

# **Superseded**

## **by a later version of this document**

**Data-Over-Cable Service Interface Specifications  
Modular CMTS**

**M-CMTS Operations Support System Interface  
Specification**

**CM-SP-M-OSSI-I07-071206**

**ISSUED**

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# Superseded

## 1 SCOPE

### 1.1 Introduction (Overview)

This specification 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 document

The purpose of this document is to define the management requirements for the M-CMTS architecture that enables an effective operation of the M-CMTS components. In particular, this specification 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 Documents

A list of the documents in the Modular CMTS Interface Specifications family is provided below. For updates, please refer to <http://www.cablemodem.com/specifications/>.

**Table 1–1 - M-CMTS Interface documents**

Designation	Title
CM-SP-DEPI	Downstream External PHY Interface
CM-SP-DTI	DOCSIS Timing Interface
CM-SP-ERMI	Edge Resource Manager Interface
CM-SP-M-OSSI	M-CMTS Operations Support System Interface

### 1.4 Organization of document

This specification 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.

## 1.5 Requirements

Throughout this document, 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 specification.
"MUST NOT"	This phrase means that the item is an absolute prohibition of this specification.
"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.

## 2 REFERENCES

### 2.1 Normative References<sup>1</sup>

In order to claim compliance with this specification, it is necessary to conform to the following standards and other works as indicated, in addition to the other requirements of this specification. Notwithstanding, intellectual property rights may be required to use or implement such normative references. At the time of publication, the editions indicated were valid. 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.

- [DEPI] DOCSIS External PHY Interface, CM-SP-DEPI-I05-070223, February 23, 2007, Cable Television Laboratories, Inc.
- [DRFI] DOCSIS Downstream Radio Frequency Interface, CM-SP-DRFI-I05-070223, February 23, 2007, Cable Television Laboratories, Inc.
- [DTI] DOCSIS Timing Interface, CM-SP-DTI-I04-061222, December 22, 2006, Cable Television Laboratories, Inc.
- [ERMI] DOCSIS Edge Resource Manager Interface, CM-SP-ERMI-I02-051209, December 9, 2005, Cable Television Laboratories, Inc.
- [OSSI2.0] DOCSIS Operations Support Systems Interface Specification, CM-SP-OSSIV2.0-I10-070803, August 3, 2007, Cable Television Laboratories, Inc.
- [RFC 2011] IETF RFC 2011, Category: Standards Track SNMPv2 Management Information Base for the Internet Protocol using SMIV2, November 1996.
- [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.
- [RFC 4133] IETF RFC 4133, A. Bierman, K. and McCloghrie, Entity MIB, August 2005.
- [RFC 4546] IETF RFC 4546, D. Raftus and E. Cardona, Radio Frequency (RF) Interface Management Information Base for DOCSIS 2.0 Compliant RF Interfaces, June 2006.

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<sup>1</sup> Table updated per M-OSSI-N-07.0562-5, #1 on 11/7/07 by KN.

[RFC 4639] IETF RFC 4639, R. Woundy and K. Marez, Cable Device Management Information Base for Data-Over-Cable Service Interface Specification (DOCSIS) Compliant Cable Modems and Cable Modem Termination Systems, December 2006.

## 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, Inc., 858 Coal Creek Circle, Louisville, CO 80027; Phone +1-303-661-9100; Fax +1-303-661-9199; <http://www.cablelabs.com>
- Internet Engineering Task Force (IETF) Secretariat, 46000 Center Oak Plaza, Sterling, VA 20166; Phone +1-571-434-3500, Fax +1-571-434-3535, <http://www.ietf.org>

### 3 TERMS AND DEFINITIONS

This specification 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.
<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.
<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>
<b>Upstream Channel Descriptor (UCD)</b>	The MAC Management Message used to communicate the characteristics of the upstream physical layer to the cable modems.
<b>Video on Demand (VoD) System</b>	System that enables individuals to select and watch video content over a network through an interactive television system.

## 4 ABBREVIATIONS AND ACRONYMS

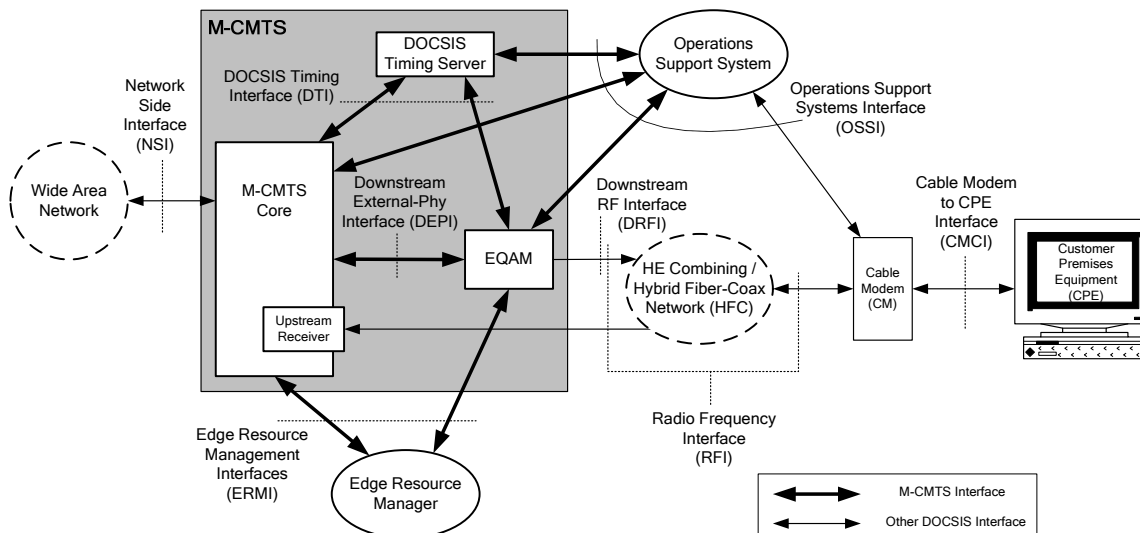
This specification uses the following abbreviations and acronyms:

<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

## 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 specifications, 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

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 specification.

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 [DRFI]
- Requirements for DOCSIS External PHY Interface [DEPI]
- Requirements for DOCSIS Timing Interface [DTI]

## 5.3 EQAM device Management Requirements Overview

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

- Requirements for Downstream RF Interface Specification [DRFI]
- Requirements for DOCSIS External PHY Interface [DEPI]
- Requirements for DOCSIS Timing Interface [DTI]
- Requirements for Edge Resource Management Interface [ERMI]
- 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 document and summarized as:

- Requirements for DOCSIS Timing Interface [DTI]
- SNMP and Management Information MIB requirements

## 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.

## 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 specification have priority over IETF-defined MIB modules. It includes MIB objects made mandatory in this specification, 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 0 and Annex A, Annex C, and Annex D. For the case of M-CMTS Core, the requirements described in this specification are in addition and/or replacement of CMTS requirements outlined in the [OSSI2.0] specification.

### 7.1 IETF Drafts and Other Modules

*Table 7-1 - IETF Drafts and Other Modules<sup>2</sup>*

Reference	MIB	Applicable Device(s)
Annex C	DOCSIS M-CMTS Interface MIB: DOCS-IF-M-CMTS-MIB	CMTS and EQAM
Annex D	DOCSIS Time Interface MIB: DTI-MIB	M-CMTS core, EQAM and DTI Server
Annex E	DOCSIS DRF MIB: DOCS-DRF-MIB	CMTS and EQAM

<sup>2</sup> Table modified per M-OSSI-N-07.0562-5, #2 on 11/9/07 by KN.

## 7.2 IETF RFC MIB Modules

*Table 7-2 - IETF RFC MIB Modules<sup>3</sup>*

Reference	MIB	Applicable Device(s)
[RFC 2011]	SNMPv2 Management Information Base for the Internet Protocol using SMIV2: IP-MIB	EQAM and DTI Server
[RFC 2863]	The Interfaces Group MIB using SMIV2: IF-MIB	M-CMTS core, EQAM and DTI Server
[RFC 3371]	Layer Two Tunneling Protocol "L2TP" Management Information Base RFC 3371, August 2002	M-CMTS Core and EQAM
[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
[RFC 3418]	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP): SNMPv2-MIB	EQAM and DTI Server
[RFC 4133]	Entity MIB: ENTITY-MIB	M-CMTS Core, EQAM and DTI Server
[RFC 4546]	DOCSIS RFI MIB: DOCS-IF-MIB	EQAM
[RFC 4639]	DOCSIS Cable Device MIB: DOCS-CABLE-DEVICE-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.

<sup>3</sup> Table modified per M-OSSI-N-07.0562, #3 on 11/12/07 by KN.

### 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, M-CMTS 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.

#### 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 4639]

The EQAM device MUST implement the docsDevEventGroup from [RFC 4639] as indicated in Annex A.

The DTI Server MUST implement the docsDevEventGroup from [RFC 4639] 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 specification.

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<sup>4</sup>**

<b>DOCSIS Interface</b>	<b>Integrated CMTS</b>	<b>Modular CMTS</b>
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 specification.

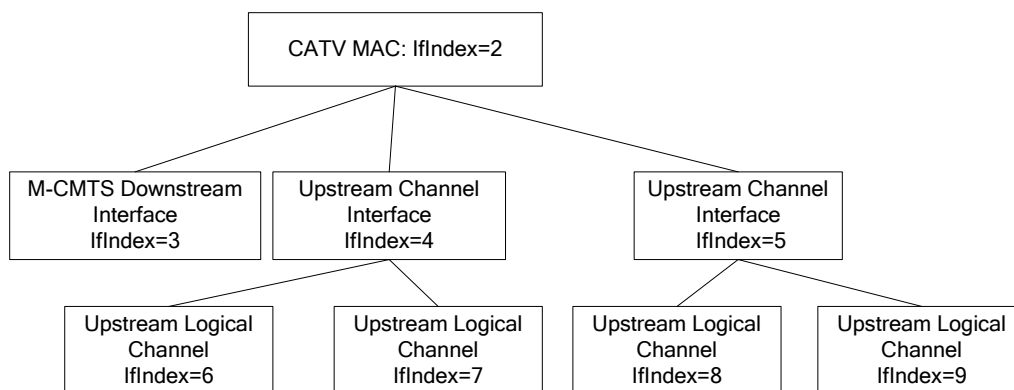
#### 7.3.3.1.2 *Interface organization and numbering*

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.

<sup>4</sup> Revised this table per ECN M-OSSI-N-05.0254-5 on 11/22/05.



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 specification.

### 7.3.3.2 Requirements for EQAM

#### 7.3.3.2.1 EQAM Interface Types

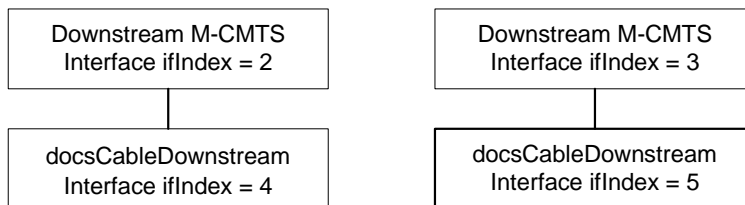
A compliant EQAM device MUST support the interface Type docsCableMCmtsDownstream for each QAM channel.

#### 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 specification.

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 specification.

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 specification.

**7.3.3.3.2 Interface organization and numbering**

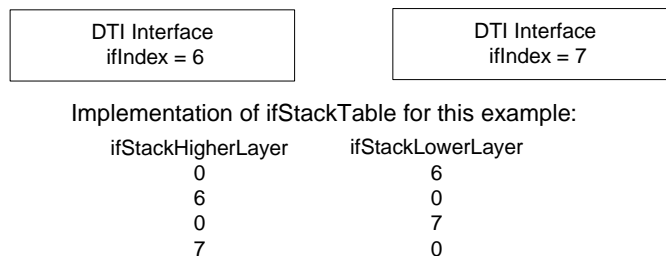
A compliant M-CMTS Core device MUST include entries in the ifStackTable [RFC 2863] for the DTI interfaces.

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 [DTI]).

### 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 **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 [RFC 4133]).

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].

### **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 [ERMI]. The MIB table docsIfMCmtsDepiSessionConfigTable 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 [RFC 4133].

A Compliant EQAM device MUST support the ENTITY-MIB objects as described in Annex A and [RFC 4133].

A Compliant DTI server device MUST support the ENTITY-MIB objects as described in Annex A and [RFC 4133].

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 [RFC 4133] (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**

entAliasPhysicalIndex QAM channel (PhysicalClass = 'port')	entAliasLogicalIndexOrZero	entAliasMappingIdentifier
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 [RFC 4133] 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 [RFC 4133] 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.

### 7.3.10 Requirements for DOCS-DRF-MIB<sup>5</sup>

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

A compliant EQAM device MUST support the DOCS-DRF-MIB module as described in Annex A and Annex E.

<sup>5</sup> Section added per M-OSSI-N-07.0562-5, #9 on 11/12/07 by KN.

## 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].

## Annex A Detailed MIB Requirements (normative)

The following abbreviations and rules apply in this Annex:

<b>ACC-FN</b>	Accessible for Notify.
<b>ATRAP</b>	Accessible through SNMP trap.
<b>D</b>	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 <b>MUST</b> be implemented correctly according to the MIB definition. If a vendor chooses not to implement the object, an agent <b>MUST NOT</b> instantiate such object and <b>MUST</b> respond with the appropriate error/exception condition (e.g., no such object for SNMPv2c).
<b>M</b>	Mandatory. The object <b>MUST</b> be implemented correctly according to the MIB definition.
<b>N-Acc</b>	Not accessible. The object is not accessible and is usually an index in a table.
<b>NA</b>	Not Applicable (to the device).
<b>N-Sup</b>	<b>MUST</b> not support. The device <b>MUST NOT</b> support the object. That is, an agent <b>MUST NOT</b> instantiate such object and <b>MUST</b> respond with the appropriate error/exception condition (e.g., no such object for SNMPv2c).
<b>O</b>	Optional. A vendor can choose to implement or not implement the object. If a vendor chooses to implement the object, the object <b>MUST</b> be implemented correctly according to the MIB definition. If a vendor chooses not to implement the object, an agent <b>MUST NOT</b> instantiate such object and <b>MUST</b> respond with the appropriate error/exception condition (e.g., no such object for SNMPv2c).
<b>Ob</b>	Obsolete. It is optional. Though in SNMP convention, obsolete objects should not be implemented, DOCSIS 2.0 OSSI 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 <b>MUST</b> be implemented correctly according to the MIB definition. If a vendor chooses not to implement the object, the SNMP agent <b>MUST NOT</b> instantiate such object and <b>MUST</b> respond with the appropriate error/exception condition (e.g., no such object for SNMPv2c).
<b>RC</b>	Read-Create. The access of the object <b>MUST</b> be implemented as Read-Create.
<b>RO</b>	Read-Only. The access of the object <b>MUST</b> be implemented as Read-Only.
<b>RW</b>	Read-Write. The access of the object <b>MUST</b> be implemented as Read-Write.
<b>RC/RO</b>	Read-Create or Read-Only. The access of the object <b>MUST</b> be implemented as either Read-Create or Read-Only as described in the MIB definition.
<b>RW/RO</b>	Read-Write or Read-Only. The access of the object <b>MUST</b> 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>6</sup>**

<b>DOCS-IF-MIB [RFC 4546]</b>				
<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
<b>DOCS-IF-M-CMTS-MIB (Annex C)</b>				
<b>docsIfMCmtsCoreDownstreamTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsCoreDownstreamType	D	RO	NA	NA
docsIfMCmtsCoreDownstreamPhyDependencies	D	RO	NA	NA
<b>docsIfMCmtsEqamDownstreamTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsEqamDownstreamTSID	NA	NA	M	RW
docsIfMCmtsEqamDownstreamPhyDependencies	NA	NA	M	RO
docsIfMCmtsEqamDownstreamDevicePhyParamLock	NA	NA	M	RO
docsIfMCmtsEqamDownstreamDeviceConfigPhyParamLock	NA	NA	M	RW
docsIfMCmtsEqamDownstreamAllocationType	NA	NA	M	RW
docsIfMCmtsEqamDownstreamAllocationStatus	NA	NA	M	RO

<sup>6</sup> Revised this table per ECN M-OSSI-N-05.0254-5 on 11/22/05. Table modified per M-OSSI-N-07.0451-3, #1 and M-OSSI-N-07.0451-3, #2 on 7/20/07 by KN. Table revised per M-OSSI-N-07.0562, #4, 5, 6, & 7 on 11/9/07 and Annex E added per #8 on 11/12/07 by KN. Row added per M-OSSI-N-07.0562-5 #12 on 11/12/07 by KN

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

docsIfMCmtsEqamGlobCfgDownErrorsCount	NA	NA	M	RO
docsIfMCmtsEqamGlobCfgDownRowStatus	NA	NA	M	RC
<b>docsIfMCmtsChannelBlockTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsChannelBlockPhysicalIndex	NA	NA	D	N-Acc
docsIfMCmtsChannelBlockNumberChannels	NA	NA	D	RO
docsIfMCmtsChannelBlockCfgNumberChannels	NA	NA	D	RW
docsIfMCmtsChannelBlockMute	NA	NA	D	RW
docsIfMCmtsChannelBlockTestType	NA	NA	D	RW
docsIfMCmtsChannelBlockTestIfIndex	NA	NA	D	RW
<b>docsIfMCmtsDepsiSessionConfigTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsDepsiSessionConfigIndex	M	N-Acc	M	N-Acc
docsIfMCmtsDepsiSessionConfigCableMacIfIndex	M	RO	M	RC/RO
docsIfMCmtsDepsiSessionConfigCableDownfIndex	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigAddrType	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigLocalAddr	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigRemoteAddr	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigL2TPv3HeaderType	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigMethod	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigTSID	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigDEPIMode	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigRsrcAllocReq	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigCinPhbIdPolicy	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigSyncEnabled	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigSyncInterval	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigPhyParamsFlag	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigChannelFrequency	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigChannelModulation	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigChannelInterleave	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigChannelPower	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigChannelAnnex	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigChannelSymbolRateM	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigChannelSymbolRateN	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigChannelOutputRate	M	RC	M	RC/RO
docsIfMCmtsDepsiSessionConfigChannelBurstSize	M	RC	M	RC/RO

docsIfMCmtsDepsessionConfigStorage	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigRowStatus	M	RC	M	RC/RO
docsIfMCmtsDepsessionConfigChannelId	M	RC	N-Sup	NA
<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>docsIfMCmtsDepsessionRsrcAllocTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsDepsessionRsrcAllocIndex	M	RC	O	RC/RO
docsIfMCmtsDepsessionRsrcAllocSeq	M	RC	O	RC/RO
docsIfMCmtsDepsessionRsrcAllocPhbId	M	RC	O	RC/RO
docsIfMCmtsDepsessionRsrcAllocFlowId	M	RC	O	RC/RO
docsIfMCmtsDepsessionRsrcAllocUdpPort	M	RC	O	RC/RO
docsIfMCmtsDepsessionRsrcAllocPolicyScnTags	M	RC	O	RC/RO
docsIfMCmtsDepsessionRsrcAllocStorage	M	RC	O	RC/RO
docsIfMCmtsDepsessionRsrcAllocRowStatus	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	NA	NA	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
docsIfMCmtsDepsessionCinLatencyThrshld	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>docsIfMCmtsDepsessionCinLatency</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsDepsessionCinLatencyPerfIntervalSeq	M	RO	O	RO
docsIfMCmtsDepsessionCinLatencyPerfValue	M	RO	O	RO
docsIfMCmtsDepsessionCinLatencyTime	M	RO	O	RO
<b>docsIfMCmtsDepsiphbPolicyTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsDepsiphbPolicyTag	M	N-Acc	NA	NA
docsIfMCmtsDepsiphbPolicySCN	M	RC	NA	NA
docsIfMCmtsDepsiphbPolicyCinPhbId	M	RC	NA	NA
docsIfMCmtsDepsiphbPolicyStorage	M	RC	NA	NA
docsIfMCmtsDepsiphbPolicyRowStatus	M	RC	NA	NA
<b>docsIfMCmtsQosServiceFlowExtTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsQosServiceFlowExtDepsiflowId	M	RO	NA	NA
docsIfMCmtsQosServiceFlowExtCinPhbId	M	RO	NA	NA
docsIfMCmtsQosServiceFlowExtDepsifIndex	M	RO	NA	NA

<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	NA	NA	NA	NA	M	RW
dtiProtocolControlErrorRateInterval	M	RW/RO	M	RW/RO	M	RW
dtiProtocolControlJitterTimeInterval	NA	NA	NA	NA	M	RW
dtiProtocolControlTestMode	NA	NA	NA	NA	M	RW
dtiProtocolControlToDValue	NA	NA	NA	NA	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	NA	NA	NA	NA	M	RO
dtiProtocolPerformanceFrameErrorRate	M	RO	M	RO	M	RO
dtiProtocolPerformancePeakToPeakJitter	NA	NA	NA	NA	M	RO
dtiProtocolPerformanceWander35Second	NA	NA	NA	NA	M	RO
dtiProtocolPerformanceWanderTSeconds	NA	NA	NA	NA	M	RO
dtiProtocolPerformanceFrameErrorRateScale	M	RO	M	RO	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	NA	NA	NA	NA	M	RO
dtiServerHopCount	NA	NA	NA	NA	M	RO
dtiServerExternalTimingSource	NA	NA	NA	NA	M	RO
dtiServerToDSources	NA	NA	NA	NA	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	NA	NA	NA	NA	M	RW

dtiServerGlobalErrorRateInterval	NA	NA	NA	NA	M	RW
dtiServerGlobalJitterTimeInterval	NA	NA	NA	NA	M	RW
dtiServerGlobalToDMethod	NA	NA	NA	NA	M	RW
dtiServerGlobalToDValue	NA	NA	NA	NA	M	RW
<b>DOCS-CABLE-DEVICE-MIB [RFC 4639]</b>						
<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>						
Object	M-CMTS Core	Access	EQAM	Access	DTI Server	Access
ifNumber	M	RO	M	RO	M	RO
IfTableLastChange	M	RO	M	RO	M	RO
<b>ifTable</b>						
Object			EQAM	Access	DTI Server	Access
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	NA
ifOutErrors			M	RO	M	RO
ifOutQLen			M	RO	N-Sup	NA
ifSpecific			M	RO	N-Sup	NA
<b>ifXTable</b>						
Object			EQAM	Access		
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		
ifHCOutOctets	M	RO		
ifHCOutUcastPkts	M	RO		
ifHCOutMulticastPkts	M	RO		
ifHCOutBroadcastPkts	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 [RFC 4133]						
entPhysicalTable						
Object	M-CMTS Core	Access	EQAM	Access	DTI Server	Access
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
entAliasMappingTable						
Object	M-CMTS Core	Access	EQAM	Access	DTI Server	Access
entAliasLogicalIndexOrZero	O	N-Acc	O	N-Acc	O	N-Acc
entAliasMappingIdentifier	O	RO	M	RO	M	RO
entPhysicalContainsTable						
Object	M-CMTS Core	Access	EQAM	Access	DTI Server	Access
entPhysicalChildIndex	O	RO	M	RO	M	RO

SNMPv2-MIB [RFC 3418]				
System Group				
Objects	EQAM	Access	DTI Server	Access
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
sysORTable				
Objects	EQAM	Access	DTI Server	Access
sysORIndex	M	N-Acc	M	N-Acc
sysORID	M	RO	M	RO
sysORDescr	M	RO	M	RO
sysORUpTime	M	RO	M	RO
SNMP Group				
Objects	EQAM	Access	DTI Server	Access
snmpEnableAuthenTraps	M	RW	M	RW
IP-MIB [RFC 2011]				
ipAddrTable				
Objects	EQAM	Access	DTI Server	Access
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
<b>SNMP-VIEW-BASED-ACM-MIB [RFC 3415]</b>				
<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
<b>SNMP-COMMUNITY-MIB [RFC 3584]</b>				
<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]				
snmpEngine Group				
Objects	EQAM	Access	DTI Server	Access
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]				
snmpMPDStats				
Objects	EQAM	Access	DTI Server	Access
snmpUnknownSecurityModels	M	RO	M	RO
snmpInvalidMsgs	M	RO	M	RO
snmpUnknownPDUHandlers	M	RO	M	RO
SNMP Applications [RFC 3413]				
Objects	EQAM	Access	DTI Server	Access
snmpTargetSpinLock	O	RW/RO	M	RW/RO
snmpTargetAddrTable				
Objects	EQAM	Access	DTI Server	Access
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

<b>SNMP-USER-BASED-SM-MIB [RFC 3414]</b>				
<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>DOCS-DRF-MIB (Annex E)</b>				
<b>docsDrfDownstreamTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsDrfDownstreamPhyDependencies	M	RO	NA	NA
<b>docsDrfDownstreamCapabilitiesTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsIfMCmtsEqamDownstreamCapabFrequency	NA	NA	M	RO
docsIfMCmtsEqamDownstreamCapabBandwidth	NA	NA	M	RO
docsIfMCmtsEqamDownstreamCapabPower	NA	NA	M	RO
docsIfMCmtsEqamDownstreamCapabModulation	NA	NA	M	RO
docsIfMCmtsEqamDownstreamCapabInterleaver	NA	NA	M	RO
docsIfMCmtsEqamDownstreamCapabJ83Annex	NA	NA	M	RO
docsIfMCmtsEqamDownstreamCapabConcurrentServices	NA	NA	M	RO
docsIfMCmtsEqamDownstreamCapabServicesTransport	NA	NA	M	RO
docsIfMCmtsEqamDownstreamCapabMuting	NA	NA	M	RO
<b>docsDrfGroupDependencyTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsDrfGroupDependencyPhyParam	NA	NA	M	N-Acc
docsDrfGroupDependencyPhysicalIndex	NA	NA	M	N-Acc
docsDrfGroupDependencyGroupID	NA	NA	M	RO
docsDrfGroupDependencyType	NA	NA	M	RO
<b>docsDrfChannelBlockTable</b>				
<b>Object</b>	<b>M-CMTS Core</b>	<b>Access</b>	<b>EQAM</b>	<b>Access</b>
docsDrfChannelBlockPhysicalIndex	NA	NA	M	N-Acc
docsDrfChannelBlockNumberChannels	NA	NA	M	RO
docsDrfChannelBlockCfgNumberChannels	NA	NA	M	RW
docsDrfChannelBlockMute	NA	NA	M	RW
docsDrfChannelBlockTestType	NA	NA	M	RW
docsDrfChannelBlockTestIfIndex	NA	NA	M	RW

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

*Table A-2 - IF-MIB ifTable MIB-Object details<sup>7</sup>*

<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>
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)
ifHCOutOctets	(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)
ifInDiscards	(n)	0	(n)	(n)

<sup>7</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>
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 [OSSI2.0]. 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	

Process	Sub-Process	CMTS & EQAM Priority	Event Message	Message Notes and Details	Error Code Set	Event ID	Trap Name
<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	
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		

Process	Sub-Process	CMTS & EQAM Priority	Event Message	Message Notes and Details	Error Code Set	Event ID	Trap Name
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)<sup>8</sup>

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,
TEXTUAL-CONVENTION
                                FROM SNMPv2-TC

OBJECT-GROUP,
MODULE-COMPLIANCE
                                FROM SNMPv2-CONF

SnmpAdminString
                                FROM SNMP-FRAMEWORK-MIB

PhysicalIndexOrZero,
PhysicalIndex
                                FROM ENTITY-MIB

ifIndex,
InterfaceIndex,
InterfaceIndexOrZero
                                FROM IF-MIB

TenthdBmV
                                FROM DOCS-IF-MIB

docsQosServiceFlowId
                                FROM DOCS-QOS-MIB

SnmpTagValue
                                FROM SNMP-TARGET-MIB

InetAddressType,
InetAddress,
InetAddressNumber
                                FROM INET-ADDRESS-MIB

clabProjDocsis
                                FROM CLAB-DEF-MIB;

```

docsIfMmtsMib MODULE-IDENTITY

```

LAST-UPDATED      "200712060000Z" -- December 6, 2007
ORGANIZATION      "Cable Television Laboratories, Inc"
CONTACT-INFO
    "Postal: Cable Television Laboratories, Inc.
     858 Coal Creek Circle
     Louisville, Colorado 80027-9750
     U.S.A.
     Phone: +1 303-661-9100"

```

<sup>8</sup> Revised annex per M-OSSI-N-05.0254-5 and M-OSSI-N-06.0329-1 by GO on 11/21/05 and 1/15/07. Revised sections of the Annex, per ECN 07.0419-3, on 4/24/07 by KN. Entire section replaced per M-OSSI-N-07.0562-5, #11 on 11/12/07 by KN.

Fax: +1 303-661-9199  
E-mail: mibs@cablelabs.com"

## 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).

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REVISION "200712060000Z" -- December 6, 2007

## DESCRIPTION

"Revised Version includes ECN M-OSSI-N-07.0562-5 and published as I07."

REVISION "200705180000Z"

## DESCRIPTION

"Revised Version includes ECN M-OSSI-N-07.0419-3 and ECN M-OSSI-N-07-0398-1 and published as I05."

REVISION "200702230000Z"

## DESCRIPTION

"Revised Version includes ECN M-OSSI-N-06.0329-1 and published as I04."

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"

::= { clabProjDocsis 6 }

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

ClDotIdUserPriority ::= TEXTUAL-CONVENTION

STATUS current

## DESCRIPTION

"A 3-bit priority ID used in the IEEE 802.1q packet header."

SYNTAX INTEGER (0..7)

DepiFlowId ::= TEXTUAL-CONVENTION

STATUS current

## DESCRIPTION

"A 3-bit DEPI flow ID used in the DEPI sublayer header."

SYNTAX INTEGER (0..7)

VlanId ::= TEXTUAL-CONVENTION

STATUS current

## DESCRIPTION

"A 12-bit VLAN ID used in the VLAN Tag header."

SYNTAX INTEGER (1..4094)

```
-----
-- 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 }
docsIfMCmtsDepiObjects   OBJECT IDENTIFIER ::= { docsIfMCmtsObjects 4 }
```

```
docsIfMCmtsDepiSessionObjects OBJECT IDENTIFIER ::=
    { docsIfMCmtsDepiObjects 1 }
docsIfMCmtsDepiQosObjects     OBJECT IDENTIFIER ::=
    { docsIfMCmtsDepiObjects 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      deprecated
  DESCRIPTION
    "M-CMTS Core extensions for the DOCSIS RFI Downstream
    docsIfDownstreamTable.
    This table is deprecated and the equivalent management
    information is now part of the DOCS-DRF-MIB MIB Module."
  ::= { docsIfMCmtsCoreObjects 1 }

docsIfMCmtsCoreDownstreamEntry OBJECT-TYPE
  SYNTAX      DocsIfMCmtsCoreDownstreamEntry
  MAX-ACCESS  not-accessible
  STATUS      deprecated
  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      deprecated
  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 deprecated
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,
    docsIfMCmtsEqamDownstreamDRRPAdvertizing 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 docsIfMCmtsDepiSessionConfigTable is locked for SNMP SETs, returning 'notWritable' on SET attempts.  
When a specific BIT is set to '0', the PHY parameter in docsIfMCmtsDepiSessionConfigTable 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 ERMI."
 ::= { 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
        docsIfMCmtsDepsessionConfigTable 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 docsisIfMCmtsEqamDownstreamAllocationType.

    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"
 ::= { docsisIfMCmtsEqamDownstreamEntry 6 }

```

## docsisIfMCmtsEqamDownstreamAllocationTimeout 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 docsisIfMCmtsDepiSessionConfigTable 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."
 ::= { docsisIfMCmtsEqamDownstreamEntry 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      deprecated
    DESCRIPTION
        "This table contains the QAM channel capabilities
        for the M-CMTS Downstream Interface PHY parameters in the
        EQAM device.
        This table is deprecated and the equivalent management
        information is now part of the DOCS-DRF-MIB MIB Module."
    ::= { docsIfMCmtsEqamObjects 2 }
```

```
docsIfMCmtsEqamDownstreamCapabilitiesEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsEqamDownstreamCapabilitiesEntry
    MAX-ACCESS  not-accessible
```

```

STATUS      deprecated
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  $f + 1 \cdot \text{bandwidth}$  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  $f - 2 \cdot \text{bandwidth}$  and the 2nd QAM channels gets a frequency of  $f - 1 \cdot \text{bandwidth}$ .

'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      deprecated
    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      deprecated
    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      deprecated
    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 deprecated

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.

'taps128increment2' set to '1' indicates the support of j = 128, i = 2 interleave.

'taps128increment3' set to '1' indicates the support of j = 128, i = 3 interleave.

'taps128increment4' set to '1' indicates the support of j = 128, i = 4 interleave.

'taps128increment5' set to '1' indicates the support of

j = 128, i = 5 interleave.

'taps128increment6' set to '1' indicates the support of  
j = 128, i = 6 interleave.

'taps128increment7' set to '1' indicates the support of  
j = 128, i = 7 interleave.

'taps128increment8' 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      deprecated
```

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 {
        eqamDependency(0),
        mpeg2OverIP(1),
        dmpt(2),
        psp(3)
    }
    MAX-ACCESS  read-only
    STATUS      deprecated
    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      deprecated
    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      deprecated
    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 allow 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`.

This table is deprecated and the equivalent management information is now part of the DOCS-DRF-MIB MIB Module."

```
::= { docsIfMCmtsEqamObjects 3 }
```

`docsIfMCmtsEqamGroupDependencyEntry` OBJECT-TYPE

SYNTAX `DocsIfMCmtsEqamGroupDependencyEntry`

MAX-ACCESS not-accessible

STATUS deprecated

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 `entPhysicalContainsTable`.

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 of 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  $P_i(P_1..P_n)$

The list  $M_j$  ( $M_1..M_n$ ) of docsIfMCmtsEqamGroupDependencyPhysicalIndex represents the values from this table with PHY parameter docsIfMCmtsEqamGroupDependencyPhyParam X and/or 'all'

The list  $Q_i$  ( $Q_1..n$ ) is the list of matches of  $M_i$  in  $P_i$

$Q_i$  with the lower position in the entyPhysicalContainsTable is selected  $Q_y$  and  $M_y$  is the group criteria selected.

All QAM channels  $B_i$  below  $M_y$  are candidates of being in the dependency group.

Each  $B_i$  is verified as A for its own  $B_{P_i}$  parent tree to verify that in effect  $M_y$  is the lowest denominator in  $M_i B_{P_i}$  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      deprecated
    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      deprecated
    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      deprecated
    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      deprecated
    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),
        taps128increment2(9),
        taps128increment3(10),
        taps128increment4(11),
        taps128increment5(12),
        taps128increment6(13),
        taps128increment7(14),
        taps128increment8(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).

'taps128increment2'	protection	190/132	usec,
	latency	8/5.6	msec
'taps128increment3'	protection	285/198	usec,
	latency	12/8.4	msec
'taps128increment4'	protection	379/264	usec,
	latency	16/11	msec
'taps128increment5'	protection	474/330	usec,
	latency	20/14	msec
'taps128increment6'	protection	569/396	usec,
	latency	24/17	msec
'taps128increment7'	protection	664/462	usec,
	latency	28/19	msec
'taps128increment8'	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 docsIfMCmtsEqamGlobCfgDownAnnex 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 an 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 14 }
```

```
-----
-- 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      deprecated
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. This Table is deprecated and the equivalent management information is now part of the DOCS-DRF-MIB MIB Module"

```
::= { docsIfMCmtsEqamObjects 5 }
```

docsIfMCmtsChannelBlockEntry OBJECT-TYPE

```
SYNTAX      DocsIfMCmtsChannelBlockEntry
MAX-ACCESS  not-accessible
STATUS      deprecated
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      deprecated
```

## DESCRIPTION

"The Physical Index of the QAM Channel Block."

::= { docsIfMCmtsChannelBlockEntry 1 }

## docsIfMCmtsChannelBlockNumberChannels OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS deprecated

## 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 deprecated

## 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 deprecated

## 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 deprecated

## 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 deprecated

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
        docsIfMCmtsDepsessionConfigMethod 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
        docsIfMCmtsDepsessionConfigRemoteAddr. There may be other
        L2TPv3 Control Plane connections from different M-CMTSs
        to the same EQAM IP host."
 ::= { docsIfMCmtsDepsessionObjects 1 }
```

```
docsIfMCmtsDepsessionConfigEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsDepsessionConfigEntry
    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
        docsIfMCmtsDepsessionConfigStorage.

        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 docsIfMCmtsDepsessionConfigRemoteAddr
          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
          docsIfMCmtsDepsessionInfoState.
```

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 DRF 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,
docsDrfDownstreamTable/
docsIfMCmtsEqamDownstreamTable,
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
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,
docsIfMCmtsDepiSessionConfigChannelOutputRate  Unsigned32,
docsIfMCmtsDepiSessionConfigChannelBurstSize  Unsigned32,
docsIfMCmtsDepiSessionConfigStorage           StorageType,
docsIfMCmtsDepiSessionConfigRowStatus         RowStatus,
docsIfMCmtsDepiSessionConfigChannelId         Unsigned32
}

```

```

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

```

```

docsIfMCmtsDepiSessionConfigCableMacIfIndex 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."
    ::= { docsIfMCmtsDepiSessionConfigEntry 2 }

```

```

docsIfMCmtsDepiSessionConfigCableMCmtsDownIfIndex 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 docsIfMCmtsDepiSessionConfigCableMacIfIndex 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-CMTS 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."
 ::= { docsIfMCmtsDepiSessionConfigEntry 8 }

docsIfMCmtsDepiSessionConfigTSID 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 not 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."
 ::= { docsIfMCmtsDepiSessionConfigEntry 9 }

docsIfMCmtsDepiSessionConfigDEPIMode 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."
 ::= { docsIfMCmtsDepiSessionConfigEntry 10 }

docsIfMCmtsDepiSessionConfigRsrcAllocReq OBJECT-TYPE
SYNTAX      Unsigned32 (0..4294967295)
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "A reference to docsIfMCmtsDepiRsrcAllocIndex of
    docsIfMCmtsDepiRsrcAllocTable used in
    the DEPI Session setup by the M-CMTS Core to configure
    EQAM PHBIDs. M-CMTS uses only the PHBIDs from the
    docsIfMCmtsDepiRsrcAllocTable 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 }
 ::= { docsIfMCmtsDepiSessionConfigEntry 11 }

docsIfMCmtsDepiSessionConfigCinPhbIdPolicy OBJECT-TYPE
SYNTAX      SnmpTagValue
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "A list of tags to reference CIN PHB policies in
    docsIfMCmtsDepiPhbPolicyTable 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 }
 ::= { docsIfMCmtsDepsessionConfigEntry 13 }

docsIfMCmtsDepsessionConfigSyncInterval 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 }
 ::= { docsIfMCmtsDepsessionConfigEntry 14 }

docsIfMCmtsDepsessionConfigPhyParamsFlag 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' }
 ::= { docsIfMCmtsDepsessionConfigEntry 15 }

docsIfMCmtsDepsessionConfigChannelFrequency 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
    taps128increment2(9),
    taps128increment3(10),
    taps128increment4(11),
    taps128increment5(12),
    taps128increment6(13),
    taps128increment7(14),
    taps128increment8(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 as 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 }
 ::= { docsIfMCmtsDepiSessionInfoEntry 6 }

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

docsIfMCmtsDepiSessionInfoEQAMSessionID 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."
 ::= { docsIfMCmtsDepiSessionInfoEntry 8 }

docsIfMCmtsDepiSessionInfoOwner 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'."
 ::= { docsIfMCmtsDepiSessionInfoEntry 9 }

docsIfMCmtsDepiSessionInfoState OBJECT-TYPE
SYNTAX      INTEGER {
    other(1),
    depiSessionUp(2),
    depiSessionError(3),
    depiSessionInProgress(4)
    }
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.
    'depiSessionInProgress'
        Indicates that the DEPI session has been configured,
        but has not yet become active."
 ::= { 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 docsIfMCmtsDepsessionInfoStorage."
 ::= { docsIfMCmtsDepsessionInfoEntry 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 PHBIDs 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 docsIfMCmtsDepsessionConfigRsrcAllocReq
          references those type of entry sets.
          In those entries the values of
          docsIfMCmtsDepsRsrcAllocUdpPort,
          docsIfMCmtsDepsRsrcAllocFlowId,
          docsIfMCmtsDepsRsrcAllocPolicyCinPolicyTag 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
          docsIfMCmtsDepsessionInfoRsrcAllocResp in
          docsIfMCmtsDepsessionInfoTable 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
          docsIfMCmtsDepsessionInfoRsrcAllocResp 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."
 ::= { docsIfMCmtsDepsessionObjects 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 { docsIfMCmtsDepsRsrcAllocIndex, docsIfMCmtsDepsRsrcAllocSeq }
 ::= { docsIfMCmtsDepsRsrcAllocTable 1 }
```

```
DocsIfMCmtsDepsRsrcAllocEntry ::= SEQUENCE
{
  docsIfMCmtsDepsRsrcAllocIndex      Unsigned32,
  docsIfMCmtsDepsRsrcAllocSeq        Unsigned32,
  docsIfMCmtsDepsRsrcAllocPhbId      Unsigned32,
  docsIfMCmtsDepsRsrcAllocFlowId     DepiFlowId,
  docsIfMCmtsDepsRsrcAllocUdpPort    InetPortNumber,
  docsIfMCmtsDepsRsrcAllocPolicyScnTags SnmpTagValue,
  docsIfMCmtsDepsRsrcAllocStorage    StorageType,
  docsIfMCmtsDepsRsrcAllocRowStatus  RowStatus,
  docsIfMCmtsDepsRsrcAllocCinPolicyTag SnmpAdminString
}
```

```
docsIfMCmtsDepsRsrcAllocIndex 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
    docsIfMCmtsDepsRsrcAllocIndex value."
  ::= { docsIfMCmtsDepsRsrcAllocEntry 1 }
```

```
docsIfMCmtsDepsRsrcAllocSeq OBJECT-TYPE
  SYNTAX      Unsigned32 (1..4294967295)
  MAX-ACCESS  not-accessible
  STATUS      current
  DESCRIPTION
    "The sequence index for entries within the same
    docsIfMCmtsDepsRsrcAllocIndex 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."
  ::= { docsIfMCmtsDepsRsrcAllocEntry 2 }
```

```
docsIfMCmtsDepsRsrcAllocPhbId OBJECT-TYPE
  SYNTAX      Unsigned32 (0..63)
  MAX-ACCESS  read-create
  STATUS      current
  DESCRIPTION
    "The PHB identifier (per-Hop-Behavior ID) associated with
    this entry. This PHBID is used solely to signal to the EQAM
    what it's local traffic policy should be for the DEPI flow, and
    is independent of the PHBs in the CIN."
```

In PSP a minimum of two PHBIDs for two flow IDs corresponds to PHBIDs EF (46) and BE (0). BE is the PHBID for the one Flow ID PHBID required in DMPT mode."

```
 ::= { docsIfMCmtsDepiRsrcAllocEntry 3 }
```

docsIfMCmtsDepiRsrcAllocFlowId OBJECT-TYPE

```
SYNTAX      DepiFlowId
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 { "" }
 ::= { docsIfMCmtsDepiRsrcAllocEntry 6 }

docsIfMCmtsDepiRsrcAllocStorage 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 docsIfMCmtsDepiRsrcAllocIndex
    share the same StorageType value."
DEFVAL { volatile }
 ::= { docsIfMCmtsDepiRsrcAllocEntry 7 }

docsIfMCmtsDepiRsrcAllocRowStatus 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 docsIfMCmtsDepiRsrcAllocPhbId to become
    'active'. All other read-create columnar objects are not
    instantiated or set to default values if not set during
    row creation."
 ::= { docsIfMCmtsDepiRsrcAllocEntry 8 }

docsIfMCmtsDepiRsrcAllocCinPolicyTag OBJECT-TYPE
SYNTAX      SnmpAdminString (SIZE (0..32))
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "A single tag to reference a CIN PHB policy in
    docsIfMCmtsDepiPhbPolicyTable for this DEPI flow.
    This allows each DEPI flow to be assigned a different
    PHBID across the CIN.

    This object is not meaningful for the EQAM, and reports
    a zero length octet string."
 ::= { docsIfMCmtsDepiRsrcAllocEntry 9 }

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

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

docsIfMCmtsDepiSessionStatsEntry OBJECT-TYPE
SYNTAX      DocsIfMCmtsDepiSessionStatsEntry

```

```

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

DocsIfMCmtsDepsessionStatsEntry ::= SEQUENCE
    {
        docsIfMCmtsDepsessionInfoOutOfSequencePkts Counter32
    }

docsIfMCmtsDepsessionInfoOutOfSequencePkts 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 }

docsIfMCmtsDepsessionCinLatencyThrshld 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
--

--
-- docsIfMCmtsDepsessionCinLatencyPerfTable
-- Applicable to CMTS only

docsIfMCmtsDepsessionCinLatencyPerfTable OBJECT-TYPE
SYNTAX      SEQUENCE OF DocsIfMCmtsDepsessionCinLatencyPerfEntry
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 docsIfMCmtsDepiSessionConfigCinPhbIdPolicy)

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 PBHIDs 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."

```
::= { docsIfMCmtsDepiQosObjects 1 }
```

docsIfMCmtsDepiPhbPolicyEntry OBJECT-TYPE

```
SYNTAX      DocsIfMCmtsDepiPhbPolicyEntry
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 docsIfMCmtsDepiRsrcAllocCinPolicyTag, the values of docsIfMCmtsDepiPhbPolicyEntry are passed to the CIN PHBID handler to encapsulate DEPI payload with DEPI tunnel PHBID. It means different DEPI flows are assigned to different PHBIDs for the CIN transport."

```
INDEX { docsIfMCmtsDepiPhbPolicyTag }
 ::= { docsIfMCmtsDepiPhbPolicyTable 1 }
```

DocsIfMCmtsDepiPhbPolicyEntry ::= SEQUENCE

```
{
docsIfMCmtsDepiPhbPolicyTag          SnmpAdminString,
docsIfMCmtsDepiPhbPolicyCinVlanState  INTEGER,
docsIfMCmtsDepiPhbPolicyCinPhbId     Unsigned32,
docsIfMCmtsDepiPhbPolicyStorage      StorageType,
docsIfMCmtsDepiPhbPolicyRowStatus    RowStatus,
docsIfMCmtsDepiPhbPolicyCinVlanId    VlanId,
docsIfMCmtsDepiPhbPolicyCinUserPriority ClDotIldUserPriority
}
```

docsIfMCmtsDepiPhbPolicyTag OBJECT-TYPE

```
SYNTAX      SnmpAdminString (SIZE (1..32))
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
```

"The index of the policy."

```
::= { docsIfMCmtsDepiPhbPolicyEntry 1 }
```

docsIfMCmtsDepiPhbPolicyCinVlanState OBJECT-TYPE

```
SYNTAX      INTEGER {
disabled(0),
```

```

        userPriorityOnly(1),
        enabled(2),
        other(3)
    }
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "Indicates the layer-2 priority settings assigned to transport
    the DEPI traffic assigned to this docsIfMCmtsDepiPhbPolicyEntry
    for the related DEPI session.
    The value 'disabled' indicates that only transport layer QoS
    settings are in use.  DEPI packets for DEPI flows using this
    policy entry will not normally use the 802.1q header.
    The value 'userPriorityOnly' indicates that the
    docsIfMCmtsDepiPhbPolicyCinVlanId object is not in use, but
    the docsIfMCmtsDepiPhbPolicyCinUserPriority is in effect.  DEPI
    packets for DEPI flows using this policy entry will normally
    use the 802.1q header with a vlan id of zero and the user
    priority configured by docsIfMCmtsDepiPhbPolicyCinUserPriority.
    The value 'enabled' indicates that values of both the
    docsIfMCmtsDepiPhbPolicyCinVlanId and the
    docsIfMCmtsDepiPhbPolicyCinUserPriority are un use.  DEPI
    packets for DEPI flows using this policy entry will use the
    802.1q header with the configured vlan id and user priority.
    The value 'other' indicates that both vlan id and user priority
    are configured by some mechanism other than this MIB."
 ::= { docsIfMCmtsDepiPhbPolicyEntry 2 }

docsIfMCmtsDepiPhbPolicyCinPhbId OBJECT-TYPE
    SYNTAX      Unsigned32 (0..63)
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The CIN PHBID assigned to transport the DEPI traffic assigned
        to this docsIfMCmtsDepiPhbPolicyEntry for the related DEPI
        session."
    ::= { docsIfMCmtsDepiPhbPolicyEntry 3 }

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

docsIfMCmtsDepiPhbPolicyRowStatus 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."
    ::= { docsIfMCmtsDepiPhbPolicyEntry 5 }

docsIfMCmtsDepiPhbPolicyCinVlanId OBJECT-TYPE
    SYNTAX      VlanId
    MAX-ACCESS  read-create
    STATUS      current

```

```

DESCRIPTION
    "The CIN Vlan ID assigned to transport the DEPI traffic
    assigned to this docsIfMCmtsDepsPhbPolicyEntry for the related
    DEPI session."
 ::= { docsIfMCmtsDepsPhbPolicyEntry 6 }

docsIfMCmtsDepsPhbPolicyCinUserPriority OBJECT-TYPE
SYNTAX      ClDotIdUserPriority
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "The 802.1p user priority assigned to transport the DEPI
    traffic assigned to this docsIfMCmtsDepsPhbPolicyEntry for the
    related DEPI session. This only applies to the DEPI session.
    The user priority of DOCSIS frames transported by the DEPI
    session is not affected by the value of this object."
 ::= { docsIfMCmtsDepsPhbPolicyEntry 7 }

--
-- 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."
 ::= { docsIfMCmtsDepsQosObjects 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 {
    docsIfMCmtsQosServiceFlowExtDepsFlowId  DepsFlowId,
    docsIfMCmtsQosServiceFlowExtCinPhbId    Unsigned32,
    docsIfMCmtsQosServiceFlowExtDepsIfIndex InterfaceIndexOrZero
}

docsIfMCmtsQosServiceFlowExtDepsFlowId OBJECT-TYPE
SYNTAX      DepsFlowId
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      deprecated
    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      deprecated
    DESCRIPTION
        "The compliance statement for M-CMTS EQAM compliant
        devices."

    MODULE -- this MODULE

-- conditionally mandatory groups

    MANDATORY-GROUPS {
        docsIfMCmtsBaseGroup,
        docsIfMCmtsEqamDevGroup
    }

    ::= { docsIfMCmtsCompliances 2}

docsIfMCmtsCoreDeviceCompliance2 MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "The compliance statement for M-CMTS Core compliant

```

```
        devices."

MODULE -- this MODULE

-- conditionally mandatory groups

MANDATORY-GROUPS {
    docsIfMCmtsBaseGroup,
    docsIfMCmtsCoreGroup2
}
::= { docsIfMCmtsCompliances 3}

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

MODULE -- this MODULE

-- conditionally mandatory groups

MANDATORY-GROUPS {
    docsIfMCmtsBaseGroup,
    docsIfMCmtsEqamDevGroup2
}

::= { docsIfMCmtsCompliances 4}

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,
docsIfMCmtsDepsessionInfoRsrcAllocCinPolicyTag,
docsIfMCmtsDepsessionInfoOutOfSequencePkts,
docsIfMCmtsDepsessionInfoCinLatencyInterval,
docsIfMCmtsDepsessionInfoCinLatencyThreshld,
docsIfMCmtsDepsessionInfoCinEventLevel,
docsIfMCmtsDepsessionInfoCinLastValue,
docsIfMCmtsDepsessionInfoCinLastValueIfIndex,
docsIfMCmtsDepsessionInfoCinLatencyValueLastTime
}
STATUS          current
DESCRIPTION
    "Group of objects implemented in M-CMTS compliant devices."
 ::= { docsIfMCmtsGroups 1 }

docsIfMCmtsCoreGroup OBJECT-GROUP
OBJECTS {
docsIfMCmtsCoreDownstreamPhyDependencies,
docsIfMCmtsCoreDownstreamType,
docsIfMCmtsQosServiceFlowExtDepsessionFlowId,
docsIfMCmtsQosServiceFlowExtCinPhbId,
docsIfMCmtsQosServiceFlowExtDepsessionIfIndex,
docsIfMCmtsDepsessionInfoCinLatencyPerfValue,
docsIfMCmtsDepsessionInfoCinLatencyTime,
docsIfMCmtsDepsessionInfoPhbPolicyCinPhbId,
docsIfMCmtsDepsessionInfoPhbPolicyStorage,
docsIfMCmtsDepsessionInfoPhbPolicyRowStatus,
docsIfMCmtsDepsessionInfoPhbPolicyCinVlanState,
docsIfMCmtsDepsessionInfoPhbPolicyCinVlanId,
docsIfMCmtsDepsessionInfoPhbPolicyCinUserPriority
}
STATUS          deprecated
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      deprecated
DESCRIPTION
    "Group of objects implemented in M-CMTS EQAM compliant
    devices."
::= { docsIfMCmtsGroups 3 }

docsIfMCmtsCoreGroup2 OBJECT-GROUP
OBJECTS {
docsIfMCmtsQosServiceFlowExtDepiFlowId,
docsIfMCmtsQosServiceFlowExtCinPhbId,
docsIfMCmtsQosServiceFlowExtDepiIfIndex,
docsIfMCmtsDepiSessionCinLatencyPerfValue,
docsIfMCmtsDepiSessionCinLatencyTime,
docsIfMCmtsDepiPhbPolicyCinPhbId,
docsIfMCmtsDepiPhbPolicyStorage,
docsIfMCmtsDepiPhbPolicyRowStatus,
docsIfMCmtsDepiPhbPolicyCinVlanState,
docsIfMCmtsDepiPhbPolicyCinVlanId,
docsIfMCmtsDepiPhbPolicyCinUserPriority
}
STATUS      current
DESCRIPTION
    "Group of objects implemented in M-CMTS Core compliant
    devices."
::= { docsIfMCmtsGroups 4 }

docsIfMCmtsEqamDevGroup2 OBJECT-GROUP
OBJECTS {
docsIfMCmtsEqamDownstreamTSID,
docsIfMCmtsEqamDownstreamPhyDependencies,
docsIfMCmtsEqamDownstreamDevicePhyParamLock,
docsIfMCmtsEqamDownstreamDeviceConfigPhyParamLock,
docsIfMCmtsEqamDownstreamAllocationType,
docsIfMCmtsEqamDownstreamAllocationStatus,
docsIfMCmtsEqamDownstreamAllocationTimeout,
docsIfMCmtsEqamDownstreamDRRPAdvertizing,

```

```
docsIfMCmtsEqamDownstreamUdpPortMapping,
docsIfMCmtsEqamGlobCfgDownPhysicalIndex,
docsIfMCmtsEqamGlobCfgDownBandwidth,
docsIfMCmtsEqamGlobCfgDownPower,
docsIfMCmtsEqamGlobCfgDownModulation,
docsIfMCmtsEqamGlobCfgDownInterleave,
docsIfMCmtsEqamGlogCfgDownAnnex,
docsIfMCmtsEqamGlobCfgDownSymbolRateM,
docsIfMCmtsEqamGlobCfgDownSymbolRateN,
docsIfMCmtsEqamGlobCfgDownLockParams,
docsIfMCmtsEqamGlobCfgDownExecutionCode,
docsIfMCmtsEqamGlobCfgDownErrorsCount,
docsIfMCmtsEqamGlobCfgDownRowStatus
}
STATUS          current
DESCRIPTION
    "Group of objects implemented in M-CMTS EQAM compliant
    devices."
 ::= { docsIfMCmtsGroups 5 }
```

END

## Annex D DTI-MIB (normative)<sup>9</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
    EntitySensorValue,
    EntitySensorDataScale     FROM ENTITY-SENSOR-MIB
    clabProjDocsis            FROM CLAB-DEF-MIB
;

dtiMib MODULE-IDENTITY
    LAST-UPDATED      "200712060000Z" -- December 6, 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          "200712060000Z" -- December 6, 2007
    DESCRIPTION
        "Revised Version includes ECN M-OSSI-N-07.0562-5
        and published as I07."
    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."

```

<sup>9</sup> Section modified per M-OSSI-N-07.0451-3, #3, #4, #5, #6, #7, and #8 on 7/20/07 by KN. Section modified per M-OSSI-N-06.0278-4 on 4 7/26/06 by KN. Entire section replaced per M-OSSI-N-07.0562-5, #13 on 11/12/07 by KN.

```

 ::= { clabProjDocsis 7 }

-- Textual Conventions

DtiCableAdvance ::= TEXTUAL-CONVENTION
  DISPLAY-HINT "2d-1d"
  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 performace
    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),  
ntpv4(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. 'ntpv4' 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 }

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 EntitySensorValue,
    dtiProtocolPerformancePeakToPeakJitter Integer32,
    dtiProtocolPerformanceWander35Second Unsigned32,
    dtiProtocolPerformanceWanderTSeconds Unsigned32,
    dtiProtocolPerformanceFrameErrorRateScale EntitySensorDataScale
}

```

## 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      EntitySensorValue
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.
    This value is read in conjunction with
    dtiProtocolPerformanceFrameErrorRateScale which determines
    The exponential value of this object. Although RFC 3434
    recommends the use of the EntitySensorValue and
    EntitySensorDataScale data types in conjunction with an
    objects of type EntitySensorDataScale and
    EntitySensorPrecision, Those two data types are not defined
    in this table as those are not used in the context of a
    sensor like in entPhySensorTable where specific units and
    precision is relevant."
 ::= { 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 }

dtiProtocolPerformanceFrameErrorRateScale OBJECT-TYPE
SYNTAX        EntitySensorDataScale
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "The scale used to measure the Frame Error Rate (FER)
    for dtiProtocolPerformanceFrameErrorRate."
 ::= { dtiProtocolPerformanceEntry 6 }

--
-- 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),
    ntpv4(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),
        ntpv4(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,
dtiProtocolPerformanceFrameErrorRateScale,
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
```

## Annex E DOCS-DRF-MIB (normative)<sup>10</sup>

```
DOCS-DRF-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY,
    OBJECT-IDENTITY,
    OBJECT-TYPE,
    Unsigned32
        FROM SNMPv2-SMI
    TruthValue,
    AutonomousType
        FROM SNMPv2-TC
    OBJECT-GROUP,
    MODULE-COMPLIANCE
        FROM SNMPv2-CONF
    PhysicalIndexOrZero,
    PhysicalIndex
        FROM ENTITY-MIB
    ifIndex,
    InterfaceIndexOrZero
        FROM IF-MIB
    docsIfDownstreamChannelEntry
        FROM DOCS-IF-MIB
    clabProjDocsis
        FROM CLAB-DEF-MIB;

docsDrfMib MODULE-IDENTITY
    LAST-UPDATED "200712060000Z" -- December 6, 2007
    ORGANIZATION "Cable Television Laboratories, Inc"
    CONTACT-INFO
        "Postal: Cable Television Laboratories, Inc.
        858 Coal Creek Circle
        Louisville, Colorado 80027-9750
        U.S.A.
        Phone: +1 303-661-9100
        Fax: +1 303-661-9199
        E-mail: mibs@cablelabs.com"
    DESCRIPTION
        "This MIB module contains the management objects for the
        management of the Downstream RF Interface specification.
        Copyright 1999-2007 Cable Television Laboratories, Inc.
        All rights reserved."
    REVISION "200712060000Z" -- December 6, 2007
    DESCRIPTION
        "Initial version, published as as part of the CableLabs
        M-OSSI specification, CM-SP-M-OSSI-I07-071206, via ECN
        M-OSSI-N-07.0562-5."
    ::= { clabProjDocsis 23 }

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

-----
-- Main Groups
-----
```

<sup>10</sup> Section added per M-OSSI-N-07.0562-5 #10 on 11/12/07 by KN.

```

docsDrfNotifications OBJECT IDENTIFIER ::= { docsDrfMib 0 }
docsDrfObjects        OBJECT IDENTIFIER ::= { docsDrfMib 1 }

-----
-- DOCSIS DRF objects
-----

-----
--
-- PHY Parameters dependencies OBJECT-IDENTITY definitions
--
-----

docsDrfRegistry OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION
    "Registration point for M-CMTS characterization of PHY
    parameters dependencies."
  ::= { docsDrfObjects 1 }

docsDrfPhyParamFixValue OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION
    "Indicates that this PHY parameter is fixed and cannot
    be changed."
  ::= { docsDrfRegistry 1 }

docsDrfPhyParamSameValue 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."
  ::= { docsDrfRegistry 2 }

docsDrfPhyParamAdjacentValues 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
    dependency."
  ::= { docsDrfRegistry 3 }

docsDrfPhyParamFrequencyRange OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION
    "This object indicates that the frequency in a TSID Group
    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."
  ::= { docsDrfRegistry 4 }

```

```
-----
-- DOCSIS DRF Interface Extension objects
-----
```

```
docsDrfDownstreamTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsDrfDownstreamEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Extensions for the DOCSIS RFI Downstream
        docsIfDownstreamChannelTable."
    ::= { docsDrfObjects 2 }

docsDrfDownstreamEntry OBJECT-TYPE
    SYNTAX      DocsDrfDownstreamEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A conceptual row for this table.
        There is a corresponding entry for each entry of
        docsIfDownstreamChannelTable."
    AUGMENTS { docsIfDownstreamChannelEntry }
    ::= { docsDrfDownstreamTable 1 }

DocsDrfDownstreamEntry ::= SEQUENCE
{
    docsDrfDownstreamPhyDependencies      BITS
}

docsDrfDownstreamPhyDependencies 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 Downstream Interface
        dependencies based on the constraints of
        docsDrfGroupDependencyEntry.
        A BIT position set to '1' indicates the PHY parameter
        belongs to a dependency group.
        A BIT position set to '0', indicates the PHY parameter
        does not belong to a dependency group.

        For Interfaces configured via DEPI this information is
        reflected in the DEPI session as DEPI TSID group
        dependencies.

        If this object value is the zero-length string, it indicates
        this interface is configurable via DEPI but no session is
        currently active."
    ::= { docsDrfDownstreamEntry 1 }
```

```
-----
-- DRF Downstream Interface Capabilities
-----
```

```
docsDrfDownstreamCapabilitiesTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsDrfDownstreamCapabilitiesEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table contains the QAM channel capabilities
        for the Downstream Interface PHY parameters."
    ::= { docsDrfObjects 3 }

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

DocsDrfDownstreamCapabilitiesEntry ::= SEQUENCE
{
    docsDrfDownstreamCapabFrequency          BITS,
    docsDrfDownstreamCapabBandwidth         BITS,
    docsDrfDownstreamCapabPower             BITS,
    docsDrfDownstreamCapabModulation        BITS,
    docsDrfDownstreamCapabInterleaver       BITS,
    docsDrfDownstreamCapabJ83Annex         BITS,
    docsDrfDownstreamCapabConcurrentServices BITS,
    docsDrfDownstreamCapabServicesTransport BITS,
    docsDrfDownstreamCapabMuting            BITS
}

docsDrfDownstreamCapabFrequency OBJECT-TYPE
    SYNTAX      BITS {
        qamDependency(0),
        adjacentChannel(1),
        adjacentChannelOrder(2)
    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The QAM channel frequency capabilities.
        'qamDependency' 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
        in docsDrfGroupDependencyTable 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 docsDrfGroupDependencyType is docsDrfPhyParamAdjacentValues.

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

```
::= { docsDrfDownstreamCapabilitiesEntry 1 }
```

docsDrfDownstreamCapabBandwidth OBJECT-TYPE

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

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The QAM channel Bandwidth capabilities.

'qamDependency' BIT set to '1' indicates the QAM channel bandwidth value has dependencies with other QAM channels as indicated in docsDrfGroupDependencyTable.

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

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

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

```
::= { docsDrfDownstreamCapabilitiesEntry 2 }
```

docsDrfDownstreamCapabPower OBJECT-TYPE

```
SYNTAX      BITS {
    qamDependency(0)
}
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The QAM channel Power capabilities.

'qamDependency' BIT set to '1' indicates the QAM channel power value has dependencies with other QAM channels as indicated in docsDrfGroupDependencyTable.

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

```
::= { docsDrfDownstreamCapabilitiesEntry 3 }
```

docsDrfDownstreamCapabModulation OBJECT-TYPE

```

SYNTAX      BITS {
    qamDependency(0),
    qam64(1),
    qam256(2)
}
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The QAM channel Modulation capabilities.
    'qamDependency' BIT set to '1' indicates the QAM channel
    modulation value has dependencies with other QAM channels
    as indicated in docsDrfGroupDependencyTable.

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

    When 'qamDependency' BIT is set to '1', a set to the
    modulation PHY parameter of a QAM channels in a
    dependency group (with docsDrfGroupDependencyType
    set to docsDrfPhyParamSameValue), sets the same modulation
    type to all QAM channels in the dependency group."
 ::= { docsDrfDownstreamCapabilitiesEntry 4 }

```

docsDrfDownstreamCapabInterleaver OBJECT-TYPE

```

SYNTAX      BITS {
    qamDependency(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.
    'qamDependency' BIT set to '1' indicates the QAM channel
    interleave value has dependencies with other QAM channels
    as indicated in docsDrfGroupDependencyTable.

    '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.

'taps128increment2' set to '1' indicates the support of  
j = 128, i = 2 interleave.

'taps128increment3' set to '1' indicates the support of  
j = 128, i = 3 interleave.

'taps128increment4' set to '1' indicates the support of  
j = 128, i = 4 interleave.

'taps128increment5' set to '1' indicates the support of  
j = 128, i = 5 interleave.

'taps128increment6' set to '1' indicates the support of  
j = 128, i = 6 interleave.

'taps128increment7' set to '1' indicates the support of  
j = 128, i = 7 interleave.

'taps128increment8' set to '1' indicates the support of  
j = 128, i = 8 interleave.

When 'gamDependency' BIT is set to '1', a set to the  
interleave PHY parameter of a QAM channels in a  
dependency group (with docsDrfGroupDependencyType  
set to docsDrfPhyParamSameValue), sets the same Interleave  
value to all QAM channels in the dependency group."

```
::= { docsDrfDownstreamCapabilitiesEntry 5 }
```

docsDrfDownstreamCapabJ83Annex OBJECT-TYPE

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

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

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

```
::= { docsDrfDownstreamCapabilitiesEntry 6 }
```

docsDrfDownstreamCapabConcurrentServices OBJECT-TYPE

```
SYNTAX      BITS {
    gamDependency(0),
    videoAndDocsis(1)
}
```

MAX-ACCESS read-only

```

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

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

    Video and DOCSIS transport service types are described in
    docsDrfDownstreamCapabServicesTransport."
 ::= { docsDrfDownstreamCapabilitiesEntry 7 }

```

docsDrfDownstreamCapabServicesTransport 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.

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

    '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 'qamDependency' BIT is set to '1', a request to set
    a QAM channel to a service type in a dependency group
    (with docsDrfGroupDependencyType set to
    docsDrfPhyParamSameValue) may be rejected."
 ::= { docsDrfDownstreamCapabilitiesEntry 8 }

```

docsDrfDownstreamCapabMuting OBJECT-TYPE

```

SYNTAX      BITS {
    qamDependency(0)
}
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The QAM channel muting capabilities.
    'qamDependency' BIT set to '1' indicates the QAM Mute
    state has dependencies with other QAM channels as
    indicated in docsDrfGroupDependencyTable.

    When 'qamDependency' BIT is set to '1', a request to
    mute a QAM channels in a dependency group (with
    docsDrfGroupDependencyType set to
    docsDrfPhyParamSameValue), sets all QAM channels in the
    dependency group to mute."
 ::= { docsDrfDownstreamCapabilitiesEntry 9 }

```

```

-----
-- DRF 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
-----

```

docsDrfGroupDependencyTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsDrfGroupDependencyEntry

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 allow 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 docsDrfGroupDependencyType.

Vendors may extend via other MIB modules the usage of docsDrfGroupDependencyType."

```
::= { docsDrfObjects 4 }
```

docsDrfGroupDependencyEntry OBJECT-TYPE

SYNTAX DocsDrfGroupDependencyEntry

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(device)
  .container(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 during system re-initialization. The storage realization of hardware dependent entries are 'permanent' or 'readOnly'. The storage realization of logical dependency entries is 'nonVolatile'.

PHY parameter dependencies that are 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 indicate no PHY dependencies for certain groups of QAM channels.

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

Note that any change in the system due to the insertion or removal of components will reset to factory default the entries associated with 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  $P_i(P_{i-1}..P_n)$

The list  $M_j$  ( $M_1..M_n$ ) of docsDrfGroupDependencyPhysicalIndex represents the values from this table with PHY parameter docsDrfGroupDependencyPhyParam X and/or 'all'

The list  $Q_i$  ( $Q_1..Q_n$ ) is the list of matches of  $M_i$  in  $P_i$

$Q_i$  with the lower position in the entyPhysicalContainsTable is selected  $Q_y$  and  $M_y$  is the group criteria selected.

All QAM channels  $B_i$  below  $M_y$  are candidates for inclusion in the dependency group.

Each  $B_i$  is verified as A for its own  $B_{P_i}$  parent tree to verify that in effect  $M_y$  is the lowest denominator in  $M_i$   $B_{P_i}$  intersection to become part of the Dependency Group

```

        of A."
INDEX { docsDrfGroupDependencyPhyParam,
        docsDrfGroupDependencyPhysicalIndex }
 ::= { docsDrfGroupDependencyTable 1 }

DocsDrfGroupDependencyEntry ::= SEQUENCE
{
docsDrfGroupDependencyPhyParam          INTEGER,
docsDrfGroupDependencyPhysicalIndex     PhysicalIndexOrZero,
docsDrfGroupDependencyGroupID          Unsigned32,
docsDrfGroupDependencyType             AutonomousType
}

docsDrfGroupDependencyPhyParam 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 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 have dependencies. The other
    enumeration values are common QAM 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 device. Thus,
    when used, 'noDependencies' is accompanied by
    docsDrfGroupDependencyPhysicalIndex '0' as the only
    entry in the table.
    In this way it is clearly distinguished when a device
    has dependencies instead of an empty table."
 ::= { docsDrfGroupDependencyEntry 1 }

docsDrfGroupDependencyPhysicalIndex OBJECT-TYPE
SYNTAX          PhysicalIndexOrZero
MAX-ACCESS     not-accessible
STATUS         current
DESCRIPTION
    "Indicates the physical element from where the PHY
    parameter dependency for QAM channels is derived.
    All the QAM channels elements under this Physical index
    will belong to a dependency group of the specified PHY
    parameter."
 ::= { docsDrfGroupDependencyEntry 2 }

docsDrfGroupDependencyGroupID 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."
 ::= { docsDrfGroupDependencyEntry 3 }

docsDrfGroupDependencyType 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 docsDrfPhyParamSameValue,
        docsDrfPhyParamAdjacentValues, docsDrfPhyParamFrequencyRange.
        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."
 ::= { docsDrfGroupDependencyEntry 4 }

-----
-- DRF Channel Block configuration
-- Configuration and diagnostic of block Channels.
-- This table is only for Channels Blocks Physical containments
-- Other configuration parameters (PHY) applicable to all channes in a
-- QAM Channel Block are set through the DS (QAM) channel interface and
-- configuration objects
-----

docsDrfChannelBlockTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsDrfChannelBlockEntry
    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."
 ::= { docsDrfObjects 5 }

docsDrfChannelBlockEntry OBJECT-TYPE
    SYNTAX      DocsDrfChannelBlockEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The conceptual row 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 { docsDrfChannelBlockPhysicalIndex }
 ::= { docsDrfChannelBlockTable 1 }

DocsDrfChannelBlockEntry ::= SEQUENCE
{
    docsDrfChannelBlockPhysicalIndex      PhysicalIndex,
    docsDrfChannelBlockNumberChannels     Unsigned32,
    docsDrfChannelBlockCfgNumberChannels  Unsigned32,
    docsDrfChannelBlockMute               TruthValue,
    docsDrfChannelBlockTestType           INTEGER,

```

```

docsDrfChannelBlockTestIfIndex      InterfaceIndexOrZero
}

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

docsDrfChannelBlockNumberChannels OBJECT-TYPE
SYNTAX      Unsigned32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The Number of QAM Channels N associated with this entry.

    The value of this attribute corresponds to the number
    of channels that can be transmitted from this block"
 ::= { docsDrfChannelBlockEntry 2 }

docsDrfChannelBlockCfgNumberChannels OBJECT-TYPE
SYNTAX      Unsigned32
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "The Number of QAM Channels N' to configure for the
    QAM block.

    This number corresponds to the number of channels that
    are configured to be currently transmitted by the 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 it is less than 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 optional
    for implementation.
    A Set to an invalid value or not supported value returns
    Error 'wrongValue'."
 ::= { docsDrfChannelBlockEntry 3 }

docsDrfChannelBlockMute 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."
 ::= { docsDrfChannelBlockEntry 4 }

docsDrfChannelBlockTestType 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
    docsDrfChannelBlockTestIfIndex has its carrier
    suppressed and the other channels in the
    Block Channel are operational.
    'alloff'
    All QAM channel carriers in the channel block are
    Suppressed.
    'onOthersOff'
    It is the condition where the QAM channel indicated in
    docsDrfChannelBlockTestIfIndex 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
    docsDrfChannelBlockTestIfIndex 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 docsDrfChannelBlockTestIfIndex 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
    docsDrfChannelBlockTestIfIndex 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
    docsDrfChannelBlockTestIfIndex is set to zero."
 ::= { docsDrfChannelBlockEntry 5 }

```

```

docsDrfChannelBlockTestIfIndex 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."
    ::= { docsDrfChannelBlockEntry 6 }

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

docsDrfConformance OBJECT IDENTIFIER ::= { docsDrfMib 2 }
docsDrfCompliances OBJECT IDENTIFIER ::= { docsDrfConformance 1 }
docsDrfGroups      OBJECT IDENTIFIER ::= { docsDrfConformance 2 }

docsDrfDeviceCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "The compliance statement DOCSIS DRFI compliant
        devices."

    MODULE -- this MODULE

-- conditionally mandatory groups

    MANDATORY-GROUPS {
        docsDrfGroup
    }
    ::= { docsDrfCompliances 1 }

docsDrfCmtsCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "The compliance statement for CMTS compliant
        devices."

    MODULE -- this MODULE

-- conditionally mandatory groups

    MANDATORY-GROUPS {
        docsDrfGroup,
        docsDrfCmtsGroup
    }

    ::= { docsDrfCompliances 2 }

docsDrfGroup OBJECT-GROUP
    OBJECTS {
        docsDrfDownstreamCapabFrequency,
        docsDrfDownstreamCapabBandwidth,
        docsDrfDownstreamCapabPower,
        docsDrfDownstreamCapabModulation,
        docsDrfDownstreamCapabInterleaver,
        docsDrfDownstreamCapabJ83Annex,
        docsDrfDownstreamCapabConcurrentServices,
        docsDrfDownstreamCapabServicesTransport,
        docsDrfDownstreamCapabMuting,
        docsDrfGroupDependencyGroupID,
        docsDrfGroupDependencyType,
    }

```

```
docsDrfChannelBlockNumberChannels,  
docsDrfChannelBlockCfgNumberChannels,  
docsDrfChannelBlockMute,  
docsDrfChannelBlockTestType,  
docsDrfChannelBlockTestIfIndex  
}  
STATUS      current  
DESCRIPTION  
    "Group of objects implemented in M-CMTS compliant devices."  
::= { docsDrfGroups 1 }
```

```
docsDrfCmtsGroup OBJECT-GROUP  
OBJECTS {  
    docsDrfDownstreamPhyDependencies  
}  
STATUS      current  
DESCRIPTION  
    "Group of objects specific for CMTS."  
::= { docsDrfGroups 2 }
```

```
END
```

## Appendix I      Acknowledgements (Informative)

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## Appendix II Revision History (Informative)

### II.1 Engineering Changes for CM-SP-M-OSSI-I02-051209

The following Engineering Change was incorporated into CM-SP-M-OSSI-I02-051209:

ECN	ECN Date	Summary
M-OSSI-N-05.0254-5	11/16/05	M-CMTS-MIB updates and corrections

### II.2 Engineering Changes for CM-SP-M-OSSI-I03-060728

The following Engineering Change was incorporated into CM-SP-M-OSSI-I03-060728:

ECN	ECN Date	Summary
M-OSSI-N-06.0278-1	6/28/06	Changes to M-CMTS DTI MIBs

### II.3 Engineering Changes for CM-SP-M-OSSI-I04-070223

The following Engineering Change was incorporated into CM-SP-M-OSSI-I04-070223:

ECN	ECN Date	Summary
M-OSSI-N-06.0329-1	12/6/06	MIB Compilation Error Cleanup

### II.4 Engineering Changes for CM-SP-M-OSSI-I05-070518

The following Engineering Changes were incorporated into CM-SP-M-OSSI-I05-070518:

ECN	ECN Date	Summary
M-OSSI-N-07.0398-1	3/21/07	OID collision in docsIfMCmtsEqamGlobCfgDownTable
M-OSSI-N-07.0419-3	4/18/07	DEPI CIN QoS configuration clean-up

### II.5 Engineering Changes for CM-SP-M-OSSI-I06-070803

The following Engineering Changes were incorporated into CM-SP-M-OSSI-I06-070803:

ECN	ECN Date	Summary
M-OSSI-N-07.0451-3	5/30/07	DTI server MIB objects

### II.6 Engineering Changes for CM-SP-M-OSSI-I07-071206

The following Engineering Changes were incorporated into CM-SP-M-OSSI-I07-071206:

ECN	ECN Date	Summary
M-OSSI-N-07.0562-5	10/31/07	Update to References and MIB objects