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Mail Monitoring MIB

Status of this Memo

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1. Introduction

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. Specifically, this memo extends the basic Network Services Monitoring MIB [8] to allow monitoring of Message Transfer Agents (MTAs). It may also be used to monitor MTA components within gateways.

2. Table of Contents

3. The SNMPv2 Network Management Framework

The SNMPv2 Network Management Framework consists of seven major components. They are:

- RFC 1902 [1] which defines the SMI, the mechanisms used for describing and naming objects for the purpose of management.
- RFC 1903 [2] defines textual conventions for SNMPv2.
- RFC 1904 [3] defines conformance statements for SNMPv2.
- RFC 1905 [4] defines transport mappings for SNMPv2.
- RFC 1906 [5] defines the protocol operations used for network access to managed objects.
- RFC 1907 [6] defines the Management Information Base for SNMPv2.
- RFC 1908 [7] specifies coexistance between SNMP and SNMPv2.

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

3.1. Object Definitions

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 refer to the object type.

4. Message Flow Model

A general model of message flow inside an MTA has to be presented before a MIB can be described. Generally speaking, message flow is modelled as occuring in four steps:

(1) Messages are received by the MTA from User Agents, Message Stores, other MTAs, and gateways.

(2) The "next hop" for the each message is determined. This is simply the destination the message is to be transmitted to; it may or may not be the final destination of the message.

Multiple "next hops" may exist for a single message (as a result of either having multiple recipients or distribution list expansion); this may make it necessary to duplicate messages.

(3) If necessary messages are converted into the format that's appropriate for the next hop. Conversion operations may be successful or unsuccessful.

(4) Messages are transmitted to the appropriate destination, which may be a User Agent, Message Store, another MTA, or gateway.

Storage of messages in the MTA occurs at some point during this process. However, it is important to note that storage may occur at different and possibly even multiple points during this process. For example, some MTAs expand messages into multiple copies as they are received. In this case (1), (2), and (3) may all occur prior to storage. Other MTAs store messages precisely as they are received and perform all expansions and conversions during retransmission processing. So here only (1) occurs prior to storage. This leads to situations where, in general, a measurement of messages received may not equal a measurement of messages in store, or a measurement of messages stored may not equal a measurement of messages retransmitted, or both.

5. MTA Objects

If there are one or more MTAs on the host, the following MIB may be used to monitor them. Any number of the MTAs on a single host or group of hosts may be monitored. Each MTA is dealt with as a separate network service and has its own applTable entry in the Network Services Monitoring MIB.

The MIB described in this document covers only the portion which is specific to the monitoring of MTAs. The network service related part of the MIB is covered in a separate document [8].

This MIB defines four tables. The first of these contains per-MTA information that isn't specific to any particular part of MTA. The second breaks each MTA down into a collection of separate components called groups. Groups are described in detail in the comments embedded in the MIB below. The third table provides a means of correlating associations tracked by the network services MIB with specific groups within different MTAs. Finally, the fourth table provides a means of tracking any errors encountered during the operation of the MTA. The first two tables must be implemented to conform with this MIB; the last two are optional.

6. Definitions

```
MTA-MIB DEFINITIONS ::= BEGIN

IMPORTS
    OBJECT-TYPE, Counter32, Gauge32, MODULE-IDENTITY, mib-2
      FROM SNMPv2-SMI
    DisplayString, TimeInterval
      FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP
      FROM SNMPv2-CONF
    applIndex, URLString
      FROM NETWORK-SERVICES-MIB;

mta MODULE-IDENTITY
    LAST-UPDATED "9708170000Z"
    ORGANIZATION "IETF Mail and Directory Management Working Group"
    CONTACT-INFO
      "        Ned Freed

       Postal: Innosoft International, Inc.
               1050 Lakes Drive
               West Covina, CA 91790
               US

       Tel: +1 626 919 3600
       Fax: +1 626 919 3614

       E-Mail: ned.freed@innosoft.com"
    DESCRIPTION
      "The MIB module describing Message Transfer Agents (MTAs)"
    REVISION "9311280000Z"
    DESCRIPTION
      "The original version of this MIB was published in RFC 1566"
    ::= {mib-2 28}

mtaTable OBJECT-TYPE
    SYNTAX SEQUENCE OF MtaEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
      "The table holding information specific to an MTA."
    ::= {mta 1}

mtaStatusCode OBJECT-TYPE
    SYNTAX INTEGER (4000000..5999999)
    MAX-ACCESS not-accessible
    STATUS current
```

```
    DESCRIPTION
      "An index capable of representing an Enhanced Mail System
       Status Code.  Enhanced Mail System Status Codes are
       defined in RFC 1893 [14].  These codes have the form

           class.subject.detail

       Here 'class' is either 2, 4, or 5 and both 'subject' and
       'detail'  are integers in the range 0..999. Given a status
       code the corresponding index value is defined to be
       ((class * 1000) + subject) * 1000 + detail.  Both SMTP
       error response codes and X.400 reason and diagnostic codes
       can be mapped into these codes, resulting in a namespace
       capable of describing most error conditions a mail system
       encounters in a generic yet detailed way."
    ::= {mta 6}

mtaEntry OBJECT-TYPE
    SYNTAX MtaEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
      "The entry associated with each MTA."
    INDEX {applIndex}
    ::= {mtaTable 1}

MtaEntry ::= SEQUENCE {
    mtaReceivedMessages
      Counter32,
    mtaStoredMessages
      Gauge32,
    mtaTransmittedMessages
      Counter32,
    mtaReceivedVolume
      Counter32,
    mtaStoredVolume
      Gauge32,
    mtaTransmittedVolume
      Counter32,
    mtaReceivedRecipients
      Counter32,
    mtaStoredRecipients
      Gauge32,
    mtaTransmittedRecipients
      Counter32,
    mtaSuccessfulConvertedMessages
      Counter32,
    mtaFailedConvertedMessages
```

```
      Counter32,
    mtaLoopsDetected
      Counter32
}

mtaReceivedMessages OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The number of messages received since MTA initialization.
       This includes messages transmitted to this MTA from other
       MTAs as well as messages that have been submitted to the
       MTA directly by end-users or applications."
    ::= {mtaEntry 1}

mtaStoredMessages OBJECT-TYPE
    SYNTAX Gauge32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total number of messages currently stored in the MTA.
       This includes messages that are awaiting transmission to
       some other MTA or are waiting for delivery to an end-user
       or application."
    ::= {mtaEntry 2}

mtaTransmittedMessages OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The number of messages transmitted since MTA initialization.
       This includes messages that were transmitted to some other
       MTA or are waiting for delivery to an end-user or
       application."
    ::= {mtaEntry 3}

mtaReceivedVolume OBJECT-TYPE
    SYNTAX Counter32
    UNITS "K-octets"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total volume of messages received since MTA
       initialization, measured in kilo-octets.  This volume should
       include all transferred data that is logically above the mail
       transport protocol level.  For example, an SMTP-based MTA
```

```
       should use the number of kilo-octets in the message header
       and body, while an X.400-based MTA should use the number of
       kilo-octets of P2 data.  This includes messages transmitted
       to this MTA from other MTAs as well as messages that have
       been submitted to the MTA directly by end-users or
       applications."
    ::= {mtaEntry 4}

mtaStoredVolume OBJECT-TYPE
    SYNTAX Gauge32
    UNITS "K-octets"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total volume of messages currently stored in the MTA,
       measured in kilo-octets.  This volume should include all
       stored data that is logically above the mail transport
       protocol level.  For example, an SMTP-based MTA should
       use the number of kilo-octets in the message header and
       body, while an X.400-based MTA would use the number of
       kilo-octets of P2 data.  This includes messages that are
       awaiting transmission to some other MTA or are waiting
       for delivery to an end-user or application."
    ::= {mtaEntry 5}

mtaTransmittedVolume OBJECT-TYPE
    SYNTAX Counter32
    UNITS "K-octets"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total volume of messages transmitted since MTA
       initialization, measured in kilo-octets.  This volume should
       include all transferred data that is logically above the mail
       transport protocol level.  For example, an SMTP-based MTA
       should use the number of kilo-octets in the message header
       and body, while an X.400-based MTA should use the number of
       kilo-octets of P2 data.  This includes messages that were
       transmitted to some other MTA or are waiting for delivery
       to an end-user or application."
    ::= {mtaEntry 6}

mtaReceivedRecipients OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total number of recipients specified in all messages
```

```
       received since MTA initialization.  Recipients this MTA
       has no responsibility for, i.e. inactive envelope
       recipients or ones referred to in message headers,
       should not be counted even if information about such
       recipients is available.  This includes messages
       transmitted to this MTA from other MTAs as well as
       messages that have been submitted to the MTA directly
       by end-users or applications."
    ::= {mtaEntry 7}

mtaStoredRecipients OBJECT-TYPE
    SYNTAX Gauge32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total number of recipients specified in all messages
       currently stored in the MTA.  Recipients this MTA has no
       responsibility for, i.e. inactive envelope recipients or
       ones referred to in message headers, should not be
       counted.  This includes messages that are awaiting
       transmission to some other MTA or are waiting for
       delivery to an end-user or application."
    ::= {mtaEntry 8}

mtaTransmittedRecipients OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total number of recipients specified in all messages
       transmitted since MTA initialization.  Recipients this
       MTA had no responsibility for, i.e. inactive envelope
       recipients or ones referred to in message headers,
       should not be counted.  This includes messages that were
       transmitted to some other MTA or are waiting for
       delivery to an end-user or application."
    ::= {mtaEntry 9}

mtaSuccessfulConvertedMessages OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The number of messages that have been successfully
       converted from one form to another since MTA
       initialization."
    ::= {mtaEntry 10}
```

```
mtaFailedConvertedMessages OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The number of messages for which an unsuccessful
       attempt was made to convert them from one form to
       another since MTA initialization."
    ::= {mtaEntry 11}

mtaLoopsDetected OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "A message loop is defined as a situation where the MTA
       decides that a given message will never be delivered to
       one or more recipients and instead will continue to
       loop endlessly through one or more MTAs.  This variable
       counts the number of times the MTA has detected such a
       situation since MTA initialization. Note that the
       mechanism MTAs use to detect loops (e.g. trace field
       counting, count of references to this MTA in a trace
       field, examination of DNS or other directory information,
       etc.), the level at which loops are detected (e.g. per
       message, per recipient, per directory entry, etc.), and
       the handling of a loop once it is detected (e.g. looping
       messages are held, looping messages are bounced or sent
       to the postmaster, messages that the MTA knows will loop
       won't be accepted, etc.) vary widely from one MTA to the
       next and cannot be inferred from this variable."
    ::= {mtaEntry 12}

-- MTAs typically group inbound reception, queue storage, and
-- outbound transmission in some way, rather than accounting for
-- such operations only across the MTA as a whole. In the most
-- extreme case separate information will be maintained for each
-- different entity that receives messages and for each entity
-- the MTA stores messages for and delivers messages to.  Other
-- MTAs may elect to treat all reception equally, all queue
-- storage equally, all deliveries equally, or some combination
-- of this. Overlapped groupings are also possible, where an MTA
-- decomposes its traffic in different ways for different
-- purposes.

-- In any case, a grouping abstraction is an extremely useful for
-- breaking down the activities of an MTA. For purposes of
-- labelling this will be called a "group" in this MIB.
```

```
-- Each group contains all the variables needed to monitor all
-- aspects of an MTA's operation.  However, the fact that all
-- groups contain all possible variables does not imply that all
-- groups must use all possible variables. For example, a single
-- group might be used to monitor only one kind of event (inbound
-- processing, outbound processing, or storage). In this sort of
-- configuration all unused counters would be inaccessible; e.g.,
-- returning either a noSuchName error (for an SNMPv1 get), or a
-- noSuchInstance exception (for an SNMPv2 get).

-- Groups can be created at any time after MTA initialization. Once
-- a group is created it should not be deleted or its mtaGroupIndex
-- changed unless the MTA is reinitialized.

-- Groups are not necessarily mutually exclusive. A given event may
-- be recorded by more than one group, a message may be seen as
-- stored by more than one group, and so on.  Groups should be all
-- inclusive, however: if groups are implemented all aspects of an
-- MTA's operation should be registered in at least one group. This
-- freedom lets implementors use different sets of groups to
-- provide differents "views" of an MTA.

-- The possibility of overlap between groups means that summing
-- variables across groups may not produce values equal to those in
-- the mtaTable. mtaTable should always provide accurate information
-- about the MTA as a whole.

-- The term "channel" is often used in MTA implementations; channels
-- are usually, but not always, equivalent to a group. However,
-- this MIB does not use the term "channel" because there is no
-- requirement that an MTA supporting this MIB has to map its
-- "channel" abstraction one-to-one onto the MIB's group abstration.

-- An MTA may create a group or group of groups at any time. Once
-- created, however, an MTA cannot delete an entry for a group from
-- the group table.  Deletation is only allowed when the MTA is
-- reinitialized, and is not required even then.  This restriction
-- is imposed so that monitoring agents can rely on group
-- assignments being consistent across multiple query operations.

-- Groups may be laid out so as to form a hierarchical arrangement,
-- with some groups acting as subgroups for other groups.
-- Alternately, disjoint groups of groups may be used to provide
-- different sorts of "snapshots" of MTA operation.  The
-- mtaGroupHierarchy variable provides an indication of how each
-- group fits into the overall arrangement being used.

mtaGroupTable OBJECT-TYPE
```

```
    SYNTAX SEQUENCE OF MtaGroupEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
      "The table holding information specific to each MTA group."
    ::= {mta 2}

mtaGroupEntry OBJECT-TYPE
    SYNTAX MtaGroupEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
      "The entry associated with each MTA group."
    INDEX {applIndex, mtaGroupIndex}
    ::= {mtaGroupTable 1}

MtaGroupEntry ::= SEQUENCE {
    mtaGroupIndex
        INTEGER,
    mtaGroupReceivedMessages
        Counter32,
    mtaGroupRejectedMessages
        Counter32,
    mtaGroupStoredMessages
        Gauge32,
    mtaGroupTransmittedMessages
        Counter32,
    mtaGroupReceivedVolume
        Counter32,
    mtaGroupStoredVolume
        Gauge32,
    mtaGroupTransmittedVolume
        Counter32,
    mtaGroupReceivedRecipients
        Counter32,
    mtaGroupStoredRecipients
        Gauge32,
    mtaGroupTransmittedRecipients
        Counter32,
    mtaGroupOldestMessageStored
        TimeInterval,
    mtaGroupInboundAssociations
        Gauge32,
    mtaGroupOutboundAssociations
        Gauge32,
    mtaGroupAccumulatedInboundAssociations
        Counter32,
    mtaGroupAccumulatedOutboundAssociations
```

```
        Counter32,
    mtaGroupLastInboundActivity
        TimeInterval,
    mtaGroupLastOutboundActivity
        TimeInterval,
    mtaGroupLastOutboundAssociationAttempt
        TimeInterval,
    mtaGroupRejectedInboundAssociations
        Counter32,
    mtaGroupFailedOutboundAssociations
        Counter32,
    mtaGroupInboundRejectionReason
        DisplayString,
    mtaGroupOutboundConnectFailureReason
        DisplayString,
    mtaGroupScheduledRetry
        TimeInterval,
    mtaGroupMailProtocol
        OBJECT IDENTIFIER,
    mtaGroupName
        DisplayString,
    mtaGroupSuccessfulConvertedMessages
        Counter32,
    mtaGroupFailedConvertedMessages
        Counter32,
    mtaGroupDescription
        DisplayString,
    mtaGroupURL
        URLString,
    mtaGroupCreationTime
        TimeInterval,
    mtaGroupHierarchy
        INTEGER,
    mtaGroupOldestMessageId
        DisplayString,
    mtaGroupLoopsDetected
        Counter32
}

mtaGroupIndex OBJECT-TYPE
    SYNTAX INTEGER (1..2147483647)
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
      "The index associated with a group for a given MTA."
    ::= {mtaGroupEntry 1}

mtaGroupReceivedMessages OBJECT-TYPE
```

```
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The number of messages received to this group since
       group creation."
    ::= {mtaGroupEntry 2}

mtaGroupRejectedMessages OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The number of messages rejected by this group since
       group creation."
    ::= {mtaGroupEntry 3}

mtaGroupStoredMessages OBJECT-TYPE
    SYNTAX Gauge32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total number of messages currently stored in this
       group's queue."
    ::= {mtaGroupEntry 4}

mtaGroupTransmittedMessages OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The number of messages transmitted by this group since
       group creation."
    ::= {mtaGroupEntry 5}

mtaGroupReceivedVolume OBJECT-TYPE
    SYNTAX Counter32
    UNITS "K-octets"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total volume of messages received to this group since
       group creation, measured in kilo-octets.  This volume
       should include all transferred data that is logically above
       the mail transport protocol level.  For example, an
       SMTP-based MTA should use the number of kilo-octets in the
       message header and body, while an X.400-based MTA should use
       the number of kilo-octets of P2 data."
```

```
    ::= {mtaGroupEntry 6}

mtaGroupStoredVolume OBJECT-TYPE
    SYNTAX Gauge32
    UNITS "K-octets"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total volume of messages currently stored in this
       group's queue, measured in kilo-octets.  This volume should
       include all stored data that is logically above the mail
       transport protocol level.  For example, an SMTP-based
       MTA should use the number of kilo-octets in the message
       header and body, while an X.400-based MTA would use the
       number of kilo-octets of P2 data."
    ::= {mtaGroupEntry 7}

mtaGroupTransmittedVolume OBJECT-TYPE
    SYNTAX Counter32
    UNITS "K-octets"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total volume of messages transmitted by this group
       since group creation, measured in kilo-octets.  This
       volume should include all transferred data that is logically
       above the mail transport protocol level.  For example, an
       SMTP-based MTA should use the number of kilo-octets in the
       message header and body, while an X.400-based MTA should use
       the number of kilo-octets of P2 data."
    ::= {mtaGroupEntry 8}

mtaGroupReceivedRecipients OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total number of recipients specified in all messages
       received to this group since group creation.
       Recipients this MTA has no responsibility for should not
       be counted."
    ::= {mtaGroupEntry 9}

mtaGroupStoredRecipients OBJECT-TYPE
    SYNTAX Gauge32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
```

```
      "The total number of recipients specified in all messages
       currently stored in this group's queue.  Recipients this
       MTA has no responsibility for should not be counted."
    ::= {mtaGroupEntry 10}

mtaGroupTransmittedRecipients OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total number of recipients specified in all messages
       transmitted by this group since group creation.
       Recipients this MTA had no responsibility for should not
       be counted."
    ::= {mtaGroupEntry 11}

mtaGroupOldestMessageStored OBJECT-TYPE
    SYNTAX TimeInterval
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "Time since the oldest message in this group's queue was
       placed in the queue."
    ::= {mtaGroupEntry 12}

mtaGroupInboundAssociations OBJECT-TYPE
    SYNTAX Gauge32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The number of current associations to the group, where the
       group is the responder."
    ::= {mtaGroupEntry 13}

mtaGroupOutboundAssociations OBJECT-TYPE
    SYNTAX Gauge32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The number of current associations to the group, where the
      group is the initiator."
    ::= {mtaGroupEntry 14}

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

```
      "The total number of associations to the group since
      group creation, where the MTA was the responder."
    ::= {mtaGroupEntry 15}

mtaGroupAccumulatedOutboundAssociations OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total number of associations from the group since
       group creation, where the MTA was the initiator."
    ::= {mtaGroupEntry 16}

mtaGroupLastInboundActivity OBJECT-TYPE
    SYNTAX TimeInterval
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "Time since the last time that this group had an active
      inbound association for purposes of message reception."
    ::= {mtaGroupEntry 17}

mtaGroupLastOutboundActivity OBJECT-TYPE
    SYNTAX TimeInterval
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "Time since the last time that this group had a
       successful outbound association for purposes of
       message delivery."
    ::= {mtaGroupEntry 18}

mtaGroupLastOutboundAssociationAttempt OBJECT-TYPE
    SYNTAX TimeInterval
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "Time since the last time that this group attempted
       to make an outbound association for purposes of
       message delivery."
    ::= {mtaGroupEntry 34}

mtaGroupRejectedInboundAssociations OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total number of inbound associations the group has
```

```
      rejected, since group creation.  Rejected associations
      are not counted in the accumulated association totals."
    ::= {mtaGroupEntry 19}

mtaGroupFailedOutboundAssociations OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The total number associations where the group was the
      initiator and association establishment has failed,
      since group creation.  Failed associations are
      not counted in the accumulated association totals."
    ::= {mtaGroupEntry 20}

mtaGroupInboundRejectionReason OBJECT-TYPE
    SYNTAX DisplayString
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The failure reason, if any, for the last association this
      group refused to respond to. An empty string indicates that
      the last attempt was successful.  If no association attempt
      has been made since the MTA was initialized the value
      should be 'never'."
    ::= {mtaGroupEntry 21}

mtaGroupOutboundConnectFailureReason OBJECT-TYPE
    SYNTAX DisplayString
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The failure reason, if any, for the last association attempt
      this group initiated. An empty string indicates that the last
      attempt was successful.  If no association attempt has been
      made since the MTA was initialized the value should be
      'never'."
    ::= {mtaGroupEntry 22}

mtaGroupScheduledRetry OBJECT-TYPE
    SYNTAX TimeInterval
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The time when this group is scheduled to next attempt to
       make an association."
    ::= {mtaGroupEntry 23}
```

```
mtaGroupMailProtocol OBJECT-TYPE
    SYNTAX OBJECT IDENTIFIER
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "An identification of the protocol being used by this group.
      For an group employing OSI protocols, this will be the
      Application Context.  For Internet applications, the IANA
      maintains a registry of the OIDs which correspond to well-known
      message transfer protocols.  If the application protocol is
      not listed in the registry, an OID value of the form
      {applTCPProtoID port} or {applUDProtoID port} are used for
      TCP-based and UDP-based protocols, respectively.  In either
      case 'port' corresponds to the primary port number being
      used by the group.  applTCPProtoID and applUDPProtoID are
      defined in [8]."
    ::= {mtaGroupEntry 24}

mtaGroupName OBJECT-TYPE
    SYNTAX DisplayString
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "A descriptive name for the group. If this group connects to
       a single remote MTA this should be the name of that MTA. If
       this in turn is an Internet MTA this should be the domain
       name.  For an OSI MTA it should be the string encoded
       distinguished name of the managed object using the format
       defined in RFC 1779 [9]. For X.400(1984) MTAs which do not
       have a Distinguished Name, the RFC 1327 [12] syntax
       'mta in globalid' should be used."
    ::= {mtaGroupEntry 25}

mtaGroupSuccessfulConvertedMessages OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "The number of messages that have been successfully
       converted from one form to another in this group
       since group creation."
    ::= {mtaGroupEntry 26}

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

```
      "The number of messages for which an unsuccessful
       attempt was made to convert them from one form to
       another in this group since group creation."
    ::= {mtaGroupEntry 27}

mtaGroupDescription OBJECT-TYPE
    SYNTAX DisplayString
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "A description of the group's purpose.  This information is
       intended to identify the group in a status display."
    ::= {mtaGroupEntry 28}

mtaGroupURL OBJECT-TYPE
    SYNTAX URLString
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "A URL pointing to a description of the group.  This
       information is intended to identify and briefly describe
       the group in a status display."
    ::= {mtaGroupEntry 29}

mtaGroupCreationTime OBJECT-TYPE
    SYNTAX TimeInterval
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "Time since this group was first created."
    ::= {mtaGroupEntry 30}

mtaGroupHierarchy OBJECT-TYPE
    SYNTAX INTEGER (-2147483648..2147483647)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "Describes how this group fits into the hierarchy. A
       positive value is interpreted as an mtaGroupIndex
       value for some other group whose variables include
       those of this group (and usually others). A negative
       value is interpreted as a group collection code: Groups
       with common negative hierarchy values comprise one
       particular breakdown of MTA activity as a whole. A
       zero value means that this MIB implementation doesn't
       implement hierarchy indicators and thus the overall
       group hierarchy cannot be determined."
    ::= {mtaGroupEntry 31}
```

```
mtaGroupOldestMessageId OBJECT-TYPE
    SYNTAX DisplayString
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "Message ID of the oldest message in the group's queue.
       Whenever possible this should be in the form of an
       RFC 822 [13] msg-id; X.400 may convert X.400 message
       identifiers to this form by following the rules laid
       out in RFC1327 [12]."
    ::= {mtaGroupEntry 32}

mtaGroupLoopsDetected OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "A message loop is defined as a situation where the MTA
       decides that a given message will never be delivered to
       one or more recipients and instead will continue to
       loop endlessly through one or more MTAs.  This variable
       counts the number of times the MTA has detected such a
       situation in conjunction with something associated with
       this group since group creation.  Note that the
       mechanism MTAs use to detect loops (e.g. trace field
       counting, count of references to this MTA in a trace
       field, examination of DNS or other directory information,
       etc.), the level at which loops are detected (e.g. per
       message, per recipient, per directory entry, etc.), and
       the handling of a loop once it is detected (e.g. looping
       messages are held, looping messages are bounced or sent
       to the postmaster, messages that the MTA knows will loop
       won't be accepted, etc.) vary widely from one MTA to the
       next and cannot be inferred from this variable."
    ::= {mtaGroupEntry 33}

-- The mtaGroupAssociationTable provides a means of correlating
-- entries in the network services association table with the
-- MTA group responsible for the association.


mtaGroupAssociationTable OBJECT-TYPE
    SYNTAX SEQUENCE OF MtaGroupAssociationEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
      "The table holding information regarding the associations
       for each MTA group."
```

```
    ::= {mta 3}

mtaGroupAssociationEntry OBJECT-TYPE
    SYNTAX MtaGroupAssociationEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
      "The entry holding information regarding the associations
       for each MTA group."
    INDEX {applIndex, mtaGroupIndex, mtaGroupAssociationIndex}
    ::= {mtaGroupAssociationTable 1}

MtaGroupAssociationEntry ::= SEQUENCE {
    mtaGroupAssociationIndex
        INTEGER
}

mtaGroupAssociationIndex OBJECT-TYPE
    SYNTAX INTEGER (1..2147483647)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "Reference into association table to allow correlation of
       this group's active associations with the association table."
    ::= {mtaGroupAssociationEntry 1}

-- The mtaGroupErrorTable gives each group a way of tallying
-- the specific errors it has encountered.  The mechanism
-- defined here uses RFC 1893 [14] status codes to identify
-- various specific errors. There are also classes for generic
-- errors of various sorts, and the entire mechanism is also
-- extensible, in that new error codes can be defined at any
-- time.

mtaGroupErrorTable OBJECT-TYPE
    SYNTAX SEQUENCE OF MtaGroupErrorEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
      "The table holding information regarding accumulated errors
       for each MTA group."
    ::= {mta 5}

mtaGroupErrorEntry OBJECT-TYPE
    SYNTAX MtaGroupErrorEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
```

```
      "The entry holding information regarding accumulated
       errors for each MTA group."
    INDEX {applIndex, mtaGroupIndex, mtaStatusCode}
    ::= {mtaGroupErrorTable 1}

MtaGroupErrorEntry ::= SEQUENCE {
    mtaGroupInboundErrorCount
        Counter32,
    mtaGroupInternalErrorCount
        Counter32,
    mtaGroupOutboundErrorCount
        Counter32
}

mtaGroupInboundErrorCount OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "Count of the number of errors of a given type that have
       been accumulated in assocation with a particular group
       while processing incoming messages. In the case of SMTP
       these will typically be errors reporting by an SMTP
       server to the remote client; in the case of X.400
       these will typically be errors encountered while
       processing an incoming message."
    ::= {mtaGroupErrorEntry 1}


mtaGroupInternalErrorCount OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "Count of the number of errors of a given type that have
       been accumulated in assocation with a particular group
       during internal MTA processing."
    ::= {mtaGroupErrorEntry 2}

mtaGroupOutboundErrorCount OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
      "Count of the number of errors of a given type that have
       been accumulated in assocation with a particular group's
       outbound connection activities. In the case of an SMTP
       client these will typically be errors reported while
```

```
       attempting to contact or while communicating with the
       remote SMTP server. In the case of X.400 these will
       typically be errors encountered while constructing
       or attempting to deliver an outgoing message."
    ::= {mtaGroupErrorEntry 3}

-- Conformance information

mtaConformance OBJECT IDENTIFIER ::= {mta 4}

mtaGroups      OBJECT IDENTIFIER ::= {mtaConformance 1}
mtaCompliances OBJECT IDENTIFIER ::= {mtaConformance 2}

-- Compliance statements

mtaCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
      "The compliance statement for SNMPv2 entities which
       implement the Mail Monitoring MIB for basic
       monitoring of MTAs."
    MODULE  -- this module
      MANDATORY-GROUPS {mtaGroup}
    ::= {mtaCompliances 1}

mtaAssocCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
      "The compliance statement for SNMPv2 entities which
       implement the Mail Monitoring MIB for monitoring of
       MTAs and their associations."
    MODULE  -- this module
      MANDATORY-GROUPS {mtaGroup, mtaAssocGroup}
    ::= {mtaCompliances 2}

mtaErrorCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
      "The compliance statement for SNMPv2 entities which
       implement the Mail Monitoring MIB for monitoring of
       MTAs and detailed errors."
    MODULE  -- this module
      MANDATORY-GROUPS {mtaGroup, mtaErrorGroup}
    ::= {mtaCompliances 3}

mtaFullCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
```

```
      "The compliance statement for SNMPv2 entities which
       implement the full Mail Monitoring MIB for monitoring
       of MTAs, associations, and detailed errors."
    MODULE  -- this module
      MANDATORY-GROUPS {mtaGroup, mtaAssocGroup, mtaErrorGroup}
    ::= {mtaCompliances 4}

-- Units of conformance

mtaGroup OBJECT-GROUP
    OBJECTS {
      mtaReceivedMessages, mtaStoredMessages,
      mtaTransmittedMessages, mtaReceivedVolume, mtaStoredVolume,
      mtaTransmittedVolume, mtaReceivedRecipients,
      mtaStoredRecipients, mtaTransmittedRecipients,
      mtaSuccessfulConvertedMessages, mtaFailedConvertedMessages,
      mtaGroupReceivedMessages, mtaGroupRejectedMessages,
      mtaGroupStoredMessages, mtaGroupTransmittedMessages,
      mtaGroupReceivedVolume, mtaGroupStoredVolume,
      mtaGroupTransmittedVolume, mtaGroupReceivedRecipients,
      mtaGroupStoredRecipients, mtaGroupTransmittedRecipients,
      mtaGroupOldestMessageStored, mtaGroupInboundAssociations,
      mtaGroupOutboundAssociations, mtaLoopsDetected,
      mtaGroupAccumulatedInboundAssociations,
      mtaGroupAccumulatedOutboundAssociations,
      mtaGroupLastInboundActivity, mtaGroupLastOutboundActivity,
      mtaGroupLastOutboundAssociationAttempt,
      mtaGroupRejectedInboundAssociations,
      mtaGroupFailedOutboundAssociations,
      mtaGroupInboundRejectionReason,
      mtaGroupOutboundConnectFailureReason,
      mtaGroupScheduledRetry, mtaGroupMailProtocol, mtaGroupName,
      mtaGroupSuccessfulConvertedMessages,
      mtaGroupFailedConvertedMessages, mtaGroupDescription,
      mtaGroupURL, mtaGroupCreationTime, mtaGroupHierarchy,
      mtaGroupOldestMessageId, mtaGroupLoopsDetected}
    STATUS current
    DESCRIPTION
      "A collection of objects providing basic monitoring of MTAs."
    ::= {mtaGroups 1}

mtaAssocGroup OBJECT-GROUP
    OBJECTS {
      mtaGroupAssociationIndex}
    STATUS current
    DESCRIPTION
      "A collection of objects providing monitoring of MTA
       associations."
```

```
    ::= {mtaGroups 2}

mtaErrorGroup OBJECT-GROUP
    OBJECTS {
      mtaGroupInboundErrorCount, mtaGroupInternalErrorCount,
      mtaGroupOutboundErrorCount}
    STATUS current
    DESCRIPTION
      "A collection of objects providing monitoring of
       detailed MTA errors."
    ::= {mtaGroups 3}

END
```

7. Changes made since RFC 1566

The only changes made to this document since it was issued as RFC 1566 [11] are the following:

(1) A number of DESCRIPTION fields have been reworded, hopefully making them clearer.

(2) mtaGroupDescription and mtaGroupURL fields have been added. These fields are intended to identify and describe the MTA and the various MTA groups.

(3) The time since the last outbound association attempt is now distinct from the time since the last successfuol outbound association attempt.

(4) Conversion operation counters have been added.

(5) A mechanism to explicitly describe group hierarchies has been added.

(6) A mechanism to count specific sorts of errors has been added.

(7) A field for the ID of the oldest message in a group’s queue has been added.

(8) Per-MTA and per-group message loop counters have been added.

(9) A new table has been added to keep track of any errors an MTA encounters.

8. Acknowledgements

This document is a work product of the Mail and Directory Management (MADMAN) Working Group of the IETF. It is based on an earlier MIB designed by S. Kille, T. Lenggenhager, D. Partain, and W. Yeong. The Electronic Mail Association's TSC committee was instrumental in providing feedback on and suggesting enhancements to RFC 1566 [11] that have led to the present document.

9. References

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10. Security Considerations

This MIB does not offer write access, and as such cannot be used to actively attack a system. However, this MIB does provide passive information about the existance, type, and configuration of applications on a given host that could potentially indicate some sort of vulnerability. Finally, the information MIB provides about network usage could be used to analyze network traffic patterns.

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