Data-Over-Cable Service Interface Specifications
Modular CMTS

M-CMTS Operations Support System Interface Specification

CM-SP-M-OSSI-I05-070518

ISSUED

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Work in Progress	An incomplete document, designed to guide discussion and generate feedback, that may include several alternative requirements for consideration.
Draft	A document in specification format considered largely complete, but lacking review by Members and vendors. Drafts are susceptible to substantial change during the review process.
Issued	A stable document, which has undergone rigorous member and vendor review and is suitable for product design and development, cross-vendor interoperability, and for certification testing.
Closed	A static document, reviewed, tested, validated, and closed to further engineering change requests to the specification through CableLabs.

Trademarks

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1 SCOPE

1.1 Introduction and 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

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.
[IETF1]	Raftus David, Goren Aviv, Proposed Standard RFC version of Radio Frequency (RF) Interface, draft-ietf-ipcdn-docs-rfmibv2-05.txt.
[IETF2]	Andy Bierman, Entity MIB (Version 3), draft-ietf-entmib-v3-07.txt.
[OSSI2.0]	DOCSIS Operations Support Systems Interface Specification, CM-SP-OSSIv2.0-I09-050812, August 12, 2005, 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 2669]	IETF RFC 2669, DOCSIS Cable Device MIB Cable Device Management Information Base for DOCSIS compliant Cable Modems and Cable Modem Termination Systems, August 1999.
[RFC 2863]	IETF RFC 2853, The Interfaces Group MIB, June 2000.
[RFC 3371]	IETF RFC 3371, L2TPv3 Extensions Working Group, Layer Two Tunneling Protocol 'L2TP' Management Information Base, August 2002.
[RFC 3410]	IETF RFC 3410, Introduction and Applicability Statements for Internet-Standard Management Framework, December 2002.
[RFC 3411]	IETF RFC 3411 / STD0062, An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks, December 2002.
[RFC 3412]	IETF RFC 3412 / STD0062, Message Processing and Dispatching for the Simple Network Management Protocol (SNMP), December 2002.
[RFC 3413]	IETF RFC 3413 / STD0062, Simple Network Management Protocol (SNMP) Applications, December 2002.
[RFC 3414]	IETF RFC 3414 / STD0062, User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3), December 2002.
[RFC 3415]	IETF RFC 3415 / STD0062, View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP), December 2002.
[RFC 3418]	IETF RFC 3418 / STD0062, Management Information Base (MIB) for the Simple Network Management Protocol (SNMP), December 2002.
[RFC 3584]	IETF RFC 3584 / BCP0074, Coexistence between Version 1, Version 2, and Version 3 of the Internet-Standard and Network Management Framework, August 2003.
[RFC 3931]	IETF RFC 3931, Layer Two Tunneling Protocol - Version 3 (L2TPv3), March 2005.

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:

Cable Modem (CM)	A modulator-demodulator at subscriber locations intended for use in conveying data communications on a cable television system.
CDN	L2TPv3 Call-Disconnect-Notify message.
Converged Interconnect Network	The network (generally gigabit Ethernet) that connects an M-CMTS Core to an EQAM.
Customer Premises Equipment (CPE)	Equipment at the end user's premises; may be provided by the service provider.
Data Rate	Throughput, data transmitted in units of time usually in bits per second (bps).
Decibels (dB)	Ratio of two power levels expressed mathematically as $dB = 10\log_{10}(P_{OUT}/P_{IN})$.
Decibel-Millivolt (dBmV)	Unit of RF power expressed in decibels relative to 1 millivolt over 75 ohms, where $dBmV = 20\log_{10}$(value in mV/1 mV).
DOCSIS-MPT (D-MPT)	DOCSIS MPT Mode.
Downstream (DS)	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. 2. RF spectrum used to transmit signals from a cable operator's headend or hub site to subscriber locations.
DTI Client	The receiver of the Timing signal from the DTI Server. Through the DTI protocol DTI clients have the same time reference.
DTI Server	Timing Signal generator for a DTI client of the point to point DOCSIS Timing Interface (DTI).
edgeQAM modulator (EQAM)	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).
Electronic Industries Alliance (EIA)	A voluntary body of manufacturers, which, among other activities, prepares and publishes standards.
Flow	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.
Gigahertz (GHz)	A unit of frequency; 1,000,000,000 or 10^9 Hz.
GigE (GE)	Gigabit Ethernet (1 Gbps).
GPSSEC	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.
Hertz (Hz)	A unit of frequency; formerly cycles per second.
Hybrid Fiber/Coax (HFC) System	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.
ICCN	L2TPv3 Incoming-Call-Connected message.
ICRP	L2TPv3 Incoming-Call-Reply message.
ICRQ	L2TPv3 Incoming-Call-Request message.

Internet Engineering Task Force (IETF)	A body responsible for, among other things, developing standards used in the Internet.
Internet Protocol (IP)	An Internet network-layer protocol.
IPv4	Internet Protocol version 4.
kilohertz (kHz)	Unit of frequency; 1,000 or 10^3 Hz; formerly kilocycles per second.
L2TP Attribute Value Pair (AVP)	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.
L2TP Control Connection	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.
L2TP Control Connection Endpoint (LCCE)	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).
L2TP Control Connection ID	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.
L2TP Control Message	An L2TP message used by the control connection.
L2TP Data Message	L2TP message used by the data channel.
L2TP Endpoint	A node that acts as one side of an L2TP tunnel.
L2TP Network Server (LNS)	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.
L2TP Pseudowire (PW)	An emulated circuit as it traverses a PSN. There is one Pseudowire per L2TP Session.
L2TP Pseudowire Type	The payload type being carried within an L2TP session. Examples include PPP, Ethernet, and Frame Relay.
L2TP Session	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.
L2TP Session ID	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.
MAC Domain	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.

Media Access Control (MAC)	Used to refer to the layer 2 element of the system which would include DOCSIS framing and signaling.
Megahertz (MHz)	A unit of frequency; 1,000,000 or 10^6 Hz; formerly megacycles per second.
Microsecond (µs)	10^{-6} second.
Millisecond (ms)	10^{-3} second.
M/N	Relationship of integer numbers M,N that represents the ratio of the downstream symbol clock rate to the DOCSIS master clock rate.
MPT	MPEG-TS mode of DEPI.
Multiple System Operator (MSO)	A corporate entity that owns and/or operates more than one cable system.
Nanosecond (ns)	10^{-9} second.
QAM channel (QAM ch)	Analog RF channel that uses quadrature amplitude modulation (QAM) to convey information.
Quadrature Amplitude Modulation (QAM)	A modulation technique in which an analog signal's amplitude and phase vary to convey information, such as digital data.
Radio Frequency (RF)	In cable television systems, this refers to electromagnetic signals in the range 5 to 1000 MHz.
Radio Frequency Interface (RFI)	Term encompassing the downstream and the upstream radio frequency interfaces.
Request For Comments (RFC)	A technical policy document of the IETF; these documents can be accessed on the World Wide Web at http://www.rfc-editor.org/.
SCCRN	L2TPv3 Start-Control-Connection-Connected message.
SCCRP	L2TPv3 Start-Control-Connection-Reply message.
SCCRQ	L2TPv3 Start-Control-Connection-Request message.
Session	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.
SLI	L2TPv3 Set Link Info message.
StopCCN	L2TPv3 Stop-Control-Connection-Notification message.
Upstream (US)	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. 2. RF spectrum used to transmit signals from a subscriber location to a cable operator's headend or hub site.
Upstream Channel Descriptor (UCD)	The MAC Management Message used to communicate the characteristics of the upstream physical layer to the cable modems.
Video on Demand (VoD) System	System that enables individuals to select and watch video content over a network through an interactive television system.

4 ABBREVIATIONS AND ACRONYMS

This specification uses the following abbreviations and acronyms:

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

5 TECHNICAL OVERVIEW

5.1 Introduction and Overview

This Section is informative.

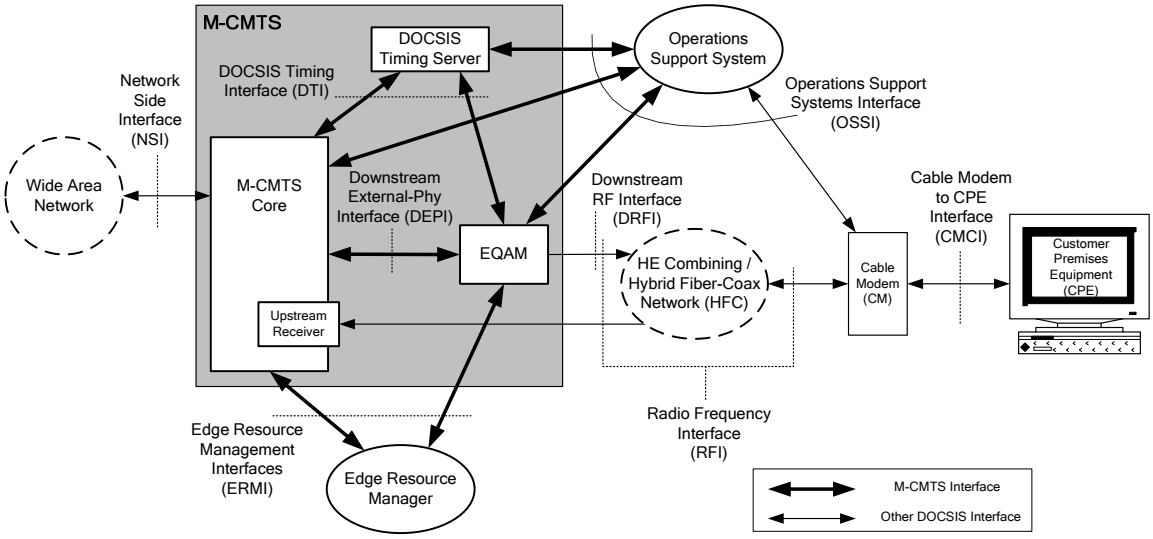


Figure 5–1 - Modular CMTS Reference Architecture

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 7.3 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 CableLabs MIB Modules

Table 7–1 - IETF Drafts and CableLabs MIB Modules

Reference	MIB	Applicable Device(s)
[IETF1]	IETF Proposed Standard RFC-version of RF MIB, "draft-ietf-ipcdn-docs-rfmibv2-05.txt": DOCS-IF-MIB	EQAM
[IETF2]	IETF Proposed Standard RFC Entity MIB (Version 3), "draft-ietf-entmib-v3-07.txt". ENTITY-MIB	M-CMTS Core, EQAM and DTI Server
Annex C	DOCS-IF-M-CMTS-MIB	CMTS and EQAM
Annex D	DTI-MIB	M-CMTS core, EQAM and DTI Server

7.2 IETF RFC MIB Modules

Table 7–2 - IETF RFC MIB Modules

Reference	MIB	Applicable Device(s)
[RFC 2863]	The Interfaces Group MIB using SMIv2: IF-MIB	M-CMTS core, EQAM and DTI Server
[RFC 2669]	DOCSIS Cable Device MIB	EQAM and DTI Server
[RFC 3371]	Layer Two Tunneling Protocol "L2TP" Management Information Base RFC 3371, August 2002	M-CMTS Core and EQAM
[RFC 2011]	SNMPv2 Management Information Base for the Internet Protocol using SMIv2: IP-MIB	EQAM and DTI Server
[RFC 3418]	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP): SNMPv2-MIB	EQAM and DTI Server
[RFC 3410] [RFC 3411] [RFC 3412] [RFC 3413] [RFC 3414] [RFC 3415] [RFC 3584]	SNMP v3 MIBs: SNMP-FRAMEWORK-MIB, SNMP-MPD-MIB, SNMP-NOTIFICATION-MIB, SNMP-TARGET-MIB, SNMP-USER-BASED-SM-MIB, SNMP-VIEW-BASED-ACM-MIB, SNMP-COMMUNITY-MIB	EQAM and DTI Server

7.3 Managed objects requirements

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

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

7.3.1 Requirements for DOCS-IF-MIB

7.3.1.1 DOCS-IF-MIB M-CMTS requirements

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

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

If a compliant M-CMTS core supports write access to docsIfDownsteamChannelTable, 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 docsIfDownsteamChannelTable, 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 2669]

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

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

7.3.3 Requirements for [RFC 2863]

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

7.3.3.1 Requirements for M-CMTS Core

7.3.3.1.1 M-CMTS Core Interface Types

To represent the DOCSIS MAC service adaptation to the DEPI PW infrastructure, the logical interfaces M-CMTS Downstream Interface (docsCableMCmtsDownstream) is defined. The equivalent M-CMTS Upstream Interfaces (docsCableMCmtsUpstream) is defined as a term but not specified in the scope of this 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[1]

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

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

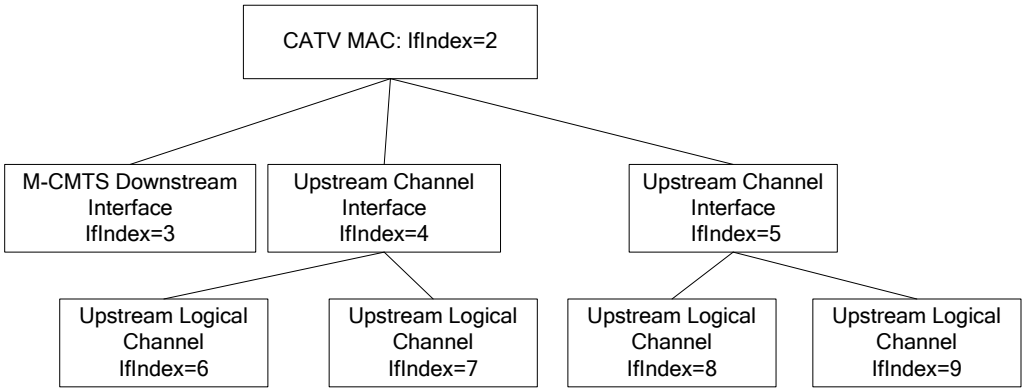
7.3.3.1.2 Interface organization and numbering

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.

[1] Revised this table per ECN M-OSSI-N-05.0254-5 on 11/22/05.

7.3.3.1.3 M-CMTS Core Interface IfStackTable

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



Implementation of ifStackTable for this example:

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

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

7.3.3.1.4 M-CMTS Core DOCSIS Interface MIB Considerations

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

7.3.3.2 Requirements for EQAM

7.3.3.2.1 EQAM Interface Types

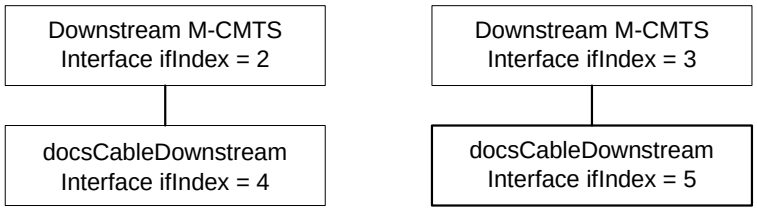
A compliant EQAM device MUST support the interface Type docsCableMCmtsDownstream for each QAM channel.

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.

Implementation of ifStackTable for this example:

ifStackHigherLayer	ifStackLowerLayer
0	6
6	0
0	7
7	0

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 - DOCSIS-OSSI Requirements MUST be separated with a colon and blank space. Each pair is separated by a ";" followed by a blank space.

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

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

any text<<HW_REV: 5.2; VENDOR: X; BOOTR: 1.4; SW_REV 2.2; MODEL: X>>any text

7.3.5.2 The SNMP Group and Notification Group

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

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 [IETF2].

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

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

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

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

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

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

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

7.3.9.1 IfTable Interfaces and ENTITY MIB physical component

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

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

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

Table 7–5 - Entity Physical Index and IfIndex mapping

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 [IETF2] describes them.

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

7.3.9.3 Implementation of ENTITY MIB for DTI Server

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

7.3.9.4 Implementation of ENTITY MIB for M-CMTS Core

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

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:

ACC-FN Accessible for Notify.

ATRAP Accessible through SNMP trap.

D Deprecated. Deprecated objects are optional. That is, a vendor can choose to implement or not implement the object. If a vendor chooses to implement the object, the object MUST be implemented correctly according to the MIB definition. If a vendor chooses not to implement the object, an agent MUST NOT instantiate such object and MUST respond with the appropriate error/exception condition (e.g., no such object for SNMPv2c).

M Mandatory. The object MUST be implemented correctly according to the MIB definition.

N-Acc Not accessible. The object is not accessible and is usually an index in a table.

NA Not Applicable (to the device).

N-Sup MUST not support. The device MUST NOT support the object. That is, an agent MUST NOT instantiate such object and MUST respond with the appropriate error/exception condition (e.g., no such object for SNMPv2c).

O Optional. A vendor can choose to implement or not implement the object. If a vendor chooses to implement the object, the object MUST be implemented correctly according to the MIB definition. If a vendor chooses not to implement the object, an agent MUST NOT instantiate such object and MUST respond with the appropriate error/exception condition (e.g., no such object for SNMPv2c).

Ob Obsolete. It is optional. Though in SNMP convention, obsolete objects should not be implemented, DOCSIS 2.0 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 MUST be implemented correctly according to the MIB definition. If a vendor chooses not to implement the object, the SNMP agent MUST NOT instantiate such object and MUST respond with the appropriate error/exception condition (e.g., no such object for SNMPv2c).

RC Read-Create. The access of the object MUST be implemented as Read-Create.

RO Read-Only. The access of the object MUST be implemented as Read-Only.

RW Read-Write. The access of the object MUST be implemented as Read-Write.

RC/RO Read-Create or Read-Only. The access of the object MUST be implemented as either Read-Create or Read-Only as described in the MIB definition.

RW/RO Read-Write or Read-Only. The access of the object MUST be implemented as either Read-Write or Read-Only as described in the MIB definition.

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

Table A–1 - Requirements[2]

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

[2] Revised this table per ECN M-OSSI-N-05.0254-5 on 11/22/05.

docsIfMCmtsEqamDownstreamCapabilitiesTable

Object	M-CMTS Core	Access	EQAM	Access
docsIfMCmtsEqamDownstreamCapabFrequency	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabBandwidth	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabPower	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabModulation	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabInterleaver	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabJ83Annex	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabConcurrentServices	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabServicesTransport	N/A	N/A	M	RO
docsIfMCmtsEqamDownstreamCapabMuting	N/A	N/A	M	RO

docsIfMCmtsEqamGroupDependencyTable

Object	M-CMTS Core	Access	EQAM	Access
docsIfMCmtsEqamGroupDependencyPhyParam	N/A	N/A	M	N-Acc
docsIfMCmtsEqamGroupDependencyPhysicalIndex	N/A	N/A	M	N-Acc
docsIfMCmtsEqamGroupDependencyGroupID	N/A	N/A	M	RO
docsIfMCmtsEqamGroupDependencyType	N/A	N/A	M	RO

docsIfMCmtsEqamGlobCfgDownTable

Object	M-CMTS Core	Access	EQAM	Access
docsIfMCmtsEqamGlobCfgDownIndex	N/A	N/A	M	N-Acc
docsIfMCmtsEqamGlobCfgDownPhysicalIndex	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownBandwidth	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownPower	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownModulation	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownInterleave	N/A	N/A	M	RC
docsIfMCmtsEqamGlogCfgDownAnnex	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownSymbolRateM	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownSymbolRateN	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownLockParams	N/A	N/A	M	RC
docsIfMCmtsEqamGlobCfgDownExecutionCode	N/A	N/A	M	RO
docsIfMCmtsEqamGlobCfgDownErrorsCount	N/A	N/A	M	RO
docsIfMCmtsEqamGlobCfgDownRowStatus	N/A	N/A	M	RC

docsIfMCmtsChannelBlockTable

Object	M-CMTS Core	Access	EQAM	Access
docsIfMCmtsChannelBlockPhysicalIndex	N/A	N/A	M	N-Acc
docsIfMCmtsChannelBlockNumberChannels	N/A	N/A	M	RO
docsIfMCmtsChannelBlockCfgNumberChannels	N/A	N/A	M	RW
docsIfMCmtsChannelBlockMute	N/A	N/A	M	RW
docsIfMCmtsChannelBlockTestType	N/A	N/A	M	RW
docsIfMCmtsChannelBlockTestIfIndex	N/A	N/A	M	RW

docsIfMCmtsDepiSessionConfigTable

Object	M-CMTS Core	Access	EQAM	Access
docsIfMCmtsDepiSessionConfigIndex	M	N-Acc	M	N-Acc
docsIfMCmtsDepiSessionConfigCableMacIfIndex	M	RO	M	RC/RO
docsIfMCmtsDepiSessionConfigCableDownfIndex	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigAddrType	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigLocalAddr	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigRemoteAddr	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigL2TPv3HeaderType	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigMethod	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigTSID	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigDEPIMode	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigRsrcAllocReq	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigCinPhbIdPolicy	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigSyncEnabled	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigSyncInterval	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigPhyParamsFlag	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigChannelFrequency	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigChannelModulation	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigChannelInterleave	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigChannelPower	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigChannelAnnex	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigChannelSymbolRateM	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigChannelSymbolRateN	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigChannelOutputRate	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigChannelBurstSize	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigStorage	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigRowStatus	M	RC	M	RC/RO
docsIfMCmtsDepiSessionConfigChannelId	M	RC	N-Sup	N/A

docsIfMCmtsDepiSessionInfoTable

Object	M-CMTS Core	Access	EQAM	Access
docsIfMCmtsDepiSessionInfoCfgIndex	M	RO	M	RO
docsIfMCmtsDepiSessionInfoUdpPort	M	RO	M	RO
docsIfMCmtsDepiSessionInfoMaxPayload	M	RO	M	RO
docsIfMCmtsDepiSessionInfoPathPayload	M	RO	M	RO
docsIfMCmtsDepiSessionInfoIncludeDOCSISMsgs	M	RO	M	RO
docsIfMCmtsDepiSessionInfoRsrcAllocResp	M	RO	M	RO
docsIfMCmtsDepiSessionInfoConnCtrlID	M	RO	M	RO
docsIfMCmtsDepiSessionInfoEQAMSessionID	M	RO	M	RO
docsIfMCmtsDepiSessionInfoOwner	M	RO	M	RO
docsIfMCmtsDepiSessionInfoState	M	RO	M	RO
docsIfMCmtsDepiSessionInfoErrorCode	M	RO	M	RO
docsIfMCmtsDepiSessionInfoCreationTime	M	RO	M	RO
docsIfMCmtsDepiSessionInfoStorage	M	RO	M	RO

docsIfMCmtsDepiRsrcAllocTable

Object	M-CMTS Core	Access	EQAM	Access
docsIfMCmtsDepiRsrcAllocIndex	M	RC	O	RC/RO
docsIfMCmtsDepiRsrcAllocSeq	M	RC	O	RC/RO
docsIfMCmtsDepiRsrcAllocPhbId	M	RC	O	RC/RO
docsIfMCmtsDepiRsrcAllocFlowId	M	RC	O	RC/RO
docsIfMCmtsDepiRsrcAllocUdpPort	M	RC	O	RC/RO
docsIfMCmtsDepiRsrcAllocPolicyScnTags	M	RC	O	RC/RO
docsIfMCmtsDepiRsrcAllocStorage	M	RC	O	RC/RO
docsIfMCmtsDepiRsrcAllocRowStatus	M	RC	O	RC/RO

docsIfMCmtsDepiSessionStatsTable

Object	M-CMTS Core	Access	EQAM	Access
docsIfMCmtsDepiSessionInfoOutOfSequencePkts	N/A	N/A	M	RO

docsIfMCmtsDepiSessionCinLatency

Object	M-CMTS Core	Access	EQAM	Access
docsIfMCmtsDepiSessionCinLatencyInterval	M	RW	M	RW
docsIfMCmtsDepiSessionCinLatencyThrshld	M	RW	M	RW
docsIfMCmtsDepiSessionCinEventLevel	M	RW	M	RW
docsIfMCmtsDepiSessionCinLastValue	M	RO	M	RO
docsIfMCmtsDepiSessionCinLastValueIfIndex	M	RO	M	RO
docsIfMCmtsDepiSessionCinLatencyValueLastTime	M	RO	M	RO

docsIfMCmtsDepiSessionCinLatency

Object	M-CMTS Core	Access	EQAM	Access
docsIfMCmtsDepiSessionCinLatencyPerfIntervalSeq	M	RO	O	RO
docsIfMCmtsDepiSessionCinLatencyPerfValue	M	RO	O	RO
docsIfMCmtsDepiSessionCinLatencyTime	M	RO	O	RO

docsIfMCmtsDepiPhbPolicyTable

Object	M-CMTS Core	Access	EQAM	Access
docsIfMCmtsDepiPhbPolicyTag	M	N-Acc	N/A	N/A
docsIfMCmtsDepiPhbPolicySCN	M	RC	N/A	N/A
docsIfMCmtsDepiPhbPolicyCinPhbId	M	RC	N/A	N/A
docsIfMCmtsDepiPhbPolicyStorage	M	RC	N/A	N/A
docsIfMCmtsDepiPhbPolicyRowStatus	M	RC	N/A	N/A

docsIfMCmtsQosServiceFlowExtTable

Object	M-CMTS Core	Access	EQAM	Access
docsIfMCmtsQosServiceFlowExtDepiFlowId	M	RO	N/A	N/A
docsIfMCmtsQosServiceFlowExtCinPhbId	M	RO	N/A	N/A
docsIfMCmtsQosServiceFlowExtDepiIfIndex	M	RO	N/A	N/A

DTI-MIB (Annex D)

dtiProtocolTable

Object	M-CMTS Core	Access	EQAM	Access	DTI Server	Access
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

dtiProtocolControlTable

Object	M-CMTS Core	Access	EQAM	Access	DTI Server	Access
dtiProtocolControlTimeInterval	N/A	N/A	N/A	N/A	M	RW
dtiProtocolControlErrorRateInterval	N/A	N/A	N/A	N/A	M	RW
dtiProtocolControlJitterTimeInterval	N/A	N/A	N/A	N/A	M	RW
dtiProtocolControlTestMode	N/A	N/A	N/A	N/A	M	RW
dtiProtocolControlToDValue	N/A	N/A	N/A	N/A	M	RW

dtiProtocolPerformanceTable

Object	M-CMTS Core	Access	EQAM	Access	DTI Server	Access
dtiProtocolPerformanceDelay	N/A	N/A	N/A	N/A	M	RO
dtiProtocolPerformanceFrameErrorRate	N/A	N/A	N/A	N/A	M	RO
dtiProtocolPerformancePeakToPeakJitter	N/A	N/A	N/A	N/A	M	RO
dtiProtocolPerformanceWander35Second	N/A	N/A	N/A	N/A	M	RO
dtiProtocolPerformanceWanderTSeconds	N/A	N/A	N/A	N/A	M	RO

dtiPathTraceabilityTable

Object	M-CMTS Core	Access	EQAM	Access	DTI Server	Access
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

dtiProtocolClientFsmStatsTable

Object	M-CMTS Core	Access	EQAM	Access	DTI Server	Access
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

dtiServerProperties

Object	M-CMTS Core	Access	EQAM	Access	DTI Server	Access
dtiServerRootClockType	N/A	N/A	N/A	N/A	M	RO
dtiServerHopCount	N/A	N/A	N/A	N/A	M	RO
dtiServerExternalTimingSource	N/A	N/A	N/A	N/A	M	RO
dtiServerToDSources	N/A	N/A	N/A	N/A	M	RO

dtiServerGlobalParameters

Object	M-CMTS Core	Access	EQAM	Access	DTI Server	Access
dtiServerGlobalTimeInterval	N/A	N/A	N/A	N/A	M	RW
dtiServerGlobalErrorRateInterval	N/A	N/A	N/A	N/A	M	RW
dtiServerGlobalJitterTimeInterval	N/A	N/A	N/A	N/A	M	RW
dtiServerGlobalToDMethod	N/A	N/A	N/A	N/A	M	RW
dtiServerGlobalToDValue	N/A	N/A	N/A	N/A	M	RW

DOCS-CABLE-DEVICE-MIB [RFC 2669]

docsDevEventGroup

Objects	EQAM	Access	DTI Server	Access
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

docsDevEvControlTable

Objects	EQAM	Access	DTI Server	Access
docsDevEvPriority	M	N-Acc	M	N-Acc
docsDevEvReporting	M	RW	M	RW

docsDevEvControlTable

Objects	EQAM	Access	DTI Server	Access
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]

interfaces

Object	M-CMTS Core	Access	EQAM	Access	DTI Server	Access
ifNumber	M	RO	M	RO	M	RO
IfTableLastChange	M	RO	M	RO	M	RO

ifTable

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	N/A
ifOutErrors	M	RO	M	RO
ifOutQLen	M	RO	N-Sup	NA
ifSpecific	M	RO	N-Sup	NA

ifXTable

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

ifStackTable

Object	EQAM	Access	DTI Server	Access
ifStackHigherLayer	M	N-Acc	M	N-Acc
ifStackLowerLayer	M	N-Acc	M	N-Acc
ifStackStatus	M	RC/RO	M	RC/RO

ifMIBObjects

Object	EQAM	Access	DTI Server	Access
ifStackLastChange	M	RC/RO	M	RC/RO

snmpTraps

Notification	EQAM	Access	DTI Server	Access
linkup	M		M	
linkDown	M		M	

ENTITY-MIB [IETF2]

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

IpNetToMediaTable

Objects	EQAM	Access	DTI Server	Access
ipNetToMediaIfIndex	M	RC/RO	O	RC/RO
ipNetToMediaPhysAddress	M	RC/RO	O	RC/RO
ipNetToMediaNetAddress	M	RC/RO	O	RC/RO
ipNetToMediaType	M	RC/RO	O	RC/RO

SNMP-VIEW-BASED-ACM-MIB [RFC 3415]

vacmContextTable

Objects	EQAM	Access	DTI Server	Access
vacmContextName	M	RO	M	RO

vacmSecurityToGroupTable

Objects	EQAM	Access	DTI Server	Access
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
vacmAccessTable				
Objects	**EQAM**	**Access**	**DTI Server**	**Access**
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
vacmViewTreeFamilyTable				
Objects	**EQAM**	**Access**	**DTI Server**	**Access**
vacmViewTreeFamilyViewName	M	N-Acc	M	N-Acc
vacmViewTreeFamilySubtree	M	N-Acc	M	N-Acc
vacmViewTreeFamilyMask	M	RC/RO	M	RC/RO
vacmViewTreeFamilyType	M	RC/RO	M	RC/RO
vacmViewTreeFamilyStorageType	M	RC/RO	M	RC/RO
vacmViewTreeFamilyStatus	M	RC/RO	M	RC/RO
SNMP-COMMUNITY-MIB [RFC 3584]				
snmpCommunityTable				
Objects	**EQAM**	**Access**	**DTI Server**	**Access**
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

SnmpTargetExtTable

Objects	EQAM	Access	DTI Server	Access
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

snmpTargetParamsTable

Objects	**EQAM**	**Access**	**DTI Server**	**Access**
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

snmpNotifyTable

Objects	**EQAM**	**Access**	**DTI Server**	**Access**
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

snmpNotifyFilterProfileTable

Objects	**EQAM**	**Access**	**DTI Server**	**Access**
SnmpNotifyFilterProfileName	M	RC/RO	M	RC/RO
snmpNotifyFilterProfileStorType	M	RC/RO	M	RC/RO
snmpNotifyFilterProfileRowStatus	M	RC/RO	M	RC/RO

snmpNotifyFilterTable

Objects	EQAM	Access	DTI Server	Access
SnmpNotifyFilterSubtree	M	N-Acc	M	N-Acc
SnmpNotifyFilterMask	M	RC/RO	M	RC/RO
SnmpNotifyFilterType	M	RC/RO	M	RC/RO
SnmpNotifyFilterStorageType	M	RC/RO	M	RC/RO
SnmpNotifyFilterRowStatus	M	RC/RO	M	RC/RO

SNMP-USER-BASED-SM-MIB [RFC 3414]

usmStats

Objects	EQAM	Access	DTI Server	Access
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

usmUser

Objects	EQAM	Access	DTI Server	Access
usmUserSpinLock	O	RW/RO	M	RW/RO

usmUserTable

Objects	EQAM	Access	DTI Server	Access
usmUserEngineID	M	N-Acc	M	N-Acc
usmUserName	M	N-Acc	M	N-Acc
usmUserSecurityName	M	RC/RO	M	RC/RO
usmUserCloneFrom	M	RC/RO	M	RC/RO
usmUserAuthProtocol	M	RC/RO	M	RC/RO
usmUserAuthKeyChange	M	RC/RO	M	RC/RO
usmUserOwnAuthKeyChange	M	RC/RO	M	RC/RO
usmUserPrivProtocol	M	RC/RO	M	RC/RO
usmUserPrivKeyChange	M	RC/RO	M	RC/RO

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

B.1 IF-MIB ifTable MIB-Object details

Table A–2 - IF-MIB ifTable MIB-Object details[3]

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

[3] Revised this table per ECN M-OSSI-N-05.0254-5 on 11/22/05.

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

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

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

B.1 M-CMTS Extensions Description

This section applies to an M-CMTS compliant device and is an extension to the OSS event management requirements specified in Annex D, Format and Content for Event, SYSLOG, and SNMP Trap (normative) of [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-CCNand 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-CCNand 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
DEPI L2TP Session Failed (DOCSIS AVPs)							
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	

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 = 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	
DEPI L2TP Connection Control (StopCCN)							
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	

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

Annex C DOCS-IF-M-CMTS-MIB (normative)[4]

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

IMPORTS
    MODULE-IDENTITY,
    OBJECT-IDENTITY,
    OBJECT-TYPE,
    Unsigned32,
    Integer32,
    Gauge32,
    Counter32,
    TimeTicks
                            FROM SNMPv2-SMI
    TimeStamp,
    TruthValue,
    RowStatus,
    StorageType,
    AutonomousType
                            FROM SNMPv2-TC
    OBJECT-GROUP,
    MODULE-COMPLIANCE
                            FROM SNMPv2-CONF
    SnmpAdminString
                            FROM SNMP-FRAMEWORK-MIB
    entPhysicalSerialNum,
    entPhysicalAlias,
    entPhysicalAssetID,
    entPhysicalClass,
    PhysicalIndexOrZero,
    PhysicalIndex,
    entityPhysicalGroup,
    entityPhysical2Group,
    entityPhysical3Group,
    entityGeneralGroup,
    entityLogical2Group,
    entityMappingGroup
                            FROM ENTITY-MIB
    ifIndex,
    InterfaceIndex,
    InterfaceIndexOrZero
                            FROM IF-MIB
    TenthdBmV
                            FROM DOCS-IF-MIB
    docsQosServiceFlowId
                            FROM DOCS-QOS-MIB
    SnmpTagValue
                            FROM SNMP-TARGET-MIB
    InetAddressType,
    InetAddress,
    InetPortNumber
                            FROM INET-ADDRESS-MIB
    clabProjDocsis
                            FROM CLAB-DEF-MIB;

docsIfMCmtsMib MODULE-IDENTITY
    LAST-UPDATED    "200705180000Z" -- May 18, 2007
```

[4] 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. KN

```
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    CONTACT-INFO
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            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
            configuration and management of the External PHY interface
            (DEPI) of the M-CMTS architecture (Modular CMTS).

            Copyright 1999-2007 Cable Television Laboratories, Inc.
            All rights reserved."

    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
-- ---------------------------------------------------------

ClDot1dUserPriority ::= 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      current
    DESCRIPTION
            "M-CMTS Core extensions for the DOCSIS RFI Downstream
            docsIfDownstreamTable."
    ::= { docsIfMCmtsCoreObjects 1 }

docsIfMCmtsCoreDownstreamEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsCoreDownstreamEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "A conceptual row for this table.
            There is a corresponding entry for each entry of
            docsIfDownstreamChannelTable."
    INDEX { ifIndex }
    ::= { docsIfMCmtsCoreDownstreamTable 1 }

DocsIfMCmtsCoreDownstreamEntry ::= SEQUENCE
    {
    docsIfMCmtsCoreDownstreamType                    INTEGER,
    docsIfMCmtsCoreDownstreamPhyDependencies         BITS
    }

docsIfMCmtsCoreDownstreamType OBJECT-TYPE
    SYNTAX      INTEGER {
        integrated(1),
        external(2)
        }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The value 'integrated' means the Downstream Interface is
            integrated to the DOCSIS MAC interface. This type
            corresponds to the legacy DOCSIS Downstream Interface of
            ifType 128.
            The value 'external' indicates a Downstream External
            Interface that is associated to a QAM channel by mechanisms
            like a DEPI session."
    ::= { docsIfMCmtsCoreDownstreamEntry 1 }

docsIfMCmtsCoreDownstreamPhyDependencies OBJECT-TYPE
```

```
    SYNTAX  BITS {
        frequency(0),
        bandwidth(1),
        power(2),
        modulation(3),
        interleaver(4),
        j83Annex(5),
        symbolRate(6),
        mute(7)
        }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The PHY parameters being flagged in the DEPI session as
            DEPI TSID group dependencies.
            A value of all bits on zero indicates no TSID group
            dependencies for PHY parameters. If this object value is
            the zero length string , indicates no DEPI session is
            configured for the M-CMTS Downstream interface or the
            Downstream interface is of the type 'integrated'."
    DEFVAL { ''h }
    ::= { docsIfMCmtsCoreDownstreamEntry 2 }

-- ---------------------------------------------------------------------
-- DOCSIS RF Interface Extension objects
-- M-CMTS EQAM device Extensions
-- ---------------------------------------------------------------------

docsIfMCmtsEqamDownstreamTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsIfMCmtsEqamDownstreamEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "M-CMTS EQAM extensions for the DOCSIS RFI Downstream
            docsIfDownstreamTable."
    ::= { docsIfMCmtsEqamObjects 1 }

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

DocsIfMCmtsEqamDownstreamEntry ::= SEQUENCE
    {
    docsIfMCmtsEqamDownstreamTSID                      Unsigned32,
    docsIfMCmtsEqamDownstreamPhyDependencies           BITS,
    docsIfMCmtsEqamDownstreamDevicePhyParamLock        BITS,
    docsIfMCmtsEqamDownstreamDeviceConfigPhyParamLock  BITS,
    docsIfMCmtsEqamDownstreamAllocationType            INTEGER,
    docsIfMCmtsEqamDownstreamAllocationStatus          BITS,
    docsIfMCmtsEqamDownstreamAllocationTimeout         Unsigned32,
    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 constrains
            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
            docsIfMCmtsDepiSessionConfigTable is locked
            for SNMP SETs returning error 'notWritable' on those
            attempts.

            Sets to this object could be complex; as a rule of
            thumb, SNMP agents ignore bits that are not recognized
            (e.g., extensions). An attempt to set BITs while
            docsIfMCmtsEqamDownstreamDeviceConfigPhyParamLock is set
            to '1' is rejected and the error code 'wrongValue' is
            returned."
    ::= { docsIfMCmtsEqamDownstreamEntry 4 }

docsIfMCmtsEqamDownstreamAllocationType OBJECT-TYPE
    SYNTAX      INTEGER {
        docsisOnly(1),
        videoOnly(2),
        any(3)
        }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "Indicates the mechanisms authorized to reserve and control
            this M-CMTS Downstream interface.
            When configured to 'docsisOnly' indicates that it can be
            allocated only to serve data over DOCSIS.
            When configured to 'videoOnly' indicates that it can be
            allocated only to video services and not for Data over
            DOCSIS.
            'any' indicates the M-CMTS Downstream Interface can be
            reserved for DOCSIS or video services."
    ::= { docsIfMCmtsEqamDownstreamEntry 5 }

docsIfMCmtsEqamDownstreamAllocationStatus OBJECT-TYPE
    SYNTAX      BITS {
```

```
        other(0),
        docsisDepi(1),
        docsisErm(2),
        videoErm(3)
        }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "Indicates the service(s) the M-CMTS Downstream Interface
            is allocated for.
            'other' BIT set to '1' indicates the resource is currently
            allocated to DOCSIS and/or Video services by a proprietary
            mechanism.
            'docsisDepi' BIT set to '1' indicates the DEPI Control
            mechanism is currently in use in the M-CMTS Downstream
            Interface allocation, e.g., an L2TPv3 DEPI Session.
            'docsisErm' indicates that ERM Resource Allocation
            Interface is being used in the M-CMTS Downstream Interface
            allocation.
            'video' indicates the resource is currently allocated by a
            video control plane using an extension of the M-CMTS ERM
            Resource Control Plane.

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

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

            Combinations like 'docsisDepi' and 'videoERM' may indicate
            concurrent services, which is vendor specific."
    REFERENCE
            "DEPI L2TP ERM RTSP section 7"
    ::= { docsIfMCmtsEqamDownstreamEntry 6 }

docsIfMCmtsEqamDownstreamAllocationTimeout OBJECT-TYPE
    SYNTAX      Unsigned32 (0..120)
    UNITS       "seconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "Indicates the number of seconds the EQAM device waits
            before advertising the QAM channel resource is idle and/or
            accepting a session establishment from a different
            control plane to the previous one. As a side effect,
            the entry in  docsIfMCmtsDepiSessionConfigTable is aged out
            and destroyed only after the expiration of this reservation
            timeout. A value zero makes the resource available
            immediately for allocation to others.

            Note that not explicit indefinite timeout needs to be
            defined to indicate exclusive allocation to a requester.
            The EQAM device can support this condition for example by
            configuring restricted access to certain Resource
            Allocation control plane to a particular IP host in the
            form of source IP or authentication mechanisms."
    ::= { docsIfMCmtsEqamDownstreamEntry 7 }
```

```
docsIfMCmtsEqamDownstreamDRRPAdvertizing OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "Indicates when a QAM channel resource should be advertised
            via DRRP (DOCSIS Resource Registration Protocol) to an Edge
            Resource Manager (ERM).

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

            Note that DRRP currently does not signal EQAM resources
            as reserved for a particular service.
            The MIB objects docsIfMCmtsEqamDownstreamDRRPAdvertizing
            and docsIfMCmtsEqamDownstreamAllocationType are used
            primarily to statically reserve QAM channels and prevent
            its allocation by dynamic means such ERM or some other
            existing mechanisms. Therefore, caution is needed when
            setting this object to 'true' since the allocation Type
            docsIfMCmtsEqamDownstreamAllocationType is not known by
            ERMs with DRRP support."
    DEFVAL { true }
    ::= { docsIfMCmtsEqamDownstreamEntry 8 }

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

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

docsIfMCmtsEqamDownstreamCapabilitiesEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsEqamDownstreamCapabilitiesEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "A conceptual row for this table."
```

```
    INDEX { ifIndex }
    ::= { docsIfMCmtsEqamDownstreamCapabilitiesTable 1 }

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

docsIfMCmtsEqamDownstreamCapabFrequency OBJECT-TYPE
    SYNTAX      BITS {
        eqamDependency(0),
        adjacentChannel(1),
        adjacentChannelOrder(2)
        }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The QAM channel frequency capabilities.
            'eqamDependency' BIT set to '1' indicates the QAM channel
            frequency value has dependencies with other QAM channels
            and an entry that includes this QAM channel is in
            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*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*bandwidth and the 2nd QAM
            channels gets a frequency of f -1*bandwidth.

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

            'adjacentChannel' BIT may be set to '1' if
            'eqamDependency' BIT is set to '1'. The same way,
            'adjacentChannelOrder' BIT may be set to '1' and implies
            'adjacentChannel' BIT is set to '1'."
    ::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 1 }
```

```
docsIfMCmtsEqamDownstreamCapabBandwidth OBJECT-TYPE
    SYNTAX      BITS {
        eqamDependency(0),
        chan6Mhz(1),
        chan8Mhz(2)
        }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The QAM channel Bandwidth capabilities.
            'eqamDependency' BIT set to '1' indicates the QAM channel
            bandwidth value has dependencies with other QAM channels
            as indicated in docsIfMCmtsEqamGroupDependencyTable.

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

            When 'eqamDependency' BIT is set to '1', a set to the
            channel bandwidth PHY parameter of a QAM channels in a
            dependency group (with docsIfMCmtsEqamGroupDependencyType
            set to docsPHYParamSameValue), sets the same channel
            bandwidth  value to all QAM channels in the dependency
            group."
    ::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 2 }

docsIfMCmtsEqamDownstreamCapabPower OBJECT-TYPE
    SYNTAX      BITS {
        eqamDependency(0)
        }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The QAM channel Power capabilities.
            'eqamDependency' BIT set to '1' indicates the QAM channel
            power value has dependencies with other QAM channels
            as indicated in docsIfMCmtsEqamGroupDependencyTable.

            When 'eqamDependency' BIT is set to '1', a set to the
            power level PHY parameter of a QAM channels in a
            dependency group (with docsIfMCmtsEqamGroupDependencyType
            set to docsPHYParamSameValue), sets the same power
            level to all QAM channels in the dependency group."
    ::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 3 }

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

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

```
            When 'eqamDependency' BIT is set to '1', a set to the
            modulation PHY parameter of a QAM channels in a
            dependency group (with docsIfMCmtsEqamGroupDependencyType
            set to docsPHYParamSameValue), sets the same modulation
            type to all QAM channels in the dependency group."
    ::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 4 }

docsIfMCmtsEqamDownstreamCapabInterleaver OBJECT-TYPE
    SYNTAX      BITS {
        eqamDependency(0),
        taps8Increment16(1),
        taps16Increment8(2),
        taps32Increment4(3),
        taps64Increment2(4),
        taps128Increment1(5),
        taps12increment17(6),
        taps128increment2(7),
        taps128increment3(8),
        taps128increment4(9),
        taps128increment5(10),
        taps128increment6(11),
        taps128increment7(12),
        taps128increment8(13)
        }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The QAM channel Interleaver capabilities.
            'eqamDependency' BIT set to '1' indicates the QAM channel
            interleave value has dependencies with other QAM channels
            as indicated in docsIfMCmtsEqamGroupDependencyTable.

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

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

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

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

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

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

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

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

            When 'eqamDependency' BIT is set to '1', a set to the
            J.83 Annex PHY parameter of a QAM channels in a
            dependency group (with docsIfMCmtsEqamGroupDependencyType
            set to docsPHYParamSameValue), sets the same J.83 Annex
            value to all QAM channels in the dependency group."
    ::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 6 }

docsIfMCmtsEqamDownstreamCapabConcurrentServices OBJECT-TYPE
    SYNTAX      BITS {
        eqamDependency(0),
        videoAndDocsis(1)
        }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The QAM channel Concurrent Services Capabilities.
            'eqamDependency' BIT set to '1' indicates the QAM channel
            is part of a dependency group that supports concurrent
            services mode as indicated in
            docsIfMCmtsEqamGroupDependencyTable.

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

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

docsIfMCmtsEqamDownstreamCapabServicesTransport OBJECT-TYPE
```

```
    SYNTAX      BITS {
        qamDependency(0),
        mpeg2OverIP(1),
        dmpt(2),
        psp(3)
        }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The QAM channel Services transports modes Capabilities.

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

            'mpeg2OverIP' set to '1' indicates video transports as
            conventional VoD is supported (known as MPT mode, MPEG-2
            transport).
            'dmpt' set to 1 indicates DOCSIS MPT mode (D-MPT) support.
            'psp' set to 1 indicates DOCSIS Packet Streaming Protocol
            mode (PSP) support.

            When 'eqamDependency' BIT is set to '1', a request to set
            a QAM channel to a service type in a dependency group
            (with docsIfMCmtsEqamGroupDependencyType set to
            docsPHYParamSameValue) may be rejected."
    ::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 8 }

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

            When 'eqamDependency' BIT is set to '1', a request to
            mute a QAM channels in a dependency group (with
            docsIfMCmtsEqamGroupDependencyType set to
            docsPHYParamSameValue), sets all QAM channels in the
            dependency group to mute."
    ::= { docsIfMCmtsEqamDownstreamCapabilitiesEntry 9 }

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

docsIfMCmtsEqamGroupDependencyTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsIfMCmtsEqamGroupDependencyEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "This table describes the rules that identify groups of
            QAM channels with PHY parameters dependencies.
            A PHY parameter dependency group means that a set to
            a QAM channel parameter may affect the value of
```

```
            other QAM Channels in the group.

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

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

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

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

            Additional details and rules to describe the PHY parameter
            dependency is indicated in
            docsIfMCmtsEqamGroupDependencyType.
            Vendors may extend via other MIB modules the usage of
            docsIfMCmtsEqamGroupDependencyType."
    ::= { docsIfMCmtsEqamObjects 3 }

docsIfMCmtsEqamGroupDependencyEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsEqamGroupDependencyEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "A conceptual row of this table.

            QAM channels are modeled as PhysicalClass 'port' from
            the ENTITY-MIB.
            An QAM channel can be represented as part of an entity
            MIB containment tree as follows:
            chassis(EQAM device)
                  .container(EQAM Slot)
                        .module(field-replaceable-module)
                              .module ( Physical RF spigot)
                                  . port (QAM channel)

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

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

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

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

```
            'nonVolatile'.

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

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

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

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

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

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

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

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

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

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

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

            Each Bi is verified as A for its own BPi parent tree to
            verify that in effect My is the lowest denominator in Mi
            BPi intersection to become part of the Dependency Group
            of A."
    INDEX { docsIfMCmtsEqamGroupDependencyPhyParam,
            docsIfMCmtsEqamGroupDependencyPhysicalIndex }
    ::= { docsIfMCmtsEqamGroupDependencyTable 1 }

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

docsIfMCmtsEqamGroupDependencyPhyParam OBJECT-TYPE
    SYNTAX      INTEGER {
        noDependencies(0),
```

```
        all(1),
        frequency(2),
        bandwidth(3),
        power(4),
        modulation(5),
        interleave(6),
        annex(7),
        symbolRate(8),
        mute(9)
        }
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "This object represents the type of DOCSIS PHY parameter
            that may have dependencies when setting an individual
            object in the dependency group.
            The value 'all' may be used as a wildcard to indicate
            all PHY parameters. The other enumeration values are
            DOCSIS PHY parameters.

            The opposite to 'all' is 'noDependencies', which indicates
            no dependencies in PHY parameters, but is only used to
            indicate no dependencies across all the EQAM device. Thus,
            when used, 'noDependencies' is accompanied by
            docsIfMCmtsEqamGroupDependencyPhysicalIndex '0' as the only
            entry in the table.
            In this way it is clearly distinguished when an EQAM device
            has dependencies instead of an empty table."
    ::= { docsIfMCmtsEqamGroupDependencyEntry 1 }

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

docsIfMCmtsEqamGroupDependencyGroupID OBJECT-TYPE
    SYNTAX      Unsigned32 (1..127)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The internal ID assigned for the QAM channels in the
            dependency group.
            The value of this object is unique in the scope of the
            PHY parameter being mapped."
    ::= { docsIfMCmtsEqamGroupDependencyEntry 3 }

docsIfMCmtsEqamGroupDependencyType OBJECT-TYPE
    SYNTAX      AutonomousType
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The description of the type of dependency associated
            with this dependency group.
            Basic type of dependencies are docsPHYParamSameValue,
            docsPHYParamAdjacentValues, docsPHYParamFrequencyRange.
            Vendors may define their own rules and policies to describe
```

```
            their implementation dependency definitions such as
            RowPointers to table entries or OBJECT-IDENTITY clauses.
            If the dependency is not described this object is set to
            zeroDotZero, although the dependency does exist."
    ::= { docsIfMCmtsEqamGroupDependencyEntry 4 }

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

docsIfMCmtsEqamGlobCfgDownTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsIfMCmtsEqamGlobCfgDownEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "A Table for setting multiple parameters of multiple
            QAM channels.
            Creating an entry in this table will set automatically
            all QAM Channels in the containment tree of
            docsIfMCmtsEqamGlobCfgDownPhysicalIndex in
            entPhysicalContainsTable to the parameter values
            specified during the row creation.

            docsIfMCmtsEqamGlobCfgDownPhysicalIndex MUST be a valid
            Physical index of entPhysicalTable.

            The ways to configure QAM channels  parameters are:
            1) Globally.
               Using this table, docsIfMCmtsEqamGlobCfgDownTable
            2) Directly.
               Using docsIfMCmtsEqamDownstreamTable and
               docsIfDownstreamChannelTable to change parameters
               and lock status of individual QAM channels.

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

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

            The processing of the entries in this table (e.g., at system
            initialization) is sequential; therefore, it could be
            overlapping rules based on the containment tree level of
            the entries."
    ::= { docsIfMCmtsEqamObjects 4 }

docsIfMCmtsEqamGlobCfgDownEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsEqamGlobCfgDownEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
             "The index of this table.
             Entries in this table persist after system
```

```
             re-initalization.
             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
            docsIfMCmtsEqamGlogCfgDownAnnex may end up with particular
            QAM channels set rejections due to incompatible Annex
            parameters, in which case the error 'errorSetFailures' is
            reported in docsIfMCmtsEqamGlobCfgDownExecutionCode."
    ::= { docsIfMCmtsEqamGlobCfgDownEntry 8 }

docsIfMCmtsEqamGlobCfgDownSymbolRateN OBJECT-TYPE
    SYNTAX      Unsigned32 (1..65535)
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
            "The object for global configuration of Downstream
            channel Symbol M factor of the QAM channels in the
            containment tree of
            docsIfMCmtsEqamGlobCfgDownPhysicalIndex.
            When setting M and N Symbol Rate parameters, both
            docsIfMCmtsEqamGlobCfgDownSymbolRateM and
            docsIfMCmtsEqamGlobCfgDownSymbolRateN objects MUST
            be present in the entry, otherwise an error code
            'notCommitted' is reported in
            docsIfMCmtsEqamGlobCfgDownExecutionCode of this entry."
    ::= { docsIfMCmtsEqamGlobCfgDownEntry 9 }

docsIfMCmtsEqamGlobCfgDownLockParams OBJECT-TYPE
    SYNTAX      BITS {
        frequency(0),
        bandwidth(1),
        power(2),
        modulation(3),
        interleaver(4),
        j83Annex(5),
        symbolRate(6),
        }
```

```
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
            "The object for global configuration of Downstream
            channel lock state of the PHY parameters of the QAM
            channels in the containment tree of
            docsIfMCmtsEqamGlobCfgDownPhysicalIndex.

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

            Setting a BIT to '1' locks the corresponding PHY parameter
            for configuration, returning error 'wrongValue' on SET
            attempts until administratively unlocked.

            A set to this object is reflected in
            docsIfMCmtsEqamDownstreamDeviceConfigPhyParamLock of the
            QAM channels being set.
            Note that setting a BIT to '0' does not necessarily grant
            write access to a PHY parameter, because of existing
            hardware constraints indicated in
            docsIfMCmtsEqamDownstreamDevicePhyParamLock."
    DEFVAL { ''h }
    ::= { docsIfMCmtsEqamGlobCfgDownEntry 10 }

docsIfMCmtsEqamGlobCfgDownExecutionCode OBJECT-TYPE
    SYNTAX      INTEGER {
        complete(1),
        errorNoPhysIndex(2),
        errorNoQAMChannels(3),
        errorSetFailures(4),
        errorNoCommitted(5),
        warningDependencies(6),
        errorOther(7)
        }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "Indicates the status of the global configuration entry
            execution. If different than 'none', represents the last
            error condition present.
            'complete' indicates the Global configuration success with
               no errors.
            'errorNoPhysIndex' indicates the value of
               docsIfMCmtsEqamGlobCfgDownPhysicalIndex does not
               exist.
            'errorSetFailures' indicates the global set was commit but
               individual QAM channels reported errors on sets. The
               counter docsIfMCmtsEqamGlobCfgDownErrorCount is
               increased for each QAM channel set failure.
            'errorNoCommitted' indicates the entry was not committed as
               sets to the associated QAM channels due to inconsistent
               PHY parameters. Few possible cases are:
               - refer to the docsIfMCmtsEqamGlogCfgDownAnnex
                 constraints and related Annex objects as it
                 describes.
               - setting 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      current
    DESCRIPTION
            "This table configure attributes of block channels and
             Controls channel Block Tests.
            A channel block is an ENTITY-MIB containment of
            PhysicalClass 'module' that represent an RF connector."
    ::= { docsIfMCmtsEqamObjects  5 }

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

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

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

docsIfMCmtsChannelBlockNumberChannels OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
```

```
    STATUS      current
    DESCRIPTION
            "The Number of QAM Channels N associated to this entry."
    ::= { docsIfMCmtsChannelBlockEntry 2 }

docsIfMCmtsChannelBlockCfgNumberChannels OBJECT-TYPE
    SYNTAX      Unsigned32(1..119)
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "The Number of QAM Channels N' to configure for the
            QAM block.
            The maximum number of channels per block follows the
            consideration of maximum number of digital channels in
            a headend described in the DRFI specification.
            As a rule N' is valid if is less or equal to N. In addition
            N minimal requirements consist of even numbers and 1
            (one QAM channel per Block Channel). Odd number of QAM
            channels per Block Channel are of optional implementation.
            A Set to an invalid value or not supported value returns
            Error 'wrongValue'."
    ::= { docsIfMCmtsChannelBlockEntry 3 }


docsIfMCmtsChannelBlockMute OBJECT-TYPE
    SYNTAX TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "The Mute control object for the Block Channel
            A set to this object to 'true' is reflected in
            ifOperStatus set to 'down' of the QAM channels
            associated to the block Channel.
            The opposite, a set to this object to 'false', is not
            necessarily reflected as ifOperStatus set to 'up' since
            other interface conditions might prevent such status."
    ::= { docsIfMCmtsChannelBlockEntry 4 }

docsIfMCmtsChannelBlockTestType OBJECT-TYPE
    SYNTAX      INTEGER {
                 noTest(1),
                 offOthersNormal(2),
                 allOff(3),
                 onOthersOff(4),
                 cwOnOthersOff(5),
                 cwOnOthersNormal(6),
                 clockTest(7)
                }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "A set of in-service and out-of-service test modes.
             The value 'noTest'(1) is the normal condition after
             reinitialization where the QAM channels are expected in
             operation.

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

             In-service tests modes:
             'offOthersNormal'
             It is the condition where the QAM Channel indicated in
```

```
                docsIfMCmtsChannelBlockTestIfIndex has its carrier
                suppressed and the other channels in the
                Block Channel are operational.
                'allOff'
                All QAM channels carriers in the channel block are
                Suppressed.
                'onOthersOff'
                It is the condition where the QAM channel indicated in
                docsIfMCmtsChannelBlockTestIfIndex is in operation
                and the other QAM channels in the channel Block have
                their carriers suppressed.

                Out-of-service test modes:
                'cwOnOthersOff'
                It is the condition where the QAM channel indicated in
                docsIfMCmtsChannelBlockTestIfIndex transmits a
                continuous wave (CW) while the other QAM
                channels in the channel Block have their carriers
                suppressed.
                'cwOnOthersNormal'
                It is the condition where the QAM channel indicated
                in docsIfMCmtsChannelBlockTestIfIndex transmits a
                continuous wave (CW) while the other QAM channels in
                the channel Block are operational.

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

                This object value does not persist after system
                Reinitialization.
                The value of this object is meaningless if
                docsIfMCmtsChannelBlockTestIfIndex is set to zero."
    ::= { docsIfMCmtsChannelBlockEntry 5 }

docsIfMCmtsChannelBlockTestIfIndex OBJECT-TYPE
    SYNTAX InterfaceIndexOrZero
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "The ifIndex of the QAM channel to perform the QAM
             channel test.
             A Set to a value that does not correspond to a QAM
             Channel within the Block channel returns error
             'wrongValue'.
             A set to zero stops a current test execution."
    ::= { docsIfMCmtsChannelBlockEntry 6 }



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

docsIfMCmtsDepiSessionConfigTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsIfMCmtsDepiSessionConfigEntry
    MAX-ACCESS  not-accessible
    STATUS      current
```

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

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

            Currently L2TPv3 is the defined tunnel mechanism for
            DEPI sessions. There may be other DEPI tunnel methods
            defined in the future.

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

            Only one L2TPv3 Control Plane from a M-CMTS Core IP is
            established per EQAM IP host destination indicated in
            docsIfMCmtsDepiSessionConfigRemoteAddr. There may be other
            L2TPv3 Control Plane connections from different M-CMTSs
            to the same EQAM IP host."
    ::= { docsIfMCmtsDepiSessionObjects 1 }

docsIfMCmtsDepiSessionConfigEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsDepiSessionConfigEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "A conceptual row for this table.
            Entries are created by either management operations or
            other M-CMTS applications or interfaces (e.g., ERMI), the
            persistence of an entry is indicated in
            docsIfMCmtsDepiSessionConfigStorage.

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

            o If the M-CMTS L2TPv3 Control Connection with the remote
              EQAM Host IP in docsIfMCmtsDepiSessionConfigRemoteAddr
              does not exist, a DEPI L2TPv3 control Connection is
              created.

            o There may be cases where the control plane with the EQAM
              IP host exists or is in progress, (e.g., a previously
              created entry with same EQAM IP host), thus the M-CMTS
              MUST avoid multiple L2TP Control Connection State
              machines.

            o DEPI L2TPv3 sessions are created based on the TSID
              value. Only the first entry with row status 'active'
              with a particular TSID value will try to establish a
              L2TPv3 session. Other entries with same TSID value
              return state of 'depiSessionError' in
              docsIfMCmtsDepiSessionInfoState.

            Relationships with the DOCSIS MAC domain IfStackTable:

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

            o When docsIfMCmtsDepiSessionConfigCableDownstreamIfIndex
```

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

            o If an entry in this table already exists for the specified
              docsIfMCmtsDepiSessionConfigCableDownstreamIfIndex,
              or corresponds to an ifIndex signaled as
              'integrated' in docsIfMCmtsDownstreamType a
              newly created entry set to active is rejected and
              reported in docsIfMCmtsDepiSessionInfoState as
              'invalidDSInterfaceValue'.

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

            Relationship with M-CMTS Downstream Interface tables:

            Setting an entry to active creates or updates (when
            docsIfMCmtsDepiSessionConfigCableMCmtsDownIfIndex is
            provided in the row creation; see the object description
            for details) the corresponding entry in the following
            tables:
             ifTable,
             docsIfDownstreamChannelTable,
             docsIfMCmtsCoreDownstreamTable/
             docsIfMCmtsEqamDownstreamTable,
             docsIfMCmtsCoreDownstreamTable,
             docsIfMCmtsDepiSessionInfoTable, and
             docsIfMCmtsDepiSessionStatsTable

            In the EQAM device this table is normally created by the
            M-CMTS Core initiated DEPI session, although manual
            configuration may be supported, with the difference that
            EQAM devices are not required to initiate DEPI sessions.
            EQAM device Operation of configured entries is not
            detailed in this MIB module."
    INDEX { docsIfMCmtsDepiSessionConfigIndex }
    ::= { docsIfMCmtsDepiSessionConfigTable 1 }

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

```
    docsIfMCmtsDepiSessionConfigChannelInterleave INTEGER,
    docsIfMCmtsDepiSessionConfigChannelPower      TenthdBmV,
    docsIfMCmtsDepiSessionConfigChannelAnnex      INTEGER,
    docsIfMCmtsDepiSessionConfigChannelSymbolRateM
                                                  Unsigned32,
    docsIfMCmtsDepiSessionConfigChannelSymbolRateN
                                                  Unsigned32,
    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 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 3 }

docsIfMCmtsDepiSessionConfigAddrType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  read-create
```

```
    STATUS      current
    DESCRIPTION
            "The type of InetAddress for
            docsIfMCmtsDepiSessionConfigLocalAddr and
            docsIfMCmtsDepiSessionConfigRemoteAddr."
    DEFVAL { ipv4 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 4 }

docsIfMCmtsDepiSessionConfigLocalAddr 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 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 5 }

docsIfMCmtsDepiSessionConfigRemoteAddr 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 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 6 }

docsIfMCmtsDepiSessionConfigL2TPv3HeaderType 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 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 7 }

docsIfMCmtsDepiSessionConfigMethod 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 no trigger the DEPI Control Plane
            creation. The TSID value zero may accomplish functions
            like testing of DEPI Control Plane connectivity without
            launching the DEPI Session itself; DLM over a M-CMTS
            Core - EQAM devices path with no Active sessions for
            administrative purposes."
    ::= { 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."
    ::= { docsIfMCmtsDepiSessionConfigEntry 12 }

docsIfMCmtsDepiSessionConfigSyncEnabled OBJECT-TYPE
```

```
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
            "Indicates the DOCSIS Sync message handling at the Edge QAM
            based upon PSP or DMPT mode of operation.
            In MPT mode 'true' indicates the EQAM MUST perform
            Sync TimeStamp correction. In PSP mode 'true' indicates
            the EQAM MUST insert DOCSIS Sync messages."
    REFERENCE
            "DEPI Specification Section 6.5"
    DEFVAL { false }
    ::= { docsIfMCmtsDepiSessionConfigEntry 13 }

docsIfMCmtsDepiSessionConfigSyncInterval OBJECT-TYPE
    SYNTAX      Unsigned32 (10..1000)
    UNITS       "docsisSyncSteps"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
            "Indicates the time nominal time interval for
            EQAM to insert DOCSIS Sync messages when operating
            in PSP mode. In DMPT mode this value is ignored.
            The unit reference of this object is steps of 200 usec.
            This object range covers the EQAM required support of
            DOCSIS Sync interval from 2 msec to 200 msec."
    DEFVAL { 1000 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 14 }

docsIfMCmtsDepiSessionConfigPhyParamsFlag OBJECT-TYPE
    SYNTAX      BITS {
        frequency(0),
        bandwidth(1),
        power(2),
        modulation(3),
        interleaver(4),
        j83Annex(5),
        symbolRate(6),
        mute(7)
        }
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
            "When configuring an entry, DOCSIS PHY parameters may
            be set directly or default values are used to populate
            the entry.
            This object indicates which PHY parameter sets need to be
            sent by the M-CMTS Core in the DEPI session request.
            A BIT position set to '1' indicates the PHY parameter is
            set during the DEPI session establishment.
            In the EQAM indicates the PHY parameters set by the M-CMTS
            core during the DEPI Session establishment procedure."
    DEFVAL { ''h }
    ::= { docsIfMCmtsDepiSessionConfigEntry 15 }

docsIfMCmtsDepiSessionConfigChannelFrequency OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
            "The channel frequency for the Downstream DEPI Session.
            A DEPI Session establishment success will update the
            corresponding ifIndex entry of docsIfChannelFrequency
```

```
            with this entry value if provided in entry creation,
            or the EQAM DEPI Frequency parameter advertised
            during the DEPI session negotiation."
    REFERENCE
            "DEPI specification"
    DEFVAL { 0 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 16 }

docsIfMCmtsDepiSessionConfigChannelModulation 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 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 17 }

docsIfMCmtsDepiSessionConfigChannelInterleave 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 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 18 }

docsIfMCmtsDepiSessionConfigChannelPower 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 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 19 }

docsIfMCmtsDepiSessionConfigChannelAnnex 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 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 20 }

docsIfMCmtsDepiSessionConfigChannelSymbolRateM 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 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 21 }

docsIfMCmtsDepiSessionConfigChannelSymbolRateN 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 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 22 }


docsIfMCmtsDepiSessionConfigChannelOutputRate 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 }
    ::= { docsIfMCmtsDepiSessionConfigEntry 23 }

-- TBD IfSpeed Values relationship to DEPI tunnel MTU

docsIfMCmtsDepiSessionConfigChannelBurstSize 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."
    ::= { docsIfMCmtsDepiSessionConfigEntry 24 }


docsIfMCmtsDepiSessionConfigStorage 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'."
    ::= { docsIfMCmtsDepiSessionConfigEntry 25 }

docsIfMCmtsDepiSessionConfigRowStatus 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

            docsIfMCmtsDepiSessionConfigCableMacIfIndex
            docsIfMCmtsDepiSessionConfigRemoteAddr
            docsIfMCmtsDepiSessionConfigTSID
            docsIfMCmtsDepiSessionConfigDEPIMode
            docsIfMCmtsDepiSessionConfigRsrcAllocReq
            docsIfMCmtsDepiSessionConfigMethod
            docsIfMCmtsDepiSessionConfigPhyFlag

            docsIfMCmtsDepiSessionConfigChannelId 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.

            docsIfMCmtsDepiSessionConfigChannelFrequency
            docsIfMCmtsDepiSessionConfigChannelModulation
            docsIfMCmtsDepiSessionConfigChannelInterleave
```

```
            docsIfMCmtsDepiSessionConfigChannelPower
            docsIfMCmtsDepiSessionConfigChannelAnnex
            docsIfMCmtsDepiSessionConfigSyncInterval

            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
            (docsIfMCmtsDepiSessionConfigCableMCmtsDownIfIndex) 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 ifAdmiStatus 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
            docsIfMCmtsDepiSessionInfoState in
            'ifAdmiStatusSetToDown'."
    ::= { docsIfMCmtsDepiSessionConfigEntry 26 }

docsIfMCmtsDepiSessionConfigChannelId 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."
    ::= { docsIfMCmtsDepiSessionConfigEntry 27 }


docsIfMCmtsDepiSessionInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsIfMCmtsDepiSessionInfoEntry
    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."
    ::= { docsIfMCmtsDepiSessionObjects 2 }

docsIfMCmtsDepiSessionInfoEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsDepiSessionInfoEntry
    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
            docsIfMCmtsDepiSessionConfigCableMCmtsDownIfIndex, which is
            equivalent to ifIndex from other M-CMTS Downstream
            interface tables."
    INDEX { ifIndex }
    ::= { docsIfMCmtsDepiSessionInfoTable 1 }

DocsIfMCmtsDepiSessionInfoEntry ::= SEQUENCE
    {
    docsIfMCmtsDepiSessionInfoCfgIndex              Unsigned32,
    docsIfMCmtsDepiSessionInfoUdpPort               InetPortNumber,
    docsIfMCmtsDepiSessionInfoMaxPayload            Unsigned32,
    docsIfMCmtsDepiSessionInfoPathPayload           Unsigned32,
    docsIfMCmtsDepiSessionInfoIncludeDOCSISMsgs     TruthValue,
    docsIfMCmtsDepiSessionInfoRsrcAllocResp         Unsigned32,
    docsIfMCmtsDepiSessionInfoConnCtrlID            Unsigned32,
    docsIfMCmtsDepiSessionInfoEQAMSessionID         Unsigned32,
    docsIfMCmtsDepiSessionInfoOwner                 INTEGER,
    docsIfMCmtsDepiSessionInfoState                 INTEGER,
    docsIfMCmtsDepiSessionInfoErrorCode             INTEGER,
    docsIfMCmtsDepiSessionInfoCreationTime          TimeStamp,
    docsIfMCmtsDepiSessionInfoStorage               StorageType
    }

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

docsIfMCmtsDepiSessionInfoUdpPort 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."
    ::= { docsIfMCmtsDepiSessionInfoEntry 2 }

docsIfMCmtsDepiSessionInfoMaxPayload 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"
    ::= { docsIfMCmtsDepiSessionInfoEntry 3 }

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

docsIfMCmtsDepiSessionInfoIncludeDOCSISMsgs 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 weather the M-CMTS Donwstream Interface
            includes DOCSIS messages as part of the DEPI payload."
    DEFVAL { false }
    ::= { docsIfMCmtsDepiSessionInfoEntry 5 }

docsIfMCmtsDepiSessionInfoRsrcAllocResp OBJECT-TYPE
    SYNTAX      Unsigned32 (0..4294967295)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "In the M-CMTS core a reference to
            docsIfMCmtsDepiRsrcAllocIndex of
            docsIfMCmtsDepiRsrcAllocTable as reported by the EQAM
            during the DEPI session establishment process.

            The number of PHBIDs in the entries referenced in
            docsIfMCmtsDepiSessionConfigRsrcAllocReq and this object
            may differ if the EQAM Host IP signals a partial list of
            PBHIDs during the DEPI session establishment.

            In the EQAM a value 0 indicates no reference to
            docsIfMCmtsDepiRsrcAllocTable. A non-zero value indicates
            the value of docsIfMCmtsDepiRsrcAllocIndex in
            docsIfMCmtsDepiRsrcAllocTable 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 docsIfMCmtsDepiSessionInfoStorage."
    ::= { docsIfMCmtsDepiSessionInfoEntry 13 }

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

```
--

docsIfMCmtsDepiRsrcAllocTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsIfMCmtsDepiRsrcAllocEntry
    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 docsIfMCmtsDepiSessionConfigRsrcAllocReq
              references those type of entry sets.
              In those entries the values of
              docsIfMCmtsDepiRsrcAllocUdpPort,
              docsIfMCmtsDepiRsrcAllocFlowId,
              docsIfMCmtsDepiRsrcAllocPolicyCinPolicyTag and
              docsIfMCmtsDepiRsrcAllocPolicyScnTags
              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
              docsIfMCmtsDepiSessionInfoRsrcAllocResp in
              docsIfMCmtsDepiSessionInfoTable 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
            docsIfMCmtsDepiSessionInfoRsrcAllocResp 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."
    ::= { docsIfMCmtsDepiSessionObjects 3 }

docsIfMCmtsDepiRsrcAllocEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsDepiRsrcAllocEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "A conceptual row for this table.
            At minimum two entries for docsIfMCmtsDepiRsrcAllocSeq
            (two Flow ID entries) per docsIfMCmtsDepiRsrcAllocIndex
            value are needed for DEPI PSP mode.
            When the docsIfMCmtsDepiRsrcAllocIndex is used for DMPT
            mode one flow Id entry value is required.

            The PHBIDs contained in this entry are expanded with the
            tags of docsIfMCmtsDepiRsrcAllocPolicySCNTags to indicate
            the association of PSP packets attributes such as DOCSIS MAPS,
            DOCSIS MAC messages and DOCSIS Service Flows to a DEPI
            Flow ID. Thus, the EQAM IP Host uses those DEPI flow IDs to
```

```
            prioritize the QAM channel traffic."
    INDEX { docsIfMCmtsDepiRsrcAllocIndex, docsIfMCmtsDepiRsrcAllocSeq }
    ::= { docsIfMCmtsDepiRsrcAllocTable 1 }

DocsIfMCmtsDepiRsrcAllocEntry ::= SEQUENCE
    {
    docsIfMCmtsDepiRsrcAllocIndex         Unsigned32,
    docsIfMCmtsDepiRsrcAllocSeq           Unsigned32,
    docsIfMCmtsDepiRsrcAllocPhbId         Unsigned32,
    docsIfMCmtsDepiRsrcAllocFlowId        DepiFlowId,
    docsIfMCmtsDepiRsrcAllocUdpPort       InetPortNumber,
    docsIfMCmtsDepiRsrcAllocPolicyScnTags SnmpTagValue,
    docsIfMCmtsDepiRsrcAllocStorage       StorageType,
    docsIfMCmtsDepiRsrcAllocRowStatus     RowStatus,
    docsIfMCmtsDepiRsrcAllocCinPolicyTag  SnmpAdminString
    }

docsIfMCmtsDepiRsrcAllocIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "The first index of this table.
            Multiple DEPI Flow Ids are within a
            docsIfMCmtsDepiRsrcAllocIndex value."
    ::= { docsIfMCmtsDepiRsrcAllocEntry 1 }

docsIfMCmtsDepiRsrcAllocSeq OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "The sequence index for entries within the same
            docsIfMCmtsDepiRsrcAllocIndex value.
            EQAM IP Host may reply with less PHBIDs than requested,
            then, the M-CMTS Core skips the sequence index of missing
            PHBIDs when creating the Resource Allocation entry
            response.

            As a rule of thumb this object has the minimal queuing
            priority information for DEPI flows treatment in the EQAM.
            The lowest sequence value indicates the DEPI Flow ID with
            the highest priority treatment at the EQAM (e.g., DOCSIS
            MAC messages should be allocated to that flow) and the
            highest sequence number indicates the DEPI Flow ID with the
            lowest priority."
    ::= { docsIfMCmtsDepiRsrcAllocEntry 2 }

docsIfMCmtsDepiRsrcAllocPhbId OBJECT-TYPE
    SYNTAX      Unsigned32 (0..63)
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
            "The PHB identifier (per-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 }
    ::= { docsIfMCmtsDepiSessionStatsTable 1 }
```

```
DocsIfMCmtsDepiSessionStatsEntry ::= SEQUENCE
       {
        docsIfMCmtsDepiSessionInfoOutOfSequencePkts   Counter32
       }

docsIfMCmtsDepiSessionInfoOutOfSequencePkts 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."
    ::= { docsIfMCmtsDepiSessionStatsEntry 1 }

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

docsIfMCmtsDepiSessionCinLatency OBJECT IDENTIFIER
    ::= { docsIfMCmtsDepiSessionObjects 5 }

docsIfMCmtsDepiSessionCinLatencyInterval 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."
    ::= { docsIfMCmtsDepiSessionCinLatency 1 }

docsIfMCmtsDepiSessionCinLatencyThrshld 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."
    ::= { docsIfMCmtsDepiSessionCinLatency 2 }

docsIfMCmtsDepiSessionCinEventLevel   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."
    ::= { docsIfMCmtsDepiSessionCinLatency 3 }

docsIfMCmtsDepiSessionCinLastValue 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 docsIfMCmtsDepiSessionCinLastValueIfIndex."
    ::= { docsIfMCmtsDepiSessionCinLatency 4 }

docsIfMCmtsDepiSessionCinLastValueIfIndex 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 docsIfMCmtsDepiSessionCinLastValue."
    ::= { docsIfMCmtsDepiSessionCinLatency 5 }

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

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

docsIfMCmtsDepiSessionCinLatencyPerfEntry OBJECT-TYPE
    SYNTAX      DocsIfMCmtsDepiSessionCinLatencyPerfEntry
    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, docsIfMCmtsDepiSessionCinLatencyPerfIntervalSeq }
    ::= { docsIfMCmtsDepiSessionCinLatencyPerfTable 1 }

DocsIfMCmtsDepiSessionCinLatencyPerfEntry ::= SEQUENCE
    {
```

```
    docsIfMCmtsDepiSessionCinLatencyPerfIntervalSeq   Unsigned32,
    docsIfMCmtsDepiSessionCinLatencyPerfValue         Unsigned32,
    docsIfMCmtsDepiSessionCinLatencyTime              TimeTicks
    }

docsIfMCmtsDepiSessionCinLatencyPerfIntervalSeq 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."
    ::= { docsIfMCmtsDepiSessionCinLatencyPerfEntry 1 }

docsIfMCmtsDepiSessionCinLatencyPerfValue 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."
    ::= { docsIfMCmtsDepiSessionCinLatencyPerfEntry 2 }

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

--
-- Policies for mapping Service Flows to PSP packets
--

--
-- docsIfMCmtsDepiPhbPolicyTable
-- Applicable to CMTS only

docsIfMCmtsDepiPhbPolicyTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsIfMCmtsDepiPhbPolicyEntry
    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 ClDot1dUserPriority
    }

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 docsIfMCmtsDepiPhbPolicyEntry for the related
            DEPI session."
    ::= { docsIfMCmtsDepiPhbPolicyEntry 6 }
```

```
docsIfMCmtsDepiPhbPolicyCinUserPriority OBJECT-TYPE
    SYNTAX      ClDot1dUserPriority
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
            "The 802.1p user priority assigned to transport the DEPI
            traffic assigned to this docsIfMCmtsDepiPhbPolicyEntry 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."
    ::= { docsIfMCmtsDepiPhbPolicyEntry 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."
    ::= { docsIfMCmtsDepiQosObjects 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 {
    docsIfMCmtsQosServiceFlowExtDepiFlowId  DepiFlowId,
    docsIfMCmtsQosServiceFlowExtCinPhbId    Unsigned32,
    docsIfMCmtsQosServiceFlowExtDepiIfIndex InterfaceIndexOrZero
    }

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

docsIfMCmtsQosServiceFlowExtCinPhbId OBJECT-TYPE
    SYNTAX      Unsigned32 (0..63)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
```

```
            "The CIN PHBID associated with this Service Flow."
    ::= { docsIfMCmtsQosServiceFlowExtEntry 2 }

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

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

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

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

    MODULE -- this MODULE

-- conditionally mandatory groups

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

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

MODULE -- this MODULE

-- conditionally mandatory groups

MANDATORY-GROUPS {
    docsIfMCmtsBaseGroup,
    docsIfMCmtsEqamDevGroup,
    entityPhysicalGroup,
    entityPhysical2Group,
    entityPhysical3Group,
    entityGeneralGroup
    }

-- Conditional Mandatory Groups

GROUP entityLogical2Group -- Same as ENTITY-MIB
    DESCRIPTION
            "Implementation of this group is not mandatory for Agents
            that model all MIB object instances within a
            single naming scope."
```

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

OBJECT entPhysicalSerialNum --Same as ENTITY-MIB
    MIN-ACCESS  not-accessible
    DESCRIPTION
            "Read and write access is not required for agents that
            cannot identify serial number information for physical
            entities, and/or cannot provide non-volatile storage for
            NMS-assigned serial numbers.

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

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

OBJECT entPhysicalAlias --Same as ENTITY-MIB
    MIN-ACCESS  read-only
    DESCRIPTION
            "Write access is required only if the associated
            entPhysicalClass value is equal to 'chassis(3)'."

OBJECT entPhysicalAssetID --Same as ENTITY-MIB
    MIN-ACCESS  not-accessible
    DESCRIPTION
            "Read and write access is not required for agents that
            cannot provide non-volatile storage for NMS-assigned asset
            identifiers.

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

OBJECT entPhysicalClass --Same as ENTITY-MIB
    SYNTAX      INTEGER {
        other(1),
        unknown(2),
        chassis(3),
        backplane(4),
        container(5),
        powerSupply(6),
        fan(7),
        sensor(8),
        module(9),
        port(10),
        stack(11)
        }
    DESCRIPTION
            "Implementation of the 'cpu(12)' enumeration is not
            required."
    ::= { docsIfMCmtsCompliances 2}
```

```
docsIfMCmtsBaseGroup OBJECT-GROUP
    OBJECTS {
        docsIfMCmtsDepiSessionConfigCableMacIfIndex,
        docsIfMCmtsDepiSessionConfigCableMCmtsDownIfIndex,
        docsIfMCmtsDepiSessionConfigAddrType,
        docsIfMCmtsDepiSessionConfigLocalAddr,
        docsIfMCmtsDepiSessionConfigRemoteAddr,
        docsIfMCmtsDepiSessionConfigL2TPv3HeaderType,
        docsIfMCmtsDepiSessionConfigMethod,
        docsIfMCmtsDepiSessionConfigTSID,
        docsIfMCmtsDepiSessionConfigDEPIMode,
        docsIfMCmtsDepiSessionConfigRsrcAllocReq,
        docsIfMCmtsDepiSessionConfigCinPhbIdPolicy,
        docsIfMCmtsDepiSessionConfigSyncEnabled,
        docsIfMCmtsDepiSessionConfigSyncInterval,
        docsIfMCmtsDepiSessionConfigPhyParamsFlag,
        docsIfMCmtsDepiSessionConfigChannelFrequency,
        docsIfMCmtsDepiSessionConfigChannelModulation,
        docsIfMCmtsDepiSessionConfigChannelInterleave,
        docsIfMCmtsDepiSessionConfigChannelPower,
        docsIfMCmtsDepiSessionConfigChannelAnnex,
        docsIfMCmtsDepiSessionConfigChannelSymbolRateM,
        docsIfMCmtsDepiSessionConfigChannelSymbolRateN,
        docsIfMCmtsDepiSessionConfigChannelOutputRate,
        docsIfMCmtsDepiSessionConfigChannelBurstSize,
        docsIfMCmtsDepiSessionConfigStorage,
        docsIfMCmtsDepiSessionConfigRowStatus,
        docsIfMCmtsDepiSessionConfigChannelId,
        docsIfMCmtsDepiSessionInfoCfgIndex,
        docsIfMCmtsDepiSessionInfoUdpPort,
        docsIfMCmtsDepiSessionInfoMaxPayload,
        docsIfMCmtsDepiSessionInfoPathPayload,
        docsIfMCmtsDepiSessionInfoIncludeDOCSISMsgs,
        docsIfMCmtsDepiSessionInfoRsrcAllocResp,
        docsIfMCmtsDepiSessionInfoConnCtrlID,
        docsIfMCmtsDepiSessionInfoEQAMSessionID,
        docsIfMCmtsDepiSessionInfoOwner,
        docsIfMCmtsDepiSessionInfoState,
        docsIfMCmtsDepiSessionInfoErrorCode,
        docsIfMCmtsDepiSessionInfoCreationTime,
        docsIfMCmtsDepiSessionInfoStorage,
        docsIfMCmtsDepiRsrcAllocPhbId,
        docsIfMCmtsDepiRsrcAllocFlowId,
        docsIfMCmtsDepiRsrcAllocUdpPort,
        docsIfMCmtsDepiRsrcAllocPolicyScnTags,
        docsIfMCmtsDepiRsrcAllocStorage,
        docsIfMCmtsDepiRsrcAllocRowStatus,
        docsIfMCmtsDepiRsrcAllocCinPolicyTag,
        docsIfMCmtsDepiSessionInfoOutOfSequencePkts,
        docsIfMCmtsDepiSessionCinLatencyInterval,
        docsIfMCmtsDepiSessionCinLatencyThrshld,
        docsIfMCmtsDepiSessionCinEventLevel,
        docsIfMCmtsDepiSessionCinLastValue,
        docsIfMCmtsDepiSessionCinLastValueIfIndex,
        docsIfMCmtsDepiSessionCinLatencyValueLastTime
        }
    STATUS      current
    DESCRIPTION
            "Group of objects implemented in M-CMTS compliant devices."
    ::= { docsIfMCmtsGroups 1 }

docsIfMCmtsCoreGroup OBJECT-GROUP
```

```
    OBJECTS {
        docsIfMCmtsCoreDownstreamPhyDependencies,
        docsIfMCmtsCoreDownstreamType,
        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 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,
        docsIfMCmtsEqamGlogCfgDownAnnex,
        docsIfMCmtsEqamGlobCfgDownSymbolRateM,
        docsIfMCmtsEqamGlobCfgDownSymbolRateN,
        docsIfMCmtsEqamGlobCfgDownLockParams,
        docsIfMCmtsEqamGlobCfgDownExecutionCode,
        docsIfMCmtsEqamGlobCfgDownErrorsCount,
        docsIfMCmtsEqamGlobCfgDownRowStatus,
        docsIfMCmtsChannelBlockNumberChannels,
        docsIfMCmtsChannelBlockCfgNumberChannels,
        docsIfMCmtsChannelBlockMute,
        docsIfMCmtsChannelBlockTestType,
        docsIfMCmtsChannelBlockTestIfIndex
        }
    STATUS      current
    DESCRIPTION
```

```
            "Group of objects implemented in M-CMTS EQAM compliant
            devices."
    ::= { docsIfMCmtsGroups 3 }
END
```

Annex D DTI-MIB (normative)

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

dtiMib MODULE-IDENTITY
    LAST-UPDATED    "200606280000Z" -- June 28, 2006
    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."
    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.
            Copyright 2005 Cable Television Laboratories, Inc.
            All rights reserved."
    ::=  { 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[5]
    }

dtiProtocolEntityType OBJECT-TYPE
```

[5] Line added per M-OSS-N-06.0278 on 4 7/26/06

```
    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[6]
        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
```

[6] Sentence modified per M-OSSI-N-06.0278-4 7/26/06

```
                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.[7]

            '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),[8]
        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.
```

[7] Text added per M-OSSI-N-06.0278-4 7/26/06
[8] Text added per M-OSSI-N-06.0278-4 7/26/06

```
            '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 }[9]

--
-- 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 }
```

[9] M-OSSI-N-06.0278-1 added this section on 7/26/06

```
    ::= { dtiProtocolControlTable 1 }

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

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

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

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

dtiProtocolControlTestMode OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "If set to 'true' starts the sequence of Test Mode
            on this DTI Client-Server connection.
            The Test Mode consist in a sequence of all DTI frames
            set to '1' before the Manchester line code is applied."
    ::= { dtiProtocolControlEntry 4 }
```

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

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

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

--
-- DTI protocol performance
--

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

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

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

dtiProtocolPerformanceDelay OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "nanoseconds"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
```

```
            "The roundtrip delay measured in nanoseconds."
    ::= { dtiProtocolPerformanceEntry 1 }

dtiProtocolPerformanceFrameErrorRate OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "FER"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "Frame Error Rate (FER) corresponds to the ratio of DTI
            protocol frames in error and the total of frames received
            during a period of time.
            Frames in error and total frames correspond to the delta
            of ifErrors and ifUcastPackets MIB objects respectively
            during the period of time defined by
            dtiFrameErrorRateInterval object. For the DTI server the
            FER value is based on the DTI client interval frames and
            for the DTI client, corresponds to the DTI
            server interval frames."
    ::= { dtiProtocolPerformanceEntry 2 }

dtiProtocolPerformancePeakToPeakJitter OBJECT-TYPE
    SYNTAX      Integer32 (-10000..10000)
    UNITS       "picoseconds"[10]
    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"[11]
    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"[12]
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The largest wander value observed by the server in a time
            interval defined by dtiWanderTimeInterval for the
            corresponding Client-Server connection."
    ::= { dtiProtocolPerformanceEntry 5 }

--
-- DTI Client State Machine
```

[10] M-OSSI-N-06.0278-4 modified these 2 sentences 7/26/06
[11] M-OSSI-N-06.0278-4 changed nanoseconds to picoseconds 7/26/06
[12] M-OSSI-N-06.0278-4 changed nanoseconds to picoseconds 7/26/06

```
--

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.
            'ntpv4' 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."[13]

OBJECT      dtiProtocolServerCableAdvanceValue
    DESCRIPTION
            "This object is always read only for DTI client
            devices. A DTI Server also treated as a DTI client
            for the interfaces connected to a DTI root server."

    ::= { 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,
    dtiProtocolPerformanceDelay,
    dtiProtocolPerformanceFrameErrorRate,
    dtiProtocolPerformancePeakToPeakJitter,
    dtiProtocolPerformanceWander35Second,
    dtiProtocolPerformanceWanderTSeconds,
    dtiProtocolServerClientStableFlag
    }
    STATUS      current
    DESCRIPTION
            "Group of object applicable to DTI Server and DTI Client."
    ::= { dtiMibGroups 1 }

dtiServerGroup OBJECT-GROUP
```

[13] M-OSSI-N-06.0278-4 added this section on 7/26/06

```
    OBJECTS {
    dtiProtocolControlTimeInterval,
    dtiProtocolControlErrorRateInterval,
    dtiProtocolControlJitterTimeInterval,
    dtiProtocolControlTestMode,
    dtiProtocolControlToDValue,
    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
```

Appendix I Acknowledgements (Informative)

On behalf of the cable industry and our member companies, CableLabs would like to thank the following individuals for their contributions to the development of this specification.

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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