specifies test methods.

— Annexes provide further mandatory requirements.

6 Reference architecture

"ITS-S Internal management Communications" (IIC) is communications between ITS-S Management Entities of different ITS-SCUs of the same ITS via the ITS station-internal network. A specific purpose of IIC is remote access to management service access points MI-SAP, MN-SAP, MF-SAP, and MS-SAP.

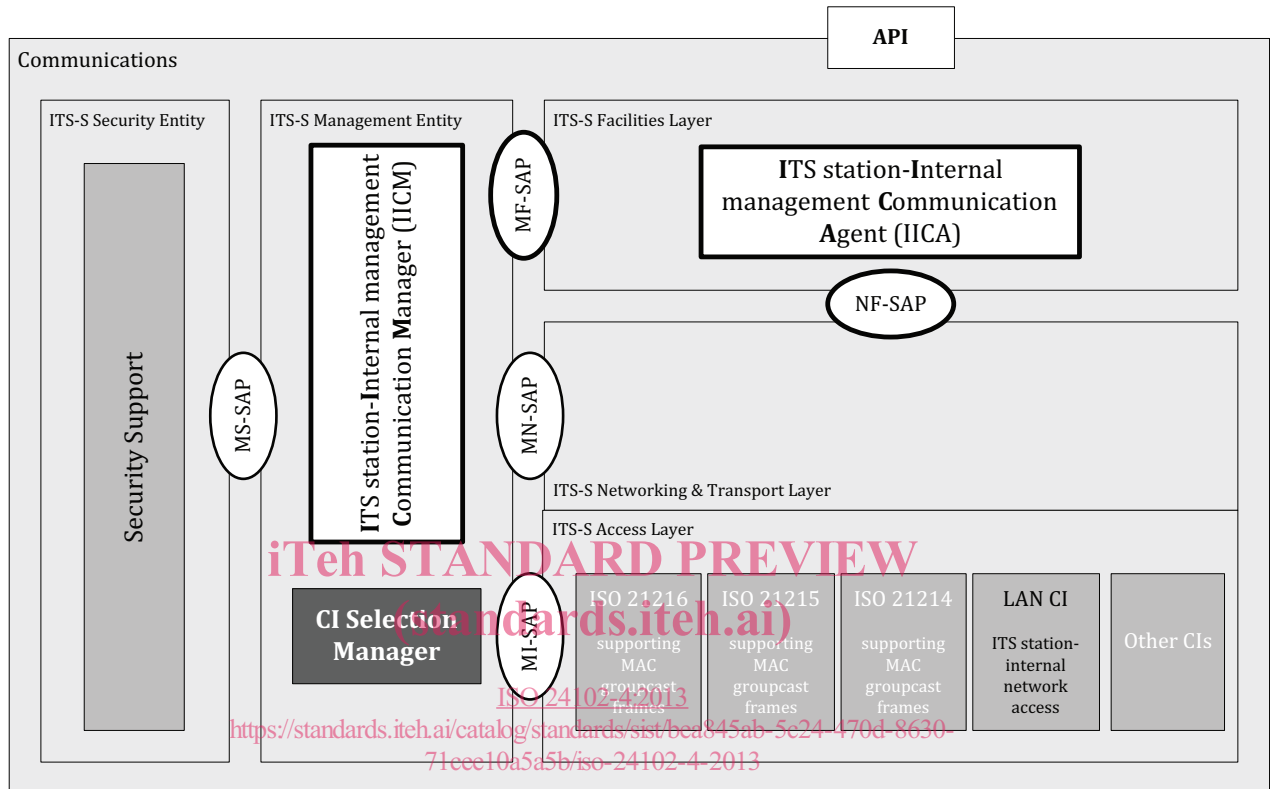The reference architecture for IIC is illustrated in Figure 2.

Figure 2 — Reference architecture for ITS station-internal management communications

Source and destination of IIC protocol data units are instances of the "ITS station-Internal management Communications Manager" (IICM). Transmission requests from the IICM are forwarded to the "ITS station-Internal management Communications Agent" (IICA) via the MF-SAP. Notifications of received IIC PDUs are sent by the IICA via the MF-SAP to the IICM.

Communications on the ITS station-internal network is performed between peer instances of the IICA via NF-SAP, a suitable networking and transport layer protocol, the IN-SAP, and a suitable access technology. Source and destination end points of the ITS-S networking and transport layer protocol are identified by an ITS-S port (ITS-SP) with the number PORT_IIC of the IICA identified in [3].

NOTE   Figure 2 shows the "Fast networking & transport layer protocol" (FNTP) specified in [3] as an example.

7 Protocol data units

"ITS-S Internal management Communications" (IIC) uses the following protocol data units (PDU) illustrated in Figure 3:

— IIC-Request;

— IIC-Response.

IIIC-Request:

SourceITS-SCU-ID	Destination ITS-SCU-ID	PDU-Counter	PDU-ID	Data	SecRq

IIIC-Response:

SourceITS-SCU-ID	Destination ITS-SCU-ID	PDU-Counter	PDU-ID	Data	Error Status	SecRs

Figure 3 — IIC PDU structure

Details on parameters of these PDUs shall be as specified in Table 1.

Table 1 — IIC PDUs

PDU element	IIC-Request	IIC-Response
SourceITS-SCU-ID	ITS-SCU-ID of source ITS-SCU, which produces the request. See parameter "ITS-scuId" specified in ISO 24102-1.	ITS-SCU-ID of ITS-SCU, which produces the response.
DestinationITS-SCU-ID	ITS-SCU-ID of destination ITS-SCU, which shall evaluate the request.	Same as SourceITS-SCU-ID of related request if not requested otherwise in this part of ISO 24102.
PDU-Counter	Even number generated from a cyclic counter at the ITS-SCU, which produces the request.	PDU-Counter of related request incremented by one.
PDU-ID	Distinguishes IIC-Request and IIC-Response.	Distinguishes IIC-Request and IIC-Response.
Data	Data type identifier followed by request data.	Data type identifier followed by response data.
ErrorStatus	Not existent.	Existent. 0: No error happened >0: Number indicating type of error.
SeqRq	Information authenticating the transmitting station.	Not existent.
SeqRs	Not existent.	Information authenticating the transmitting station.

The ASN.1 specification of the PDUs as provided in Annex A of this part of ISO 24102 shall apply.

ITS-SCU-ID values used in parameters "SourceITS-SCU-ID" and "DestinationITS-SCU-ID" shall be as specified in Table 2.

Table 2 — ITS-SCU-ID value assignment

SourceITS-SCU-ID	DestinationITS-SCU-ID	Description
0		Reserved. Used to indicate "own/local ITS-SCU". Must not be used in communications with other ITS-SCUs.
n.a.	1	ITS-SCU-ID identifying ITS-SCUs with ITS-S host role.
n.a.	2	ITS-SCU-ID identifying ITS-SCUs with ITS-S router role.
n.a.	3 - 7	ITS-SCU-ID identifying ITS-SCUs with an implementation specific role
8 ... 65534		ITS-SCU-ID identifying uniquely a specific ITS-SCU in an ITS station.
n.a.	65535	ITS-SCU-ID identifying all ITS-SCUs.

"PDU-ID" values and the related "Data" values shall be set as specified in Annex B of this part of ISO 24102.

"ErrorStatus" values shall be set as specified in Table 3.

Table 3 — ErrorStatus value assignment

ErrorStatus	Description
0	No error
1	PDU-ID unknown or not implemented
2	Duplicate ITS-SCU-ID
3	Invalid or unknown AliveMessage
4	Invalid or unknown ITS-SCU type
5 ... 254	Reserved for future use
255	Unspecified error

For transmission and reception of these PDUs, the networking and transport layer protocol shall use port number PORT_IIC identified in [3].

8 Communication procedures

8.1 Initialization

8.1.1 IICM

ITS station-internal management communications between addressable ITS-SCUs shall be initialized as specified in Clause 9 on management procedures.

8.1.2 IICA

Prior to the initialization specified in Clause 9, the IICA shall initialize communications via NF-SAP as requested for the selected ITS-S networking and transport layer protocol. As a minimum, the ITS-SP PORT_ICC identified in [3] shall be announced to the ITS-S networking and transport layer protocol.

8.2 Transmission

8.2.1 IIC-Request PDU

Upon request from a protocol in the ITS-S management entity, the IICM shall construct the IIC-Request PDU specified in Clause 7. In case secure transmission is needed, the "Security Support" illustrated in Figure 2 shall be involved via the MS-SAP. Details on security shall be as specified in Clause 10.