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S T A N D A R D S

Network Operations Subcommittee

AMERICAN NATIONAL STANDARD

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**MPEG Management Information Base
SCTE-HMS-MPEG MIB**

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SCOPE

This document is identical to SCTE 154-4 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 MPEG MIB Tree.

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NORMATIVE REFERENCES

IETF RFC 2578 SNMPv2-SMI
IETF RFC 2580 SNMPv2-CONF
IETF RFC 2579 SNMPv2-TC
IETF RFC 2863 IF-MIB
IETF RFC 4001 INET-ADDRESS-MIB
SCTE 36 2002R2007 (formerly HMS028) SCTE-ROOT
SCTE 37 2008 (formerly HMS072) SCTE-HMS-ROOTS
SCTE 154-5 2008 SCTE-HMS-HEADENDIDENT-TC-MIB
ISO/IEC 13818-1:2007 |ITU-T H.222 Systems

INFORMATIVE REFERENCES

MPEG2 - ISO/IEC 13818 Part 2 Video
AVC - ISO/IEC 14496-10 | ITU-T H.264 Video
ISO 639-2:1998 Part 2 – International Standard that lists short codes for language names.

TERMS AND DEFINITIONS

This document defines the following terms:

CA – Conditional Access - Conditional Access systems restrict television program access to certain groups of users either because of concerns for privacy or the desire to collect revenue for the service.

CAT – Conditional Access Table – Tables that are designed to deny general users access to premium or otherwise restricted content, and to establish protocols and systems to grant authorized user's access

ECM – Entitlement Control Message - an encrypted message that is used to prevent unauthorized reception for such services as cable or satellite television.

EMM – Entitlement Management Message - an encrypted message that contains private conditional access information about the authority a viewer has to acquire reception for such services as cable or satellite television.

ES – Elementary Stream - Defined by MPEG-2 Systems (ISO/IEC 13818-1). An elementary stream contains only one kind of data, e.g. audio, video or closed caption. An elementary stream is often referred to as "elementary", "data", "audio" or "video" bit streams or streams.

IGMP- Internet Group Management Protocol - A protocol that hosts use to keep local routers informed of their membership in multicast groups. When all hosts leave a group, the router no longer forwards datagram's that arrive for the group.

MPTS – Multi-Program Transport Stream - Transport Streams are the combining (multiplexing) of multiple program channels (typically digital video channels) onto a signal communication channel (such as a satellite transponder channel). A MPEG transport stream (MPEG-TS) may also called a multi-program transport stream (MPTS) and at other times a SPTS.

NIT – Network Information Table - Describes how transport streams are organized on the current network, and also describes some of the physical properties of the network itself. The NIT also contains the name of the network, and the *network ID*. This is a value that uniquely identifies the network that is currently broadcasting the transport stream, and may be different from the original network ID that we discussed earlier, if the transport stream is being rebroadcast.

PAT - Program Association Table- Each Transport Stream contains one or more Transport Stream packets with PID value 0x0000. These Transport Stream packets together shall contain a complete Program Association Table (PAT), providing a complete list of all programs within the Transport Stream.

PCR - Program Clock Reference - The program clock reference (PCR) is transmitted within a video transport stream as a time reference. A sufficiently accurate and correctly received PCR is a precondition for correct data display in the receiver.

PID - Packet ID- Packet identifier; a unique 13-bit value used to identify the type of data stored in the packet payload (see ITU-T H.222.0 / ISO/IEC 13818-1).

PMT - Program Map Table - A specific PID within a transport stream which provides the mapping between a program number and the program elements it is comprised of. It contains a minimum of a program number, PCR PID, stream types and program element PIDs.

PSI – Program Specific Information - Program Specific Information is metadata, part of the MPEG-2 standards. The PSI Data contains four tables: PAT (Program Association Table), CAT (Conditional Access Table), PAT (Program Map Table) and NIT(Network Information Table).

PSIP – Program And System Information Protocol - This is the digital information transmitted by a DTV station that includes the time and date, major and minor channel numbers, and program information.

SDV – Switched Digital Video - Industry term for a network scheme for distributing digital video via a cable with limited capacity.

SPTS – Single Program Transport Stream –

A Transport Stream which combines PES packets from only one program with a common timebase.

SSM – Source Specific Multicast - is a method of delivering multicast packets originating in only a specific source address S to any receiver that requests it. It limits the original multicast model to be originated from just one host, simplifying the requirements on the network and easing security of multicast delivery.

TS – Transport Stream – A Transport Stream combines PES packets from one or more programs with one or more independent time bases into a single stream. The PES packets made up of elementary streams that form a program share a common timebase.

TSID – Transport Stream Identifier – Identifier of a Transport Stream.

VBR- Variable Bit Rate– Variable Bit Rate provides a specified throughput capacity but data is not sent evenly. This is a popular choice for voice and videoconferencing data.

VOD – Video On Demand - A service that allows subscribers to retrieve and watch a selection of movies (on video) at any time.

REQUIREMENTS

This section defines the mandatory syntax of the SCTE-HMS-MPEG-MIB.

It follows the IETF Simple Network Management Protocol (SNMP) for defining managed objects.

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 MIB syntax is given below.

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

IMPORTS

```
OBJECT-TYPE, OBJECT-IDENTITY, MODULE-IDENTITY,
enterprises, Counter32, Integer32, Unsigned32, Counter64
FROM SNMPv2-SMI
OBJECT-GROUP, MODULE-COMPLIANCE
FROM SNMPv2-CONF
DateAndTime, TruthValue, RowPointer, AutonomousType
FROM SNMPv2-TC
InterfaceIndex
FROM IF-MIB
InetAddress, InetAddressType, InetPortNumber
FROM INET-ADDRESS-MIB
HePIDValue, ProgDataType
FROM SCTE-HMS-HEADENDIDENT-TC-MIB;
```

scteHmsMpegMIB MODULE-IDENTITY

```
LAST-UPDATED "200811171700Z" -- Nov 17, 2008
```

ORGANIZATION

```
"SCTE HMS Subcommittee"
```

CONTACT-INFO

```
"SCTE HMS Subcommittee, Chairman
mailto:standards@scte.org "
```

DESCRIPTION

```
"This MIB module is for representing MPEG equipment present in
the headend and is supported by a SNMP agent. It defines both
the MPEG input and output MIB objects for managing
MPEG input and output transport streams, programs and elementary
streams. It provides both input and output related statistics,
as well as program mapping and video session information.
```

```
All the tables, except mpegProgramMappingTable and
mpegVideoSessionTable, capture and store the information
related to active transport streams only. Optional
```

```

MIB objects will have default values defined in this MIB file."
REVISION "200811171700Z"
DESCRIPTION
  " Finalized MPEG mib for release"
 ::= { enterprises scteRoot(5591) scteHmsTree(1) insidePlantIdent(11) heDigital(5)
heDigitalMPEG(4) 1 }

--
-- Textual Conventions can be found in SCTE-HMS-HEADENDIDENT-TC-MIB
--

--
-- Node definitions
--
mpegMIBObjects OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION
    "This branch specifies the MPEG Common MIB objects that can be common
    to any device using MPEG."
  ::= { scteHmsMpegMIB 1 }

mpegDigitalInputs OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION
    "This branch specifies the attributes of the incoming streams
    to the MPEG device."
  ::= { mpegMIBObjects 1 }

mpegOutputs OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION
    "This branch specifies the attributes of the output streams of
    the MPEG device."
  ::= { mpegMIBObjects 2 }

mpegMIBConformance OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION
    "This branch describes the different MPEG MIB object groups and
    the different levels of compliance."
  ::= { scteHmsMpegMIB 2 }

mpegMIBCompliances OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION
    "The different levels of compliance to the MPEG MIB."
  ::= { mpegMIBConformance 1 }

mpegMIBGroups OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION
    "The MPEG MIB object groups."
  ::= { mpegMIBConformance 2 }

--

```

```

-- mpegDigitalInputs
--
mpegLossOfSignalTimeout OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "milliseconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object specifies the loss of signal timeout on any
        incoming stream."
    ::= { mpegDigitalInputs 1 }

mpegInputTSTable OBJECT-TYPE
    SYNTAX SEQUENCE OF MpegInputTSEntry
    MAX-ACCESS not-accessible
    STATUS      current
    DESCRIPTION
        "This table specifies the attributes of video sessions or SPTSs."
    ::= { mpegDigitalInputs 2 }

mpegInputTSEntry OBJECT-TYPE
    SYNTAX      MpegInputTSEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Each entry specifies the attributes of a transport stream
        (SPTS/MPTS)."
    INDEX { mpegInputTSIndex }
    ::= { mpegInputTSTable 1 }

MpegInputTSEntry ::= SEQUENCE {
    mpegInputTSIndex
        Unsigned32,
    mpegInputTSType
        INTEGER,
    mpegInputTSConnectionType
        INTEGER,
    mpegInputTSConnection
        RowPointer,
    mpegInputTSActiveConnection
        RowPointer,
    mpegInputTSPsiDetected
        TruthValue,
    mpegInputTSStartTime
        DateAndTime,
    mpegInputTSResourceAllocated
        TruthValue,
    mpegInputTSNumPrograms
        Unsigned32,
    mpegInputTSRate
        Unsigned32,
    mpegInputTSMaxRate
        Unsigned32,
    mpegInputTSPatVersion
        Integer32,
    mpegInputTSCatVersion
        Integer32,

```

```

mpegInputTSNitPid
  HePIDValue,
mpegInputTSNumEmms
  Unsigned32,
mpegInputTSTSID
  Unsigned32,
mpegInputTSLock
  INTEGER
}

mpegInputTSIndex OBJECT-TYPE
SYNTAX      Unsigned32
MAX-ACCESS not-accessible
STATUS      current
DESCRIPTION
  "The unique identifier of the Input TS."
 ::= { mpegInputTSEntry 1 }

mpegInputTSType OBJECT-TYPE
SYNTAX      INTEGER {
  spts (1),
  mpts (2)
}
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
  "The type of stream, e.g., SPTS or MPTS."
 ::= { mpegInputTSEntry 2 }

mpegInputTSConnectionType OBJECT-TYPE
SYNTAX      INTEGER {
  other(1),
  udp(2)
}
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
  "The type of input flow of the stream.
   The value 'udp' indicates either unicast or multicast
   udp origination flows."
 ::= { mpegInputTSEntry 3 }

mpegInputTSConnection OBJECT-TYPE
SYNTAX      RowPointer
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
  "The reference to the first entry in the set of data
   sources that are capable of providing content for the
   input stream.
   For the Connection Type 'udp' this object contains the
   pointer to the first entry of the UDP Origination table

Below is an example of the value expected for a Connection Type
'udp'.
An input stream (mpegInputTSIndex = 8) is being feed by a udp
Connection (mpegInputUdpOriginationIndex = 4) with 3 associated

```

udp streams each one identified by
mpegInputUdpOriginationId = 1,2,3.

mpegInputTSEntry

TSIndex	ConnectionType	Connection
1	1	<any>
2	1	<any>
...		
8	1	mpegInputUdpOriginationIfIndex.4.3
9	2	<any>

MpegInputUdpOriginationEntry

UdpOriginationIndex	UdpOriginationId
3	1, 4, 5
4	1, 2, 3

..."

::= { mpegInputTSEntry 4 }

mpegInputTSActiveConnection OBJECT-TYPE

SYNTAX RowPointer

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The reference to the selected data source for the input stream.

For devices or sessions that do not support redundant connections this object will return the same value as mpegInputTSConnection.

For the Connection Type 'udp' this object contains the pointer to the UDP Origination table that the input Stream is using.

Below is an example of the value expected for a Connection Type 'udp'.

An input stream (mpegInputTSIndex = 8) is being feed by a udp Connection (mpegInputUdpOriginationIndex = 4) have associated 3 udp streams each one identified by mpegInputUdpOriginationId = 1,2,3. The Udp stream 3 is currently used by the input transport stream.

mpegInputTSEntry

TSIndex	ConnectionType	ActiveConnection
1	1	<any>
2	1	<any>
...		
8	1	mpegInputUdpOriginationIfIndex.4.3
9	2	<any>

MpegInputUdpOriginationEntry

UdpOriginationIndex	UdpOriginationId
3	1, 4, 5
4	1, 2, 3

...

Note in the example that the sub oid 4 (in mpegInputUdpOriginationIfIndex.4.3) represents the sub-oid that aggregates all the udp origination flows associated with the

```
transport stream."
::= { mpegInputTSEntry 5 }
```

```
mpegInputTSPsiDetected OBJECT-TYPE
SYNTAX      TruthValue
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "A simple check that Program Specific Information has or has
    not been detected.
    The value 'true' indicates PSI was detected."
::= { mpegInputTSEntry 6 }
```

```
mpegInputTSStartTime OBJECT-TYPE
SYNTAX      DateAndTime
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Specifies the time the MPEG device started receiving the
    stream, i.e., the time the entry was added to the table."
::= { mpegInputTSEntry 7 }
```

```
mpegInputTSResourceAllocated OBJECT-TYPE
SYNTAX      TruthValue
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "If true, all resources have been allocated for the stream."
::= { mpegInputTSEntry 8 }
```

```
mpegInputTSNumPrograms OBJECT-TYPE
SYNTAX      Unsigned32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The number of programs in the input transport stream."
::= { mpegInputTSEntry 9 }
```

```
mpegInputTSRate OBJECT-TYPE
SYNTAX      Unsigned32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The data rate of the incoming program or SPTS."
::= { mpegInputTSEntry 10 }
```

```
mpegInputTSMaxRate OBJECT-TYPE
SYNTAX      Unsigned32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The maximum data rate of the incoming stream for either
    a variable or constant bit rate stream (VBR/CVR)."
::= { mpegInputTSEntry 11 }
```

```
mpegInputTSPatVersion OBJECT-TYPE
SYNTAX      Integer32 (-1..31)
```

MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Program Association Table version of the transport stream.
 The value -1 means PAT version is not supported for input
 transport stream."
 DEFVAL { -1 }
 ::= { mpegInputTSEntry 12 }

mpegInputTSCatVersion OBJECT-TYPE
 SYNTAX Integer32 (-1..31)
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The Conditional Access Table version number of transport
 stream. The value -1 means CAT version is not supported
 for input transport stream."
 DEFVAL { 0 }
 ::= { mpegInputTSEntry 13 }

mpegInputTSNitPid OBJECT-TYPE
 SYNTAX HePIDValue
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "NIT PID of the input transport stream."
 ::= { mpegInputTSEntry 14 }

mpegInputTSNumEmms OBJECT-TYPE
 SYNTAX Unsigned32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of EMMs in the input stream. The default value 9999
 means the device does not support encryption."
 DEFVAL { 9999 }
 ::= { mpegInputTSEntry 15 }

mpegInputTSTSID OBJECT-TYPE
 SYNTAX Unsigned32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The input TSID of the transport stream. A valid TSID is of 16
 bits length. If TSID is not supported, all 32-bits shall be set
 to 1."
 ::= { mpegInputTSEntry 16 }

mpegInputTSLock OBJECT-TYPE
 SYNTAX INTEGER {
 locked(1),
 notLocked(2),
 intermittent(3),
 notMonitored(4)
 }
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"Indicates the lock status of the transport stream.

'intermittent' means the transport stream is transitioning between lock and unlock state over a period of time. This condition is vendor-specific.

'notMonitored' means the device is not tracking the locking state."

::= { mpegInputTSEntry 17 }

mpegInputProgTable OBJECT-TYPE

SYNTAX SEQUENCE OF MpegInputProgEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The table describing the PSI of each incoming program."

::= { mpegDigitalInputs 3 }

mpegInputProgEntry OBJECT-TYPE

SYNTAX MpegInputProgEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry specifies the parameters for each incoming program."

```
INDEX {
    mpegInputTSIndex,
    mpegInputProgIndex
}
```

::= { mpegInputProgTable 1 }

MpegInputProgEntry ::= SEQUENCE {

mpegInputProgIndex

Unsigned32,

mpegInputProgNo

Unsigned32,

mpegInputProgPmtVersion

Unsigned32,

mpegInputProgPmtPid

HePIDValue,

mpegInputProgPcrPid

HePIDValue,

mpegInputProgEcmPid

HePIDValue,

mpegInputProgNumElems

Unsigned32,

mpegInputProgNumEcms

Unsigned32,

mpegInputProgCaDescr

OCTET STRING,

mpegInputProgScte35Descr

OCTET STRING,

mpegInputProgScte18Descr

OCTET STRING

}

mpegInputProgIndex OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This object serves as the third index of this mib table. The index should uniquely identify a program given a transport stream index. In other words, it's unique within same transport stream."

::= { mpegInputProgEntry 1 }

mpegInputProgNo OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the identifier of the program present in the transport stream of the incoming video stream. This information is contained in PAT table."

::= { mpegInputProgEntry 2 }

mpegInputProgPmtVersion OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the PMT version of the program. It is a 5-bit unsigned integer. The default value of 0 means input program PMT version is no supported."

DEFVAL { 0 }

::= { mpegInputProgEntry 3 }

mpegInputProgPmtPid OBJECT-TYPE

SYNTAX HePIDValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"PMT PID of the program."

::= { mpegInputProgEntry 4 }

mpegInputProgPcrPid OBJECT-TYPE

SYNTAX HePIDValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"PCR PID of the program."

::= { mpegInputProgEntry 5 }

mpegInputProgEcmPid OBJECT-TYPE

SYNTAX HePIDValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the ECM PID of the program."

::= { mpegInputProgEntry 6 }

mpegInputProgNumElems OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current