
**Intelligent transport systems — ITS
station management —**

**Part 3:
Service access points**

Systèmes intelligents de transport — Gestion des stations ITS —

Partie 3: Points d'accès au service

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Published in Switzerland

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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 (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 24102-3:2013), which has been technically revised. It also incorporates the Amendment ISO 24102-3:2013/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 family of International Standards for communications in intelligent transport systems (ITS) based on the ITS station and communications architecture specified in ISO 21217 and illustrated in [Figure 1](#).

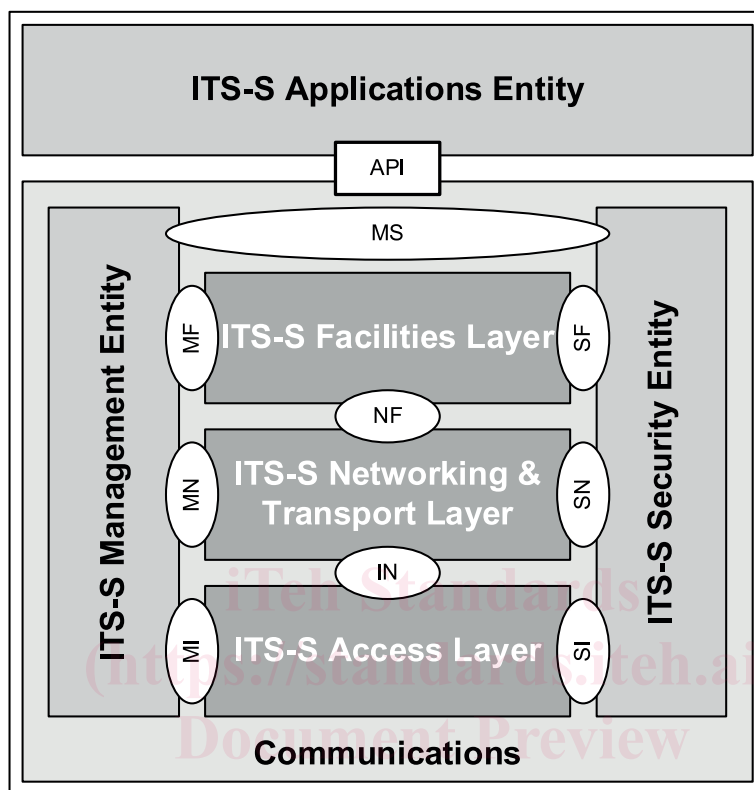


Figure 1 — ITS station reference architecture with named interfaces

This document is Part 3 of a multipart 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](#).

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

Intelligent transport systems — ITS station management —

Part 3: Service access points

1 Scope

This document 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 & 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 & transport layer,
 - the ITS-S facilities layer;
- the interface between the ITS-S management entity and the ITS-S security entity (MS-SAP)
- the interfaces between the ITS-S application entity and
 - the ITS-S management entity (MA-SAP),
 - the ITS-S security entity (SA-SAP).

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 21217, *Intelligent Transport Systems — Communications access for land mobiles (CALM) — Architecture*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21217 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/>

4 Symbols and abbreviated terms

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

5 Service access points

The functionality of the management services and service primitives of the service access points (SAPs)

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

is specified in this document. The functionality shall be as specified using the abstract syntax notation ASN.1. These SAPs are internal functional interfaces of the ITS station architecture specified in ISO 21217, and illustrated in [Figure 1](#).

NOTE 1 For the purpose of this document the SX-SAPs are also considered as management SAPs.

NOTE 2 SAPs can be non-exposed interfaces. Thus service primitives of SAPs are not subject to conformance tests.

NOTE 3 All interfaces towards the ITS-S applications are considered to be implemented in an API. Such an API provides, as a minimum, the functionality of the MA-SAP, the SA-SAP, and the FA-SAP; the FA-SAP is a communications SAP also considered in this document as it fits logically to MA-SAP and SA-SAP.

The service primitives contain functions that are specified in ASN.1 in other standards, providing management and security functionality.

Means to secure the access to management functionality need to be specified within the global context of the BSMD security introduced in ISO 21217. Details are outside the scope of this document.

6 XY-COMMAND service

6.1 Terminology

The term "ITS-S layer" means

- ITS-S access layer (Y=I), or
- ITS-S networking & transport layer (Y=N), or
- ITS-S facilities layer (Y=F),

see [Figure 1](#).

The term "ITS-S entity" means

- ITS-S management entity (X=M), or
- ITS-S security entity (X=S, Y=S), or
- ITS-S application entity (Y=A),

see [Figure 1](#).

The term XY-COMMAND identifies a service where X equals either M or S, and Y equals either I, N, F, or A, and a service where X equals M and Y equals S.

The term XY-REQUEST identifies a service where X equals either M or S, and Y equals either I, N, F, or A, and a service where X equals M and Y equals S.

XY-COMMAND.request is commands presented by X to Y, and acknowledged by Y to X with XY-COMMAND.confirm.

XY-REQUEST.request is commands presented by Y to X, and acknowledged by X to Y with XY-REQUEST.confirm.

An XY-COMMAND.request service primitive contains the service function XY-Command; an XY-COMMAND.confirm service primitive contains the service function XY-CmdConfirm.

An XY-REQUEST.request service primitive contains the service function XY-Request; an XY-REQUEST.confirm service primitive contains the service function XY-ReqConfirm.

The functionality of these service primitives, disregard of their implementation, shall be as defined in ASN.1; the respective ASN.1 specifications are provided in [Annex A](#).

These ASN.1 specifications become observable as PDUs for ITS station-internal management communications specified in ISO 24102-4[2]; thus for the specification of these PDUs, the respective ASN.1 definitions become normative and mandatory in the strict sense.

Service functions are identified by a unique reference number. A specific service function that is used in different SAPs is identified by the same reference number value in all of these SAPs.

6.2 XY-COMMAND

6.2.1 XY-COMMAND.request service primitive

The service primitive XY-COMMAND.request allows the ITS-S management entity or ITS-S security entity to trigger an action at an ITS-S layer or in the ITS-S application entity.

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

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

Table 1 — XY-COMMAND.request parameter description

Name	Description
Link-ID	Only present in the service primitives of the MI-SAP and SI-SAP. Unique identifier of a VCI or CI specified in ISO 21218[4].
CommandRef	Cyclic reference number of command unique for the given XY-COMMAND.
XY-Command.No	Reference number of service function.
XY-Command.Value	Service function.

An XY-COMMAND.request shall be generated by the ITS-S management or security entity when the selected ITS-S layer or the ITS-S application entity shall perform an action.

Upon receipt of XY-COMMAND.request, disregard of its implementation, the requested action shall be performed. Details are outside the scope of this document.

6.2.2 XY-COMMAND.confirm service primitive

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

The parameters of the management service primitive XY-COMMAND.confirm are as follows:

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

Table 2 — XY-COMMAND.confirm Parameter description

Name	Description
Link-ID	Only present in the service primitives of the MI-SAP and SI-SAP. Unique identifier of a VCI or CI specified in ISO 21218[4].
CommandRef	Unique cyclic reference number of command. Same value as in related MN-COMMAND.request.
XY-CmdConfirm.No	Reference number of service function. Same value as XY-Command.No in related XY-COMMAND.request.
XY-CmdConfirm.Value	Service function; carries optional confirm data.
ErrStatus	Error/return code, see Table B.1 .

An XY-COMMAND.confirm shall be generated by the respective ITS-S layer or the ITS-S application entity upon performance of a previous XY-COMMAND.request in case ErrStatus indicates error, or XY-CmdConfirm is present. It may be generated in case ErrStatus indicates success or XY-CmdConfirm is not present.

Upon receipt of XY-COMMAND.confirm, disregard of its implementation, ErrStatus and XY-CmdConfirm shall be evaluated and a possible action shall be performed properly. Details are outside the scope of this document.

6.3 XY-REQUEST service

6.3.1 XY-REQUEST.request service primitive

The service primitive XY-REQUEST.request allows an ITS-S layer or the ITS-S application entity to trigger an action at the ITS-S management or security entity.

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

```
XY-REQUEST.request    (
                        CommandRef,
                        XY-Request
                        )
```

Table 3 — XY-REQUEST.request parameter description

Name	Description
CommandRef	Unique cyclic reference number of command.
XY-Request.No	Reference number of service function.
XY-Request.Value	Service function.

An XY-REQUEST.request shall be generated by an ITS-S layer or the ITS-S application entity when the ITS-S management or security entity shall perform an action.

Upon receipt of XY-REQUEST.request, disregard of its implementation, the required action shall be performed. Details are outside the scope of this document.

6.3.2 XY-REQUEST.confirm service primitive

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

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

```
XY-REQUEST.confirm
(
    CommandRef,
    XY-ReqConfirm,
    ErrStatus
)
```

Table 4 — XY-REQUEST.confirm Parameter description

Name	Description
CommandRef	Unique cyclic reference number of command. Same value as in related XY-REQUEST.request.
XY-ReqConfirm.No	Reference number of service function. Same value as XY-Request.No in related MN-REQUEST.request.
XY-ReqConfirm.Value	Service function; carries optional confirm data.
ErrStatus	Error/return code, see Table B.1 .

An XY-REQUEST.confirm shall be generated by the respective ITS station management or security entity upon performance of a previous XY-REQUEST.request in case ErrStatus indicates error or XY-ReqConfirm is present. It may be generated in case ErrStatus indicates success or XY-ReqConfirm is not present.

Upon receipt of XY-REQUEST.confirm, disregard of its implementation, ErrStatus and MN-ReqConfirm shall be evaluated and a possible action shall be performed properly. Details are outside the scope of this document.

7 MI-SAP

7.1 General

In addition to the MI-COMMAND, MI-REQUEST, SI-COMMAND, and SI-REQUEST service, the following services are specified for the MI-SAP:

- the service MI-SET that allows the ITS-S management entity to set I-Parameter values in a "(Virtual) Communication Interface" (CI, VCI); see ISO 21218[4];
- the service MI-GET that allows the ITS-S management entity to read I-Parameter values from a (virtual) CI.

Setting of I-Parameter values is built on the service primitives MI-SET.request and MI-SET.confirm.

Reading of I-Parameter values is built on the service primitives MI-GET.request and MI-GET.confirm.

The functionality of these service primitives, disregard of their implementation, shall be as defined in ASN.1; the respective ASN.1 specifications are provided in [Annex A](#):

- MI-SET.request is of ASN.1 type MI-Set-request;
- MI-SET.confirm is of ASN.1 type MI-Set-confirm;
- MI-GET.request is of ASN.1 type MI-Get-request;
- MI-GET.confirm is of ASN.1 type MI-Get-confirm.

NOTE Station-internal management communications between the ITS-S management entity and the ITS-S access layer in other ITS-SCUs is provided by the PDUs "MI-rset", "MI-rget", "MI-rcmd" and "MI-rreq" specified in ISO 24102-4[7].

7.2 MI-SET service

7.2.1 MI-SET.request service primitive

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 5 — MI-SET.request parameter description

Name	Description	Component of MI-Set-request
Link-ID	Unique identifier of a VCI/CI.	linkID
CommandRef	Unique cyclic reference number of command.	commandRef
Sequence of I-Param	I-Parameters specified in ISO 21218[4].	set-params

An MI-SET.request is generated by the ITS-S management entity when I-Parameters specified in ISO 21218[4] shall be set.

Upon receipt of MI-SET.request, disregard of its implementation, the selected parameters shall be set if applicable.

7.2.2 MI-SET.confirm service primitive

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,
    SequenceOfErrors,
    ErrorCode
)
```

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 6 — MI-SET.confirm parameter description

Name	Description	Component of MI-Set-confirm
Link-ID	Unique identifier of a VCI/CI.	linkID
CommandRef	Unique cyclic reference number of command.	commandRef
SequenceOfErrors	Sequence of information elements for I-Parameters (I-Param.No and error status code) where setting of a value failed.	errors
ErrorCode	General error status code of the MI-SET.request	errStatus

Error status codes shall be as specified in [Annex B](#). These are used in the parameter SequenceOfErrors, and in the parameter ErrorCode.

Possible error status codes used in the parameter SequenceOfErrors are listed below.

- 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".
- In case a general error not covered by the above error codes occurs, the request shall be acknowledged with ErrStatus 1 "UNSPECIFIED ERROR".

Possible error status codes used in the parameter ErrorCode are listed below

- Successful setting of all parameters may be acknowledged with ErrStatus 0 "SUCCESS".
- Any kind of failure shall be acknowledged with ErrStatus 1 "UNSPECIFIED ERROR" with details to be reported in the parameter Sequence of errors.

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

Upon receipt of MI-SET.confirm, the ITS-S management entity shall evaluate the sequence of errors, if applicable, and act accordingly. Details are outside the scope of this document.

7.3 MI-GET service

7.3.1 MI-GET.request service primitive

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

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

```
MI-GET.request
(
  Link-ID,
  CommandRef
  SequenceOf_I-ParamNo
)
```

Table 7 — MI-GET.request parameter description

Name	Description	Component of MI-Get-request
Link-ID	Unique identifier of a VCI/CI.	linkID
CommandRef	Unique cyclic reference number of command.	commandRef
SequenceOf_I-ParamNo	Sequence of I-Paramter reference numbers, see ISO 21218[4].	get-param-no

An MI-GET.request is generated by the ITS-S management entity when I-Parameter values shall be retrieved.

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

7.3.2 MI-GET.confirm service primitive

The 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,
  SequenceOf_I-Param
)
```

Table 8 — MI-GET.confirm parameter description

Name	Description	Component of MI-Get-confirm
Link-ID	Unique identifier of a VCI/CI.	linkID
CommandRef	Unique cyclic reference number of command.	commandRef
SequenceOf_I-Param	Sequence of successfully retrieved I-Parameters, followed by sequence of status information elements for I-Parameters (I-Param.No and error status code) where retrieval of a value failed..	get-param
ErrorCode	General error status code of the MI-GET.request	errStatus

Error status codes shall be as specified in [Annex B](#). These are used in the parameter SequenceOf_I-Params, and in the parameter ErrorCode.