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Notification Log MIB

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects used for logging Simple Network Management Protocol (SNMP) Notifications.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

Table of Contents

1 The SNMP Management Framework	2
2 Overview	3
2.1 Environment	3
2.1.1 SNMP Engines and Contexts	4
2.1.2 Security	4
2.2 Structure	5
2.2.1 Configuration	5
2.2.2 Statistics	6
2.2.3 Log	6
2.3 Example	6
3 Definitions	7
4 Intellectual Property	23
5 References	23
6 Security Considerations	25
7 Author's Address	25
8 Full Copyright Statement	26

1. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in RFC 2571 [RFC2571].
- o Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIV1 and described in STD 16, RFC 1155 [RFC1155], STD 16, RFC 1212 [RFC1212] and RFC 1215 [RFC1215]. The second version, called SMIV2, is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].
- o Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, RFC 1157 [RFC1157]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in RFC 1901 [RFC1901] and RFC 1906 [RFC1906]. The third version of the message protocol is called SNMPv3 and described in RFC 1906 [RFC1906], RFC 2572 [RFC2572] and RFC 2574 [RFC2574].
- o Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, RFC 1157 [RFC1157]. A second set of protocol operations and associated PDU formats is described in RFC 1905 [RFC1905].

- o A set of fundamental applications described in RFC 2573 [RFC2573] and the view-based access control mechanism described in RFC 2575 [RFC2575].

A more detailed introduction to the current SNMP Management Framework can be found in RFC 2570 [RFC2570].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIV2. A MIB conforming to the SMIV1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIV2 will be converted into textual descriptions in SMIV1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.

2. Overview

Systems that support SNMP often need a mechanism for recording Notification information as a hedge against lost Notifications, whether those are Traps or Informs [RFC1905] that exceed retransmission limits. This MIB therefore provides common infrastructure for other MIBs in the form of a local logging function. It is intended primarily for senders of Notifications but could be used also by receivers.

Given the Notification Log MIB, individual MIBs bear less responsibility to record the transient information associated with an event against the possibility that the Notification message is lost, and applications can poll the log to verify that they have not missed important Notifications.

2.1. Environment

The overall environmental concerns for the MIB are:

- o SNMP Engines and Contexts
- o Security

2.1.1. SNMP Engines and Contexts

There are two distinct information flows from multiple notification originators that one may log. The first is the notifications that are received (from one or more SNMP engines) for logging as SNMP informs and traps. The other comprises notifications delivered to an SNMP engine at the interface to the notification originator (using a notification mechanism other than SNMP informs or traps). The latter information flow (using a notification mechanism other than SNMP informs or traps) is modeled here as the SNMP engine (which maintains the log) sending a notification to itself. The remainder of this section discusses the handling of the former information flow - notifications (received in the form of SNMP informs or traps) from multiple SNMP engines.

As described in the SNMP architecture [RFC2571], a given system may support multiple SNMP engines operating independently of one another, each with its own SNMP engine identification. Furthermore, within the purview of a given engine there may be multiple named management contexts supporting overlapping or disjoint sets of MIB objects and Notifications. Thus, understanding a particular Notification requires knowing the SNMP engine and management context from whence it came.

To provide the necessary source information for a logged Notification, the MIB includes objects to record that Notification's source SNMP engine ID and management context name.

2.1.2. Security

Security for Notifications is awkward since access control for the objects in the Notification can be checked only where the Notification is created. Thus such checking is possible only for locally-generated Notifications, and even then only when security credentials are available.

For the purpose of this discussion, "security credentials" means the input values for the abstract service interface function `isAccessAllowed` [RFC2571] and using those credentials means conceptually using that function to see that those credentials allow access to the MIB objects in question, operating as for a Notification Originator in [RFC2573].

The Notification Log MIB has the notion of a "named log." By using log names and view-based access control [RFC2575] a network administrator can provide different access for different users. When an application creates a named log the security credentials of the creator stay associated with that log.

A managed system with fewer resources MAY disallow the creation of named logs, providing only the default, null-named log. Such a log has no implicit security credentials for Notification object access control and Notifications are put into it with no further checking.

When putting locally-generated Notifications into a named log, the managed system MUST use the security credentials associated with that log and MUST apply the same access control rules as described for a Notification Originator in [RFC2573].

The managed system SHOULD NOT apply access control when adding remotely-generated Notifications into either a named log or the default, null-named log. In those cases the security of the information in the log SHOULD be left to the normal, overall access control for the log itself.

The Notification Log MIB allows applications to set the maximum number of Notifications that can be logged, using `nlmConfigGlobalEntryLimit`. Similarly, an application can set the maximum age using `nlmConfigGlobalAgeOut`, after which older Notifications MAY be timed out. Please be aware that contention between multiple applications trying to set these objects to different values MAY affect the reliability and completeness of data seen by each application, i.e., it is possible that one application may change the value of either of these objects, resulting in some Notifications being deleted before the other applications have had a chance to see them. This could be used to orchestrate a denial-of-service attack. Methods for countering such an attack are for further study.

2.2. Structure

The MIB has the following sections:

- o Configuration -- control over how much the log can hold and what Notifications are to be logged.
- o Statistics -- indications of logging activity.
- o Log -- the Notifications themselves.

2.2.1. Configuration

The configuration section contains objects to manage resource use by the MIB.

This section also contains a table to specify what logs exist and how they operate. Deciding which Notifications are to be logged depends

on filters defined in the the `snmpNotifyFilterTable` in the standard SNMP Notification MIB [RFC2573] identified by the initial index (`snmpNotifyFilterName`) from that table.

2.2.2. Statistics

The statistics section contains counters for Notifications logged and discarded, supplying a means to understand the results of log capacity configuration and resource problems.

2.2.3. Log

The log contains the Notifications and the objects that came in their variable binding list, indexed by an integer that reflects when the entry was made. An application that wants to collect all logged Notifications or to know if it may have missed any can keep track of the highest index it has retrieved and start from there on its next poll, checking `sysUpTime` for a discontinuity that would have reset the index and perhaps have lost entries.

Variables are in a table indexed by Notification index and variable index within that Notification. The values are kept as a "discriminated union," with one value object per variable. Exactly which value object is instantiated depends on the SNMP data type of the variable, with a separate object of appropriate type for each distinct SNMP data type.

An application can thus reconstruct the information from the Notification PDU from what is recorded in the log.

2.3. Example

Following is an example configuration of a named log for logging only `linkUp` and `linkDown` Notifications.

In `nlmConfigLogTable`:

```
nlmConfigLogFilterName.5."links"      = "link-status"
nlmConfigLogEntryLimit.5."links"      = 0
nlmConfigLogAdminStatus.5."links"     = enabled
nlmConfigLogOperStatus.5."links"      = operational
nlmConfigLogStorageType.5."links"     = nonVolatile
nlmConfigLogEntryStatus.5."links"     = active
```

Note that `snmpTraps` is:

```
iso.org.dod.internet.snmpV2.snmpModules.snmpMIB.snmpMIBObjects.5
```

Or numerically:

1.3.6.1.6.3.1.1.5

And linkDown is snmpTraps.3 and linkUp is snmpTraps.4.

So to allow the two Notifications in snmpNotifyFilterTable:

```
snmpNotifyFilterMask.11."link-status".1.3.6.1.6.3.1.1.5.3 = ''H
snmpNotifyFilterType.11."link-status".1.3.6.1.6.3.1.1.5.3 = include
snmpNotifyFilterStorageType.11."link-status".1.3.6.1.6.3.1.1.5.3
= nonVolatile
snmpNotifyFilterRowStatus.11."link-status".1.3.6.1.6.3.1.1.5.3
= active

snmpNotifyFilterMask.11."link-status".1.3.6.1.6.3.1.1.5.4 = ''H
snmpNotifyFilterType.11."link-status".1.3.6.1.6.3.1.1.5.4 = include
snmpNotifyFilterStorageType.11."link-status".1.3.6.1.6.3.1.1.5.4
= nonVolatile
snmpNotifyFilterRowStatus.11."link-status".1.3.6.1.6.3.1.1.5.4
= active
```

3. Definitions

NOTIFICATION-LOG-MIB DEFINITIONS ::= BEGIN

IMPORTS

```
MODULE-IDENTITY, OBJECT-TYPE,
Integer32, Unsigned32,
TimeTicks, Counter32, Counter64,
IpAddress, Opaque, mib-2          FROM SNMPv2-SMI
TimeStamp, DateAndTime,
StorageType, RowStatus,
TAddress, TDomain                FROM SNMPv2-TC
SnmpAdminString, SnmpEngineID    FROM SNMP-FRAMEWORK-MIB
MODULE-COMPLIANCE, OBJECT-GROUP  FROM SNMPv2-CONF;
```

notificationLogMIB MODULE-IDENTITY

```
LAST-UPDATED "200011270000Z"          -- 27 November 2000
ORGANIZATION "IETF Distributed Management Working Group"
CONTACT-INFO "Ramanathan Kavasseri
Cisco Systems, Inc.
170 West Tasman Drive,
San Jose CA 95134-1706.
Phone: +1 408 527 2446
Email: ramk@cisco.com"
```

DESCRIPTION

"The MIB module for logging SNMP Notifications, that is, Traps

and Informs."
 -- Revision History

```

      REVISION      "200011270000Z"          -- 27 November 2000
      DESCRIPTION   "This is the initial version of this MIB.
                    Published as RFC 3014"
 ::= { mib-2 92 }

```

```
notificationLogMIBObjects OBJECT IDENTIFIER ::= { notificationLogMIB 1 }
```

```

nlmConfig OBJECT IDENTIFIER ::= { notificationLogMIBObjects 1 }
nlmStats  OBJECT IDENTIFIER ::= { notificationLogMIBObjects 2 }
nlmLog     OBJECT IDENTIFIER ::= { notificationLogMIBObjects 3 }

```

```

--
-- Configuration Section
--

```

```

nlmConfigGlobalEntryLimit OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS   read-write
    STATUS      current
    DESCRIPTION
        "The maximum number of notification entries that may be held
        in nlmLogTable for all nlmLogNames added together. A particular
        setting does not guarantee that much data can be held.

```

If an application changes the limit while there are Notifications in the log, the oldest Notifications MUST be discarded to bring the log down to the new limit - thus the value of nlmConfigGlobalEntryLimit MUST take precedence over the values of nlmConfigGlobalAgeOut and nlmConfigLogEntryLimit, even if the Notification being discarded has been present for fewer minutes than the value of nlmConfigGlobalAgeOut, or if the named log has fewer entries than that specified in nlmConfigLogEntryLimit.

A value of 0 means no limit.

Please be aware that contention between multiple managers trying to set this object to different values MAY affect the reliability and completeness of data seen by each manager."

```

DEFVAL { 0 }
 ::= { nlmConfig 1 }

```

```

nlmConfigGlobalAgeOut OBJECT-TYPE
    SYNTAX      Unsigned32

```



```

UNITS          "minutes"
MAX-ACCESS     read-write
STATUS         current
DESCRIPTION

```

"The number of minutes a Notification SHOULD be kept in a log before it is automatically removed.

If an application changes the value of nlmConfigGlobalAgeOut, Notifications older than the new time MAY be discarded to meet the new time.

A value of 0 means no age out.

Please be aware that contention between multiple managers trying to set this object to different values MAY affect the reliability and completeness of data seen by each manager."

```

DEFVAL { 1440 } -- 24 hours
::= { nlmConfig 2 }

```

```

--
-- Basic Log Configuration Table
--

```

```

nlmConfigLogTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF NlmConfigLogEntry
    MAX-ACCESS       not-accessible
    STATUS           current
    DESCRIPTION
        "A table of logging control entries."
    ::= { nlmConfig 3 }

```

```

nlmConfigLogEntry OBJECT-TYPE
    SYNTAX          NlmConfigLogEntry
    MAX-ACCESS       not-accessible
    STATUS           current
    DESCRIPTION
        "A logging control entry. Depending on the entry's storage type
        entries may be supplied by the system or created and deleted by
        applications using nlmConfigLogEntryStatus."
    INDEX           { nlmLogName }
    ::= { nlmConfigLogTable 1 }

```

```

NlmConfigLogEntry ::= SEQUENCE {
    nlmLogName          SnmpAdminString,
    nlmConfigLogFilterName  SnmpAdminString,
    nlmConfigLogEntryLimit  Unsigned32,
    nlmConfigLogAdminStatus  INTEGER,

```

```
nlmConfigLogOperStatus    INTEGER,  
nlmConfigLogStorageType   StorageType,  
nlmConfigLogEntryStatus   RowStatus  
}
```

nlmLogName OBJECT-TYPE

```
SYNTAX      SnmpAdminString (SIZE(0..32))  
MAX-ACCESS  not-accessible  
STATUS      current  
DESCRIPTION  
    "The name of the log.
```

An implementation may allow multiple named logs, up to some implementation-specific limit (which may be none). A zero-length log name is reserved for creation and deletion by the managed system, and MUST be used as the default log name by systems that do not support named logs."

```
::= { nlmConfigLogEntry 1 }
```

nlmConfigLogFilterName OBJECT-TYPE

```
SYNTAX      SnmpAdminString (SIZE(0..32))  
MAX-ACCESS  read-create  
STATUS      current  
DESCRIPTION
```

"A value of snmpNotifyFilterProfileName as used as an index into the snmpNotifyFilterTable in the SNMP Notification MIB, specifying the locally or remotely originated Notifications to be filtered out and not logged in this log.

A zero-length value or a name that does not identify an existing entry in snmpNotifyFilterTable indicate no Notifications are to be logged in this log."

```
DEFVAL { ''H }  
::= { nlmConfigLogEntry 2 }
```

nlmConfigLogEntryLimit OBJECT-TYPE

```
SYNTAX      Unsigned32  
MAX-ACCESS  read-create  
STATUS      current  
DESCRIPTION
```

"The maximum number of notification entries that can be held in nlmLogTable for this named log. A particular setting does not guarantee that that much data can be held.

If an application changes the limit while there are Notifications in the log, the oldest Notifications are discarded to bring the log down to the new limit.

A value of 0 indicates no limit.

Please be aware that contention between multiple managers trying to set this object to different values MAY affect the reliability and completeness of data seen by each manager."

DEFVAL { 0 }

::= { nlmConfigLogEntry 3 }

nlmConfigLogAdminStatus OBJECT-TYPE

SYNTAX INTEGER { enabled(1), disabled(2) }

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Control to enable or disable the log without otherwise disturbing the log's entry.

Please be aware that contention between multiple managers trying to set this object to different values MAY affect the reliability and completeness of data seen by each manager."

DEFVAL { enabled }

::= { nlmConfigLogEntry 4 }

nlmConfigLogOperStatus OBJECT-TYPE

SYNTAX INTEGER { disabled(1), operational(2), noFilter(3) }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The operational status of this log:

disabled administratively disabled

operational administratively enabled and working

noFilter administratively enabled but either
nlmConfigLogFilterName is zero length
or does not name an existing entry in
snmpNotifyFilterTable"

::= { nlmConfigLogEntry 5 }

nlmConfigLogStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The storage type of this conceptual row."

::= { nlmConfigLogEntry 6 }

nlmConfigLogEntryStatus OBJECT-TYPE

SYNTAX RowStatus
 MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"Control for creating and deleting entries. Entries may be modified while active."

For non-null-named logs, the managed system records the security credentials from the request that sets nlmConfigLogStatus to 'active' and uses that identity to apply access control to the objects in the Notification to decide if that Notification may be logged."

::= { nlmConfigLogEntry 7 }

--

-- Statistics Section

--

nlmStatsGlobalNotificationsLogged OBJECT-TYPE

SYNTAX Counter32
 UNITS "notifications"
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"The number of Notifications put into the nlmLogTable. This counts a Notification once for each log entry, so a Notification put into multiple logs is counted multiple times."

::= { nlmStats 1 }

nlmStatsGlobalNotificationsBumped OBJECT-TYPE

SYNTAX Counter32
 UNITS "notifications"
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"The number of log entries discarded to make room for a new entry due to lack of resources or the value of nlmConfigGlobalEntryLimit or nlmConfigLogEntryLimit. This does not include entries discarded due to the value of nlmConfigGlobalAgeOut."

::= { nlmStats 2 }

--

-- Log Statistics Table

--

nlmStatsLogTable OBJECT-TYPE

SYNTAX SEQUENCE OF NlmStatsLogEntry
 MAX-ACCESS not-accessible

```

    STATUS      current
    DESCRIPTION
        "A table of Notification log statistics entries."
    ::= { nlmStats 3 }

nlmStatsLogEntry OBJECT-TYPE
    SYNTAX      NlmStatsLogEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A Notification log statistics entry."
    AUGMENTS { nlmConfigLogEntry }
    ::= { nlmStatsLogTable 1 }

NlmStatsLogEntry ::= SEQUENCE {
    nlmStatsLogNotificationsLogged Counter32,
    nlmStatsLogNotificationsBumped Counter32
}

nlmStatsLogNotificationsLogged OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "notifications"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of Notifications put in this named log."
    ::= { nlmStatsLogEntry 1 }

nlmStatsLogNotificationsBumped OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "notifications"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of log entries discarded from this named log to make
        room for a new entry due to lack of resources or the value of
        nlmConfigGlobalEntryLimit or nlmConfigLogEntryLimit.  This does not
        include entries discarded due to the value of
        nlmConfigGlobalAgeOut."
    ::= { nlmStatsLogEntry 2 }

--
-- Log Section
--
--
-- Log Table
```

--

nlmLogTable OBJECT-TYPE

SYNTAX SEQUENCE OF NlmLogEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of Notification log entries.

It is an implementation-specific matter whether entries in this table are preserved across initializations of the management system. In general one would expect that they are not.

Note that keeping entries across initializations of the management system leads to some confusion with counters and TimeStamps, since both of those are based on sysUpTime, which resets on management initialization. In this situation, counters apply only after the reset and nlmLogTime for entries made before the reset MUST be set to 0."

::= { nlmLog 1 }

nlmLogEntry OBJECT-TYPE

SYNTAX NlmLogEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A Notification log entry.

Entries appear in this table when Notifications occur and pass filtering by nlmConfigLogFilterName and access control. They are removed to make way for new entries due to lack of resources or the values of nlmConfigGlobalEntryLimit, nlmConfigGlobalAgeOut, or nlmConfigLogEntryLimit.

If adding an entry would exceed nlmConfigGlobalEntryLimit or system resources in general, the oldest entry in any log SHOULD be removed to make room for the new one.

If adding an entry would exceed nlmConfigLogEntryLimit the oldest entry in that log SHOULD be removed to make room for the new one.

Before the managed system puts a locally-generated Notification into a non-null-named log it assures that the creator of the log has access to the information in the Notification. If not it does not log that Notification in that log."

INDEX { nlmLogName, nlmLogIndex }

::= { nlmLogTable 1 }

```

NlmLogEntry ::= SEQUENCE {
    nlmLogIndex          Unsigned32,
    nlmLogTime           TimeStamp,
    nlmLogDateAndTime    DateAndTime,
    nlmLogEngineID       SnmpEngineID,
    nlmLogEngineTAddress TAddress,
    nlmLogEngineTDomain  TDomain,
    nlmLogContextEngineID SnmpEngineID,
    nlmLogContextName     SnmpAdminString,
    nlmLogNotificationID  OBJECT IDENTIFIER
}

```

```

nlmLogIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A monotonically increasing integer for the sole purpose of
        indexing entries within the named log.  When it reaches the
        maximum value, an extremely unlikely event, the agent wraps the
        value back to 1."
    ::= { nlmLogEntry 1 }

```

```

nlmLogTime OBJECT-TYPE
    SYNTAX      TimeStamp
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The value of sysUpTime when the entry was placed in the log.  If
        the entry occurred before the most recent management system
        initialization this object value MUST be set to zero."
    ::= { nlmLogEntry 2 }

```

```

nlmLogDateAndTime OBJECT-TYPE
    SYNTAX      DateAndTime
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The local date and time when the entry was logged, instantiated
        only by systems that have date and time capability."
    ::= { nlmLogEntry 3 }

```

```

nlmLogEngineID OBJECT-TYPE
    SYNTAX      SnmpEngineID
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The identification of the SNMP engine at which the Notification

```

originated.

If the log can contain Notifications from only one engine or the Trap is in SNMPv1 format, this object is a zero-length string."

::= { nlmLogEntry 4 }

nlmLogEngineTAddress OBJECT-TYPE

SYNTAX TAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The transport service address of the SNMP engine from which the Notification was received, formatted according to the corresponding value of nlmLogEngineTDomain. This is used to identify the source of an SNMPv1 trap, since an nlmLogEngineId cannot be extracted from the SNMPv1 trap pdu.

This object MUST always be instantiated, even if the log can contain Notifications from only one engine.

Please be aware that the nlmLogEngineTAddress may not uniquely identify the SNMP engine from which the Notification was received. For example, if an SNMP engine uses DHCP or NAT to obtain ip addresses, the address it uses may be shared with other network devices, and hence will not uniquely identify the SNMP engine."

::= { nlmLogEntry 5 }

nlmLogEngineTDomain OBJECT-TYPE

SYNTAX TDomain

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates the kind of transport service by which a Notification was received from an SNMP engine. nlmLogEngineTAddress contains the transport service address of the SNMP engine from which this Notification was received.

Possible values for this object are presently found in the Transport Mappings for SNMPv2 document (RFC 1906 [8])."

::= { nlmLogEntry 6 }

nlmLogContextEngineID OBJECT-TYPE

SYNTAX SnmpEngineID

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"If the Notification was received in a protocol which has a contextEngineID element like SNMPv3, this object has that value. Otherwise its value is a zero-length string."
 ::= { nlmLogEntry 7 }

nlmLogContextName OBJECT-TYPE

SYNTAX SnmpAdminString

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The name of the SNMP MIB context from which the Notification came. For SNMPv1 Traps this is the community string from the Trap."

::= { nlmLogEntry 8 }

nlmLogNotificationID OBJECT-TYPE

SYNTAX OBJECT IDENTIFIER

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The NOTIFICATION-TYPE object identifier of the Notification that occurred."

::= { nlmLogEntry 9 }

--

-- Log Variable Table

--

nlmLogVariableTable OBJECT-TYPE

SYNTAX SEQUENCE OF NlmLogVariableEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of variables to go with Notification log entries."

::= { nlmLog 2 }

nlmLogVariableEntry OBJECT-TYPE

SYNTAX NlmLogVariableEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A Notification log entry variable."

Entries appear in this table when there are variables in the varbind list of a Notification in nlmLogTable."

INDEX { nlmLogName, nlmLogIndex, nlmLogVariableIndex }

::= { nlmLogVariableTable 1 }

NlmLogVariableEntry ::= SEQUENCE {

```

    nlmLogVariableIndex      Unsigned32,
    nlmLogVariableID         OBJECT IDENTIFIER,
    nlmLogVariableValueType  INTEGER,
    nlmLogVariableCounter32Val Counter32,
    nlmLogVariableUnsigned32Val Unsigned32,
    nlmLogVariableTimeTicksVal TimeTicks,
    nlmLogVariableInteger32Val Integer32,
    nlmLogVariableOctetStringVal OCTET STRING,
    nlmLogVariableIpAddressVal IpAddress,
    nlmLogVariableOidVal     OBJECT IDENTIFIER,
    nlmLogVariableCounter64Val Counter64,
    nlmLogVariableOpaqueVal  Opaque
}

nlmLogVariableIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A monotonically increasing integer, starting at 1 for a given
        nlmLogIndex, for indexing variables within the logged
        Notification."
    ::= { nlmLogVariableEntry 1 }

nlmLogVariableID OBJECT-TYPE
    SYNTAX      OBJECT IDENTIFIER
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The variable's object identifier."
    ::= { nlmLogVariableEntry 2 }

nlmLogVariableValueType OBJECT-TYPE
    SYNTAX      INTEGER { counter32(1), unsigned32(2), timeTicks(3),
        integer32(4), ipAddress(5), octetString(6),
        objectId(7), counter64(8), opaque(9) }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The type of the value. One and only one of the value
        objects that follow must be instantiated, based on this type."
    ::= { nlmLogVariableEntry 3 }

nlmLogVariableCounter32Val OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION

```

"The value when nlmLogVariableType is 'counter32'."
 ::= { nlmLogVariableEntry 4 }

nlmLogVariableUnsigned32Val OBJECT-TYPE

SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The value when nlmLogVariableType is 'unsigned32'."
 ::= { nlmLogVariableEntry 5 }

nlmLogVariableTimeTicksVal OBJECT-TYPE

SYNTAX TimeTicks
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The value when nlmLogVariableType is 'timeTicks'."
 ::= { nlmLogVariableEntry 6 }

nlmLogVariableInteger32Val OBJECT-TYPE

SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The value when nlmLogVariableType is 'integer32'."
 ::= { nlmLogVariableEntry 7 }

nlmLogVariableOctetStringVal OBJECT-TYPE

SYNTAX OCTET STRING
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The value when nlmLogVariableType is 'octetString'."
 ::= { nlmLogVariableEntry 8 }

nlmLogVariableIpAddressVal OBJECT-TYPE

SYNTAX IpAddress
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The value when nlmLogVariableType is 'ipAddress'.
Although this seems to be unfriendly for IPv6, we
have to recognize that there are a number of older
MIBs that do contain an IPv4 format address, known
as IpAddress.

IPv6 addresses are represented using TAddress or
InetAddress, and so the underlying datatype is

OCTET STRING, and their value would be stored in the nlmLogVariableOctetStringVal column."
 ::= { nlmLogVariableEntry 9 }

nlmLogVariableOidVal OBJECT-TYPE
 SYNTAX OBJECT IDENTIFIER
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The value when nlmLogVariableType is 'objectId'."
 ::= { nlmLogVariableEntry 10 }

nlmLogVariableCounter64Val OBJECT-TYPE
 SYNTAX Counter64
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The value when nlmLogVariableType is 'counter64'."
 ::= { nlmLogVariableEntry 11 }

nlmLogVariableOpaqueVal OBJECT-TYPE
 SYNTAX Opaque
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The value when nlmLogVariableType is 'opaque'."
 ::= { nlmLogVariableEntry 12 }

--
 -- Conformance
 --

notificationLogMIBConformance OBJECT IDENTIFIER ::= { notificationLogMIB 3 }
 notificationLogMIBCompliances OBJECT IDENTIFIER ::= { notificationLogMIBConformance 1 }
 notificationLogMIBGroups OBJECT IDENTIFIER ::= { notificationLogMIBConformance 2 }

-- Compliance

notificationLogMIBCompliance MODULE-COMPLIANCE
 STATUS current
 DESCRIPTION
 "The compliance statement for entities which implement the Notification Log MIB."
 MODULE -- this module

```

MANDATORY-GROUPS {
    notificationLogConfigGroup,
    notificationLogStatsGroup,
    notificationLogLogGroup
}

```

```

OBJECT nlmConfigGlobalEntryLimit
SYNTAX Unsigned32 (0..4294967295)
MIN-ACCESS read-only
DESCRIPTION
    "Implementations may choose a limit and not allow it to be
    changed or may enforce an upper or lower bound on the
    limit."

```

```

OBJECT nlmConfigLogEntryLimit
SYNTAX Unsigned32 (0..4294967295)
MIN-ACCESS read-only
DESCRIPTION
    "Implementations may choose a limit and not allow it to be
    changed or may enforce an upper or lower bound on the
    limit."

```

```

OBJECT nlmConfigLogEntryStatus
MIN-ACCESS read-only
DESCRIPTION
    "Implementations may disallow the creation of named logs."

```

```

GROUP notificationLogDateGroup
DESCRIPTION
    "This group is mandatory on systems that keep wall clock
    date and time and should not be implemented on systems that
    do not have a wall clock date."

```

```

 ::= { notificationLogMIBCompliances 1 }

```

```

-- Units of Conformance

```

```

notificationLogConfigGroup OBJECT-GROUP
OBJECTS {
    nlmConfigGlobalEntryLimit,
    nlmConfigGlobalAgeOut,
    nlmConfigLogFilterName,
    nlmConfigLogEntryLimit,
    nlmConfigLogAdminStatus,
    nlmConfigLogOperStatus,
    nlmConfigLogStorageType,
    nlmConfigLogEntryStatus
}

```

```
STATUS current
DESCRIPTION
    "Notification log configuration management."
 ::= { notificationLogMIBGroups 1 }

notificationLogStatsGroup OBJECT-GROUP
OBJECTS {
    nlmStatsGlobalNotificationsLogged,
    nlmStatsGlobalNotificationsBumped,
    nlmStatsLogNotificationsLogged,
    nlmStatsLogNotificationsBumped
}
STATUS current
DESCRIPTION
    "Notification log statistics."
 ::= { notificationLogMIBGroups 2 }

notificationLogLogGroup OBJECT-GROUP
OBJECTS {
    nlmLogTime,
    nlmLogEngineID,
    nlmLogEngineTAddress,
    nlmLogEngineTDomain,
    nlmLogContextEngineID,
    nlmLogContextName,
    nlmLogNotificationID,
    nlmLogVariableID,
    nlmLogVariableValueType,
    nlmLogVariableCounter32Val,
    nlmLogVariableUnsigned32Val,
    nlmLogVariableTimeTicksVal,
    nlmLogVariableInteger32Val,
    nlmLogVariableOctetStringVal,
    nlmLogVariableIpAddressVal,
    nlmLogVariableOidVal,
    nlmLogVariableCounter64Val,
    nlmLogVariableOpaqueVal
}
STATUS current
DESCRIPTION
    "Notification log data."
 ::= { notificationLogMIBGroups 3 }

notificationLogDateGroup OBJECT-GROUP
OBJECTS {
    nlmLogDateAndTime
}
STATUS current
```

DESCRIPTION

"Conditionally mandatory notification log data.
This group is mandatory on systems that keep wall
clock date and time and should not be implemented
on systems that do not have a wall clock date."
::= { notificationLogMIBGroups 4 }

END

4. Intellectual Property

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5. References

- [RFC2571] Harrington, D., Presuhn, R. and B. Wijnen, "An Architecture for Describing SNMP Management Frameworks", RFC 2571, April 1999.
- [RFC1155] Rose, M. and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based Internets", STD 16, RFC 1155, May 1990.
- [RFC1212] Rose, M. and K. McCloghrie, "Concise MIB Definitions", STD 16, RFC 1212, March 1991.
- [RFC1215] Rose, M., "A Convention for Defining Traps for use with the SNMP", RFC 1215, March 1991.

- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.
- [RFC1157] Case, J., Fedor, M., Schoffstall, M. and J. Davin, "Simple Network Management Protocol", STD 15, RFC 1157, May 1990.
- [RFC1901] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Introduction to Community-based SNMPv2", RFC 1901, January 1996.
- [RFC1906] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Transport Mappings for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1906, January 1996.
- [RFC2572] Case, J., Harrington D., Presuhn R. and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", RFC 2572, April 1999.
- [RFC2574] Blumenthal, U. and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", RFC 2574, April 1999.
- [RFC1905] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1905, January 1996.
- [RFC2573] Levi, D., Meyer, P. and B. Stewart, "SNMPv3 Applications", RFC 2573, April 1999.
- [RFC2575] Wijnen, B., Presuhn, R. and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", RFC 2575, April 1999.
- [RFC2570] Case, J., Mundy, R., Partain, D. and B. Stewart, "Introduction to Version 3 of the Internet-standard Network Management Framework", RFC 2570, April 1999.

6. Security Considerations

Security issues are discussed in Section 3.1.2.

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