Real Time Protocol (RTP) MIB Version 2
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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it defines objects for managing Real-Time Transport Protocol (RTP) systems (RFC3550) and is a proposed replacement for RFC 2959 - the RTP MIB.
For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIv2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

2. Overview

An "RTP System" may be a host end-system that runs an application program that sends or receives RTP data packets, or it may be an intermediate-system that forwards RTP packets. RTP Control Protocol (RTCP) packets are sent by senders and receivers to convey information about RTP packet transmission and reception [RFC3550]. RTP monitors may collect RTCP information on senders and receivers to and from an RTP host or intermediate-system.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

2.1 Components

The RTP MIB is structured around "Session," "Receiver" and "Sender" conceptual abstractions.

2.1.1 An "RTP Session" is the "...association of participants communicating with RTP. For each participant, the session is defined by a particular pair of destination transport addresses (one network address plus a port pair for RTP and RTCP). The destination transport addresses may be common for all participants, as in the
case of IP multicast, or may be different for each, as in the case of individual unicast addresses plus a common port pair," as defined in section 3 of [RFC3550].

2.1.2 A "Sender" is identified within an RTP session by a 32-bit numeric "Synchronization Source," or "SSRC", value and is "...the source of a stream of RTP packets" as defined in section 3 of [RFC3550]. The sender is also a source of RTCP Sender Report packets as specified in section 6 of [RFC3550].

2.1.3 A "Receiver" of a "stream of RTP packets" can be a unicast or multicast Receiver as described in 2.1.1, above. An RTP Receiver has an SSRC value that is unique to the session. An RTP Receiver is a source of RTCP Receiver Reports as specified in section 6 of [RFC3550].

2.2 Applicability of the MIB to RTP System Implementations

The RTP MIB may be used in two types of RTP implementations, RTP Host Systems (end systems) and RTP Monitors, see section 3 of [RFC3550]. Use of the RTP MIB for RTP Translators and Mixers, as defined in section 7 of [RFC3550], is for further study.

2.2.1 RTP host Systems are end-systems that may use the RTP MIB to collect RTP session and stream data that the host is sending or receiving; these data may be used by a network manager to detect and diagnose faults that occur over the lifetime of an RTP session as in a "help-desk" scenario.

2.2.2 RTP Monitors of multicast RTP sessions may be third-party or may be located in the RTP host. RTP Monitors may use the RTP MIB to collect RTP session and stream statistical data; these data may be used by a network manager for capacity planning and other network-management purposes. An RTP Monitor may use the RTP MIB to collect data to permit a network manager to detect and diagnose faults in RTP sessions or to permit a network manager to configure its operation.

2.2.3 Many host systems will want to keep track of streams beyond what they are sending and receiving. In a host monitor system, a host agent would use RTP data from the host to maintain data about streams it is sending and receiving, and RTCP data to collect data about other hosts in the session. For example, an agent for an RTP host that is sending a stream would use data from its RTP system to maintain the rtpSenderTable, but it may want to maintain a rtpRcvrTable for endpoints that are receiving its stream. To do this the RTP agent will collect RTCP data from the receivers of its stream to build the rtpRcvrTable. A host monitor system MUST set the rtpSessionMonitor object to 'true(1)', but it does not have to accept management operations that create and destroy rows in its rtpSessionTable.

2.2.4 The RTCP XR MIB provides extended data related to the performance of Voice over IP streams. The RTP-MIBV2 and RTCP XR MIBs have been designed to be used together to support the management of Voice over IP systems.
2.3 The Structure of the RTP MIB

There are six tables in the RTP MIB. The rtpSessionTable contains objects that describe active sessions at the host, or monitor. The rtpSenderTable contains information about senders to the RTP session. The rtpRcvrTable contains information about receivers of RTP session data. The rtpSessionInverseTable, rtpSenderInverseTable, and rtpRcvrInverseTable contain information to efficiently find indexes into the rtpSessionTable, rtpSenderTable, and rtpRcvrTable, respectively.

The reverse lookup tables (rtpSessionInverseTable, rtpSenderInverseTable, and rtpRcvrInverseTable) are optional tables to help management applications efficiently access conceptual rows in other tables. Implementors of this MIB SHOULD implement these tables for multicast RTP sessions when table indexes (rtpSessionIndex of rtpSessionTable, rtpSenderSSRC of rtpSenderTable, and the SSRC pair in the rtpRcvrTable) are not available from other MIBs. Otherwise, the management application may be forced to perform expensive tree walks through large numbers of sessions, senders, or receivers.

For any particular RTP session, the rtpSessionMonitor object indicates whether remote senders or receivers to the RTP session are to be monitored. If rtpSessionMonitor is true(1) then senders and receivers to the session MUST be monitored with entries in the rtpSenderTable and rtpRcvrTable. RTP sessions are monitored by the RTP agent that updates rtpSenderTable and rtpRcvrTable objects with information from RTCP reports from remote senders or remote receivers respectively.

rtpSessionNewIndex is a global object that permits a network-management application to obtain a unique index for conceptual row creation in the rtpSessionTable. In this way the SNMP Set operation MAY be used to configure a monitor.

3. Definitions

RTP-MIB DEFINITIONS ::= BEGIN

IMPORTS
    Counter32, Counter64, Gauge32, mib-2, Integer32,
    MODULE-IDENTITY, OBJECT-TYPE, Unsigned32                     FROM SNMPv2-SMI
    InetAddressType, InetAddress, InetPortNumber                              FROM INET-ADDRESS-MIB
    RowStatus, TestAndIncr,
    TruthValue, DateAndTime                     FROM SNMPv2-TC
    OBJECT-GROUP, MODULE-COMPLIANCE FROM SNMPv2-CONF
    Utf8String                                  FROM SYSAPPL-MIB
    InterfaceIndex                              FROM IF-MIB;

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[Page 4]
The managed objects of RTP systems. The MIB is structured around three types of information.
1. General information about RTP sessions such as the session address.
2. Information about RTP streams being sent to an RTP session by a particular sender.
3. Information about RTP streams received on an RTP session by a particular receiver from a particular sender.

There are two types of RTP Systems, RTP hosts and RTP monitors. As described below, certain objects are unique to a particular type of RTP System. An RTP host may also function as an RTP monitor.

Refer to RFC 3550, 'RTP: A Transport Protocol for Real-Time Applications,' section 3.0, for definitions.
rtpSessionNewIndex OBJECT-TYPE  
SYNTAX TestAndIncr  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION  
"This object is used to assign values to rtpSessionIndex as described in ‘Textual Conventions for SMIV2’. For an RTP system that supports the creation of rows, the network manager would read the object, and then write the value back in the Set that creates a new instance of rtpSessionEntry. If the Set fails with the code ‘inconsistentValue,’ then the process must be repeated; If the Set succeeds, then the object is incremented, and the new instance is created according to the manager’s directions. However, if the RTP agent is not acting as a monitor, only the RTP agent may create conceptual rows in the RTP session table."

::= { rtpMIBV2Objects 1 }

rtpSessionInverseTable OBJECT-TYPE  
SYNTAX SEQUENCE OF RtpSessionInverseEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
"Maps source and destination address to or more rtpSessionIndex values describing rows in the rtpSessionTable. This allows rows to be retrieved in the rtpSessionTable corresponding to a given session without having to walk the entire (potentially large) table."

::= { rtpMIBV2Objects 2 }

rtpSessionInverseEntry OCTET STRING  
SYNTAX RtpSessionInverseEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
"Each entry corresponds to exactly one entry in the rtpSessionTable."

INDEX { rtpSessionSourceIPaddress, rtpSessionSourceRTPport, rtpSessionDestIPaddress, rtpSessionDestRTPport, rtpSessionCallState, rtpSessionIndex }  

::= { rtpSessionInverseTable 1 }

RtpSessionInverseEntry ::= SEQUENCE {  
  rtpSessionInverseStartTime     DateAndTime  
}
rtpSessionInverseStartTime OBJECT-TYPE
SYNTAX DateAndTime
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The local time at which this row was created."
::= { rtpSessionInverseEntry 1 }

--
--  SESSION TABLE
--
rtpSessionTable OBJECT-TYPE
SYNTAX SEQUENCE OF RtpSessionEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "There's one entry in rtpSessionTable for each RTP session on which packets are being sent, received, and/or monitored."
::= { rtpMIBV2Objects 3 }

rtpSessionEntry OBJECT-TYPE
SYNTAX RtpSessionEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "Data in rtpSessionTable uniquely identify an RTP session. A host RTP agent MUST create a read-only row for each session to which packets are being sent or received. Rows MUST be created by the RTP Agent at the start of a session when one or more senders or receivers are observed. An RTP session SHOULD be monitored to create management information on all RTP streams being sent or received when the rtpSessionMonitor has the TruthValue of 'true(1)'. An RTP monitor SHOULD permit row creation with the side effect of causing the RTP System to join the multicast session for the purposes of gathering management information (additional conceptual rows are created in the rtpRcvrTable and rtpSenderTable). Thus, rtpSessionTable rows SHOULD be created for RTP session monitoring purposes. Rows created by a management application SHOULD be deleted via SNMP operations by management applications. Rows created by management operations are deleted by management operations by setting rtpSessionRowStatus to 'destroy(6)'.”
INDEX { rtpSessionCallState, rtpSessionIndex }
::= { rtpSessionTable 1 }

RtpSessionEntry ::= SEQUENCE {
    rtpSessionCallState  INTEGER,
    rtpSessionIndex  INTEGER32,
    rtpSessionSessionIdentifier  OCTET STRING,
    rtpSessionStartTime  DateAndTime,
    rtpSessionStopTime  DateAndTime,
rtpSessionSourceIPtype InetAddressType,
rtpSessionSourceIPAddress InetAddress,
rtpSessionSourceRTPPort InetPortNumber,
rtpSessionSourceRTCPPort InetPortNumber,
rtpSessionDestIPtype InetAddressType,
rtpSessionDestIPAddress InetAddress,
rtpSessionDestRTPPort InetPortNumber,
rtpSessionDestRTCPPort InetPortNumber,
rtpSessionSrceIdenType INTEGER,
rtpSessionSrceIdentifier OCTET STRING,
rtpSessionDestIdenType INTEGER,
rtpSessionDestIdentifier OCTET STRING,
rtpSessionIfIndex InterfaceIndex,
rtpSessionMonitor TruthValue,
rtpSessionSenderJoins Counter32,
rtpSessionReceiverJoins Counter32,
rtpSessionByes Counter32,
rtpSessionRowStatus RowStatus,
rtpSessionMaxNumEntries Integer32

rtpSessionCallState OBJECT-TYPE
SYNTAX INTEGER { active(1),
              completed(2)
              }
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"Index for this session within the Session ID
table. The value of this parameter shall be 2 if the
session is complete or inactive and 1 if the session
is still active."
::= { rtpSessionEntry 1 }

rtpSessionIndex OBJECT-TYPE
SYNTAX Integer32 (1..2147483647)
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The index of the conceptual row which is for SNMP purposes
only and has no relation to any protocol value. There is
no requirement that these rows are created or maintained
sequentially."
::= { rtpSessionEntry 2 }

rtpSessionSessionIdentifier OBJECT-TYPE
SYNTAX OCTET STRING (SIZE(0..128))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Unique identifier for this session. A billing record
correlation identifier should be used if available,
otherwise an identifier such as SSRC can be used."
::= { rtpSessionEntry 3 }
rtpSessionStartTime OBJECT-TYPE
SYNTAX DateAndTime
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Call start time for this call. If the start time is not
known then this represents the earliest known time associated
with the call."
::= { rtpSessionEntry 4 }

rtpSessionStopTime OBJECT-TYPE
SYNTAX DateAndTime
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Call stop time for this call. If the call is still active
then this shall have the value 0. If the call is complete
but the time is unknown then this shall have the value of the
latest time associated with the call."
::= { rtpSessionEntry 5 }

rtpSessionSourceIPtype OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"IP address type for the originating IP endpoint for this
RTP stream."
::= { rtpSessionEntry 6 }

rtpSessionSourceIPAddress OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"IP address for the originating IP endpoint for this
RTP stream."
::= { rtpSessionEntry 7 }

rtpSessionSourceRTPport OBJECT-TYPE
SYNTAX InetPortNumber
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Source UDP port for RTP. A value of 0 indicates
an unknown port number."
::= { rtpSessionEntry 8 }

rtpSessionSourceRTCPport OBJECT-TYPE
SYNTAX InetPortNumber
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Source UDP port for RTCP. A value of 0 indicates
an unknown port number."
::= { rtpSessionEntry 9 }
rtpSessionDestIPtype OBJECT-TYPE
   SYNTAX InetAddressType
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
   "Destination IP address type for this session."
   ::= { rtpSessionEntry 10 }

rtpSessionDestIPaddress OBJECT-TYPE
   SYNTAX InetAddress
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
   "Destination IP address for this session."
   ::= { rtpSessionEntry 11 }

rtpSessionDestRTPPort OBJECT-TYPE
   SYNTAX InetPortNumber
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
   "Destination UDP port for RTP. A value of 0 indicates
   an unknown port number."
   ::= { rtpSessionEntry 12 }

rtpSessionDestRTCPPort OBJECT-TYPE
   SYNTAX InetPortNumber
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
   "Destination UDP port for RTCP. A value of 0 indicates
   an unknown port number."
   ::= { rtpSessionEntry 13 }

rtpSessionSrceIdenType OBJECT-TYPE
   SYNTAX INTEGER {dialedNumber (1),
                   urlID (2),
                   other (3) }
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
   "Defines the type of address in parameter
   rtpSessionSourceIdentifier"
   ::= { rtpSessionEntry 14 }

rtpSessionSrceIdentifier OBJECT-TYPE
   SYNTAX OCTET STRING (SIZE(0..128))
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
   "Alternate identifier to the IP address. This can be E.164,
   DN, or URL."
   ::= { rtpSessionEntry 15 }
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rtpSessionDestIdenType OBJECT-TYPE
SYNTAX INTEGER {dialedNumber (1),
               urlID (2),
               other (3) }
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  "Defines the type of address in parameter rtpSessionDestIdentifier."
 ::= { rtpSessionEntry 16 }

rtpSessionDestIdentifier OBJECT-TYPE
SYNTAX OCTET STRING (SIZE(0..128))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  "Alternate identifier to the IP address. This can be E.164, DN, or URL."
 ::= { rtpSessionEntry 17 }

rtpSessionIfIndex OBJECT-TYPE
SYNTAX InterfaceIndex
MAX-ACCESS read-create
STATUS current
DESCRIPTION
  "The ifIndex value is set to the corresponding value from IF-MIB (See
   RFC 2233, 'The Interfaces Group MIB using SMIv2'). This is the interface
   that the RTP stream is being sent to or received from, or in the case of
   an RTP Monitor the interface that RTCP packets will be received on. Cannot be
   changed if rtpSessionRowStatus is 'active'."
 ::= { rtpSessionEntry 18 }

rtpSessionMonitor OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  "Boolean, Set to 'true(1)' if remote senders or receivers in addition to the
   local RTP System are to be monitored using RTCP. RTP Monitors MUST
   initialize to 'true(1)' and RTP Hosts SHOULD initialize this 'false(2)'.
   Note that because 'host monitor' systems are receiving RTCP from their
   remote participants they MUST set this value to 'true(1)'."
 ::= { rtpSessionEntry 19 }

rtpSessionSenderJoins OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  "The number of senders that have been observed to have joined the session
   since this conceptual row was created (rtpSessionStartTime). A sender
   'joins' an RTP
session by sending to it. Senders that leave and then
re-join following an RTCP BYE (see RFC 3550, ‘RTP: A
Transport Protocol for Real-Time Applications,’ sec. 6.6)
or session timeout may be counted twice. Every time a new
RTP sender is detected either using RTP or RTCP, this counter
is incremented."
::= { rtpSessionEntry 20 }

rtpSessionReceiverJoins OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of receivers that have been observed to
have joined this session since this conceptual row was
created (rtpSessionStartTime). A receiver ‘joins’ an RTP
session by sending RTCP Receiver Reports to the session.
Receivers that leave and then re-join following an RTCP BYE
(see RFC 3550, ‘RTP: A Transport Protocol for Real-Time
Applications,’ sec. 6.6) or session timeout may be counted
twice."
::= { rtpSessionEntry 21 }

rtpSessionByes OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"A count of RTCP BYE (see RFC 3550, ‘RTP: A Transport
Protocol for Real-Time Applications,’ sec. 6.6) messages
received by this entity."
::= { rtpSessionEntry 22 }

rtpSessionRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Value of ‘active’ when RTP or RTCP messages are being
sent or received by an RTP System. A newly-created
conceptual row must have the all read-create objects
initialized before becoming ‘active’. A conceptual row that is in the ‘notReady’ or ‘notInService’
state MAY be removed after 5 minutes."
::= { rtpSessionEntry 23 }

rtpSessionMaxNumEntries OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The maximum number of entries that can be supported
in this table."
::= { rtpSessionEntry 24 }

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-- SENDER INVERSE TABLE
--
rtpSenderInverseTable OBJECT-TYPE
SYNTAX          SEQUENCE OF RtpSenderInverseEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
"Maps rtpSenderIPAddress, rtpSessionIndex, to the rtpSenderSSRC
index of the rtpSenderTable. This table allows management
applications to find entries sorted by Sender IP address rather
than sorted by rtpSessionIndex. Given the rtpSessionDomain and
rtpSenderAddr, a set of rtpSessionIndex and rtpSenderSSRC values
can be returned from a tree walk. When rtpSessionIndex is
specified in the SNMP Get-Next operations, one or more
rtpSenderSSRC values may be returned."
::= { rtpMIBV2Objects 4 }

rtpSenderInverseEntry OBJECT-TYPE
SYNTAX          RtpSenderInverseEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
"Each entry corresponds to exactly one entry in the
rtpSenderTable - the entry containing the index pair,
rtpSessionIndex, rtpSenderSSRC."
INDEX { rtpSenderIPaddress, rtpSenderRTPport, rtpSessionCallState,
rtpSessionIndex, rtpSenderSSRC }
::= { rtpSenderInverseTable 1 }

RtpSenderInverseEntry ::= SEQUENCE {
    rtpSenderInverseStartTime     DateAndTime
}

rtpSenderInverseStartTime OBJECT-TYPE
SYNTAX          DateAndTime
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
"The time at which this row was
created."
::= { rtpSenderInverseEntry 1 }

--

-- SENDERS TABLE
--
rtpSenderTable OBJECT-TYPE
SYNTAX          SEQUENCE OF RtpSenderEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
"Table of information about a sender or senders to an RTP
Session. RTP sending hosts MUST have an entry in this table
for each stream being sent. RTP receiving hosts MAY have an
entry in this table for each sending stream being received by
this host. RTP monitors MUST create an entry for each observed 
sender to a multicast RTP Session as a side-effect when a 
conceptual row in the rtpSessionTable is made 'active' by a 
manager."

::= { rtpMIBV2Objects 5 }

rtpSenderEntry OBJECT-TYPE
SYNTAX RtpSenderEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"Each entry contains information from a single RTP Sender 
Synchronization Source (SSRC, see RFC 3550 ‘RTP: A Transport 
Protocol for Real-Time Applications’ sec.6). The session is 
identified to the the SNMP entity by rtpSessionIndex. 
Rows are removed by the RTP agent when a BYE is received 
from the sender or when the sender times out (see RFC 
3550, Sec. 6.2.1) or when the rtpSessionEntry is deleted."
INDEX { rtpSessionCallState, rtpSessionIndex, rtpSenderSSRC }
::= { rtpSenderTable 1 }

RtpSenderEntry ::= SEQUENCE {
  rtpSenderSSRC              Unsigned32,
  rtpSenderCNAME             Utf8String,
  rtpSenderIPtype            InetAddressType,
  rtpSenderIPaddress         InetAddress,
  rtpSenderRTPport           InetPortNumber,
  rtpSenderRTCPport          InetPortNumber,
  rtpSenderPackets           Counter64,
  rtpSenderOctets            Counter64,
  rtpSenderTool              Utf8String,
  rtpSenderSRs               Counter32,
  rtpSenderSRTime            DateAndTime,
  rtpSenderPT                Integer32,
  rtpSenderStartTime         DateAndTime
}

rtpSenderSSRC OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The RTP SSRC, or synchronization source identifier of the 
sender. The RTP session address plus an SSRC uniquely 
identify a sender to an RTP session (see RFC 3550, ‘RTP: A 
Transport Protocol for Real-Time Applications’ sec.3)."
::= { rtpSenderEntry 1 }

rtpSenderCNAME OBJECT-TYPE
SYNTAX Utf8String
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The RTP canonical name of the sender."
::= { rtpSenderEntry 2 }

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rtpSenderIPtype OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
   "IP address type for the originating IP endpoint for this RTP stream."
 ::= { rtpSenderEntry 3 }

rtpSenderIPAddress OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS read-only
STATUS current
DESCRIPTION
   "IP address for the originating IP endpoint for this RTP stream."
 ::= { rtpSenderEntry 4 }

rtpSenderRTPport OBJECT-TYPE
SYNTAX InetPortNumber
MAX-ACCESS read-only
STATUS current
DESCRIPTION
   "Source UDP port for RTP. A value of 0 indicates an unknown port number."
 ::= { rtpSenderEntry 5 }

rtpSenderRTCPport OBJECT-TYPE
SYNTAX InetPortNumber
MAX-ACCESS read-only
STATUS current
DESCRIPTION
   "Source UDP port for RTCP. A value of 0 indicates an unknown port number."
 ::= { rtpSenderEntry 6 }

rtpSenderPackets OBJECT-TYPE
SYNTAX Counter64
MAX-ACCESS read-only
STATUS current
DESCRIPTION
   "Count of RTP packets sent by this sender, or observed by an RTP monitor, since rtpSenderStartTime."
 ::= { rtpSenderEntry 7 }

rtpSenderOctets OBJECT-TYPE
SYNTAX Counter64
MAX-ACCESS read-only
STATUS current
DESCRIPTION
   "Count of non-header RTP octets sent by this sender, or observed by an RTP monitor, since rtpSenderStartTime."
 ::= { rtpSenderEntry 8 }
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rtpSenderTool OBJECT-TYPE
SYNTAX         Utf8String (SIZE(0..127))
MAX-ACCESS     read-only
STATUS         current
DESCRIPTION    "Name of the application program source of the stream."
::= { rtpSenderEntry 9 }

rtpSenderSRs OBJECT-TYPE
SYNTAX         Counter32
MAX-ACCESS     read-only
STATUS         current
DESCRIPTION    "A count of the number of RTCP Sender Reports that have
been sent from this sender, or observed if the RTP entity
is a monitor, since rtpSenderStartTime."
::= { rtpSenderEntry 10 }

rtpSenderSRTime OBJECT-TYPE
SYNTAX         DateAndTime
MAX-ACCESS     read-only
STATUS         current
DESCRIPTION    "rtpSenderSRTime is the time at which
the last SR was received from this sender, in the case of a
monitor or receiving host. Or sent by this sender, in the
case of a sending host."
::= { rtpSenderEntry 11 }

rtpSenderPT OBJECT-TYPE
SYNTAX         Integer32(0..127)
MAX-ACCESS     read-only
STATUS         current
DESCRIPTION    "Payload type from the RTP header of the most recently received
RTP Packet (see RFC 3550, 'RTP: A Transport Protocol for
Real-Time Applications' sec. 5)."
::= { rtpSenderEntry 12 }

rtpSenderStartTime OBJECT-TYPE
SYNTAX         DateAndTime
MAX-ACCESS     read-only
STATUS         current
DESCRIPTION    "The time at which this row was
created."
::= { rtpSenderEntry 13 }

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-- RECEIVER INVERSE TABLE
--

rtpRcvrInverseTable OBJECT-TYPE
SYNTAX       SEQUENCE OF RtpRcvrInverseEntry
MAX-ACCESS   not-accessible
STATUS       current
DESCRIPTION
"Maps rtpRcvrIPaddress and rtpSessionIndex to the rtpRcvrSRCSSRC and rtpRcvrSSRC indexes of the rtpRcvrTable. This table allows management applications to find entries by rtpRcvrIPaddress rather than by rtpSessionIndex. Given rtpSessionDomain and rtpRcvrIPaddress, a set of rtpSessionIndex, rtpRcvrSRCSSRC, and rtpRcvrSSRC values can be returned from a tree walk. When rtpSessionIndex is specified in SNMP Get-Next operations, one or more rtpRcvrSRCSSRC and rtpRcvrSSRC pairs may be returned."::= { rtpMIBV2Objects 6 }

RtpRcvrInverseEntry OBJECT-TYPE
SYNTAX       RtpRcvrInverseEntry
MAX-ACCESS   not-accessible
STATUS       current
DESCRIPTION
"Each entry corresponds to exactly one entry in the rtpRcvrTable - the entry containing the index pair, rtpSessionIndex, rtpRcvrSRCSSRC."
INDEX { rtpRcvrIPaddress, rtpRcvrRTPort, rtpSessionCallState, rtpSessionIndex, rtpRcvrSRCSSRC, rtpRcvrSSRC }
::= { rtpRcvrInverseTable 1 }

RtpRcvrInverseEntry ::= SEQUENCE {
rtpRcvrInverseStartTime DateAndTime
}

rtpRcvrInverseStartTime OBJECT-TYPE
SYNTAX       DateAndTime
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
"The time at which this row was created."
::= { rtpRcvrInverseEntry 1 }
```
RTP hosts that receive RTP session packets MUST create an entry in this table for that receiver/sender pair. RTP hosts that send RTP session packets MAY create an entry in this table for each receiver to their stream using RTCP feedback from the RTP group. RTP monitors create an entry for each observed RTP session receiver as a side effect when a conceptual row in the rtpSessionTable is made 'active' by a manager.

 ::= { rtpMIBV2Objects 7 }

```

```
Each entry contains information from a single RTP Synchronization Source that is receiving packets from the sender identified by rtpRcvrSRCSSID (SSRC, see RFC 3550, ‘RTP: A Transport Protocol for Real-Time Applications’ sec.6). The session is identified to the the RTP Agent entity by rtpSessionIndex. Rows are removed by the RTP agent when a BYE is received from the sender or when the sender times out (see RFC 3550) or when the rtpSessionEntry is deleted.

INDEX { rtpSessionCallState, rtpSessionIndex, rtpRcvrSRCSSID, rtpRcvrSSRC }

 ::= { rtpRcvrTable 1 }

```

```
RtpRcvrEntry ::= SEQUENCE {
  rtpRcvrSRCSSID        Unsigned32,
  rtpRcvrSSRC           Unsigned32,
  rtpRcvrCNAME          Utf8String,
  rtpRcvrIPtype         InetAddressType,
  rtpRcvrIPaddress      InetAddress,
  rtpRcvrRTPport        InetPortNumber,
  rtpRcvrRTCPport       InetPortNumber,
  rtpRcvrRTT            Gauge32,
  rtpRcvrLostPackets    Counter64,
  rtpRcvrJitter         Gauge32,
  rtpRcvrTool           Utf8String,
  rtpRcvrRRs            Counter32,
  rtpRcvrRTTTime        DateAndTime,
  rtpRcvrPT             Integer32,
  rtpRcvrPackets        Counter64,
  rtpRcvrOctets         Counter64,
  rtpRcvrStartTime      DateAndTime
}
```
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February 2006

rtpRcvrSRCSSRC OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The RTP SSRC, or synchronization source identifier of the sender. The RTP session address plus an SSRC uniquely identify a sender or receiver of an RTP stream (see RFC 3550, 'RTP: A Transport Protocol for Real-Time Applications’ sec.3)."
::= { rtpRcvrEntry 1 }

rtpRcvrSSRC OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The RTP SSRC, or synchronization source identifier of the receiver. The RTP session address plus an SSRC uniquely identify a receiver of an RTP stream (see RFC 3550, 'RTP: A Transport Protocol for Real-Time Applications’ sec.3)."
::= { rtpRcvrEntry 2 }

rtpRcvrCNAME OBJECT-TYPE
SYNTAX Utf8String
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The RTP canonical name of the receiver."
::= { rtpRcvrEntry 3 }

rtpRcvrIPtype OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Destination IP address type for this session."
::= { rtpRcvrEntry 4 }

rtpRcvrIPaddress OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Destination IP address for this session."
::= { rtpRcvrEntry 5 }

rtpRcvrRTPport OBJECT-TYPE
SYNTAX InetPortNumber
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Destination UDP port for RTP. A value of 0 indicates an unknown port number."
::= { rtpRcvrEntry 6 }
rtpRcvrRTCPport OBJECT-TYPE
SYNTAX InetPortNumber
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Destination UDP port for RTCP. A value of 0 indicates an unknown port number."
::= { rtpRcvrEntry 7 }

rtpRcvrRTT OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The round trip time measurement taken by the source of the RTP stream based on the algorithm described on sec. 6 of RFC 3550, 'RTP: A Transport Protocol for Real-Time Applications.' This algorithm can produce meaningful results when the RTP agent has the same clock as the stream sender (when the RTP monitor is also the sending host for the particular receiver). Otherwise, the entity should return 'noSuchInstance' in response to queries against rtpRcvrRTT."
::= { rtpRcvrEntry 8 }

rtpRcvrLostPackets OBJECT-TYPE
SYNTAX Counter64
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"A count of RTP packets lost as observed by this receiver since rtpRcvrStartTime."
::= { rtpRcvrEntry 9 }

rtpRcvrJitter OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"An estimate of delay variation as observed by this receiver. (see RFC 3550, 'RTP: A Transport Protocol for Real-Time Applications' sec.6.3.1 and A.8)."
::= { rtpRcvrEntry 10 }

rtpRcvrTool OBJECT-TYPE
SYNTAX Utf8String (SIZE(0..127))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Name of the application program source of the stream."
::= { rtpRcvrEntry 11 }
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rtpRcvrRRs OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
   "A count of the number of RTCP Receiver Reports that have
   been sent from this receiver, or observed if the RTP entity
   is a monitor, since rtpRcvrStartTime."
::= { rtpRcvrEntry 12 }
rtpRcvrRRTime OBJECT-TYPE
SYNTAX         DateAndTime
MAX-ACCESS     read-only
STATUS         current
DESCRIPTION
   "rtpRcvrRRTime is the time at which the last RTCP Receiver Report
   was received from this receiver, in the case of a monitor or RR
   receiver (the RTP Sender). It is the time at which the last
   RR was sent by this receiver in the case of an RTP receiver
   sending the RR."
::= { rtpRcvrEntry 13 }
rtpRcvrPT OBJECT-TYPE
SYNTAX          Integer32(0..127)
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
   "Static or dynamic payload type from the RTP header (see
RFC 3550, ‘RTP: A Transport Protocol for Real-Time
Applications’ sec. 5)."
::= { rtpRcvrEntry 14 }
rtpRcvrPackets OBJECT-TYPE
SYNTAX          Counter64
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
   "Count of RTP packets received by this RTP host receiver
since rtpRcvrStartTime."
::= { rtpRcvrEntry 15 }
rtpRcvrOctets OBJECT-TYPE
SYNTAX          Counter64
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
   "Count of non-header RTP octets received by this receiving RTP
host since rtpRcvrStartTime."
::= { rtpRcvrEntry 16 }
rtpRcvrStartTime OBJECT-TYPE
SYNTAX          DateAndTime
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The time at which this row was created."
 ::= { rtpRcvrEntry 17 }

--
-- MODULE GROUPS
--
-- There are two types of RTP Systems, RTP hosts and RTP Monitors.
-- Thus there are three kinds of objects: 1) Objects common to both
-- kinds of systems, 2) Objects unique to RTP Hosts and 3) Objects
-- unique to RTP Monitors. There is a fourth group, 4) Objects that
-- SHOULD be implemented by Multicast hosts and RTP Monitors

rtpGroups OBJECT IDENTIFIER ::= { rtpConformance 1 }
rtpSystemGroup OBJECT-GROUP
OBJECTS         {
    rtpSessionSessionIdentifier,
    rtpSessionStartTime,
    rtpSessionStopTime,
    rtpSessionDestIPtype,
    rtpSessionDestIPaddress,
    rtpSessionDestRTPport,
    rtpSessionDestRTCPport,
    rtpSessionSrceIdenType,
    rtpSessionSrceIdentifier,
    rtpSessionDestIdenType,
    rtpSessionDestIdentifier,
    rtpSessionIfIndex,
    rtpSessionSenderJoins,
    rtpSessionReceiverJoins,
    rtpSessionByes,
    rtpSessionMonitor,
    rtpSessionMaxNumEntries,
    rtpSenderCNAME,
    rtpSenderIPtype,
    rtpSenderIPaddress,
    rtpSenderRTPport,
    rtpSenderRTCPport,
    rtpSenderPackets,
    rtpSenderOctets,
    rtpSenderTool,
    rtpSenderSRs,
    rtpSenderSRTime,
    rtpSenderStartTme,
    rtpRcvrCNAME,
    rtpRcvrIPtype,
    rtpRcvrIPaddress,
    rtpRcvrRTPport,
    rtpRcvrRTCPport,
    rtpRcvrLostPackets,
    rtpRcvrSessions
rtpRcvrJitter,  
rtpRcvrTool,  
rtpRcvrRRs,  
rtpRcvrRRTime,  
rtpRcvrStartTime  
}

STATUS current

DESCRIPTION "Objects available to all RTP Systems."
::= { rtpGroups 1 }

rtpHostGroup OBJECT-GROUP
{
  rtpSessionSourceIPtype,  
rtpSessionSourceIPAddress,  
rtpSessionSourceRTPport,  
rtpSessionSourceRTCPport,  
rtpSenderPT,  
rtpRcvrPT,  
rtpRcvrRTT,  
rtpRcvrOctets,  
rtpRcvrPackets  
}

STATUS current

DESCRIPTION "Objects that are available to RTP Host systems, but may not be available to RTP Monitor systems."
::= { rtpGroups 2 }

rtpMonitorGroup OBJECT-GROUP
{
  rtpSessionNewIndex,  
rtpSessionRowStatus  
}

STATUS current

DESCRIPTION "Objects used to create rows in the RTP Session Table. These objects are not needed if the system does not create rows."
::= { rtpGroups 3 }

rtpInverseGroup OBJECT-GROUP
{
  rtpSessionInverseStartTime,  
rtpSenderInverseStartTime,  
rtpRcvrInverseStartTime  
}

STATUS current

DESCRIPTION "Objects used in the Inverse Lookup Tables."
::= { rtpGroups 4 }

--
-- Compliance
--

rtpCompliances OBJECT IDENTIFIER ::= { rtpConformance 2 }
rtpHostCompliance  MODULE-COMPLIANCE
          STATUS          current

          DESCRIPTION
          "Host implementations MUST comply."

          MODULE          RTP-MIB

          MANDATORY-GROUPS {
              rtpSystemGroup,
              rtpHostGroup
          }

          GROUP          rtpMonitorGroup

          DESCRIPTION
          "Host systems may optionally support row creation and deletion.
          This would allow an RTP Host system to act as an RTP Monitor."

          GROUP          rtpInverseGroup

          DESCRIPTION
          "Multicast RTP Systems SHOULD implement the optional
          tables."

          OBJECT          rtpSessionNewIndex
          MIN-ACCESS      not-accessible

          DESCRIPTION
          "RTP system implementations support of
          row creation and deletion is OPTIONAL so
          implementation of this object is OPTIONAL."

          OBJECT          rtpSessionDestIPtype
          MIN-ACCESS      read-only

          DESCRIPTION
          "Row creation and deletion is OPTIONAL so
          read-create access to this object is OPTIONAL."

          OBJECT          rtpSessionDestIPaddress
          MIN-ACCESS      read-only

          DESCRIPTION
          "Row creation and deletion is OPTIONAL so
          read-create access to this object is OPTIONAL."

          OBJECT          rtpSessionDestRTCPort
          MIN-ACCESS      read-only

          DESCRIPTION
          "Row creation and deletion is OPTIONAL so
          read-create access to this object is OPTIONAL."

          OBJECT          rtpSessionDestRTPPort
          MIN-ACCESS      read-only

          DESCRIPTION
          "Row creation and deletion is OPTIONAL so
          read-create access to this object is OPTIONAL."

          OBJECT          rtpSessionIfIndex
          MIN-ACCESS      read-only

          DESCRIPTION
          "Row creation and deletion is OPTIONAL so
          read-create access to this object is OPTIONAL."

          OBJECT          rtpSessionRowStatus
          MIN-ACCESS      not-accessible

          DESCRIPTION
          "Row creation and deletion is OPTIONAL so
          read-create access to this object is OPTIONAL."
OBJECT  rtpSessionInverseStartTime  
    MIN-ACCESS not-accessible  
    DESCRIPTION  
      "Multicast RTP Systems SHOULD implement the optional  
                    tables."

OBJECT  rtpSenderInverseStartTime  
    MIN-ACCESS not-accessible  
    DESCRIPTION  
      "Multicast RTP Systems SHOULD implement the optional  
                    tables."

OBJECT  rtpRcvrInverseStartTime  
    MIN-ACCESS not-accessible  
    DESCRIPTION  
      "Multicast RTP Systems SHOULD implement the optional  
                    tables."

::= { rtpCompliances 1 }

rtpMonitorCompliance  MODULE-COMPLIANCE  
    STATUS          current  
    DESCRIPTION  
      "Monitor implementations must comply. RTP Monitors are not  
                    required to support creation or deletion."

    MODULE           RTP-MIB  
    MANDATORY-GROUPS     {  
                              rtpSystemGroup,  
                              rtpMonitorGroup  
                          }  
    GROUP                rtpHostGroup  
    DESCRIPTION  
      "Monitor implementations may not have access to values in the  
                    rtpHostGroup."

GROUP                rtpInverseGroup  
    DESCRIPTION  
      "Multicast RTP Systems SHOULD implement the optional  
                    tables."

OBJECT  rtpSessionSourceIPtype  
    MIN-ACCESS not-accessible  
    DESCRIPTION  
      "RTP monitor sourcing of RTP or RTCP data packets  
                    is OPTIONAL and implementation of this object is  
                    OPTIONAL."

OBJECT  rtpSessionSourceIPAddress  
    MIN-ACCESS not-accessible  
    DESCRIPTION  
      "RTP monitor sourcing of RTP or RTCP data packets  
                    is OPTIONAL and implementation of this object is  
                    OPTIONAL."

OBJECT  rtpSessionSourceRTPport  
    MIN-ACCESS not-accessible  
    DESCRIPTION  
      "RTP monitor sourcing of RTP or RTCP data packets  
                    is OPTIONAL and implementation of this object is  
                    OPTIONAL."
OBJECT  rtpSessionSourceRTCPport
   MIN-ACCESS not-accessible
   DESCRIPTION
   "RTP monitor sourcing of RTP or RTCP data packets
   is OPTIONAL and implementation of this object is
   OPTIONAL."

OBJECT  rtpRcvrPT
   MIN-ACCESS not-accessible
   DESCRIPTION
   "RTP monitor systems may not support
   retrieval of the RTP Payload Type from the RTP
   header (and may receive RTCP messages only). When
   queried for the payload type information"

OBJECT  rtpSenderPT
   MIN-ACCESS not-accessible
   DESCRIPTION
   "RTP monitor systems may not support
   retrieval of the RTP Payload Type from the RTP
   header (and may receive RTCP messages only). When
   queried for the payload type information."

OBJECT  rtpRcvrOctets
   MIN-ACCESS not-accessible
   DESCRIPTION
   "RTP monitor systems may receive only the RTCP messages
   and not the RTP messages that contain the octet count
   of the RTP message. Thus implementation of this
   object is OPTIONAL"

OBJECT  rtpRcvrPackets
   MIN-ACCESS not-accessible
   DESCRIPTION
   "RTP monitor systems may receive only the RTCP messages
   and not the RTP messages that contain the octet count
   of the RTP message. Thus implementation of this
   object is OPTIONAL."

OBJECT  rtpSessionIfIndex
   MIN-ACCESS read-only
   DESCRIPTION
   "Row creation and deletion is OPTIONAL so
   read-create access to this object is OPTIONAL."

OBJECT  rtpSessionInverseStartTime
   MIN-ACCESS not-accessible
   DESCRIPTION
   "Multicast RTP Systems SHOULD implement the optional
   tables."

OBJECT  rtpSenderInverseStartTime
   MIN-ACCESS not-accessible
   DESCRIPTION
   "Multicast RTP Systems SHOULD implement the optional
   tables."

OBJECT  rtpRcvrInverseStartTime
   MIN-ACCESS not-accessible
   DESCRIPTION
   "Multicast RTP Systems SHOULD implement the optional
   tables."

::= { rtpCompliances 2 }
4. Security Considerations

In most cases, MIBs are not themselves security risks; if SNMP security is operating as intended, the use of a MIB to view information about a system, or to change some parameter at the system, is a tool, not a threat. However, there are a number of management objects defined in this MIB that have a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

None of the read-only objects in this MIB reports a password, though some SDES [RFC3550] items such as the CNAME [RFC3550], the canonical name, may be deemed sensitive depending on the security policies of a particular enterprise. If access to these objects is not limited by an appropriate access control policy, these objects can provide an attacker with information about a system’s configuration and the services that that system is providing. Some enterprises view their network and system configurations, as well as information about usage and performance, as corporate assets; such enterprises may wish to restrict SNMP access to most of the objects in the MIB. This MIB supports read-write operations against rtpSessionNewIndex which has the side effect of creating an entry in the rtpSessionTable when it is written to. Five objects in rtpSessionEntry have read-create access: rtpSessionDomain, rtpSessionRemAddr, rtpSessionIfIndex, rtpSessionRowStatus, and rtpSessionIfAddr identify an RTP session to be monitored on a particular interface. The values of these objects are not to be changed once created, and initialization of these objects affects only the monitoring of an RTP session and not the operation of an RTP session on any host end-system. Since write operations to rtpSessionNewIndex and the five objects in rtpSessionEntry affect the operation of the monitor, write access to these objects should be subject to access control.

Confidentiality of RTP and RTCP data packets is defined in section 9 of the RTP specification [RFC3550]. Encryption may be performed on RTP packets, RTCP packets, or both. Encryption of RTCP packets may pose a problem for third-party monitors though "For RTCP, it is allowed to split a compound RTCP packet into two lower-layer packets, one to be encrypted and one to be sent in the clear. For example, SDES information might be encrypted while reception reports were sent in the clear to accommodate third-party monitors [RFC3550]."

SNMPv1 by itself is not a secure environment. Even if the network itself is secure (for example by using IPSec), there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB. It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model RFC 2574 [RFC2574] and the View-based Access Control Model RFC 2575 [RFC2575] is recommended. It is then a customer/user responsibility to ensure that the SNMP entity giving access to an instance of this MIB, is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.
5. IANA Considerations

TBD

6. Acknowledgements

The authors wish to thank Brian Park for his contributions in reviewing this MIB.

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8. References


9. Informative References


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