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Mail Monitoring 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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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 defined in RFC 2788 [16] to allow monitoring of Message Transfer Agents (MTAs). It may also be used to monitor MTA components within gateways.

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1. The SNMP Network Management Framework

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in RFC 2571 [1].
- 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 [2], STD 16, RFC 1212 [3] and RFC 1215 [4]. The second version, called SMIV2, is described in STD 58, RFC 2578 [5], STD 58, RFC 2579 [6] and STD 58, RFC 2580 [7].
- 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 [8]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in RFC 1901 [9] and RFC 1906 [10]. The third version of the message protocol is called SNMPv3 and described in RFC 1906 [10], RFC 2572 [11] and RFC 2574 [12].
- o Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, RFC 1157 [8]. A second set of protocol operations and associated PDU formats is described in RFC 1905 [13].
- o A set of fundamental applications described in RFC 2573 [14] and the view-based access control mechanism described in RFC 2575 [15].

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. 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 occurring 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.

3. 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 RFC 2788 [16].

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.

4. Definitions

MTA-MIB DEFINITIONS ::= BEGIN

IMPORTS

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

mta MODULE-IDENTITY

```
LAST-UPDATED "200003030000Z"
ORGANIZATION "IETF Mail and Directory Management Working Group"
CONTACT-INFO
    "      Ned Freed

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```

DESCRIPTION

"The MIB module describing Message Transfer Agents (MTAs)"

REVISION "200003030000Z"

DESCRIPTION

"This revision, published in RFC 2789, changes a number of DisplayStrings to SnmpAdminStrings. Note that this change

is not strictly supported by SMIV2. However, the alternative of deprecating the old objects and defining new objects would have a more adverse impact on backward compatibility and interoperability, given the particular semantics of these objects. The defining reference for distinguished names has also been updated from RFC 1779 to RFC 2253."

REVISION "199905120000Z"

DESCRIPTION

"This revision fixes a number of technical problems found in previous versions: The conformance groups for different versions of this MIB have been corrected, the recommendation that an empty string be returned if the last operation was successful has been removed from mtaGroupInboundRejectionReason and mtaGroupOutboundConnectFailureReason as it conflicts with the stated purpose of these variables, and the required mtaStatusCode entry has been added to MtaGroupErrorEntry. It should be noted that this last change in no way affects the bits on the wire."

REVISION "199708170000Z"

DESCRIPTION

"This revision, published in RFC 2249, adds the mtaGroupDescription and mtaGroupURL fields, conversion operation counters, a group hierarchy description mechanism, counters for specific errors, oldest message IDs, per-MTA and per-group loop counters, and a new table for tracking any errors an MTA encounters."

REVISION "199311280000Z"

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}

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 any counters that are unused as a result of a
-- given MTA's use of the group construct must 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 different "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 abstraction.

-- 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. Deletion 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.

-- Note that SNMP also defines and uses term "group". MTA groups are
-- NOT the same as SNMP groups.

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
    SnmpAdminString,
mtaGroupOutboundConnectFailureReason
    SnmpAdminString,
mtaGroupScheduledRetry
    TimeInterval,
mtaGroupMailProtocol
    OBJECT IDENTIFIER,
mtaGroupName
    SnmpAdminString,
mtaGroupSuccessfulConvertedMessages
```

```
        Counter32,
mtaGroupFailedConvertedMessages
        Counter32,
mtaGroupDescription
        SnmpAdminString,
mtaGroupURL
        URLString,
mtaGroupCreationTime
        TimeInterval,
mtaGroupHierarchy
        INTEGER,
mtaGroupOldestMessageId
        SnmpAdminString,
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 SnmpAdminString

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The failure reason, if any, for the last association this group refused to respond to. If no association attempt

has been made since the MTA was initialized the value should be 'never'."

::= {mtaGroupEntry 21}

mtaGroupOutboundConnectFailureReason OBJECT-TYPE

SYNTAX SnmpAdminString

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The failure reason, if any, for the last association attempt this group initiated. 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 amount of time until this group is next scheduled to 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, OID values of the form {applTCPProtoID port} or {applUDPPProtoID 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 protocol. The usual IANA procedures may be used to register ports for new protocols. applTCPProtoID and applUDPPProtoID are defined in the NETWORK-SERVICES-MIB, RFC 2788."

::= {mtaGroupEntry 24}

mtaGroupName OBJECT-TYPE

SYNTAX SnmpAdminString

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 2253. For X.400(1984) MTAs which do not have a Distinguished Name, the RFC 2156 syntax 'mta in globalid' used in X400-Received: fields can 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 SnmpAdminString

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 SnmpAdminString

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 msg-id; X.400 may convert X.400 message identifiers to this form by following the rules laid out in RFC2156."

::= {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 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 {
    mtaStatusCode
        INTEGER (4000000..5999999),
    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 association 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 association 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 association 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}
```

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. 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."
 ::= {mtaGroupErrorEntry 4}

-- 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 RFC 1566 implementations
        which support the Mail Monitoring MIB for basic
        monitoring of MTAs."
    MODULE -- this module
        MANDATORY-GROUPS {mtaRFC1566Group}
    ::= {mtaCompliances 1}

mtaAssocCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for RFC 1566 implementations
        which support the Mail Monitoring MIB for monitoring
        of MTAs and their associations."
    MODULE -- this module
        MANDATORY-GROUPS {mtaRFC1566Group, mtaRFC1566AssocGroup}
    ::= {mtaCompliances 2}

mtaRFC2249Compliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for RFC 2249 implementations
        which support the Mail Monitoring MIB for basic
        monitoring of MTAs."
    MODULE -- this module
        MANDATORY-GROUPS {mtaRFC2249Group}
    ::= {mtaCompliances 5}

mtaRFC2249AssocCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for RFC 2249 implementations
```



```
        which support the Mail Monitoring MIB for monitoring of
        MTAs and their associations."
MODULE  -- this module
    MANDATORY-GROUPS {mtaRFC2249Group, mtaRFC2249AssocGroup}
 ::= {mtaCompliances 6}

mtaRFC2249ErrorCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for RFC 2249 implementations
        which support the Mail Monitoring MIB for monitoring of
        MTAs and detailed errors."
    MODULE  -- this module
        MANDATORY-GROUPS {mtaRFC2249Group, mtaRFC2249ErrorGroup}
 ::= {mtaCompliances 7}

mtaRFC2249FullCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for RFC 2249 implementations
        which support the full Mail Monitoring MIB for
        monitoring of MTAs, associations, and detailed errors."
    MODULE  -- this module
        MANDATORY-GROUPS {mtaRFC2249Group, mtaRFC2249AssocGroup,
                           mtaRFC2249ErrorGroup}
 ::= {mtaCompliances 8}

mtaRFC2789Compliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for RFC 2789 implementations
        which support the Mail Monitoring MIB for basic
        monitoring of MTAs."
    MODULE  -- this module
        MANDATORY-GROUPS {mtaRFC2789Group}
 ::= {mtaCompliances 9}

mtaRFC2789AssocCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for RFC 2789 implementations
        which support the Mail Monitoring MIB for monitoring of
        MTAs and their associations."
    MODULE  -- this module
        MANDATORY-GROUPS {mtaRFC2789Group, mtaRFC2789AssocGroup}
 ::= {mtaCompliances 10}

mtaRFC2789ErrorCompliance MODULE-COMPLIANCE
```

```

STATUS current
DESCRIPTION
    "The compliance statement for RFC 2789 implementations
    which support the Mail Monitoring MIB for monitoring of
    MTAs and detailed errors."
MODULE -- this module
    MANDATORY-GROUPS {mtaRFC2789Group, mtaRFC2789ErrorGroup}
    ::= {mtaCompliances 11}

mtaRFC2789FullCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for RFC 2789 implementations
        which support the full Mail Monitoring MIB for
        monitoring of MTAs, associations, and detailed errors."
    MODULE -- this module
        MANDATORY-GROUPS {mtaRFC2789Group, mtaRFC2789AssocGroup,
                           mtaRFC2789ErrorGroup}
        ::= {mtaCompliances 12}

-- Units of conformance

mtaRFC1566Group OBJECT-GROUP
    OBJECTS {
        mtaReceivedMessages, mtaStoredMessages,
        mtaTransmittedMessages, mtaReceivedVolume, mtaStoredVolume,
        mtaTransmittedVolume, mtaReceivedRecipients,
        mtaStoredRecipients, mtaTransmittedRecipients,
        mtaGroupReceivedMessages, mtaGroupRejectedMessages,
        mtaGroupStoredMessages, mtaGroupTransmittedMessages,
        mtaGroupReceivedVolume, mtaGroupStoredVolume,
        mtaGroupTransmittedVolume, mtaGroupReceivedRecipients,
        mtaGroupStoredRecipients, mtaGroupTransmittedRecipients,
        mtaGroupOldestMessageStored, mtaGroupInboundAssociations,
        mtaGroupOutboundAssociations,
        mtaGroupAccumulatedInboundAssociations,
        mtaGroupAccumulatedOutboundAssociations,
        mtaGroupLastInboundActivity, mtaGroupLastOutboundActivity,
        mtaGroupRejectedInboundAssociations,
        mtaGroupFailedOutboundAssociations,
        mtaGroupInboundRejectionReason,
        mtaGroupOutboundConnectFailureReason,
        mtaGroupScheduledRetry, mtaGroupMailProtocol, mtaGroupName}
    STATUS current
    DESCRIPTION
        "A collection of objects providing basic monitoring of MTAs.
        This is the original set of such objects defined in RFC
        1566."

```

```
::= {mtaGroups 10}

mtaRFC1566AssocGroup OBJECT-GROUP
  OBJECTS {
    mtaGroupAssociationIndex}
  STATUS current
  DESCRIPTION
    "A collection of objects providing monitoring of MTA
    associations. This is the original set of such objects
    defined in RFC 1566."
  ::= {mtaGroups 11}

mtaRFC2249Group 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.
    This group was originally defined in RFC 2249."
  ::= {mtaGroups 4}

mtaRFC2249AssocGroup OBJECT-GROUP
  OBJECTS {
    mtaGroupAssociationIndex}
```

STATUS current

DESCRIPTION

"A collection of objects providing monitoring of MTA associations. This group was originally defined in RFC 2249."

::= {mtaGroups 5}

mtaRFC2249ErrorGroup OBJECT-GROUP

OBJECTS {

mtaGroupInboundErrorCount, mtaGroupInternalErrorCount,
mtaGroupOutboundErrorCount}

STATUS current

DESCRIPTION

"A collection of objects providing monitoring of detailed MTA errors. This group was originally defined in RFC 2249."

::= {mtaGroups 6}

mtaRFC2789Group 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."

This is the appropriate group for RFC 2789."
 ::= {mtaGroups 7}

mtaRFC2789AssocGroup OBJECT-GROUP
 OBJECTS {
 mtaGroupAssociationIndex}
 STATUS current
 DESCRIPTION
 "A collection of objects providing monitoring of MTA
 associations. This is the appropriate group for RFC
 2789 association monitoring."
 ::= {mtaGroups 8}

mtaRFC2789ErrorGroup OBJECT-GROUP
 OBJECTS {
 mtaGroupInboundErrorCount, mtaGroupInternalErrorCount,
 mtaGroupOutboundErrorCount}
 STATUS current
 DESCRIPTION
 "A collection of objects providing monitoring of
 detailed MTA errors. This is the appropriate group
 for RFC 2789 error monitoring."
 ::= {mtaGroups 9}

END

5. Changes made since RFC 2249

This revision corrects a number of minor technical errors in the construction of the mail monitoring MIB in RFC 2249 [18]:

- (1) All DisplayStrings have been changed to SnmpAdminStrings,
- (2) the conformance groups for different versions of this MIB have been corrected,
- (3) the required mtaStatusCode entry has been added to MtaGroupErrorEntry (which does not affect the bits on the wire in any way), and
- (4) the recommendation that an empty string be returned if the last operation was successful has been removed from mtaGroupInboundRejectionReason and mtaGroupOutboundConnectFailureReason as it conflicts with the stated purpose of these variables.

6. 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 [19] that have led to the present document.

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8. 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.

However, this MIB does provide passive information about the existence, 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.

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 [12] and the View-based Access Control Model RFC 2575 [15] 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.

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