FINAL DRAFT
Technical Specification

# ISO/DTS 26048-1

# Intelligent transport systems — Field device Simple Network Management Protocol (SNMP) data interface —

## Part 1: Global objects

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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 document 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).

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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*.

A list of all parts in the ISO 26048 series can be found on the ISO website.

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# Intelligent transport systems — Field device Simple Network Management Protocol (SNMP) data interface —

# Part 1: Global objects

## 1 Scope

Field devices are a key component in intelligent transport systems (ITS). Field devices include traffic signals, message signs, weather stations, traffic sensors, roadside equipment for connected ITS environments, etc.

The ISO 26048 series defines data that can be used to manage field devices, including device configuration, control and monitoring. Field devices can be quite complex, necessitating the standardization of many data concepts for exchange. As such, the ISO 26048 series is divided into several individual parts. This document (ISO 26048-1) introduces the ISO 26048 series, provides content that is normatively referenced in subsequent parts, and defines data that is applicable to the management of a wide range of field devices.

The scope of the ISO 26048 series does not define the logic used by the management station, the underlying protocols used to exchange the defined data elements, or internal design of the field device. However, the ISO 26048 series does define functional requirements on the interface and assumes an interface based on an SNMPv3 environment as specified by ISO 15784-2.

NOTE Many of the concepts defined in this document were derived from NTCIP 1103[1] and NTCIP 1201,[2] however, the design has been updated to better address security concerns. It is expected that future versions of NTCIP will migrate to the design defined in this document.

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## 2 Normative references

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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 15784-2, *Intelligent transport systems (ITS) — Data exchange involving roadside modules communication — Part 2: Centre to field device communications using Simple Network Management Protocol (SNMP)*

ISO/IEC 8825-1, *Information technology — ASN.1 encoding rules — Part 1: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

ISO/IEC 8825-7, *Information technology — ASN.1 encoding rules — Part 7: Specification of Octet Encoding Rules (OER)*

ISO/IEC/IEEE 24765, *Systems and software engineering — Vocabulary*

ISO/TS 14812, *Intelligent transport systems — Vocabulary*

RFC 3415, *View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)*

RFC 4217, *Securing FTP with TLS*

RFC 5424, *The Syslog Protocol*

RFC 5676, *Definitions of Managed Objects for Mapping SYSLOG Messages to Simple Network Management Protocol (SNMP) Notifications*

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RFC 8446, *The Transport Layer Security (TLS) Protocol Version 1.3*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC/IEEE 24765, ISO/TS 14812 and the following apply.

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

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

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

**3.1**
**command generator**
*Simple Network Management Protocol (SNMP) application* (3.19) that monitors and manipulates management information

**3.2**
**command responder**
*Simple Network Management Protocol (SNMP) application* (3.19) that provides access to management information

**3.3**
**control object**
writable *Simple Network Management Protocol (SNMP) object* (3.23) used to request immediate activation of a feature or state of the *field device* (3.5)

Note 1 to entry: Although control objects are writable, they are not considered part of the agent configuration and are therefore not *database parameters* (3.4).

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**3.4**
**database parameter**
writable Simple Network Management Protocol (SNMP) object used to configure an *SNMP agent* (3.18) and that can be set and validated using a single SNMP SetRequest-PDU

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**3.5**
**field device**
fixed or portable roadside module that includes a *Simple Network Management Protocol (SNMP) agent* (3.18)

**3.6**
**fire**
start a process when a *trigger* (3.28) value transitions from false to true

**3.7**
**inform**
*notification* (3.11) sent with an expectation of an acknowledgement

**3.8**
**interrelated parameter**
writable *Simple Network Management Protocol (SNMP) object* (3.23) used to configure an *SNMP agent* (3.18) and that is designed to require the use of multiple SNMP SetRequest-PDUs prior to validating and implementing a new value

Note 1 to entry: The need for multiple SetRequest-PDUs is typically due to the number of other SNMP objects that are associated with the object. For example, a table can contain a column indicating a percent value where all rows of the table are supposed to equal 100. Configuring all rows within the table at once can exceed the size limitations on a single PDU. In this case, the designer can declare the SNMP object to be an interrelated parameter.

Note 2 to entry: Interrelated parameters are set using the transaction feature defined in 8.21.

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**3.9**
**log**
registry of data *snapshots* (3.17) within a *Simple Network Management Protocol (SNMP) agent* (3.18) that can be retrieved by an *SNMP manager* (3.22)

**3.10**
**management station**
system that manages one or more *field devices* (3.5) with a *Simple Network Management Protocol (SNMP) manager* (3.22)

**3.11**
**notification**
Simple Network Management Protocol (SNMP) message from a *SNMP agent* (3.18) that is generated independently from any explicit request

Note 1 to entry: While a notification is not generated in response to any explicit request, it can be generated based on configured parameters stored within the *SNMP agent* (3.18).

**3.12**
**notification originator**
*Simple Network Management Protocol (SNMP) application* (3.19) that initiates asynchronous messages

**3.13**
**notification receiver**
*Simple Network Management Protocol (SNMP) application* (3.19) that processes asynchronous messages

**3.14**
**principal**
entity on whose behalf services are provided or processing takes place

EXAMPLE 1 An individual.

EXAMPLE 2 An application.

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**3.15**
**proxy forwarder**
*Simple Network Management Protocol (SNMP) application* (3.19) that forwards messages between entities

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Note 1 to entry: Proxy forwarder applications typically change the protocol or message model as a part of their functionality.

**3.16**
**response time**
time from the receipt of a Confirmed Class pduType by the *command responder* (3.2) to the sending of the response PDU by the command responder

Note 1 to entry: For this document, the response time is measured at the application programming interface of the command responder. Any delays imposed within the lower layers are network delays and are not included in the response time.

**3.17**
**snapshot**
**data snapshot**
information captured when a *trigger* (3.28) *fires* (3.6) within a *Simple Network Management Protocol (SNMP) agent* (3.18)

Note 1 to entry: A snapshot can be used in the generation of an SNMP *notification* (3.11) or the creation of a new entry within a *log* (3.9).

**3.18**
**SNMP agent**
*Simple Network Management Protocol (SNMP) entity* (3.20) containing one or more *command responder* (3.2) and/or *notification originator* (3.12) applications

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**3.19**
**SNMP application**
application that provides specific functional processing of Simple Network Management Protocol (SNMP) management data

**3.20**
**SNMP entity**
implementation of one or more Simple Network Management Protocol (SNMP) message processing models with one or more associated *SNMP applications* (3.19)

Note 1 to entry: An SNMP entity may also support one or more security models.

**3.21**
**SNMP field manager**
fixed or portable roadside module that includes a *Simple Network Management Protocol (SNMP) agent* (3.18) and an *SNMP manager* (3.22)

Note 1 to entry: SNMP field managers are *field devices* (3.5) that can control other field devices.

**3.22**
**SNMP manager**
*Simple Network Management Protocol (SNMP) entity* (3.20) containing one or more *command generator* (3.1) and/or *notification receiver* (3.13) applications

**3.23**
**SNMP object**
instance of a data element within a *field device* (3.5) that can be exchanged via Simple Network Management Protocol (SNMP)

Note 1 to entry: SNMP objects can be categorized as *control objects* (3.3), *database parameters* (3.4), *interrelated parameters* (3.8), or *status objects* (3.26).

**3.24**
**SNMP target**
*Simple Network Management Protocol (SNMP) entity* (3.20) to which another SNMP entity can send requests or *notifications* (3.11)

Note 1 to entry: *SNMP agents* (3.18) use the concept of a target to identify the *SNMP manager* (3.22) to which a notification is to be sent.

Note 2 to entry: *Field devices* (3.5) can be configured to request data from other field devices to use in their expression or *trigger* (3.28) logic.

Note 3 to entry: Field devices can be configured to control other field devices in response to a trigger firing.

**3.25**
**standardized request**
get or set request that conforms to the specification of a request message included in a dialogue defined within a document approved by a standards development organization

**3.26**
**status object**
read-only SNMP object

Note 1 to entry: Status objects are typically used to report the conditions that can be monitored by the *SNMP agent* (3.18).

**3.27**
**trap**
*notification* (3.11) sent without any expectation of an acknowledgement

**3.28**
**trigger**
condition that evaluates to a Boolean value

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## 4 Symbols and abbreviated terms

| | |
|---|---|
| ARC-IT | architecture reference for cooperative and intelligent transportation |
| ASCII | American standard code for information interchange |
| ASN.1 | abstract syntax notation one |
| C-PICS | consolidated protocols implementation conformance statement |
| DTLS | datagram transport layer security |
| (D)TLS | datagram transport layer security or transport layer security |
| FTRT | feature-to-requirement traceability |
| IETF | Internet Engineering Task Force |
| IP | internet protocol |
| IPsec | internet protocol security |
| ISO | International Organization for Standardization |
| ITS | intelligent transport systems |
| ITS-S | ITS station |
| MIB | management information base |
| NTCIP | national transportation communications for ITS protocol |
| NTFT | need-to-feature traceability |
| OID | object identifier |
| PDU | protocol data unit |
| PT | predicate traceability |
| RFC | request for comments |
| RTM | requirements traceability matrix |
| SMI | structure and management of information |
| SNMP | simple network management protocol |
| SRSA | supplemental roadside sensor and actuator |
| TCP | transport control protocol |
| TLS | transport layer security |
| UDP | user datagram protocol |
| USM | user-based security model |
| VACM | view-based access model |

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# 5 Conventions and architecture

## 5.1 ISO maintenance portal

This document is accompanied by electronic attachments that form an integral part of this document and are available for download through the ISO maintenance portal at https://standards.iso.org/iso/ts/26048/-1/ed-1/en.

## 5.2 MIB files

This document normatively incorporates one or more management information bases (MIBs), which conform to RFC 2578, RFC 2579, and RFC 2580. These files are defined in ASCII text files, which can be accessed electronically from the ISO maintenance portal as indicated in 5.1.

The filename for each component MIB is the name of the MIB with a ".mib" extension. A complete listing of MIBs associated with this document is contained in Annex B.

## 5.3 ASN.1

This document contains references to and explanations of ASN.1 data concepts[3] within its text. In all cases, the ASN.1 terms are presented in a fixed width font (e.g. `such as this`) to distinguish these terms from normal English.

## 5.4 Conformance

Conformance and consistency to this document is defined by the traceability tables available through the ISO Maintenance Portal, including the need-to-feature traceability (NTFT) table, the feature-to-requirements traceability (FTRT) table, and the requirements traceability matrix (RTM).

Each item of conformance in this document is worded as if it has been selected in these tables. For example, requirements are stated as simple "shall" statements even if they are listed as optional in the FTRT table. The applicability of each item of conformance is defined in the traceability tables as discussed further in Annex A.

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ISO/DTS 26048-1
https://standards.iteh.ai/catalog/standards/iso/f9dc43d2-f5b9-43e4-9206-9ca2f756a74b/iso-dts-26048-1

## 5.5 SNMP terminology

Terminology between the different versions of SNMP is slightly different. For the purposes of the ISO 26048 series, the terminology of SNMPv3 is adopted.

## 5.6 Architecture

### 5.6.1 ITS services

The ISO 26048 series defines mechanisms by which field devices can be monitored, configured and controlled. Field devices may be used to support almost any ITS service with a roadside component. Reference [4] provides a listing of known ITS services.

### 5.6.2 Functional view of interface

The ISO 26048 series is concerned with defining the data concepts used to manage a field device. The data concepts defined in this document have been defined based on needs derived from an analysis of various services contained within the architecture reference for cooperative and intelligent transportation (ARC-IT).[5]

### 5.6.3 Physical view

Figure 1 depicts the physical view of this interface using the graphical conventions defined by ARC-IT and documented in ISO 14813-5:2020, Annex B.

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