TECHNICAL SPECIFICATION

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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).

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*.

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.

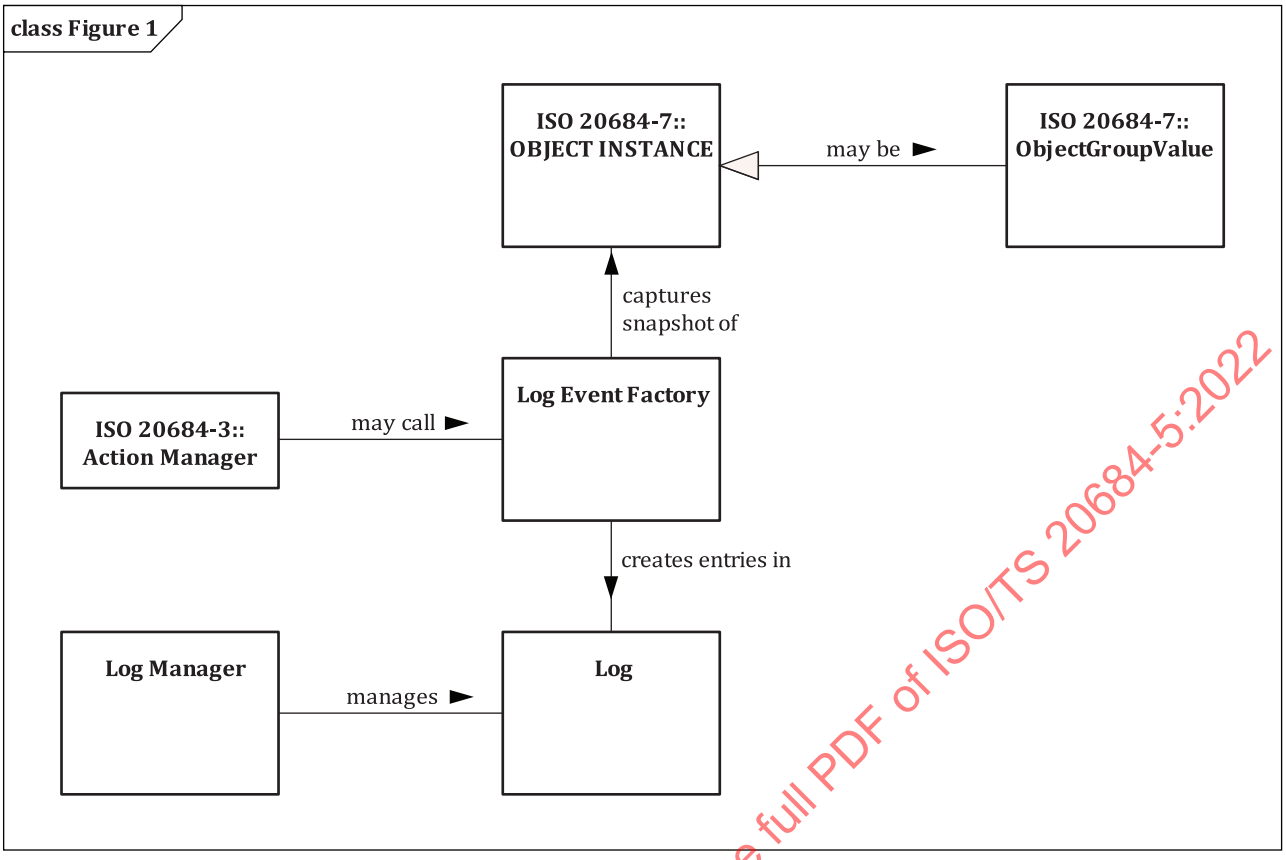

Figure 1 — Conceptual overview of logging

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.

6.3.2.9 Delete a log manager

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

6.3.2.10 Delete all log managers of an owner

The field device shall allow a manager to delete all log managers owned by a specific owner.

6.3.3 Log management capability requirements

6.3.3.1 Latency of event logging

The field device shall enter the notification into the log within 1,0 seconds of the notification being created, unless otherwise specified.

7 Dialogues

7.1 Clear old events from a log

This dialogue shall be initiated by the manager using logic that is implementation specific. The dialogue shall be as follows.

a) The manager shall determine the time before which all log entries should be deleted for a specific log.

b) The manager shall set the value of fdLogManagerClearTiime.x.y and fdLogManagerClearDate.x.y to indicate the desired time, where "x" indicates the fdLogManagerOwner and "y" indicates the fdLogManagerName.

c) The device shall delete entries for the indicated log (i.e. for the indicated log owner and log name) older than the indicated date and time and respond to the request as per the rules of SNMP.

8 Security vulnerabilities

There are data elements defined in this document with a MAX-ACCESS clause of read-write and/or read-create. These and other data elements are sensitive and need to be protected from malicious and inadvertent manipulation and/or disclosure. The support for requests in a non-secure environment without proper protection can have a negative effect on network operations. A sampling of the vulnerabilities includes:

a) the ability to change when events are logged;

b) the ability to delete logs;

c) the ability to create additional log entries that consume resources intended for other purposes; and

d) the ability to monitor current configurations.

To overcome these vulnerabilities, it is highly recommended that SNMPv3 with TLS support, as defined in RFC 6353, is used to exchange the data.

Annex A
(normative)

Management information base (MIB)

This annex provides definitions which it is useful to import into other management information base (MIB) modules of this document.

A.1 Log MIB

```
-- ****************************************************************************
-- A.1.1 Log Header
-- ****************************************************************************

-- ASN1START
LOG-MIB DEFINITIONS ::= BEGIN
IMPORTS

MODULE-IDENTITY, OBJECT-TYPE, OBJECT-IDENTITY, Integer32, Unsigned32, Counter32
                                                    FROM SNMPv2-SMI
                                                      -- RFC 2578

TruthValue, StorageType, RowStatus
                                                    FROM SNMPv2-TC
                                                      -- RFC 2579


MODULE-COMPLIANCE, OBJECT-GROUP
                                                    FROM SNMPv2-CONF
                                                      -- RFC 2580

SnmpAdminString
                                                    FROM SNMP-FRAMEWORK-MIB
                                                      -- RFC 3411

ITSDailyTimeStamp, ITSDateStamp, ITSUnsigned8, ITSOerString, fieldDevice,
iso20684p5
                                                    FROM FIELD-DEVICE-TC-MIB
                                                      -- ISO 20684-1 Annex A

;
fdLogMIB MODULE-IDENTITY
  LAST-UPDATED "202002132330Z"
  ORGANIZATION "ISO TC 204 WG 9"
  CONTACT-INFO
   "name: Kenneth Vaughn
    phone: +1-571-331-5670
    email: kvaughn@trevilon.com
    postal: 6606 FM 1488 RD STE 148-503
            Magnolia, TX 77354
             USA"
  DESCRIPTION
    "This MIB defines a mechanism by which a manager can configure a device to
    record information about events in a log for later retrieval."

  REVISION "202002132330Z"
  DESCRIPTION
    "Initial revision of the document as proposed for CD ballot."

  ::= {iso20684p5 1}


-- ****************************************************************************
-- A.1.2 Node Definitions
```

```
-- ****************************************************************************

fdLogConformance OBJECT-IDENTITY
  STATUS     current
  DESCRIPTION
    "A node containing conformance statements related to the fdLogMIB, as
    defined in ISO/TS 20684-7."
  ::= {fdLogMIB 2}

fdLogCompliances OBJECT-IDENTITY
  STATUS     current
  DESCRIPTION
    "A node for compliance statements for the fdLogMIB."
  ::= {fdLogConformance 1}

fdLogGroups OBJECT-IDENTITY
  STATUS     current
  DESCRIPTION
    "A node for group definitions related to fdLogMIB."
  ::= {fdLogConformance 2}

fdLog OBJECT-IDENTITY
  STATUS     current
  DESCRIPTION
    "A node defining management information related to the field device's Log."
  ::= {fieldDevice 11}

-- ****************************************************************************
-- A.1.3 Objects
-- ****************************************************************************

fdLogsRecordingLatency OBJECT-TYPE
  SYNTAX     Unsigned32
    UNITS      "milliseconds"
  MAX-ACCESS read-only
  STATUS     current
  DESCRIPTION
    "The maximum latency between retrieving an object value and it appearing in
    the log."
  ::= {fdLog 1}

fdLogsMaxVariableSize OBJECT-TYPE
  SYNTAX     Unsigned32
    UNITS      "octets"
  MAX-ACCESS read-only
  STATUS     current
  DESCRIPTION
    "The maximum size for any variable value that can be recorded in the log."
  ::= {fdLog 2}

fdLogsGlobalSizeLimit OBJECT-TYPE
  SYNTAX     Unsigned32
    UNITS      "octets"
  MAX-ACCESS read-write
  STATUS     current
  DESCRIPTION
    "The maximum storage space for variable values allocated for all logs
    within the field device. Any log entry that would cause the global size to
    exceed this limit will cause the log that is recording the log entry to
    delete its oldest entries until the new entry can be added without
    exceeding this limit. If the log is still not able to record the event
    after clearing all other entries, the new entry will also be bumped without
    being recorded."
  ::= {fdLog 3}

fdLogsGlobalEntryLimit OBJECT-TYPE
  SYNTAX     Unsigned32
  MAX-ACCESS read-write
  STATUS     current
  DESCRIPTION
    "The maximum number of log entries allowed for any log. This is designed
```

```
    to allow the system administrator to control the size of logs of other
    managers."
  ::= {fdLog 4}

fdLogsGlobalAgeOut OBJECT-TYPE
  SYNTAX     Unsigned32
    UNITS      "seconds"
  MAX-ACCESS read-write
  STATUS     current
  DESCRIPTION
    "The maximum age, in seconds, for any log entry before it is automatically
    deleted."
  ::= {fdLog 5}

fdLogsTotalLogged OBJECT-TYPE
  SYNTAX     Counter32
  MAX-ACCESS read-only
  STATUS     current
  DESCRIPTION
    "The number of events that have been created across all logs."
  ::= {fdLog 6}

fdLogsTotalBumped OBJECT-TYPE
  SYNTAX     Counter32
  MAX-ACCESS read-only
  STATUS     current
  DESCRIPTION
    "The number of log entries that have been bumped out of the log due to
    size limits or entry limits. Removals due to aging out or due to manual
    requests to clear are not included in this count."
  ::= {fdLog 7}

fdLogsDeleteAllConfiguration OBJECT-TYPE
  SYNTAX     TruthValue
  MAX-ACCESS read-write
  STATUS     current
  DESCRIPTION
    "When set to true, this object shall delete all entries in the log
    manager and log event factory. Access to this object should be granted to
    only the most trusted users."
  ::= {fdLog 8}

fdLogsClearAllLogs OBJECT-TYPE
  SYNTAX     TruthValue
  MAX-ACCESS read-write
  STATUS     current
  DESCRIPTION
    "When set to true, this object will delete all entries in all logs
    contained within the log table. Access to this object should be granted to
    only the most trusted users."
  ::= {fdLog 9}

fdLogEventFactoryTable OBJECT-TYPE
  SYNTAX     SEQUENCE OF FdLogEventFactoryEntry
  MAX-ACCESS not-accessible
  STATUS     current
  DESCRIPTION
    "A table that defines where to log events and what data should be
    recorded with each event."
  ::= {fdLog 10}

fdLogEventFactoryEntry OBJECT-TYPE
  SYNTAX     FdLogEventFactoryEntry
  MAX-ACCESS not-accessible
  STATUS     current
  DESCRIPTION
    "An entry in the fdLogEventFactoryTable. An entry of this table can be
    called by external logic (e.g., the Action table defined in ISO/TS 20684-3)
    to create an entry in the fdLogTable."

  INDEX      {fdLogManagerOwner, fdLogEventFactoryName}
```

```
  ::= {fdLogEventFactoryTable 1}

FdLogEventFactoryEntry ::= SEQUENCE {
                fdLogEventFactoryName          SnmpAdminString,
                fdLogEventFactoryObjectContext SnmpAdminString,
                fdLogEventFactoryObjectID      OBJECT IDENTIFIER,
                fdLogEventFactoryLogName       SnmpAdminString,
                fdLogEventFactoryStorageType   StorageType,
                fdLogEventFactoryRowStatus     RowStatus }

fdLogEventFactoryName OBJECT-TYPE
  SYNTAX     SnmpAdminString (SIZE (0..32))
  MAX-ACCESS not-accessible
  STATUS     current
  DESCRIPTION
    "The name of this Log Event Factory. This name is used to identify the
    type of event that occurred within the log. While it is expected that each
    type of trigger action would be associated with its own event factory, this
    is not a requirement."
  ::= {fdLogEventFactoryEntry 1}

fdLogEventFactoryObjectContext OBJECT-TYPE
  SYNTAX     SnmpAdminString (SIZE (0..32))
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "The management context of the object instance containing the data to be
    retrieved and recorded with the logged event. If the object identifier does
    not point to a valid context at the time that the data is being retrieved,
    the log shall record a zero-length string."
  ::= {fdLogEventFactoryEntry 2}

fdLogEventFactoryObjectID OBJECT-TYPE
  SYNTAX     OBJECT IDENTIFIER
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "The object identifier of the object instance containing the data to be
    retrieved and recorded with the logged event. If the object identifier does
    not point to a valid object instance at the time that the data is being
    retrieved, the log shall record a zero-length string."
  ::= {fdLogEventFactoryEntry 3}

fdLogEventFactoryLogName OBJECT-TYPE
  SYNTAX     SnmpAdminString(SIZE (1..32))
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "The name of the log (fdLogManagerName) into which the event shall be
    recorded. The fdLogOwner shall be the same as the fdLogOwner value
    associated with the entry of this fdLogEventFactoryEntry."
  ::= {fdLogEventFactoryEntry 4}

fdLogEventFactoryStorageType OBJECT-TYPE
  SYNTAX     StorageType
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "The storageType for this conceptual row."
  ::= {fdLogEventFactoryEntry 5}

fdLogEventFactoryRowStatus OBJECT-TYPE
  SYNTAX     RowStatus
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "The status of this conceptual row. Any attempt to modify any read-create
    object within this conceptual row, other than this object, while the
    value of this object is active (1) shall result in an
    inconsistentValue error."
  ::= {fdLogEventFactoryEntry 6}
```

```
fdLogManagerTable OBJECT-TYPE
  SYNTAX     SEQUENCE OF FdLogManagerEntry
  MAX-ACCESS not-accessible
  STATUS     current
  DESCRIPTION
    "A table used to manage the log."
  REFERENCE  "RFC 3014 nlmConfigLogTable, NTCIP 1103 eventClassTable"
  ::= {fdLog 11}

fdLogManagerEntry OBJECT-TYPE
  SYNTAX     FdLogManagerEntry
  MAX-ACCESS not-accessible
  STATUS     current
  DESCRIPTION
    "An entry in the fdLogManagerTable that provides for the management of a
    specific event log (i.e., the set of entries in the fdLogTable with a
    common fdLogOwner and fdLogName)."
  REFERENCE  "RFC 3014 nlmConfigLogEntry, NTCIP 1103 eventClassEntry"
  INDEX      {fdLogManagerOwner, fdLogManagerName}
  ::= {fdLogManagerTable 1}

FdLogManagerEntry ::= SEQUENCE {
               fdLogManagerOwner        SnmpAdminString,
               fdLogManagerName         SnmpAdminString,
               fdLogManagerDescription  SnmpAdminString,
               fdLogManagerSizeLimit    Unsigned32,
               fdLogManagerEntryLimit   Unsigned32,
               fdLogManagerClearDate    ITSDateStamp,
               fdLogManagerClearTime    ITSDailyTimeStamp,
               fdLogManagerLogStorage   StorageType,
               fdLogManagerEventsLogged Counter32,
               fdLogManagerEventsBumped Counter32,
               fdLogManagerStorageType  StorageType,
               fdLogManagerRowStatus    RowStatus }

fdLogManagerOwner OBJECT-TYPE
  SYNTAX     SnmpAdminString(SIZE (1..32))
  MAX-ACCESS not-accessible
  STATUS     current
  DESCRIPTION
    "The owner of this entry. The exact semantics of this string are subject to
     the security policy defined by the security administrator."
  ::= {fdLogManagerEntry 1}

fdLogManagerName OBJECT-TYPE
  SYNTAX     SnmpAdminString(SIZE (1..32))
  MAX-ACCESS not-accessible
  STATUS     current
  DESCRIPTION
    "The name of this entry, unique within the scope of the fdLogOwner."
  ::= {fdLogManagerEntry 2}

fdLogManagerDescription OBJECT-TYPE
  SYNTAX     SnmpAdminString
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "A description of the purpose of this log."
  REFERENCE  "NTCIP 1103 eventClassDescription"
  ::= {fdLogManagerEntry 3}

fdLogManagerSizeLimit OBJECT-TYPE
  SYNTAX     Unsigned32
    UNITS      "octets"
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "The maximum number of octets allowed for all fdLogValue instances with
    this fdLogManagerOwner and fdLogManagerName. A new log entry that would
    cause the log to exceed this limit shall cause the oldest logged event(s)
```

```
    to be bumped and deleted from the log until the new entry can be stored
    within the limit."
  ::= {fdLogManagerEntry 4}

fdLogManagerEntryLimit OBJECT-TYPE
  SYNTAX     Unsigned32
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "The maximum number of events to be stored in the log. A new log entry
    that would cause the log to exceed this value shall cause the oldest logged
    event to be bumped and deleted from the log."
  ::= {fdLogManagerEntry 5}

fdLogManagerClearDate OBJECT-TYPE
  SYNTAX     ITSDateStamp
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "The date component of the clear date and time. Upon setting this value,
    the log manager shall delete any fdLogEntry that has the same fdLogOwner
    and fdLogName as the instance of fdLogManagerClearDate and was entered into
    the log after the defined clear date and time (i.e., the entry is deleted
    only if fdLogManagerClearDate and fdLogManagerClearTime specify an instant
    that is after the values for fdLogDate and fdLogTime for the entry). If a
    new event occurs and the clear date and time represents an instant in time
    that is in the future, the event shall not be recorded in the log and the
    event counters shall not be incremented."
  ::= {fdLogManagerEntry 6}

fdLogManagerClearTime OBJECT-TYPE
  SYNTAX     ITSDailyTimeStamp
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "The time component of the clear date and time. Upon setting this value,
    the log manager shall delete any fdLogEntry that has the same fdLogOwner
    and fdLogName as the instance of fdLogManagerClearDate and was entered into
    the log after the defined clear date and time (i.e., the entry is deleted
    only if fdLogManagerClearDate and fdLogManagerClearTime specify an instant
    that is after the values for fdLogDate and fdLogTime for the entry). If a
    new event occurs and the clear date and time represents an instant in time
    that is in the future, the event shall not be recorded in the log and the
    event counters shall not be incremented."
  REFERENCE  "NTCIP 1103 eventClassClearTime"
  ::= {fdLogManagerEntry 7}

fdLogManagerLogStorage OBJECT-TYPE
  SYNTAX     StorageType
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "The StorageType for the rows in the fdLogTable that are associated with
    this fdLogManager."
  ::= {fdLogManagerEntry 8}

fdLogManagerEventsLogged OBJECT-TYPE
  SYNTAX     Counter32
  MAX-ACCESS read-only
  STATUS     current
  DESCRIPTION
    "The number of events that have been recorded in the log since its last
    initialization (e.g., since the log was created or the last reboot if the
    log storage is volatile). This number shall be the same as the fdLogIndex
    of the newest entry in the log."
  ::= {fdLogManagerEntry 9}

fdLogManagerEventsBumped OBJECT-TYPE
  SYNTAX     Counter32
  MAX-ACCESS read-only
  STATUS     current
```

```
  DESCRIPTION
    "The number of events associated with this fdLogManagerEntry that have been
    removed due to defined size or entry limits."
  ::= {fdLogManagerEntry 10}

fdLogManagerStorageType OBJECT-TYPE
  SYNTAX     StorageType
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "The storage type for this entry in the fdLogManagerTable."
  ::= {fdLogManagerEntry 11}

fdLogManagerRowStatus OBJECT-TYPE
  SYNTAX     RowStatus
  MAX-ACCESS read-create
  STATUS     current
  DESCRIPTION
    "The status of this conceptual row. Any attempt to modify any read-create
    object within this conceptual row, other than this object, while the
    value of this object is active (1) shall result in an
    inconsistentValue error."
  ::= {fdLogManagerEntry 12}

fdLogTable OBJECT-TYPE
  SYNTAX     SEQUENCE OF FdLogEntry
  MAX-ACCESS not-accessible
  STATUS     current
  DESCRIPTION
    "A table storing logged events."
  REFERENCE  "RFC 3014 nlmLogTable"
  ::= {fdLog 12}

fdLogEntry OBJECT-TYPE
  SYNTAX     FdLogEntry
  MAX-ACCESS not-accessible
  STATUS     current
  DESCRIPTION
    "The record of a logged event."
  REFERENCE  "RFC 3014 nlmLogEntry (reuses nlmLogName as primary index, which
              corresponds to eventLogClass)"
  INDEX      {fdLogManagerOwner, fdLogManagerName, fdLogIndex}
  ::= {fdLogTable 1}

FdLogEntry ::= SEQUENCE {
                fdLogIndex         Unsigned32,
                fdLogFactoryName   SnmpAdminString,
                fdLogValue         ITSOerString,
                fdLogEventDate     ITSDateStamp,
                fdLogEventTime     ITSDailyTimeStamp,
                fdLogDate          ITSDateStamp,
                fdLogTime          ITSDailyTimeStamp,
                fdLogDataLatency ITSUnsigned8 }

fdLogIndex OBJECT-TYPE
  SYNTAX     Unsigned32
  MAX-ACCESS not-accessible
  STATUS     current
  DESCRIPTION
    "The sequential number associated with the event to uniquely identity it
    within the scope of the fdLogOwner and fdLogName."
  ::= {fdLogEntry 1}

fdLogFactoryName OBJECT-TYPE
  SYNTAX     SnmpAdminString(SIZE (1..32))
  MAX-ACCESS read-only
  STATUS     current
  DESCRIPTION
    "The name of the event factory (i.e., fdLogEventFactoryName) that generated
    the entry in the log. This value allows a manager to identify the type of
    event that caused the entry."
```

```
  ::= {fdLogEntry 2}

fdLogValue OBJECT-TYPE
  SYNTAX     ITSOerString
  MAX-ACCESS read-only
  STATUS     current
  DESCRIPTION
    "The OER-encoded value of the fdLogEventFactoryObject that existed when
    this entry was created. In theory, this is the value of the object when
    the event occurred, but in practice there is likely to be some delay
    between the event occurring and the data being obtained and recorded in
    this log (as recorded in the latency field)."
  ::= {fdLogEntry 3}

fdLogEventDate OBJECT-TYPE
  SYNTAX     ITSDateStamp
  MAX-ACCESS read-only
  STATUS     current
  DESCRIPTION
    "The date on which the event was detected according to the UTC Clock within
    the field device."
  ::= {fdLogEntry 4}

fdLogEventTime OBJECT-TYPE
  SYNTAX     ITSDailyTimeStamp
  MAX-ACCESS read-only
  STATUS     current
  DESCRIPTION
    "The time of day at which the event was detected according to the UTC Clock
    within the field device."
  ::= {fdLogEntry 5}

fdLogDate OBJECT-TYPE
  SYNTAX     ITSDateStamp
  MAX-ACCESS read-only
  STATUS     current
  DESCRIPTION
    "The date on which the event was logged in this table according to the UTC
    Clock within the field device."
  REFERENCE  "RFC 3014 nlmLogDateAndTime, NTCIP 1103 eventLogTime"
    ::= {fdLogEntry 6}

fdLogTime OBJECT-TYPE
  SYNTAX     ITSDailyTimeStamp
  MAX-ACCESS read-only
  STATUS     current
  DESCRIPTION
    "The time of day at which the event was logged in this table according
    to the UTC Clock within the field device. The log date and time is mostly
    used internally when clearing entries older than a specified date and time."
  REFERENCE  "RFC 3014 nlmLogTime, NTCIP eventLogTime, NTCIP
              eventLogTimeMilliseconds"
  ::= {fdLogEntry 7}

fdLogDataLatency OBJECT-TYPE
  SYNTAX     ITSUnsigned8
  MAX-ACCESS read-only
  STATUS     current
  DESCRIPTION
    "A concise identification of the latency between when the event was
    detected (e.g., causing a trigger to fire) and when this entry was created
    in the log. The value is represented by the base 2 logarithm of the number
    of milliseconds that elapsed between the event and the time at which the
    data was recorded in the log, multiplied by 10 and rounded to the nearest
    integer value. For example, if exactly one second (1000 ms) elapsed between
    the detection of the event and the recording of data in the log, the
    latency value would be round(log2(1000) * 10) = round(9.966 * 10) =
    round(99.66) = 100. A latency value of 255 represents a latency in excess
    of 12.73 hours."
  ::= {fdLogEntry 8}
```

```
-- ****************************************************************************
-- A.1.4 Conformance Information
-- ****************************************************************************

fdLogMIBCompliance MODULE-COMPLIANCE
  STATUS     current
  DESCRIPTION
    "The conformance statement for the field device log MIB."
  MODULE     -- this module
    MANDATORY-GROUPS {
                fdLogCapabilitiesGroup,
                fdLogGlobalConfigurationGroup,
                fdLogEventFactoryManagementGroup,
                fdLogEventFactoryConfigurationGroup,
                fdLogManagerManagementGroup,
                fdLogManagerConfigurationGroup,
                fdLogManagerStatisticsGroup,
                fdLogManagerSummaryStatisticsGroup,
                fdLogClearGroup,
                fdLogClearAllGroup,
                fdLogManagerDeleteAllGroup,
                fdLogRetrievalGroup
              }
  ::= {fdLogCompliances 1}

fdLogCapabilitiesGroup OBJECT-GROUP
  OBJECTS    {
              fdLogsRecordingLatency,
              fdLogsMaxVariableSize
              }
  STATUS     current
  DESCRIPTION
    "Management information that identifies the capabilities of the logging
    system."
  REFERENCE "Clause 6.1.2.1"
  ::= {fdLogGroups 1}

fdLogGlobalConfigurationGroup OBJECT-GROUP
  OBJECTS    {
              fdLogsGlobalSizeLimit,
              fdLogsGlobalEntryLimit,
              fdLogsGlobalAgeOut
              }
  STATUS     current
  DESCRIPTION
    "Management that allows the configuration of global log parameters."
  REFERENCE "Clause 6.1.2.2, Clause 6.1.2.3"
  ::= {fdLogGroups 2}

fdLogEventFactoryManagementGroup OBJECT-GROUP
  OBJECTS    {
              fdLogEventFactoryRowStatus
              }
  STATUS     current
  DESCRIPTION
    ""
  REFERENCE "Clause 6.2.2.1, Clause 6.2.2.2, Clause 6.2.2.3, Clause 6.2.2.4"
  ::= {fdLogGroups 3}

fdLogEventFactoryConfigurationGroup OBJECT-GROUP
  OBJECTS    {
              fdLogEventFactoryObjectContext,
              fdLogEventFactoryObjectID,
              fdLogEventFactoryLogName,
              fdLogEventFactoryStorageType
              }
  STATUS     current
  DESCRIPTION
    ""
  REFERENCE "Clause 6.2.2.1, Clause 6.2.2.2"
  ::= {fdLogGroups 4}
```

```
fdLogManagerManagementGroup OBJECT-GROUP
  OBJECTS     {
              fdLogManagerRowStatus
              }
  STATUS      current
  DESCRIPTION
    "Management information that provides for creation, deletion, and management
    of an fdLogManagerEntry."
  REFERENCE "Clause 6.3.2.1, Clause 6.3.2.2, Clause 6.3.2.5, Clause 6.3.2.6,
             Clause 6.3.2.9"
  ::= {fdLogGroups 5}

fdLogManagerConfigurationGroup OBJECT-GROUP
  OBJECTS     {
              fdLogManagerDescription,
              fdLogManagerSizeLimit,
              fdLogManagerEntryLimit,
              fdLogManagerLogStorage,
              fdLogManagerStorageType
              }
  STATUS      current
  DESCRIPTION
    "Management information that allows the configuration of an
    fdLogManagerEntry."
  REFERENCE "Clause 6.3.2.1, Clause 6.3.2.2"
  ::= {fdLogGroups 6}

fdLogManagerStatisticsGroup OBJECT-GROUP
  OBJECTS     {
              fdLogManagerEventsLogged,
              fdLogManagerEventsBumped
              }
  STATUS      current
  DESCRIPTION
    "Management information that provides statistics regarding an
     fdLogManagerEntry."
  REFERENCE "Clause 6.3.2.3"
  ::= {fdLogGroups 7}

fdLogManagerSummaryStatisticsGroup OBJECT-GROUP
  OBJECTS     {
              fdLogsTotalLogged,
              fdLogsTotalBumped
              }
  STATUS      current
  DESCRIPTION
    "Management information that provides summary statistics regarding all
    entries within the fdLogManagerTable."
  REFERENCE "Clause 6.3.2.4"
  ::= {fdLogGroups 8}

fdLogClearGroup OBJECT-GROUP
  OBJECTS     {
              fdLogManagerClearDate,
              fdLogManagerClearTime
              }
  STATUS      current
  DESCRIPTION
    "Management information that allows a manager to clear all fdLogEntries that
    have a specified fdLogManagerOwner and fdLogManagerName."
  REFERENCE "Clause 6.3.2.7"
  ::= {fdLogGroups 9}

fdLogClearAllGroup OBJECT-GROUP
  OBJECTS     {
              fdLogsClearAllLogs
              }
  STATUS      current
  DESCRIPTION
    "Management information that allows a manager to clear all fdLogEntries that
```

```
    have a specified fdLogManagerOwner."
  REFERENCE "Clause 6.3.2.8"
  ::= {fdLogGroups 10}

fdLogManagerDeleteAllGroup OBJECT-GROUP
  OBJECTS     {
              fdLogsDeleteAllConfiguration
              }
  STATUS      current
  DESCRIPTION
    "Management information that allows a manager to delete all
    fdLogManagerEntries stored within the field device."
  REFERENCE "Clause 6.3.2.10"
  ::= {fdLogGroups 11}

fdLogRetrievalGroup OBJECT-GROUP
  OBJECTS     {
              fdLogFactoryName,
              fdLogValue,
              fdLogEventDate,
              fdLogEventTime,
              fdLogDate,
              fdLogTime,
              fdLogDataLatency
              }
  STATUS      current
  DESCRIPTION
    "Management information that allows a manager to retrieve a log entry."
  REFERENCE "Clause 6.1.2.4"
  ::= {fdLogGroups 12}


END
-- ASN1END
```