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Intelligent transport systems — Roadside modules SNMP data interface —

Part 5: Logs

Systèmes de transport intelligents — Interface de données SNMP pour les modules en bord de route —

Partie 5: Journal d'événements

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Foreword

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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 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).

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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 20684 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.

Introduction

0.1 Background

The need for standardized communication with ITS field devices is growing around the world. Several countries have adopted Simple Network Management Protocol (SNMP) based field device communication standards.

There is a growing view and empirical evidence that standardizing this activity will result in improved ITS performance, reduced cost, reduced deployment time, and improved maintainability. The ISO 20684 series extends ISO 15784-2 by defining the management information necessary to monitor, configure and control features of field devices. The data elements defined in all parts of ISO 20684 series may be used with any protocol but were designed with an expectation that they would be used with one of the ISO 15784-2 protocols.

By using this approach, agencies can specify open procurements and systems can be expanded geographically in an open and non-proprietary manner, which reduces costs, speeds up deployment, and simplifies integration.

0.2 Overview

SNMP is a collection of well-thought-out and well-proven concepts and principles. SNMP employs the sound principles of abstraction and standardization. This has led to SNMP being widely accepted as the prime choice for communication between management systems and devices on the internet and other communications networks.

The original implementation of SNMP was used to manage network devices such as routers and switches. Since then, the use of SNMP has grown into many areas of application on the internet and has also been used successfully over various serial communications networks.

This document defines management information for ITS field devices following the SNMP conventions.

0.3 Document approach and layout

This document defines:

a) the conformance requirements for this document (Clause 4);

b) a set of user needs for user-defined trigger conditions that can “fire” to initiate actions (Clause 5);

c) a set of detailed requirements for the identified user needs (Clause 6);

d) custom dialogues for the logging feature (Clause 7);

e) security considerations for the information defined in this document (Clause 8);

f) the management information bases that define the data for the defined requirements (Annex A);

g) the requirements traceability matrix (RTM) that traces the requirements to the design elements (Annex B).

Intelligent transport systems — Roadside modules SNMP data interface —

Part 5: Logs

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 (C-ITS) environments, etc.

Field devices often need to exchange information with other external entities (managers). Field devices can be quite complex, necessitating the standardization of many data concepts for exchange. As such, the ISO 20684 series is divided several individual parts.

This document specifies the user needs, requirements and design elements that are used to record timestamped information in a log for later retrieval. This allows a manager to determine the state of a particular object instance nearly simultaneously when the trigger action occurs without frequent polling.

NOTE 1 There are similarities between certain portions of NTCIP 1103.

NOTE 2 ISO 20684-1 provides additional details about how the ISO 20684 series relates to the overall ITS architecture.

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 20684-1:2021, *Intelligent transport systems — Roadside modules SNMP data interface — Part 1: Overview*

ISO/TS 20684-7, *Intelligent transport systems – Roadside modules SNMP data interface – Part 7: Support features*

IETF RFC 2578, *Structure of Management Information Version 2 (SMIv2), April 1999*.

IETF RFC 2579, *Textual Conventions for SMIv2, April 1999*.

IETF RFC 2580, *Conformance Statements for SMIv2, April 1999*.

IETF RFC 3411, *An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks, December 2002*.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20684-1 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/

4 Conformance

This clause follows the rules defined in ISO 20684-1. Table 1 traces each user need to a set of software features. Table 2 traces each feature to a set of requirements. For a full understanding of these tables and codes, see ISO 20684-1.

Table 1 — User need and feature conformance

Need	Requirement	Conformance
5.1: Log user-defined exceptions		M
	6.1: Log	M
	6.3: Log manager	M
	20684-7 6.2: UTC clock	M
	20684-7 6.4: Object group	O

Table 2 — Requirement conformance

Feature	Requirement	Conformance
6.1: Log		
	6.1.2.1: Determine log capabilities	M
	6.1.2.2: Configure global logging limits	M
	6.1.2.3: Verify global logging configuration	M
	6.1.2.4: Retrieve logged event	M
	6.1.3.1: Maximum data size	M
6.2: Log event factory		
	6.2.2.1: Configure a log event factory	M
	6.2.2.2: Verify configuration of log event factory	M
	6.2.2.3: Toggle log event factory	M
	6.2.2.4: Delete log event factory	M
6.3: Log manager		
	6.3.2.1: Configure a log manager	M
	6.3.2.2: Verify log manager configuration	M
	6.3.2.3: Retrieve log manager statistics	M
	6.3.2.4: Retrieve log manager summary statistics	M
	6.3.2.5: Retrieve log manager status	M
	6.3.2.6: Toggle a log manager	M
	6.3.2.7: Clear old events from log	M
	6.3.2.8: Clear all logs	M
	6.3.2.9: Delete a log manager	M
	6.3.2.10: Delete all log managers of an owner	M
	6.3.3.1: Latency of event logging	M

5 User needs

5.1 Log user-defined exceptions

5.1.1 Log user-defined exceptions user need

A manager needs to be able to configure a field device to log events for later retrieval. This user need allows a manager to detect transient conditions that can potentially occur between successive polls as well as capturing accurate timestamps of when different events occurred. A manager can potentially need to manage multiple types of events separately and multiple managers can wish to monitor the same or different events.

EXAMPLE 1 A manager wants the device to record the number of vehicles counted every 15 min so that the manager can retrieve the information at the end of each day.

EXAMPLE 2 A manager wants to retrieve diagnostic events (e.g. cabinet door open) separately from operational events (e.g. a new message on a sign). This can perhaps be due to internal logic or perhaps because two separate systems communicate with the device.

5.1.2 Log user-defined exception design overview

5.1.2.1 Required features

In the simplest case, the "log user-defined exceptions" user need shall support the following features.

a) A mechanism to initiate the logging action, such as one of the triggering mechanisms specified in ISO/TS 20684-3.

b) A log event factory, as defined by this document, which defines details about the event to be created when the logging action is initiated as well as the log in which it will be stored.

3. A log manager, as defined by this document, which allows for the management of each log.

4. A log, as defined by this document, which stores the events created by the log event factory.

5. UTC clock, as specified by ISO/TS 20684-7, which is used to timestamp entries in the log.

5.1.2.2 Optional object group feature

An implementation can support the object group feature, as specified by ISO/TS 20684-7, which can be used to define a group of multiple object instances to be stored within a log entry as a single field.

5.1.3 Graphical relationships

The relationships among these features are depicted in Figure 1.

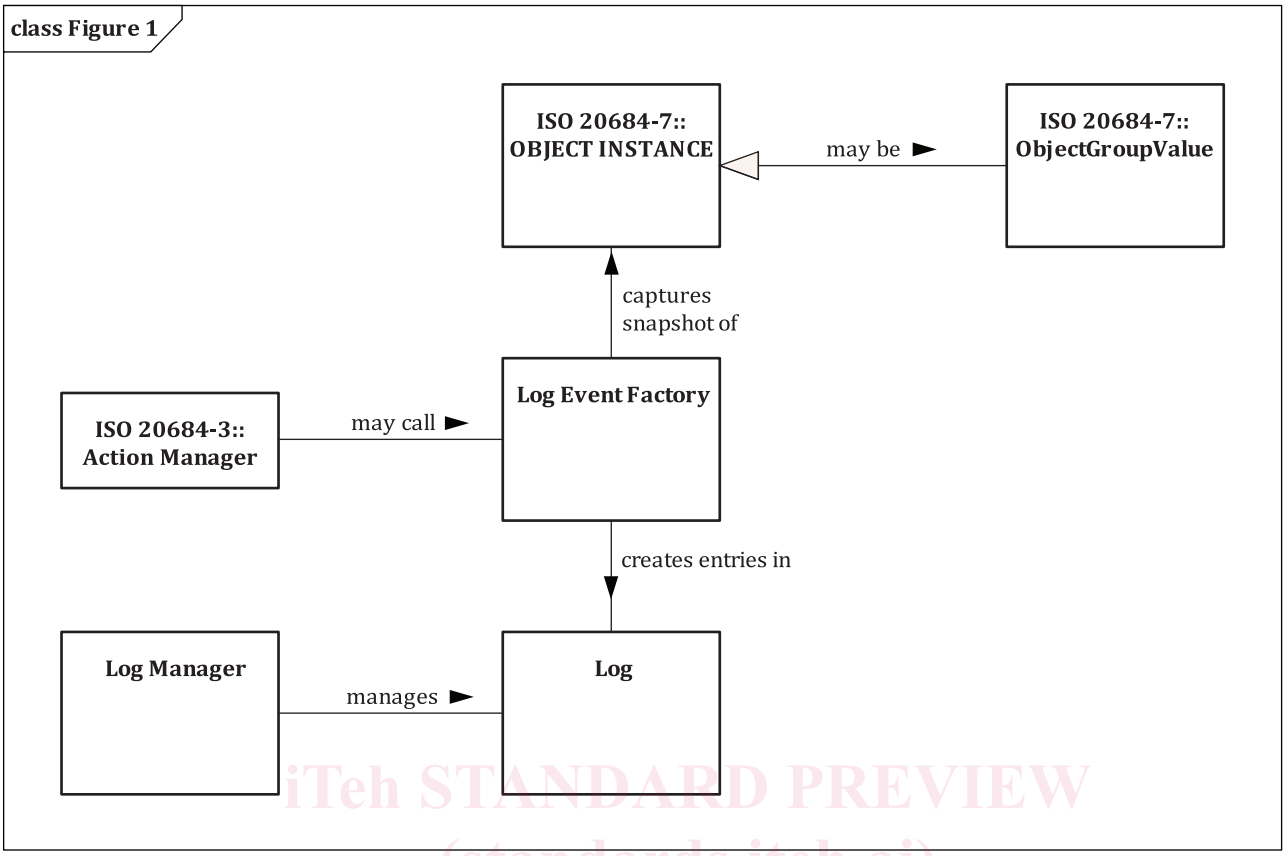

Figure 1 — Conceptual overview of logging

When a trigger (defined in ISO/TS 20684-3) fires, it calls an action (ISO/TS 20684-3), which may direct the call to a LogEventFactory. When called, the LogEventFactory captures a defined object value from the device and records this in a new entry in the identified log based on configured parameters.

While the log entry only records a single object instance value, the object instance can potentially be an instance of fdObjectGroupCurrentValue (ISO/TS 20684-7), which can contain multiple object instance values packaged in an efficient manner.

The log can be managed (e.g. fully or partially cleared) using the LogManager. The LogManager also reports statistics for the log.

6 Requirements

6.1 Log

6.1.1 Log definition

A log is a store of event information for later retrieval.

A log manager creates a log entry when it is called (e.g. by a properly configured action as per ISO/TS 20684-3). The event entry includes a timestamp of the event and the current value of a specified object instance.

6.1.2 Log data exchange requirements

6.1.2.1 Determine log capabilities

The field device shall allow the manager to determine the maximum size for the value that can be logged for each entry and the maximum latency of log entries.

6.1.2.2 Configure global logging limits

The field device shall allow a manager to configure global limits for the log, including the maximum size of stored data, the maximum number of events, and the maximum age of events.

6.1.2.3 Verify global logging configuration

The field device shall allow a manager to retrieve the configuration of the global logging parameters.

6.1.2.4 Retrieve logged event

The field device shall allow a manager to retrieve a log entry.

6.1.3 Log capability requirements

6.1.3.1 Maximum data size

The log shall be able to store data values of at least 400 octets for each log entry.

6.2 Log event factory

6.2.1 Log event factory definition

The log event factory creates new LogEntries when called from an external process, such as the fdActionTable, as defined in ISO/TS 20684-3.

6.2.2 Log event factory data exchange requirements

6.2.2.1 Configure a log event factory

The field device shall allow a manager to configure a log event factory by specifying the object instance whose value should be recorded and the log in which the value should be stored.

6.2.2.2 Verify configuration of log event factory

The field device shall allow a manager to determine the configuration of a log event factory.

6.2.2.3 Toggle log event factory

The field device shall allow a manager to toggle the enabled status of a log event factory.

6.2.2.4 Delete log event factory

The field device shall allow a manager to delete a log event factory.

6.3 Log manager

6.3.1 Log manager definition

A log manager is responsible for entering events into its associated log when called by logic (e.g. ISO/TS 20684-3) and ensuring that the log does not grow beyond its designated size.

6.3.2 Log management data exchange requirements

6.3.2.1 Configure a log manager

The field device shall allow a manager to configure a log manager by specifying its:

a) description;

b) maximum number of entries;

c) maximum storage size; and

d) storage type.

6.3.2.2 Verify log manager configuration

The field device shall allow a manager to retrieve the configuration of a log manager.

6.3.2.3 Retrieve log manager statistics

The field device shall allow a manager to retrieve:

a) the number of events that have been logged in a specific log; and

b) the number of event entries that have been bumped for a specific log.

6.3.2.4 Retrieve log manager summary statistics

The field device shall allow a manager to retrieve:

a) the total number of events that have been logged in all logs; and

b) the total number of event entries that have been bumped for all logs.

6.3.2.5 Retrieve log manager status

The field device shall allow a manager to retrieve the status of each log manager.

6.3.2.6 Toggle a log manager

The field device shall allow a manager to toggle a log manager on and off.

6.3.2.7 Clear old events from log

The field device shall allow a manager to direct a log manager to clear old events from a specific log.

6.3.2.8 Clear all logs

The field device shall allow a manager to clear all entries in all logs.