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

**Part 4:
Station-internal management
communications**

*Systèmes intelligents de transport — Accès aux communications 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	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Abbreviated terms	2
5 ITS station management	2
6 Reference architecture	3
7 Protocol data units	3
8 Communication procedures	5
8.1 Initialization	5
8.2 Transmission	5
8.3 Reception	6
9 Management procedures	7
9.1 General	7
9.2 ITS-SCU-ID assignment	7
9.3 Maintenance of ITS-SCU-ID	8
9.4 Shutdown of ITS-SCU	8
10 Security	8
11 Conformance	8
12 Test methods	9
Annex A (normative) ASN.1 module	10
Annex B (normative) IIC PDUs	13
Bibliography	18

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Foreword

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

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

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. 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.

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.

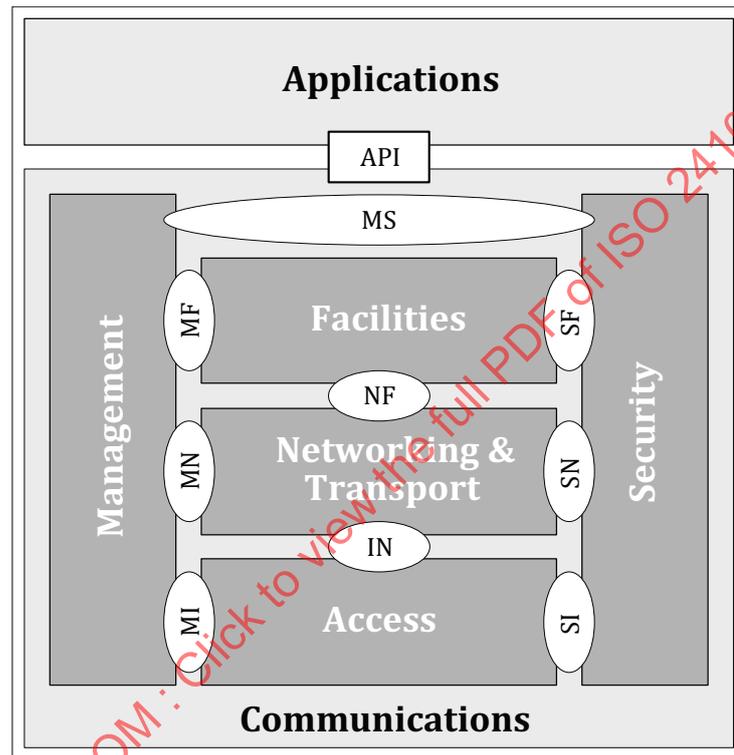


Figure 1 — ITS station reference architecture with named interfaces

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](#).

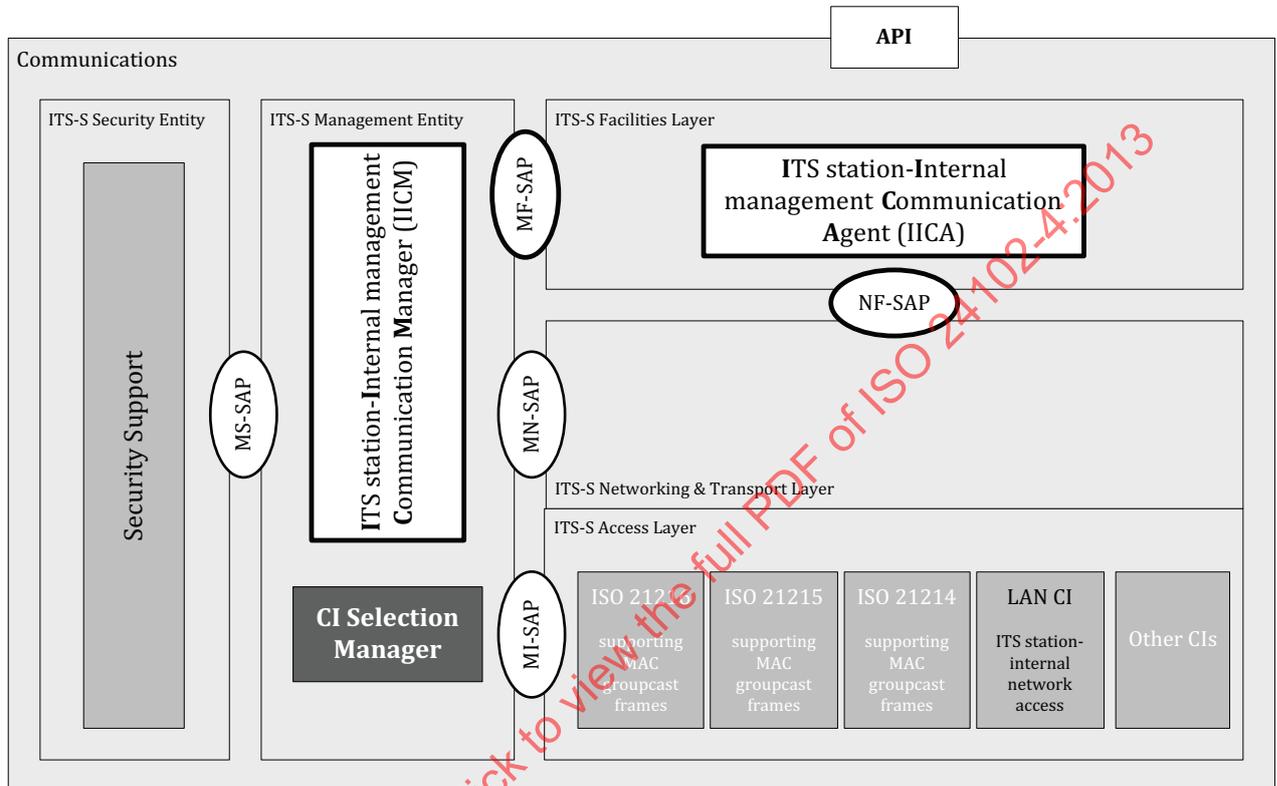


Figure 2 — Reference architecture for ITS station-internal management communications

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.

IIC-Request:

SourceITS-SCU-ID	DestinationITS-SCU-ID	PDU-Counter	PDU-ID	Data	SecRq
------------------	-----------------------	-------------	--------	------	-------

IIC-Response:

SourceITS-SCU-ID	DestinationITS-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-sculd” 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](#).

The “PDU-Counter” value shall be set to an even value uniquely in an ITS-SCU under the control of the IICM issuing the request. The initial value shall be zero. For every next IIC-Request PDU, the counter value shall be incremented by two. It shall wrap from 65 534 to zero. The IICM shall note the value of the PDU-Counter in case a response is expected.

The IICM shall forward the IIC-Request PDU to the IICA using MF-COMMAND `IICrequestTX` specified in [Annex A](#).

The IICA shall request transmission of the IIC-Request PDU using the appropriate service of the NF-SAP.

8.2.2 IIC-Response PDU

Upon reception of an IIC-Request PDU which requires transmission of an IIC-Response PDU, the IICM shall construct the IIC-Response 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](#).

The “PDU-Counter” value shall be set equal to the value of the “PDU-Counter” contained in the related IIC-Request PDU incremented by one.

The IICM shall forward the IIC-Response PDU to the IICA using MF-COMMAND `IICresponseTX` specified in [Annex A](#).

The IICA shall request transmission of the IIC-Response PDU using the appropriate service of the NF-SAP.

8.3 Reception

8.3.1 IIC-Request PDU

The IICA shall forward an IIC-Request PDU received via NF-SAP to the IICM using MF-REQUEST `IICrequestRX` specified in [Annex A](#).

The IICM shall perform the following steps:

- 1) Check DestinationITS-SCU-ID:
 - i) If it is either 1 or 2 and the selected value does not indicate an existing role of the ITS-SCU, steps 2), 3), 4), and 5) are not performed.
 - ii) If it is either 0 or from the range of reserved values, steps 2), 3), 4), and 5) are not performed.
- 2) Check the PDU-Counter value. In case the value is odd, steps 3), 4), and 5) are not performed.
- 3) In case the element SecRq is not empty, involve the “Security Support” illustrated in [Figure 2](#) via the MS-SAP as specified in [Clause 10](#).
- 4) Perform the required action as indicated by PDU-ID and Data contained in the IIC-Request PDU.
- 5) In case a response is required, the IICM shall prepare the IIC-Response PDU as specified above.

8.3.2 IIC-Response PDU

The IICA shall forward an IIC-Response PDU received via NF-SAP to the IICM using MF-REQUEST `IICresponseRX` specified in [Annex A](#).

The IICM shall perform the following steps:

- 1) Check DestinationITS-SCU-ID:
 - i) If it is either 1 or 2 and the selected value does not indicate an existing role of the ITS-SCU, steps 2), 3), and 4) are not performed.

- ii) If it is either 0 or from the range of reserved values, steps 2), 3), and 4) are not performed.
- 2) Check the PDU-Counter:
 - i) In case the value is even, steps 3) and 4) are not performed.
 - ii) In case the PDU was privately addressed, check that the value of the PDU-Counter is as required in [Table 1](#). Otherwise, steps 3) and 4) are not performed.
- 3) In case the element SecRs is not empty, the IICM shall involve the “Security Support” illustrated in [Figure 2](#) via the MS-SAP as specified in [Clause 10](#).
- 4) Perform the required action as indicated by PDU-ID and Data contained in the IIC-Response PDU.

9 Management procedures

9.1 General

The management procedures specified in [Clause 9](#) include procedures

- for initial assignment of unique ITS-SCU-IDs,
- for ITS-SCU-ID maintenance, and
- for release of ITS-SCU-IDs.

NOTE Uniqueness ITS-SCU-IDs in the range 8 ... 65534 may be achieved by implementation-dependent means.

9.2 ITS-SCU-ID assignment

In case an ITS-SCU does not have a pre-defined unique ITS-SCU-ID, the procedure specified in this sub-clause shall be followed.

The ITS-SCU shall generate an ITS-SCU-ID as specified in [Table 2](#) as its own ITS-SCU-ID and shall put the selected ITS-SCU-ID to its local ITS-SCU-list. ITS-SCU-ID values already in the local ITS-SCU-list indicate usage by another ITS-SCU in the same station and shall not be selected. Then the IIC-Request PDU `ITS-SCUalive (new)` shall be sent to all ITS-SCUs, indicating a first choice of ITS-SCU-ID in the `SourceITS-SCU-ID` element, or a new choice of ITS-SCU-ID, and the type of ITS-SCU in the “Data” element. In case of a negative acknowledgement, i.e. indication of usage of this ITS-SCU-ID value by another ITS-SCU (see below), the ITS-SCU shall repeat the procedure with a new ITS-SCU-ID value.

Upon activation, an ITS-SCU may listen to receive IIC-Request PDUs or IIC-Response PDUs in order to identify already allocated ITS-SCU-IDs.

Upon reception of an IIC-Request PDU `ITS-SCUalive (new)`, an ITS-SCU shall check the `SourceITS-SCU-ID`.

- If the `SourceITS-SCU-ID` is equal to the own ITS-SCU-ID, the receiving ITS-SCU shall send an IIC-Response PDU `ITS-SCUalive` to all ITS-SCUs, reporting the own ITS-SCU-ID and type of ITS-SCU to all ITS-SCUs, indicating `ErrorStatus = 2`.
- If the `SourceITS-SCU-ID` is different to the own ITS-SCU-ID, the ITS-SCU shall take this information to its local ITS-SCU-list, if not already present there. An existing entry shall not be updated with this new information. The ITS-SCU shall acknowledge the IIC-Request PDU with the IIC-Response PDU `ITS-SCUalive`, reporting the own ITS-SCU-ID and type of ITS-SCU, indicating `ErrorStatus = 0`.

Upon reception of an IIC-Request PDU `ITS-SCUalive (alive)`, an ITS-SCU shall check the `SourceITS-SCU-ID`.

- If the `SourceITS-SCU-ID` is equal to the own ITS-SCU-ID, the receiving ITS-SCU shall send an IIC-Response PDU `ITS-SCUalive` to all ITS-SCUs, reporting the own ITS-SCU-ID and type of ITS-SCU to all ITS-SCUs, indicating `ErrorStatus = 2`. All ITS-SCUs with this ITS-SCU-ID shall invalidate this ITS-SCU-ID and shall start the procedure to select a new ITS-SCU-ID.

- If the SourceITS-SCU-ID is different to the own ITS-SCU-ID, the ITS-SCU shall take this information to its local ITS-SCU-list, if not already present there. The IIC-Request PDU shall not be acknowledged with an IIC-Response.

Upon reception of an IIC-Response PDU *ITS-SCUalive*, an ITS-SCU shall check the *ErrorStatus*.

- In case of *ErrorStatus* = 0, the ITS-SCU shall take this information to its local ITS-SCU-list, if not already present there.
- In case of *ErrorStatus* = 2, an address conflict was detected. The procedure to be selected upon this event depends on the value of “Message” and SourceITS-SCU-ID contained in the IIC-Response as presented in [Table 4](#).

Table 4 — Error handling procedure for IIC-Response PDU (*ITS-SCUalive*)

ErrorStatus = 2 (Duplicate ITS-SCU-ID)	SourceITS-SCU-ID = own ITS-SCU-ID	SourceITS-SCU-ID ≠ own ITS-SCU-ID
AliveMessage = new	Map ITS-SCU-ID to ITS-SCUtype reported in the response. Restart ITS-SCU-ID assignment process.	Nothing shall be done.
AliveMessage = alive	IMPORTANT — This should never happen. Reset ITS-SCU and restart ITS-SCU ID assignment process.	IMPORTANT — This should never happen. Delete SourceITS-SCU-ID from local ITS-SCU-list.
AliveMessage = delete	IMPORTANT — This should never happen. Nothing shall be done.	

9.3 Maintenance of ITS-SCU-ID

An ITS-SCU shall periodically transmit the “alive-signal” IIC-Request PDU *ITS-SCUalive* (alive) in order to indicate its presence in the ITS station. The period of transmission shall be as set in parameter “Talive” specified in ISO 24102-1. The value of “Talive” shall be defined by implementation and shall be unique in an ITS station.

An ITS-SCU periodically shall check the local ITS-SCU-list. If for a period of at least three times “Talive” no “alive-signal” IIC-Request PDU *ITS-SCUalive* (alive) was received, the ITS-SCU shall assume that this ITS-SCU is no longer alive. The ITS-SCU-ID shall be deleted from the local ITS-SCU-list.

9.4 Shutdown of ITS-SCU

In case an ITS-SCU has the capability to perform a power shutdown, prior to performing such a shutdown of an ITS-SCU, the IIC-Request PDU *ITS-SCUalive* (delete) shall be sent to all ITS-SCUs. This message shall not be acknowledged.

10 Security

Details of security data elements presented in [Figure 3](#) and related security procedures will be specified in another International Standard, which is not yet known.

11 Conformance

The “Protocol Implementation Conformance Statements” (PICS) proforma is specified in ETSI TS 102 797-1.

12 Test methods

The “Test Suite Structure & Test Purposes” (TSS&TP) for conformance testing are specified in ETSI TS 102 797-2.

The “Abstract Test Suite” (ATS) for conformance testing is specified in ETSI TS 102 797-3.

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Annex A (normative)

ASN.1 module

A.1 Overview

The following ASN.1 module is specified in this annex:

— CALMittsscu { ISO (1) standard (0) calm-management (24102) iitsscu (4) version1 (1)}

A.2 Module CALMittsscu

This module specifies ASN.1 type definitions together with useful ASN.1 value definitions.

Unaligned packed encoding rules (PER) as specified in ISO/IEC 8825-2 shall be applied for this ASN.1 module.

In order to achieve octet alignment enabling cheap implementations, "fill" bits were defined. All fill bits shall be set to the value '0'b.

```

CALMittsscu { iso (1) standard (0) calm-management (24102) iitsscu (4) version1 (1) }
DEFINITIONS AUTOMATIC TAGS ::= BEGIN

IMPORTS
  CIaClass, CIclass, CIstatus, Directivity, Link-ID, LLserviceAddr, MACaddress, MedType FROM
  CALMllsap { iso(1) standard(0) calm-ll-sap(21218) version1(1) }

ITS-scuId, Param24102No, Param24102 FROM CALMmanagement { iso (1) standard (0) calm-man-
agement (24102) local (1) version1 (1) }.

ErrStatus, MF-Command-request, MF-Request-request, MN-Command-request, MN-Request-request,
MI-Command-request, MI-Request-request, MI-Get-request, MI-Set-request, MF-Command-confirm,
MF-Request-confirm, MN-Command-confirm, MN-Request-confirm, MI-Command-confirm, MI-Request-
confirm, MI-Get-confirm, MI-Set-confirm FROM CALMmsap { iso (1) standard (0) calm-management
(24102) msap (3) version1 (1) }

-- Details on SecRq and SecRs to be provided by a standard on security
;
-- End of IMPORTS

-- Types

-- PDUs --
IIC-Request ::= SEQUENCE {
    sourceITS-scuId          ITS-scuId,
    destinationITS-scuId    ITS-scuId,
    pduCounter              PduCounter,
    fill                    BIT STRING (SIZE(3)),
    pduRequest              IICPpdu,
    secRq                   SecRq
}

IICPpdu ::= CHOICE {
    request                 PduRequest,
    response                PduResponse
}

SecRq ::= OCTET STRING (SIZE(0..65535))

PduRequest ::= SEQUENCE {
    requests                CHOICE {

```

```

        alive                ITS-SCUalive,
        mf-rcmd              MF-Command-request,
        mf-rreq              MF-Request-request,
        mn-rcmd              MN-Command-request,
        mn-rreq              MN-Request-request,
        mi-rcmd              MI-Command-request,
        mi-rreq              MI-Request-request,
        mi-rget              MI-Get-request,
        mi-rset              MI-Set-request,
        vCI-info             VCI-info-req,
        vCI-update           VCI-update-req,
        get-param24102       Param24102No,
        set-param24102       Param24102
    }
}

ITS-SCUalive ::= SEQUENCE {
    message      AliveMessage,
    its-scuType  ITS-SCUtype
}

AliveMessage ::= INTEGER {
    alive (0),
    delete (1),
    new (255)
} (0..255)

ITS-SCUtype ::= INTEGER {
    host (1),
    router (2),
    any (255)
} (0..255)

VCI-info-req ::= SEQUENCE {
    medType      MedType,
    ciaClass     CIaClass,
    ciClass      CIclass
}

VCI-update-req ::= SEQUENCE (SIZE(0..255)) OF VCI-Info

VCI-Info ::= SEQUENCE {
    linkId       Link-ID,
    medType      MedType,
    ciaClass     CIaClass,
    ciClass      CIclass,
    status       Cistatus
}

IIC-Response ::= SEQUENCE {
    sourceITS-scuId  ITS-scuId,
    destinationITS-scuId  ITS-scuId,
    pduCounter       PduCounter,
    fill             BIT STRING (SIZE(3)),
    pduResponse      IICPpdu,
    errorStatus      PduErrStatus,
    secRs            SecRs
}

SecRs ::= OCTET STRING (SIZE(0..65535))

PduResponse ::= SEQUENCE {
    responses      CHOICE {
        alive                ITS-SCUalive,
        mf-rcmd              MF-Command-confirm,
        mf-rreq              MF-Request-confirm,
        mn-rcmd              MN-Command-confirm,
        mn-rreq              MN-Request-confirm,
        mi-rcmd              MI-Command-confirm,
        mi-rreq              MI-Request-confirm,
        mi-rget              MI-Get-confirm,
    }
}

```

ISO 24102-4:2013(E)

```
        mi-rset          MI-Set-confirm,
        vCI-info        VCI-info-res,
        vCI-update      NULL,
        get-param24102  Param24102,
        set-param24102  ErrStatus
    }
}

PduErrStatus ::= INTEGER {
    success (0),
    pduUnknown (1),
    duplicateITS-scuId (2),
    invalidAliveMessage (3),
    invalidITSScuType (4),
    unspecFailure (255)
} (0..255)

VCI-info-res ::= SEQUENCE (SIZE(0..255)) OF VCI-Info

-- MF-SAP --
-- MF-COMMANDs --

IICrequestTX ::= IIC-Request
IICresponseTX ::= IIC-Response

-- MF-REQUESTs --

IICrequestRX ::= IIC-Request
IICresponseRX ::= IIC-Response

-- General types --

PduCounter ::= INTEGER (0..65535)

-- Values
/*
    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
```

Annex B (normative)

IIC PDUs

B.1 List of PDUs

[Table B.1](#) presents an overview of all ICC PDUs. Further details are specified in the next subclauses of this annex. The column “Response” indicates whether a response PDU is mandatory (yes) or prohibited (no). See also [Table 1](#).

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Table B.1 — PDU-ID

Type of PDU	Response	Comment
ITS-SCUalive	yes	Used to assign, maintain, and delete unique ITS-SCU-ID values in a station.
MF-rcmd	yes	A management command MF-COMMAND issued by the ITS station management entity of the local ITS-SCU, to be forwarded to the MF-SAP of one or several remote ITS-SCUs.
MF-rreq	yes	A command MF-REQUEST issued by the local facilities layer, to be forwarded to the ITS station management entity in one or several remote ITS-SCUs.
MN-rcmd	yes	A management command MN-COMMAND issued by the ITS station management entity of the local ITS-SCU, to be forwarded to the MN-SAP of one or several remote ITS-SCUs.
MN-rreq	yes	A command MN-REQUEST issued by the local networking and transport layer, to be forwarded to the ITS station management entity in one or several remote ITS-SCUs.
MI-rcmd	yes	A management command MI-COMMAND issued by the ITS station management entity of the local ITS-SCU, to be forwarded to the MI-SAP of a remote ITS-SCUs.
MI-rreq	yes	A command MI-REQUEST issued by the local access layer, to be forwarded to the ITS station management entity in one or several remote ITS-SCUs.
MI-rget	yes	A command MI-GETPARAM issued by the ITS station management entity, to be forwarded to the MI-SAP of a remote ITS-SCU.
MI-rset	yes	A command MI-SETPARAM issued by the ITS station management entity, to be forwarded to the MI-SAP of a remote ITS-SCU.
VCI-info	yes	Request to all ITS-SCUs containing a router, to report about existing VCIs. Information to be stored in VCI list.
VCI-update	no	Information on change of VCI information to be stored in VCI list. Broadcasted to all ITS-SCUs.
GET-Param24102	yes	Retrieves the value of a management parameter Param24102 specified in ISO 24102-1 from another ITS-SCU.
SET-Param24102	yes	Set the value of a management parameter Param24102 specified in ISO 24102-1 from another ITS-SCU.
COMMAND	yes	Request executing of a command in a remote ITS-SCU.

B.2 PDU details

B.2.1 ASN.1

ASN.1 details of all PDUs shall be as presented in [Annex A](#).

B.2.2 ITS-SCUalive

[Table B.2](#) shows details of the “Data” element in the IIC-Request PDU.