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 management objects used for describing alarms using the ITU Alarm Model, defined in X.733 and X.736.

Table of Contents

1. The SNMP Management Framework
2. Introduction
3. ITU Alarm Architecture
   3.1. Relation to Alarm MIB
   3.2. Alarm States
3.3. ITU-T X.733, X.736 Trap Content

4. MIB Overview
5. Definitions
6. Example
7. Security Considerations

8. Authors' Address
9. Acknowledgements
10. References
11. Full Copyright Statement
1. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- An overall architecture, described in RFC 2571 [RFC2571].
- 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].
- 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].
- 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].

- 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.

Chisholm & Romascanu Standards Track [Page 3]

ITU Alarm MIB March 2001

2. Introduction

This MIB module defines alarms specific to the model defined in ITU
X.733[X.733] and X.736[X.736]. This MIB module follows the modular
architecture defined by the Alarm MIB[ALARM-MIB], in which the
model-neutral Alarm MIB can be augmented by other alarm information
defined according to more specific models that determine their
behaviour and characteristics.

3. ITU Alarm Architecture

3.1 Relation to Alarm MIB

This MIB will be used in conjunction with the Alarm MIB [ALARM-MIB].
The relationship between the Alarm MIB and the ITU Alarm MIB is expressed by the following:

The alarmDetailsTable has a corresponding table in the ITU Alarms MIB - the ituAlarmTable - with similar indexing. For each row in the ituAlarmTable there is one row in the alarmDetailsTable.

The alarmActiveTable has a corresponding table in the ITU Alarms MIBs - the ituAlarmActiveTable - with similar indexing. For each row in the ituAlarmTable there is one row in the alarmActiveTable.

Also, the alarmDetailsModelPointer object in the alarmDetailsTable points to the ituAlarm module, identifying alarms that comply to the ITU alarm model. The alarmActiveModelPointer object in the alarmActiveTable points to the ituAlarm module identifying active alarms that comply to the ITU alarm model.

### 3.2 Alarm States

The raise and clear relationship is defined in the Alarm MIB. The ITU alarm model allows for more alarm states. These states are indicated using ituAlarmPerceivedSeverity object.

### 3.3 ITU-T X.733, X.736 Trap Content

Mandatory Alarm information from ITU-T X.733, X.736 alarm documents has been included in the ituAlarmTable and the ituAlarmActiveTable, depending on the variability of this information.

4. MIB Overview

The ituAlarmTable contains information from the ITU Alarm Model about possible alarms in the system.

The ituAlarmActiveTable contains information from the ITU Alarm Model about alarms which are currently occurring on the system.
5. Definitions

ITU-ALARM-MIB DEFINITIONS ::= BEGIN

IMPORTS

   MODULE-IDENTITY, OBJECT-TYPE,
   Counter32, Gauge32, mib-2                    FROM SNMPv2-SMI
   DisplayString, AutonomousType       FROM SNMPv2-TC
   alarmListName, alarmDetailsIndex,
   alarmActiveTimeFilter               FROM ALARM-MIB
   MODULE-COMPLIANCE, OBJECT-GROUP     FROM SNMPv2-CONF;

ituAlarm MODULE-IDENTITY

   LAST-UPDATED "200103020000Z"
   ORGANIZATION "IETF Distributed Management Working Group"
   CONTACT-INFO

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   DESCRIPTION

     "The MIB module describes ITU Alarm information
     as defined in ITU Recommendation X.733 [X.733]
     and ITU Recommendation X.736 [X.736]."

   REVISION    "200103020000Z"
   DESCRIPTION

     "Initial version, published as RFC XXXX."

::= { mib-2 xx }

ituAlarmObjects OBJECT IDENTIFIER ::= { ituAlarm 1 }

ituAlarmDetails OBJECT IDENTIFIER ::= { ituAlarmObjects 1 }

ituAlarmActive  OBJECT IDENTIFIER ::= { ituAlarmObjects 2 }
ITU Alarm MIB

ituAlarmTable OBJECT-TYPE
SYNTAX      SEQUENCE OF ItuAlarmEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
  "A table of ITU Alarm information about possible alarms on the system."
 ::= { ituAlarmDetails 1 }

ituAlarmEntry OBJECT-TYPE
SYNTAX      ItuAlarmEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
  "Entries appear in this table for each possible alarm."
INDEX       { alarmListName, alarmDetailsIndex }
 ::= { ituAlarmTable 1 }

ItuAlarmEntry ::= SEQUENCE {
  ituAlarmEventType             INTEGER,
  ituAlarmProbableCause         INTEGER,
  ituAlarmPerceivedSeverity     INTEGER,
  ituAlarmAdditionalText        DisplayString,
  ituAlarmDetector              AutonomousType,
  ituAlarmServiceProvider       AutonomousType,
  ituAlarmServiceUser           AutonomousType }

ituAlarmEventType OBJECT-TYPE
SYNTAX      INTEGER
  { other (1),
    communicationsAlarm (2),
    qualityOfServiceAlarm (3),
    processingErrorAlarm (4),
    equipmentAlarm (5),
    environmentalAlarm (6),
    integrityViolation (7),
    operationalViolation (8),
    physicalViolation (9),
    securityServiceOrMechanismViolation (10),
    timeDomainViolation (11) }
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
"Represents the event type values for the alarms as per [X.733] and [X.736]"

::= { ituAlarmEntry 1 }

ituAlarmProbableCause OBJECT-TYPE

SYNTAX INTEGER

{ 
  other (1),
  adapterError (2),
  applicationSubsystemFailure (3),
  bandwidthReduced (4),
  callEstablishmentError (5),
  communicationsProtocolError (6),
  communicationsSubsystemFailure (7),
  configurationOrCustomizationError (8),
  congestion (9),
  corruptData (10),
  cpuCyclesLimitExceeded (11),
  dataSetOrModemError (12),
  degradedSignal (13),
  dteDceInterfaceError (14),
  enclosureDoorOpen (15),
  equipmentMalfunction (16),
  excessiveVibration (17),
  fileError (18),
  fireDetected (19),
  floodDetected (20),
  framingError (21),
  heatingVentCoolingSystemProblem (22),
  humidityUnacceptable (23),
  inputOutputDeviceError (24),
  inputDeviceError (25),
  lanError (26),
  leakDetected (27),
  localNodeTransmissionError (28),
  lossOfFrame (29),
  lossOfSignal (30),
  materialSupplyExhausted (31),
  multiplexerProblem (32),
  outOfMemory (33),
  outputDeviceError (34),
  performanceDegraded (35),
}
powerProblem (36),
pressureUnacceptable (37),
processorProblem (38),
pumpFailure (39),
queueSizeExceeded (40),
receiveFailure (41),
receiverFailure (42),
remoteNodeTransmissionError (43),
resourceAtOrNearingCapacity (44),
responseTimeExcessive (45),
retransmissionRateExcessive (46),
softwareError (47),
softwareProgramAbnormallyTerminated (48),
softwareProgramError (49),
storageCapacityProblem (50),

Chisholm & Romascanu        Standards Track                      [Page 7]

ITU Alarm MIB                    March 2001

temperatureUnacceptable (51),
thresholdCrossed (52),
timingProblem (53),
toxicLeakDetected (54),
transmitFailure (55),
transmitterFailure (56),
underlyingResourceUnavailable (57),
versionMismatch (58),
authenticationFailure (59),
breachOfConfidentiality (60),
cableTamper (61),
delayedInformation (62),
denialOfService (63),
duplicateInformation (64),
informationMissing (65),
informationModificationDetected (66),
informationOutOfSequence (67),
intrusionDetection (68),
keyExpired (69),
nonRepudiationFailure (70),
outOfHoursActivity (71),
outOfService (72),
proceduralError (73),
unauthorizedAccessAttempt (74),
unexpectedInformation (75)

MAX-ACCESS        read-only
STATUS       current

DESCRIPTION
" Represents the probable cause values for the alarms as per [X.733] and [X.736]."
::= { ituAlarmEntry 2 }

ituAlarmPerceivedSeverity OBJECT-TYPE
SYNTAX  INTEGER                   {
cleared (1),
indeterminate (2),
critical (3),
major (4),
minor (5),
warning (6)
}
MAX-ACCESS        read-only
STATUS       current
DESCRIPTION
" Represents the perceived severity values for the alarms as per [X.733]."
::= { ituAlarmEntry 3 }

ituAlarmAdditionalText OBJECT-TYPE
SYNTAX DisplayString

MAX-ACCESS read-only
STATUS       current
DESCRIPTION
" Represents the additional text field for the alarm as per [X.733]."
::= { ituAlarmEntry 4 }

ituAlarmDetector OBJECT-TYPE
SYNTAX AutonomousType
MAX-ACCESS read-only
STATUS       current
DESCRIPTION
" Represents the SecurityAlarmDetector object from [X.736]."
::= { ituAlarmEntry 5 }

ituAlarmServiceProvider OBJECT-TYPE
SYNTAX AutonomousType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Represents the ServiceProvider object from [X.736]."
::= { ituAlarmEntry 6 }

ituAlarmServiceUser OBJECT-TYPE
SYNTAX AutonomousType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Represents the ServiceUser object from [X.736]."
::= { ituAlarmEntry 7 }

-- ITU Active Alarm Table --

ituAlarmActiveTable OBJECT-TYPE
SYNTAX SEQUENCE OF ItuAlarmActiveEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A table of ITU information for active alarms entries."
::= { ituAlarmActiveTable 1 }

ituAlarmActiveEntry OBJECT-TYPE
SYNTAX ItuAlarmActiveEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"Entries appear in this table when alarms are active. They are removed when the alarm is no longer occurring."
INDEX { alarmListName, alarmActiveTimeFilter, alarmDetailsIndex }
::= { ituAlarmActiveTable 1 }

ItuAlarmActiveEntry ::= SEQUENCE {
   ituAlarmActiveTrendIndication INTEGER
}

ituAlarmActiveTrendIndication OBJECT-TYPE
SYNTAX INTEGER

moreSevere (1),
nocChange (2),
lessSevere (3)

MAX-ACCESS read-only
STATUS current
DESCRIPTION "Represents the trend indication values for the alarms as per [X.733]."
 ::= { ituAlarmActiveEntry 1 }
ituAlarmActiveStatsIndeterminateCurrent OBJECT-TYPE
SYNTAX       Gauge32
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
    "A count of the current number of active alarms with a
     ituAlarmPerceivedSeverity of indeterminate."
::= { ituAlarmActiveStatsEntry 1 }

ituAlarmActiveStatsCriticalCurrent OBJECT-TYPE
SYNTAX       Gauge32
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
    "A count of the current number of active alarms with a
     ituAlarmPerceivedSeverity of critical."
::= { ituAlarmActiveStatsEntry 2 }

ituAlarmActiveStatsMajorCurrent OBJECT-TYPE
SYNTAX       Gauge32
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
    "A count of the current number of active alarms with a
     ituAlarmPerceivedSeverity of major."
::= { ituAlarmActiveStatsEntry 3 }

ituAlarmActiveStatsMinorCurrent OBJECT-TYPE
SYNTAX       Gauge32
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
    "A count of the current number of active alarms with a
     ituAlarmPerceivedSeverity of minor."
::= { ituAlarmActiveStatsEntry 4 }

ituAlarmActiveStatsWarningCurrent OBJECT-TYPE
SYNTAX       Gauge32
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
    "A count of the current number of active alarms with a
     ituAlarmPerceivedSeverity of warning."
::= { ituAlarmActiveStatsEntry 5 }
ITU Alarm Active Stats

ITU Alarm Active Stats Indeterminate Total

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

"A count of the total number of active alarms with a
ituAlarmPerceivedSeverity of indeterminate since system
restart."
::= { ituAlarmActiveStatsEntry 6 }
```

ITU Alarm Active Stats Critical Total

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

"A count of the total number of active alarms with a
ituAlarmPerceivedSeverity of critical since system restart."
::= { ituAlarmActiveStatsEntry 7 }
```

ITU Alarm Active Stats Major Total

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

"A count of the total number of active alarms with a
ituAlarmPerceivedSeverity of major since system restart."
::= { ituAlarmActiveStatsEntry 8 }
```

ITU Alarm Active Stats Minor Total

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

"A count of the total number of active alarms with a
ituAlarmPerceivedSeverity of minor since system restart."
::= { ituAlarmActiveStatsEntry 9 }
```

ITU Alarm Active Stats Warning Total

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

"A count of the total number of active alarms with a
ituAlarmPerceivedSeverity of warning since system restart." ::= { ituAlarmActiveStatsEntry 10 }

-- Conformance

ituAlarmConformance OBJECT IDENTIFIER ::= { ituAlarm 2 }
ituAlarmCompliances OBJECT IDENTIFIER ::= { ituAlarmConformance 1 }

ituAlarmCompliance MODULE-COMPLIANCE
  STATUS current
  DESCRIPTION
    "The compliance statement for systems supporting
    the ITU Alarm MIB."
  MODULE -- this module

MANDATORY-GROUPS {
  ituAlarmGroup
}
 ::= { ituAlarmCompliances 1 }

ituAlarmGroups OBJECT IDENTIFIER ::= { ituAlarmConformance 2 }

ituAlarmGroup OBJECT-GROUP
  OBJECTS {
    ituAlarmEventType,
    ituAlarmProbableCause,
    ituAlarmPerceivedSeverity
  }
  STATUS current
  DESCRIPTION
    "ITU alarm details list group."
 ::= { ituAlarmGroups 1 }

ituAlarmServiceUserGroup OBJECT-GROUP
  OBJECTS {
    ituAlarmAdditionalText,
    ituAlarmActiveTrendIndication
  }
  STATUS current
  DESCRIPTION
    "The use of these parameters is a service-user option."
 ::= { ituAlarmGroups 2 }
ituAlarmSecurityGroup OBJECT-GROUP
OBJECTS {
    ituAlarmDetector, 
    ituAlarmServiceProvider, 
    ituAlarmServiceUser
}
STATUS current
DESCRIPTION "Security Alarm Reporting Function as defined in \[X.736]\]"
::= { ituAlarmGroups 3 }

ituAlarmStatisticsGroup OBJECT-GROUP
OBJECTS {
    ituAlarmActiveIndeterminateCurrent, 
    ituAlarmActiveCriticalCurrent, 
    ituAlarmActiveMajorCurrent, 
    ituAlarmActiveMinorCurrent, 
    ituAlarmActiveWarningCurrent, 
    ituAlarmActiveIndeterminateTotal, 
    ituAlarmActiveCriticalTotal, 
    ituAlarmActiveMajorTotal, 
    ituAlarmActiveMinorTotal, 
    ituAlarmActiveWarningTotal
}

6. Example

The following example shows a mapping of linkUp and linkDown traps into the model-neutral MIB \[ALARM-MIB\] and ITU Alarm MIB.

```
alarmDetailsIndex                 3
alarmDetailsNotificationId        1.3.6.1.6.3.1.1.5.3
alarmDetailsClearNotificationId   1.3.6.1.6.3.1.1.5.4
alarmDetailsType                  raise (3)
alarmDetailsModelPointer          ituAlarmEntry.3
```
7. Security Considerations

There are no management objects defined in this MIB that have a MAX-ACCESS clause of read-write and/or read-create. So, if this MIB is implemented correctly, then there is no risk that an intruder can alter or create any management objects of this MIB via direct SNMP SET operations.

The security related managed objects in this MIB are sensitive since they provide information regarding operational condition and quality of server, pertaining to security.

It is thus important to control even GET access to these objects and possibly to even encrypt the values of these object when sending them over the network via SNMP. Not all versions of SNMP provide features for such a secure environment.
SNMPv1 by itself is not a secure environment. Even if the network itself is secure (for example by using IPSec), even then, there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB.

It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model RFC 2574 [RFC2574] and the View-based Access Control Model RFC 2575 [RFC2575] is recommended.

It is then a customer/user responsibility to ensure that the SNMP entity giving access to an instance of this MIB, is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

8. Authors' Address

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9. Acknowledgements

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<thead>
<tr>
<th>Reference</th>
<th>Description</th>
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<tbody>
<tr>
<td>[ALARM-MIB]</td>
<td>Chisholm, S., Romascanu, D., &quot;Alarm MIB, Work in Progress&quot;</td>
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</table>

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