

Internet Draft

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**Real-time Application Quality of Service  
Monitoring (RAQMON) MIB**

<[draft-siddiqui-rmonmib-raqmon-mib-02.txt](#)>

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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. The document proposes an extension to the Remote Monitoring MIB [[RFC2819](#)]. In particular, it describes managed objects used for realtime application QOS monitoring.

This memo also updates the [[SIDDQUI1](#)] with several options of protocols that could be used between RAQMON Data Sources and RAQMON



Report Collectors.

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. In particular, it defines a method of sorting the interfaces of a monitored device according to values of parameters specific to this interface.

The original RAQMON draft [[SIDDQUI1](#)] was split into 3 parts to identify the RAQMON Framework, RAQMON QOS PDU and RAQMON MIB.

This memo updates [[SIDDQUI1](#)] that defined the Management Information Base (MIB) for use with network management protocols in the Internet community. The document proposes an extension to the Remote Monitoring MIB [[RFC2819](#)] to accommodate RAQMON solution.

The memo [[SIDDQUI2](#)] defines a Real-Time Application QOS Monitoring (RAQMON) Framework that extends the RMON Framework to allow Real-time Application QoS information of these types of end devices as outlined by RAQMON Charter of the RMON Workgroup.

The memo [[SIDDQUI3](#)] takes a portion of <[draft-siddiqui-rmonmib-raqmon-mib-01.txt](#)> that defined RAQMON QOS PDU and describes how various PDUs can be transported over existing Application level transport protocol like Real Time Communication Protocol (RTCP) and Simple Network Management Protocol (SNMP) to transport statistics between RDS and RRC.

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 [\[RFC2119\]](#).

## 2. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in [RFC 2571](#) [[RFC2571](#)].
- 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](#) [[RFC1155](#)], STD 16, [RFC 1212](#) [[RFC1212](#)] and [RFC 1215](#) [[RFC1215](#)]. The second version, called SMIV2, is described in STD 58, [RFC 2578](#) [[RFC2578](#)], STD 58, [RFC 2579](#) [[RFC2579](#)] and STD 58, [RFC 2580](#) [[RFC2580](#)].
- 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](#) [[RFC1157](#)]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in [RFC 1901](#) [[RFC1901](#)] and [RFC 1906](#) [[RFC1906](#)]. The third version of the message protocol is called SNMPv3 and described in [RFC 1906](#) [[RFC1906](#)], [RFC 2572](#) [[RFC2572](#)] and [RFC 2574](#) [[RFC2574](#)].
- o Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, [RFC 1157](#) [[RFC1157](#)]. A second set of protocol operations and associated PDU formats is described in [RFC 1905](#) [[RFC1905](#)].
- o A set of fundamental applications described in [RFC 2573](#) [[RFC2573](#)] and the view-based access control mechanism described in [RFC 2575](#) [[RFC2575](#)].

A more detailed introduction to the current SNMP Management Framework can be found in [RFC 2570](#) [[RFC2570](#)].

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.

### 3. RAQMON Framework

As outlined in [[SIDDQUI2](#)] the RAQMON framework is based on three entities:

- RAQMON Data Source (RDS) - RAQMON Report Collector (RRC) - RAQMON MIB Structure

Figure 1 below shows various interfaces in RAQMON Framework. This draft specifies the Management Information Base (MIB) Modules used by the RAQMON Report Collectors to store data derived from RAQMON PDUs.

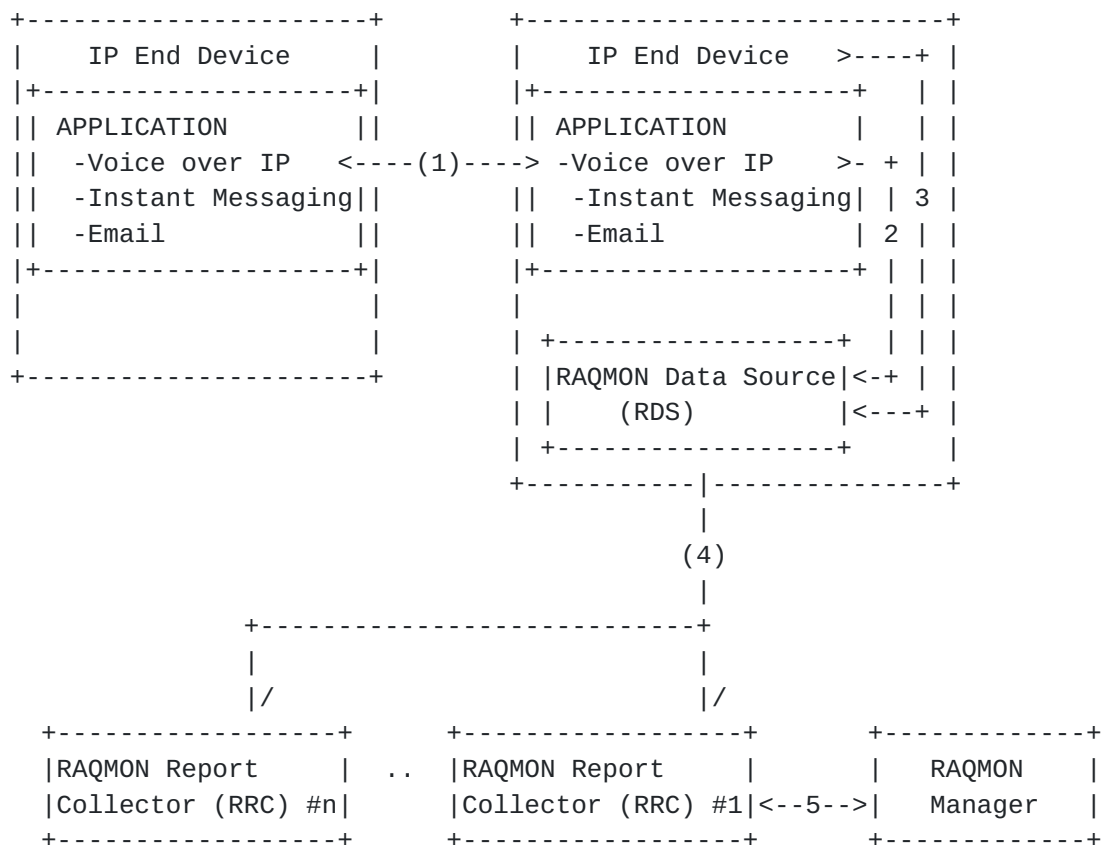


Figure 1 - RAQMON Framework.

(1) Communication Session between IP end devices/apps affected by





underlying transport network

- (2) Context-Sensitive transport network Specific Metrics
- (3) Device State Specific Metrics
- (4) RAQMON PDU transmitted over this interface (IP Address, port)
- (5) RAQMON MIB running between RRCs and a RAQMON Application ('RAQMON manager')

#### **4. Structure of the RAQMON MIB**

The RAQMON MIB is composed of three MIB groups:

The raqmonSession MIB group incorporates the following tables:

- raqmonParticipantTable contains information about participants in open and closed (terminated) sessions
- raqmonQosTable contains historical information about QoS during sessions
- raqmonParticipantAddrTable maps participant addresses into the index of the raqmonParticipantTable

The raqmonException MIB group includes a table of filters that trigger notifications for sessions with poor QoS.

The raqmonConfig MIB group includes object that define the configuration of the RAQMON collector.

All objects in the MIB MUST be implemented by the RAQMON collectors, with the exception of the raqmonPDUBasicPDU object and raqmonSNMPTransportNotification which MUST be implemented by a RAQMON device. This is reflected in the conformance clauses.

#### **5. RAQMON MIB Definitions**

```
--  
-- The original version of this MIB was created by Richard Smith from  
-- Avaya Labs Australia
```

```
RAQMON-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    OBJECT-GROUP, NOTIFICATION-GROUP  
    FROM SNMPv2-CONF
```

```
    mib-2, enterprises, IpAddress, Integer32, Unsigned32,  
    Gauge32, Counter32, OBJECT-TYPE,
```

MODULE-IDENTITY, NOTIFICATION-TYPE  
FROM SNMPv2-SMI

RowStatus, TEXTUAL-CONVENTION, TruthValue  
FROM SNMPv2-TC  
Utf8String

```

FROM SYSAPPL-MIB
Dscp
FROM DIFFSERV-DSCP-TC;

```

```

raqmon MODULE-IDENTITY
  LAST-UPDATED "200210140000Z"
  ORGANIZATION
    "Avaya Inc."
  CONTACT-INFO
    "Dan Romascanu
    Postal: Avaya Israel
           Atidim Technology Park, Bldg. #3
           Tel Aviv, 61131
           Israel
    Tel:   +972 3 6458414
    Email: dromasca@avaya.com
    "
  DESCRIPTION
    "RAQMON MIB"
    ::= { mib-2 6889 }

```

```

--
-- Type definitions
--

```

```

Duration ::= Unsigned32

```

```

--
-- Textual conventions
--

```

```

RaqmonDateAndTime ::= TEXTUAL-CONVENTION
  DISPLAY-HINT
    "2d-1d-1d,1d:1d:1d"
  STATUS current
  DESCRIPTION
    "A date-time specification in Coordinated Universal
    Time (UTC).
    This definition is used rather than DateAndTime
    from SNMPv2-TC or ExtUTCTime from SMIV2
    since a fixed length field in UTC was preferred
    for use as an INDEX."

    field  octets  contents                                range
    -----

```



<a href="#"><u>1</u></a>	1-2	year	0..65536
<a href="#"><u>2</u></a>	3	month	1..12
<a href="#"><u>3</u></a>	4	day	1..31
<a href="#"><u>4</u></a>	5	hour	0..23
<a href="#"><u>5</u></a>	6	minutes	0..59
<a href="#"><u>6</u></a>	7	seconds	0..59

For example, Tuesday May 26, 1992 at 1:30:15 UTC  
would be displayed as:

1992-5-26,13:30:15."  
SYNTAX OCTET STRING (SIZE (7))

--

-- Node definitions

--

raqmonEvents OBJECT IDENTIFIER ::= { raqmon 0 }

raqmonSessionAlarm NOTIFICATION-TYPE

OBJECTS { raqmonParticipantAddr,

raqmonParticipantName,

raqmonParticipantPeerAddr, raqmonQosRTT,

raqmonQosJitter,

raqmonQosLostPackets, raqmonQosRcvdPackets }

STATUS current

DESCRIPTION

"A notification generated by an entry in the  
raqmonSessionExceptionTable."

::= { raqmonEvents 1 }

raqmonSNMPTransportNotofication NOTIFICATION-TYPE

OBJECTS { raqmonPDUBasicPDU }

STATUS current

DESCRIPTION

"A Notification generated by a RAQMON device to a  
collector, if an SNMP agent is implemented in the  
RAQMON device. Note that similar format PDUs MAY  
Be generated by RAQMON devices without a full  
SNMP agent being REQUIRED."

::= { raqmonEvents 2 }

raqmonMIBObjects OBJECT IDENTIFIER ::= { raqmon 1 }

raqmonSession OBJECT IDENTIFIER ::= { raqmonMIBObjects 1 }



```
raqmonParticipantTable OBJECT-TYPE
    SYNTAX SEQUENCE OF RaqmonParticipantEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "Table of information about participants in sessions.
        Contains both active and closed (terminated) sessions.
        "
    ::= { raqmonSession 1 }

raqmonParticipantEntry OBJECT-TYPE
    SYNTAX RaqmonParticipantEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "Each entry contains information from a single session
        participant.
        Rows are removed for inactive sessions
        when implementation
        specific age or space limits are reached.
        "
    INDEX { raqmonParticipantStartDate, raqmonParticipantIndex }
    ::= { raqmonParticipantTable 1 }

RaqmonParticipantEntry ::=
    SEQUENCE {
        raqmonParticipantStartDate
            RaqmonDateAndTime,
        raqmonParticipantIndex
            Integer32,
        raqmonParticipantAddr
            IpAddress,
        raqmonParticipantSendPort
            INTEGER,
        raqmonParticipantRecvPort
            Integer32,
        raqmonParticipantSetupDelay
            Unsigned32,
        raqmonParticipantName
            Utf8String,
        raqmonParticipantTool
            Utf8String,
        raqmonParticipantQosCount
            Unsigned32,
        raqmonParticipantEndDate
            RaqmonDateAndTime,
        raqmonParticipantRcvdPT
            INTEGER,
```





```
raqmonParticipantSentPT
    INTEGER,
raqmonParticipantActive
    TruthValue,
raqmonParticipantPeerIndex
    OCTET STRING,
raqmonParticipantPeerAddr
    IpAddress,
raqmonParticipantSrcLayer2
    INTEGER,
raqmonParticipantDestLayer2
    INTEGER,
raqmonParticipantSrcLayer3
    Dscp,
raqmonParticipantDestLayer3
    Dscp,
raqmonParticipantCPUMean
    INTEGER,
raqmonParticipantCPUMin
    INTEGER,
raqmonParticipantCPUMax
    INTEGER,
raqmonParticipantMemoryMean
    INTEGER,
raqmonParticipantMemoryMin
    INTEGER,
raqmonParticipantMemoryMax
    INTEGER,
raqmonParticipantRTTMean
    Gauge32,
raqmonParticipantRTTMin
    Gauge32,
raqmonParticipantRTTMax
    Gauge32,
raqmonParticipantJitterMean
    Gauge32,
raqmonParticipantJitterMin
    Gauge32,
raqmonParticipantJitterMax
    Gauge32,
raqmonParticipantPackets
    Counter32,
raqmonParticipantLostPackets
    Counter32
```

```
}
```

```
raqmonParticipantStartDate OBJECT-TYPE
    SYNTAX RaqmonDateAndTime
```



MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
    "The date and time of this entry.  
    It will be the date and time  
    of the first report received."  
::= { raqmonParticipantEntry 1 }

raqmonParticipantIndex 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. The index will be unique for a  
    particular date and time."  
::= { raqmonParticipantEntry 2 }

raqmonParticipantAddr OBJECT-TYPE  
SYNTAX IpAddress  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
    "IP Address of the participant for this session."  
::= { raqmonParticipantEntry 3 }

raqmonParticipantSendPort OBJECT-TYPE  
SYNTAX INTEGER (0..65535)  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
    "Port from which session data is sent."  
::= { raqmonParticipantEntry 4 }

raqmonParticipantRecvPort OBJECT-TYPE  
SYNTAX Integer32  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION  
    "Port on which session data is received."  
::= { raqmonParticipantEntry 5 }

raqmonParticipantSetupDelay OBJECT-TYPE  
SYNTAX Unsigned32



MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
    "Session setup time in milliseconds."  
::= { raqmonParticipantEntry 6 }

raqmonParticipantName OBJECT-TYPE  
    SYNTAX Utf8String  
    MAX-ACCESS read-only  
    STATUS current  
    DESCRIPTION  
        "The data source name for the participant."  
::= { raqmonParticipantEntry 7 }

raqmonParticipantTool OBJECT-TYPE  
    SYNTAX Utf8String  
    MAX-ACCESS read-only  
    STATUS current  
    DESCRIPTION  
        "A string giving the name and possibly version  
        of the application  
        generating the stream, e.g., videotool 1.2.  
        This information may be  
        useful for debugging purposes and is similar  
        to the Mailer or Mail-  
        System-Version SMTP headers. The tool value  
        is expected to remain  
        constant for the duration of the session."  
::= { raqmonParticipantEntry 8 }

raqmonParticipantQosCount OBJECT-TYPE  
    SYNTAX Unsigned32  
    MAX-ACCESS read-only  
    STATUS current  
    DESCRIPTION  
        "Count of entries in the QOS history table  
        for this participant and  
        session."  
::= { raqmonParticipantEntry 9 }

raqmonParticipantEndDate OBJECT-TYPE  
    SYNTAX RaqmonDateAndTime  
    MAX-ACCESS read-only  
    STATUS current  
    DESCRIPTION  
        "The date and time of the last report received."  
::= { raqmonParticipantEntry 10 }



**raqmonParticipantRcvdPT OBJECT-TYPE**

SYNTAX INTEGER (0..127)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Payload type of received packets."

::= { raqmonParticipantEntry 11 }

**raqmonParticipantSentPT OBJECT-TYPE**

SYNTAX INTEGER (0..127)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Payload type of sent packets."

::= { raqmonParticipantEntry 12 }

**raqmonParticipantActive OBJECT-TYPE**

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Value 'true' indicates that the session  
for this participant is active (open).  
Value 'false' indicates that the session  
is closed (terminated).  
"

::= { raqmonParticipantEntry 13 }

**raqmonParticipantPeerIndex OBJECT-TYPE**

SYNTAX OCTET STRING (SIZE (0 | 11))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The index of the corresponding entry in this table for  
the other peer participant. If there is no  
such entry then the  
value will be a zero length string. Otherwise it will  
be a string of length 11 consisting of  
the raqmonParticipantStartDate  
octet string appended with an octet string of length 4  
containing raqmonParticipantIndex (most  
significant octet first).  
Note, the entry may no longer exist even if the index is  
not zero length since the entry may have  
been deleted due  
to implementation defined limits being exceeded.  
"

::= { raqmonParticipantEntry 14 }





```
raqmonParticipantPeerAddr OBJECT-TYPE
    SYNTAX IpAddress
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "IP address of peer endpoint."
    ::= { raqmonParticipantEntry 15 }

raqmonParticipantSrcLayer2 OBJECT-TYPE
    SYNTAX INTEGER (0..7)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Source Layer 2 priority"
    ::= { raqmonParticipantEntry 16 }

raqmonParticipantDestLayer2 OBJECT-TYPE
    SYNTAX INTEGER (0..7)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Destination Layer 2 priority."
    ::= { raqmonParticipantEntry 17 }

raqmonParticipantSrcLayer3 OBJECT-TYPE
    SYNTAX Dscp
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Source Layer 3 DSCP value"
    ::= { raqmonParticipantEntry 18 }

raqmonParticipantDestLayer3 OBJECT-TYPE
    SYNTAX Dscp
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "Destination Layer 3 DSCP value"
    ::= { raqmonParticipantEntry 19 }

raqmonParticipantCPUMean OBJECT-TYPE
    SYNTAX INTEGER (0..100)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Mean CPU utilization as a percentage."
    ::= { raqmonParticipantEntry 20 }
```



```
raqmonParticipantCPUMin OBJECT-TYPE
    SYNTAX INTEGER (0..100)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Minimum CPU utilization as a percentage."
    ::= { raqmonParticipantEntry 21 }

raqmonParticipantCPUMax OBJECT-TYPE
    SYNTAX INTEGER (0..100)
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "Maximum CPU utilization as a percentage."
    ::= { raqmonParticipantEntry 22 }

raqmonParticipantMemoryMean OBJECT-TYPE
    SYNTAX INTEGER (0..100)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Mean memory utilization as a percentage."
    ::= { raqmonParticipantEntry 23 }

raqmonParticipantMemoryMin OBJECT-TYPE
    SYNTAX INTEGER (0..100)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Minimum memory utilization as a percentage."
    ::= { raqmonParticipantEntry 24 }

raqmonParticipantMemoryMax OBJECT-TYPE
    SYNTAX INTEGER (0..100)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Maximum memory utilization as a percentage."
    ::= { raqmonParticipantEntry 25 }

raqmonParticipantRTTMean OBJECT-TYPE
    SYNTAX Gauge32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Mean round trip time (RTT) over the entire session."
    ::= { raqmonParticipantEntry 26 }
```



## raqmonParticipantRTTMin OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Minimum round trip time (RTT) over the entire session."

::= { raqmonParticipantEntry 27 }

## raqmonParticipantRTTMax OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Maximum round trip time (RTT) over the entire session."

::= { raqmonParticipantEntry 28 }

## raqmonParticipantJitterMean OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Mean jitter over the entire session."

::= { raqmonParticipantEntry 29 }

## raqmonParticipantJitterMin OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Minimum jitter over the entire session."

::= { raqmonParticipantEntry 30 }

## raqmonParticipantJitterMax OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Maximum jitter over the entire session."

::= { raqmonParticipantEntry 31 }

## raqmonParticipantPackets OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Count of packets received for the entire session."

::= { raqmonParticipantEntry 32 }



raqmonParticipantLostPackets OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Count of packets lost by this  
receiver for the entire session."

::= { raqmonParticipantEntry 33 }

raqmonQosTable OBJECT-TYPE

SYNTAX SEQUENCE OF RaqmonQosEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table of historical information  
about quality of service  
data during sessions.  
"

::= { raqmonSession 2 }

raqmonQosEntry OBJECT-TYPE

SYNTAX RaqmonQosEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains information from  
a single RAQMON packet.  
Rows are removed for  
inactive sessions when implementation  
specific time or space limits are reached.  
"

INDEX { raqmonParticipantStartDate,  
raqmonParticipantIndex, raqmonQosTime }

::= { raqmonQosTable 1 }

RaqmonQosEntry ::=

SEQUENCE {

raqmonQosTime

Duration,

raqmonQosRTT

Gauge32,

raqmonQosJitter

Gauge32,

raqmonQosRcvdPackets

Integer32,

raqmonQosRcvdOctets





```
        Integer32,
    raqmonQosSentPackets
        Integer32,
    raqmonQosSentOctets
        Integer32,
    raqmonQosLostPackets
        Integer32,
    raqmonQosRsvpStatus
        INTEGER
}
```

raqmonQosTime OBJECT-TYPE

SYNTAX Duration

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Time of this entry measured  
from the start of the corresponding  
participant session."

::= { raqmonQosEntry 1 }

raqmonQosRTT OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The round trip time.  
Will contain the previous value if there was no report  
for this time (or 2^32 - 1 if value never reported).  
"

::= { raqmonQosEntry 2 }

raqmonQosJitter OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"An estimate of delay variation  
as observed by this receiver.  
Will contain the previous value if there was no report  
for this time (or 2^32 - 1 if value never reported).  
"

::= { raqmonQosEntry 3 }

raqmonQosRcvdPackets OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current



## DESCRIPTION

"Count of packets received by this receiver  
since the last entry containing a value for this field.  
This is not a cumulative  
value since the start of the session.  
Set to -1 if value not reported for this time.  
"

::= { raqmonQosEntry 4 }

## raqmonQosRcvdOctets OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"Count of octets received by this receiver  
since the last entry containing a value for this field.  
This is not a cumulative value  
since the start of the session.  
Set to -1 if value not reported for this time.  
"

::= { raqmonQosEntry 5 }

## raqmonQosSentPackets OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"Count of packets sent since the last entry containing a  
value for this field.  
This is not a cumulative value since  
the start of the session.  
Set to -1 if value not reported for this time.  
"

::= { raqmonQosEntry 6 }

## raqmonQosSentOctets OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"Count of octets sent since the last entry containing a  
value for this field.  
This is not a cumulative value  
since the start of the session.  
Set to -1 if value not reported for this time.  
"

::= { raqmonQosEntry 7 }



**raqmonQosLostPackets OBJECT-TYPE**

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A count of packets lost as observed by this receiver  
since the last entry containing a value for this field.  
Set to -1 if value not reported for this time."

::= { raqmonQosEntry 8 }

**raqmonQosRsvpStatus OBJECT-TYPE**

SYNTAX INTEGER

{  
unknown(-1),  
notInUse(0),  
disabled(1),  
reservationPending(2),  
reservationFailed(3),  
reservationSuccess(4)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The RSVP status.  
Will contain the previous value if there was no report  
for this time (or <unknown> if no  
value was ever reported)."

::= { raqmonQosEntry 9 }

**raqmonParticipantAddrTable OBJECT-TYPE**

SYNTAX SEQUENCE OF RaqmonParticipantAddrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Maps raqmonParticipantAddr to the index of the  
raqmonParticipantTable. This table allows management  
applications to find entries  
sorted by raqmonParticipantAddr  
rather than raqmonParticipantStartDate."

::= { raqmonSession 3 }

**raqmonParticipantAddrEntry OBJECT-TYPE**

SYNTAX RaqmonParticipantAddrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry corresponds to exactly one entry in the  
raqmonParticipantEntry - the entry containing the



```
        index pair rraqmonParticipantStartDate,
        raqmonParticipantIndex."
INDEX { raqmonParticipantAddr,
        raqmonParticipantStartDate,
        raqmonParticipantIndex }
 ::= { raqmonParticipantAddrTable 1 }

RaqmonParticipantAddrEntry ::=
    SEQUENCE {
        raqmonParticipantAddrEndDate
        RaqmonDateAndTime
    }

raqmonParticipantAddrEndDate OBJECT-TYPE
    SYNTAX RaqmonDateAndTime
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The value of
        raqmonParticipantEndDate for the corresponding
        raqmonParticipantEntry."
    ::= { raqmonParticipantAddrEntry 1 }

raqmonException OBJECT IDENTIFIER ::= { raqmonMIBObjects 2 }

raqmonSessionExceptionTable OBJECT-TYPE
    SYNTAX SEQUENCE OF RaqmonSessionExceptionEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "This table creates filters so that a
        management station can
        get immediate notification of a
        session that has had poor
        quality of service."
    ::= { raqmonException 2 }

raqmonSessionExceptionEntry OBJECT-TYPE
    SYNTAX RaqmonSessionExceptionEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "A conceptual row in the raqmonSessionExceptionTable."
    INDEX { raqmonSessionExceptionIndex }
    ::= { raqmonSessionExceptionTable 1 }

RaqmonSessionExceptionEntry ::=
    SEQUENCE {
```





```
    raqmonSessionExceptionIndex
        INTEGER,
    raqmonSessionExceptionJitterThreshold
        Unsigned32,
    raqmonSessionExceptionRttThreshold
        Unsigned32,
    raqmonSessionExceptionLostPacketsThreshold
        Integer32,
    raqmonSessionExceptionRowStatus
        RowStatus
}
```

raqmonSessionExceptionIndex OBJECT-TYPE

SYNTAX INTEGER (1..65535)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An index that uniquely identifies an  
entry in the raqmonSessionExceptionTable."

::= { raqmonSessionExceptionEntry 2 }

raqmonSessionExceptionJitterThreshold OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Threshold for jitter in units of milliseconds.

The value during a session must be greater than or  
equal to this value for an exception to be created."

::= { raqmonSessionExceptionEntry 3 }

raqmonSessionExceptionRttThreshold OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Threshold for round trip time in units of milliseconds.

The value during a session must be greater than or  
equal to this value for an exception to be created."

::= { raqmonSessionExceptionEntry 4 }

raqmonSessionExceptionLostPacketsThreshold OBJECT-TYPE

SYNTAX Integer32 (0..1000)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Threshold for lost packets in  
units of tenth of a percent.



The value during a session must be greater than or equal to this value for an exception to be created."  
 ::= { raqmonSessionExceptionEntry 5 }

raqmonSessionExceptionRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Value of 'active' when exceptions are being monitored by the 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."

::= { raqmonSessionExceptionEntry 7 }

raqmonConfig OBJECT IDENTIFIER ::= { raqmonMIBObjects 3 }

raqmonConfigPort OBJECT-TYPE

SYNTAX Unsigned32 (0..65535)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The UDP port to listen on for RAQMON reports."

::= { raqmonConfig 1 }

raqmonConfigPDUTransport OBJECT-TYPE

SYNTAX INTEGER

{  
 other(0),  
 rtcp(1),  
 snmp(2)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The PDU transport used by this collector."

::= { raqmonConfig 2 }

-- editor note: does this need to be read-write? Can a collector support  
-- multiple transports simultaneously?

raqmonConfigRaqmonPDUs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current



## DESCRIPTION

"Count of RAQMON PDUs received by the Collector."  
::= { raqmonConfig 3 }

-- RAQMON PDU Definition

raqmonPDU OBJECT IDENTIFIER ::= { raqmonMIBObjects 4 }

raqmonPDUBasicPDU OBJECT-TYPE

SYNTAX OCTET STRING

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A binary representation of the Basic RAQMON PDU,"

REFERENCE "[SIDDQUI3 - [Section 4.1](#)]"

::= { raqmonPDU 1 }

raqmonConformance OBJECT IDENTIFIER ::= { raqmon 2 }

raqmonGroups OBJECT IDENTIFIER ::= { raqmonConformance 1 }

raqmonCollectorGroup OBJECT-GROUP

OBJECTS {

raqmonParticipantStartDate,  
raqmonParticipantIndex,  
raqmonParticipantAddr,  
raqmonParticipantSendPort,  
raqmonParticipantRecvPort,  
raqmonParticipantSetupDelay,  
raqmonParticipantName,  
raqmonParticipantTool,  
raqmonParticipantQosCount,  
raqmonParticipantEndDate,  
raqmonParticipantRcvdPT,  
raqmonParticipantSentPT,  
raqmonParticipantActive,  
raqmonParticipantPeerIndex,  
raqmonParticipantPeerAddr,  
raqmonParticipantSrcLayer2,  
raqmonParticipantDestLayer2,  
raqmonParticipantSrcLayer3,  
raqmonParticipantDestLayer3,  
raqmonParticipantCPUMean,  
raqmonParticipantCPUMin,  
raqmonParticipantCPUMax,  
raqmonParticipantMemoryMean,  
raqmonParticipantMemoryMin,



```
    raqmonParticipantMemoryMax,  
    raqmonParticipantRTTMean,  
    raqmonParticipantRTTMin,  
    raqmonParticipantRTTMax,  
    raqmonParticipantJitterMean,  
    raqmonParticipantJitterMin,  
    raqmonParticipantJitterMax,  
    raqmonParticipantPackets,  
    raqmonParticipantLostPackets,  
    raqmonQosTime, raqmonQosRTT,  
    raqmonQosJitter, raqmonQosRcvdPackets,  
    raqmonQosRcvdOctets,  
    raqmonQosSentPackets,  
    raqmonQosSentOctets,  
    raqmonQosLostPackets,  
    raqmonQosRsvpStatus,  
    raqmonParticipantAddrEndDate,  
    raqmonConfigPort, raqmonSessionExceptionIndex,  
    raqmonSessionExceptionJitterThreshold,  
    raqmonSessionExceptionRttThreshold,  
    raqmonSessionExceptionLostPacketsThreshold,
```

```
    raqmonSessionExceptionRowStatus,  
    raqmonConfigPDUTransport,
```

```
        raqmonConfigRaqmonPDUs }
```

```
    STATUS current
```

```
    DESCRIPTION
```

```
        "Objects used in RAQMON by a Collector"
```

```
 ::= { raqmonGroups 1 }
```

```
raqmonCollectorNotifications NOTIFICATION-GROUP
```

```
    NOTIFICATIONS { raqmonSessionAlarm }
```

```
    STATUS current
```

```
    DESCRIPTION
```

```
        "Notifications sent by a RAQMON collector."
```

```
 ::= { raqmonGroups 2 }
```

```
raqmonDeviceGroup OBJECT-GROUP
```

```
    OBJECTS {
```

```
        raqmonPDUBasicPDU }
```

```
    STATUS current
```

```
    DESCRIPTION
```

```
        "Objects by a device to generate Notifications, for  
        RAQMON SNMP Transport."
```

```
 ::= { raqmonGroups 3 }
```

```
raqmonDeviceNotifications NOTIFICATION-GROUP
```

```
    NOTIFICATIONS { raqmonSNMPTransportNotification }
```

STATUS current  
DESCRIPTION

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"Notifications send by a RAQMON device."  
 ::= { raqmonGroups 4 }

END

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## **8. Security Considerations**

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.

There are a number of managed objects in this MIB that may contain sensitive information. These are:

raqmonParticipantAddr

It is thus important to control even GET access to these objects and possibly to even encrypt the values of these object when sending them over the network via SNMP. Not all versions of SNMP provide features for such a secure environment.

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 [[RFC2274](#)] and the View-based Access Control Model [[RFC2275](#)] 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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## **B. Log of Changes**

(This section will be removed prior to publication as RFC)

### **B1. Changes in [draft-siddiqui-rmonmib-raqmon-mib-02.txt](#)**

- changed OID of raqmonSessionAlarm
- clarifications in DESCRIPTION clauses
- changed raqmonParticipantActive SYNTAX to TruthValue
- change range of raqmonParticipantSrcLayer2 and raqmonParticipantDestLayer2 to (0..7)
- changed raqmonParticipantSrcLayer3 and raqmonParticipantDestLayer3 to Dscp
- changed counters SYNTAX to Counter32
- added raqmonConfigPDUTransport and raqmonConfigRaqmonPDUs
- added raqmonPDUBasicPDU and raqmonSNMPTransportNotification
- changed raqmonConformance to reflect the different conformance requirements

for

collectors and RAQMON devices

