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

**Part 3:
Service access points**

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*Systemes intelligents de transport — Accès aux communications des
services mobiles terrestres (CALM) — Gestion des stations ITS —*

Partie 3: Points d'accès au service

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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* [ISO 24102-3:2013](http://standards.iteh.ai/catalog/standards/sist/69c0045c-9907-4cf3-b4c9-1324804c7d84/iso-24102-3-2013)
- *Part 4: ITS 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 24102 is part 3 of a multipart International Standard which determines the intelligent transport systems (ITS) station management service access points.

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.

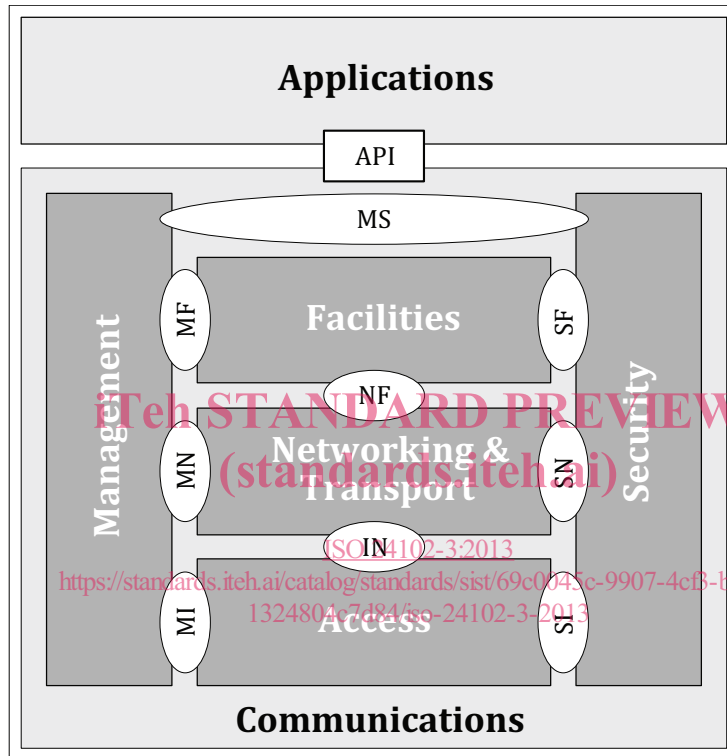


Figure 1 — ITS station reference architecture with named interfaces

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

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

Part 3: Service access points

1 Scope

This part of ISO 24102 specifies the management service access points, i.e. the service access points of

- the interfaces between the ITS-S management entity and
 - the ITS-S access layer (MI-SAP),
 - the ITS-S networking and transport layer (MN-SAP),
 - the ITS-S facilities layer (MF-SAP),
- the interfaces between the ITS-S security entity and
 - the ITS-S access layer,
 - the ITS-S networking and transport layer,
 - the ITS-S facilities layer,
- the interface between the ITS-S management entity and the ITS-S security entity (MS-SAP).

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) — Part 2*

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 24102-4, *Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management — Part 4: Station-internal management communications*

ISO 24102-5, *Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management — Part 5: Fast service advertisement protocol (FSAP)*

3 Terms and definitions

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

4 Abbreviated terms

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

MF-COMMAND	command issued by the ITS-S management entity and sent to the ITS-S facilities layer via the MF-SAP
MF-REQUEST	command issued by the ITS-S facilities layer and sent to the ITS-S management entity via the MF-SAP
MI-COMMAND	command issued by the ITS-S management entity and sent to the ITS-S access layer via the MI-SAP
MI-GET	command issued by the ITS-S management entity in order to get the value of one or several CI parameters; sent via the MI-SAP to the ITS-S access layer
MI-REQUEST	command issued by the ITS-S access layer and sent to the ITS-S management entity via the MI-SAP
MI-SET	command issued by the ITS-S management entity in order to set the value of one or several CI parameters; sent via the MI-SAP to the ITS-S access layer
MN-COMMAND	command issued by the ITS-S management entity and sent to the ITS-S networking and transport layer via the MN-SAP
MN-REQUEST	command issued by the ITS-S networking and transport layer and sent to the ITS-S management entity via the MN-SAP
MS-COMMAND	command issued by the ITS-S management entity and sent to the ITS-S security entity via the MS-SAP
MS-REQUEST	command issued by the ITS-S security entity and sent to the ITS-S management entity via the MS-SAP
SF-COMMAND	command issued by the ITS-S security entity and sent to the ITS-S facilities layer via the SF-SAP
SF-REQUEST	command issued by the ITS-S facilities layer and sent to the ITS-S security entity via the SF-SAP
SI-COMMAND	command issued by the ITS-S security entity and sent to the ITS-S access layer via the SI-SAP
SI-REQUEST	command issued by the ITS-S access layer and sent to the ITS-S security entity via the SI-SAP
SN-COMMAND	command issued by the ITS-S security entity and sent to the ITS-S networking and transport layer via the SN-SAP
SN-REQUEST	command issued by the ITS-S networking and transport layer and sent to the ITS-S security entity via the SN-SAP

5 Requirements

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

- 1) General management functionality specified in ISO 24102-1.
- 2) The functionality of remote ITS station management specified in ISO 24102-2.
- 3) The functionality of management/security service access points specified this part of ISO 24102.
- 4) The functionality of ITS station-internal management communications specified in ISO 24102-4.
- 5) The functionality of the “Fast Service Advertisement Protocol” (FSAP) specified in ISO 24102-5.

The functionality of the service access points

- MI-SAP, MN-SAP, MF-SAP,
- SI-SAP, SN-SAP, SF-SAP,
- MS-SAP,

shall be as specified in this part of ISO 24102.

NOTE 1 SAPs can be non-exposed interfaces. Thus, service primitives of SAPs are not subject to conformance tests.

NOTE 2 The MA-interface and SA-interface presented in Figure 1 are not specified in this part of ISO 24102, although these are recognized as part of the ITS station reference architecture specified in ISO 21217. All interfaces towards the ITS-S applications are considered to be APIs rather than SAPs.

Means to secure the access to management functionality need to be specified within the global context of CALM security. Details are outside the scope of this part of ISO 24102.

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

- [Clause 6](#) specifies the MI-SAP.
- [Clause 7](#) specifies the MN-SAP.
- [Clause 8](#) specifies the MF-SAP.
- [Clause 9](#) specifies the SI-SAP.
- [Clause 10](#) specifies the SN-SAP.
- [Clause 11](#) specifies the SF-SAP.
- [Clause 12](#) specifies the MS-SAP.
- Annexes provide further mandatory requirements.

6 MI-SAP

6.1 General

Basically, there are the following different types of services:

- a) a service that allows the ITS-S management entity to set I-Parameter values in a “(Virtual) Communication Interface” (CI, VCI), see ISO 21218;
- b) a service that allows the ITS-S management entity to read I-Parameter values from a (virtual) CI;

- c) a service that allows a “Management Adaptation Entity” (MAE), see ISO 21218, to notify events to the ITS-S management, including changes in (virtual) CI I-Parameter values;
- d) a service that allows the ITS-S management entity to send a command to an MAE;
- e) a service that allows an MAE to send a command to the ITS-S management entity;
- f) a service for transmission requests of a management data packet;
- g) a service for reception notification of a management data packet.

Setting of I-Parameter values shall be built on the service MI-SET.

Reading of I-Parameter values shall be built on the service MI-GET.

Issuing of commands by the ITS-S management entity shall be built on the service MI-COMMAND.

Issuing of commands by a CI or VCI shall be built on the service MI-REQUEST.

Transmission request and reception notification of management data packets shall be built on the services MI-COMMAND and MI-REQUEST.

Event notifications shall be built on the service MI-REQUEST.

Every request and confirm service primitive shall be identified by a CommandRef parameter. A value unique within the available number space shall be assigned to the request service primitive. The related confirm service primitive shall use the same number as provided in the related request service primitive.

Management communications with the access layer in other ITS-SCUs shall be with Inter-ITS-SCU communication PDUs “MI-rset”, “MI-rget”, “MI-rcmd”, and “MI-rreq” as specified in ISO 24102-4.

Details of the service primitives shall be as specified in [Annex A](#).

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6.2 MI-SET

6.2.1 MI-SET.request

The service primitive MI-SET.request allows setting of I-Parameters by the ITS-S management.

The parameters of MI-SET.request are as follows:

```
MI-SET.request      (
                    Link-ID,
                    CommandRef,
                    Sequence of I-Param
                    )
```

Table 1 — MI-SET.request parameter description

Name	Description
Link-ID	Unique identifier of a VCI/CI.
CommandRef	Unique cyclic reference number of command.
-	Number of subsequent elements I-Param.
I-Param.No	See ISO 21218.
I-Param.Value	See ISO 21218.

An MI-SET.request is generated by the ITS-S management entity when I-Parameters specified in ISO 21218 shall be set.

On receipt of MI-SET.request, the selected parameters shall be set if applicable.

6.2.2 MI-SET.confirm

The service primitive MI-SET.confirm reports the result of a previous MI-SET.request.

The parameters of MI-SET.confirm are as follows:

```
MI-SET.confirm      (
                    Link-ID,
                    CommandRef,
                    Sequence of Errors OPTIONAL
                    )
```

The optional element “Sequence of Errors” shall be available once at least one of the requested settings was in error. It may be available in order to acknowledge settings explicitly.

Table 2 — MI-SET.confirm parameter description

Name	Description
Link-ID	Unique identifier of a VCI/CI.
CommandRef	Unique cyclic reference number of command.
-	Number of subsequent error messages.
Errors.I-ParamNo	Parameter reference number for which Result.Code applies.
Errors.errStatus	Return/error code, see Table P.1 .

A request to set a defined “read only” I-Parameter shall be acknowledged with ErrStatus 7 “ACCESS VIOLATION”. A request to set an undefined I-Parameter shall be acknowledged with ErrStatus 2 “INVALID PARAMETER NUMBER”. A request to set a defined I-Parameter with an illegal value shall be acknowledged with ErrStatus 3 “INVALID PARAMETER VALUE”. A request to set a defined I-Parameter with an illegal type of value shall be acknowledged with ErrStatus 1 “UNSPECIFIED FAILURE”.

An MI-SET.confirm is generated by the MAE upon reception of a previous MI-SET.request.

On receipt of MI-SET.confirm, the ITS-S management entity shall evaluate Errors, if applicable, and act accordingly. Details are outside the scope of this part of ISO 24102.

6.3 MI-GET

6.3.1 MI-GET.request

The service primitive MI-GET.request requests reporting of I-Parameter values to the ITS-S management.

The parameters of the management service primitive MI-GET.request are as follows:

```
MI-GET.request      (
                    Link-ID,
                    CommandRef
                    Sequence of I-ParamNo
                    )
```

Table 3 — MI-GET.request parameter description

Name	Description
Link-ID	Unique identifier of a VCI/CI.
CommandRef	Unique cyclic reference number of command.
-	Number of subsequent elements I-Param.No.
I-ParamNo	See ISO 21218.

This primitive is generated by the ITS-S management entity when I-Parameter values shall be retrieved.

On receipt of MI-GET.request, I-Parameters shall be reported to the ITS-S management entity.

6.3.2 MI-GET.confirm

The management service primitive MI-GET.confirm reports I-Parameter values to the ITS-S management entity.

The parameters of MI-GET.confirm are as follows:

```
MI-GET.confirm      (
                    Link-ID,
                    CommandRef,
                    Sequence of I-Param
                    )
```

Table 4 — MI-GET.confirm parameter description

Name	Description
Link-ID	Unique identifier of a VCI/CI.
CommandRef	Unique cyclic reference number of command.
-	Number of subsequent elements I-Param.
I-Param.No	See ISO 21218.
I-Param.Value	See ISO 21218.

A request to get the value of a defined “write only” I-Parameter shall be acknowledged with ErrStatus 7 “ACCESS VIOLATION”. A request to get the value of an undefined I-Parameter shall be acknowledged with ErrStatus 2 “INVALID PARAMETER NUMBER”

The management service primitive MI-GET.confirm shall be generated by the MAE upon reception of a previous MI-GET.request.

The ITS-S management entity shall evaluate the parameter values and act accordingly. If any errors occurred in the processing of the related MI-GET.request, the MI-GET.confirm shall contain at least the entry Param.No = 255, where I-Param.Value shall explain the details of the error (see ISO 21218).

Further details are outside the scope of this part of ISO 24102.

6.4 MI-COMMAND

6.4.1 MI-COMMANDs

[Annex F](#) provides an overview and coding details on MI-COMMANDs that may be sent by the ITS-S management entity to the ITS-S access layer.

MI-COMMANDs shall be enabled by means of the service primitives MI-COMMAND.request and MI-COMMAND.confirm.

6.4.2 MI-COMMAND.request

The service primitive MI-COMMAND.request allows the ITS-S management to trigger an action at a CI.

The parameters of MI-COMMAND.request are as follows:

```
MI-COMMAND.request (
                    Link-ID,
                    CommandRef,
                    MI-Command
                    )
```

Table 5 — MI-COMMAND.request parameter description

Name	Description
Link-ID	Unique identifier of a VCI/CI.
CommandRef	Unique cyclic reference number of command.
MI-Command.No	See Annex F .
MI-Command.Value	See Annex F .

An MI-COMMAND.request shall be generated by the ITS-S management when the CI shall perform an action. On receipt of MI-COMMAND.request by the MAE, the requested action shall be performed.

6.4.3 MI-COMMAND.confirm

The service primitive MI-COMMAND.confirm reports the result of a previous MI-COMMAND.request.

The parameters of MI-COMMAND.confirm are as follows:

```
MI-COMMAND.confirm      (
                          Link-ID,
                          CommandRef
                          ErrStatus
                          )
```

Table 6 — MI-COMMAND.confirm parameter description

Name	Description
Link-ID	Unique identifier of a VCI/CI.
CommandRef	Unique cyclic reference number of command.
ErrStatus	Return/error code, see Table P.1 .

An undefined MI-COMMAND shall be acknowledged with ErrStatus 5 “INVALID COMMAND/REQUEST NUMBER”.

An MI-COMMAND.confirm shall be generated by the MAE upon performance of a previous MI-COMMAND.request.

On receipt of MI-COMMAND.confirm, the ITS-S management entity shall evaluate ErrStatus and act accordingly. Details are outside the scope of this part of ISO 24102.

6.5 MI-REQUEST

6.5.1 MI-REQUESTs

[Annex G](#) provides an overview and coding details on MI-REQUESTs.

MI-REQUESTs shall be enabled by means of the service primitives MI-REQUEST.request and MI-REQUEST.confirm.

6.5.2 MI-REQUEST.request

The service primitive MI-REQUEST.request allows the MAE to trigger an action at the ITS-S management entity.

The parameters of MI-REQUEST.request are as follows:

```
MI-REQUEST.request      (
                          Link-ID,
                          CommandRef,
```

MI-Request
)

Table 7 — MI-REQUEST.request parameter description

Name	Description
Link-ID	Unique identifier of a VCI/CI.
CommandRef	Unique cyclic reference number of command.
MI-Request.No	See Annex G .
MI-Request.Value	See Annex G .

An MI-REQUEST.request shall be generated by a MAE when the ITS-S management entity shall perform an action.

On receipt of MI-REQUEST.request the required action is performed.

6.5.3 MI-REQUEST.confirm

The service primitive MI-REQUEST.confirm reports the result of a previous MI-REQUEST.request.

The parameters of MI-REQUEST.confirm are as follows:

MI-REQUEST.confirm

(
Link-ID,
CommandRef,
ErrStatus
)

Table 8 — MI-REQUEST.confirm parameter description

Name	Description
Link-ID	Unique identifier of a VCI/CI.
CommandRef	Unique cyclic reference number of command.
ErrStatus	Return/error code, see Table P.1 .

An undefined REQUEST shall be acknowledged with ErrStatus 5 “INVALID COMMAND/REQUEST NUMBER”.

An MI-REQUEST.confirm shall be generated by the ITS-S management e upon performance of a previous MI-REQUEST.request.

On receipt of MI-REQUEST.confirm, the MAE shall evaluate ErrStatus and act accordingly. Details are outside the scope of this part of ISO 24102.

6.6 MI-NOTIFY

6.6.1 Pseudo-service

The MI-NOTIFY service is a pseudo-service.

The MI-COMMAND “Monitor” shall be used to start and stop monitoring of a specific I-Parameter.

Notification of an I-Parameter value shall be done with MI-REQUEST “Event”.

6.6.2 Retrieve monitor status

The actual status of monitoring of I-Parameters can be retrieved by means of the MI-GET.request service primitive with I-Parameter “Notify”.

The related MI-GET.response shall show all I-Parameter numbers that are currently activated for monitoring.

6.6.3 MAC management frame

MI-COMMAND “UnitDataCmd” is used by the ITS-S management to request transmission of a management data packet. The MAE shall treat this packet the same way as packets received from the IN-SAP, except for indication of a management packet in the MAC header of the transmitted frame.

MI-REQUEST “UnitDataReq” is used by the MAE to notify reception of a management data packet to the ITS-S management entity.

7 MN-SAP

7.1 General

Basically, there shall be the following different types of services that facilitate

- a) sending a command from the ITS-S management entity to the ITS-S networking and transport layer, and
- b) receiving a request (command) from the ITS-S networking and transport layer to the ITS-S management entity.

Issuing of commands to the ITS-S networking and transport layer shall be built on the service MN-COMMAND.

Receiving requests from the ITS-S networking and transport layer shall be built on the service MN-REQUEST.

Details of the service primitives shall be as specified in [Annex A](#).

Management communications with the networking and transport layer in other ITS-SCUs shall be with Inter-ITS-SCU communication PDUs “MN-rcmd” and “MN-rreq” as specified in ISO 24102-4.

7.2 MN-COMMAND

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7.2.1 MN-COMMANDs

[Annex D](#) provides an overview and coding details on MN-COMMANDs that may be sent by the ITS-S management entity to the ITS-S networking and transport layer.

MN-COMMANDs shall be enabled by means of the service primitives MN-COMMAND.request and MN-COMMAND.confirm.

7.2.2 MN-COMMAND.request

The service primitive MN-COMMAND.request allows the ITS-S management entity to trigger an action at the ITS-S networking and transport layer.

The parameters of the management service primitive MN-COMMAND.request are as follows:

```
MN-COMMAND.request      (
                          CommandRef,
                          MN-Command
                          )
```

Table 9 — MN-COMMAND.request parameter description

Name	Description
CommandRef	Unique cyclic reference number of command.
MN-Command.No	Reference number of command.
MN-Command.Value	Value of command.

An MN-COMMAND.request shall be generated by the ITS-S management entity when the ITS-S networking and transport layer shall perform an action.