Definitions of Managed Objects for Extensible SNMP Agents

May 14, 1997

MIB module in a manner that is both compliant to the SNMPv2 SMI, and semantically identical to the peer SNMPv1 definitions.

Abstract

This memo defines an experimental portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes objects managing SNMP agents that use the Agent Extensibility (AgentX) Protocol.

This memo specifies a MIB module in a manner that is both compliant to the SNMPv2 SMI, and semantically identical to the peer SNMPv1 definitions.

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This memo does not specify a standard for the Internet community.

The SNMP Network Management Framework presently consists of three major components. They are: the SMI, described in RFC 1902 [1] - the mechanisms used for describing and naming objects for the purpose of management. the MIB-II, STD 17, RFC 1213 [2] - the core set of managed objects for the Internet suite of protocols. the protocol, RFC 1157 [3] and/or RFC 1905 [4], - the protocol for accessing managed objects.

The Framework permits new objects to be defined for the purpose of experimentation and evaluation.

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) defined in the SMI. In particular, each object type is named by an OBJECT IDENTIFIER, an administratively assigned name. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the descriptor, to also refer to the object type.
The SNMP Agent Extensibility Protocol (AgentX) is a protocol used to distribute the implementation of an SNMP agent amongst a single "master agent" and multiple "subagents". See [5] for details about the AgentX protocol.

The goals of the AgentX MIB are: List the set of subagents that currently have logical sessions open with the master agent. Identify the subagent’s type, vendor, transport address, AgentX protocol version and other characteristics. Identify the set of MIB objects each subagent implements, the context in which the objects are registered and the priority of the registration. Provide statistics about the protocol operation such as the number of packets to and from each subagent. Determine protocol operational parameters such as the timeout interval for responses from a subagent and the priority at which a subagent registers a particular MIB region. Allow (but do not require) managers to be able to modify AgentX protocol operational parameters and to explicitly close subagent sessions with the master agent.
AGENTX-MIB DEFINITIONS ::= BEGIN

IMPORTS
   MODULE-IDENTITY, OBJECT-TYPE, experimental, Counter32, Unsigned32
   FROM SNMPv2-SMI
   MODULE-COMPLIANCE, OBJECT-GROUP
   FROM SNMPv2-CONF
   DisplayString, TimeStamp
   FROM SNMPv2-TC;

agentxMIB MODULE-IDENTITY
LAST-UPDATED "9705141200Z" -- May 14, 1997
ORGANIZATION "IETF AgentX Working Group"
CONTACT-INFO
"Smitha Gudur
sgudur@bmc.com"

   Send comments to the AgentX working group: agentx@fv.com."
DESCRIPTION
"The MIB module for the SNMP Agent Extensibility Protocol
(AgentX). This MIB module will be implemented by the master
agent."
-- For testing purposes only. Need to get an experimental id
-- ::= { experimental 2001 }
 ::= { experimental XX }
agentxObjects OBJECT IDENTIFIER ::= { agentxMIB 1 }
agentxGeneral OBJECT IDENTIFIER ::= { agentxObjects 1 }

--
-- Textual Conventions
--
Utf8String ::= TEXTUAL-CONVENTION
   DISPLAY-HINT "255a"
   STATUS  current
   DESCRIPTION
   "To facilitate internationalization, this TC represents
   information taken from the ISO/IEC IS 10646-1 character set,
   encoded as an octet string using the UTF-8 character encoding
   scheme described in RFC 2044 [8]. For strings in 7-bit US-ASCII,
   there is no impact since the UTF-8 representation is identical
to the US-ASCII encoding."
   SYNTAX  OCTET STRING (SIZE (0..255))

agentxDefaultTimeout OBJECT-TYPE
SYNTAX      INTEGER (0..255)
UNITS       "seconds"
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
"The default length of time, in seconds, that the master agent
should allow to elapse after dispatching a message to a subagent
before it regards the subagent as not responding. This is a
system-wide value that may be overridden by the values
associated with a particular subagent (agentxSATimeout) or a
particular registered MIB region (agentxRegTimeout)."
DEFVAL      { 5 }
::= { agentxGeneral 1 }

agentxMasterAgentXVer OBJECT-TYPE
SYNTAX      INTEGER (1..256)
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
"The AgentX protocol version supported by this master
agent. Current version is 1. Note that the master agent must
allow registration of earlier version subagents."
DEFVAL      { 1 }
::= { agentxGeneral 2 }

agentxMasterTransports OBJECT-TYPE
-- For testing with a pre-v2c compiler
-- SYNTAX      BIT STRING {
SYNTAX      BITS {
  unixDomainSockets(0),
tcp(1),
udp(2),
sharedMem(3),
other(4)
}
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
"The transports that the master agent supports."
DEFVAL      { { unixDomainSockets } }
::= { agentxGeneral 4 }

--
-- The AgentX Subagent Group
--

agentxSubagent OBJECT IDENTIFIER ::= { agentxObjects 2 }

agentxSATableLastChange OBJECT-TYPE
SYNTAX      TimeStamp
MAX-ACCESS  read-only
STATUS    current
DESCRIPTION  
"The value of sysUpTime when the last row creation or deletion
occurred in the agentxSubagentTable."
::= { agentxSubagent 1 }

agentxSANumber OBJECT-TYPE
SYNTAX     Unsigned32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION  
"The current number of entries in the agentxSubagentTable. Note
that this may be smaller than the largest value of agentxSAIndex
since index values are not reused when entries come and go from
the agentxSubagentTable."
::= { agentxSubagent 2 }

--
-- The AgentX Subagent Table
--

agentxSubagentTable OBJECT-TYPE
SYNTAX     SEQUENCE OF AgentxSubagentEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION  
"A table of AgentX subagents that have open sessions with the
AgentX master agent."
::= { agentxSubagent 3 }

agentxSubagentEntry OBJECT-TYPE
SYNTAX     AgentxSubagentEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION  
"Information about a single open session between the AgentX
master agent and a subagent."
INDEX     { agentxSAIndex }
::= { agentxSubagentTable 1 }

AgentxSubagentEntry ::= SEQUENCE {
    agentxSAIndex         Unsigned32,
    agentxSAObjectID      OBJECT IDENTIFIER,
    agentxSADescr         Utf8String,
    agentxSAAdminStatus   INTEGER,
    agentxSAOpenTime      TimeStamp,
    agentxSAAgentXVer     INTEGER,
agentxSATimeout INTEGER,
agentxSATransportType INTEGER,
agentxSATransportAddr OCTET STRING
}

agentxSAIndex OBJECT-TYPE
SYNTAX     Unsigned32
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
   "A unique, small-integer index for the subagent’s session. Note
   that if a subagent’s session with the master agent is closed for
   any reason its index will not be re-used, therefore, the values
   of agentxSAIndex may not be contiguous and will not be the same
   for the same subagent across multiple sessions."
::= { agentxSubagentEntry 1 }

gagentxSAObjectID OBJECT-TYPE
SYNTAX     OBJECT IDENTIFIER
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
   "This is analogous to sysObjectID defined in MIB-2 [2] and is taken
   from the o.id field of the agentx-Open-PDU."
::= { agentxSubagentEntry 2 }

agentxSADescr OBJECT-TYPE
SYNTAX     Utf8String
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
   "A textual description of the subagent. This is analogous to
   sysDescr defined in MIB-2 [2] and is taken from the o.descr
   field of the agentx-Open-PDU."
::= { agentxSubagentEntry 3 }

agentxSAAdminStatus OBJECT-TYPE
SYNTAX     INTEGER {
    up(1),
    down(2)
}
MAX-ACCESS read-write
STATUS     current
DESCRIPTION
   "The administrative (desired) status of the subagent. Setting
   the value to ‘down(2)’ closes the subagent (with c.reason set to
   ‘reasonByManager’). When read, the value returned is always
   ‘up(1)’."
DEFVAL { up } ::= { agentxSubagentEntry 4 }

agentxSAOpenTime OBJECT-TYPE
SYNTAX TimeStamp
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The value of sysUpTime when this session was opened and, therefore, this entry was added to the table."
 ::= { agentxSubagentEntry 5 }

agentxSAAgentXVer OBJECT-TYPE
SYNTAX INTEGER (1..256)
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The version of the AgentX protocol supported by the subagent. This will be equal to or less than the value of agentxMasterAgentXVer."
DEFVAL { 1 }
 ::= { agentxSubagentEntry 6 }

agentxSATimeout OBJECT-TYPE
SYNTAX INTEGER (0..255)
MAX-ACCESS read-write
STATUS current
DESCRIPTION "The length of time, in seconds, that a master agent should allow to elapse after dispatching a message to this subagent before it regards the subagent as not responding. This value is taken from the o.timeout field of the agentx-Open-PDU. This is a subagent-wide value that may be overridden by values associated with specific registered MIB regions (see agentxRegTimeout). The default value of '0' indicates that the master agent’s default timeout value should be used (see agentxDefaultTimeout).

Note that, if the agent supports writing of this object the new value will be used for the next agentx-Open-PDU the subagent sends."
DEFVAL { 0 }
 ::= { agentxSubagentEntry 7 }

agentxSATransportType OBJECT-TYPE
SYNTAX INTEGER {
    unixDomainSockets(1),
tcp(2),
udp(3),
sharedMem(4),
other(5)
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The transport used for AgentX protocol messages between this
subagent and the master agent."
 ::= { agentxSubagentEntry 8 }

agentxSATransportAddr OBJECT-TYPE
SYNTAX OCTET STRING
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The 'address' of the session this subagent has open with the
master agent. Interpretation of this value depends on the value
of agentxSATransportType."
 ::= { agentxSubagentEntry 9 }

--
-- The AgentX Registration Table
--

agentxRegistrationTable OBJECT-TYPE
SYNTAX SEQUENCE OF AgentxRegistrationEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A table of registered OBJECT IDENTIFIER regions. This is the
table used to dispatch AgentX PDUs to the appropriate subagent
based on the requested OIDs in the SNMP messages. Note that a
subagent registration may be broken up into multiple entries in
this table, as described in the AgentX Protocol specification,
[5]."
 ::= { agentxObjects 3 }

agentxRegistrationEntry OBJECT-TYPE
SYNTAX AgentxRegistrationEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A single registered region. Regions are added by the master
agent when subagents register and are removed from the table
when the subagents unregister the region or their sessions are
closed. Note that the combination of agentxRegContext, agentxRegStart and agentxRegDispatchOrder will be unique and could have been used for indexing purposes.

INDEX  
{ agentxRegIndex }
::: { agentxRegistrationTable 1 }

AgentxRegistrationEntry ::= SEQUENCE {
  agentxRegIndex           Unsigned32,  
  agentxRegContext         OCTET STRING,  
  agentxRegStart           OBJECT IDENTIFIER,  
  agentxRegEnd             OBJECT IDENTIFIER,  
  agentxRegPriority        Unsigned32,  
  agentxRegSAIndex         Unsigned32,  
  agentxRegTimeout         INTEGER
}

agentxRegIndex OBJECT-TYPE
SYNTAX      Unsigned32
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION  
"An integer that uniquely identifies a registration entry."
::: { agentxRegistrationEntry 1 }

agentxRegContext OBJECT-TYPE
SYNTAX      OCTET STRING
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION  
"The context in which the subagent supports the objects in this region. A zero-length context indicates the default context."
::: { agentxRegistrationEntry 2 }

agentxRegStart OBJECT-TYPE
SYNTAX      OBJECT IDENTIFIER
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION  
"The starting OBJECT IDENTIFIER of this registration entry. The subagent identified by agentxRegSAIndex implements objects starting at this value (inclusive). Note that this value could identify an object type, an object instance, or a partial object instance identifier."
::: { agentxRegistrationEntry 3 }

agentxRegEnd OBJECT-TYPE
SYNTAX      OBJECT IDENTIFIER
MAX-ACCESS  read-only
 STATUS current
DESCRIPTION
"The ending OBJECT IDENTIFIER of this registration entry. The subagent identified by agentxRegSAIndex implements objects up to but not including this value. Note that this value could identify an object type, an object instance, or a partial object instance identifier."
 ::= { agentxRegistrationEntry 4 }

-- -- --
--agentxRegDispatchOrder OBJECT-TYPE
-- SYNTAX INTEGER (0..256)
-- MAX-ACCESS read-only
-- STATUS current
-- DESCRIPTION
-- "An indication of this range’s order or precedence for dispatching purposes. This value will normally be 0 indicating that there is no duplicate OID registration for this range. If the value is anything but 0 then there is duplicate registration and the entry with the lowest value of agentxRegDispatchOrder will be the one selected."
-- REFERENCE
-- "Agent Extensibility (AgentX) Protocol Version 1, [5], section 7.1.4.1 Handling Duplicate OID Ranges."
-- DEFVAL { 0 }
-- ::= { agentxRegistrationEntry 5 }

-- --
-- To support other subagents types that can be visible to the manager.
--
agentxRegPriority OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"The subagent’s priority when exporting this OID range. Lower values have higher priority.

Note that, if the agent supports writing of this object the new value will be used for subsequent agentx-Register-PDUs the subagent sends for this region. In other words, if the manager wishes to change the value operationally, she must set this value then set the corresponding agentxSAAdminStatus to ‘down(2)’ (as indicated by agentxRegSAIndex), which will close the subagent, after which is will automatically re-open the
session and re-register its OID ranges with the new priority."
DEFVAL { 255 }
 ::= { agentxRegistrationEntry 5 }

agentxRegSAIndex OBJECT-TYPE
SYNTAX     Unsigned32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The value of agentxSAIndex for the subagent that registered
 this OID range."
 ::= { agentxRegistrationEntry 6 }

agentxRegTimeout OBJECT-TYPE
SYNTAX     INTEGER (0..255)
MAX-ACCESS read-write
STATUS     current
DESCRIPTION
 "The timeout value, in seconds, for subagent responses to
 requests associated with this OID range. The value '0'
 indicates that default value (indicated by agentxSATimeout
 or agentxDefaultTimeout) is to be used. This value is taken
 from the r.timeout field of the agentx-Register-PDU.

 Note that, if the agent supports writing of this object the new
 value will be used for subsequent agentx-Register-PDUs the
 subagent sends for this region."
DEFVAL { 0 }
 ::= { agentxRegistrationEntry 7 }

--
-- The AgentX Statistics Group
--
-- The statistics in this group are maintained by the Master Agent.
--
-- Other stats have been removed. Support trap generation based
-- on certain situations for duplicate registration.
--
agentxStats OBJECT IDENTIFIER ::= { agentxObjects 4 }

agentxRegisterDuplicate OBJECT-TYPE
SYNTAX     Counter32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The number of agentx-Response-PDU messages sent by the master
 agent in response to incoming agentx-Register-PDU messages where
the res.error field was set to 'duplicateRegistration'."

::= { agentxStats 1 }

--

-- Conformance Statements for the AgentX MIB
--

agentxConformance OBJECT IDENTIFIER ::= { agentxMIB 2 }
agentxMIBGroups OBJECT IDENTIFIER ::= { agentxConformance 1 }
agentxMIBCompliances OBJECT IDENTIFIER ::= { agentxConformance 2 }

agentxMIBCompliance MODULE-COMPLIANCE
  STATUS current
  DESCRIPTION "The compliance statement for SNMP entities that implement the
  AgentX protocol. Note that a compliant agent can implement all
  objects in this MIB module as read-only."

MODULE -- this module
  MANDATORY-GROUPS { agentxMIBGroup }

OBJECT agentxDefaultTimeout
  MIN-ACCESS read-only
  DESCRIPTION "Write access is not required."

OBJECT agentxSATimeout
  MIN-ACCESS read-only
  DESCRIPTION "Write access is not required."

OBJECT agentxSAAdminStatus
  MIN-ACCESS read-only
  DESCRIPTION "Write access is not required."

OBJECT agentxRegPriority
  MIN-ACCESS read-only
  DESCRIPTION "Write access is not required."

OBJECT agentxRegTimeout
  MIN-ACCESS read-only
  DESCRIPTION "Write access is not required."

::= { agentxMIBCompliances 1 }
agentxMIBGroup OBJECT-GROUP
OBJECTS {
    agentxDefaultTimeout,
    agentxMasterAgentXVer,
    agentxMasterTransports,
    agentxSATableLastChange,
    agentxSANumber,
    agentxSATimeout,
    agentxSAObjectID,
    agentxSADeclr,
    agentxSAAdminStatus,
    agentxSAOpenTime,
    agentxSAAgentXVer,
    agentxSATransportType,
    agentxSATransportAddr,
    agentxRegContext,
    agentxRegStart,
    agentxRegEnd,
    agentxRegPriority,
    agentxRegSAIndex,
    agentxRegTimeout,
    agentxRegisterDuplicate
}
STATUS current
DESCRIPTION
    "All accessible objects in the AgentX MIB."
 ::= { agentxMIBGroups 1 }

END

This document is a product of the IETF’s AgentX Working Group.

Special acknowledgement is made to:

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This MIB is an evolution of the Subagent MIB by Bert Wijnen
(wijnen@vnet.ibm.com) which in turn was derived from the SMUX-MIB
by Marshall Rose [6].
Security issues are not discussed in this memo.

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