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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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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.

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3. The SNMPv2 Network Management Framework

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

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

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"
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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 $((\text{class} * 1000) + \text{subject}) * 1000 + \text{detail}$. 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 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.

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 {applUDPProtoID 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 applUDPPProtoID 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 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}

-- 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 successful 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 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.

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