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SCOPE
This document is identical to SCTE 85-4 2009 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 MIB definitions for HMS optical switch equipment present in the headend (or indoor) and is supported by a SNMP agent.

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NORMATIVE REFERENCE
IETF RFC 1907 SNMPv2-MIB
IETF RFC 2578 SNMPv2-SMI
IETF RFC 2579 SNMPv2-TC
IETF RFC 2580 SNMPv2-CONF
IETF RFC 2737 ENTITY-MIB
SCTE 36 SCTE-ROOT
SCTE 37 SCTE-HMS-ROOTS
SCTE 38-11 SCTE-HMS-HEADENDIDENT-MIB
SCTE 83-1 SCTE-HMS-HE-OPTIC-MIB
SCTE 38-1 SCTE-HMS-HE-PROPERTY-MIB
SCTE 84-1 SCTE-HMS-HE-COMMON-MIB

INFORMATIVE REFERENCE
None

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-HE-OPTICAL-SWITCH-MIB. It follows the IETF Simple Network Management Protocol (SNMP) for defining managed objects.

The syntax is given below.
SCTE-HMS-HE-OPTICAL-SWITCH-MIB DEFINITIONS ::= BEGIN

IMPORTS
  MODULE-COMPLIANCE, OBJECT-GROUP
  FROM SNMPv2-CONF
  OBJECT-TYPE, MODULE-IDENTITY, Unsigned32, Integer32
  FROM SNMPv2-SMI
  DisplayString
  FROM SNMPv2-TC
  entPhysicalIndex
  FROM ENTITY-MIB
  HeFaultStatus, HeHundredthNanoMeter,
  HeTenthdB, HeTenthdBm, HeOnOffControl
  FROM SCTE-HMS-HEADENDIDENT-MIB
  heOpticalSwitchGroup
  FROM SCTE-HMS-HE-OPTICS-MIB;

heOpticalSwitchMIB MODULE-IDENTITY
LAST-UPDATED "200310090000Z" -- Oct 9, 2003
ORGANIZATION "SCTE HMS Working Group"
CONTACT-INFO
  "SCTE HMS Subcommittee, Chairman
  mailto: standards@SCTE.org"

DESCRIPTION
  "The MIB module for the HMS HE Optical Switch module
  entities.

  This MIB module is for representing optical
  switch equipment present in the headend (or indoor)
  and is supported by an SNMP agent.

  This MIB is limited in its scope and intended to
  describe an A-B (2 input and 1 output) or a crossbar
  optical switch. Up to 2 optical inputs and 2 outputs
  are supported. Any devices with more than 2 optical
  inputs or outputs shall be covered by another MIB.

  This MIB does not intend to dictate all of the nuances
  involved in changing control settings (automatic or
  manual mode, changing switch controls in each possible
  mode combination). The most common desired behaviors
  are noted but specific switch operation and behavior
  are left to the optical switch vendors.

  Not all control enumerations must be supported. This
  is noted in the variables that have optional
  enumerations.

  Refer to the associated notes for information on what
  SNMP responses should be returned for unsupported
  enumerations."

 ::= { heOpticalSwitchGroup 1 }
heOpSwitchMIBObjects OBJECT IDENTIFIER ::= { heOpticalSwitchMIB 1}

-- Every optical switch is modeled by the tables presented
-- in this MIB module. These tables extend the entPhysicalTable
-- according to RFC 2737. The extension index entPhysicalIndex uniquely
-- identifies the optical switch.

-- Every optical switch is also modeled by the following tables:
--  entPhysicalEntry - 1 row; (defined in document: RFC2737)
--  heCommonEntry    - 1 row. (defined in document: HMS111)

-- Every optical switch module will have its alarms modeled by the table:
--  propertyEntry - x rows; (defined in document: HMS026)
--  by the optical switch

-- discretePropertyEntry - y rows; (defined in document: HMS026)
-- the optical switch

-- Every optical switch module will have a list of currently active
-- alarms modeled by the table:
--  currentAlarmEntry - z rows; (defined in document: HMS026)
-- switch

-- Thus, an A-B optical switch (2 optical inputs and one optical output)
-- will be represented by one row in entPhysicalTable, one row in
-- heCommonTable, one row in heOpSwitchUnitTable, two rows in
-- heOpSwitchInputTable and one row in heOpSwitchOutputTable.

-- Additionally, a crossbar optical switch (2 inputs and 2 outputs)
-- will be represented by one row in entPhysicalTable, one row in
-- heCommonTable, one row in heOpSwitchUnitTable, two rows
-- in heOpSwitchInputTable and two rows in heOpSwitchOutputTable.

-- Correlation of outputs and inputs are indicated by the heOpSwitchState
-- variable. Correlation of physical inputs and outputs to
-- heOpSwitchInputTable and heOpSwitchOutputTables rows is indicated
-- by the heOpSwitchInputDescription and heOpSwitchOutputDescription
-- variables.

-- the Optical Switch Unit Table
heOpSwitchUnitTable OBJECT-TYPE
SYNTAX      SEQUENCE OF HeOpSwitchUnitEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
   "A table containing information about Optical Switch used
   in an indoor environment."
::= { heOpSwitchMIBObjects 1 }
SYNTAX     HeOpSwitchUnitEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
    "List of information about each optical switch."
INDEX { entPhysicalIndex }
 ::= { heOpSwitchUnitTable 1 }

HeOpSwitchUnitEntry ::= SEQUENCE {
  heOpSwitchMode      INTEGER,
  heOpSwitchControl                   INTEGER,
  heOpSwitchRevertEnable             HeOnOffControl,
  heOpSwitchState                     INTEGER,
  heOpSwitchFailoverStatus            HeFaultStatus,
  heOpSwitchBothInputStatus           HeFaultStatus,
  heOpSwitchSelectWavelength   HeHundredthNanoMeter,
  heOpSwitchHysteresis               HeTenthdB,
  heOpSwitchWaitToRestoreTime         Integer32
}

heOpSwitchMode OBJECT-TYPE
SYNTAX     INTEGER {
  automatic(1),
  manual(2)
}
MAX-ACCESS    read-write
STATUS     current
DESCRIPTION
    "This controls and/or reports the switching mode.  If
      automatic(1), the optical switch will evaluate the optical
      input status and make the decision to affect the switch state.
      If set to manual(2), the optical switch will not affect the
      switch state itself."

 ::= { heOpSwitchUnitEntry 1 }

heOpSwitchControl OBJECT-TYPE
SYNTAX     INTEGER {
  pathA(1),
  pathB(2),
  cross(3),
  bar(4),
  bothA(5),
  bothB(6)
}
MAX-ACCESS    read-write
STATUS     current
DESCRIPTION
    "Sets the intended state of the Optical Switch. The effect
of this control will depend on the value of heOpSwitchMode.
If heOpSwitchMode is set to automatic, the value this
control is set to will be the preferred setting. If it is
set to manual, the switch will assume this setting. Actual
switch operation while changing switch control value(s)
is up to the equipment vendor. For example, if the switch
is in manual mode and the operator tries to connect the output to an invalid input, the switch may or may not change state.

Not all enumerations must be supported. For example, an A-B optical switch may support only the pathA and pathB enumerations while a cross-bar switch may support cross, bar, bothA or bothB or only cross and bar but not pathA and pathB enumerations. See the note below about the expected SNMP response.

A value pathA(1) connects the switch output to side A (first input) of the switch. This enumeration is intended for use by an A-B switch.

A value pathB(2) connects the switch output to side B (second input) of the switch. This enumeration is intended for use by an A-B switch.

A value cross(3) connects the switch outputs to the inputs as follows:
- Side A (first or primary) output is connected to side B (second or alternate) input.
- Side B (second or alternate) output is connected to side A (first or primary) input.
This enumeration is intended for use by a cross-bar switch.

A value bar(4) connects the switch outputs to the inputs as follows:
- Side A (first or primary) output is connected to side A (first or primary) input.
- Side B (second or alternate) output is connected to side B (second or alternate) input.
This enumeration is intended for use by a cross-bar switch.

A value bothA(5) connects the switch outputs to the inputs as follows:
- Side A (first or primary) output is connected to side A (first or primary) input.
- Side B (second or alternate) output is connected to side A (first or primary) input.
This enumeration is intended for use by a cross-bar switch.

A value bothB(6) connects the switch outputs to the inputs as follows:
- Side A (first or primary) output is connected to side B (second or alternate) input.
- Side B (second or alternate) output is connected to side B (second or alternate) input.
This enumeration is intended for use by a cross-bar switch.

*** IMPORTANT ***
It is NOT required that an optical switch support all enumerations. A SET request for an unsupported value shall yield a badValue(3) error by an SNMPv1 agent or an inconsistentValue(12) by an SNMPv2 agent."
heOpSwitchRevertEnable OBJECT-TYPE
SYNTAX HeOnOffControl
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"This controls the use of revertive switching.

If set to on, the switch will attempt to go back to the preferred settings indicated by heOpSwitchControl if heOpSwitchMode is set to automatic, and the input status of the preferred input is normal. The switch will not attempt to revert to the settings indicated by heOpSwitchControl until heOpSwitchWaitToRestoreTime (if supported) has expired since the preferred input was restored to normal levels.

If set to off, the switch will not attempt to go back to the preferred settings indicated by heOpSwitchControl if heOpSwitchMode is set to automatic, and the input status of the preferred input is normal.
"

heOpSwitchState OBJECT-TYPE
SYNTAX INTEGER {
  pathA(1),
  pathB(2),
  cross(3),
  bar(4),
  bothA(5),
  bothB(6)
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Reports the state of the Optical Switch. Not all enumerations must be supported. For example, an A-B optical switch may support only the pathA and pathB enumerations while a cross-bar switch may support cross, bar, bothA or bothB or only cross and bar but not pathA and pathB enumerations.

A value pathA(1) indicates that the switch output is being fed by side A (first input) of the switch. This enumeration is intended for use by an A-B switch.

A value pathB(2) indicates that the switch output is being fed by side B (second input) of the switch. This enumeration is intended for use by an A-B switch."
A value cross(3) indicates that the switch outputs are fed as follows:
   Side A (first or primary) output is connected to side B (second or alternate) input.
   Side B (second or alternate) output is connected to side A (first or primary) input.
   This enumeration is intended for use by a cross-bar switch.

A value bar(4) indicates that the switch outputs are fed as follows:
   Side A (first or primary) output is connected to side A (first or primary) input.
   Side B (second or alternate) output is connected to side B (second or alternate) input.
   This enumeration is intended for use by a cross-bar switch.

A value bothA(5) indicates that the switch outputs are fed as follows:
   Side A (first or primary) output is connected to side A (first or primary) input.
   Side B (second or alternate) output is connected to side A (first or primary) input.
   This enumeration is intended for use by a cross-bar switch.

A value bothB(6) indicates that the switch outputs are fed as follows:
   Side A (first or primary) output is connected to side B (second or alternate) input.
   Side B (second or alternate) output is connected to side B (second or alternate) input.
   This enumeration is intended for use by a cross-bar switch.

::= { heOpSwitchUnitEntry 4 }

heOpSwitchFailoverStatus OBJECT-TYPE
SYNTAX  HeFaultStatus
MAX-ACCESS read-only
STATUS  current
DESCRIPTION
"The integral status of both inputs.

A value is fault(2), if current switch state heOpSwitchState is different than the preferred setting heOpSwitchControl, otherwise, it is normal(1).

This object must provide for the alarm management capabilities with a corresponding entry in the discretePropertyTable of SCTE-HMS-PROPERTY-MIB (HMS026).

An alarm shall be recorded as an entry in the currentAlarmTable of SCTE-HMS-PROPERTY-MIB (HMS026).

A log record shall be added as an entry in the heCommonLogTable.

An heCommonAlarmEvent notification shall be sent."
heOpSwitchBothInputStatus OBJECT-TYPE
SYNTAX HeFaultStatus
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The integral status of both inputs.
A value is fault(2), if both input levels are below
the nominal value; otherwise, it is normal(1).
This object must provide for the alarm management capabilities
with a corresponding entry in the discretePropertyTable of
SCTE-HMS-PROPERTY-MIB (HMS026).
An alarm shall be recorded as an entry in the currentAlarmTable
of SCTE-HMS-PROPERTY-MIB (HMS026).
A log record shall be added as an entry in the heCommonLogTable.
An heCommonAlarmEvent notification shall be sent."

heOpSwitchSelectWavelength OBJECT-TYPE
SYNTAX HeHundredthNanoMeter
UNITS "0.01 nm"
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"Wavelength feeding the particular input of the optical switch.
Typical values might be 131000 (1310 nm) and 155000 (1550 nm)."

heOpSwitchHysteresis OBJECT-TYPE
SYNTAX HeTenthdB (-20..20)
UNITS "0.1 dB"
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"Controls switch input hysteresis amount. The amount of hysteresis
used and the ability to change it is to be determined by
the vendor."

heOpSwitchWaitToRestoreTime OBJECT-TYPE
SYNTAX Integer32
UNITS "1 sec"
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"Controls hysteresis time in sec.
If in automatic switching mode and revert mode is enabled,
a switch back to the original side will be delayed for the time specified by this object.

 ::= { heOpSwitchUnitEntry 9 }

-- the Optical Switch Input Table
heOpSwitchInputTable OBJECT-TYPE
   SYNTAXSEQUENCE OF HeOpSwitchInputEntry
   MAX-ACCESS not-accessible
   STATUScurrent
   DESCRIPTION
      "A table containing information about each Optical Switch input used in an indoor environment."
 ::= { heOpSwitchMIBObjects 2 }

heOpSwitchInputEntry OBJECT-TYPE
   SYNTAX HeOpSwitchInputEntry
   MAX-ACCESS not-accessible
   STATUScurrent
   DESCRIPTION
      "List of information about each optical switch input."
   INDEX{entPhysicalIndex,heOpSwitchInputIndex}
 ::= { heOpSwitchInputTable 1 }

HeOpSwitchInputEntry ::= SEQUENCE
   {
      heOpSwitchInputIndexUnsigned32,
      heOpSwitchInputOpticalLevelHeTenthdBm,
      heOpSwitchSetInputPowerThresholdHeTenthdBm,
      heOpSwitchInputStatusHeFaultStatus,
      heOpSwitchInputDescriptionDisplayString
   }

heOpSwitchInputIndex OBJECT-TYPE
   SYNTAXUnsigned32
   MAX-ACCESSnot-accessible
   STATUScurrent
   DESCRIPTION
      "Index number corresponding to the Optical Input."
 ::= { heOpSwitchInputEntry 1 }

heOpSwitchInputOpticalLevel OBJECT-TYPE
   SYNTAXHeTenthdBm
   UNITS"0.1 dBm"
   MAX-ACCESSread-only
   STATUScurrent
   DESCRIPTION
      "The measured optical input power for the optical switch."
 ::= { heOpSwitchInputEntry 2 }

heOpSwitchSetInputPowerThreshold OBJECT-TYPE
   SYNTAXHeTenthdBm
   UNITS"0.1 dBm"
   MAX-ACCESSread-write
   STATUScurrent
DESCRIPTION
"Input power switchover point for this input."
::= { heOpSwitchInputEntry 3 }

heOpSwitchInputStatus OBJECT-TYPE
SYNTAX HeFaultStatus
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The integral status of the input.
A value is fault(2), if the input levels are not in
the nominal range; otherwise, it is normal(1).
This object must provide for the alarm management capabilities
with a corresponding entry in the discretePropertyTable of
SCTE-HMS-PROPERTY-MIB (HMS026).
An alarm shall be recorded as an entry in the currentAlarmTable
of SCTE-HMS-PROPERTY-MIB (HMS026).
A log record shall be added as an entry in the heCommonLogTable.
An heCommonAlarmEvent notification shall be sent."
::= { heOpSwitchInputEntry 4 }

heOpSwitchInputDescription OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..32))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"A description of the switch input. The description text is
to be determined by the equipment manufacturer. For example,
Input A or Side B."
::= { heOpSwitchInputEntry 5 }

-- the Optical Switch Output Table
heOpSwitchOutputTable OBJECT-TYPE
SYNTAX SEQUENCE OF HeOpSwitchOutputEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A table containing information about each Optical Switch
output used in an indoor environment."
::= { heOpSwitchMIBObjects 3 }

heOpSwitchOutputEntry OBJECT-TYPE
SYNTAX HeOpSwitchOutputEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"List of information about each optical switch output."
INDEX { entPhysicalIndex, heOpSwitchOutputIndex }
::= { heOpSwitchOutputTable 1 }

HeOpSwitchOutputEntry ::= SEQUENCE
{
    heOpSwitchOutputIndex Unsigned32,
    heOpSwitchOutputDescription DisplayString
}

heOpSwitchOutputIndex OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "Index number corresponding to the Optical Output."
::= { heOpSwitchOutputEntry 1 }

heOpSwitchOutputDescription OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..32))
MAX-ACCESS read-only
STATUS current
DESCRIPTION "A description of the switch output. The description text is
to be determined by the equipment manufacturer. For example,
Output A or Secondary Output."
::= { heOpSwitchOutputEntry 2 }

-- conformance information
heOpSwitchMIBConformance OBJECT IDENTIFIER ::= { heOpticalSwitchMIB 2 }

heOpSwitchMIBCompliances OBJECT IDENTIFIER ::= { heOpSwitchMIBConformance 1 }

heOpSwitchMIBGroups OBJECT IDENTIFIER ::= { heOpSwitchMIBConformance 2 }

heOpSwitchBasicCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION "The compliance statement for SNMP HMS Headend Optical
Switch entities which implement the SNMP
heOpticalSwitchMIB."

MODULE -- this module
MANDATORY-GROUPS { heOpSwitchUnitMandatoryGroup,
    heOpSwitchInputMandatoryGroup,
    heOpSwitchOutputMandatoryGroup
}
::= { heOpSwitchMIBCompliances 1 }

heOpSwitchUnitMandatoryGroup OBJECT-GROUP
OBJECTS {
    heOpSwitchMode,
    heOpSwitchControl,
    heOpSwitchState,
    heOpSwitchFailoverStatus
}
The main group defines `heOpSwitchUnitTable` objects which are mandatory to all indoor optical switch modules.

```plaintext
::= { heOpSwitchMIBGroups 1 }
```

**heOpSwitchInputMandatoryGroup** OBJECT-GROUP

```plaintext
OBJECTS {
  heOpSwitchInputStatus,
  heOpSwitchInputDescription
}
```

The main group defines `heOpSwitchInputTable` objects which are mandatory to all indoor optical switch modules.

```plaintext
::= { heOpSwitchMIBGroups 2 }
```

**heOpSwitchOutputMandatoryGroup** OBJECT-GROUP

```plaintext
OBJECTS {
  heOpSwitchOutputDescription
}
```

The main group defines `heOpSwitchOutputTable` objects which are mandatory to all indoor optical switch modules.

```plaintext
::= { heOpSwitchMIBGroups 3 }
```

**heOpSwitchUnitGroup** OBJECT-GROUP

```plaintext
OBJECTS {
  heOpSwitchRevertEnable,
  heOpSwitchBothInputStatus,
  heOpSwitchSelectWavelength,
  heOpSwitchHysteresis,
  heOpSwitchWaitToRestoreTime
}
```

The collection of `heOpSwitchUnitTable` objects which are used to represent the indoor optical switch module.

```plaintext
::= { heOpSwitchMIBGroups 4 }
```

**heOpSwitchInputElementGroup** OBJECT-GROUP

```plaintext
OBJECTS {
  heOpSwitchInputOpticalLevel,
  heOpSwitchSetInputPowerThreshold
}
```

The collection of `heOpSwitchInputTable` objects which are used to represent the indoor optical switch module.

```plaintext
::= { heOpSwitchMIBGroups 5 }
```