



***Society of Cable  
Telecommunications  
Engineers***

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**ENGINEERING COMMITTEE  
Data Standards Subcommittee**

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**AMERICAN NATIONAL STANDARD**

**ANSI/SCTE 141 2007**

**Operations Support System Interface  
for  
Modular Cable Modem Termination Systems**

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# Operations Support System Interface for Modular Cable Modem Termination Systems

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# 1 SCOPE

## 1.1 Introduction and Overview

This standard defines the Network Management requirements to support a Modular Cable Modem Termination System (M-CMTS) for headend components compliant to DOCSIS.

The M-CMTS architecture separates the traditional CMTS into two parts. The first part is the downstream physical (PHY) component (known as a DOCSIS EQAM) and the second part consists of the IP networking and DOCSIS MAC functions of the CMTS (known as the M-CMTS Core). This separation of a CMTS into EQAM and M-CMTS Core introduces three new protocol interfaces to DOCSIS-compliant headend systems.

- DOCSIS Timing Interface (DTI): Provides a frequency reference for M-CMTS Core and DOCSIS EQAM via direct connections to a DTI Server.
- Downstream External PHY Interface (DEPI): Controls the delivery of DOCSIS frames from the M-CMTS core to the EQAM devices.
- Edge Resource Management Interface (ERMI): Provides EQAM devices registration and control to the Edge Resource Management device with the purpose of sharing EQAM resources with video systems such as Video on Demand (VoD).

## 1.2 Purpose of standard

The purpose of this standard is to define the management requirements for the M-CMTS architecture that enables an effective operation of the M-CMTS components. In particular, this standard defines the configuration, monitoring and performance requirements of the M-CMTS Core, DOCSIS EQAMs and DTI Server for the Modular CMTS interfaces.

## 1.3 Modular CMTS Interface Standards

A list of the standards in the Modular CMTS Interface Standards family is provided below.

{Editor's Note: These must all be updated to the appropriate SCTE standard reference when available}

*Table 1-1 - M-CMTS Interface standards*

Designation	Title
SCTE 137-2 2007	DOCSIS Downstream External PHY Interface for Modular
SCTE 137-1 2007	DOCSIS Timing Interface for Cable Modem Termination Systems
SCTE 139 2007	Edge Resource Manager Interface for Modular Cable Modem Termination Systems
SCTE 141 2007	Operations Support System Interface for Modular Cable Modem Termination Systems

## 1.4 Organization of document

This standard is organized in two parts: the first part describes the overall management mandatory requirements for M-CMTS modules based on the M-CMTS interfaces requirements. The second is the Annexes section, which contains the mandatory Management Objects and MIB objects definitions for compliant equipment.

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## 2 REFERENCES

All references are subject to revision; users of this specification are therefore encouraged to investigate the possibility of applying the most recent edition of the standards and other references listed below.

### 2.1 Normative References

{Editor's note: The references to DSS draft documents should be changed to SCTE references when available and IETF drafts to RFCs}

- [SCTE 137-2 ] DOCSIS Downstream External PHY Interface for Modular, 2007.
- [SCTE 133] Downstream RF Interface for Cable Modem Termination Systems, 2007.
- [SCTE 137-1] DOCSIS Timing Interface for Cable Modem Termination Systems, 2007.
- [SCTE 139] Edge Resource Manager Interface for Modular Cable Modem Termination Systems, 2007.
- [IETF1] Raftus David, Goren Aviv, Proposed Standard RFC version of Radio Frequency (RF) Interface, draft-ietf-ipcdn-docs-rfmibv2-05.txt.
- [IETF2] IETF RFC 4133 Entity MIB (Version 3). A. Bierman, K. McCloghrie. August 2005.
- [OSSI2.0] ANSI/SCTE 79-2 2007 DOCS 2.0 Operations Support System Interface
- [RFC 2011] IETF RFC 2011, Category: Standards Track SNMPv2 Management Information Base for the Internet Protocol using SMIV2, November 1996.
- [RFC 2669] IETF RFC 2669, DOCSIS Cable Device MIB Cable Device Management Information Base for DOCSIS compliant Cable Modems and Cable Modem Termination Systems, August 1999.
- [RFC 2863] IETF RFC 2853, The Interfaces Group MIB, June 2000.
- [RFC 3371] IETF RFC 3371, L2TPv3 Extensions Working Group, Layer Two Tunneling Protocol 'L2TP' Management Information Base, August 2002.
- [RFC 3410] IETF RFC 3410, Introduction and Applicability Statements for Internet-Standard Management Framework, December 2002.
- [RFC 3411] IETF RFC 3411 / STD0062, An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks, December 2002.
- [RFC 3412] IETF RFC 3412 / STD0062, Message Processing and Dispatching for the Simple Network Management Protocol (SNMP), December 2002.
- [RFC 3413] IETF RFC 3413 / STD0062, Simple Network Management Protocol (SNMP) Applications, December 2002.
- [RFC 3414] IETF RFC 3414 / STD0062, User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3), December 2002.
- [RFC 3415] IETF RFC 3415 / STD0062, View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP), December 2002.
- [RFC 3418] IETF RFC 3418 / STD0062, Management Information Base (MIB) for the Simple Network Management Protocol (SNMP), December 2002.
- [RFC 3584] IETF RFC 3584 / BCP0074, Coexistence between Version 1, Version 2, and Version 3 of the Internet-Standard and Network Management Framework, August 2003.
- [RFC 3931] IETF RFC 3931, Layer Two Tunneling Protocol - Version 3 (L2TPv3), March 2005.

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## 2.2 Informative References

- [PW-MIB] IETF draft-ietf-pwe3-pw-mib-06.txt, Zelig, D., Nadeau, T., Pseudo Wire (PW) Management Information Base, July 2005.
- [RFC 2661] IETF RFC 2661, Layer Two Tunneling Protocol "L2TP", August 1999.
- [RFC 4087] IETF RFC 4087 IP Tunnel MIB, June 2005.

## 2.3 Reference Acquisition

- Cable Television Laboratories, <http://www.cablemodem.com/specifications/>
- Internet Engineering Task Force (IETF) <http://www.ietf.org/>

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### 3 TERMS AND DEFINITIONS

This standard uses the following terms and definitions:

<b>Cable Modem (CM)</b>	A modulator-demodulator at subscriber locations intended for use in conveying data communications on a cable television system.
<b>CDN</b>	L2TPv3 Call-Disconnect-Notify message.
<b>Converged Interconnect Network</b>	The network (generally gigabit Ethernet) that connects an M-CMTS Core to an EQAM.
<b>Customer Premises Equipment (CPE)</b>	Equipment at the end user's premises; may be provided by the service provider.
<b>Data Rate</b>	Throughput, data transmitted in units of time usually in bits per second (bps).
<b>Decibels (dB)</b>	Ratio of two power levels expressed mathematically as $dB = 10\log_{10}(P_{OUT}/P_{IN})$ .
<b>Decibel-Millivolt (dBmV)</b>	Unit of RF power expressed in decibels relative to 1 millivolt over 75 ohms, where $dBmV = 20\log_{10}(\text{value in mV}/1 \text{ mV})$ .
<b>DOCSIS-MPT (D-MPT)</b>	DOCSIS MPT Mode.
<b>Downstream (DS)</b>	<ol style="list-style-type: none"><li>1. Transmissions from CMTS to CM. This includes transmission from the M-CMTS Core to the EQAM as well as the RF transmissions from the EQAM to the CM.</li><li>2. RF spectrum used to transmit signals from a cable operator's headend or hub site to subscriber locations.</li></ol>
<b>DTI Client</b>	The receiver of the Timing signal from the DTI Server. Through the DTI protocol DTI clients have the same time reference.
<b>DTI Server</b>	Timing Signal generator for a DTI client of the point to point DOCSIS Timing Interface (DTI).
<b>edgeQAM modulator (EQAM)</b>	A headend or hub device that receives packets of digital video or data. It re-packetizes the video or data into an MPEG transport stream and digitally modulates the digital transport stream onto a downstream RF carrier using quadrature amplitude modulation (QAM).
<b>Electronic Industries Alliance (EIA)</b>	A voluntary body of manufacturers, which, among other activities, prepares and publishes standards.
<b>Flow</b>	A stream of packets in DEPI used to transport data of a certain priority from the M-CMTS Core to a particular QAM channel of the EQAM. In PSP operation, there can exist several flows per QAM channel.
<b>Gigahertz (GHz)</b>	A unit of frequency; 1,000,000,000 or $10^9$ Hz.
<b>GigE (GE)</b>	Gigabit Ethernet (1 Gbps).
<b>GPSSEC</b>	The timestamp used for GPS systems. This timestamp is a 32-bit counter that increments every second and uses as initialization reference January 6, 1980.
<b>Hertz (Hz)</b>	A unit of frequency; formerly cycles per second.
<b>Hybrid Fiber/Coax (HFC) System</b>	A broadband bidirectional shared-media transmission system using optical fiber trunks between the headend and the fiber nodes, and coaxial cable distribution from the fiber nodes to the customer locations.
<b>ICCN</b>	L2TPv3 Incoming-Call-Connected message.
<b>ICRP</b>	L2TPv3 Incoming-Call-Reply message.

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<b>ICRQ</b>	L2TPv3 Incoming-Call-Request message.
<b>Internet Engineering Task Force (IETF)</b>	A body responsible for, among other things, developing standards used in the Internet.
<b>Internet Protocol (IP)</b>	An Internet network-layer protocol.
<b>IPv4</b>	Internet Protocol version 4.
<b>kilohertz (kHz)</b>	Unit of frequency; 1,000 or $10^3$ Hz; formerly kilocycles per second.
<b>L2TP Attribute Value Pair (AVP)</b>	The L2TP variable-length concatenation of a unique Attribute (represented by an integer), a length field, and a Value containing the actual value identified by the attribute.
<b>L2TP Control Connection</b>	An L2TP control connection is a reliable control channel that is used to establish, maintain, and release individual L2TP sessions as well as the control connection itself.
<b>L2TP Control Connection Endpoint (LCCE)</b>	An L2TP node that exists at either end of an L2TP control connection. May also be referred to as an LAC or LNS, depending on whether tunneled frames are processed at the data link (LAC) or network layer (LNS).
<b>L2TP Control Connection ID</b>	The Control Connection ID field contains the identifier for the control connection, a 32-bit value. The Assigned Control Connection ID AVP, Attribute Type 61, contains the ID being assigned to this control connection by the sender. The Control Connection ID specified in the AVP must be included in the Control Connection ID field of all control packets sent to the peer for the lifetime of the control connection. Because a Control Connection ID value of 0 is used in this special manner, the zero value must not be sent as an Assigned Control Connection ID value.
<b>L2TP Control Message</b>	An L2TP message used by the control connection.
<b>L2TP Data Message</b>	L2TP message used by the data channel.
<b>L2TP Endpoint</b>	A node that acts as one side of an L2TP tunnel.
<b>L2TP Network Server (LNS)</b>	If a given L2TP session is terminated at the L2TP node and the encapsulated network layer (L3) packet processed on a virtual interface, we refer to this L2TP node as an L2TP Network Server (LNS). A given LCCE may act as both an LNS for some sessions and an LAC for others, so these terms must only be used within the context of a given set of sessions unless the LCCE is in fact single purpose for a given topology.
<b>L2TP Pseudowire (PW)</b>	An emulated circuit as it traverses a PSN. There is one Pseudowire per L2TP Session.
<b>L2TP Pseudowire Type</b>	The payload type being carried within an L2TP session. Examples include PPP, Ethernet, and Frame Relay.
<b>L2TP Session</b>	An L2TP session is the entity that is created between two LCCEs in order to exchange parameters for and maintain an emulated L2 connection. Multiple sessions may be associated with a single Control Connection.

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<b>L2TP Session ID</b>	A 32-bit field containing a non-zero identifier for a session. L2TP sessions are named by identifiers that have local significance only. That is, the same logical session will be given different Session IDs by each end of the control connection for the life of the session. When the L2TP control connection is used for session establishment, session IDs are selected and exchanged as Local Session ID AVPs during the creation of a session. The Session ID alone provides the necessary context for all further packet processing, including the presence, size, and value of the Cookie, the type of L2-Specific Sublayer, and the type of payload being tunneled.
<b>MAC Domain</b>	A grouping of layer 2 devices that can communicate with each other without using bridging or routing. In DOCSIS is the group of CMs that are using upstream and downstream channels linked together through a MAC forwarding entity.
<b>Media Access Control (MAC)</b>	Used to refer to the layer 2 element of the system which would include DOCSIS framing and signaling.
<b>Megahertz (MHz)</b>	A unit of frequency; 1,000,000 or $10^6$ Hz; formerly megacycles per second.
<b>Microsecond (<math>\mu</math>s)</b>	$10^{-6}$ second.
<b>Millisecond (ms)</b>	$10^{-3}$ second.
<b>M/N</b>	Relationship of integer numbers M,N that represents the ratio of the downstream symbol clock rate to the DOCSIS master clock rate.
<b>MPT</b>	MPEG-TS mode of DEPI.
<b>Multiple System Operator (MSO)</b>	A corporate entity that owns and/or operates more than one cable system.
<b>Nanosecond (ns)</b>	$10^{-9}$ second.
<b>QAM channel (QAM ch)</b>	Analog RF channel that uses quadrature amplitude modulation (QAM) to convey information.
<b>Quadrature Amplitude Modulation (QAM)</b>	A modulation technique in which an analog signal's amplitude and phase vary to convey information, such as digital data.
<b>Radio Frequency (RF)</b>	In cable television systems, this refers to electromagnetic signals in the range 5 to 1000 MHz.
<b>Radio Frequency Interface (RFI)</b>	Term encompassing the downstream and the upstream radio frequency interfaces.
<b>Request For Comments (RFC)</b>	A technical policy document of the IETF; these documents can be accessed on the World Wide Web at <a href="http://www.rfc-editor.org/">http://www.rfc-editor.org/</a> .
<b>SCCRN</b>	L2TPv3 Start-Control-Connection-Connected message.
<b>SCCRP</b>	L2TPv3 Start-Control-Connection-Reply message.
<b>SCCRQ</b>	L2TPv3 Start-Control-Connection-Request message.
<b>Session</b>	An L2TP data plane connection from the M-CMTS Core to the QAM channel. There must be one session per QAM Channel. There is one DEPI pseudowire type per session. There may be multiple MPT flows and multiple PSP flows per session. Multiple sessions may be bound to a single control connection.
<b>SLI</b>	L2TPv3 Set Link Info message.
<b>StopCCN</b>	L2TPv3 Stop-Control-Connection-Notification message.
<b>Upstream (US)</b>	<ol style="list-style-type: none"> <li>1. Transmissions from CM to CMTS. This includes transmission from the EQAM to M-CMTS Core as well as the RF transmissions from the CM to the EQAM.</li> <li>2. RF spectrum used to transmit signals from a subscriber location to a cable operator's headend or hub site.</li> </ol>

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**Upstream  
Channel  
Descriptor (UCD)**

The MAC Management Message used to communicate the characteristics of the upstream physical layer to the cable modems.

**Video on Demand  
(VoD) System**

System that enables individuals to select and watch video content over a network through an interactive television system.

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## 4 ABBREVIATIONS, ACRONYMS AND CONVENTIONS

### 4.1 Abbreviations and Acronyms

This standard uses the following abbreviations and acronyms:

<b>CIN</b>	Converged Interconnect Network
<b>CMCI</b>	Cable Modem CPE Interface
<b>CMTS</b>	Cable Modem Termination System
<b>CRC</b>	Cyclic Redundancy Check
<b>DEPI</b>	Downstream External-PHY Interface
<b>DOCSIS</b>	Data-Over-Cable Service Interface Specifications
<b>DRFI</b>	Downstream Radio Frequency Interface
<b>DSCP</b>	Differentiated Services Code Point
<b>DTI</b>	DOCSIS Timing Interface
<b>ERM</b>	Edge Resource Manager
<b>ERMI</b>	Edge Resource Manager Interface
<b>Gbps</b>	Gigabits per second
<b>GPS</b>	Global Positioning System
<b>ITU</b>	International Telecommunications Union
<b>ITU-T</b>	Telecommunication Standardization Sector of the International Telecommunication Union
<b>Kbps</b>	Kilobits per second
<b>LSB</b>	Least Significant Bit
<b>Mbps</b>	Megabits per second
<b>M-CMTS</b>	Modular Cable Modem Termination System
<b>MIB</b>	Management Information Base
<b>MPEG</b>	Moving Picture Experts Group
<b>MPEG-TS</b>	Moving Picture Experts Group Transport Stream
<b>MSB</b>	Most Significant Bit
<b>OSSI</b>	Operations System Support Interface
<b>PHY</b>	Physical Layer
<b>PSP</b>	Packet-Streaming-Protocol
<b>S-CDMA</b>	Synchronous Code Division Multiple Access
<b>SNMP</b>	Simple Network Management Protocol
<b>TBD</b>	To Be Determined (or To Be Deferred)
<b>TSID</b>	MPEG2 Transport Stream ID
<b>ToD</b>	Time of Day
<b>UDP</b>	User Datagram Protocol

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## 4.2 Conventions

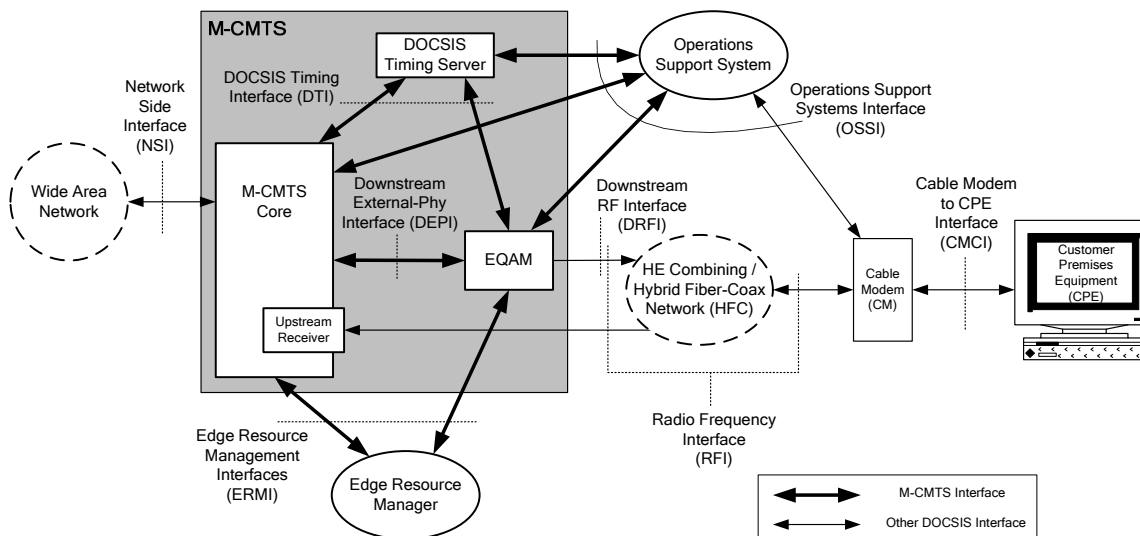
Throughout this standard, the words that are used to define the significance of particular requirements are capitalized. These words are:

- |              |   |
|--------------|---|
| "MUST"       | This word means that the item is an absolute requirement of this standard.  |
| "MUST NOT"   | This phrase means that the item is an absolute prohibition of this standard.  |
| "SHOULD"     | This word means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighed before choosing a different course.   |
| "SHOULD NOT" | This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label. |
| "MAY"        | This word means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.  |

## 5 TECHNICAL OVERVIEW

### 5.1 Introduction and Overview

This Section is informative.



*Figure 5-1 - Modular CMTS Reference Architecture*

Figure 5-1 depicts the Modular CMTS architecture on which the traditional CMTS system is divided into: the M-CMTS core and the EQAM device. The M-CMTS Core contains all the traditional DOCSIS CMTS functions, including MAC timing and framing, packet classification, service flow management, and security. The EQAM device performs the RF transmission functions such as modulation and frequency up-conversion for the transmission of Data packets over the HFC. The M-CMTS architecture includes a DOCSIS Timing server to maintain a consistent timing reference between the M-CMTS core and EQAM, as well as to mitigate the propagation delay differences of these two components. The DOCSIS Timing Interface (DTI) runs between the DTI Server and the M-CMTS and EQAM devices, and is known as the DTI clients.

The EQAM device, as specified by the DOCSIS M-CMTS Interface specifications, is an adaptation of the Video QAM devices used for VoD service. To optimize the resource allocation of DOCSIS QAM channels for DOCSIS and VoD services, the M-CMTS architecture defines a Resource Manager to control the reservation of those QAM (Edge) resources. The Edge Resource Manager (ERM) provides reliable and optimized access to EQAM device resources. The ERM interface is designed to manage the resource allocation of various EQAM resources for DOCSIS and VoD activities. In addition, the EQAM device supports a Registration Interface to ERM with the purpose of maintaining an accurate inventory of resources availability in the EQAM devices.

In the absence of ERM, or in a transition from VOD EQAMs only to VOD and DOCSIS QAMs, the M-CMTS architecture offers the option to configure and allocate EQAM resources via the M-CMTS core by using the Downstream External PHY Interface (DEPI). DEPI is basically a Layer 2 encapsulation of the DOCSIS traffic for the purpose of transport from the M-CMTS core to the EQAM device.

The DRFI is defined by the M-CMTS architecture for the purpose of gathering all the RF specification requirements from DOCSIS into a standalone specification to be referenced in the future for Modular or integrated CMTS implementations.

Complete details of the M-CMTS interfaces are within their respective standards, and referenced in Section 1.3.

The Operations Support Systems requirements of the M-CMTS architecture consist of the Management Information Base (MIB), residing in the M-CMTS modules such as M-CMTS core, EQAM device and DTI Server, with the

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purpose of providing configuration, monitoring, and troubleshooting management functions of the M-CMTS interface specifications.

## **5.2 M-CMTS Core Management Requirements Overview**

The M-CMTS Core Management requirements are of two types:

- M-CMTS Core MUST support standard OSSI CMTS requirements, as specified in [OSSI2.0]
- M-CMTS Core MUST support the M-CMTS OSS requirements defined by this standard.

For M-CMTS Core-compliant devices, conflicts of M-CMTS OSSI requirements and OSSI CMTS requirements are resolved by the prevailing M-CMTS OSSI requirements. The M-CMTS Core compliant device MUST support M-CMTS OSSI requirements over OSSI CMTS requirements in case those requirements are in conflict.

M-CMTS OSSI requirements for the M-CMTS Core are summarized below:

- Requirements for Downstream RF Interface Specification [SCTE 133]
- Requirements for DOCSIS External PHY Interface [SCTE 137-2 ]
- Requirements for DOCSIS Timing Interface [SCTE 137-1]

## **5.3 EQAM device Management Requirements Overview**

The management requirements for the EQAM-compliant device are specified in this standard and summarized as:

- Requirements for Downstream RF Interface Specification [SCTE 133]
- Requirements for DOCSIS External PHY Interface [SCTE 137-2 ]
- Requirements for DOCSIS Timing Interface [SCTE 137-1]
- Requirements for Edge Resource Management Interface [
- SNMP and Management Information MIB requirements

## **5.4 DTI Server Management Requirements Overview**

The management requirements for the M-CMTS DTI Server-compliant device are specified in this standard and summarized as:

- Requirements for DOCSIS Timing Interface [SCTE 137-1]
- SNMP and Management Information MIB requirements

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## **6 SNMP PROTOCOL**

### **6.1 SNMP Mode for M-CMTS Core**

M-CMTS Core has no additional SNMP protocol requirements above those defined in the DOCSIS OSSI specifications.

### **6.2 SNMP Mode for EQAM**

The EQAM MUST support SNMPv3 as described by [RFC 3411] through [RFC 3415]. The EQAM MUST support SNMPv1 and SNMPv2c coexistence mode as described in [RFC 3584].

The EQAM is not required to support writable configuration via SNMP SETs, therefore EQAM MAY support creation, deletion or modification of SNMPv3 and [RFC 3584] configured parameters via SNMP.

If the EQAM does not provide SNMP write access to SNMPv3 and coexistence MIB objects configuration, the EQAM MUST provide alternative Management interfaces to do so.

### **6.3 SNMP Mode for DTI Server**

The DTI Server MUST support SNMPv3 as described by [RFC 3411] through [RFC 3415]. The DTI Server MUST support SNMPv1 and SNMPv2c coexistence mode as described in [RFC 3584].

The DTI Server is not required to support writable configuration via SNMP SETs; therefore, DTI Server MAY support creation, deletion or modification of SNMPv3 and [RFC 3584] configured parameters.

If the DTI Server does not provide SNMP write access to SNMPv3 and coexistence MIB objects configuration, the EQAM MUST provide alternative Management interfaces to do so.

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## 7 MANAGEMENT INFORMATION BASE (MIB)

This section defines the minimum set of managed objects required to be supported by M-CMTS entities.

The requirements described in this standard have priority over IETF-defined MIB modules. It includes MIB objects made mandatory in this standard, whereas the IETF standards may have defined them as deprecated, obsolete, or those with optional implementation compliances.

Unless otherwise indicated, IETF deprecated, obsolete, or optional MIB objects that are supported by the M-CMTS core **MUST** be implemented correctly according to the MIB module definition.

Unless otherwise indicated, IETF deprecated, obsolete, or optional MIB objects that are supported by the DTI Server **MUST** be implemented correctly according to the MIB module definition.

Unless otherwise indicated, IETF deprecated, obsolete, or optional MIB objects that are supported by the EQAM device **MUST** be implemented correctly according to the MIB module definition.

If an M-CMTS core device does not support a deprecated, obsolete, or optional MIB object, the device SNMP Agent **MUST NOT** instantiate the MIB object and **MUST** return the corresponding error code on SNMP PDU requests.

If a DTI Server does not support a deprecated, obsolete, or optional MIB object, the device SNMP Agent **MUST NOT** instantiate the MIB object and **MUST** return the corresponding error code on SNMP PDU requests.

If an EQAM device does not support a deprecated, obsolete, or optional MIB object, the device SNMP Agent **MUST NOT** instantiate the MIB object and **MUST** return the corresponding error code on SNMP PDU requests.

The following sections provide a detailed summary of the MIB modules applicability for M-CMTS components.

Specific requirements per component are detailed in Section 7.3 and Annex A, Annex C, and Annex D. For the case of M-CMTS Core, the requirements described in this standard are in addition and/or replacement of CMTS requirements outlined in the [OSSI2.0] specification.

### 7.1 IETF Drafts and CableLabs MIB Modules

*Table 7-1 - IETF Drafts and CableLabs MIB Modules*

Reference	MIB	Applicable Device(s)
[IETF1]	IETF Proposed Standard RFC-version of RF MIB, "draft-ietf-ipcdn-docs-rfmbv2-05.txt": DOCS-IF-MIB	EQAM
[IETF2]	IETF Proposed Standard RFC Entity MIB (Version 3), "draft-ietf-entmib-v3-07.txt". ENTITY-MIB	M-CMTS Core, EQAM and DTI Server
Annex C	DOCS-IF-M-CMTS-MIB	CMTS and EQAM
Annex D	DTI-MIB	M-CMTS core, EQAM and DTI Server

### 7.2 IETF RFC MIB Modules

*Table 7-2 - IETF RFC MIB Modules*

Reference	MIB	Applicable Device(s)
[RFC 2863]	The Interfaces Group MIB using SMIV2: IF-MIB	M-CMTS core, EQAM and DTI Server

Reference	MIB	Applicable Device(s)
[RFC 2669]	DOCSIS Cable Device MIB	EQAM and DTI Server
[RFC 3371]	Layer Two Tunneling Protocol "L2TP" Management Information Base RFC 3371, August 2002	M-CMTS Core and EQAM
[RFC 2011]	SNMPv2 Management Information Base for the Internet Protocol using SMIPv2: IP-MIB	EQAM and DTI Server
[RFC 3418]	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP): SNMPv2-MIB	EQAM and DTI Server
[RFC 3410] [RFC 3411] [RFC 3412] [RFC 3413] [RFC 3414] [RFC 3415] [RFC 3584]	SNMP v3 MIBs: SNMP-FRAMEWORK-MIB, SNMP-MPD-MIB, SNMP-NOTIFICATION-MIB, SNMP-TARGET-MIB, SNMP-USER-BASED-SM-MIB, SNMP-VIEW-BASED-ACM-MIB, SNMP-COMMUNITY-MIB	EQAM and DTI Server

### 7.3 Managed objects requirements

The following sections detail any additional implementation requirements for the MIB modules listed above. Refer to Annex A for specific object implementation requirements.

The M-CMTS Core, DTI Server and EQAM compliant devices MUST support a minimum of 10 available SNMP table rows unless otherwise specified by the corresponding IETF MIB Module document or the corresponding DOCSIS OSSI specification. The minimum number of available SNMP table rows SHOULD mean rows (per table) that are available to support device configuration. M-CMTS Core, DTI Server and EQAM MUST not count default or static preconfigured row entries as part of the minimum number of available SNMP table rows.

#### 7.3.1 Requirements for DOCS-IF-MIB

##### 7.3.1.1 DOCS-IF-MIB M-CMTS requirements

A compliant M-CMTS core MAY implement the table docsIfDownstreamChannelTable as read-only and defer the configuration aspects of M-CMTS Downstream interfaces to DOCS-IF-M-CMTS-MIB.

If a compliant M-CMTS core device supports write access to docsIfDownstreamChannelTable, in the event of a SET operation in one of the writable MIB Objects of this table, the M-CMTS Core MUST update the docsIfMCmtsDepiSessionConfigTable equivalent PHY Parameter and perform the L2TPv3 parameter update signaling from there. The M-CMTS core may reject the set parameter because the DEPI Control Table was signaled previously that a bit lock has been set for the particular PHY parameter. Thus, MCMTS MAY reject SNMP Sets to Downstream PHY parameters that were previously signaled as locked without the need to invoke the L2TPv3 request.

If a compliant M-CMTS core supports write access to docsIfDownstreamChannelTable, the M-CMTS Core MUST use the L2TPv3 connection control plane when instructed to set any writable MIB object in docsIfDownstreamTable. The M-CMTS MUST delay the SNMP PDU response to the SNMP requester entity until the L2TPv3 [RFC 3931] session returns the status of the execution of the SNMP request.

The M-CMTS MUST return the error "NotWritable" if the PHY parameter of the EQAM channel associated with the Downstream Interface is being reported as "locked" by the L2TPv3 Session.

If a compliant M-CMTS core supports write access to docsIfDownstreamChannelTable, the M-CMTS Core MUST return "CommitFailed" error for a SNMP SET, to any writable parameter in the docsIfDownstream Table of a Downstream Interface, with no L2TPv3 Session active.

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### 7.3.1.2 DOCS-IF-MIB EQAM requirements

The EQAM device MUST implement the conceptual table docsIfDownstreamTable, as indicated in Annex A.

The EQAM MUST report the transmit power in the MIB object docsIfDownChannelPower; within 2 dB of the actual transmit power.

### 7.3.2 Requirements for [RFC 2669]

The EQAM device MUST implement the docsDevEventGroup from [RFC 2669], as indicated in Annex A.

The DTI Server MUST implement the docsDevEventGroup from [RFC 2669], as indicated in Annex A.

### 7.3.3 Requirements for [RFC 2863]

The Interface MIB [RFC 2863] MUST be implemented by compliant M-CMTS Cores, DTI Server, and EQAM devices, as described in Annex A and B.1.

#### 7.3.3.1 Requirements for M-CMTS Core

##### 7.3.3.1.1 M-CMTS Core Interface Types

To represent the DOCSIS MAC service adaptation to the DEPI PW infrastructure, the logical interfaces M-CMTS Downstream Interface (docsCableMCmtsDownstream) is defined. The equivalent M-CMTS Upstream Interfaces (docsCableMCmtsUpstream) is defined as a term but not specified in the scope of this standard.

To guarantee backward compatibility with the DOCSIS OSSI Management framework and existing MIB Modules (see [OSSI2.0]), the logic association of the CMTS Physical interfaces, as well as the DOCSIS MAC interface IfStackTable hierarchy, is preserved. Table 7–3 shows the differences between the IfIndex for Integrated CMTS and M-CMTS Core implementations. Currently, IANA has not assigned these values, so in the interim period, IfType numbers for docsCableMCmtsDownstream and docsCableMCmtsUPstream Interfaces, in M-CMTS Compliant devices, MUST report 'other' for downstream Interface DOCSIS IfType.

*Table 7–3 - CMTS and M-CMTS Interfaces*

DOCSIS Interface	Integrated CMTS	Modular CMTS
CATV MAC interface	docsCableMacLayer (127)	docsCableMacLayer (127)
CATV downstream channel	docsCableDownstream (128)	docsCableMCmtsDownstream (ifType 229)
CATV upstream interface	docsCableUpStream (129)	docsCableMCmtsUpStream (ifType TBD) - out of scope -
CATV upstream logical channel	docsCableUpstreamChannel (205)	docsCableUpstreamChannel (205)

Figure 7–1 depicts the upstream interfaces attached to the M-CMTS Core. There is a possibility that in the future, upstream receivers would be external to the M-CMTS Core, but outside of the scope of this standard.

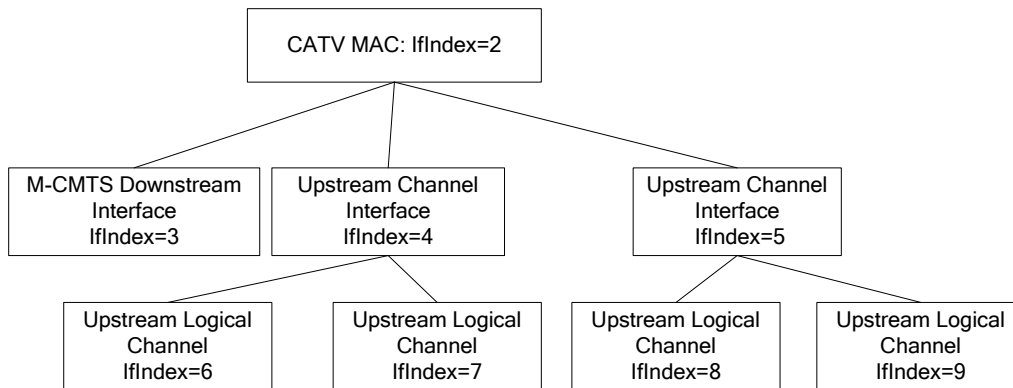
##### 7.3.3.1.2 Interface organization and numbering

A compliant M-CMTS Core device MUST have an instance of ifEntry for each M-CMTS Downstream Interface.

The M-CMTS Core compliant device MUST include entries in the ifStackTable [RFC 2863] to identify the stack relationships of the M-CMTS Downstream interfaces.

##### 7.3.3.1.3 M-CMTS Core Interface IfStackTable

The M-CMTS Core maintains a similar IfStackTable Structure to that defined in DOCSIS OSSI specifications. Figure 7–1 depicts an example of an M-CMTS Core Interface Stack. In Figure 7–1, the CATV interface has one M-CMTS DS Interface and two US interfaces, each one with two US logical channels.



Implementation of ifStackTable for this example:

ifStackHigherLayer	ifStackLowerLayer
0	2
2	3
2	4
2	5
3	0
4	6
4	7
5	8
5	9
6	0
7	0
8	0
9	0

Figure 7-1 - ifStackTable Example for M-CMTS Core

#### 7.3.3.1.4 M-CMTS Core DOCSIS Interface MIB Considerations

A compliant M-CMTS Core device MUST conform to the Interface requirements from Annex B.1 of this standard.

### 7.3.3.2 Requirements for EQAM

#### 7.3.3.2.1 EQAM Interface Types

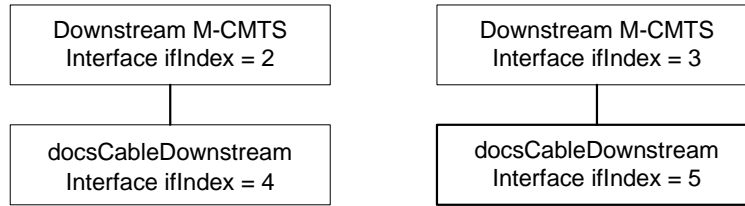
A compliant EQAM device MUST support the interface Type docsCableMCmtsDownstream for each QAM channel.

#### 7.3.3.2.2 Interface organization and numbering

A compliant EQAM device MUST have an instance of ifEntry for each M-CMTS Downstream Interface. The EQAM compliant device MUST include entries in the ifStackTable [RFC 2863] of the M-CMTS Downstream interfaces.

#### 7.3.3.2.3 EQAM Interface IfStackTable

A compliant EQAM device MUST model the docsCableMCmtsDownstream interfaces at the top of the interface stack with no sub-interfaces. Figure 7-2 depicts an example of the IfStackTable entries corresponding to two M-CMTS downstream Interfaces in the EQAM.



Implementation of ifStackTable for this example:

ifStackHigherLayer	ifStackLowerLayer
0	2
2	4
0	3
3	5
4	0
5	0

*Figure 7-2 - ifStackTable Example for EQAM*

#### 7.3.3.2.4 EQAM IF-MIB relation with ENTITY-MIB

See Section 7.3.9 ENTITY-MIB for details on the ENTITY-MIB relationship with IF-MIB.

### 7.3.3.3 DTI Interface Requirements

#### 7.3.3.3.1 DTI Server Interface Types

The DTI Server MUST support instances of ifEntry for all DTI interfaces. That is, interfaces connecting to the DTI root server and DTI clients.

A compliant M-CMTS Core device MUST support an instance of ifEntry for all the DTI client interfaces residing in the device.

A compliant EQAM device MUST support an instance of ifEntry for all the DTI client interfaces residing in the device.

A compliant M-CMTS Core device MUST set the ifType of DTI Interfaces to 'other', and MUST conform to the requirements defined in Annex D of this standard.

A compliant EQAM device MUST set the ifType of DTI Interfaces to 'other', and MUST conform to the requirements defined in Annex D of this standard.

A compliant DTI Server device MUST set the ifType of DTI Interfaces to 'other', and MUST conform to the requirements defined in Annex D of this standard.

#### 7.3.3.3.2 Interface organization and numbering

A compliant M-CMTS Core device MUST include entries in the ifStackTable [RFC 2863] for the DTI interfaces.

A compliant EQAM device MUST include entries in the ifStackTable [RFC 2863] for the DTI interfaces.

A compliant DTI Server device MUST include entries in the ifStackTable [RFC 2863] for the DTI interfaces.

#### 7.3.3.3.3 DTI Interface IfStackTable

Compliant DTI Server devices MUST implement the DTI interfaces at the top of the Interface stack with no sub-interfaces. Figure 7-3 depicts an example of the IfStackTable entries corresponding to two M-CMTS downstream Interfaces in the EQAM.

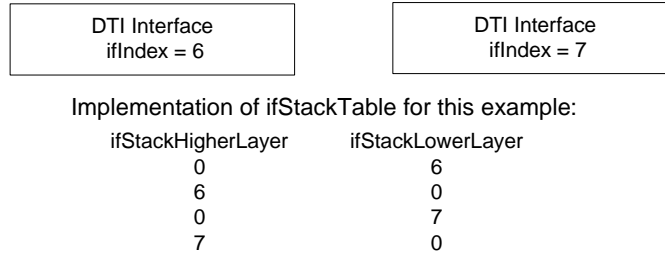


Figure 7-3 - ifStackTable Example for DTI Interfaces

7.3.3.3.4 EQAM IF-MIB relation with ENTITY-MIB

See Section 7.3.9 ENTITY-MIB for details on the ENTITY-MIB relationship with IF-MIB.

7.3.4 Requirements for [RFC 2011]

A compliant EQAM device MUST support ipNetToMediaTable and ipAddrTable from the ipGroup [RFC 2011]. The EQAM compliant device MAY support other objects of the ipGroup.

A compliant DTI Server MUST support the ipAddrTable from [RFC 2011].

A compliant DTI Server MAY support the ipNetToMediaTable [RFC 2011], although it is unnecessary as an IP Host. DTI has other mechanisms to discover the DTI network topology (see [SCTE 137-1]).

7.3.5 Requirements for [RFC 3418]

7.3.5.1 The System Group

The EQAM compliant device MUST support the systemGroup of [RFC 3418].

The DTI compliant device MUST support the systemGroup of [RFC 3418].

A compliant EQAM MUST conform to the requirements of the SysDescr MIB object, as shown in the table below:

Table 7-4 - DOCSIS-OSSI Requirements

Variable to report	Format
Hardware Version	HW_REV: <Hardware version>
Vendor Name	VENDOR: <Vendor name>
Boot ROM	BOOTR: <Boot ROM Version>
Software Version	SW_REV: <Software version>
Model Number	MODEL: <Model number>

Each type-value pair in Table 7-4 - DOCSIS-OSSI Requirements MUST be separated with a colon and blank space. Each pair is separated by a ";" followed by a blank space.

The values of the object sysDescr of the EQAM device MUST correspond to the related objects in entPhysicalEntry of the PhysicalClass module that contains the overall software control of the EQAM and other modules. (i.e., Physical Class 'chassis' or 'stack' in the ENTITY-MIB [IETF2].)

For example, a sysDescr of an EQAM vendor X, hardware version 5.2, Boot ROM version 1.4, SW version 2.2, and model number X would be reported as:

any text<<HW\_REV: 5.2; VENDOR: X; BOOTR: 1.4; SW\_REV 2.2; MODEL: X>>any text

7.3.5.2 The SNMP Group and Notification Group

Compliant EQAM and DTI Servers MUST support the MIB object snmpEnableAuthenTraps from the snmpGroup and the notifications coldStart and authenticationFailure from the snmpBasicNotificationsGroup of [RFC 3418].

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### 7.3.6 Requirements for DOCS-IF-M-CMTS-MIB

A compliant M-CMTS Core device MUST support the DOCS-IF-M-CMTS-MIB module as described in Annex A and Annex C.

A compliant EQAM device MUST support the DOCS-IF-M-CMTS-MIB module as described in Annex A and Annex C.

### 7.3.7 Requirements for DTI-MIB

A compliant M-CMTS Core device MUST support the DTI-MIB module as described in Annex D.

A compliant EQAM device MUST support the DTI-MIB module as described in Annex D.

A compliant DTI server device MUST support the DTI-MIB module as described in Annex D.

### 7.3.8 Requirements for [RFC 3371]

The M-CMTS Core MAY implement the groups in the L2TP-MIB.

#### 7.3.8.1 Relationship of DOCS-IF-M-CMTS-MIB and L2TP-MIB

The DOCS-IF-M-CMTS-MIB provides mechanisms for static configuration of DEPI L2TPv3 tunnels as well as providing status information on dynamic DEPI L2TPv3 sessions created by other means such as ERMI []. The MIB table docsIfMCmtsDepsessionConfigTable follows a similar structure of Pseudo Wire (PW) MIB [PW-MIB]. Therefore, the current L2TP-MIB [RFC 3371] reference to the TUNNEL-MIB [RFC 4087] is no longer needed.

The current L2TP-MIB is based on L2TP protocol [RFC 2661] and has not been updated for L2TPv3 Pseudowire framework. As a result, some information and capability developed for L2TPv3 has not been reflected in the MIB. Because of this, the use of the L2TP- MIB [RFC 3371] is not required for a compliant M-CMTS Core or EQAM.

### 7.3.9 Requirements for ENTITY-MIB

A compliant M-CMTS Core MAY implement the ENTITY-MIB module as described in Annex A. The formal requirements for the ENTITY-MIB module are in [IETF2].

A Compliant EQAM device MUST support the ENTITY-MIB objects as described in Annex A and [IETF2].

A Compliant DTI server device MUST support the ENTITY-MIB objects as described in Annex A and [IETF2].

In particular, the ENTITY-MIB requirements in Annex A include MIB objects from the Entity object groups entityGeneralGroup, entityMappingGroup, entityPhysicalGroup, entityPhysical2Group, and entityPhysical3Group.

Compliant QAM and DTI devices are not required to implement Logical Management Entities as defined in [IETF2] (e.g., to manage multiple EQAM chassis as logical entities). Therefore, support of MIB objects from entLogical2Group is not required.

A Compliant M-CMTS Core device MAY implement Logical Management Entities, in which case the entLogical2Group MUST be supported.

A Compliant EQAM device MAY implement Logical Management Entities, in which case the entLogical2Group MUST be supported.

A Compliant DTI Server device MAY implement Logical Management Entities, in which case the entLogical2Group MUST be supported.

#### 7.3.9.1 IfTable Interfaces and ENTITY MIB physical component

ENTITY-MIB mapping of physical components of Entity PhysicalClass 'port' and ifTable interfaces are completed through the entAliasMappingTable.

A simple example of this mapping is presented in Table 7–5. The example shows QAM channel PhysicalIndex = m to ifIndex = n mapping.

**Note:** entAliasLogicalIndexOrZero is set to zero to indicate "all" logical entities; including devices with only one Logical Management Entity.

*Table 7-5 - Entity Physical Index and IfIndex mapping*

<b>entAliasPhysicalIndex</b> QAM channel (PhysicalClass = 'port')	<b>entAliasLogicalIndexOrZero</b>	<b>entAliasMappingIdentifier</b>
m	0	ifIndex.n

**7.3.9.2 Implementation of ENTITY MIB for EQAM**

A compliant EQAM MUST assign the ENTITY-MIB PhysicalClass type of 'port' to QAM channels. A compliant EQAM device MUST assign RF Ports the PhysicalClass 'module'. Other Physical Class types such as 'stack', 'chassis', 'backplane', 'module', etc., are used as the ENTITY-MIB [IETF2] describes them.

A compliant EQAM device MUST map Ethernet interfaces and QAM channels (Physical entities of Entity PhysicalClass equals 'port') to ifEntry interfaces by means of entAliasMappingEntry with entAliasMappingIdentifier equal to the respective instance of ifIndex.

**7.3.9.3 Implementation of ENTITY MIB for DTI Server**

A compliant DTI Server MUST assign the ENTITY-MIB PhysicalClass type of 'port' to DTI ports for ports destined to RootServer and DTI Clients. Other Physical Class types such 'stack', 'chassis', 'backplane', and 'module', are used as ENTITY-MIB [IETF2] describes them.

**7.3.9.4 Implementation of ENTITY MIB for M-CMTS Core**

In order for a compliant M-CMTS Core to claim support of the DEPI control objects docsIfMCmtsDepiControlCableMacEntDescriptor and docsIfMCmtsDepiControlCableDownEntId, the M-CMTS Core MUST support the ENTITY-MIB Annex A. Specifically, the MIB objects from the Entity object groups: entityGeneralGroup, entityMappingGroup, entityPhysicalGroup, entityPhysical2Group and entityPhysical3Group, with the exception of entLPPhysicalIndex, which is needed if multiple Logical Management Entities, are supported.

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## **8 FAULT MANAGEMENT**

### **8.1 Event Notification and Control mechanisms**

A compliant EQAM device **MUST** support the Event notification requirements described in sections 7.4.2 and 7.4.3 of the DOCSIS OSSI specification [OSSI2.0].

A compliant DTI server device **MUST** support the Event notification requirements described in sections 7.4.2 and 7.4.3 of the DOCSIS OSSI specification [OSSI2.0].

A compliant EQAM device **MUST** support the event reporting mechanism defined for DOCSIS-compliant CMTS in [OSSI2.0].

A compliant DTI server device **MUST** support the event reporting mechanism defined for DOCSIS-compliant CMTS in [OSSI2.0].

A compliant EQAM device **MUST NOT** implement the CM provisioning described in section 7.4.2.3, "Standard DOCSIS events for CMs" in [OSSI2.0].

A compliant DTI Server device **MUST NOT** implement the CM provisioning described in section 7.4.2.3, "Standard DOCSIS events for CMs" in [OSSI2.0].

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## Annex A Detailed MIB Requirements (normative)

The following abbreviations and rules apply in this Annex:

- ACC-FN** Accessible for Notify.
- ATRAP** Accessible through SNMP trap.
- D** Deprecated. Deprecated objects are optional. That is, a vendor can choose to implement or not implement the object. If a vendor chooses to implement the object, the object **MUST** be implemented correctly according to the MIB definition. If a vendor chooses not to implement the object, an agent **MUST NOT** instantiate such object and **MUST** respond with the appropriate error/exception condition (e.g., no such object for SNMPv2c).
- M** Mandatory. The object **MUST** be implemented correctly according to the MIB definition.
- N-Acc** Not accessible. The object is not accessible and is usually an index in a table.
- NA** Not Applicable (to the device).
- N-Sup** **MUST** not support. The device **MUST NOT** support the object. That is, an agent **MUST NOT** instantiate such object and **MUST** respond with the appropriate error/exception condition (e.g., no such object for SNMPv2c).
- O** Optional. A vendor can choose to implement or not implement the object. If a vendor chooses to implement the object, the object **MUST** be implemented correctly according to the MIB definition. If a vendor chooses not to implement the object, an agent **MUST NOT** instantiate such object and **MUST** respond with the appropriate error/exception condition (e.g., no such object for SNMPv2c).
- Ob** Obsolete. It is optional. Though in SNMP convention, obsolete objects should not be implemented, DOCSIS 2.0 OSSSI lets vendors choose whether or not to support the obsolete object. That is, a vendor can choose to implement or not implement the object. If a vendor chooses to implement the object, the object **MUST** be implemented correctly according to the MIB definition. If a vendor chooses not to implement the object, the SNMP agent **MUST NOT** instantiate such object and **MUST** respond with the appropriate error/exception condition (e.g., no such object for SNMPv2c).
- RC** Read-Create. The access of the object **MUST** be implemented as Read-Create.
- RO** Read-Only. The access of the object **MUST** be implemented as Read-Only.
- RW** Read-Write. The access of the object **MUST** be implemented as Read-Write.
- RC/RO** Read-Create or Read-Only. The access of the object **MUST** be implemented as either Read-Create or Read-Only as described in the MIB definition.
- RW/RO** Read-Write or Read-Only. The access of the object **MUST** be implemented as either Read-Write or Read-Only as described in the MIB definition.

The table below lists the M-CMTS modules M-CMTS Core, EQAM device, and DTI Server Compliance requirements summary.

*Table A-1 - Requirements<sup>1 2</sup>*

DOCS-IF-MIB (DOCS-IF-MIB: draft-ietf-ipcdn-docs-rfmibv2-05.txt)				
<b>docsIfDownstreamChannelTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfDownChannelId	M	RW	NA	NA
docsIfDownChannelFrequency	M	RW/RO	M	RW/RO
docsIfDownChannelWidth	M	RW/RO	M	RW/RO
docsIfDownChannelModulation	M	RW	M	RW/RO
docsIfDownChannelInterleave	M	RW	M	RW/RO
docsIfDownChannelPower	M	RW/RO	M	RW/RO
docsIfDownChannelAnnex	O	RW/RO	O	RW/RO
DOCS-IF-M-CMTS-MIB (Annex C)				
<b>docsIfMCmtsCoreDownstreamTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsCoreDownstreamType	M	RO	N/A	N/A
docsIfMCmtsCoreDownstreamPhyDependencies	M	RO	N/A	N/A
<b>docsIfMCmtsEqamDownstreamTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsEqamDownstreamTSID	N/A	N/A	M	RW
docsIfMCmtsEqamDownstreamPhyDependencies	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamDevicePhyParamLock	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamDeviceConfigPhyParamLock	N/A	N/A	M	RW
docsIfMCmtsEqamDownstreamAllocationType	N/A	N/A	M	RW
docsIfMCmtsEqamDownstreamAllocationStatus	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamAllocationTimeout	N/A	N/A	M	RW
docsIfMCmtsEqamDownstreamDRRPAdvertizing	N/A	N/A	M	RW
docsIfMCmtsEqamDownstreamUdpPortMapping	N/A	N/A	M	RW

<sup>1</sup> Revised this table per ECN M-OSSI-N-05.0254-5 on 11/22/05.

<sup>2</sup> Table modified per M-OSSI-N-07.0451-3, #1 and M-OSSI-N-07.0451-3, #2 on 7/20/07 by KN.

<b>docsIfMCmtsEqamDownstreamCapabilitiesTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsEqamDownstreamCapabFrequency	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabBandwidth	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabPower	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabModulation	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabInterleaver	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabJ83Annex	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabConcurrentServices	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabServicesTransport	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabMuting	N/A	N/A	M	RO
<b>docsIfMCmtsEqamGroupDependencyTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsEqamGroupDependencyPhyParam	N/A	N/A	M	N-Acc
docsIfMCmtsEqamGroupDependencyPhysicalIndex	N/A	N/A	M	N-Acc
docsIfMCmtsEqamGroupDependencyGroupID	N/A	N/A	M	RO
docsIfMCmtsEqamGroupDependencyType	N/A	N/A	M	RO
<b>docsIfMCmtsEqamGlobCfgDownTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsEqamGlobCfgDownIndex	N/A	N/A	M	N-Acc
docsIfMCmtsEqamGlobCfgDownPhysicalIndex	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownBandwidth	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownPower	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownModulation	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownInterleave	N/A	N/A	M	RC
docsIfMCmtsEqamGlogCfgDownAnnex	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownSymbolRateM	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownSymbolRateN	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownLockParams	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownExecutionCode	N/A	N/A	M	RO
docsIfMCmtsEqamGlobCfgDownErrorsCount	N/A	N/A	M	RO
docsIfMCmtsEqamGlobCfgDownRowStatus	N/A	N/A	M	RC

<b>docsIfMCmtsChannelBlockTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsChannelBlockPhysicalIndex	N/A	N/A	M	N-Acc
docsIfMCmtsChannelBlockNumberChannels	N/A	N/A	M	RO
docsIfMCmtsChannelBlockCfgNumberChannels	N/A	N/A	M	RW
docsIfMCmtsChannelBlockMute	N/A	N/A	M	RW
docsIfMCmtsChannelBlockTestType	N/A	N/A	M	RW
docsIfMCmtsChannelBlockTestIfIndex	N/A	N/A	M	RW
<b>docsIfMCmtsDepsessionConfigTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsDepsessionConfigIndex	M	N-Acc	M	N-Acc
docsIfMCmtsDepsessionConfigCableMacIfIndex	M	RO	M	RC/RO
docsIfMCmtsDepsessionConfigCableDownfIndex	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigAddrType	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigLocalAddr	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigRemoteAddr	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigL2TPv3HeaderType	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigMethod	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigTSID	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigDEPIMode	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigRsrcAllocReq	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigCinPhbIdPolicy	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigSyncEnabled	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigSyncInterval	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigPhyParamsFlag	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigChannelFrequency	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigChannelModulation	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigChannelInterleave	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigChannelPower	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigChannelAnnex	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigChannelSymbolRateM	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigChannelSymbolRateN	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigChannelOutputRate	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigChannelBurstSize	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigStorage	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigRowStatus	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigChannelId	M	RC	N-Sup	N/A

<b>docsIfMCmtsDepsessionInfoTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsDepsessionInfoCfgIndex	M	RO	M	RO
docsIfMCmtsDepsessionInfoUdpPort	M	RO	M	RO
docsIfMCmtsDepsessionInfoMaxPayload	M	RO	M	RO
docsIfMCmtsDepsessionInfoPathPayload	M	RO	M	RO
docsIfMCmtsDepsessionInfoIncludeDOCSISMsgs	M	RO	M	RO
docsIfMCmtsDepsessionInfoRsrcAllocResp	M	RO	M	RO
docsIfMCmtsDepsessionInfoConnCtrlID	M	RO	M	RO
docsIfMCmtsDepsessionInfoEQAMSessionID	M	RO	M	RO
docsIfMCmtsDepsessionInfoOwner	M	RO	M	RO
docsIfMCmtsDepsessionInfoState	M	RO	M	RO
docsIfMCmtsDepsessionInfoErrorCode	M	RO	M	RO
docsIfMCmtsDepsessionInfoCreationTime	M	RO	M	RO
docsIfMCmtsDepsessionInfoStorage	M	RO	M	RO
<b>docsIfMCmtsDepsRsrcAllocTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsDepsRsrcAllocIndex	M	RC	O	RC/RO
docsIfMCmtsDepsRsrcAllocSeq	M	RC	O	RC/RO
docsIfMCmtsDepsRsrcAllocPhbId	M	RC	O	RC/RO
docsIfMCmtsDepsRsrcAllocFlowId	M	RC	O	RC/RO
docsIfMCmtsDepsRsrcAllocUdpPort	M	RC	O	RC/RO
docsIfMCmtsDepsRsrcAllocPolicyScnTags	M	RC	O	RC/RO
docsIfMCmtsDepsRsrcAllocStorage	M	RC	O	RC/RO
docsIfMCmtsDepsRsrcAllocRowStatus	M	RC	O	RC/RO
<b>docsIfMCmtsDepsessionStatsTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsDepsessionInfoOutOfSequencePkts	N/A	N/A	M	RO
<b>docsIfMCmtsDepsessionCinLatency</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsDepsessionCinLatencyInterval	M	RW	M	RW
docsIfMCmtsDepsessionCinLatencyThreshld	M	RW	M	RW
docsIfMCmtsDepsessionCinEventLevel	M	RW	M	RW
docsIfMCmtsDepsessionCinLastValue	M	RO	M	RO
docsIfMCmtsDepsessionCinLastValueIfIndex	M	RO	M	RO
docsIfMCmtsDepsessionCinLatencyValueLastTime	M	RO	M	RO

<b>docsIfMCmtsDepiSessionCinLatency</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>		
docsIfMCmtsDepiSessionCinLatencyPerfIntervalSeq	M	RO	O	RO		
docsIfMCmtsDepiSessionCinLatencyPerfValue	M	RO	O	RO		
docsIfMCmtsDepiSessionCinLatencyTime	M	RO	O	RO		
<b>docsIfMCmtsDepiPhbPolicyTable</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>		
docsIfMCmtsDepiPhbPolicyTag	M	N-Acc	N/A	N/A		
docsIfMCmtsDepiPhbPolicySCN	M	RC	N/A	N/A		
docsIfMCmtsDepiPhbPolicyCinPhbId	M	RC	N/A	N/A		
docsIfMCmtsDepiPhbPolicyStorage	M	RC	N/A	N/A		
docsIfMCmtsDepiPhbPolicyRowStatus	M	RC	N/A	N/A		
<b>docsIfMCmtsQosServiceFlowExtTable</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>		
docsIfMCmtsQosServiceFlowExtDepiFlowId	M	RO	N/A	N/A		
docsIfMCmtsQosServiceFlowExtCinPhbId	M	RO	N/A	N/A		
docsIfMCmtsQosServiceFlowExtDepiIfIndex	M	RO	N/A	N/A		
<b>DTI-MIB (Annex D)</b>						
<b>dtiProtocolTable</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
dtiProtocolEntityType	M	RO	M	RO	M	RO
dtiProtocolClientClockType	M	RO	M	RO	M	RO
dtiProtocolServerStatusFlag	M	RO	M	RO	M	RO
dtiProtocolClientStatusFlag	M	RO	M	RO	M	RO
dtiProtocolServerToDState	M	RO	M	RO	M	RO
dtiProtocolServerToDType	M	RO	M	RO	M	RO
dtiProtocolServerToDValue	M	RO	M	RO	M	RO
dtiProtocolServerCableAdvanceFlag	M	RO	M	RO	M	RO
dtiProtocolServerCableAdvanceValue	M	RW	M	RO	M	RO
dtiProtocolClientPhaseError	M	RO	M	RO	M	RO
dtiProtocolClientVersion	M	RO	M	RO	M	RO
dtiProtocolClientPathTraceability	M	RO	M	RO	M	RO

<b>dtiProtocolControlTable</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
dtiProtocolControlTimeInterval	N/A	N/A	N/A	N/A	M	RW
dtiProtocolControlErrorRateInterval	M	RW/RO	M	RW/RO	M	RW
dtiProtocolControlJitterTimeInterval	N/A	N/A	N/A	N/A	M	RW
dtiProtocolControlTestMode	N/A	N/A	N/A	N/A	M	RW
dtiProtocolControlToDValue	N/A	N/A	N/A	N/A	M	RW
<b>dtiProtocolPerformanceTable</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
dtiProtocolPerformanceDelay	N/A	N/A	N/A	N/A	M	RO
dtiProtocolPerformanceFrameErrorRate	M	RO	M	RO	M	RO
dtiProtocolPerformancePeakToPeakJitter	N/A	N/A	N/A	N/A	M	RO
dtiProtocolPerformanceWander35Seconds	N/A	N/A	N/A	N/A	M	RO
dtiProtocolPerformanceWanderTSeconds	N/A	N/A	N/A	N/A	M	RO
<b>dtiPathTraceabilityTable</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
dtiPathTraceabilityIndex	M	RO	M	RO	M	RO
dtiPathTraceabilityRootServerInetAddrType	M	RO	M	RO	M	RO
dtiPathTraceabilityRootServerInetAddr	M	RO	M	RO	M	RO
dtiPathTraceabilityRootServerOutPhyIdx	M	RO	M	RO	M	RO
dtiPathTraceabilityServerInetAddrType	M	RO	M	RO	M	RO
dtiPathTraceabilityServerInetAddr	M	RO	M	RO	M	RO
dtiPathTraceabilityServerOutPhyIdx	M	RO	M	RO	M	RO
dtiPathTraceabilityRootServerProtVersion	M	RO	M	RO	M	RO
dtiPathTraceabilityServerProtVersion	M	RO	M	RO	M	RO

<b>dtiProtocolClientFsmStatsTable</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
dtiProtocolClientFsmStatsT3Count	M	RO	M	RO	M	RO
dtiProtocolClientFsmStatsT4Count	M	RO	M	RO	M	RO
dtiProtocolClientFsmStatsT6Count	M	RO	M	RO	M	RO
dtiProtocolClientFsmStatsT7Count	M	RO	M	RO	M	RO
dtiProtocolClientFsmStatsNormalActiveTime	M	RO	M	RO	M	RO
dtiProtocolClientFsmStatsHoldoverActiveTime	M	RO	M	RO	M	RO
<b>dtiServerProperties</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
dtiServerRootClockType	N/A	N/A	N/A	N/A	M	RO
dtiServerHopCount	N/A	N/A	N/A	N/A	M	RO
dtiServerExternalTimingSource	N/A	N/A	N/A	N/A	M	RO
dtiServerToDSources	N/A	N/A	N/A	N/A	M	RO
<b>dtiServerGlobalParameters</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
dtiServerGlobalTimeInterval	N/A	N/A	N/A	N/A	M	RW
dtiServerGlobalErrorRateInterval	N/A	N/A	N/A	N/A	M	RW
dtiServerGlobalJitterTimeInterval	N/A	N/A	N/A	N/A	M	RW
dtiServerGlobalToDMethod	N/A	N/A	N/A	N/A	M	RW
dtiServerGlobalToDVvalue	N/A	N/A	N/A	N/A	M	RW
DOCS-CABLE-DEVICE-MIB [RFC 2669]						
<b>docsDevEventGroup</b>						
<b>Objects</b>			<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
docsDevEvControl			M	RW	M	RW
docsDevEvSyslog			M	RW	M	RW

docsDevEvThrottleAdminStatus	M	RW	M	RW		
docsDevEvThrottleInhibited	M	RW	M	RW		
docsDevEvThrottleThreshold	M	RW	M	RW		
docsDevEvThrottleInterval	M	RW	M	RW		
<b>docsDevEvControlTable</b>						
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>		
docsDevEvPriority	M	N-Acc	M	N-Acc		
docsDevEvReporting	M	RW	M	RW		
<b>docsDevEvControlTable</b>						
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>		
docsDevEvIndex	M	N-Acc	M	N-Acc		
docsDevEvFirstTime	M	RO	M	RO		
docsDevEvLastTime	M	RO	M	RO		
docsDevEvCounts	M	RO	M	RO		
docsDevEvLevel	M	RO	M	RO		
docsDevEvId	M	RO	M	RO		
docsDevEvText	M	RO	M	RO		
IF-MIB [RFC 2863]						
<b>interfaces</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
ifNumber	M	RO	M	RO	M	RO
IfTableLastChange	M	RO	M	RO	M	RO
<b>ifTable</b>						
<b>Object</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>		
IfIndex	M	RO	M	RO		
ifDescr	M	RO	M	RO		
ifType	M	RO	M	RO		
ifMtu	M	RO	M	RO		
ifSpeed	M	RO	M	RO		
ifPhysAddress	M	RO	M	RO		

ifAdminStatus	M	RO	M	RO
ifOperStatus	M	RO	M	RO
ifLastChange	M	RO	M	RO
ifInOctets	M	RO	N-Sup	NA
ifInUcastPkts	M	RO	M	RO
ifInNUcastPkts	M	RO	N-Sup	NA
ifInDiscards	M	RO	N-Sup	NA
ifInErrors	M	RO	M	RO
ifInUnknownProtos	M	RO	N-Sup	NA
ifOutOctets	M	RO	N-Sup	NA
ifOutUcastPkts	M	RO	M	RO
ifOutNUcastPkts	M	RO	N-Sup	NA
ifOutDiscards	M	RO	N-Sup	N/A
ifOutErrors	M	RO	M	RO
ifOutQLen	M	RO	N-Sup	NA
ifSpecific	M	RO	N-Sup	NA
<b>ifXTable</b>				
<b>Object</b>			<b>EQAM</b>	<b>Access</b>
ifName			M	RO
ifInMulticastPkts			M	RO
ifInBroadcastPkts			M	RO
ifOutMulticastPkts			M	RO
ifOutBroadcastPkts			M	RO
ifHCInOctets			M	RO
ifHCInUcastPkts			M	RO
ifHCInMulticastPkts			M	RO
ifHCInBroadcastPkts			M	RO
ifHCOctets			M	RO
ifHCOUcastPkts			M	RO
ifHCOMulticastPkts			M	RO
ifHCOBroadcastPkts			M	RO
ifLinkUpDownTrapEnable			M	RO
ifHighSpeed			M	RO
ifPromiscuousMode			M	RO
ifConnectorPresent			M	RO
ifAlias			M	RO
ifCounterDiscontinuityTime			M	RO

<b>ifStackTable</b>						
<b>Object</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>		
ifStackHigherLayer	M	N-Acc	M	N-Acc		
ifStackLowerLayer	M	N-Acc	M	N-Acc		
ifStackStatus	M	RC/RO	M	RC/RO		
<b>ifMIBObjects</b>						
<b>Object</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>		
ifStackLastChange	M	RC/RO	M	RC/RO		
<b>snmpTraps</b>						
<b>Notification</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>		
linkup	M		M			
linkDown	M		M			
ENTITY-MIB [IETF2]						
<b>entPhysicalTable</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
entPhysicalIndex	O	N-Acc	O	N-Acc	O	N-Acc
entPhysicalDescr	O	RO	M	RO	M	RO
entPhysicalVendorType	O	RO	M	RO	M	RO
entPhysicalContainedIn	O	RO	M	RO	M	RO
entPhysicalClass	O	RO	M	RO	M	RO
entPhysicalParentRelPos	O	RO	M	RO	M	RO
entPhysicalName	O	RO	M	RO	M	RO
entPhysicalHardwareRev	O	RO	M	RO	M	RO
entPhysicalFirmwareRev	O	RO	M	RO	M	RO
entPhysicalSoftwareRev	O	RO	M	RO	M	RO
entPhysicalSerialNum	O	RW/RO	M	RW/RO	M	RW/RO
entPhysicalMfgName	O	RO	M	RO	M	RO
entPhysicalModelName	O	RO	M	RO	M	RO
entPhysicalAlias	O	RW/RO	M	RW/RO	M	RW/RO
entPhysicalAssetID	O	RW/RO	M	RW/RO	M	RW/RO

entPhysicalIsFRU	O	RO	M	RO	M	RO
entPhysicalMfgDate	O	RO	M	RO	M	RO
entPhysicalUris	O	RW/RO	M	RW/RO	M	RW/RO
<b>entAliasMappingTable</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
entAliasLogicalIndexOrZero	O	N-Acc	O	N-Acc	O	N-Acc
entAliasMappingIdentifier	O	RO	M	RO	M	RO
<b>entPhysicalContainsTable</b>						
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
entPhysicalChildIndex	O	RO	M	RO	M	RO
SNMPv2-MIB [RFC 3418]						
<b>System Group</b>						
<b>Objects</b>			<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
sysDescr			M	RO	M	RO
sysObjectID			M	RO	M	RO
sysUpTime			M	RO	M	RO
sysContact			M	RW	M	RW
sysName			M	RW	M	RW
sysLocation			M	RW	M	RW
sysServices			M	RO	M	RO
sysORLastChange			M	RO	M	RO
<b>sysORTable</b>						
<b>Objects</b>			<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
sysORIndex			M	N-Acc	M	N-Acc
sysORID			M	RO	M	RO
sysORDescr			M	RO	M	RO
sysORUpTime			M	RO	M	RO

<b>SNMP Group</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
snmpEnableAuthenTraps	M	RW	M	RW
IP-MIB [RFC 2011]				
<b>ipAddrTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
ipAdEntAddr	M	RO	M	RO
ipAdEntIfIndex	M	RO	M	RO
ipAdEntNetMask	M	RO	M	RO
ipAdEntBcastAddr	M	RO	M	RO
ipAdEntReasmMaxSize	M	RO	M	RO
<b>IpNetToMediaTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
ipNetToMediaIfIndex	M	RC/RO	O	RC/RO
ipNetToMediaPhysAddress	M	RC/RO	O	RC/RO
ipNetToMediaNetAddress	M	RC/RO	O	RC/RO
ipNetToMediaType	M	RC/RO	O	RC/RO
SNMP-VIEW-BASED-ACM-MIB [RFC 3415]				
<b>vacmContextTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
vacmContextName	M	RO	M	RO
<b>vacmSecurityToGroupTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
vacmSecurityModel	M	N-Acc	M	N-Acc
vacmSecurityName	M	N-Acc	M	N-Acc
vacmGroupName	M	RC/RO	M	RC/RO

vacmSecurityToGroupStorageType	M	RC/RO	M	RC/RO
vacmSecurityToGroupStatus	M	RC/RO	M	RC/RO
<b>vacmAccessTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
vacmAccessContextPrefix	M	N-Acc	M	N-Acc
vacmAccessSecurityModel	M	N-Acc	M	N-Acc
vacmAccessSecurityLevel	M	N-Acc	M	N-Acc
vacmAccessContextMatch	M	RC/RO	M	RC/RO
vacmAccessReadViewName	M	RC/RO	M	RC/RO
vacmAccessWriteViewName	M	RC/RO	M	RC/RO
vacmAccessNotifyViewName	M	RC/RO	M	RC/RO
vacmAccessStorageType	M	RC/RO	M	RC/RO
vacmAccessStatus	M	RC/RO	M	RC/RO
vacmViewSpinLock	M	RW/RO	M	RW/RO
<b>vacmViewTreeFamilyTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
vacmViewTreeFamilyViewName	M	N-Acc	M	N-Acc
vacmViewTreeFamilySubtree	M	N-Acc	M	N-Acc
vacmViewTreeFamilyMask	M	RC/RO	M	RC/RO
vacmViewTreeFamilyType	M	RC/RO	M	RC/RO
vacmViewTreeFamilyStorageType	M	RC/RO	M	RC/RO
vacmViewTreeFamilyStatus	M	RC/RO	M	RC/RO
SNMP-COMMUNITY-MIB [RFC 3584]				
<b>snmpCommunityTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
snmpCommunityIndex	M	N-Acc	M	N-Acc
snmpCommunityName	M	RC/RO	M	RC/RO
snmpCommunitySecurityName	M	RC/RO	M	RC/RO
snmpCommunityContextEngineID	M	RC/RO	M	RC/RO
snmpCommunityContextName	M	RC/RO	M	RC/RO
snmpCommunityTransportTag	M	RC/RO	M	RC/RO
snmpCommunityStorageType	M	RC/RO	M	RC/RO
snmpCommunityStatus	M	RC/RO	M	RC/RO

<b>Snmptargetexttable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
snmpTargetAddrTMask	M	RC/RO	M	RC/RO
snmpTargetAddrMMS	M	RC/RO	M	RC/RO
snmpTrapAddress	O	ACC-FN	O	ACC-FN
snmpTrapCommunity	O	ACC-FN	O	ACC-FN
SNMP Management Framework architecture [RFC 3411]				
<b>snmpEngine Group</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
snmpEngineID	M	RO	M	RO
snmpEngineBoots	M	RO	M	RO
snmpEngineTime	M	RO	M	RO
snmpEngineMaxMessageSize	M	RO	M	RO
SNMP Message Processing and Dispatching MIB [RFC 3412]				
<b>snmpMPDStats</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
snmpUnknownSecurityModels	M	RO	M	RO
snmpInvalidMsgs	M	RO	M	RO
snmpUnknownPDUHandlers	M	RO	M	RO
SNMP Applications [RFC 3413]				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
snmpTargetSpinLock	O	RW/RO	M	RW/RO
<b>snmpTargetAddrTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
snmpTargetAddrName	M	N-Acc	M	N-Acc
snmpTargetAddrTDomain	M	RC/RO	M	RC/RO
SnmpTargetAddrTAddress	M	RC/RO	M	RC/RO

SnmpTargetAddrTimeout	M	RC/RO	M	RC/RO
SnmpTargetAddrRetryCount	M	RC/RO	M	RC/RO
SnmpTargetAddrTagList	M	RC/RO	M	RC/RO
SnmpTargetAddrParams	M	RC/RO	M	RC/RO
SnmpTargetAddrStorageType	M	RC/RO	M	RC/RO
SnmpTargetAddrRowStatus	M	RC/RO	M	RC/RO
<b>snmpTargetParamsTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
SnmpTargetParamsName	M	N-Acc	M	N-Acc
SnmpTargetParamsMPModel	M	RC/RO	M	RC/RO
SnmpTargetParamsSecurityModel	M	RC/RO	M	RC/RO
SnmpTargetParamsSecurityName	M	RC/RO	M	RC/RO
SnmpTargetParamsSecurityLevel	M	RC/RO	M	RC/RO
SnmpTargetParamsStorageType	M	RC/RO	M	RC/RO
SnmpTargetParamsRowStatus	M	RC/RO	M	RC/RO
SnmpUnavailableContexts	M	RC/RO	M	RC/RO
snmpUnknownContexts	M	RC/RO	M	RC/RO
<b>snmpNotifyTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
snmpNotifyName	M	N-Acc	M	N-Acc
snmpNotifyTag	M	RC/RO	M	RC/RO
SnmpNotifyType	M	RC/RO	M	RC/RO
snmpNotifyStorageType	M	RC/RO	M	RC/RO
SnmpNotifyRowStatus	M	RC/RO	M	RC/RO
<b>snmpNotifyFilterProfileTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
SnmpNotifyFilterProfileName	M	RC/RO	M	RC/RO
snmpNotifyFilterProfileStorType	M	RC/RO	M	RC/RO
snmpNotifyFilterProfileRowStatus	M	RC/RO	M	RC/RO

<b>snmpNotifyFilterTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
SnmpNotifyFilterSubtree	M	N-Acc	M	N-Acc
SnmpNotifyFilterMask	M	RC/RO	M	RC/RO
SnmpNotifyFilterType	M	RC/RO	M	RC/RO
SnmpNotifyFilterStorageType	M	RC/RO	M	RC/RO
SnmpNotifyFilterRowStatus	M	RC/RO	M	RC/RO
SNMP-USER-BASED-SM-MIB [RFC 3414]				
<b>usmStats</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
usmStatsUnsupportedSecLevels	M	RO	M	RO
usmStatsNotInTimeWindows	M	RO	M	RO
usmStatsUnknownUserNames	M	RO	M	RO
usmStatsUnknownEngineIDs	M	RO	M	RO
usmStatsWrongDigests	M	RO	M	RO
usmStatsDecryptionErrors	M	RO	M	RO
<b>usmUser</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
usmUserSpinLock	O	RW/RO	M	RW/RO
<b>usmUserTable</b>				
<b>Objects</b>	<b>EQAM</b>	<b>Access</b>	<b>DTI Server</b>	<b>Access</b>
usmUserEngineID	M	N-Acc	M	N-Acc
usmUserName	M	N-Acc	M	N-Acc
usmUserSecurityName	M	RC/RO	M	RC/RO
usmUserCloneFrom	M	RC/RO	M	RC/RO
usmUserAuthProtocol	M	RC/RO	M	RC/RO
usmUserAuthKeyChange	M	RC/RO	M	RC/RO
usmUserOwnAuthKeyChange	M	RC/RO	M	RC/RO
usmUserPrivProtocol	M	RC/RO	M	RC/RO
usmUserPrivKeyChange	M	RC/RO	M	RC/RO

usmUserOwnPrivKeyChange	M	RC/RO	M	RC/RO
usmUserPublic	M	RC/RO	M	RC/RO
usmUserStorageType	M	RC/RO	M	RC/RO

## B.1 IF-MIB ifTable MIB-Object details

Table A-2 - IF-MIB ifTable MIB-Object details<sup>3</sup>

IF-MIB Object details for Cable Device using 1000 Mbps Ethernet	M-CMTS Core NSI Ethernet-100/1000	CMTS-Downstream M-CMTS Core, M-CMTS EQAM	EQAM GigE	DTI/ M-CMTS/ EQAM Client
ifIndex	(n)	(n)	(n)	(n)
ifType	6	229	6	other(1)
ifSpeed	100,000,000 - 1000,000,000	~64-QAM=30,341,646 ~256-QAM=42,884,296	1000,000,000	5,000,000
ifHighSpeed	100- 1000	~64-QAM=30 ~256-QAM=42	1000	5
ifPhysAddress	Eth MAC	Empty-String	Eth MAC	Empty-String
ifAdminStatus	Up(1), Down(2), Testing(3)	Up(1), Down(2), Testing(3)	Up(1), Down(2), Testing(3)	Up(1), Down(2), Testing(3)
ifOperStatus	Up(1), Down(2), Testing(3), Dormant(5), notPresent(6)	Up(1), Down(2), Testing(3), Dormant(5), notPresent(6)	Up(1), Down(2), Testing(3), Dormant(5), notPresent(6)	Up(1), Down(2), Testing(3), Dormant(5), notPresent(6)
ifMtu	1500	1464, (n)	1500, (n)	256
ifInOctets	(n)	0	(n)	(n)
IfHCInOctets	(n)	0	(n)	(n)
ifOutOctets	(n)	(n)	(n)	(n)
ifHCOctets	(n)	(n)	(n)	(n)
ifInUcastPkts	(n)	0	(n)	(n)
ifHCInUcastPkts	(n)	0	(n)	(n)
ifInMulticastPkts	(n)	0	(n)	(n)
ifHCInMulticastPkts	(n)	0	(n)	(n)
ifInBroadcastPkts	(n)	0	(n)	(n)
ifHCInBroadcastPkts	(n)	0	(n)	(n)

<sup>3</sup> Revised this table per ECN M-OSSI-N-05.0254-5 on 11/22/05.

<b>IF-MIB Object details for Cable Device using 1000 Mbps Ethernet</b>	<b>M-CMTS Core NSI Ethernet-100/1000</b>	<b>CMTS-Downstream M-CMTS Core, M-CMTS EQAM</b>	<b>EQAM GigE</b>	<b>DTI/ M-CMTS/ EQAM Client</b>
ifInDiscards	(n)	0	(n)	(n)
ifInErrors	(n)	0	(n)	(n)
ifInUnknownProtos	(n)	0	(n)	(n)
ifOutUcastPkts	(n)	(n)	(n)	(n)
ifHCOutUcastPkts	(n)	(n)	(n)	(n)
ifOutMulticastPkts	(n)	(n)	(n)	(n)
ifHCOutMulticastPkts	(n)	(n)	(n)	(n)
ifOutBroadcastPkts	(n)	(n)	(n)	(n)
ifHCOutBroadcastPkts	(n)	(n)	(n)	(n)
ifOutDiscards	(n)	(n)	(n)	(n)
ifOutErrors	(n)	(n)	(n)	(n)
ifPromiscuousMode	True(1), false(2)	True(1), false(2)	True(1), false(2)	True(1), false(2)

## Annex B Format and Content for Event, SYSLOG, and SNMP Trap (normative)

This Annex contains management events for detection of failures or operational condition changes of relevance for the Modular CMTS architecture.

### B.1 M-CMTS Extensions Description

This section applies to an M-CMTS compliant device and is an extension to the OSS event management requirements specified in Annex D, Format and Content for Event, SYSLOG, and SNMP Trap (normative) of [OSS12.0]. Events in this list are applicable to M-CMTS Core, EQAM device, and/or DTI Server, as detailed in Section B.3.

### B.2 M-CMTS Compliant devices Event DEPI Process definitions

The events in the Process "DEPI" are indications of error conditions in the DEPI Session or the L2TPv3 control plane. The events on this category are generated as consequences of Stop-CCN or CDN messages delivered or received for the other end of the Connection or Session.

There are 3 Subset sub-processes for the event DEPI process: the first two are related to standard L2TPv3 Stop-CCN and CDN messages. The third sub-process is related to CDN messages, but specific to DOCSIS PW fault conditions.

An M-CMTS Core compliant device **MUST** support the events described in the event DEPI process, DEPI-CDN sub-process. An M-CMTS Core **SHOULD** support the events in the event DEPI Process, sub-processes L2TP-Stop-CCN and L2TP-CDN.

An EQAM compliant device **MUST** support the events described in the event DEPI process DEPI-CDN sub-process. An M-CMTS Core **SHOULD** support the events in the event DEPI Process, sub-processes L2TP-Stop-CCN and L2TP-CDN.

### B.3 M-CMTS Devices Event Extensions

*Table B-1 - M-CMTS Devices Event Extensions*

Process	Sub-Process	CMTS & EQAM Priority	Event Message	Message Notes and Details	Error Code Set	Event ID	Trap Name
<b>DEPI L2TP Session Failed (DOCSIS AVPs)</b>							
Depi	DEPI-CDN	Critical	CDN; Result Code = 0;	for syslog & local-log  Mandatory Add: ; Error Code = 0;  Optional Add: <EC Text>  Should Add in <EC Text>: "; PWType = <value>"	M01.1	77000101	

Process	Sub-Process	CMTS & EQAM Priority	Event Message	Message Notes and Details	Error Code Set	Event ID	Trap Name
Depi	DEPI-CDN	Critical	CDN; Result Code = 0	for syslog & local-log  Mandatory Add: ; Error Code = 3;  Optional Add: <EC Text>  Should Add in <EC Text>: "; PHBID = <value>"	M01.2	77000102	
Depi	DEPI-CDN	Critical	CDN; Result Code = 0	for syslog & local-log  Mandatory Add: ; Error Code = 4;  Optional Add: <EC Text>  Should Add in <EC Text>: "; PWType = <value>"	M01.3	77000103	
Depi	DEPI-CDN	Critical	CDN; Result Code = 1	for syslog & local-log  Mandatory Add: ; Error Code = 1;  Should Add in <EC Text>: "; PHY = <AVP type>; Value = <value>"	M01.4	77000104	
Depi	DEPI-CDN	Critical	CDN; Result Code = 2	for syslog & local-log  Mandatory Add: ; Error Code = 2;  Optional Add: <EC Text>  Should Add in <EC Text>: "; PHY = <AVP type>; Value = <value>"	M01.5	77000105	
<b>DEPI L2TP Connection Control (StopCCN)</b>							
Depi	L2TP-StopCCN	Critical	StopCCN; Result Code = 1	Optional Add: ; Error Code = <EC>; <EC Text>	M02.1	77000201	
Depi	L2TP-StopCCN	Critical	StopCCN; Result Code = 2	Mandatory Add: ; Error Code = <EC>; Optional Add: <EC Text>	M02.2	77000202	
Depi	L2TP-StopCCN	Critical	StopCCN; Result Code = 3	Optional Add: ; Error Code = <EC>; <EC Text>	M02.3	77000203	
Depi	L2TP-StopCCN	Critical	StopCCN; Result Code = 4	Optional Add: ; Error Code = <EC>; <EC Text>	M02.4	77000204	

Process	Sub-Process	CMTS & EQAM Priority	Event Message	Message Notes and Details	Error Code Set	Event ID	Trap Name
Depi	L2TP-StopCCN	Critical	StopCCN; Result Code = 5	Mandatory Add: Error Code = <EC>; Optional Add: <EC Text> Note: <EC> indicates Highest Version support Value	M02.5	77000205	
Depi	L2TP-StopCCN	Critical	StopCCN; Result Code = 6	Optional Add: ; Error Code = <EC>; <EC Text>	M02.6	77000206	
Depi	L2TP-StopCCN	Critical	StopCCN; Result Code = 7	Optional Add: ; Error Code = <EC>; <EC Text>	M02.7	77000207	
<b>DEPI L2TP Session Control (CDN)</b>							
Depi	L2TP-CDN	Critical	CDN; Result Code = 1	Optional Add: ; Error Code = <EC>; <EC Text>	M03.1		
Depi	L2TP-CDN	Critical	CDN; Result Code = 2	Mandatory Add: ; Error Code = <EC>; Optional Add: <EC Text>	M03.2		
Depi	L2TP-CDN	Critical	CDN; Result Code = 3	Optional Add: ; Error Code = <EC>; <EC Text>	M03.3		
Depi	L2TP-CDN	Critical	CDN; Result Code = 4	Optional Add: ; Error Code = <EC>; <EC Text>	M03.4		
Depi	L2TP-CDN	Critical	CDN; Result Code = 5	Optional Add: ; Error Code = <EC>; <EC Text>	M03.5		
Depi	L2TP-CDN	Critical	CDN; Result Code = 13	Optional Add: ; Error Code = <EC>; <EC Text>	M03.13		
Depi	L2TP-CDN	Critical	CDN; Result Code = 14	Optional Add: ; Error Code = <EC>; <EC Text>	M03.14		
Depi	L2TP-CDN	Critical	CDN; Result Code = 15	Optional Add: ; Error Code = <EC>; <EC Text>	M03.15		
Depi	L2TP-CDN	Critical	CDN; Result Code = 16	Optional Add: ; Error Code = <EC>; <EC Text>	M03.16		

---

## Annex C DOCS-IF-M-CMTS-MIB (normative)

DOCS-IF-M-CMTS-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY,  
OBJECT-IDENTITY,  
OBJECT-TYPE,  
Unsigned32,  
Integer32,  
Gauge32,  
Counter32,  
TimeTicks

FROM SNMPv2-SMI

TimeStamp,  
TruthValue,  
RowStatus,  
StorageType,  
AutonomousType

FROM SNMPv2-TC

OBJECT-GROUP,  
MODULE-COMPLIANCE

FROM SNMPv2-CONF

SnmAdminString

FROM SNMP-FRAMEWORK-MIB

entPhysicalSerialNum,  
entPhysicalAlias,  
entPhysicalAssetID,  
entPhysicalClass,  
PhysicalIndexOrZero,  
PhysicalIndex,  
entityPhysicalGroup,  
entityPhysical2Group,  
entityPhysical3Group,  
entityGeneralGroup,  
entityLogical2Group,  
entityMappingGroup

FROM ENTITY-MIB

ifIndex,  
InterfaceIndex,  
InterfaceIndexOrZero

FROM IF-MIB

TenthdBmV

FROM DOCS-IF-MIB

docsQosServiceFlowId

FROM DOCS-QOS-MIB

SnmTagValue

FROM SNMP-TARGET-MIB

InetAddressType,  
InetAddress,  
InetAddressNumber

FROM INET-ADDRESS-MIB

clabProjDocsis

FROM CLAB-DEF-MIB;

docsIfMCmtsMib MODULE-IDENTITY

LAST-UPDATED "200511160000Z" -- November 16, 2005

ORGANIZATION "Cable Television Laboratories, Inc"

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DESCRIPTION

"This MIB module contains the management objects for the configuration and management of the External PHY interface (DEPI) of the M-CMTS architecture (Modular CMTS)."

REVISION "200511160000Z"

DESCRIPTION

"Revised Version  
includes ECN M-OSSI-N-05.0254-5"

REVISION "200508050000Z"

DESCRIPTION

"Initial version of the DOCSIS Modular CMTS MIB module.  
This revision is published as part of the CableLabs M-CMTS OSS specification  
Copyright 1999-2005 Cable Television Laboratories, Inc.  
All rights reserved."

::= { clabProjDocsis 6 }

-----  
-- Textual Conventions  
-----

-----  
-- Main Groups  
-----

docsIfMCmtsNotifications OBJECT IDENTIFIER ::= { docsIfMCmtsMib 0 }  
docsIfMCmtsObjects OBJECT IDENTIFIER ::= { docsIfMCmtsMib 1 }  
docsIfMCmtsBaseObjects OBJECT IDENTIFIER ::= { docsIfMCmtsObjects 1 }  
docsIfMCmtsCoreObjects OBJECT IDENTIFIER ::= { docsIfMCmtsObjects 2 }  
docsIfMCmtsEqamObjects OBJECT IDENTIFIER ::= { docsIfMCmtsObjects 3 }  
docsIfMCmtsDepsObjects OBJECT IDENTIFIER ::= { docsIfMCmtsObjects 4 }

docsIfMCmtsDepsSessionObjects OBJECT IDENTIFIER ::= { docsIfMCmtsDepsObjects 1 }

docsIfMCmtsDepsQosObjects OBJECT IDENTIFIER ::= { docsIfMCmtsDepsObjects 2 }

-----  
-- DOCSIS RF Interface Extension objects  
-- M-CMTS Base Extensions  
-----

-----  
-- Phy Parameters dependencies OBJECT-IDENTITY definitions  
-----

docsIfMCmtsBaseAdmin OBJECT-IDENTITY

STATUS current

DESCRIPTION

"Registration point for M-CMTS characterization of PHY"

---

```

    parameters dependencies."
    ::= { docsIfMCmtsBaseObjects 1 }

docsPHYParamFixValue OBJECT-IDENTITY
    STATUS    current
    DESCRIPTION
        "Indicates that this PHY parameter is fix and cannot
        be changed."
    ::= { docsIfMCmtsBaseAdmin 1 }

docsPHYParamSameValue OBJECT-IDENTITY
    STATUS    current
    DESCRIPTION
        "Indicates that the PHY parameter value is the same for
        the elements in a dependency group; thus, a change in
        the PHY parameter of an element in the group will change
        the PHY parameter value in the other elements of the
        dependency group."
    ::= { docsIfMCmtsBaseAdmin 2 }

docsPHYParamAdjacentValues OBJECT-IDENTITY
    STATUS    current
    DESCRIPTION
        "Indicates that the PHY parameter has an adjacency or
        sequence pattern for the elements in a dependency group
        e.g., A group of channels all using J.83 Annex A, may set
        frequencies in the group by setting a 6 MHz spacing
        between the channels in the group. Vendors may rather
        use a more detailed vendor-specific OBJECT-IDENTITY or a
        table pointer to describe this type of PHY parameter
        adjacencies."
    ::= { docsIfMCmtsBaseAdmin 3 }

docsPHYParamFrequencyRange OBJECT-IDENTITY
    STATUS    current
    DESCRIPTION
        "This object indicates that the frequency in a group ID
        is constrained to a frequency range. Vendors may extend
        the MIB construct containing this reference to detail such
        constraints or rather use a more detailed vendor-specific
        OBJECT-IDENTITY or a table pointer to describe the
        frequency range supported."
    ::= { docsIfMCmtsBaseAdmin 4 }

-----
-- DOCSIS RF Interface Extension objects
-- M-CMTS Core Extensions
-----

docsIfMCmtsCoreDownstreamTable OBJECT-TYPE
    SYNTAX    SEQUENCE OF DocsIfMCmtsCoreDownstreamEntry
    MAX-ACCESS not-accessible
    STATUS    current
    DESCRIPTION
        "M-CMTS Core extensions for the DOCSIS RFI Downstream
        docsIfDownstreamTable."
    ::= { docsIfMCmtsCoreObjects 1 }

docsIfMCmtsCoreDownstreamEntry OBJECT-TYPE
    SYNTAX    DocsIfMCmtsCoreDownstreamEntry
    MAX-ACCESS not-accessible
    STATUS    current

```

---

---

DESCRIPTION

"A conceptual row for this table.  
There is a corresponding entry for each entry of  
docsIfDownstreamChannelTable."

INDEX { ifIndex }

::= { docsIfMCmtsCoreDownstreamTable 1 }

DocsIfMCmtsCoreDownstreamEntry ::= SEQUENCE

```
{
docsIfMCmtsCoreDownstreamType          INTEGER,
docsIfMCmtsCoreDownstreamPhyDependencies  BITS
}
```

docsIfMCmtsCoreDownstreamType OBJECT-TYPE

```
SYNTAX  INTEGER {
    integrated(1),
    external(2)
}
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value 'integrated' means the Downstream Interface is  
integrated to the DOCSIS MAC interface. This type  
corresponds to the legacy DOCSIS Downstream Interface of  
ifType 128.

The value 'external' indicates a Downstream External  
Interface that is associated to a QAM channel by mechanisms  
like a DEPI session."

::= { docsIfMCmtsCoreDownstreamEntry 1 }

docsIfMCmtsCoreDownstreamPhyDependencies OBJECT-TYPE

```
SYNTAX  BITS {
    frequency(0),
    bandwidth(1),
    power(2),
    modulation(3),
    interleaver(4),
    j83Annex(5),
    symbolRate(6),
    mute(7)
}
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The PHY parameters being flagged in the DEPI session as  
DEPI TSID group dependencies.

A value of all bits on zero indicates no TSID group  
dependencies for PHY parameters. If this object value is  
the zero length string , indicates no DEPI session is  
configured for the M-CMTS Downstream interface or the  
Downstream interface is of the type 'integrated'."

DEFVAL { "h }

::= { docsIfMCmtsCoreDownstreamEntry 2 }

-----  
-- DOCSIS RF Interface Extension objects

-- M-CMTS EQAM device Extensions  
-----

docsIfMCmtsEqamDownstreamTable OBJECT-TYPE

```
SYNTAX  SEQUENCE OF DocsIfMCmtsEqamDownstreamEntry
```

```
MAX-ACCESS not-accessible
```

---

```

STATUS    current
DESCRIPTION
    "M-CMTS EQAM extensions for the DOCSIS RFI Downstream
    docsIfDownstreamTable."
::= { docsIfMCmtsEqamObjects 1 }

docsIfMCmtsEqamDownstreamEntry OBJECT-TYPE
SYNTAX    DocsIfMCmtsEqamDownstreamEntry
MAX-ACCESS not-accessible
STATUS    current
DESCRIPTION
    "A conceptual row for this table."
INDEX { ifIndex }
::= { docsIfMCmtsEqamDownstreamTable 1 }

DocsIfMCmtsEqamDownstreamEntry ::= SEQUENCE
{
    docsIfMCmtsEqamDownstreamTSID             Unsigned32,
    docsIfMCmtsEqamDownstreamPhyDependencies  BITS,
    docsIfMCmtsEqamDownstreamDevicePhyParamLock  BITS,
    docsIfMCmtsEqamDownstreamDeviceConfigPhyParamLock  BITS,
    docsIfMCmtsEqamDownstreamAllocationType      INTEGER,
    docsIfMCmtsEqamDownstreamAllocationStatus    BITS,
    docsIfMCmtsEqamDownstreamAllocationTimeout  Unsigned32,
    docsIfMCmtsEqamDownstreamDRRPAvertizing     TruthValue,
    docsIfMCmtsEqamDownstreamUdpPortMapping     InetPortNumber
}

docsIfMCmtsEqamDownstreamTSID OBJECT-TYPE
SYNTAX    Unsigned32 (0..65535)
MAX-ACCESS read-write
STATUS    current
DESCRIPTION
    "Represents the TSID value for the QAM channel of this
    M-CMTS Downstream Interface.
    The value '0' indicates no TSID is being configured in the
    EQAM device for this interface entry."
::= { docsIfMCmtsEqamDownstreamEntry 1 }

docsIfMCmtsEqamDownstreamPhyDependencies OBJECT-TYPE
SYNTAX    BITS {
    frequency(0),
    bandwidth(1),
    power(2),
    modulation(3),
    interleaver(4),
    j83Annex(5),
    symbolRate(6),
    mute(7)
}
MAX-ACCESS read-only
STATUS    current
DESCRIPTION
    "The summary of the M-CMTS Downstream Interface
    dependencies based on the constraints of
    docsIfMCmtsEqamGroupDependencyEntry.
    A BIT position set to '1' indicates the PHY parameter
    belongs to a dependency group (DEPI TSID group).
    The opposite, a BIT position set to '0', indicates
    the QAM channel does not belong to a dependency group."
DEFVAL { "h }
::= { docsIfMCmtsEqamDownstreamEntry 2 }

```

---

docsIfMCmtsEqamDownstreamDevicePhyParamLock OBJECT-TYPE

SYNTAX BITS {  
frequency(0),  
bandwidth(1),  
power(2),  
modulation(3),  
interleaver(4),  
j83Annex(5),  
symbolRate(6),  
mute(7)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates if by design the QAM Channel is directly configurable. This BIT set is derived from the dependency group a QAM channel belongs where docsIfMCmtsEqamGroupDependencyType is equal to docsPHYParamFixValue

When a specific BIT is set to '1', the PHY parameter in docsIfMCmtsDepsessionConfigTable is locked for SNMP SETs, returning 'notWritable' on SET attempts.

When a specific BIT is set to '0', the PHY parameter in docsIfMCmtsDepsessionConfigTable is processed.

Note that when a BIT is set to '0' an SNMP SET as described above may affect the PHY parameter in other QAM channels as described in docsIfMCmtsEqamGroupDependencyTable or rejected with error 'wrongValue' based on the constraints indicated by the EQAM capabilities

docsIfMCmtsEqamDownstreamCapabilitiesTable of DOCS-If-M-CMTS-MIB.

This object contains information that is used to signal 'lock' PHY parameters to other entities via interfaces such as DEPI and ERML."

::= { docsIfMCmtsEqamDownstreamEntry 3 }

docsIfMCmtsEqamDownstreamDeviceConfigPhyParamLock OBJECT-TYPE

SYNTAX BITS {  
frequency(0),  
bandwidth(1),  
power(2),  
modulation(3),  
interleaver(4),  
j83Annex(5),  
symbolRate(6),  
mute(7)  
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Administrative configuration of lock bits for EQAM channels PHY parameters.

A BIT set of this object is meaningful when the same BIT set in docsIfMCmtsEqamDownstreamDevicePhyParamLock is set to '0'. Therefore, a SET to this object when the entry value of docsIfMCmtsEqamDownstreamDevicePhyParamLock is set to '1' returns error 'wrongValue'.

When a PHY parameter BIT in this object is set to '1' the QAM channel PHY parameter in

---

docsIfMCmtsDepiSessionConfigTable is locked  
for SNMP SETs returning error 'notWritable' on those  
attempts.

Sets to this object could be complex; as a rule of  
thumb, SNMP agents ignore bits that are not recognized  
(e.g., extensions). An attempt to set BITS while  
docsIfMCmtsEqamDownstreamDeviceConfigPhyParamLock is set  
to '1' is rejected and the error code 'wrongValue' is  
returned."

::= { docsIfMCmtsEqamDownstreamEntry 4 }

docsIfMCmtsEqamDownstreamAllocationType OBJECT-TYPE

SYNTAX INTEGER {  
docsisOnly(1),  
videoOnly(2),  
any(3)  
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates the mechanisms authorized to reserve and control  
this M-CMTS Downstream interface.

When configured to 'docsisOnly' indicates that it can be  
allocated only to serve data over DOCSIS.

When configured to 'videoOnly' indicates that it can be  
allocated only to video services and not for Data over  
DOCSIS.

'any' indicates the M-CMTS Downstream Interface can be  
reserved for DOCSIS or video services."

::= { docsIfMCmtsEqamDownstreamEntry 5 }

docsIfMCmtsEqamDownstreamAllocationStatus OBJECT-TYPE

SYNTAX BITS {  
other(0),  
docsisDepi(1),  
docsisErm(2),  
videoErm(3)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates the service(s) the M-CMTS Downstream Interface  
is allocated for.

'other' BIT set to '1' indicates the resource is currently  
allocated to DOCSIS and/or Video services by a proprietary  
mechanism.

'docsisDepi' BIT set to '1' indicates the DEPI Control  
mechanism is currently in use in the M-CMTS Downstream  
Interface allocation, e.g., an L2TPv3 DEPI Session.

'docsisErm' indicates that ERM Resource Allocation  
Interface is being used in the M-CMTS Downstream Interface  
allocation.

'video' indicates the resource is currently allocated by a  
video control plane using an extension of the M-CMTS ERM  
Resource Control Plane.

All BITS set to zero or a zero-length octet string  
indicates the M-CMTS Downstream Interface is available for  
allocation constrained to the type of resource allocation  
referenced by docsIfMCmtsEqamDownstreamAllocationType.

---

It may be the case where several BITS are set to '1' simultaneously:  
The most common case is 'docsisDepi' and 'docsisERM' BITS.  
In this situation, the ERM has allocated the QAM channel and the DEPI Session handles optional parameters configuration and/or in-band link status.

Combinations like 'docsisDepi' and 'videoERM' may indicate concurrent services, which is vendor specific."

#### REFERENCE

"DEPI L2TP ERM RTSP section 7"

::= { docsIfMCmtsEqamDownstreamEntry 6 }

#### docsIfMCmtsEqamDownstreamAllocationTimeout OBJECT-TYPE

SYNTAX Unsigned32 (0..120)

UNITS "seconds"

MAX-ACCESS read-write

STATUS current

#### DESCRIPTION

"Indicates the number of seconds the EQAM device waits before advertising the QAM channel resource is idle and/or accepting a session establishment from a different control plane to the previous one. As a side effect, the entry in docsIfMCmtsDepiSessionConfigTable is aged out and destroyed only after the expiration of this reservation timeout. A value zero makes the resource available immediately for allocation to others.

Note that not explicit indefinite timeout needs to be defined to indicate exclusive allocation to a requester. The EQAM device can support this condition for example by configuring restricted access to certain Resource Allocation control plane to a particular IP host in the form of source IP or authentication mechanisms."

::= { docsIfMCmtsEqamDownstreamEntry 7 }

#### docsIfMCmtsEqamDownstreamDRRPAdvertizing OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

#### DESCRIPTION

"Indicates when a QAM channel resource should be advertised via DRRP (DOCSIS Resource Registration Protocol) to an Edge Resource Manager (ERM).

This Object is useful when a device is allocated for instance to DOCSIS only by a static reservation (docsIfMCmtsEqamDownstreamAllocationType 'docsisOnly'). It means an Edge Resource Manager won't have this QAM channel resource available allocate upon requests from different entities.

Note that DRRP currently does not signal EQAM resources as reserved for a particular service. The MIB objects docsIfMCmtsEqamDownstreamDRRPAdvertizing and docsIfMCmtsEqamDownstreamAllocationType are used primarily to statically reserve QAM channels and prevent its allocation by dynamic means such ERM or some other existing mechanisms. Therefore, caution is needed when setting this object to 'true' since the allocation Type docsIfMCmtsEqamDownstreamAllocationType is not known by ERMs with DRRP support."

---

```

DEFVAL { true }
::= { docsIfMCmtsEqamDownstreamEntry 8 }

docsIfMCmtsEqamDownstreamUdpPortMapping OBJECT-TYPE
SYNTAX      InetPortNumber
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The UDP Port within a L2TPv3 Session PDU the EQAM uses
    to map DEPI flows to the EQAM channels associated to this
    table entry.
    When the EQAM device does not support UDP port mapping to
    DEPI flows, this object reports the value 1701 (the default
    UDP port when M-CMTS Initiates a DEPI session with L2TPv3
    header over UDP)."
::= { docsIfMCmtsEqamDownstreamEntry 9 }
--
-- EQAM M-CMTS Downstream Interface Capabilities
--

docsIfMCmtsEqamDownstreamCapabilitiesTable OBJECT-TYPE
SYNTAX      SEQUENCE OF DocsIfMCmtsEqamDownstreamCapabilitiesEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "This table contains the QAM channel capabilities
    for the M-CMTS Downstream Interface PHY parameters in the
    EQAM device."
::= { docsIfMCmtsEqamObjects 2 }

docsIfMCmtsEqamDownstreamCapabilitiesEntry OBJECT-TYPE
SYNTAX      DocsIfMCmtsEqamDownstreamCapabilitiesEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "A conceptual row for this table."
INDEX { ifIndex }
::= { docsIfMCmtsEqamDownstreamCapabilitiesTable 1 }

DocsIfMCmtsEqamDownstreamCapabilitiesEntry ::= SEQUENCE
{
    docsIfMCmtsEqamDownstreamCapabFrequency          BITS,
    docsIfMCmtsEqamDownstreamCapabBandwidth          BITS,
    docsIfMCmtsEqamDownstreamCapabPower              BITS,
    docsIfMCmtsEqamDownstreamCapabModulation         BITS,
    docsIfMCmtsEqamDownstreamCapabInterleaver        BITS,
    docsIfMCmtsEqamDownstreamCapabJ83Annex          BITS,
    docsIfMCmtsEqamDownstreamCapabConcurrentServices BITS,
    docsIfMCmtsEqamDownstreamCapabServicesTransport  BITS,
    docsIfMCmtsEqamDownstreamCapabMuting             BITS
}

docsIfMCmtsEqamDownstreamCapabFrequency OBJECT-TYPE
SYNTAX      BITS {
    eqamDependency(0),
    adjacentChannel(1),
    adjacentChannelOrder(2)
}
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The QAM channel frequency capabilities."

```

---

---

'eqamDependency' BIT set to '1' indicates the QAM channel frequency value has dependencies with other QAM channels and an entry that includes this QAM channel is in docsIfMCmtsEqamGroupDependencyTable for the PHY parameter 'frequency'.

'adjacentChannel' BIT set to '1' indicates the QAM channel frequencies in the dependency group (DEPI TSID group) are adjacent and constrained in a frequency range based on the number of QAM channels in the dependency group.

'adjacentChannelOrder' BIT set to '1' indicates the QAM channel frequency adjacency is based in the QAM channel sequence like entPhysicalParentRelPos in EntPhysicalTable or other vendor sequence.

e.g., a dependency group of four QAM channels with 'adjacentChannelOrder' BIT set to '1':  
The 4th QAM channel in the sequence gets a frequency assignment  $f + 1 * \text{bandwidth}$  when the frequency value of the 3rd QAM channel in the sequence is set to  $f$ .  
Similarly the 1st QAM channel in the sequence gets a frequency assignment of  $f - 2 * \text{bandwidth}$  and the 2nd QAM channels gets a frequency of  $f - 1 * \text{bandwidth}$ .

'adjacentChannel' 'adjacentChannelOrder' BITs may be set to '1' when a dependency group includes the QAM channel of this M-CMTS Downstream interface and the value of the object docsIfMCmtsEqamGroupDependencyType is docsPHYParamAdjacentValues.

'adjacentChannel' BIT may be set to '1' if 'eqamDependency' BIT is set to '1'. The same way, 'adjacentChannelOrder' BIT may be set to '1' and implies 'adjacentChannel' BIT is set to '1'."

::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 1 }

docsIfMCmtsEqamDownstreamCapabBandwidth OBJECT-TYPE

```
SYNTAX BITS {
    eqamDependency(0),
    chan6Mhz(1),
    chan8Mhz(2)
}
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The QAM channel Bandwidth capabilities.  
'eqamDependency' BIT set to '1' indicates the QAM channel bandwidth value has dependencies with other QAM channels as indicated in docsIfMCmtsEqamGroupDependencyTable.

'chan6Mhz' set to '1' indicates 6 MHz channel width support.  
'chan8Mhz' set to '1' indicates 8 MHz channel width support.

When 'eqamDependency' BIT is set to '1', a set to the channel bandwidth PHY parameter of a QAM channels in a dependency group (with docsIfMCmtsEqamGroupDependencyType set to docsPHYParamSameValue), sets the same channel bandwidth value to all QAM channels in the dependency group."

---

::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 2 }

docsIfMCmtsEqamDownstreamCapabPower OBJECT-TYPE

SYNTAX BITS {  
  eqamDependency(0)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The QAM channel Power capabilities.  
'eqamDependency' BIT set to '1' indicates the QAM channel power value has dependencies with other QAM channels as indicated in docsIfMCmtsEqamGroupDependencyTable.

When 'eqamDependency' BIT is set to '1', a set to the power level PHY parameter of a QAM channels in a dependency group (with docsIfMCmtsEqamGroupDependencyType set to docsPHYParamSameValue), sets the same power level to all QAM channels in the dependency group."

::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 3 }

docsIfMCmtsEqamDownstreamCapabModulation OBJECT-TYPE

SYNTAX BITS {  
  eqamDependency(0),  
  qam64(1),  
  qam256(2)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The QAM channel Modulation capabilities.  
'eqamDependency' BIT set to '1' indicates the QAM channel modulation value has dependencies with other QAM channels as indicated in docsIfMCmtsEqamGroupDependencyTable.

'qam64' set to '1' indicates 64 QAM modulation support.  
'qam256' set to '1' indicates 256 QAM modulation support.

When 'eqamDependency' BIT is set to '1', a set to the modulation PHY parameter of a QAM channels in a dependency group (with docsIfMCmtsEqamGroupDependencyType set to docsPHYParamSameValue), sets the same modulation type to all QAM channels in the dependency group."

::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 4 }

docsIfMCmtsEqamDownstreamCapabInterleaver OBJECT-TYPE

SYNTAX BITS {  
  eqamDependency(0),  
  taps8Increment16(1),  
  taps16Increment8(2),  
  taps32Increment4(3),  
  taps64Increment2(4),  
  taps128Increment1(5),  
  taps12increment17(6),  
  taps128increment2(7),  
  taps128increment3(8),  
  taps128increment4(9),  
  taps128increment5(10),  
  taps128increment6(11),  
  taps128increment7(12),  
  taps128increment8(13)  
}

---

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The QAM channel Interleaver capabilities.

'eqamDependency' BIT set to '1' indicates the QAM channel interleave value has dependencies with other QAM channels as indicated in docsIfMCmtsEqamGroupDependencyTable.

'taps8Increment16' set to '1' indicates the support of  
j = 8, i = 16 interleave.

'taps16Increment8' set to '1' indicates the support of  
j = 16, i = 8 interleave.

'taps32Increment4' set to '1' indicates the support of  
j = 32, i = 4 interleave.

'taps64Increment2' set to '1' indicates the support of  
j = 64, i = 2 interleave.

'taps128Increment1' set to '1' indicates the support of  
j = 128, i = 1 interleave.

'taps12increment17' set to '1' indicates the support of  
j = 12, i = 17 interleave.

'tabs128increment2' set to '1' indicates the support of  
j = 128, i = 2 interleave.

'tabs128increment3' set to '1' indicates the support of  
j = 128, i = 3 interleave.

'tabs128increment4' set to '1' indicates the support of  
j = 128, i = 4 interleave.

'tabs128increment5' set to '1' indicates the support of  
j = 128, i = 5 interleave.

'tabs128increment6' set to '1' indicates the support of  
j = 128, i = 6 interleave.

'tabs128increment7' set to '1' indicates the support of  
j = 128, i = 7 interleave.

'tabs128increment8' set to '1' indicates the support of  
j = 128, i = 8 interleave.

When 'eqamDependency' BIT is set to '1', a set to the interleave PHY parameter of a QAM channels in a dependency group (with docsIfMCmtsEqamGroupDependencyType set to docsPHYParamSameValue), sets the same Interleave value to all QAM channels in the dependency group."  
::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 5 }

docsIfMCmtsEqamDownstreamCapabJ83Annex OBJECT-TYPE

```
SYNTAX BITS {  
    eqamDependency(0),  
    annexA(1),  
    annexB(2),  
    annexC(3)  
}
```

MAX-ACCESS read-only

---

STATUS current

DESCRIPTION

"The QAM channel J.83 Annex Capabilities.  
'eqamDependency' BIT set to '1' indicates the QAM channel J.83 Annex value has dependencies with other QAM channels as indicated in docsIfMCmtsEqamGroupDependencyTable.

'annexA' set to '1' indicates J.83 Annex A support.  
'annexB' set to '1' indicates J.83 Annex B support.  
'annexC' set to '1' indicates J.83 Annex C support.

When 'eqamDependency' BIT is set to '1', a set to the J.83 Annex PHY parameter of a QAM channels in a dependency group (with docsIfMCmtsEqamGroupDependencyType set to docsPHYParamSameValue), sets the same J.83 Annex value to all QAM channels in the dependency group."

::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 6 }

docsIfMCmtsEqamDownstreamCapabConcurrentServices OBJECT-TYPE

SYNTAX BITS {  
eqamDependency(0),  
videoAndDocsis(1)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The QAM channel Concurrent Services Capabilities.  
'eqamDependency' BIT set to '1' indicates the QAM channel is part of a dependency group that supports concurrent services mode as indicated in docsIfMCmtsEqamGroupDependencyTable.

'videoAndDocsis' BIT set to '1' indicates video transport and DOCSIS transport can be supported simultaneously.

Video and DOCSIS transport service types are described in docsIfMCmtsEqamDownstreamCapabServicesTransport."

::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 7 }

docsIfMCmtsEqamDownstreamCapabServicesTransport OBJECT-TYPE

SYNTAX BITS {  
qamDependency(0),  
mpeg2OverIP(1),  
dmpt(2),  
psp(3)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The QAM channel Services transports modes Capabilities.

'eqamDependency' BIT set to '1' indicates the QAM channel Service transport type has dependencies with other QAM channels as indicated in docsIfMCmtsEqamGroupDependencyTable.

'mpeg2OverIP' set to '1' indicates video transports as conventional VoD is supported (known as MPT mode, MPEG-2 transport).

'dmpt' set to 1 indicates DOCSIS MPT mode (D-MPT) support.

'psp' set to 1 indicates DOCSIS Packet Streaming Protocol mode (PSP) support.

---

When 'eqamDependency' BIT is set to '1', a request to set a QAM channel to a service type in a dependency group (with docsIfMCmtsEqamGroupDependencyType set to docsPHYParamSameValue) may be rejected."

::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 8 }

docsIfMCmtsEqamDownstreamCapabMuting OBJECT-TYPE

SYNTAX BITS {  
eqamDependency(0)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The QAM channel muting capabilities.  
'eqamDependency' BIT set to '1' indicates the EQAM Mute state has dependencies with other QAM channels as indicated in docsIfMCmtsEqamGroupDependencyTable.

When 'eqamDependency' BIT is set to '1', a request to mute a QAM channels in a dependency group (with docsIfMCmtsEqamGroupDependencyType set to docsPHYParamSameValue), sets all QAM channels in the dependency group to mute."

::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 9 }

-----  
-- EQAM M-CMTS Group Dependency of PHY parameters Definitions  
-- Defines the group of QAM channels that may be impacted for  
-- individual QAM channels PHY parameters changes. Extends ENTITY-MIB  
-----

docsIfMCmtsEqamGroupDependencyTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsIfMCmtsEqamGroupDependencyEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table describes the rules that identify groups of QAM channels with PHY parameters dependencies. A PHY parameter dependency group means that a set to a QAM channel parameter may affect the value of other QAM Channels in the group.

TSID is a broadcast term borrowed by the M-CMTS architecture to represent a unique identifier of QAM channels in the M-CMTS architecture.

TSID Group is the DEPI concept of a set of QAM channels with a PHY parameter dependency. This module refers to TSID group as a PHY dependency Group.

This table uses the ENTITY-MIB physical component structure to allows the managed system to describe the QAM channels' PHY parameters dependencies. A management entity can use the information from this table to generate the DEPI TSID Groups.

Examples of PHY dependencies could be usage of adjacent frequencies, or QAM channels of RF ports restricted, or same interleaver value, modulation and J.83 Annex value.

Additional details and rules to describe the PHY parameter

---

dependency is indicated in  
docsIfMCmtsEqamGroupDependencyType.  
Vendors may extend via other MIB modules the usage of  
docsIfMCmtsEqamGroupDependencyType."  
::= { docsIfMCmtsEqamObjects 3 }

docsIfMCmtsEqamGroupDependencyEntry OBJECT-TYPE  
SYNTAX DocsIfMCmtsEqamGroupDependencyEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION

"A conceptual row of this table.

QAM channels are modeled as PhysicalClass 'port' from  
the ENTITY-MIB.

An QAM channel can be represented as part of an entity  
MIB containment tree as follows:

```
chassis(EQAM device)
  .container(EQAM Slot)
    .module(field-replaceable-module)
      .module ( Physical RF spigot)
        . port (QAM channel)
```

PhysicalClass 'stack' is left optional and not included  
as a reference or examples for this table.

Based on the hardware capabilities the Agent will create  
entries in this table including the entPhysicalEntry of  
the close element to the root (e.g., up to 'chassis' or  
'stack') including the PHY parameter of the dependency  
as part of the entry index

The Aggregation is then defined as all the QAM channels  
(entity PhysicalClass = 'port') below the tree as  
indicated in entyPhysicalContainsTable.

Logical or software dependencies of the QAM channels PHY  
parameters in addition to the hardware dependency entries  
can be present and MUST persist to system  
re-initialization. The storage realization of hardware  
dependent entries are 'permanent' or 'readOnly'. The  
storage realization of logical dependency entries is  
'nonVolatile'.

PHY parameters dependencies being logically defined may be  
present in this table but its configuration is outside of  
the scope of this MIB Module, including the definition of  
simulated Physical components such backplane types or  
modules accomplish its logical grouping.

PHY parameters with no Physical entities associated in  
this table indicates no PHY dependencies for certain groups  
of QAM channels.

Administrative changes to the  
docsIfMCmtsEqamGroupDependencyPhyParamLock are preserved in  
non-volatile memory upon system re-initialization.

Note that any change in the system due to the  
insertion or removal or components will reset to factory  
default the entries associated to those components.

---

An entry in this table is reflected in the MIB object docsIfMExtDownstreamTSIDGroupPhyParamFlag for individual QAM channels.

A recursive method to find the PHY dependency group of an QAM channel A, PHY parameter X is as follows:

The parent tree of QAM channel A is recursively calculated by navigating entyPhysicalContainsTable from bottom to top Pi(P1..Pn)

The list Mj (M1..Mn) of docsIfMCmtsEqamGroupDependencyPhysicalIndex represents the values from this table with PHY parameter docsIfMCmtsEqamGroupDependencyPhyParam X and/or 'all'

The list Qi (Q1..n) is the list of matches of Mi in Pi

Qi with the lower position in the entyPhysicalContainsTable is selected Qy and My is the group criteria selected.

All QAM channels Bi below My are candidates of being in the dependency group.

Each Bi is verified as A for its own BPi parent tree to verify that in effect My is the lowest denominator in Mi BPi intersection to become part of the Dependency Group of A."

```
INDEX { docsIfMCmtsEqamGroupDependencyPhyParam,
        docsIfMCmtsEqamGroupDependencyPhysicalIndex }
 ::= { docsIfMCmtsEqamGroupDependencyTable 1 }
```

```
DocsIfMCmtsEqamGroupDependencyEntry ::= SEQUENCE
{
    docsIfMCmtsEqamGroupDependencyPhyParam    INTEGER,
    docsIfMCmtsEqamGroupDependencyPhysicalIndex PhysicalIndexOrZero,
    docsIfMCmtsEqamGroupDependencyGroupID     Unsigned32,
    docsIfMCmtsEqamGroupDependencyType       AutonomousType
}
```

docsIfMCmtsEqamGroupDependencyPhyParam OBJECT-TYPE

```
SYNTAX INTEGER {
    noDependencies(0),
    all(1),
    frequency(2),
    bandwidth(3),
    power(4),
    modulation(5),
    interleave(6),
    annex(7),
    symbolRate(8),
    mute(9)
}
```

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This object represents the type of DOCSIS PHY parameter that may have dependencies when setting an individual object in the dependency group.

The value 'all' may be used as a wildcard to indicate all PHY parameters. The other enumeration values are DOCSIS PHY parameters.

---

The opposite to 'all' is 'noDependencies', which indicates no dependencies in PHY parameters, but is only used to indicate no dependencies across all the EQAM device. Thus, when used, 'noDependencies' is accompanied by docsIfMCmtsEqamGroupDependencyPhysicalIndex '0' as the only entry in the table.

In this way it is clearly distinguished when an EQAM device has dependencies instead of an empty table."

```
::= { docsIfMCmtsEqamGroupDependencyEntry 1 }
```

docsIfMCmtsEqamGroupDependencyPhysicalIndex OBJECT-TYPE

SYNTAX PhysicalIndexOrZero

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Indicates the physical element from where the PHY parameter dependency for QAM channels applies. All the QAM channels elements under this Physical index will belong to a dependency group of the specified PHY parameter."

```
::= { docsIfMCmtsEqamGroupDependencyEntry 2 }
```

docsIfMCmtsEqamGroupDependencyGroupID OBJECT-TYPE

SYNTAX Unsigned32 (1..127)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The internal ID assigned for the QAM channels in the dependency group.

The value of this object is unique in the scope of the PHY parameter being mapped."

```
::= { docsIfMCmtsEqamGroupDependencyEntry 3 }
```

docsIfMCmtsEqamGroupDependencyType OBJECT-TYPE

SYNTAX AutonomousType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The description of the type of dependency associated with this dependency group.

Basic type of dependencies are docsPHYParamSameValue, docsPHYParamAdjacentValues, docsPHYParamFrequencyRange.

Vendors may define their own rules and policies to describe their implementation dependency definitions such as RowPointers to table entries or OBJECT-IDENTITY clauses.

If the dependency is not described this object is set to zeroDotZero, although the dependency does exist."

```
::= { docsIfMCmtsEqamGroupDependencyEntry 4 }
```

```
-----  
-- EQAM M-CMTS Global configuration  
-- Defines the structure to include configuration rules applicable  
-- at EQAM device initialization and management actions  
-- Uses the containment structure of the ENTITY-MIB to create the global  
-- configuration rules.  
-----
```

docsIfMCmtsEqamGlobCfgDownTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsIfMCmtsEqamGlobCfgDownEntry

MAX-ACCESS not-accessible

STATUS current

---

DESCRIPTION

"A Table for setting multiple parameters of multiple QAM channels.  
Creating an entry in this table will set automatically all QAM Channels in the containment tree of docsIfMCmtsEqamGlobCfgDownPhysicalIndex in entPhysicalContainsTable to the parameter values specified during the row creation.

docsIfMCmtsEqamGlobCfgDownPhysicalIndex MUST be a valid Physical index of entPhysicalTable.

The ways to configure QAM channels parameters are:

1) Globally.

Using this table, docsIfMCmtsEqamGlobCfgDownTable

2) Directly.

Using docsIfMCmtsEqamDownstreamTable and docsIfDownstreamChannelTable to change parameters and lock status of individual QAM channels.

In general an entry in this table will set the parameters of QAM channels of the containment tree recursively the same way as doing directly as described in 2)above. It means, potentially there could be rejections based on locked parameters and/or PHY dependencies that prevent the sets.

The row creation in this table is not rejected or set in 'inactive' or 'notInService' state due individual QAM channels in the group failures due the global set, instead, an error status is reported per entry.

The processing of the entries in this table (e.g., at system initialization) is sequential; therefore, it could be overlapping rules based on the containment tree level of the entries."

::= { docsIfMCmtsEqamObjects 4 }

docsIfMCmtsEqamGlobCfgDownEntry OBJECT-TYPE

SYNTAX DocsIfMCmtsEqamGlobCfgDownEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The index of this table.

Entries in this table persist after system re-initialization.

It is common to have 'holes' in this table since not all the parameters associated with a QAM channel might be desired of global set, therefore, columnar values do not handle default values for entry creation."

INDEX { docsIfMCmtsEqamGlobCfgDownIndex }

::= { docsIfMCmtsEqamGlobCfgDownTable 1 }

DocsIfMCmtsEqamGlobCfgDownEntry ::= SEQUENCE

```
{
docsIfMCmtsEqamGlobCfgDownIndex      Unsigned32,
docsIfMCmtsEqamGlobCfgDownPhysicalIndex PhysicalIndexOrZero,
docsIfMCmtsEqamGlobCfgDownBandwidth  Integer32,
docsIfMCmtsEqamGlobCfgDownPower      TenthdBmV,
docsIfMCmtsEqamGlobCfgDownModulation INTEGER,
docsIfMCmtsEqamGlobCfgDownInterleave INTEGER,
docsIfMCmtsEqamGlogCfgDownAnnex     INTEGER,
```

---

```

docsIfMCmtsEqamGlobCfgDownSymbolRateM Unsigned32,
docsIfMCmtsEqamGlobCfgDownSymbolRateN Unsigned32,
docsIfMCmtsEqamGlobCfgDownLockParams BITS,
docsIfMCmtsEqamGlobCfgDownExecutionCode INTEGER,
docsIfMCmtsEqamGlobCfgDownErrorsCount Gauge32,
docsIfMCmtsEqamGlobCfgDownRowStatus RowStatus
}

docsIfMCmtsEqamGlobCfgDownIndex OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
    "The unique identifier of entries in this table."
 ::= { docsIfMCmtsEqamGlobCfgDownEntry 1 }

docsIfMCmtsEqamGlobCfgDownPhysicalIndex OBJECT-TYPE
SYNTAX PhysicalIndexOrZero
MAX-ACCESS read-create
STATUS current
DESCRIPTION
    "The ENTITY-MIB Physical Index that includes the QAM
    channels associated to the global parameter being set.
    The QAM Channels covered by this global set are those
    linked to the entPhysicalContainsTable containment tree
    starting at the value of this object.
    The value '0' indicates all containment
    elements in the managed system."
 ::= { docsIfMCmtsEqamGlobCfgDownEntry 2 }

docsIfMCmtsEqamGlobCfgDownBandwidth OBJECT-TYPE
SYNTAX Integer32 (6000000 | 8000000)
UNITS "hertz"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
    "The object for global configuration of Downstream
    channel bandwidth of the QAM channels in the containment
    tree of docsIfMCmtsEqamGlobCfgDownPhysicalIndex.
    A set to this object is reflected in docsIfDownChannelWidth
    of the QAM channels being set.
    The syntax of this object is Integer32 to maintain the same
    type of docsIfDownChannelWidth as initially defined in
    RFC 2670."
 ::= { docsIfMCmtsEqamGlobCfgDownEntry 3 }

docsIfMCmtsEqamGlobCfgDownPower OBJECT-TYPE
SYNTAX TenthdBmV
UNITS "dBmV"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
    "The object for global configuration of Downstream
    channel Power Level of the QAM channels in the containment
    tree of docsIfMCmtsEqamGlobCfgDownPhysicalIndex.
    A set to this object is reflected in
    docsIfDownChannelPower of the QAM channels being set."
 ::= { docsIfMCmtsEqamGlobCfgDownEntry 4 }

docsIfMCmtsEqamGlobCfgDownModulation OBJECT-TYPE
SYNTAX INTEGER {

```

---

```

    qam64(3),
    qam256(4)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
    "The object for global configuration of Downstream
    channel modulation of the QAM channels in the containment
    tree of docsIfMCmtsEqamGlobCfgDownPhysicalIndex.
    A set to this object is reflected in
    docsIfDownChannelModulation of the QAM channels being set.
    Values '1' and '2' are not used, only '3' and '4' to
    maintain compatibility with docsIfDownChannelModulation
    enumeration values initially defined in RFC 2670."
 ::= { docsIfMCmtsEqamGlobCfgDownEntry 5 }

```

docsIfMCmtsEqamGlobCfgDownInterleave OBJECT-TYPE

```

SYNTAX INTEGER {
    unknown(1),
    other(2),
    taps8Increment16(3),
    taps16Increment8(4),
    taps32Increment4(5),
    taps64Increment2(6),
    taps128Increment1(7),
    taps12increment17(8),
    tabs128increment2(9),
    tabs128increment3(10),
    tabs128increment4(11),
    tabs128increment5(12),
    tabs128increment6(13),
    tabs128increment7(14),
    tabs128increment8(15)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
    "The object for global configuration of Downstream
    channel interleave of the QAM channels in the containment
    tree of docsIfMCmtsEqamGlobCfgDownPhysicalIndex.
    A set to this object is reflected in
    docsIfDownChannelInterleave of the QAM channels being set.
    Values are defined as follows:
        64QAM/256QAM
    '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

```

Values below are not defined for DOCSIS RFI MIB for docsIfDownChannelInterleave. The EQAM Channel supports these values for video services (see docsIfMCmtsEqamDownstreamCapabInterleaver specific EQAM supported values).

---

```

'tabs128increment2': protection 190/132 usec,
                    latency    8/5.6 msec
'tabs128increment3': protection 285/198 usec,
                    latency    12/8.4 msec
'tabs128increment4': protection 379/264 usec,
                    latency    16/11 msec
'tabs128increment5': protection 474/330 usec,
                    latency    20/14 msec
'tabs128increment6': protection 569/396 usec,
                    latency    24/17 msec
'tabs128increment7': protection 664/462 usec,
                    latency    28/19 msec
'tabs128increment8': protection 759/528 usec,
                    latency    32/22 msec

```

Setting this object without setting docsIfMCmtsEqamGlogCfgDownAnnex may end up with particular QAM channels set rejections due to incompatible Annex parameters, in which case the error 'errorSetFailures' is reported in docsIfMCmtsEqamGlobCfgDownExecutionCode."

```

::= { docsIfMCmtsEqamGlobCfgDownEntry 6 }

```

docsIfMCmtsEqamGlogCfgDownAnnex OBJECT-TYPE

```

SYNTAX    INTEGER {
    annexA(3),
    annexB(4),
    annexC(5)
}

```

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The object for global configuration of Downstream channel J.83 Annex of the QAM channels in the containment tree of docsIfMCmtsEqamGlobCfgDownPhysicalIndex. A set to this object is reflected in docsIfDownChannelAnnex of the QAM channels being set. Values '1' and '2' are not used, only '3', '4' and '5' to maintain compatibility with docsIfDownChannelAnnex enumeration values initially defined in RFC 2670.

This object set has dependencies with docsIfDownChannelInterleave, docsIfMCmtsEqamGlobCfgDownBandwidth and probably docsIfMCmtsEqamGlobCfgDownSymbolRateM/N, in particular in the rare event of changing the J.83 Annex type for the already configured EQAM.

An entry set with an invalid combination of J.83 Annex PHY parameters mentioned above is not executed and reported as error code 'errorNoCommitted' in docsIfMCmtsEqamGlobCfgDownExecutionCode.

If an entry sets this object but any of the other J.83 Annex PHY related objects, is missing, the missing parameters are set to a default value only in the case of a change of J.83 Annex type (e.g., setting Annex A when currently in Annex B)."

```

::= { docsIfMCmtsEqamGlobCfgDownEntry 7 }

```

docsIfMCmtsEqamGlobCfgDownSymbolRateM OBJECT-TYPE

```

SYNTAX    Unsigned32 (1..65535)

```

---

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The object for global configuration of Downstream channel Symbol M factor of the QAM channels in the containment tree of docsIfMCmtsEqamGlobCfgDownPhysicalIndex.

When setting M and N Symbol Rate parameters, both docsIfMCmtsEqamGlobCfgDownSymbolRateM and docsIfMCmtsEqamGlobCfgDownSymbolRateN objects MUST be present in the entry, otherwise an error code 'notCommitted' is reported in docsIfMCmtsEqamGlobCfgDownExecutionCode of this entry.

Setting this object without setting docsIfMCmtsEqamGlogCfgDownAnnex may end up with particular QAM channels set rejections due to incompatible Annex parameters, in which case the error 'errorSetFailures' is reported in docsIfMCmtsEqamGlobCfgDownExecutionCode."

::= { docsIfMCmtsEqamGlobCfgDownEntry 8 }

docsIfMCmtsEqamGlobCfgDownSymbolRateN OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The object for global configuration of Downstream channel Symbol M factor of the QAM channels in the containment tree of docsIfMCmtsEqamGlobCfgDownPhysicalIndex.

When setting M and N Symbol Rate parameters, both docsIfMCmtsEqamGlobCfgDownSymbolRateM and docsIfMCmtsEqamGlobCfgDownSymbolRateN objects MUST be present in the entry, otherwise an error code 'notCommitted' is reported in docsIfMCmtsEqamGlobCfgDownExecutionCode of this entry."

::= { docsIfMCmtsEqamGlobCfgDownEntry 9 }

docsIfMCmtsEqamGlobCfgDownLockParams OBJECT-TYPE

SYNTAX BITS {

frequency(0),  
bandwidth(1),  
power(2),  
modulation(3),  
interleaver(4),  
j83Annex(5),  
symbolRate(6),  
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The object for global configuration of Downstream channel lock state of the PHY parameters of the QAM channels in the containment tree of docsIfMCmtsEqamGlobCfgDownPhysicalIndex.

A locked PHY parameter is blocked for sets via Management or other means such as DEPI session.

Setting a BIT to '1' locks the corresponding PHY parameter for configuration, returning error 'wrongValue' on SET

---

attempts until administratively unlocked.

A set to this object is reflected in docsIfMCmtsEqamDownstreamDeviceConfigPhyParamLock of the QAM channels being set.

Note that setting a BIT to '0' does not necessarily grant write access to a PHY parameter, because of existing hardware constraints indicated in

docsIfMCmtsEqamDownstreamDevicePhyParamLock."

DEFVAL { "h }

::= { docsIfMCmtsEqamGlobCfgDownEntry 10 }

docsIfMCmtsEqamGlobCfgDownExecutionCode OBJECT-TYPE

SYNTAX INTEGER {  
complete(1),  
errorNoPhysIndex(2),  
errorNoQAMChannels(3),  
errorSetFailures(4),  
errorNoCommitted(5),  
warningDependencies(6),  
errorOther(7)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates the status of the global configuration entry execution. If different than 'none', represents the last error condition present.

'complete' indicates the Global configuration success with no errors.

'errorNoPhysIndex' indicates the value of docsIfMCmtsEqamGlobCfgDownPhysicalIndex does not exist.

'errorSetFailures' indicates the global set was commit but individual QAM channels reported errors on sets. The counter docsIfMCmtsEqamGlobCfgDownErrorCount is increased for each QAM channel set failure.

'errorNoCommitted' indicates the entry was not committed as sets to the associated QAM channels due to inconsistent PHY parameters. Few possible cases are:

- refer to the docsIfMCmtsEqamGlogCfgDownAnnex constraints and related Annex objects as it describes.

- setting a unique parameter with wrong syntax, leaving the entry in 'notReady' status See

RowStatus Object description.

'warningDependencies' indicates the command was executed and the system may have detected dependencies. This execution code is optional and considered a warning rather than an error, as the management entity can have knowledge about group dependencies prior to setting an entry by inspecting docsIfMCmtsEqamGroupDependencyTable.

'errorOther' indicates an error condition not considered in the above situations.

As multiple QAM channels are set only the last error condition is maintained in case of a no 'complete' execution status. A warning condition (e.g., 'warningDependencies' does not override an existing error condition (other enumeration values)."

::= { docsIfMCmtsEqamGlobCfgDownEntry 12 }

---

```
docsIfMCmtsEqamGlobCfgDownErrorsCount OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The number of error cases where a QAM channel was not
    successfully set. This value starts counting at zero
    any time the global configuration entry is executed.
    This object is reset back to zero in case of a successful
    set."
 ::= { docsIfMCmtsEqamGlobCfgDownEntry 13 }
```

```
docsIfMCmtsEqamGlobCfgDownRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
    "The status of this conceptual table row entry.
    In order to create an entry the object
    docsIfMCmtsEqamGlobCfgDownPhysicalIndex MUST be set
```

This table has 'holes' for all the read-create' objects not specified in the setup.

An entry is set to 'active' status if at least one read-create object of the list below is set, otherwise, the entry is in 'notReady' status.

```
docsIfMCmtsEqamGlobCfgDownBandwidth
docsIfMCmtsEqamGlobCfgDownPower
docsIfMCmtsEqamGlobCfgDownModulation
docsIfMCmtsEqamGlobCfgDownInterleave
docsIfMCmtsEqamGlogCfgDownAnnex
docsIfMCmtsEqamGlobCfgDownSymbolRateM
docsIfMCmtsEqamGlobCfgDownSymbolRateN
```

Once an entry is active the QAM channels associated to the docsIfMCmtsEqamGlobCfgDownPhysicalIndex containment tree are set to the parameters specified in the entry. The Entry remains in 'active' row status and the execution status is reported by docsIfMCmtsEqamGlobCfgDownExecutionCode.

Setting a previously set object to a new value or specifying an object not initially set during row creation, sets the entry in row status 'notInService'. A set of this object to 'active' triggers again the global configuration action. As a rule, the EQAM device is not expected to track old parameter values. Thus, the set to 'active' of the entry performs the global set of all the old and new parameters defined in the entry.

Due to the possible value 'notInService' as a valid configuration state, this entry MUST NOT be aged out when Row Status is 'notInService'."

```
::= { docsIfMCmtsEqamGlobCfgDownEntry 13 }
```

---

```
-- CMTS and EQAM Channel Block configuration
-- Configuration and diagnostic of block Channels.
```

---

-- This table is only for Block Channels Physical containments  
-- Other configuration parameters (PHY) applicable to all channes in a  
-- Block Channel are set through docsIfMCmtsEqamGlobCfgDownTable  
-----

docsIfMCmtsChannelBlockTable OBJECT-TYPE  
SYNTAX SEQUENCE OF DocsIfMCmtsChannelBlockEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
"This table configure attributes of block channels and  
Controls channel Block Tests.  
A channel block is an ENTITY-MIB containment of  
PhysicalClass 'module' that represent an RF connector."  
::= { docsIfMCmtsEqamObjects 5 }

docsIfMCmtsChannelBlockEntry OBJECT-TYPE  
SYNTAX DocsIfMCmtsChannelBlockEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
"The conceptual row entry of this table  
Entries in this table are created at system  
Initialization for Block Channels compliant to DRFI  
Specification.  
Sets in entries of this table persist after system  
initialization."  
INDEX { docsIfMCmtsChannelBlockPhysicalIndex }  
::= { docsIfMCmtsChannelBlockTable 1 }

DocsIfMCmtsChannelBlockEntry ::= SEQUENCE  
{  
docsIfMCmtsChannelBlockPhysicalIndex PhysicalIndex,  
docsIfMCmtsChannelBlockNumberChannels Unsigned32,  
docsIfMCmtsChannelBlockCfgNumberChannels Unsigned32,  
docsIfMCmtsChannelBlockMute TruthValue,  
docsIfMCmtsChannelBlockTestType INTEGER,  
docsIfMCmtsChannelBlockTestIfIndex InterfaceIndexOrZero  
}

docsIfMCmtsChannelBlockPhysicalIndex OBJECT-TYPE  
SYNTAX PhysicalIndex  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
"The Physical Index of the QAM Channel Block."  
::= { docsIfMCmtsChannelBlockEntry 1 }

docsIfMCmtsChannelBlockNumberChannels OBJECT-TYPE  
SYNTAX Unsigned32  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"The Number of QAM Channels N associated to this entry."  
::= { docsIfMCmtsChannelBlockEntry 2 }

docsIfMCmtsChannelBlockCfgNumberChannels OBJECT-TYPE  
SYNTAX Unsigned32(1..119)  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION

---

"The Number of QAM Channels N' to configure for the QAM block.  
The maximum number of channels per block follows the consideration of maximum number of digital channels in a headend described in the DRFI specification.  
As a rule N' is valid if is less or equal to N. In addition N minimal requirements consist of even numbers and 1 (one QAM channel per Block Channel). Odd number of QAM channels per Block Channel are of optional implementation.  
A Set to an invalid value or not supported value returns Error 'wrongValue'."

::= { docsIfMCmtsChannelBlockEntry 3 }

docsIfMCmtsChannelBlockMute OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The Mute control object for the Block Channel

A set to this object to 'true' is reflected in ifOperStatus set to 'down' of the QAM channels associated to the block Channel.

The opposite, a set to this object to 'false', is not necessarily reflected as ifOperStatus set to 'up' since other interface conditions might prevent such status."

::= { docsIfMCmtsChannelBlockEntry 4 }

docsIfMCmtsChannelBlockTestType OBJECT-TYPE

SYNTAX INTEGER {

noTest(1),  
offOthersNormal(2),  
allOff(3),  
onOthersOff(4),  
cwOnOthersOff(5),  
cwOnOthersNormal(6),  
clockTest(7)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A set of in-service and out-of-service test modes.

The value 'noTest'(1) is the normal condition after reinitialization where the QAM channels are expected in operation.

'noTest'

It is also used to take out of testing mode a QAM channel within the block.

In-service tests modes:

'offOthersNormal'

It is the condition where the QAM Channel indicated in docsIfMCmtsChannelBlockTestIfIndex has its carrier suppressed and the other channels in the Block Channel are operational.

'allOff'

All QAM channels carriers in the channel block are Suppressed.

'onOthersOff'

It is the condition where the QAM channel indicated in docsIfMCmtsChannelBlockTestIfIndex is in operation

---

and the other QAM channels in the channel Block have their carriers suppressed.

Out-of-service test modes:

'cwOnOthersOff'

It is the condition where the QAM channel indicated in docsIfMCmtsChannelBlockTestIfIndex transmits a continuous wave (CW) while the other QAM channels in the channel Block have their carriers suppressed.

'cwOnOthersNormal'

It is the condition where the QAM channel indicated in docsIfMCmtsChannelBlockTestIfIndex transmits a continuous wave (CW) while the other QAM channels in the channel Block are operational.

'clockTest'

It is the condition where the QAM channel indicated in docsIfMCmtsChannelBlockTestIfIndex transmits a sequence of alternating -1 and 1 symbols.

This object value does not persist after system Reinitialization.

The value of this object is meaningless if docsIfMCmtsChannelBlockTestIfIndex is set to zero."

::= { docsIfMCmtsChannelBlockEntry 5 }

docsIfMCmtsChannelBlockTestIfIndex OBJECT-TYPE

SYNTAX InterfaceIndexOrZero

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The ifIndex of the QAM channel to perform the QAM channel test.

A Set to a value that does not correspond to a QAM Channel within the Block channel returns error 'wrongValue'.

A set to zero stops a current test execution."

::= { docsIfMCmtsChannelBlockEntry 6 }

--  
-- DEPI Management objects  
-- Applicable to both M-CMTS core and EQAM device  
--  
--  
-- DEPI Control Table  
--

docsIfMCmtsDepsessionConfigTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsIfMCmtsDepsessionConfigEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The Control table for the configuration of M-CMTS Downstream Interfaces.

The M-CMTS Downstream Interface configuration information is contained in this table.

Currently L2TPv3 is the defined tunnel mechanism for

---

DEPI sessions. There may be other DEPI tunnel methods defined in the future.

The configuration of entries with docsIfMCmtsDepiSessionConfigMethod equal to 'l2tpControl' follows the rule below:

Only one L2TPv3 Control Plane from a M-CMTS Core IP is established per EQAM IP host destination indicated in docsIfMCmtsDepiSessionConfigRemoteAddr. There may be other L2TPv3 Control Plane connections from different M-CMTSs to the same EQAM IP host."

::= { docsIfMCmtsDepiSessionObjects 1 }

docsIfMCmtsDepiSessionConfigEntry OBJECT-TYPE

SYNTAX DocsIfMCmtsDepiSessionConfigEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A conceptual row for this table.

Entries are created by either management operations or other M-CMTS applications or interfaces (e.g., ERMI), the persistence of an entry is indicated in docsIfMCmtsDepiSessionConfigStorage.

The DEPI connection mechanism using L2TPv3 is initiated when an entry in this table is set to active. The following conditions apply:

- o If the M-CMTS L2TPv3 Control Connection with the remote EQAM Host IP in docsIfMCmtsDepiSessionConfigRemoteAddr does not exist, a DEPI L2TPv3 control Connection is created.
- o There may be cases where the control plane with the EQAM IP host exists or is in progress, (e.g., a previously created entry with same EQAM IP host), thus the M-CMTS MUST avoid multiple L2TP Control Connection State machines.
- o DEPI L2TPv3 sessions are created based on the TSID value. Only the first entry with row status 'active' with a particular TSID value will try to establish a L2TPv3 session. Other entries with same TSID value return state of 'depiSessionError' in docsIfMCmtsDepiSessionInfoState.

Relationships with the DOCSIS MAC domain IfStackTable:

This control considers the ability of the M-CMTS to use a manager-specified Downstream interface value for the configuration of the DOCSIS MAC domain downstream interfaces of the M-CMTS architecture.

- o When docsIfMCmtsDepiSessionConfigCableDownstreamIfIndex is a non-zero value the value of docsIfMCmtsDepiSessionConfigCableMacLayerIfIndex MUST be an existing DOCSIS MAC layer interface.

- o If an entry in this table already exists for the specified docsIfMCmtsDepiSessionConfigCableDownstreamIfIndex, or corresponds to an ifIndex signaled as

---

'integrated' in docsIfMCmtsDownstreamType a newly created entry set to active is rejected and reported in docsIfMCmtsDepiSessionInfoState as 'invalidDSInterfaceValue'.

- o The M-CMTS accepts or rejects the creation of a new table entry based on the possibility of adding a new Downstream interface to the MAC domain. On success it is reported in docsIfMCmtsDownstreamType as 'depisession'.

Relationship with M-CMTS Downstream Interface tables:

Setting an entry to active creates or updates (when docsIfMCmtsDepiSessionConfigCableMCmtsDownIfIndex is provided in the row creation; see the object description for details) the corresponding entry in the following tables:

ifTable,  
docsIfDownstreamChannelTable,  
docsIfMCmtsCoreDownstreamTable/  
docsIfMCmtsEqamDownstreamTable,  
docsIfMCmtsCoreDownstreamTable,  
docsIfMCmtsDepiSessionInfoTable, and  
docsIfMCmtsDepiSessionStatsTable

In the EQAM device this table is normally created by the M-CMTS Core initiated DEPI session, although manual configuration may be supported, with the difference that EQAM devices are not required to initiate DEPI sessions. EQAM device Operation of configured entries is not detailed in this MIB module."

```
INDEX { docsIfMCmtsDepiSessionConfigIndex }  
 ::= { docsIfMCmtsDepiSessionConfigTable 1 }
```

```
DocsIfMCmtsDepiSessionConfigEntry ::= SEQUENCE  
{  
  docsIfMCmtsDepiSessionConfigIndex      Unsigned32,  
  docsIfMCmtsDepiSessionConfigCableMacIfIndex  
      InterfaceIndexOrZero,  
  docsIfMCmtsDepiSessionConfigCableMCmtsDownIfIndex  
      InterfaceIndexOrZero,  
  docsIfMCmtsDepiSessionConfigAddrType   InetAddressType,  
  docsIfMCmtsDepiSessionConfigLocalAddr  InetAddress,  
  docsIfMCmtsDepiSessionConfigRemoteAddr  InetAddress,  
  docsIfMCmtsDepiSessionConfigL2TPv3HeaderType  INTEGER,  
  docsIfMCmtsDepiSessionConfigMethod      INTEGER,  
  docsIfMCmtsDepiSessionConfigTSID        Unsigned32,  
  docsIfMCmtsDepiSessionConfigDEPIMode    INTEGER,  
  docsIfMCmtsDepiSessionConfigRsrcAllocReq  Unsigned32,  
  docsIfMCmtsDepiSessionConfigCinPhbIdPolicy  SnmpTagValue,  
  docsIfMCmtsDepiSessionConfigSyncEnabled  TruthValue,  
  docsIfMCmtsDepiSessionConfigSyncInterval  Unsigned32,  
  docsIfMCmtsDepiSessionConfigPhyParamsFlag  BITS,  
  docsIfMCmtsDepiSessionConfigChannelFrequency  Unsigned32,  
  docsIfMCmtsDepiSessionConfigChannelModulation  INTEGER,  
  docsIfMCmtsDepiSessionConfigChannelInterleave  INTEGER,  
  docsIfMCmtsDepiSessionConfigChannelPower    TenthdBmV,  
  docsIfMCmtsDepiSessionConfigChannelAnnex    INTEGER,  
  docsIfMCmtsDepiSessionConfigChannelSymbolRateM  
      Unsigned32,  
  docsIfMCmtsDepiSessionConfigChannelSymbolRateN
```

---

```

        Unsigned32,
docsIfMCmtsDepsessionConfigChannelOutputRate Unsigned32,
docsIfMCmtsDepsessionConfigChannelBurstSize Unsigned32,
docsIfMCmtsDepsessionConfigStorage      StorageType,
docsIfMCmtsDepsessionConfigRowStatus    RowStatus,
docsIfMCmtsDepsessionConfigChannelId    Unsigned32
    }

docsIfMCmtsDepsessionConfigIndex OBJECT-TYPE
SYNTAX      Unsigned32 (1..4294967295)
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The index for entries in this conceptual table."
 ::= { docsIfMCmtsDepsessionConfigEntry 1 }

docsIfMCmtsDepsessionConfigCableMacIfIndex OBJECT-TYPE
SYNTAX      InterfaceIndexOrZero
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "Defines the MAC domain (ifType docsCableMaclayer)on
    which the DEPI Session is being set for an existing M-CMTS
    Downstream interface.

    This object MUST be set to a valid DOCSIS MAC layer
    interface in order to make the entry active."
 ::= { docsIfMCmtsDepsessionConfigEntry 2 }

docsIfMCmtsDepsessionConfigCableMCmtsDownIfIndex OBJECT-TYPE
SYNTAX      InterfaceIndexOrZero
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "Defines the Downstream channel index on which the DEPI
    Session is being set.

    The set of this object is optional. When this object is not
    specified the M-CMTS is expected to generate an internal
    value with its corresponding ifStackTable dependencies at
    the time or making this entry active.

    When setting this value to a non-zero value, this object
    and docsIfMCmtsDepsessionConfigCableMacIfIndex MUST
    correspond to a valid Cable and MCmtsDownstream interfaces
    pair from the ifStackTable.

    A set to an ifIndex corresponding to an ifType 128
    (docsCableDownstream Interface) won't allow to turn the
    entry active."
DEFVAL { 0 }
 ::= { docsIfMCmtsDepsessionConfigEntry 3 }

docsIfMCmtsDepsessionConfigAddrType OBJECT-TYPE
SYNTAX      InetAddressType
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "The type of InetAddress for
    docsIfMCmtsDepsessionConfigLocalAddr and
    docsIfMCmtsDepsessionConfigRemoteAddr."

```

---

```

DEFVAL { ipv4 }
::= { docsIfMCmtsDepsessionConfigEntry 4 }

docsIfMCmtsDepsessionConfigLocalAddr OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "The InetAddress of the local entity the DEPI Session
    is set."
DEFVAL { '00000000'h }
::= { docsIfMCmtsDepsessionConfigEntry 5 }

docsIfMCmtsDepsessionConfigRemoteAddr OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "The InetAddress of the remote peer the DEPI Session
    is set."
DEFVAL { '00000000'h }
::= { docsIfMCmtsDepsessionConfigEntry 6 }

docsIfMCmtsDepsessionConfigL2TPv3HeaderType OBJECT-TYPE
SYNTAX      INTEGER {
                ip(1),
                udp(2)
            }
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "Indicates the type of L2TPv3 header being configured for
    the DEPI session.
    The value 'ip' means L2TPv3 Header Over IP
    The value 'udp' means L2TPv3 Header Over UDP. A M-CMPTS Core
    initiates a DEPI session with L2TPv3 over UDP using the
    port number 1701 as destination port. The EQAM replies
    may modify its UDP source port as indicated in the L2TPv3
    RFC to convey the DEPI specification option of mapping
    DEPI flows to a QAM Channel within an EQAM."
DEFVAL { udp }
::= { docsIfMCmtsDepsessionConfigEntry 7 }

docsIfMCmtsDepsessionConfigMethod OBJECT-TYPE
SYNTAX      INTEGER {
                other(1),
                l2tpControl(2)
            }
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "Indicates the DEPI Tunnel mechanism used for the DEPI
    session. Currently only 'l2tpControl' is supported.
    The value 'other' is used to indicate other means."
::= { docsIfMCmtsDepsessionConfigEntry 8 }

docsIfMCmtsDepsessionConfigTSID OBJECT-TYPE
SYNTAX      Unsigned32 (0..65535)
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "The TSID to be associated to the DEPI Session.

```

---

TSID is a 16-bit unsigned integer value configured per QAM channel in the EQAM device and serves as a QAM channel identifier at several network levels.

When this object is set to 0, at the most the L2TPv3 Control Plane of the DEPI session is established but not DEPI L2TPv3 Session itself. It means, there might be the situations where the DEPI Control Plane already exists e.g., a different DEPI session to same EQAM device. In this case the new entry will no trigger the DEPI Control Plane creation. The TSID value zero may accomplish functions like testing of DEPI Control Plane connectivity without launching the DEPI Session itself; DLM over a M-CMTS Core - EQAM devices path with no Active sessions for administrative purposes."

::= { docsIfMCmtsDepsessionConfigEntry 9 }

docsIfMCmtsDepsessionConfigDEPIMode OBJECT-TYPE

SYNTAX INTEGER {  
    dmpt(1),  
    psp(2)  
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The DEPI mode of operation of this entry  
'dmpt' indicates DOCSIS MPT mode (D-MPT)  
'psp' indicates Packet Streaming Protocol."

::= { docsIfMCmtsDepsessionConfigEntry 10 }

docsIfMCmtsDepsessionConfigRsrcAllocReq OBJECT-TYPE

SYNTAX Unsigned32 (0..4294967295)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"A reference to docsIfMCmtsDepsessionConfigRsrcAllocIndex of docsIfMCmtsDepsessionConfigRsrcAllocTable used in the DEPI Session setup by the M-CMTS Core to configure EQAM PHBIDs. M-CMTS uses only the PHBIDs from the docsIfMCmtsDepsessionConfigRsrcAllocTable for the DEPI resource allocation request, ignoring DEPI Flow ID values and UDP Ports.

For the EQAM this object has no meaning as it is set to zero always."

DEFVAL { 0 }

::= { docsIfMCmtsDepsessionConfigEntry 11 }

docsIfMCmtsDepsessionConfigCinPhbIdPolicy OBJECT-TYPE

SYNTAX SnmpTagValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"A list of tags to reference CIN PHB policies in docsIfMCmtsDepsessionConfigCinPhbPolicyTable for this DEPI session.

This object is not meaningful for the EQAM, and reports a zero length octet string."

::= { docsIfMCmtsDepsessionConfigEntry 12 }

docsIfMCmtsDepsessionConfigSyncEnabled OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

---

DESCRIPTION

"Indicates the DOCSIS Sync message handling at the Edge QAM based upon PSP or DMPT mode of operation.  
In MPT mode 'true' indicates the EQAM MUST perform Sync TimeStamp correction. In PSP mode 'true' indicates the EQAM MUST insert DOCSIS Sync messages."

REFERENCE

"DEPI Specification Section 6.5"

DEFVAL { false }

::= { docsIfMCmtsDepiSessionConfigEntry 13 }

docsIfMCmtsDepiSessionConfigSyncInterval OBJECT-TYPE

SYNTAX Unsigned32 (10..1000)

UNITS "docsisSyncSteps"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Indicates the time nominal time interval for EQAM to insert DOCSIS Sync messages when operating in PSP mode. In DMPT mode this value is ignored.  
The unit reference of this object is steps of 200 usec.  
This object range covers the EQAM required support of DOCSIS Sync interval from 2 msec to 200 msec."

DEFVAL { 1000 }

::= { docsIfMCmtsDepiSessionConfigEntry 14 }

docsIfMCmtsDepiSessionConfigPhyParamsFlag OBJECT-TYPE

SYNTAX BITS {

frequency(0),  
bandwidth(1),  
power(2),  
modulation(3),  
interleaver(4),  
j83Annex(5),  
symbolRate(6),  
mute(7)  
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"When configuring an entry, DOCSIS PHY parameters may be set directly or default values are used to populate the entry.  
This object indicates which PHY parameter sets need to be sent by the M-CMTS Core in the DEPI session request.  
A BIT position set to '1' indicates the PHY parameter is set during the DEPI session establishment.  
In the EQAM indicates the PHY parameters set by the M-CMTS core during the DEPI Session establishment procedure."

DEFVAL { "h" }

::= { docsIfMCmtsDepiSessionConfigEntry 15 }

docsIfMCmtsDepiSessionConfigChannelFrequency OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The channel frequency for the Downstream DEPI Session.  
A DEPI Session establishment success will update the corresponding ifIndex entry of docsIfChannelFrequency with this entry value if provided in entry creation, or the EQAM DEPI Frequency parameter advertised

---

```

        during the DEPI session negotiation."
REFERENCE
    "DEPI specification"
DEFVAL { 0 }
::= { docsIfMCmtsDepsessionConfigEntry 16 }

docsIfMCmtsDepsessionConfigChannelModulation OBJECT-TYPE
SYNTAX  INTEGER {
    unknown(1),
    qam64(3),
    qam256(4)
}
MAX-ACCESS read-create
STATUS   current
DESCRIPTION
    "The channel modulation for the Downstream DEPI Session.
    A DEPI Session establishment success will update the
    corresponding ifIndex entry of docsIfDownChannelModulation
    with this entry value if provided in entry creation,
    or the EQAM DEPI Modulation parameter advertised
    during the DEPI session negotiation."
DEFVAL { unknown }
::= { docsIfMCmtsDepsessionConfigEntry 17 }

docsIfMCmtsDepsessionConfigChannelInterleave OBJECT-TYPE
SYNTAX  INTEGER {
    unknown(1),
    taps8Increment16(3),
    taps16Increment8(4),
    taps32Increment4(5),
    taps64Increment2(6),
    taps128Increment1(7),
    taps12increment17(8),
    -- non RFIv2 MIB 2670 interleave modes
    tabs128increment2(9),
    tabs128increment3(10),
    tabs128increment4(11),
    tabs128increment5(12),
    tabs128increment6(13),
    tabs128increment7(14),
    tabs128increment8(15)
}
MAX-ACCESS read-create
STATUS   current
DESCRIPTION
    "The channel Interleaver for the Downstream DEPI Session.
    A DEPI Session establishment success will update the
    corresponding ifIndex entry of docsIfDownChannelInterleave
    with this entry value if provided in entry creation,
    or the EQAM DEPI interleaver parameter advertised
    during the DEPI session negotiation."
DEFVAL { unknown }
::= { docsIfMCmtsDepsessionConfigEntry 18 }

docsIfMCmtsDepsessionConfigChannelPower OBJECT-TYPE
SYNTAX  TenthdBmV
MAX-ACCESS read-create
STATUS   current
DESCRIPTION
    "The channel power level for the Downstream DEPI Session.
    A DEPI Session establishment success will update the
    corresponding ifIndex entry of docsIfDownChannelPower

```

---

with this entry value if provided in entry creation,  
or the EQAM DEPI power level parameter advertised  
during the DEPI session negotiation."

DEFVAL { 0 }

::= { docsIfMCmtsDepsessionConfigEntry 19 }

docsIfMCmtsDepsessionConfigChannelAnnex OBJECT-TYPE

SYNTAX INTEGER {

unknown(1),  
annexA(3),  
annexB(4),  
annexC(5)  
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The channel J.83 Annex type for the Downstream DEPI  
Session.

A DEPI Session establishment success will update the  
corresponding ifIndex entry of docsIfDownChannelAnnex  
with this entry value if provided in entry creation,  
or the EQAM DEPI power level parameter advertised  
during the DEPI session negotiation. Also the value  
of docsIfDownChannelWidth is set according to  
the J.83 specification."

DEFVAL { unknown }

::= { docsIfMCmtsDepsessionConfigEntry 20 }

docsIfMCmtsDepsessionConfigChannelSymbolRateM OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The value M for the estimation of the DS Symbol Rate  
as (10.24 MHz)\*M/N"

DEFVAL { 1 }

::= { docsIfMCmtsDepsessionConfigEntry 21 }

docsIfMCmtsDepsessionConfigChannelSymbolRateN OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The value N for the estimation of the DS Symbol Rate  
as (10.24 MHz)\*M/N"

DEFVAL { 1 }

::= { docsIfMCmtsDepsessionConfigEntry 22 }

docsIfMCmtsDepsessionConfigChannelOutputRate OBJECT-TYPE

SYNTAX Unsigned32 (0..100)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The percentage of the maximum output rate for the  
aggregated traffic that is being sent though this  
M-CMTS Downstream interface to the QAM channel  
associated with this DEPI session.

Using a value lower than 100% of the QAM channel  
configured payload rate prevents the build up of  
a queue delay when MPEG-TS nulls are added in the  
presence of jitter in the CIN.

---

This object is meaningful only to the M-CMTS core.  
The EQAM device reports a value 0."

REFERENCE

"DEPI M-CMTS Core Output Rate"

DEFVAL { 99 }

::= { docsIfMCmtsDepsessionConfigEntry 23 }

-- TBD IfSpeed Values relationship to DEPI tunnel MTU

docsIfMCmtsDepsessionConfigChannelBurstSize OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The maximum burst size for the aggregate output rate  
of this M-CMTS Downstream Interface. The default value  
of this object corresponds to 3 M-CMTS Core payload  
MTUs.

This value has no meaning for the EQAM device and reports  
a value of 0."

::= { docsIfMCmtsDepsessionConfigEntry 24 }

docsIfMCmtsDepsessionConfigStorage OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The storage realization of the entry.

No columnar values can be changed if the StorageType of  
an entry is 'permanent'."

::= { docsIfMCmtsDepsessionConfigEntry 25 }

docsIfMCmtsDepsessionConfigRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this conceptual table row entry.

In order to set an entry to the 'active' status,

the MIB objects below must be set to proper values:

Other objects default values are used for the DEPI session

docsIfMCmtsDepsessionConfigCableMacIfIndex

docsIfMCmtsDepsessionConfigRemoteAddr

docsIfMCmtsDepsessionConfigTSID

docsIfMCmtsDepsessionConfigDEPIMode

docsIfMCmtsDepsessionConfigRsrcAllocReq

docsIfMCmtsDepsessionConfigMethod

docsIfMCmtsDepsessionConfigPhyFlag

docsIfMCmtsDepsessionConfigChannelId must be unique within  
the MAC sublayer domain in order to set this entry to  
active,

PHY parameters listed below are not required to be  
populated in this table, then default values are used to  
populate the entry or implementation may opt to not  
instantiate those objects.

docsIfMCmtsDepsessionConfigChannelFrequency

docsIfMCmtsDepsessionConfigChannelModulation

---

docsIfMCmtsDepsessionConfigChannelInterleave  
docsIfMCmtsDepsessionConfigChannelPower  
docsIfMCmtsDepsessionConfigChannelAnnex  
docsIfMCmtsDepsessionConfigSyncInterval

When the row entry is 'active' the DEPI tunnel control and/or the DEPI session is established. Retries and timeouts are proper of the DEPI Tunnel protocol used.

For L2TPv3 while the entry is active the M-CMTS must continue to set the DEPI session and log the respective errors for unsuccessful operations.

Relationship with the IfTable ifAdminStatus

Setting ifAdminStatus from ifTable to the interface pointed by this entry (docsIfMCmtsDepsessionConfigCableMCmtsDownIfIndex) to 'down' sets this entry Row Status to 'notInService'. A set to ifAdminStatus to 'up' while in 'down' state sets back the Row Status to 'active'.

The opposite is not true: a set to this object to 'active' when previously 'notInService' and while ifAdminStatus is 'down' returns an error 'inconsistentValue', such only one point of contact is needed to enable and disable the interface.

Setting this object to 'notInService' while ifAdminStatus is 'down' sets ifOperStatus to 'down'.

Setting this entry to 'notInService' will tear down the DEPI session. DEPI Tunnel Control teardown in the absence of sessions is Tunnel protocol dependent, e.g., for L2TPv3 Control Connections may use tunnel Idle Timeout objects defined in L2TP-MIB.

Due to the dependencies of IfAdminStatus and this table row Status, M-CMTS Core and EQAM devices MUST not age out entries with Row Status 'notInService' and docsIfMCmtsDepsessionInfoState in 'ifAdminStatusSetToDown'."

::= { docsIfMCmtsDepsessionConfigEntry 26 }

docsIfMCmtsDepsessionConfigChannelId OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The downstream channel identification of this M-CMTS Downstream interface.

During entry creation The M-CMTS Core assigns a Channel ID if this object is not provided.

When this object is set to a Channel ID value already in use by a different downstream interface within the same MAC domain the error 'inconsistentValue' error is returned if this entry is active."

::= { docsIfMCmtsDepsessionConfigEntry 27 }

docsIfMCmtsDepsessionInfoTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsIfMCmtsDepsessionInfoEntry

---

MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
"This table provides M-CMTS Downstream Interface with  
DEPI session information related to the DEPI session  
configuration process."  
::= { docsIfMCmtsDepsessionObjects 2 }

docsIfMCmtsDepsessionInfoEntry OBJECT-TYPE  
SYNTAX DocsIfMCmtsDepsessionInfoEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
"A conceptual row for this table.  
Entries in this table are created when a DEPI Session  
Configuration Table entry becomes active. Both entries  
are linked through  
docsIfMCmtsDepsessionConfigCableMCmtsDownIfIndex, which is  
equivalent to ifIndex from other M-CMTS Downstream  
interface tables."  
INDEX { ifIndex }  
::= { docsIfMCmtsDepsessionInfoTable 1 }

DocsIfMCmtsDepsessionInfoEntry ::= SEQUENCE  
{  
docsIfMCmtsDepsessionInfoCfgIndex Unsigned32,  
docsIfMCmtsDepsessionInfoUdpPort InetPortNumber,  
docsIfMCmtsDepsessionInfoMaxPayload Unsigned32,  
docsIfMCmtsDepsessionInfoPathPayload Unsigned32,  
docsIfMCmtsDepsessionInfoIncludeDOCSISMsgs TruthValue,  
docsIfMCmtsDepsessionInfoRsrcAllocResp Unsigned32,  
docsIfMCmtsDepsessionInfoConnCtrlID Unsigned32,  
docsIfMCmtsDepsessionInfoEQAMSessionID Unsigned32,  
docsIfMCmtsDepsessionInfoOwner INTEGER,  
docsIfMCmtsDepsessionInfoState INTEGER,  
docsIfMCmtsDepsessionInfoErrorCode INTEGER,  
docsIfMCmtsDepsessionInfoCreationTime TimeStamp,  
docsIfMCmtsDepsessionInfoStorage StorageType  
}

docsIfMCmtsDepsessionInfoCfgIndex OBJECT-TYPE  
SYNTAX Unsigned32 (1..4294967295)  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"The value of the docsIfMCmtsDepsessionConfigTable index  
(docsIfMCmtsDepsessionConfigIndex) associated to this  
M-CMTS Downstream Interface Entry."  
::= { docsIfMCmtsDepsessionInfoEntry 1 }

docsIfMCmtsDepsessionInfoUdpPort OBJECT-TYPE  
SYNTAX InetPortNumber  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"The UDP Port reported by the EQAM when the DEPI session  
uses the L2TPv3 Header Over UDP.  
This object reports a value 0 when the DEPI session is  
running with the L2TPv3 Session IP Header.  
This port number is negotiated between the M-CMTS Core and  
the EQAM according to the L2TPv3 RFC."  
::= { docsIfMCmtsDepsessionInfoEntry 2 }

---

docsIfMCmtsDepsessionInfoMaxPayload OBJECT-TYPE  
SYNTAX Unsigned32 (1..4294967295)  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"The maximum MTU negotiated between the M-CMTS Core and the EQAM during the DEPI session establishment process. The local payload MTU is known from the IfEntry of this M-CMTS Downstream Interface. It considers the header subtractions as indicated in the DEPI specification."  
REFERENCE  
"DEPI specification, Signaling  
DEPI specification Annex A"  
 ::= { docsIfMCmtsDepsessionInfoEntry 3 }

docsIfMCmtsDepsessionInfoPathPayload OBJECT-TYPE  
SYNTAX Unsigned32 (1..4294967295)  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"The maximum MTU traversing the CIN from M-CMTS Core to the EQAM. This calculated by the M-CMTS core by procedures such MTU discovery as described in the DEPI specification."  
REFERENCE  
"DEPI specification, Network MTU"  
 ::= { docsIfMCmtsDepsessionInfoEntry 4 }

docsIfMCmtsDepsessionInfoIncludeDOCSISMsgs OBJECT-TYPE  
SYNTAX TruthValue  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"Reports if the M-CMTS includes DOCSIS MAP messages and other MAC Management messages in the Downstream interface entry associated with this DEPI control entry. The CMTS determines whether the M-CMTS Downstream Interface includes DOCSIS messages as part of the DEPI payload."  
DEFVAL { false }  
 ::= { docsIfMCmtsDepsessionInfoEntry 5 }

docsIfMCmtsDepsessionInfoRsrcAllocResp OBJECT-TYPE  
SYNTAX Unsigned32 (0..4294967295)  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"In the M-CMTS core a reference to docsIfMCmtsDepsessionInfoRsrcAllocIndex of docsIfMCmtsDepsessionInfoRsrcAllocTable as reported by the EQAM during the DEPI session establishment process.  
  
The number of PHBIDs in the entries referenced in docsIfMCmtsDepsessionInfoRsrcAllocReq and this object may differ if the EQAM Host IP signals a partial list of PHBIDs during the DEPI session establishment.  
  
In the EQAM a value 0 indicates no reference to docsIfMCmtsDepsessionInfoRsrcAllocTable. A non-zero value indicates the value of docsIfMCmtsDepsessionInfoRsrcAllocIndex in docsIfMCmtsDepsessionInfoRsrcAllocTable as being signaled by the EQAM to the M-CMTS Core."  
DEFVAL { 0 }

---

```

 ::= { docsIfMCmtsDepsessionInfoEntry 6 }

docsIfMCmtsDepsessionInfoConnCtrlID OBJECT-TYPE
SYNTAX    Unsigned32
MAX-ACCESS read-only
STATUS    current
DESCRIPTION
    "Indicates the DEPI Tunnel Connection Control Identifier
    For L2TPv3 this corresponds to CCID."
 ::= { docsIfMCmtsDepsessionInfoEntry 7 }

docsIfMCmtsDepsessionInfoEQAMSessionID OBJECT-TYPE
SYNTAX    Unsigned32
MAX-ACCESS read-only
STATUS    current
DESCRIPTION
    "Indicates the DEPI Session Identifier associated to the
    EQAM IP host. In the M-CMTS it corresponds to the L2TPv3
    Remote Session ID, while in the EQAM indicates the local
    Session ID. This object in conjunction with the Connection
    Control ID identifies the DEPI session."
 ::= { docsIfMCmtsDepsessionInfoEntry 8 }

docsIfMCmtsDepsessionInfoOwner OBJECT-TYPE
SYNTAX    INTEGER {
    management(1),
    dynamic(2)
    }
MAX-ACCESS read-only
STATUS    current
DESCRIPTION
    "The creation method of the entry. Applicable to both
    M-CMTS Core and EQAM devices.
    'management'
        Indicates the entry was created via a direct
        configuration management such as SNMP or command line.

    'dynamic'
        Indicates the entry was created via a mechanism
        different of user management, e.g., auto discovery or
        dynamic addition with the assistance of other
        Interfaces like ERMI.

    Writable columnar values of entries with this object set
    to 'dynamic' should not be changed via management
    operations. An attempt to do so returns an SNMP error
    'notWritable'."
 ::= { docsIfMCmtsDepsessionInfoEntry 9 }

docsIfMCmtsDepsessionInfoState OBJECT-TYPE
SYNTAX    INTEGER {
    other(1),
    depiSessionUp(2),
    depiSessionError(3)
    }
MAX-ACCESS read-only
STATUS    current
DESCRIPTION
    "A high level state of the DEPI session.
    'depiSessionUp'
        Indicates the DEPI session is UP and able to pass
        traffic."

```

---

---

```

'depiSessionError'
  Indicates the DEPI session encountered
  an error and the DEPI session was disconnected or
  never reached the session connection state.
  docsIfMCmtsDepiSessionInfoErrorCode indicates possible
  reasons for the error conditions."
::= { docsIfMCmtsDepiSessionInfoEntry 10 }

docsIfMCmtsDepiSessionInfoErrorCode OBJECT-TYPE
SYNTAX    INTEGER {
  none(1),
  invalidMACInterfaceValue(2),
  invalidDSInterfaceValue(3),
  noResourcesForDSInterfaceIndex(4),
  l2tpv3Error(5),
  ifAdminStatusSetToDown(6)
}
MAX-ACCESS read-only
STATUS    current
DESCRIPTION
  "The error Code raised when docsIfMCmtsDepiSessionInfoState
  is 'depisessionerror'
  'invalidMACInterfaceValue'
    Indicates wrong assignment of the M-CMTS MAC interface
    ifIndex.
  'invalidDSInterfaceValue'
    Indicates wrong assignment of the M-CMTS Downstream
    interface ifIndex
  'noResourcesForDSInterfaceIfIndex'
    Indicates the M-CMTS Core has no more resources to
    assign a session to this entry.
  'l2tpv3Error'
    An L2TPv3 StopCCN or CDN message was issued
  'ifAdminStatusSetToDown'
    Indicates the ifAdminStatus was set to down and the
    session was torn down. More details are in the Row
    Status and ifAdminStatus relationship, described in
    docsIfMCmtsDepiSessionConfigRowStatus.

  More detail state may be provided by the proper DEPI tunnel
  Mechanism, e.g., L2TP-MIB l2tpTunnelStatsEntry."
::= { docsIfMCmtsDepiSessionInfoEntry 11 }

docsIfMCmtsDepiSessionInfoCreationTime OBJECT-TYPE
SYNTAX    TimeStamp
MAX-ACCESS read-only
STATUS    current
DESCRIPTION
  "The sysUptime when the entry was turned active."
::= { docsIfMCmtsDepiSessionInfoEntry 12 }

docsIfMCmtsDepiSessionInfoStorage OBJECT-TYPE
SYNTAX    StorageType
MAX-ACCESS read-only
STATUS    current
DESCRIPTION
  "The storage realization of the entry.
  This object value is the same as the corresponding
  entry of docsIfMCmtsDepiSessionInfoStorage."
::= { docsIfMCmtsDepiSessionInfoEntry 13 }

```

--

---

-- DEPI Session Resource Allocation Table  
-- Sets DEPI FlowIds policies to map DOCSIS Packets to DEPI Flow IDs  
--

docsIfMCmtsDepsRsrcAllocTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsIfMCmtsDepsRsrcAllocEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table containing PHBIDs Resources used for DEPI applications.

At the M-CMTS core these entries contain information about the mapping of egress traffic to PHIDs and DEPI flow IDs also known as DEPI payload encapsulation.

For the M-CMTS Core there are two type of entries:

- o One set of entries is a preconfigured list of PHBIDs used for M-CMTS requests to EQAM IP Host, e.g., the MIB object docsIfMCmtsDepsSessionConfigRsrcAllocReq references those type of entry sets.

In those entries the values of docsIfMCmtsDepsRsrcAllocUdpPort, docsIfMCmtsDepsRsrcAllocFlowId and docsIfMCmtsDepsRsrcAllocPolicyScnTags are ignored by the M-CMTS.

- o The second set of entries has the responses from the EQAM IP host to the M-CMTS when the DEPI session request is successful. The object docsIfMCmtsDepsSessionConfigPhbldResp in docsIfMCmtsDepsSessionConfigTable references an entry of this type.

The EQAM MAY implement this table to configure the different queue prioritization of the DEPI flow IDs, PHBIDs and UDP ports triplet used in the DEPI Resource allocation response to the M-CMTS. If this table is not implemented by the EQAM device the object docsIfMCmtsDepsSessionInfoRsrcAllocResp is set to zero, and the DEPI session Resource Allocation response is vendor specific. Also the EQAM device MAY implement this table as read-only for the purpose of debugging the DEPI Resource Allocation Responses sent to the M-CMTS core."

::= { docsIfMCmtsDepsSessionObjects 3 }

docsIfMCmtsDepsRsrcAllocEntry OBJECT-TYPE

SYNTAX DocsIfMCmtsDepsRsrcAllocEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A conceptual row for this table.

At minimum two entries for docsIfMCmtsDepsRsrcAllocSeq (two Flow ID entries) per docsIfMCmtsDepsRsrcAllocIndex value are needed for DEPI PSP mode.

When the docsIfMCmtsDepsRsrcAllocIndex is used for DMPT mode one flow Id entry value is required.

The PHBIDs contained in this entry are expanded with the tags of docsIfMCmtsDepsRsrcAllocPolicySCNTags to indicate the association of PSP packets attributes such as DOCSIS MAPS,

---

DOCSIS MAC messages and DOCSIS Service Flows to a DEPI Flow ID. Thus, the EQAM IP Host uses those DEPI flow IDs to prioritize the QAM channel traffic."

INDEX { docsIfMCmtsDepiRsrcAllocIndex, docsIfMCmtsDepiRsrcAllocSeq }  
::= { docsIfMCmtsDepiRsrcAllocTable 1 }

DocsIfMCmtsDepiRsrcAllocEntry ::= SEQUENCE

```
{  
docsIfMCmtsDepiRsrcAllocIndex    Unsigned32,  
docsIfMCmtsDepiRsrcAllocSeq      Unsigned32,  
docsIfMCmtsDepiRsrcAllocPhbId    Unsigned32,  
docsIfMCmtsDepiRsrcAllocFlowId   Unsigned32,  
docsIfMCmtsDepiRsrcAllocUdpPort  InetPortNumber,  
docsIfMCmtsDepiRsrcAllocPolicyScnTags SnmpTagValue,  
docsIfMCmtsDepiRsrcAllocStorage  StorageType,  
docsIfMCmtsDepiRsrcAllocRowStatus RowStatus  
}
```

docsIfMCmtsDepiRsrcAllocIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The first index of this table.

Multiple DEPI Flow Ids are within a

docsIfMCmtsDepiRsrcAllocIndex value."

::= { docsIfMCmtsDepiRsrcAllocEntry 1 }

docsIfMCmtsDepiRsrcAllocSeq OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The sequence index for entries within the same

docsIfMCmtsDepiRsrcAllocIndex value.

EQAM IP Host may reply with less PHBIDs than requested,

then, the M-CMTS Core skips the sequence index of missing

PHBIDs when creating the Resource Allocation entry

response.

As a rule of thumb this object has the minimal queuing  
priority information for DEPI flows treatment in the EQAM.

The lowest sequence value indicates the DEPI Flow ID with

the highest priority treatment at the EQAM (e.g., DOCSIS

MAC messages should be allocated to that flow) and the

highest sequence number indicates the DEPI Flow ID with the

lowest priority."

::= { docsIfMCmtsDepiRsrcAllocEntry 2 }

docsIfMCmtsDepiRsrcAllocPhbId OBJECT-TYPE

SYNTAX Unsigned32 (0..63)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The PHB identifier (per-Hub-Behavior ID) associated to  
this entry.

In PSP a minimum of two PHBIDs for two flow IDs corresponds

to PHBIDs EF and BE. BE is the PHBID for the one Flow ID

PHBID required in DMPT mode."

::= { docsIfMCmtsDepiRsrcAllocEntry 3 }

docsIfMCmtsDepiRsrcAllocFlowId OBJECT-TYPE

---

SYNTAX Unsigned32 (0 | 1..4294967295)  
MAX-ACCESS read-create  
STATUS current  
DESCRIPTION  
"The Flow ID value reported in the Resource Allocation  
Response for the corresponding PHBID."  
DEFVAL { 0 }  
::= { docsIfMCmtsDepiRsrcAllocEntry 4 }

docsIfMCmtsDepiRsrcAllocUdpPort OBJECT-TYPE

SYNTAX InetPortNumber  
MAX-ACCESS read-create  
STATUS current  
DESCRIPTION  
"The UDP Port reported by the Resource Allocation  
Response for the corresponding PHBID in this table."  
DEFVAL { 0 }  
::= { docsIfMCmtsDepiRsrcAllocEntry 5 }

docsIfMCmtsDepiRsrcAllocPolicyScnTags OBJECT-TYPE

SYNTAX SnmpTagValue  
MAX-ACCESS read-create  
STATUS current  
DESCRIPTION  
"A list of Service Class Names (SCN) tags associated to  
PHBID/Flow IDs.  
The policies associated to each DEPI Flow ID of this table  
allow the mapping of specific DOCSIS Service Flows well  
distinguished by SCN.

The SCN encoding does not include the null terminated  
octets as DOCSIS specify for other configuration mechanisms  
such as Cable Modem config files encoding.

This object is applicable to M-CMTS core but not to  
EQAM devices.

In D-MPT mode no tags are needed since all DOCSIS traffic  
is mapped to same DEPI Flow ID, thus this object is set to  
zero-length string (no tag) or ignored.

In PSP mode DOCSIS MAPS, DOCSIS MAC messages and PacketCable  
1.0/1.5 voice traffic are mapped to the highest priority DEPI  
Flow ID (lower sequence number in the Resource allocation  
response)

If this object is empty (no tag), the default policy is  
used.

In PSP mode the default policy consists to assign the DEPI  
Flow ID of the lowest priority (highest sequence number) to  
the DOCSIS traffic. DOCSIS Traffic not matched to a policy  
Tag is mapped to the default policy Flow ID.

In PSP mode the docsIfMCmtsDepiRsrcAllocSeq values pointed  
in a M-CMTS Core Resource Allocation Request has the  
preconfigured Policy Tags to map DOCSIS traffic to DEPI  
Flow IDs. When the Resource Allocation response from the  
EQAM is received, it could have same or less of the PHBIDs  
requested, and the PHBID references could be in a different  
order sequence. Therefore, the M-CMTS Core MUST accommodate  
the policy Tags initial configuration to the EQAM order

---

sequence and number of PHBIDs.

For example:

A Resource Allocation Request:

Seq Num	PHBID	Flow ID	UDP Port	Policy Tags
1	EF			VoiceGold*
2	AF			VideoConference
3	BE			empty - no tag -

\* - PCMM voice service based on SCN, no PacketCable 1.0/1.5 voice

The EQAM Resource Allocation response:

Seq Num	PHBID	Flow ID	UDP Port	Policy Tags
1	EF	6	50201	
2	BE	7	50202	

It is vendor specific to re-allocate the policy Tags in the case of less DEPI Flow IDs in the Resource Allocation response than in the requests. In the example PHBID AF policy tag could be assigned to either Flow ID 6 or 7

Final Resource Allocation Tag reordering

Seq Num	PHBID	Flow ID	UDP Port	Policy Tags
1	EF	6	50201	VoiceGold VideoConference
2	BE	7	50202	empty - no tag -

Change of sequence in the response example:

A Resource Allocation Request:

Seq Num	PHBID	Flow ID	UDP Port	Policy Tags
1	0x30			VoiceGold
2	0x20			VideoConference
3	0x10			empty - no tag -

\* - PCMM voice service based on SCN, no PacketCable 1.0/1.5 voice

The EQAM Resource Allocation response:

Seq Num	PHBID	Flow ID	UDP Port	Policy Tags
1	0x20	6	50201	
2	0x10	7	50202	
3	0x30	8	50203	

Final Resource Allocation Tag reordering

Seq Num	PHBID	Flow ID	UDP Port	Policy Tags
1	0x20	6	50201	VoiceGold
2	0x10	7	50202	VideoConference
3	0x30	8	50203	empty - no tag -"

DEFVAL { "" }

::= { docsIfMCmtsDepsRsrcAllocEntry 6 }

---

```

docsIfMCmtsDepsRsrcAllocStorage OBJECT-TYPE
    SYNTAX      StorageType
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The storage realization of this entry.
        Entries corresponding to a Resource Allocation Response
        are of type 'volatile' and do not persist.
        Entries set as 'permanent' need not write access
        for its read-create type base objects.

        All entries within the same docsIfMCmtsDepsRsrcAllocIndex
        share the same StorageType value."
    DEFVAL { volatile }
    ::= { docsIfMCmtsDepsRsrcAllocEntry 7 }

docsIfMCmtsDepsRsrcAllocRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this conceptual row.
        Administratively created entries need only
        set the value of docsIfMCmtsDepsRsrcAllocPhbId to become
        'active'. All other read-create columnar objects are not
        instantiated or set to default values if not set during
        row creation."
    ::= { docsIfMCmtsDepsRsrcAllocEntry 8 }

--
-- QOS extensions for M-CMTS architecture
-- Policies for mapping PSP packets to SF policies
--

docsIfMCmtsDepsSessionStatsTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsIfMCmtsDepsSessionStatsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table provides DEPI Session statistics for the
        M-CMTS Downstream Interface."
    ::= { docsIfMCmtsDepsSessionObjects 4 }

docsIfMCmtsDepsSessionStatsEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsDepsSessionStatsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A conceptual row for this table."
    INDEX { ifIndex }
    ::= { docsIfMCmtsDepsSessionStatsTable 1 }

DocsIfMCmtsDepsSessionStatsEntry ::= SEQUENCE
    {
        docsIfMCmtsDepsSessionInfoOutOfSequencePkts Counter32
    }

docsIfMCmtsDepsSessionInfoOutOfSequencePkts OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION

```

---

```

    "The count of DEPI session packets out of sequence.
    It is vendor dependent the re-sequence of DEPI packets.
    EQAM Implementations that do not re-sequence DEPI
    packets also increase the value of ifInDiscards
    for the respective entry.
    This counter is meaningful for M-CMTS Downstream
    interfaces configured in PSP mode. This object
    is not instantiated for D-MPT mode of operation."
 ::= { docsIfMCmtsDepsessionStatsEntry 1 }

--
-- DEPI Latency Measurement (DLM)
--

docsIfMCmtsDepsessionCinLatency OBJECT IDENTIFIER
 ::= { docsIfMCmtsDepsessionObjects 5 }

docsIfMCmtsDepsessionCinLatencyInterval OBJECT-TYPE
 SYNTAX      Unsigned32 (0..420)
 UNITS       "seconds"
 MAX-ACCESS  read-write
 STATUS      current
 DESCRIPTION
  "The time interval used to measure periodically the CIN
  latency per DEPI session.
  Active measurement of CIN latency applies to active DEPI
  sessions only.
  This object is constrained to 420 seconds to prevent
  the Master Clock counter overruns.
  A value zero indicates no CIN latency measurements to be
  performed."
 ::= { docsIfMCmtsDepsessionCinLatency 1 }

docsIfMCmtsDepsessionCinLatencyThreshld OBJECT-TYPE
 SYNTAX      Unsigned32 (0 | 1..4294967295)
 UNITS       "MasterClockTicks"
 MAX-ACCESS  read-write
 STATUS      current
 DESCRIPTION
  "The CIN latency threshold measured in DOCSIS Master clock
  ticks to be reported as an event when exceeded.
  The DOCSIS Master Clock is the 10.24 MHz reference clock."
 ::= { docsIfMCmtsDepsessionCinLatency 2 }

docsIfMCmtsDepsessionCinEventLevel OBJECT-TYPE
 SYNTAX      INTEGER {
    emergency(1),
    alert(2),
    critical(3),
    error(4),
    warning(5),
    notice(6),
    information(7),
    debug(8)
  }
 MAX-ACCESS  read-write
 STATUS      current
 DESCRIPTION
  "The desired event level to report in case of the CIN
  latency threshold being exceeded."
 ::= { docsIfMCmtsDepsessionCinLatency 3 }

```

---

```

docsIfMCmtsDepsessionCinLastValue OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    UNITS       "MasterClockTicks"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The CIN latency value measured for the DEPI session
        pointed by docsIfMCmtsDepsessionCinLastValueIfIndex."
    ::= { docsIfMCmtsDepsessionCinLatency 4 }

docsIfMCmtsDepsessionCinLastValueIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The ifIndex of the DEPI Session associated to the CIN
        latency value pointed measured for the DEPI session
        pointed by docsIfMCmtsDepsessionCinLastValue."
    ::= { docsIfMCmtsDepsessionCinLatency 5 }

docsIfMCmtsDepsessionCinLatencyValueLastTime OBJECT-TYPE
    SYNTAX      TimeTicks
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The sysUpTime value of the last time the object
        docsIfMCmtsDepsessionCinLastValue was updated."
    ::= { docsIfMCmtsDepsessionCinLatency 6 }

docsIfMCmtsDepsessionCinLatencyPerfTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsIfMCmtsDepsessionCinLatencyPerfEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table provides accumulative measurements of the CIN
        latency on the network."
    ::= { docsIfMCmtsDepsessionObjects 6 }

docsIfMCmtsDepsessionCinLatencyPerfEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsDepsessionCinLatencyPerfEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A conceptual row for this table.
        It is a vendor implementation to limit the number
        of entries per DEPI session (ifIndex) to be stored
        in this table. When the table is full, the oldest
        measurement is replaced with a new one."
    INDEX { ifIndex, docsIfMCmtsDepsessionCinLatencyPerfIntervalSeq }
    ::= { docsIfMCmtsDepsessionCinLatencyPerfTable 1 }

DocsIfMCmtsDepsessionCinLatencyPerfEntry ::= SEQUENCE
    {
        docsIfMCmtsDepsessionCinLatencyPerfIntervalSeq Unsigned32,
        docsIfMCmtsDepsessionCinLatencyPerfValue      Unsigned32,
        docsIfMCmtsDepsessionCinLatencyTime           TimeTicks
    }

docsIfMCmtsDepsessionCinLatencyPerfIntervalSeq OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  not-accessible
    STATUS      current

```

---

---

DESCRIPTION  
 "The interval sequence where the CIN latency measurement was taken. It is valid an implementation that overrides the oldest sequence number entry with the most recent measurement."  
 ::= { docsIfMCmtsDepsessionCinLatencyPerfEntry 1 }

docsIfMCmtsDepsessionCinLatencyPerfValue OBJECT-TYPE  
 SYNTAX Unsigned32 (1..4294967295)  
 UNITS "MasterClockTicks"  
 MAX-ACCESS read-only  
 STATUS current  
 DESCRIPTION  
 "The CIN latency value measured for the DEPI session pointed by this entry."  
 ::= { docsIfMCmtsDepsessionCinLatencyPerfEntry 2 }

docsIfMCmtsDepsessionCinLatencyTime OBJECT-TYPE  
 SYNTAX TimeTicks  
 MAX-ACCESS read-only  
 STATUS current  
 DESCRIPTION  
 "The sysUpTime value of the last time this entry was updated."  
 ::= { docsIfMCmtsDepsessionCinLatencyPerfEntry 3 }

--  
 -- Policies for mapping Service Flows to PSP packets  
 --  
 --  
 -- docsIfMCmtsDepsessionPhbPolicyTable  
 -- Applicable to CMTS only

docsIfMCmtsDepsessionPhbPolicyTable OBJECT-TYPE  
 SYNTAX SEQUENCE OF DocsIfMCmtsDepsessionPhbPolicyEntry  
 MAX-ACCESS not-accessible  
 STATUS current  
 DESCRIPTION  
 "The policy rules that apply to DOCSIS traffic (traffic profiles) of a DEPI session.  
 Traffic Profiles are ways to discriminate specific traffic flows for QOS treatment in the CIN and EQAM device.  
  
 The main function of this table is to map the DOCSIS SF egress traffic to the Converged Interconnect Network PHB configuration; thus, from the M-CMTS to the EQAM IP host Ingress port, the QOS levels are defined properly.  
  
 In D-MPT mode this table is only applicable to PHB egress marking for the CIN.  
  
 In PSP mode this table is referenced PHBID CIN (referenced by docsIfMCmtsDepsessionConfigCinPhbIdPolicy)  
  
 The CIN PHBs is operator specific. The CIN per-hub-Behavior of this table accomplishes:  
  
 o DOCSIS MAPs, DOCSIS MAC messages and PacketCable VoIP PHBID are configured in a reserved policy tag 'ExpediteForwardCIN' traffic. This policy has a 'permanent' storage.

---

---

o Data traffic (per DOCSIS Service Flows) is assigned to PHBIDs based on Admission policies rules, e.g., Service Class Name, DOCSIS specific parameters, etc. This table only deals with policies based with SCN. Other traffic descriptor rules are vendor dependent."

::= { docsIfMCmtsDepsQosObjects 1 }

docsIfMCmtsDepsPhbPolicyEntry OBJECT-TYPE

SYNTAX DocsIfMCmtsDepsPhbPolicyEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The conceptual Table entry.

A consumer of this table uses a lexicographical matching of entries to apply the respective policy, e.g., this table is used for two types of policy assignments:

When referenced by an instance of docsIfMCmtsDepsSessionConfigCinPhbIdPolicy, the value of docsIfMCmtsDepsPhbPolicySCN is passed to the CIN PHBID handler to encapsulate the SF payload with DEPI tunnel PHBID. It means different DOCSIS traffic profiles are assigned to different PHBIDs for the CIN transport."

INDEX { docsIfMCmtsDepsPhbPolicyTag }

::= { docsIfMCmtsDepsPhbPolicyTable 1 }

DocsIfMCmtsDepsPhbPolicyEntry ::= SEQUENCE

```
{
docsIfMCmtsDepsPhbPolicyTag      SnmpAdminString,
docsIfMCmtsDepsPhbPolicySCN     SnmpAdminString,
docsIfMCmtsDepsPhbPolicyCinPhbId Unsigned32,
docsIfMCmtsDepsPhbPolicyStorage StorageType,
docsIfMCmtsDepsPhbPolicyRowStatus RowStatus
}
```

docsIfMCmtsDepsPhbPolicyTag OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE (1..32))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The index of the policy."

::= { docsIfMCmtsDepsPhbPolicyEntry 1 }

docsIfMCmtsDepsPhbPolicySCN OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE(1..15))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The Service Class Name used to map DOCSIS traffic to DEPI Flow IDs and/or CIN PHBIDs.

This value is not null terminated as other DOCSIS interfaces defines SCN."

::= { docsIfMCmtsDepsPhbPolicyEntry 2 }

docsIfMCmtsDepsPhbPolicyCinPhbId OBJECT-TYPE

SYNTAX Unsigned32 (0..63)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The CIN PHBID assigned to transport the DOCSIS traffic that matches docsIfMCmtsDepsPhbPolicySCN for the related DEPI session."

---

```

::= { docsIfMCmtsDepsiPhbPolicyEntry 3 }

docsIfMCmtsDepsiPhbPolicyStorage OBJECT-TYPE
    SYNTAX      StorageType
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The storage realization of this entry
        'permanent' columnar objects allow write access."
    ::= { docsIfMCmtsDepsiPhbPolicyEntry 4 }

docsIfMCmtsDepsiPhbPolicyRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this conceptual table.
        Changes in this columnar objects while this entry is active
        will take effect on new DOCSIS packets being mapped by this
        policy entry."
    ::= { docsIfMCmtsDepsiPhbPolicyEntry 5 }

--
-- Extensions for DOCSIS QOS Service Flow Table
--

docsIfMCmtsQosServiceFlowExtTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsIfMCmtsQosServiceFlowExtEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table contains M-CMTS Extensions of the
        DOCSIS Service Flow table to describe DEPI QOS associations
        to Service Flows.

        DEPI Connection Control Table indicates the policies to
        apply any time a new DOCSIS Service Flow is added to the
        M-CMTS Downstream interface."
    ::= { docsIfMCmtsDepsiQosObjects 2 }

docsIfMCmtsQosServiceFlowExtEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsQosServiceFlowExtEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry in the table exists for each
        Service Flow ID of a M-CMTS Downstream Interface type.
        This table is an extension of DocsQosServiceFlowEntry."
    INDEX {
        ifIndex,
        docsQosServiceFlowId
    }
    ::= { docsIfMCmtsQosServiceFlowExtTable 1 }

DocsIfMCmtsQosServiceFlowExtEntry ::= SEQUENCE {
    docsIfMCmtsQosServiceFlowExtDepsiFlowId Unsigned32,
    docsIfMCmtsQosServiceFlowExtCinPhbId Unsigned32,
    docsIfMCmtsQosServiceFlowExtDepsiIfIndex InterfaceIndexOrZero
}

docsIfMCmtsQosServiceFlowExtDepsiFlowId OBJECT-TYPE
    SYNTAX      Unsigned32 (1..127)

```

---

---

```

MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The DEPI Flow ID associated with this Service Flow."
 ::= { docsIfMCmtsQosServiceFlowExtEntry 1 }

docsIfMCmtsQosServiceFlowExtCinPhbId OBJECT-TYPE
SYNTAX Unsigned32 (0..63)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The CIN PHBID associated with this Service Flow."
 ::= { docsIfMCmtsQosServiceFlowExtEntry 2 }

docsIfMCmtsQosServiceFlowExtDepiIfIndex OBJECT-TYPE
SYNTAX InterfaceIndexOrZero
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The ifIndex of the M-CMTS DS interface pertaining to
    this Service flow."
 ::= { docsIfMCmtsQosServiceFlowExtEntry 3 }

-----
-- Conformance definitions
-----

docsIfMCmtsConformance OBJECT IDENTIFIER ::= { docsIfMCmtsMib 2 }
docsIfMCmtsCompliances OBJECT IDENTIFIER ::= { docsIfMCmtsConformance 1 }
docsIfMCmtsGroups OBJECT IDENTIFIER ::= { docsIfMCmtsConformance 2 }

docsIfMCmtsCoreDeviceCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
    "The compliance statement for M-CMTS Core compliant
    devices."

MODULE -- this MODULE

-- conditionally mandatory groups

MANDATORY-GROUPS {
    docsIfMCmtsBaseGroup,
    docsIfMCmtsCoreGroup
}
 ::= { docsIfMCmtsCompliances 1 }

docsIfMCmtsEQAMCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
    "The compliance statement for M-CMTS EQAM compliant
    devices."

MODULE -- this MODULE

-- conditionally mandatory groups

MANDATORY-GROUPS {
    docsIfMCmtsBaseGroup,
    docsIfMCmtsEqamDevGroup,
    entityPhysicalGroup,
    entityPhysical2Group,

```

---

```
entityPhysical3Group,  
entityGeneralGroup  
}
```

-- Conditional Mandatory Groups

GROUP entityLogical2Group -- Same as ENTITY-MIB

DESCRIPTION

"Implementation of this group is not mandatory for Agents that model all MIB object instances within a single naming scope."

GROUP entityMappingGroup -- More specific for EQAMs

DESCRIPTION

"Implementation of the entPhysicalContainsTable is mandatory for EQAMs. Implementation of the entLPMappingTable and entAliasMappingTable are required for agents with MIB object instances within multiple logical entities. EQAM devices with MIB object instances in a single naming scope SHOULD implement entAliasMappingTable by using entAliasLogicalIndexOrZero set to zero."

OBJECT entPhysicalSerialNum --Same as ENTITY-MIB

MIN-ACCESS not-accessible

DESCRIPTION

"Read and write access is not required for agents that cannot identify serial number information for physical entities, and/or cannot provide non-volatile storage for NMS-assigned serial numbers.

Write access is not required for agents that can identify serial number information for physical entities but cannot provide non-volatile storage for NMS-assigned serial numbers.

Write access is not required for physical entities for physical entities for which the associated value of the entPhysicalIsFRU object is equal to 'false(2)'."

OBJECT entPhysicalAlias --Same as ENTITY-MIB

MIN-ACCESS read-only

DESCRIPTION

"Write access is required only if the associated entPhysicalClass value is equal to 'chassis(3)'."

OBJECT entPhysicalAssetID --Same as ENTITY-MIB

MIN-ACCESS not-accessible

DESCRIPTION

"Read and write access is not required for agents that cannot provide non-volatile storage for NMS-assigned asset identifiers.

Write access is not required for physical entities for which the associated value of entPhysicalIsFRU is equal to 'false(2)'."

OBJECT entPhysicalClass --Same as ENTITY-MIB

SYNTAX INTEGER {

other(1),  
unknown(2),  
chassis(3),

---

```
backplane(4),
container(5),
powerSupply(6),
fan(7),
sensor(8),
module(9),
port(10),
stack(11)
}
```

DESCRIPTION

"Implementation of the 'cpu(12)' enumeration is not required."

::= { docsIfMCmtsCompliances 2 }

docsIfMCmtsBaseGroup OBJECT-GROUP

OBJECTS {

```
docsIfMCmtsDepsessionConfigCableMacIfIndex,
docsIfMCmtsDepsessionConfigCableMCmtsDownIfIndex,
docsIfMCmtsDepsessionConfigAddrType,
docsIfMCmtsDepsessionConfigLocalAddr,
docsIfMCmtsDepsessionConfigRemoteAddr,
docsIfMCmtsDepsessionConfigL2TPv3HeaderType,
docsIfMCmtsDepsessionConfigMethod,
docsIfMCmtsDepsessionConfigTSID,
docsIfMCmtsDepsessionConfigDEPIMode,
docsIfMCmtsDepsessionConfigRsrcAllocReq,
docsIfMCmtsDepsessionConfigCinPhbIdPolicy,
docsIfMCmtsDepsessionConfigSyncEnabled,
docsIfMCmtsDepsessionConfigSyncInterval,
docsIfMCmtsDepsessionConfigPhyParamsFlag,
docsIfMCmtsDepsessionConfigChannelFrequency,
docsIfMCmtsDepsessionConfigChannelModulation,
docsIfMCmtsDepsessionConfigChannelInterleave,
docsIfMCmtsDepsessionConfigChannelPower,
docsIfMCmtsDepsessionConfigChannelAnnex,
docsIfMCmtsDepsessionConfigChannelSymbolRateM,
docsIfMCmtsDepsessionConfigChannelSymbolRateN,
docsIfMCmtsDepsessionConfigChannelOutputRate,
docsIfMCmtsDepsessionConfigChannelBurstSize,
docsIfMCmtsDepsessionConfigStorage,
docsIfMCmtsDepsessionConfigRowStatus,
docsIfMCmtsDepsessionConfigChannelId,
docsIfMCmtsDepsessionInfoCfgIndex,
docsIfMCmtsDepsessionInfoUdpPort,
docsIfMCmtsDepsessionInfoMaxPayload,
docsIfMCmtsDepsessionInfoPathPayload,
docsIfMCmtsDepsessionInfoIncludeDOCSISMsgs,
docsIfMCmtsDepsessionInfoRsrcAllocResp,
docsIfMCmtsDepsessionInfoConnCtrlID,
docsIfMCmtsDepsessionInfoEQAMSessionID,
docsIfMCmtsDepsessionInfoOwner,
docsIfMCmtsDepsessionInfoState,
docsIfMCmtsDepsessionInfoErrorCode,
docsIfMCmtsDepsessionInfoCreationTime,
docsIfMCmtsDepsessionInfoStorage,
docsIfMCmtsDepsessionInfoRsrcAllocPhbId,
docsIfMCmtsDepsessionInfoRsrcAllocFlowId,
docsIfMCmtsDepsessionInfoRsrcAllocUdpPort,
docsIfMCmtsDepsessionInfoRsrcAllocPolicyScnTags,
docsIfMCmtsDepsessionInfoRsrcAllocStorage,
docsIfMCmtsDepsessionInfoRsrcAllocRowStatus,
docsIfMCmtsDepsessionInfoOutOfSequencePkts,
```

---

```

docsIfMCmtsDepsessionCinLatencyInterval,
docsIfMCmtsDepsessionCinLatencyThreshld,
docsIfMCmtsDepsessionCinEventLevel,
docsIfMCmtsDepsessionCinLastValue,
docsIfMCmtsDepsessionCinLastValueIfIndex,
docsIfMCmtsDepsessionCinLatencyValueLastTime
}
STATUS    current
DESCRIPTION
    "Group of objects implemented in M-CMTS compliant devices."
::= { docsIfMCmtsGroups 1 }

docsIfMCmtsCoreGroup OBJECT-GROUP
OBJECTS {
docsIfMCmtsCoreDownstreamPhyDependencies,
docsIfMCmtsCoreDownstreamType,
docsIfMCmtsQosServiceFlowExtDepsessionCinPhbId,
docsIfMCmtsQosServiceFlowExtDepsessionCinPhbId,
docsIfMCmtsQosServiceFlowExtDepsessionCinPhbId,
docsIfMCmtsDepsessionCinLatencyPerfValue,
docsIfMCmtsDepsessionCinLatencyTime,
docsIfMCmtsDepsessionCinPhbPolicySCN,
docsIfMCmtsDepsessionCinPhbPolicyCinPhbId,
docsIfMCmtsDepsessionCinPhbPolicyStorage,
docsIfMCmtsDepsessionCinPhbPolicyRowStatus
}
STATUS    current
DESCRIPTION
    "Group of objects implemented in M-CMTS Core compliant
    devices."
::= { docsIfMCmtsGroups 2 }

docsIfMCmtsEqamDevGroup OBJECT-GROUP
OBJECTS {
docsIfMCmtsEqamDownstreamTSID,
docsIfMCmtsEqamDownstreamPhyDependencies,
docsIfMCmtsEqamDownstreamDevicePhyParamLock,
docsIfMCmtsEqamDownstreamDeviceConfigPhyParamLock,
docsIfMCmtsEqamDownstreamAllocationType,
docsIfMCmtsEqamDownstreamAllocationStatus,
docsIfMCmtsEqamDownstreamAllocationTimeout,
docsIfMCmtsEqamDownstreamDRRPAdvertizing,
docsIfMCmtsEqamDownstreamUdpPortMapping,
docsIfMCmtsEqamDownstreamCapabFrequency,
docsIfMCmtsEqamDownstreamCapabBandwidth,
docsIfMCmtsEqamDownstreamCapabPower,
docsIfMCmtsEqamDownstreamCapabModulation,
docsIfMCmtsEqamDownstreamCapabInterleaver,
docsIfMCmtsEqamDownstreamCapabJ83Annex,
docsIfMCmtsEqamDownstreamCapabConcurrentServices,
docsIfMCmtsEqamDownstreamCapabServicesTransport,
docsIfMCmtsEqamDownstreamCapabMuting,
docsIfMCmtsEqamGroupDependencyGroupID,
docsIfMCmtsEqamGroupDependencyType,
docsIfMCmtsEqamGlobCfgDownPhysicalIndex,
docsIfMCmtsEqamGlobCfgDownBandwidth,
docsIfMCmtsEqamGlobCfgDownPower,
docsIfMCmtsEqamGlobCfgDownModulation,
docsIfMCmtsEqamGlobCfgDownInterleave,
docsIfMCmtsEqamGlobCfgDownAnnex,
docsIfMCmtsEqamGlobCfgDownSymbolRateM,
docsIfMCmtsEqamGlobCfgDownSymbolRateN,

```

---

```
docsIfMCmtsEqamGlobCfgDownLockParams,
docsIfMCmtsEqamGlobCfgDownExecutionCode,
docsIfMCmtsEqamGlobCfgDownErrorsCount,
docsIfMCmtsEqamGlobCfgDownRowStatus,
docsIfMCmtsChannelBlockNumberChannels,
docsIfMCmtsChannelBlockCfgNumberChannels,
docsIfMCmtsChannelBlockMute,
docsIfMCmtsChannelBlockTestType,
docsIfMCmtsChannelBlockTestIfIndex
}
STATUS    current
DESCRIPTION
    "Group of objects implemented in M-CMTS EQAM compliant
    devices."
 ::= { docsIfMCmtsGroups 3 }
END
```

---

## Annex D DTI-MIB (normative)<sup>4 5</sup>

```
DTI-MIB DEFINITIONS ::= BEGIN
IMPORTS
    MODULE-IDENTITY,
        Integer32,
        Unsigned32,
        Counter32,
    OBJECT-TYPE          FROM SNMPv2-SMI
    TruthValue,
    TEXTUAL-CONVENTION  FROM SNMPv2-TC
    OBJECT-GROUP,
    MODULE-COMPLIANCE  FROM SNMPv2-CONF
    InetAddressType,
    InetAddress          FROM INET-ADDRESS-MIB
    ifIndex              FROM IF-MIB
    PhysicalIndex        FROM ENTITY-MIB
    clabProjDocsis      FROM CLAB-DEF-MIB
;

dtiMib MODULE-IDENTITY
    LAST-UPDATED "200708030000Z" -- August 3, 2007
    ORGANIZATION "CableLabs Cable Television Laboratories, Inc"
    CONTACT-INFO
        "Postal: Cable Television Laboratories, Inc
         858 Coal Creek Circle
         Louisville, CO 80027
         U.S.A.
         Phone: +1 303-661-9100
         Fax: +1 303-661-9199
         E-mail: mibs@cablelabs.com"
    DESCRIPTION
        "This MIB module provides the management objects necessary
        to configure and manage the DOCSIS Timing Interface
        devices.
        Copyright 2005-2007 Cable Television Laboratories, Inc.
        All rights reserved."
    REVISION "200708030000Z"
    DESCRIPTION
        "Revised Version includes ECN M-OSSI-N-07.0451-3
        and published as I06"
    REVISION "200606280000Z" -- June 28, 2006
    DESCRIPTION
        "Revised Version
        includes ECN M-OSSI-N-06.0278-4"
    REVISION "200508050000Z" -- August 5, 2005
    DESCRIPTION
        "Initial version of the DTI MIB module.
        This revision is published as part of the CableLabs
        M-CMTS specification."
    ::= { clabProjDocsis 7 }

-- Textual Conventions

DtiCableAdvance ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "2d-1d"
```

---

<sup>4</sup> Section modified per M-OSSI-N-07.0451-3, #3, #4, #5, #6, #7, and #8 on 7/20/07 by KN.

<sup>5</sup> Section modified per M-OSS-N-06.0278-4 on 4 7/26/06.

---

```

STATUS    current
DESCRIPTION
    "The early time adjustment the Client applies to the
    DTI timing frame to mitigate the propagation delay
    between the DTI server and client. The cable advance
    value is calculated by the DTI server and sent to the
    DTI client.

    The DTI cable Advance is a 24-bit field. The first two
    bytes represent the integer value of the 149.8 MHz sample
    clock cycles that measure the Cable advance value; the
    third octet represents the remaining fraction of the cable
    advance value in units of the 256th of the 149.8 MHz
    clock cycle."
SYNTAX    OCTET STRING (SIZE (3))

-- Administrative assignments
dtiNotifications    OBJECT IDENTIFIER ::= { dtiMib 0 }
dtiMibObjects        OBJECT IDENTIFIER ::= { dtiMib 1 }
dtiProtocolObjects   OBJECT IDENTIFIER ::= { dtiMibObjects 1 }
dtiServerObjects     OBJECT IDENTIFIER ::= { dtiMibObjects 2 }
dtiClientObjects     OBJECT IDENTIFIER ::= { dtiMibObjects 3 }
dtiServerProperties  OBJECT IDENTIFIER ::= { dtiServerObjects 1 }
dtiServerGlobalParameters OBJECT IDENTIFIER ::= { dtiServerObjects 2 }

--
-- The following group describes the objects that apply to
-- both DTI Server and DTI Client
--

dtiProtocolTable OBJECT-TYPE
    SYNTAX    SEQUENCE OF DtiProtocolEntry
    MAX-ACCESS not-accessible
    STATUS    current
    DESCRIPTION
        "This table describes the DTI protocol related information
        contained in Server and Client Frames of a DTI
        client-server pair."
    ::= { dtiProtocolObjects 1 }

dtiProtocolEntry OBJECT-TYPE
    SYNTAX    DtiProtocolEntry
    MAX-ACCESS not-accessible
    STATUS    current
    DESCRIPTION
        "A conceptual row entry in the DTI Protocol table.
        A DTI server has an entry for each client interface.
        A DTI client has an entry for each server connection.
        A DTI server (proxy) is a client of the root server DTI
        input."
    INDEX { ifIndex }
    ::= { dtiProtocolTable 1 }

DtiProtocolEntry ::= SEQUENCE {
    dtiProtocolEntityType    INTEGER,
    dtiProtocolClientClockType    INTEGER,
    dtiProtocolServerStatusFlag    INTEGER,
    dtiProtocolClientStatusFlag    INTEGER,
    dtiProtocolServerToDState    INTEGER,
    dtiProtocolServerToDType    INTEGER,
    dtiProtocolServerToDValue    OCTET STRING,
    dtiProtocolServerCableAdvanceFlag    INTEGER,

```

---

```
dtiProtocolServerCableAdvanceValue DtiCableAdvance,
dtiProtocolClientPhaseError Integer32,
dtiProtocolClientVersion Unsigned32,
dtiProtocolClientPathTraceability Unsigned32,
dtiProtocolServerClientStableFlag INTEGER
}
```

dtiProtocolEntityType OBJECT-TYPE

```
SYNTAX INTEGER {
    root(1),
    server(2),
    client(3)
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The type of DTI interface of this entry in the managed
    entity.
    'root'
    indicates the interface generates DTI Server
    Frames and processes DTI Client Frames from a proxy
    server or a client.
    'server'
    indicates the interface generates DTI Server Frames
    and processes DTI Client Frames from a DTI client.
    'client'
    indicates the interface processes DTI Server Frames and
    generates DTI Client Frames."
 ::= { dtiProtocolEntry 1 }
```

dtiProtocolClientClockType OBJECT-TYPE

```
SYNTAX INTEGER {
    ituI(1),
    ituII(2),
    ituIII(3),
    st3(4),
    dtiClock(5)
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The clock Type of the client as reported in DTI client
    Frames."
 ::= { dtiProtocolEntry 2 }
```

dtiProtocolServerStatusFlag OBJECT-TYPE

```
SYNTAX INTEGER {
    unknown(0),
    warmup(1),
    freerun(2),
    fastTrackingMode(3),
    normalMode(4),
    holdoverMode(5),
    clientStable(6), -- deprecated
    testMode(7)
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The current Operational Status of the server side of the
    DTI interface. This MIB object should be updated no more
    than once per second. The Server reports the status of the
```

---

DTI interface associated to this entry as follows:

'warmup'

The server clock has not yet stabilized and has not acquired a stable Time of Day.

'freerun'

The server has a stable clock and Time of Day but is not locked to an external clock reference.

'fastTrackingMode'

The server is in the process of locking to the timing reference.

'normalMode'

The server is locked to the timing reference.

'holdover'

The server has lost the timing reference and is in holdover mode.

'clientStable'

The server has verified that the Client phase error is acceptable for this DTI interface entry. This value is deprecated as does not indicate the status of the server side of the DTI interface. The performance stable client is reported by dtiProtocolServerClientStableFlag.

'testMode'

The server has entered in Test Mode for this DTI entry interface due a set to 'true' of dtiProtocolControlTestMode or because is receiving test mode frames from the DTI client remote end."

#### REFERENCE

"DOCSIS Timing Interface Specification, DTI Server-Client Protocol Interaction."

::= { dtiProtocolEntry 3 }

dtiProtocolClientStatusFlag OBJECT-TYPE

SYNTAX INTEGER {  
unknown(0),  
warmup(1),  
freerun(2),  
fastTrackingMode(3),  
normalMode(4),  
holdoverMode(5),  
bridgingMode(6),  
testMode(7)  
}

MAX-ACCESS read-only

STATUS current

#### DESCRIPTION

"The current Operational Status of the client side of the DTI interface. This MIB object should be updated no more than once per second.

The Client status values are:

'warmup'

The client clock has not stabilized yet.

'freerun'

The client has a stable clock but has not locked to an external clock reference yet.

'fastTrackingMode'

The client is in the process of locking to the timing reference.

'normalMode'

---

The client is locked to the timing reference.

'holdover'  
The client has lost the timing reference and is in holdover mode.

'bridgingMode'  
The client has lost its timing reference but is under acceptable operational conditions based on previous data acquired in 'normalMode' state.

'testMode' (Rephrase this definition)  
The client has entered in Test Mode for this DTI interface entry due to a set to 'true' of dtiProtocolControlTestMode or because is receiving Test Signaling frames from the DTI Server remote end."

REFERENCE

"DOCSIS Timing Interface Specification, DTI Client Operation."

::= { dtiProtocolEntry 4 }

dtiProtocolServerToDState OBJECT-TYPE

SYNTAX INTEGER {  
valid(1),  
invalid(2)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates the validity of the Time of Day.  
Possible values are 'valid' and 'invalid'.  
When the object dtiProtocolControlToDValue  
Corresponding to this Client-Server connection or the  
global object dtiServerGlobalToDValue  
is set by a manager rather than acquired via the protocol,  
'valid'.  
A ToD invalid state could be a consequence of an improper  
configuration of dtiServerToDSources or connectivity  
problems within the ToD protocol."

::= { dtiProtocolEntry 5 }

dtiProtocolServerToDType OBJECT-TYPE

SYNTAX INTEGER {  
default(1),  
userTime(2),  
ntp4(3),  
gps(4)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates the current Time of Day source for DTI  
Server-Client connection.  
'default' indicates the ToD of the DTI server is used and  
implies that this value is not updated via GPS or NTP.  
'userTime' indicates the ToD value was configured by the  
management interface. This object reports 'userTime'  
when dtiProtocolServerToDValue is set by a manager  
entity.  
'ntp4' indicates NTP, Network Time Protocol version 4.  
'gps' indicates GPS ToD gpssec."

::= { dtiProtocolEntry 6 }

dtiProtocolServerToDValue OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0|33))

---

MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"The value of the Time of Day sent by the server in the  
format DDDDD.YYYY/MM/DD.HH:MM:SS.SHH:F.D independent of  
being transmitted in short or verbose message format in  
the DTI Server Frame. Reading this object returns the ToD  
value for the specific DTI Client-Server connection."  
::= { dtiProtocolEntry 7 }

dtiProtocolServerCableAdvanceFlag OBJECT-TYPE

SYNTAX INTEGER {  
valid(1),  
invalid(2),  
manual(3)  
}  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"This object indicates the cable advance status of the DTI  
Server Frame. This object is not updated more than once per  
second. If dtiProtocolServerCableAdvanceValue is set to a  
valid value by a manager entity, this objects reports  
'manual'.  
::= { dtiProtocolEntry 8 }

dtiProtocolServerCableAdvanceValue OBJECT-TYPE

SYNTAX DtiCableAdvance  
UNITS "clockSamples"  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION  
"A Set to zero-length string returns the control of the  
Cable Advance Field and Cable Advance Flag Bit to the DTI  
server.  
  
Setting this object to a valid value sets the DTI Server  
Frames Frame Cable Advance field to the specified value and  
sets the Cable Advance Status Flag BIT to '1' (valid), and  
sets the object dtiProtocolServerCableAdvanceFlag to  
'manual' for this entry."  
::= { dtiProtocolEntry 9 }

dtiProtocolClientPhaseError OBJECT-TYPE

SYNTAX Integer32 (-32767..32767)  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"The phase error measured at the client as reported to the  
server in the DTI Client Frames. This object is quantified  
in units of a 149.8MHz clock cycles. This object  
represents the 16 MSB bits of the 3 octet Client Clock  
Integrated Phase field."  
::= { dtiProtocolEntry 10 }

dtiProtocolClientVersion OBJECT-TYPE

SYNTAX Unsigned32 (0..1023)  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"This object reports the client DTI protocol version as  
indicated in the 10-bit field 'CLIENT DTI VERSION'.  
::= { dtiProtocolEntry 11 }

---

::= { dtiProtocolEntry 11 }

dtiProtocolClientPathTraceability OBJECT-TYPE

SYNTAX Unsigned32 (0..4294967295)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A reference to the index of dtiPathTraceabilityTable to which this DTI Client-Server connection has associated its traceable path. It is likely that many traceable paths of DTI clients would have the same rootServer and proxy server for multiple Client Server. A manager application can build the Traceability Path, e.g., of a DTI client, if reading this entry from a proxy DTI server as follows:

Client:

This entry DTI Client IP Address,

This entry ifIndex, (see below)

dtiProtocolClientVersion

Proxy Server:

dtiPathTraceabilityServerInetAddr,

dtiPathTraceabilityServerOutPhyIdx,

dtiPathTraceabilityServerProtVersion

RootServer:

dtiPathTraceabilityRootServerInetAddr,

dtiPathTraceabilityRootServerOutPhyIdx,

dtiPathTraceabilityRootServerProtVersion

For the DTI client the Physical port would correspond to:

PhysicalIndex where

entAliasMappingIdentifier.PhysicalIndex = ifIndex"

::= { dtiProtocolEntry 12 }

dtiProtocolServerClientStableFlag OBJECT-TYPE

SYNTAX INTEGER {

valid(1),

invalid(2)

}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object indicates the client performance stable status of the DTI Server Frame. This object is not updated more than once per second."

::= { dtiProtocolEntry 13 }

--

-- DTI Protocol Control

-- Provides mechanisms to control the DTI Client-Server connections

-- on a pair basis

dtiProtocolControlTable OBJECT-TYPE

SYNTAX SEQUENCE OF DtiProtocolControlEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table is an extension of dtiProtocolTable for the control of individual DTI Client-Server connections."

::= { dtiProtocolObjects 2 }

dtiProtocolControlEntry OBJECT-TYPE

SYNTAX DtiProtocolControlEntry

---

MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
"A conceptual row entry of this table."  
INDEX { ifIndex }  
::= { dtiProtocolControlTable 1 }

DtiProtocolControlEntry ::= SEQUENCE {  
dtiProtocolControlTimeInterval Unsigned32,  
dtiProtocolControlErrorRateInterval Unsigned32,  
dtiProtocolControlJitterTimeInterval Unsigned32,  
dtiProtocolControlTestMode TruthValue,  
dtiProtocolControlToDValue OCTET STRING  
}

dtiProtocolControlTimeInterval OBJECT-TYPE  
SYNTAX Unsigned32 (0..3600)  
UNITS "seconds"  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION  
"The time interval used to calculate  
dtiProtocolPerformanceDelay and  
dtiProtocolPerformanceWanderTSeconds for this Client-Server  
connection.  
The value zero indicates the Wander for T Seconds and  
Protocol Delay is not calculated."  
DEFVAL { 0 }  
::= { dtiProtocolControlEntry 1 }

dtiProtocolControlErrorRateInterval OBJECT-TYPE  
SYNTAX Unsigned32 (0..3600)  
UNITS "seconds"  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION  
"The time interval used to calculate the value of  
dtiProtocolPerformanceFrameErrorRate for this Client-Server  
connection. The value zero indicates no current FER  
measurements are being taken."  
DEFVAL { 0 }  
::= { dtiProtocolControlEntry 2 }

dtiProtocolControlJitterTimeInterval OBJECT-TYPE  
SYNTAX Unsigned32 (0..3600)  
UNITS "seconds"  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION  
"The time interval used to calculate  
dtiProtocolPerformancePeakToPeakJitter for this  
Client-Server connection.  
The value zero indicates no Jitter measurements are being  
taken."  
DEFVAL { 0 }  
::= { dtiProtocolControlEntry 3 }

dtiProtocolControlTestMode OBJECT-TYPE  
SYNTAX TruthValue  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION

---

```

    "If set to 'true' starts the sequence of Test Mode
    on this DTI Client-Server connection.
    The Test Mode consist in a sequence of all DTI frames
    set to '1' before the Manchester line code is applied."
 ::= { dtiProtocolControlEntry 4 }

dtiProtocolControlToDValue OBJECT-TYPE
SYNTAX  OCTET STRING (SIZE (0|33))
MAX-ACCESS  read-write
STATUS  current
DESCRIPTION
    "The control object to specify a particular ToD value to
    a Client-Server connection. The format of this object is
    DDDDD.YYYY/MM/DD.HH:MM:SS.SHH:F.D independent of being
    transmitted in short or verbose message format in the DTI
    Server Frame.

    Setting this object to a zero length string resets the ToD
    source of this DTI Client-Server connection to the current
    Server ToD reference of dtiServerGlobalToDMethod and
    dtiServerGlobalToDValue.

    Reading this value returns the last set value of this
    object or zero length string if a global ToD value and/or
    method were lately performed."
 ::= { dtiProtocolControlEntry 5 }

--
-- DTI protocol performance
--

dtiProtocolPerformanceTable OBJECT-TYPE
SYNTAX  SEQUENCE OF DtiProtocolPerformanceEntry
MAX-ACCESS  not-accessible
STATUS  current
DESCRIPTION
    "The DTI protocol performance metrics of a DTI
    Client-Server Connection. In the DTI server an entry
    of this table registers the DTI Client frames performance.
    In the DTI client the measurements
    correspond to the DTI server frames performance."
 ::= { dtiProtocolObjects 3 }

dtiProtocolPerformanceEntry OBJECT-TYPE
SYNTAX  DtiProtocolPerformanceEntry
MAX-ACCESS  not-accessible
STATUS  current
DESCRIPTION
    "A conceptual row entry in the DTI performance table.
    This table is an extension of dtiProtocolTable for
    entries with dtiProtocolEntityType equals to 'root'
    and 'server'."
INDEX { ifIndex }
 ::= { dtiProtocolPerformanceTable 1 }

DtiProtocolPerformanceEntry ::= SEQUENCE {
    dtiProtocolPerformanceDelay      Unsigned32,
    dtiProtocolPerformanceFrameErrorRate  Unsigned32,
    dtiProtocolPerformancePeakToPeakJitter  Integer32,
    dtiProtocolPerformanceWander35Second  Unsigned32,
    dtiProtocolPerformanceWanderTSeconds  Unsigned32
}

```

---

dtiProtocolPerformanceDelay OBJECT-TYPE

SYNTAX Unsigned32

UNITS "nanoseconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The roundtrip delay measured in nanoseconds."

::= { dtiProtocolPerformanceEntry 1 }

dtiProtocolPerformanceFrameErrorRate OBJECT-TYPE

SYNTAX Unsigned32

UNITS "FER"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Frame Error Rate (FER) corresponds to the ratio of DTI protocol frames in error and the total of frames received during a period of time.

Frames in error and total frames correspond to the delta of ifErrors and ifUcastPackets MIB objects respectively during the period of time defined by dtiProtocolControlErrorRateInterval object. For the DTI server the FER value is based on the DTI client interval frames and for the DTI client, corresponds to the DTI server interval frames."

::= { dtiProtocolPerformanceEntry 2 }

dtiProtocolPerformancePeakToPeakJitter OBJECT-TYPE

SYNTAX Integer32 (-10000..10000)

UNITS "picoseconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The maximum phase variation (with frequency components > 10 Hz) in the client frame with respect to the master clock and reported in the DTI client frame for the time interval specified in dtiProtocolControlJitterTimeInterval object."

::= { dtiProtocolPerformanceEntry 3 }

dtiProtocolPerformanceWander35Second OBJECT-TYPE

SYNTAX Unsigned32(1..4294967295)

UNITS "picoseconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The largest wander value observed by the server in a 35-second interval for the corresponding Client-Server connection."

::= { dtiProtocolPerformanceEntry 4 }

dtiProtocolPerformanceWanderTSeconds OBJECT-TYPE

SYNTAX Unsigned32(1..4294967295)

UNITS "picoseconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The largest wander value observed by the server in a time interval defined by dtiWanderTimeInterval for the corresponding Client-Server connection."

::= { dtiProtocolPerformanceEntry 5 }

---

```

--
-- DTI Client State Machine
--

dtiProtocolClientFsmStatsTable OBJECT-TYPE
    SYNTAX SEQUENCE OF DtiProtocolClientFsmStatsEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "Statistics associated to the DTI client state machine.
        This table contains counters of the most significant
        DTI finite State machine transitions and states as
        reported in the DTI Client Frame.

        Below is a description of the State Transition and
        counters supported (not all State Transitions need
        object definitions):

        T1: Warmup to Free-run
        Normally once after the clock warms up.
        Rather than defining a counter for this
        state transition, the managed system updates
        the object ifDiscontinuity with the time when
        the clock performs a transition to Free-run
        State
        T2: Free-run to Fast
        Not defined counter. T2 = T3 + 1
        T3: Fast to Free-run (dtiProtocolClientFsmStatsT3Count)
        T4: Fast to Normal (dtiProtocolClientFsmStatsT4Count)
        Counts the times the clock enters to the normal
        mode of operation.
        T5: Normal to Bridging
        Not defined counter. T5 = T6 + T7
        T6: Bridging to Normal (dtiProtocolClientFsmStatsT6Count)
        T7: Bridging to Holdover (dtiProtocolClientFsmStatsT7Count)
        T8: Holdover to Fast
        No counter defined.
        If DTI Client State is Holdover, T8 = T7 - 1
        other DTI Client State, T8 = T7

        This table also includes the active time the DTI client is
        in Normal state(dtiProtocolClientFsmStatsNormalActiveTime)
        and Holdover state
        (dtiProtocolClientFsmStatsHoldoverActiveTime)."
```

REFERENCE

```

    "DOCSIS Timing Interface Specification, DTI Client Mode
    Transition Diagram."
 ::= { dtiProtocolObjects 6 }
```

```

dtiProtocolClientFsmStatsEntry OBJECT-TYPE
    SYNTAX DtiProtocolClientFsmStatsEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "A conceptual row entry in the DTI FSM Statistics table.
        In the DTI Server (proxy) this table has an entry for
        each DTI client interface as well as an entry for each
        Server (proxy) interface to root server. In the DTI client
        there is an entry for each client interface."
    INDEX { ifIndex }
 ::= { dtiProtocolClientFsmStatsTable 1 }
```

---

---

```

DtiProtocolClientFsmStatsEntry ::= SEQUENCE {
    dtiProtocolClientFsmStatsT3Count      Counter32,
    dtiProtocolClientFsmStatsT4Count      Counter32,
    dtiProtocolClientFsmStatsT6Count      Counter32,
    dtiProtocolClientFsmStatsT7Count      Counter32,
    dtiProtocolClientFsmStatsNormalActiveTime Counter32,
    dtiProtocolClientFsmStatsHoldoverActiveTime Counter32
}

dtiProtocolClientFsmStatsT3Count OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "Counts the Transition from Fast to Free-run state (T3).
    This transition occurs when the client aborts the clock
    acquisition due to a high Frame Error Rate."
REFERENCE
    "DOCSIS Timing Interface Specification, DTI Client Mode
    Transition Diagram."
 ::= { dtiProtocolClientFsmStatsEntry 1 }

dtiProtocolClientFsmStatsT4Count OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "Counts the Transition from Fast to Normal state (T4).
    This transition occurs when the client acquires for the
    first time or recovers a stable clock reference."
REFERENCE
    "DOCSIS Timing Interface Specification, DTI Client Mode
    Transition Diagram."
 ::= { dtiProtocolClientFsmStatsEntry 2 }

dtiProtocolClientFsmStatsT6Count OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "Counts the Transition from Bridging to Normal state (T6).
    This transition occurs when in Bridging mode the Frame
    Error rate is reduced and the DTI client recovers the clock
    reference before a bridging mode timeout."
REFERENCE
    "DOCSIS Timing Interface Specification, DTI Client Mode
    Transition Diagram."
 ::= { dtiProtocolClientFsmStatsEntry 3 }

dtiProtocolClientFsmStatsT7Count OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "Counts the Transition from Bridging to Holdover state
    (T7). This transition occurs when the client is in Bridging
    mode, the bridging timeout expires and the DTI client
    enters in Holdover mode."
REFERENCE
    "DOCSIS Timing Interface Specification, DTI Client Mode
    Transition Diagram."

```

---

```

::= { dtiProtocolClientFsmStatsEntry 4 }

dtiProtocolClientFsmStatsNormalActiveTime OBJECT-TYPE
SYNTAX Counter32
UNITS "milliseconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The cumulative count in 10 KHz clock cycles the DTI client
    is being in Normal Mode.
    The percentage of time the DTI client is being operating in
    Normal Mode is calculated as the ratio of this object and
    sysUpTime within two consecutive measurements. Note that
    the value sysUpTime is given in hundreds of seconds,
    therefore it needs to be multiplied by 100."
REFERENCE
    "DOCSIS Timing Interface Specification, DTI Client Mode
    Transition Diagram."
::= { dtiProtocolClientFsmStatsEntry 5 }

```

```

dtiProtocolClientFsmStatsHoldoverActiveTime OBJECT-TYPE
SYNTAX Counter32
UNITS "milliseconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The cumulative count in 10 KHz clock cycles the DTI client
    is being in Holdover Mode.
    The percentage of time the DTI client is being operating in
    Holdover Mode is calculated as the ratio of this object and
    sysUpTime within two consecutive measurements. Note that
    the value sysUpTime is given in hundreds of seconds;
    therefore it needs to be multiplied by 100."
REFERENCE
    "DOCSIS Timing Interface Specification, DTI Client Mode
    Transition Diagram."
::= { dtiProtocolClientFsmStatsEntry 6 }

```

```

--
-- Path Traceability Table
--

```

```

dtiPathTraceabilityTable OBJECT-TYPE
SYNTAX SEQUENCE OF DtiPathTraceabilityEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
    "The Traceable Path information sent from the DTI server
    to the client. The traceability path includes node
    information about DTI root server and DTI server (proxy).
    The entries of this table are pointed by dtiProtocolTable
    in both DTI Server and Client.
    The DTI server may aggregate in a single entry all the
    root-to-server traceable paths that are common across
    multiple DTI clients."
::= { dtiProtocolObjects 4 }

```

```

dtiPathTraceabilityEntry OBJECT-TYPE
SYNTAX DtiPathTraceabilityEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

```

---

"A conceptual row entry in the DTI Path Traceability table.  
This table is an expansion of the dtiProtocolTable for  
entries with dtiProtocolEntityType equal to 'server'  
and 'client'."

INDEX { dtiPathTraceabilityIndex }  
::= { dtiPathTraceabilityTable 1 }

DtiPathTraceabilityEntry ::= SEQUENCE {  
dtiPathTraceabilityIndex Unsigned32,  
dtiPathTraceabilityRootServerInetAddrType InetAddressType,  
dtiPathTraceabilityRootServerInetAddr InetAddress,  
dtiPathTraceabilityRootServerOutPhyIdx PhysicalIndex,  
dtiPathTraceabilityServerInetAddrType InetAddressType,  
dtiPathTraceabilityServerInetAddr InetAddress,  
dtiPathTraceabilityServerOutPhyIdx PhysicalIndex,  
dtiPathTraceabilityRootServerProtVersion Unsigned32,  
dtiPathTraceabilityServerProtVersion Unsigned32  
}

dtiPathTraceabilityIndex OBJECT-TYPE  
SYNTAX Unsigned32 (1..4294967295)  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
"The index of this conceptual entry."  
::= { dtiPathTraceabilityEntry 1 }

dtiPathTraceabilityRootServerInetAddrType OBJECT-TYPE  
SYNTAX InetAddressType  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"The type of internet address for  
dtiPathTraceabilityRootServerInetAddr."  
::= { dtiPathTraceabilityEntry 2 }

dtiPathTraceabilityRootServerInetAddr OBJECT-TYPE  
SYNTAX InetAddress  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"The IP address of the clock synchronization root server.  
If this management entity has dtiServerExternalSource  
'notExternal' this value returns an empty octet string and  
dtiPathTraceabilityRootServerInetAddrType.  
The type of this address is determined by the value of the  
dtiPathTraceabilityRootServerInetAddrType object."  
::= { dtiPathTraceabilityEntry 3 }

dtiPathTraceabilityRootServerOutPhyIdx OBJECT-TYPE  
SYNTAX PhysicalIndex  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"The physical port number of the clock synchronization  
root server."  
::= { dtiPathTraceabilityEntry 4 }

dtiPathTraceabilityServerInetAddrType OBJECT-TYPE  
SYNTAX InetAddressType  
MAX-ACCESS read-only  
STATUS current

---

```

DESCRIPTION
    "The type of internet address for
    dtiPathTraceabilityServerInetAddr."
 ::= { dtiPathTraceabilityEntry 5 }

dtiPathTraceabilityServerInetAddr OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The IP address of the clock synchronization server
    associated with this management entity. The type of this
    address is determined by the value of the
    dtiPathTraceabilityServerInetAddrType object."
 ::= { dtiPathTraceabilityEntry 6 }

dtiPathTraceabilityServerOutPhyIdx OBJECT-TYPE
SYNTAX      PhysicalIndex
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The physical port number of the clock synchronization
    server associated with this management entity."
 ::= { dtiPathTraceabilityEntry 7 }

dtiPathTraceabilityRootServerProtVersion OBJECT-TYPE
SYNTAX      Unsigned32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The DTI Protocol Version of the clock synchronization root
    server."
 ::= { dtiPathTraceabilityEntry 8 }

dtiPathTraceabilityServerProtVersion OBJECT-TYPE
SYNTAX      Unsigned32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The DTI Protocol Version of the clock synchronization
    server associated with this management entity."
 ::= { dtiPathTraceabilityEntry 9 }

--
-- DTI server objects
--

dtiServerRootClockType OBJECT-TYPE
SYNTAX      INTEGER {
    ituI(1),
    ituII(2),
    ituIII(3),
    st3(4)
    }
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The clock type of the root server this server is
    connected. If dtiServerHopCount is 'root' the clock type
    is the self clock.
    'ituI' corresponds to an ITU Type I clock.
    'ituII' corresponds to an ITU Type II clock.

```

---

---

'ituIII' corresponds to an ITU Type III clock.  
'st3' corresponds to an ANSI T1.101 ST3 clock."  
 ::= { dtiServerProperties 1 }

dtiServerHopCount OBJECT-TYPE  
SYNTAX INTEGER { root(1), proxy(2) }  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"This object indicates the type of the DTI server.  
'root' indicates the server is the DTI root server. 'proxy'  
indicates the DTI server is connected to a root DTI  
server."  
 ::= { dtiServerProperties 2 }

dtiServerExternalTimingSource OBJECT-TYPE  
SYNTAX INTEGER {  
noExternal(1),  
gps(2),  
network(3)  
}  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"The type of external clock that provides the reference  
for this DTI server.  
'none' indicates the DTI server has no timing reference  
input.  
'gps' indicates the timing source is GPS.  
'network' indicates the timing is obtained from a network  
such as a PDH, or SONET network."  
 ::= { dtiServerProperties 3 }

dtiServerToDSources OBJECT-TYPE  
SYNTAX BITS {  
default(0),  
userTime(1),  
ntp4(2),  
gps(3)  
}  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"Indicates the DTI Server's registered Time of Day sources.  
A bit set to '1' has the following meaning:  
  
'default' the internal DTI Server ToD reference without  
external updates.  
'userTime' indicates the capability of ToD being set by a  
manager entity either setting  
dtiServerGlobalToDValue or  
dtiProtocolControlToDValue.  
'ntp4' indicates support of NTP Network Time Protocol  
version 4.  
'gps' indicates support of GPS ToD gpssec.  
  
The initialization or configuration of GPS or NTPv4 ToD  
sources is not defined in this MIB module."  
 ::= { dtiServerProperties 4 }

--  
--

---

--

dtiServerGlobalTimeInterval OBJECT-TYPE

SYNTAX Unsigned32 (0..3600)

UNITS "seconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The time interval used to calculate dtiProtocolPerformanceDelay and dtiProtocolPerformanceWanderTSeconds for all Client-Server connections of the managed system.

A set to this object overrides all the entries of dtiProtocolControlTimeInterval previously configured. The value zero indicates the Wander for T Seconds and Protocol Delay is not calculated."

DEFVAL { 0 }

::= { dtiServerGlobalParameters 1 }

dtiServerGlobalErrorRateInterval OBJECT-TYPE

SYNTAX Unsigned32 (0..3600)

UNITS "seconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The time interval used to calculate the value of dtiProtocolPerformanceFrameErrorRate for all Client-Server connections of the managed system.

A set to this object overrides all the entries of dtiProtocolControlErrorRateInterval previously configured. The value zero indicates no current FER measurements are being taken."

DEFVAL { 0 }

::= { dtiServerGlobalParameters 2 }

dtiServerGlobalJitterTimeInterval OBJECT-TYPE

SYNTAX Unsigned32 (0..3600)

UNITS "seconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The time interval used to calculate dtiProtocolPerformancePeakToPeakJitter for all Client-Server connections of the managed system.

A set to this object overrides all the entries of dtiProtocolControlErrorRateInterval previously configured. The value zero indicates no Jitter measurements are being taken."

DEFVAL { 0 }

::= { dtiServerGlobalParameters 3 }

dtiServerGlobalToDMethod OBJECT-TYPE

SYNTAX INTEGER {

default(1),

userTime(2),

ntp4(3),

gps(4)

}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Selects the type of ToD Source for the DTI server

---

operation. The set of this object to its enumerated values is described below:

'default' instructs the DTI server to use the last ToD reference as the value for its internal clock.  
'userTime' instructs the DTI server to use the value of dtiServerGlobalToDValue for the DTI server internal time ticks clock.  
'ntpv4' instructs the DTI server to use the NTP Network Time Protocol version 4 as the ToD reference.  
'gps' instructs the DTI server to use the GPS gpssec ToD as the ToD reference.

It is recommended to reject an SNMP SET to a particular ToD method if such ToD capability is not active or requires other configuration steps.

A successful set of this object sets to a zero length string all the DTI Client-Server connections that previously were set via dtiProtocolControlToDValue to particular ToD Values."

::= { dtiServerGlobalParameters 4 }

dtiServerGlobalToDValue OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0|33))

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The control object to specify the ToD value for all DTI server Client-Server connections. The format of this object is DDDDD.YYYY/MM/DD.HH:MM:SS.SHH:F.D independent of being transmitted in short or verbose message format in the DTI Server Frame.

A set of this object to a valid value different of zero length string automatically sets dtiServerGlobalToDMethod to 'userTime'. Setting this object to zero re-establishes the ToD source to the current Server ToD reference dtiServerGlobalToDMethod 'default', 'ntpProtocol' or 'gps'."

::= { dtiServerGlobalParameters 5 }

--  
--  
--

-- Conformance information

dtiMibConformance OBJECT IDENTIFIER ::= { dtiMib 2 }

dtiMibCompliances OBJECT IDENTIFIER ::= { dtiMibConformance 1 }

dtiMibGroups OBJECT IDENTIFIER ::= { dtiMibConformance 2 }

-- Compliance statements

dtiMibCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"The compliance statement for DTI."

MODULE

-- unconditionally mandatory groups

MANDATORY-GROUPS {

dtiBaseGroup

}

---

-- conditionally mandatory groups

GROUP dtiServerGroup

DESCRIPTION

"Mandatory group for DTI server."

GROUP dtiClientGroup

DESCRIPTION

"Mandatory group for DTI client."

OBJECT dtiProtocolServerStatusFlag

SYNTAX INTEGER {

unknown(0),

warmup(1),

freerun(2),

fastTrackingMode(3),

normalMode(4),

holdoverMode(5),

testMode(7)

}

DESCRIPTION

" The value 'clientStable' is deprecated and not used."

OBJECT dtiProtocolServerCableAdvanceValue

MIN-ACCESS read-only

DESCRIPTION

"This object is read-write for DTI server interfaces and read-only for DTI client interfaces (e.g., a DTI interface connected to a DTI server or a DTI root server)."

OBJECT dtiProtocolControlErrorRateInterval

SYNTAX Unsigned32 (1..3600)

WRITE-SYNTAX Unsigned32 (0..3600)

MIN-ACCESS read-only

DESCRIPTION

"This object is read-write for DTI server interfaces and write access for DTI client interfaces is not required. (e.g., a DTI interface connected to a DTI server or a DTI root server).The Error Rate Interval for DTI client interfaces is vendor-specific with a suggested value in the interval from 1 to 60 seconds."

::= { dtiMibCompliances 1 }

dtiBaseGroup OBJECT-GROUP

OBJECTS {

dtiProtocolServerToDState,

dtiProtocolServerToDValue,

dtiProtocolServerCableAdvanceFlag,

dtiProtocolServerCableAdvanceValue,

dtiProtocolClientPhaseError,

dtiProtocolClientVersion,

dtiProtocolEntityType,

dtiProtocolClientClockType,

dtiProtocolServerStatusFlag,

dtiProtocolClientStatusFlag,

dtiProtocolServerToDState,

dtiProtocolServerToDType,

dtiProtocolServerToDValue,

dtiProtocolServerCableAdvanceFlag,

dtiProtocolServerCableAdvanceValue,

dtiProtocolClientPhaseError,

---

```

dtiProtocolClientVersion,
dtiProtocolClientPathTraceability,
dtiPathTraceabilityRootServerInetAddrType,
dtiPathTraceabilityRootServerInetAddr,
dtiPathTraceabilityRootServerOutPhyIdx,
dtiPathTraceabilityServerInetAddrType,
dtiPathTraceabilityServerInetAddr,
dtiPathTraceabilityServerOutPhyIdx,
dtiPathTraceabilityRootServerProtVersion,
dtiPathTraceabilityServerProtVersion,
dtiProtocolControlErrorRateInterval,
dtiProtocolPerformanceFrameErrorRate,
dtiProtocolServerClientStableFlag
}
STATUS    current
DESCRIPTION
    "Group of object applicable to DTI Server and DTI Client."
 ::= { dtiMibGroups 1 }

dtiServerGroup OBJECT-GROUP
OBJECTS {
dtiProtocolControlTimeInterval,
dtiProtocolControlJitterTimeInterval,
dtiProtocolControlTestMode,
dtiProtocolControlToDValue,
dtiProtocolPerformanceDelay,
dtiProtocolPerformancePeakToPeakJitter,
dtiProtocolPerformanceWander35Second,
dtiProtocolPerformanceWanderTSeconds,
dtiServerRootClockType,
dtiServerHopCount,
dtiServerExternalTimingSource,
dtiServerToDSources,
dtiServerGlobalTimeInterval,
dtiServerGlobalErrorRateInterval,
dtiServerGlobalJitterTimeInterval,
dtiServerGlobalToDMethod,
dtiServerGlobalToDValue
}
STATUS    current
DESCRIPTION
    "Group of objects applicable to DTI Server only."
 ::= { dtiMibGroups 2 }

dtiClientGroup OBJECT-GROUP
OBJECTS {
dtiProtocolClientFsmStatsT3Count,
dtiProtocolClientFsmStatsT4Count,
dtiProtocolClientFsmStatsT6Count,
dtiProtocolClientFsmStatsT7Count,
dtiProtocolClientFsmStatsNormalActiveTime,
dtiProtocolClientFsmStatsHoldoverActiveTime
}
STATUS    current
DESCRIPTION
    "Group of objects applicable to DTI Client."
 ::= { dtiMibGroups 3 }
END

```