SCTE·ISBE STANDARDS

Network Operations Subcommittee

AMERICAN NATIONAL STANDARD

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SCTE-HMS-QAM-MIB

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SCOPE
This document is identical to SCTE 154-2 2008 except for informative components which may have been updated such as the title page, NOTICE text, headers and footers. No normative changes have been made to this document.

This document provides the definition for MIB objects within the SCTE-HMS-QAM-MIB Tree.

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NORMATIVE REFERENCE
IETF RFC 2578 SNMPv2-SMI
IETF RFC 2579 SNMPv2-TC
IETF RFC 2580 SNMPv2-CONF
IETF RFC 2863 IF-MIB
IETF RFC 3411 SNMP-FRAMEWORK-MIB
IETF RFC 3418 SNMPV2-MIB
IETF RFC 4001 INET-ADDRESS-MIB
IETF RFC 4133 ENTITY-MIB
IANAiftype-MIB
SCTE 36 2002R2007 (formerly HMS028) SCTE-ROOT
SCTE 37 2007 (formerly HMS072) SCTE-HMS-ROOTS
HMS154-5R3 SCTE-HMS-HEADENDIDENT-TC-MIB
ITU-T J.83 Annex B

INFORMATIVE REFERENCE
DOC-IF-M-CMTS-MIB
DOCS-IF-MIB

TERMS AND DEFINITIONS
This document defines the following terms:
Management Information Base (MIB) – the specification of information in a manner that allows standard access through a network management protocol.

REQUIREMENTS
This section defines the mandatory syntax of the SCTE-HMS-QAM-MIB. It follows the IETF Simple Network Management Protocol (SNMP) for defining managed objects. This mib falls under the SCTE-HMS-ROOTS mib defined by the SCTE Standards HMS Subcommittee.

To avoid issues related to device security and possible user contention, this MIB is only read-only. Device manufacturers are expected to provide device provisioning and control as a separate "out of band" service via protocols of their choice.

The syntax is given below.

```
SCTE-HMS-QAM-MIB DEFINITIONS ::= BEGIN

IMPORTS
      OBJECT-TYPE, OBJECT-IDENTITY, MODULE-IDENTITY,
      enterprises, Integer32, Unsigned32
            FROM SNMPv2-SMI
      OBJECT-GROUP, MODULE-COMPLIANCE
            FROM SNMPv2-CONF
      entPhysicalIndex
            FROM ENTITY-MIB
      ifIndex
            FROM IF-MIB
      InetAddress, InetAddressType
            FROM INET-ADDRESS-MIB
      QAMChannelModulationFormat, QAMChannelInterleaveMode
          FROM SCTE-HMS-HEADENDIDENT-TC-MIB;

heDigitalQamMIB MODULE-IDENTITY
      LAST-UPDATED "200807160305Z"
      ORGANIZATION
            "SCTE HMS Working Group"
      CONTACT-INFO
            "SCTE HMS Subcommittee, Chairman
            mailto:standards@scte.org "
      DESCRIPTION
            "This MIB module is for representing Edge QAM equipment
present
                  in the headend (or indoor) and is supported by a
SNMP agent.
                  It defines QAM channel related configuration MIB
objects
                  associated with both QAM channel's physical and
logical
                  characteristics.

                  qamChannelTable is optional for devices that are
supporting
                  equivalent DOCSIS MIB objects.

                  qamConfigTable is optional and applies to devices
that choose to
                  provide logical level configuration. "

      REVISION "200807160305Z"
      DESCRIPTION
            "Updated Objects based on Comments at 7/11/08 meeting.
            1. Made QAMChannelInterleave mode an imported enumeration
and used the
            values from the docsiFDownChannelInterleave enumeration.
             2. Changed name of QAMModulationFormat to
QAMChannelModulationFormat.
            3. Added unknown and other to qamChannelAnnexMode
            4. For consistency changed values names for
qamChannelCommonOutputBw,
```

```
                qamChannelCommonUtilization to add the word Common to the
names.
          5. Changed description clause of qamConfigQamChannelIdMin
and
              qamConfigQamChannelIdMax to reference
entPhysicalIndex. "

     REVISION "200804181055Z"
     DESCRIPTION
          "Renumbered objects in qamConfigTable to remove gaps."

     REVISION "200802041850Z"
     DESCRIPTION
          "Changes based on comments,
          1. Changed description of qamChannelPower.
          2. Added units to qamChannelOutputBw.
          3. Changed Units on qamChannelUtilization to 0.1
Percent."

      REVISION "200712171150Z"
     DESCRIPTION
          "Changes based on comments,
          1. Removed IpAddress import.
          2. Changed UNITS,comment, SYNTAX on
qamChannelUtilization."

      REVISION "200710031700Z"
     DESCRIPTION
          "Added SCTE-HMS-HEADENDIDENT-TC name to file. Added
          QAMModulationFormat textual convention."

      REVISION "200710021200Z"
     DESCRIPTION
          "Prepare MIB for ballot."

::= { enterprises scteRoot(5591) scteHmsTree(1) insidePlantIdent(11)
heDigital(5) heDigitalQAM(3) 1}

--
-- Node definitions
--
qamMIBObjects  OBJECT-IDENTITY
     STATUS     current
     DESCRIPTION
          "This branch specifies the QAM MIB objects."
     ::= { heDigitalQamMIB 1 }

qamMIBConformance  OBJECT-IDENTITY
     STATUS     current
     DESCRIPTION
          "This branch describes the different QAM MIB object
groups and
          the different level of compliance."
     ::= { heDigitalQamMIB 2 }
```

```
qamMIBCompliances  OBJECT-IDENTITY
     STATUS      current
     DESCRIPTION
          "The different levels of compliance to the QAM MIB."
     ::= { qamMIBConformance 1 }

qamMIBGroups  OBJECT-IDENTITY
     STATUS      current
     DESCRIPTION
          "The QAM MIB object groups."
     ::= { qamMIBConformance 2 }

qamChannelTable  OBJECT-TYPE
     SYNTAX SEQUENCE OF QamChannelEntry
     MAX-ACCESS not-accessible
     STATUS      current
     DESCRIPTION
          "This table describes the configuration and attributes of
each
          QAM channel of the QAM designated by ifIndex."
     ::= { qamMIBObjects 1 }

qamChannelEntry  OBJECT-TYPE
     SYNTAX      QamChannelEntry
     MAX-ACCESS not-accessible
     STATUS      current
     DESCRIPTION
          "There is an entry in the table for each QAM channel. The
index
          to this table is the ifIndex of each QAM channel."
     INDEX { ifIndex }
     ::= { qamChannelTable 1 }

QamChannelEntry ::= SEQUENCE {
     qamChannelFrequency
          Unsigned32,
     qamChannelModulationFormat
          QAMChannelModulationFormat,
     qamChannelInterleaverLevel
          QAMChannelInterleaveMode,
     qamChannelInterleaverMode
          INTEGER,
     qamChannelPower
          Integer32,
     qamChannelSquelch
          INTEGER,
     qamChannelContWaveMode
          INTEGER,
     qamChannelAnnexMode
          INTEGER
}

qamChannelFrequency  OBJECT-TYPE
```

```
        SYNTAX      Unsigned32
        UNITS       "Hertz"
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "The center frequency of the QAM channel."
        ::= { qamChannelEntry 1 }


qamChannelModulationFormat  OBJECT-TYPE
        SYNTAX      QAMChannelModulationFormat
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "RF Modululation for this output QAM channel when
            qamChannelContWaveMode is off."
        ::= { qamChannelEntry 2 }


qamChannelInterleaverLevel  OBJECT-TYPE
        SYNTAX      INTEGER {
            level1 (1),
            level2 (2)
        }
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "The interleaver level for FEC coding.

            level1 - implies interleaver level 1
            level2 - implies interleaver level 2

            This object is only valid when AnnexMode has the value
annexB."
        ::= { qamChannelEntry 3 }


qamChannelInterleaverMode  OBJECT-TYPE
        SYNTAX      QAMChannelInterleaveMode
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "The interleaving depth or operation mode of the
interleaver.
      'taps8Increment16':  protection 5.9/4.1 usec,
                                    latency .22/.15 msec
      'taps16Increment8':  protection 12/8.2 usec,
                            latency .48/.33 msec
      'taps32Increment4':  protection 24/16 usec,
                            latency .98/.68 msec
      'taps64Increment2':  protection 47/33 usec,
                            latency 2/1.4 msec
      'taps128Increment1': protection 95/66 usec,
                            latency 4/2.8 msec
      'taps12increment17': protection 18/14 usec,
                            latency 0.43/0.32 msec
      'taps128increment2': protection 190/132 usec,
```

```
                                   latency 8/5.6 msec
    'taps128increment3': protection 285/198 usec,
                               latency 12/8.4 msec
    'taps128increment4': protection 380/264 usec,
                               latency 16/11 msec
    'taps128increment5': protection 475/330 usec,
                               latency 20/14 msec
    'taps128increment6': protection 570/396 usec,
                               latency 24/17 msec
    'taps128increment7: protection 664/462 usec,
                               latency 28/20 msec
    'taps128increment8': protection 759/528 usec,
                               latency 32/22 msec


    The value 'taps12increment17' is supported by EuroDOCSIS
    cable systems only, and the others by DOCSIS cable systems.


    If the QAM chammel interface is down, this object either
    returns the configured value,
    or the value of 'unknown'.
    The value of 'other' is returned if the interleave
    is known but not defined in the above list.


    When the qamChannelInterleaverLevel is set to 'level 1', a
            single interleaving depth is supported, namely
'taps128Increment1'.


            When the qamChannelInterleaverLevel is set to 'level2',
all the
            other interleaving depths are also supported."
      REFERENCE
            "ITU-T J.83 Annex B."
      ::= { qamChannelEntry 4 }


qamChannelPower  OBJECT-TYPE
      SYNTAX      Integer32
      UNITS       "0.1 dBmV"
      MAX-ACCESS read-only
      STATUS      current
      DESCRIPTION
            "The output power of the QAM channel. If the QAM channel
is muted,
            value is not valid."
      ::= { qamChannelEntry 5 }


qamChannelSquelch  OBJECT-TYPE
      SYNTAX      INTEGER {
            unmuted (1),
            muted (2)
      }
      MAX-ACCESS read-only
      STATUS      current
      DESCRIPTION
            "Indicates whether the QAM port is muted or not."
```

```
        ::= { qamChannelEntry 6 }

qamChannelContWaveMode   OBJECT-TYPE
      SYNTAX     INTEGER {
            cwmOff (1),
            cwmOn (2)
      }
      MAX-ACCESS read-only
      STATUS     current
      DESCRIPTION
            "Indicates whether Continuous Wave mode is enabled or not
for
            output."
      ::= { qamChannelEntry 7 }

qamChannelAnnexMode   OBJECT-TYPE
      SYNTAX     INTEGER {
          unknown(1),
          other(2),
          annexA(3),
          annexB(4),
          annexC(5)
      }
      MAX-ACCESS read-only
      STATUS     current
      DESCRIPTION
            "Specifies the ITU-T standard supported by the QAM
channel

            annexA - standard specified by Annex A of ITU-T J.83
            annexB - standard specified by Annex B of ITU-T J.83
            annexC - standard specified by Annex C of ITU-T J.83
            Other  - other standard that may apply."
      ::= { qamChannelEntry 8 }

qamChannelCommonTable   OBJECT-TYPE
      SYNTAX SEQUENCE OF QamChannelCommonEntry
      MAX-ACCESS not-accessible
      STATUS     current
      DESCRIPTION
            "This table decribes MPEG and DOCSIS characteristics that
are
            not part of the DOCSIS-IF-MIB."
      ::= { qamMIBObjects 2 }

qamChannelCommonEntry   OBJECT-TYPE
      SYNTAX     QamChannelCommonEntry
      MAX-ACCESS not-accessible
      STATUS     current
      DESCRIPTION
            "Each entry of this table describes attributes of an RF
channel
            for both MPEG and DOCSIS QAMs."
      INDEX { ifIndex }
```

```
        ::= { qamChannelCommonTable 1 }

QamChannelCommonEntry ::= SEQUENCE {
      qamChannelCommonOutputBw
            Integer32,
      qamChannelCommonUtilization
            Integer32
}

qamChannelCommonOutputBw  OBJECT-TYPE
      SYNTAX      Integer32
      UNITS       "bps"
      MAX-ACCESS read-only
      STATUS      current
      DESCRIPTION
            "The QAM channel output bandwidth or capacity."
      ::= { qamChannelCommonEntry 1 }

qamChannelCommonUtilization  OBJECT-TYPE
      SYNTAX      Integer32 (-1|0..1000)
      UNITS       "0.1 Percent"
      MAX-ACCESS read-only
      STATUS      current
      DESCRIPTION
            "The utilization of the QAM channel in 0.1 percentage.
            This rate may be calculated as transport stream packets /
            ( transport stream packets + null packets ). If not
             applicable, a value of -1 is returned."
      ::= { qamChannelCommonEntry 2 }

qamConfigTable  OBJECT-TYPE
      SYNTAX SEQUENCE OF QamConfigEntry
      MAX-ACCESS not-accessible
      STATUS      current
      DESCRIPTION
            "This table is designed to show the IP addresses
configuration
            for the QAM channels, optionally UDP port range, Program
Number
            range associated with QAM channels. Configuring these
parameters
            is necessary when performing session-based provisioning.
A
            session-based provisioning request must conform to the
            configurations in this table. The QAM channels within an
QAM
            device may be partitioned to support multiple UDP, QAM or
            ProgramNo ranges. Though it's helpful to partition the
QAM
            channels when the total number of QAM channel increases,
this is
            not a must. This table may also be used to show the
reserved UDP
```

```
            ports, or program numbers for special purposes instead of
using
            default ones allowed by hardware, software, or MPEG
protocol."
      ::= { qamMIBObjects 3 }

qamConfigEntry  OBJECT-TYPE
      SYNTAX      QamConfigEntry
      MAX-ACCESS not-accessible
      STATUS      current
      DESCRIPTION
            "Each entry corresponds to the configuration of a QAM
channel
            range."
      INDEX { entPhysicalIndex,
            qamConfigIndex }
      ::= { qamConfigTable 1 }

QamConfigEntry ::= SEQUENCE {
      qamConfigIndex
            Unsigned32,
      qamConfigQamChannelIdMin
            Integer32,
      qamConfigQamChannelIdMax
            Integer32,
      qamConfigIPAddrType
            InetAddressType,
      qamConfigIPAddr
            InetAddress,
      qamConfigUdpPortRangeMin
            Integer32,
      qamConfigUdpPortRangeMax
            Integer32,
      qamConfigOutputProgNoMin
            Integer32,
      qamConfigOutputProgNoMax
            Integer32
}

qamConfigIndex  OBJECT-TYPE
      SYNTAX      Unsigned32
      MAX-ACCESS not-accessible
      STATUS      current
      DESCRIPTION
            "The table index."
      ::= { qamConfigEntry 1 }

qamConfigQamChannelIdMin  OBJECT-TYPE
      SYNTAX      Integer32
      MAX-ACCESS read-only
      STATUS      current
      DESCRIPTION
            "QAMChannelId maybe within a line card or global
depending on
```

```
                entPhysicalIndex."
      DEFVAL { 1 }
      ::= { qamConfigEntry 2 }


qamConfigQamChannelIdMax  OBJECT-TYPE
      SYNTAX      Integer32
      MAX-ACCESS read-only
      STATUS      current
      DESCRIPTION
           "QAMChannelId maybe within a line card or global
depending on
           entPhysicalIndex."
      ::= { qamConfigEntry 3 }


qamConfigIPAddrType  OBJECT-TYPE
      SYNTAX      InetAddressType
      MAX-ACCESS read-only
      STATUS      current
      DESCRIPTION
           "The type of the program destination address as defined
by
           inetAddressType. The default value is 1 for ipv4(1)"
      DEFVAL { ipv4 }
      ::= { qamConfigEntry 4 }


qamConfigIPAddr  OBJECT-TYPE
      SYNTAX      InetAddress
      MAX-ACCESS read-only
      STATUS      current
      DESCRIPTION
           "IP address of the QAM channel."
      ::= { qamConfigEntry 5 }


qamConfigUdpPortRangeMin  OBJECT-TYPE
      SYNTAX      Integer32 (0..65535)
      MAX-ACCESS read-only
      STATUS      current
      DESCRIPTION
           "The lowest UDP port of the UDP port range that can be
used
           on this QAM channel."
      ::= { qamConfigEntry 6 }


qamConfigUdpPortRangeMax  OBJECT-TYPE
      SYNTAX      Integer32 (0..65535)
      MAX-ACCESS read-only
      STATUS      current
      DESCRIPTION
           "The highest UDP port of the UDP port range that can be
used on
           this QAM channel."
      ::= { qamConfigEntry 7 }


qamConfigOutputProgNoMin  OBJECT-TYPE
```

```
      SYNTAX      Integer32 (1..65535)
      MAX-ACCESS read-only
      STATUS      current
      DESCRIPTION
            "The lowest MPEG output program number that can be used
on the
            QAM channel."
      DEFVAL { 1 }
      ::= { qamConfigEntry 8 }

qamConfigOutputProgNoMax  OBJECT-TYPE
      SYNTAX      Integer32 (1..65535)
      MAX-ACCESS read-only
      STATUS      current
      DESCRIPTION
            "The highest MPEG output program number that can be used
on the
            QAM channel."
      DEFVAL { 255 }
      ::= { qamConfigEntry 9 }

qamSupport  MODULE-COMPLIANCE
      STATUS      current
      DESCRIPTION
            "These objects describe the support level for QAM."
      MODULE
            MANDATORY-GROUPS { qamChannelGroup }
            GROUP qamConfigGroup
            DESCRIPTION
            "The qamConfigGroup is unconditionally optional"
      ::= { qamMIBCompliances 1 }

docsisSupport  MODULE-COMPLIANCE
      STATUS      current
      DESCRIPTION
            "These objects are not covered by any DOCSIS MIB, but
            they would need to be supported by a DOCSIS EQAM."
      MODULE
            MANDATORY-GROUPS { qamMpegDocsisCommonGroup }
      ::= { qamMIBCompliances 2 }

qamMpegDocsisCommonGroup  OBJECT-GROUP
      OBJECTS { qamChannelCommonOutputBw,
            qamChannelCommonUtilization }
      STATUS      current
      DESCRIPTION
            "These objects are not covered by any DOCSIS MIB. It is
            legitimate for a DOCSIS QAM to support them."
      ::= { qamMIBGroups 1 }

qamChannelGroup  OBJECT-GROUP
      OBJECTS { qamChannelFrequency,
            qamChannelModulationFormat,
            qamChannelInterleaverLevel,
```

```
            qamChannelInterleaverMode,
            qamChannelPower,
            qamChannelSquelch,
            qamChannelContWaveMode,
            qamChannelAnnexMode }
     STATUS       current
     DESCRIPTION
            "The objects characterizing the RF channel and that may
be
            supported by an equivalent DOCSIS MIB object."
     ::= { qamMIBGroups 2 }

qamConfigGroup  OBJECT-GROUP
     OBJECTS { qamConfigQamChannelIdMin,
            qamConfigQamChannelIdMax,
            qamConfigIPAddrType,
            qamConfigIPAddr,
            qamConfigUdpPortRangeMin,
            qamConfigUdpPortRangeMax,
            qamConfigOutputProgNoMin,
            qamConfigOutputProgNoMax }
     STATUS       current
     DESCRIPTION
            "QAM configuration objects."
     ::= { qamMIBGroups 3 }
END
```