

Data-Over-Cable-Service-Interface Specifications Modular Headend Architecture

Edge QAM Provisioning and Management Interface Specification

CM-SP-EQAM-PMI-I01-081209

ISSUED

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Contents

1	SCOPE	1
1.1	Introduction and Purpose	1
1.2	Requirements and Conventions	1
2	REFERENCES	2
2.1	Normative References	2
2.2	Informative References	3
2.3	Reference Acquisition	3
3	TERMS AND DEFINITIONS	4
4	ABBREVIATIONS AND ACRONYMS	5
5	THEORY OF OPERATION	6
5.1	Introduction	6
5.2	Provisioning	6
5.3	Configuration	6
6	EQAM PROVISIONING	7
6.1	Establishing IP Connectivity	7
6.1.1	EQAM Static Provisioning	7
6.1.2	EQAM Dynamic Provisioning	8
7	EQAM CONFIGURATION	11
7.1	Configuration File Download	11
7.2	Initial EQAM Configuration	13
7.3	EQAM Configuration with Administrative Interface	13
7.4	EQAM Configuration with XML File	14
7.5	Vendor-Specific Extensions	14
7.6	XML Configuration File Checksum	15
7.7	Configuration Error File	15
8	EQAM MANAGEMENT	16
8.1	DOCSIS MIB Modules	16
8.2	IETF RFC MIB Modules	16
8.3	SCTE MIB Modules	18
9	EQAM FAULT REPORTING	20
9.1	SNMP Usage	20
9.2	Event Notification	20
9.2.1	Format of Events	20
9.2.2	BIT Values for docsDevEvReporting [RFC4639]	22
9.2.3	Standard events for EQAM	22
9.2.4	Event Priorities and Vendor-Specific Events	24
9.3	List of events	25
ANNEX A	DETAILED MIB REQUIREMENTS (NORMATIVE)	28
A.1	Object Model schema Definition	29
A.2	IF-MIB ifTable MIB-Object details	58

ANNEX B	DESCRIPTION OF THE XML BASED CONFIGURATION FILE	60
B.1	EqamCfg.....	62
B.1.1	System	63
B.1.2	Inputs	63
B.1.3	RFOutputs.....	64
B.1.4	Vendor Object.....	65
B.1.5	Checksum Object	65
B.2	Configuration File XML Schema Definition.....	66
B.2.1	EQAM-CFG_1.0.XSD	66
B.2.2	EQAM_1.0.XSD.....	67
B.2.3	DOCS-CABLE-DEVICE_RFC4639.XSD.....	72
B.2.4	SNMPv2_RFC3418.XSD	72
ANNEX C	DOCS-EQAM MANAGEMENT REQUIREMENTS.....	73
C.1	DOCS-EQAM Object Model Overview.....	73
C.2	DOCS-EQAM Object Model Definitions	73
C.2.1	DOCS-EQAM Object Model Data Types	73
C.2.2	DOCS-EQAM Object Model Class Diagram	74
C.2.3	DOCS-EQAM Object Model Description.....	75
C.3	EQAM MIB Module	92
APPENDIX I	ACKNOWLEDGEMENTS	125

Figures

FIGURE 6–1 - EQAM PROVISIONING FLOW.....	7
FIGURE 6–2 - IPV4 PROVISIONING MESSAGE FLOW	8
FIGURE 7–1 - EQAM CONFIGURATION PROCESS	12
FIGURE B–1 - XML CONFIGURATION OBJECT MODEL.....	61
FIGURE C–1 - QAM OBJECT MODEL DIAGRAM	74

Tables

TABLE 6–1 - DHCP BACKOFF DISTRIBUTION VALUES	8
TABLE 7–1 - EQAM CONFIGURATION WITH ADMINISTRATIVE INTERFACE	13
TABLE 7–2 - EQAM CONFIGURATION WITH XML FILE	14
TABLE 8–1 - DOCSIS MIB MODULES	16
TABLE 8–2 - IETF RFC MIB MODULES.....	16
TABLE 8–2 - SCTE MIB MODULES.....	18
TABLE 9–1 - DEFAULT EVENT REPORTING MECHANISM VERSUS PRIORITY (NON-VOLATILE LOCAL LOG SUPPORT ONLY)	23
TABLE 9–2 - DEFAULT EVENT REPORTING MECHANISM VERSUS PRIORITY (VOLATILE LOCAL LOG SUPPORT ONLY)	23
TABLE 9–3 - DEFAULT EVENT REPORTING MECHANISM VERSUS PRIORITY	24
TABLE 9–4 - EVENT PRIORITIES ASSIGNMENT	24
TABLE A–1 - MIB IMPLEMENTATION SUPPORT	28
TABLE A–2 - SNMP ACCESS REQUIREMENTS.....	28
TABLE A–3 - REQUIREMENTS.....	29
TABLE A–4 - IF-MIB IFTABLE MIB-OBJECT DETAILS	58
TABLE B–1 - EQAMCFG CONFIG FILE ELEMENTS	62
TABLE B–2 - SYSTEM OBJECT.....	63
TABLE B–3 - INPUTS ELEMENTS	63
TABLE B–4 - EDGEINPUTS ELEMENTS	64
TABLE B–5 - RFOUTPUTS ELEMENTS.....	64
TABLE B–6 - RFPORTS ELEMENTS	64
TABLE B–7 - RFPORT ELEMENTS	64
TABLE B–8 - QAMCHANNELS ELEMENTS	65
TABLE B–9 - CHANNEL ELEMENTS.....	65
TABLE B–10 - VENDOR OBJECT.....	65
TABLE B–11 - CHECKSUM OBJECT.....	65
TABLE C–1 - CONTROL OBJECT	75
TABLE C–2 - NMSACCESS OBJECT.....	76
TABLE C–3 - TIME OBJECT	77
TABLE C–4 - SYSLOGSERVER OBJECT	77
TABLE C–5 - REGISTRATION OBJECT	78
TABLE C–6 - TSINPUTCFG OBJECT.....	80
TABLE C–7 - TSOUTCfg OBJECT	81
TABLE C–8 - RESERVEDUDPMap OBJECT	81
TABLE C–9 - RESERVEDPidRANGE OBJECT.....	82
TABLE C–10 - DEPICFG OBJECT	82
TABLE C–11 - EDGEINPUT OBJECT	82
TABLE C–12 - INPUTREGISTRATION.....	83
TABLE C–13 - RFPORT OBJECT	84
TABLE C–14 - FIBERNode OBJECT	85
TABLE C–15 - CHANNEL OBJECT	85
TABLE C–16 - TSOUTCfg OBJECT	88
TABLE C–17 - STATICUDPMap OBJECT.....	88
TABLE C–18 - SESSIONLOGCTRL	89
TABLE C–19 - SESSIONLOG	89
TABLE C–20 - NOTIFY OBJECT.....	91

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1 SCOPE

1.1 Introduction and Purpose

This specification is part of the Data-Over-Cable-Service-Interface Specifications (DOCSIS) family of specifications developed by Cable Television Laboratories (CableLabs). This specification is a component of the Modular Headend Architecture; in particular it defines the Provisioning and Management requirements for the EQAM device.

1.2 Requirements and Conventions

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.

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- [SHA-1] Federal Information Processing Standards Publication 180-2, 2002 August 1, Announcing the SECURE HASH STANDARD.

2.2 Informative References

- [MHA-TR] Data-Over-Cable Service Interface Specifications, Modular Headend Architecture EQAM Architectural Overview Technical Report, CM-TR-MHA-V02-081209, December 9, 2008, Cable Television Laboratories, Inc.

2.3 Reference Acquisition

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- International Telecommunication Union – Telecommunication Standardization Sector (ITU-T), <http://www.itu.int/itu-t/>
- International Organization for Standardization (ISO), <http://www.iso.org>
- Society of Cable Telecommunication Engineers, 140 Philips Road, Exton PA 19341-1318, Phone +1-610-524-1725; Internet: <http://www.scte.org> / E-Mail: standards@scte.org

3 TERMS AND DEFINITIONS

This specification uses the following terms:

Edge QAM	A head-end or hub device that receives packets of digital video or data from the operator network. It re-packetizes the video or data into an MPEG transport stream and digitally modulates the transport stream onto a downstream RF carrier using QAM.
MAC domain	A grouping of layer 2 devices that can communicate with each other without using bridging or routing. In DOCSIS, a MAC domain is the group of CMs that are using upstream and downstream channels linked together through a MAC forwarding entity.
Service Group	An HFC service group (also known as a service group) is a portion of an HFC access network used to deliver a set of services to a population of cable modems that share a common spectrum of RF channels.

4 ABBREVIATIONS AND ACRONYMS

This specification uses the following abbreviations:

EQAM	Edge QAM
ERM	Edge Resource Manager
HFC	Hybrid Fiber/Coaxial Cable
IF	Interface
IEEE	Institute of Electrical and Electronics Engineers
IGMP	Internet Group Management Protocol
IP	Internet Protocol
MPEG	Moving Pictures Experts Group
MPTS	Multiple Program Transport Stream
NMS	Network Management System
QAM	Quadrature Amplitude Modulator
RF	Radio Frequency
RFC	Request for Comment
SDV	Switched Digital Video
SPTS	Single Program Transport Stream
SSM	Source Specific Multicast
XML	Extensible Markup Language
XSID	XML Schema Definition

5 THEORY OF OPERATION

The role of the EQAM in the video-on-demand and switched-digital-video architecture is to receive an IP unicast or multicast stream containing MPEG transport stream packets, and then produce that transport stream on one or more RF outputs for transmission over the hybrid fiber-coax cable plant.

5.1 Introduction

This specification covers the configuration, provisioning, and management requirements for an EQAM device. The Provisioning section provides details on how the EQAM is initially provisioned manually, as well as via DHCP-based provisioning. The Configuration section provides details on how the configuration management settings are applied and saved at the EQAM. The Fault Management section provides details on error-handling requirements for the EQAM. Finally, the Management requirements are covered in the Annex sections of this specification.

5.2 Provisioning

The EQAM management interface needs to be provisioned with an IP address and other configuration parameters. The EQAM IPv4 provisioning is specified to allow Operators flexibility with either static or dynamic using DHCPv4 provisioning process.

5.3 Configuration

The XML configuration file is used to set the EQAM parameters value. The configuration file must always be fully reapplied at boot up time. At any time, the EQAM must be able to apply the common section of the XML configuration described in this specification. The configuration file can be saved locally on the EQAM (with non-volatile memory) or remotely on a centralized file server.

When the configuration files are on a server, they can be downloaded to the EQAM with TFTP or HTTPS via manual or DHCP control. The file can also be uploaded to the server to keep an updated copy when the EQAM configuration is modified by other administrative interfaces (CLI/GUI/SNMP). To keep some flexibility, specific vendor extensions can be included in a dedicated section of the file.

6 EQAM PROVISIONING

6.1 Establishing IP Connectivity

The EQAM's Management interface requires an IP address and other parameters before it can download its initial configuration file. Static as well as dynamic (DHCP) provisioning will be available to provision the IP parameters for the EQAM Management interface. The EQAM provisioning flow is outlined in Figure 6–1.

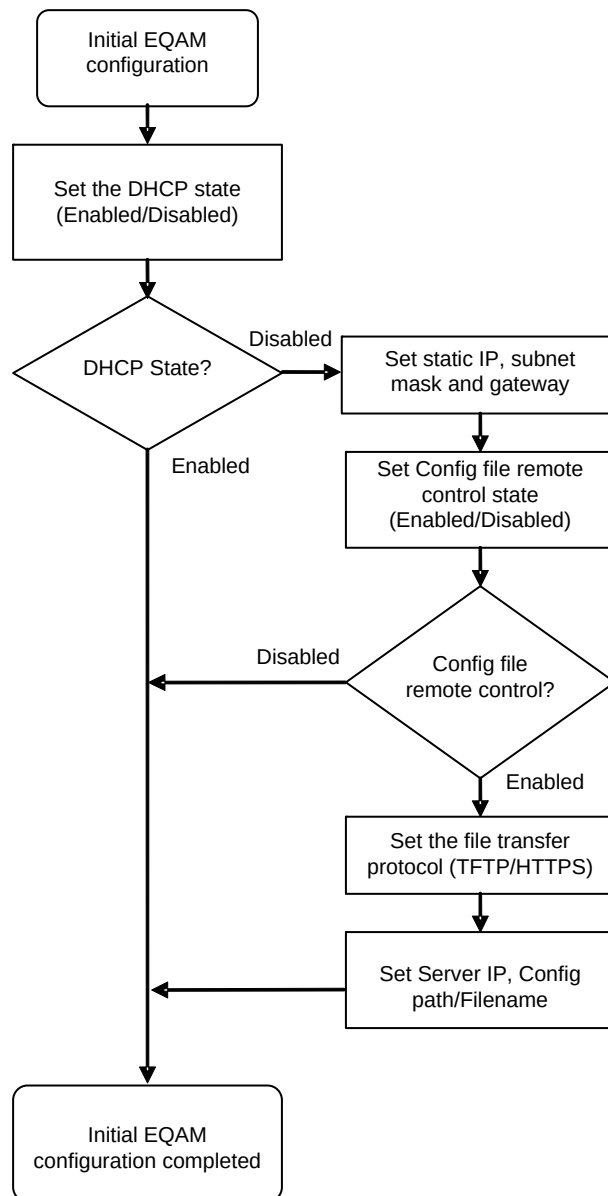


Figure 6–1 - EQAM Provisioning Flow

6.1.1 EQAM Static Provisioning

The EQAM MUST provide a user interface for provisioning the IP address, the IP mask, the default router address, the TFTP server address, and the configuration file name for its Management interface.

When shipped, the EQAM MUST be able to perform a standalone boot with the following factory configuration:

- Known static IP address (192.168.0.1)
- RF ports disabled

6.1.2 EQAM Dynamic Provisioning

The EQAM MUST allow the selection of DHCP for provisioning of its Management Interface.

6.1.2.1 Establish IPv4 Network Connectivity using DHCPv4

This section describes how the EQAM is dynamically provisioned with an IPv4 address and associated parameters.

The standard DHCPv4 message exchange between the EQAM and the DHCPv4 server is shown in Figure 6–2. The EQAM MUST use DHCPv4 [RFC2131] in order to obtain an IP address and other parameters needed to establish IP connectivity.

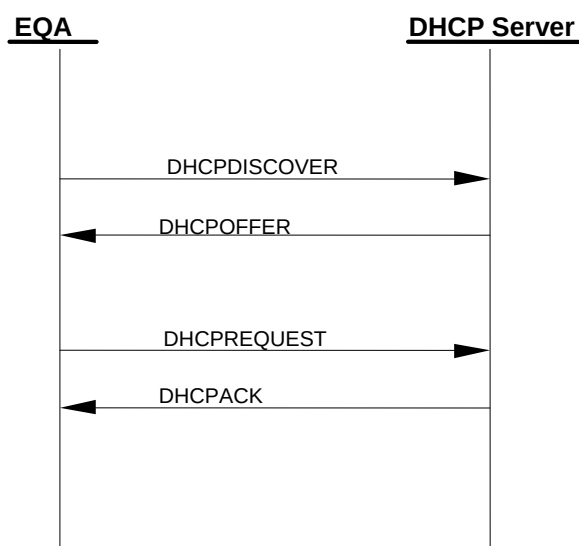


Figure 6–2 - IPv4 Provisioning Message Flow

The EQAM may receive multiple DHCPOFFER messages in response to its DHCPDISCOVER message. If a received DHCPOFFER message does not include all of the required DHCPv4 fields and options as described in Section 6.1.2.1.1, the EQAM MUST discard the DHCPOFFER message and wait for another DHCPOFFER message. If none of the received DHCPOFFER messages contain all the required DHCPv4 fields and options, the EQAM retransmits the DHCPDISCOVER message.

The EQAM SHOULD choose backoff values for retransmission of DHCPDISCOVER messages according to a uniform distribution between the minimum and maximum values in the rows of the table below.

Table 6–1 - DHCP Backoff Distribution Values

Backoff Number	Minimum (sec.)	Maximum (sec.)
1	3	5
2	7	9

Backoff Number	Minimum (sec.)	Maximum (sec.)
3	15	17
4	31	33
5	63	65

The EQAM SHOULD also implement a different retransmission strategy for the RENEWING and REBINDING states as recommended in [RFC2131], which is based on one-half of the remaining lease time.

The EQAM MUST limit the number of retransmissions to five or fewer for the DHCPDISCOVER and DHCPREQUEST messages.

[RFC3203] describes an extension to DHCPv4 that allows a DHCP server to send a FORCERENEW message that forces a client to renew its lease. The EQAM MUST ignore all received FORCERENEW messages.

6.1.2.1.1 DHCPv4 Fields Used by the EQAM

The following fields MUST be present in the DHCPDISCOVER and DHCPREQUEST messages from the EQAM:

- The hardware type (htype) MUST be set to 1;
- The hardware length (hlen) MUST be set to 6;
- The client hardware address (chaddr) MUST be set to the 48-bit MAC address associated with the Management interface of the EQAM;
- The client identifier option MUST be included using the format defined in [RFC4361];
- The parameter request list option MUST be included. The following option codes defined in [RFC2131] MUST be included in the list:
 - Option code 1 (Subnet Mask)
 - Option code 2 (Time Offset)
 - Option code 3 (Router Option)
 - Option code 4 (Time Server Option)
 - Option code 7 (Log Server Option)
- Option code 60 (Vendor Class Identifier) - the following ASCII-encoded string MUST be present in Option code 60: "EQAM:"
- Option code 125 (DHCPv4 Vendor - Identifying Vendor Specific Information Options for DOCSIS 3.0 defined in [CANN DHCP] includes the following sub-options:
 - Sub-option code 1, the DHCPv4 Option Request option. This option code MUST be included in the DHCPv4 Option Request option.
 - Sub-option code 2, DHCPv4 TFTP Servers Option.

The following fields are expected in the DHCP OFFER and DHCP ACK messages returned to the EQAM. The EQAM MUST configure itself with the listed fields from the DHCP ACK:

- The IP address to be used by the EQAM (yiaddr) (critical);
- The IP addresses of the TFTP servers for use in the next phase of the boot process (DHCPv4 TFTP Servers option defined in [CANN DHCP]) (optional);
- The name of the EQAM configuration file to be read from the TFTP server by the EQAM (file) (optional);
- The subnet mask to be used by the EQAM (Subnet Mask, option 1) (non-critical);
- The time offset of the EQAM from UTC (Time Offset, option 2). This is used by the EQAM to calculate a time for use in error logs (non-critical).
- A list of addresses of one or more routers to be used for forwarding IP traffic originating from the EQAM's IP stack (Router Option, option 3). The EQAM is not required to use more than one router IP address for forwarding (non-critical).
- A list of ToD servers from which the current time may be obtained (Time Server Option, option 4) (non-critical).
- A list of syslog servers to which logging information may be sent (Log Server Option, option 7) (non-critical).

If a critical field is missing or invalid in the DHCP ACK received during initialization, the EQAM MUST:

1. Log an error.
2. Proceed as if the acquisition of the IPv4 address through DHCPv4 has failed.

If a non-critical field is missing or invalid in the DHCP ACK received during initialization, the EQAM MUST log a warning, ignore the field, and continue the IPv4 provisioning process.

If the yiaddr field is missing or invalid in the DHCP ACK received during a renew or rebind operation, the EQAM MUST log an error and restart DHCPv4 provisioning.

If any other critical or non-critical field is missing or invalid in the DHCP ACK received during a renew or rebind operation, the EQAM MUST log a warning, ignore the field if it is invalid, and remain operational.

6.1.2.1.2 Use of T1 and T2 Timers

The EQAM MUST initiate the lease renewal process when timer DHCP-T1 expires. The EQAM MUST initiate the lease rebinding process when timer DHCP-T2 expires. Timers DHCP-T1 and DHCP-T2 are called T1 and T2, respectively, in the DHCP specifications. If the DHCP server sends a value for DHCP-T1 to the EQAM in a DHCP message option, the EQAM MUST use that value. If the DHCP server does not send a value for DHCP-T1, the EQAM MUST set DHCP-T1 to one-half of the duration of the lease [RFC2131]. If the DHCP server sends a value for DHCP-T2 to the EQAM in a DHCP message option, the EQAM MUST use that value. If the DHCP server does not send a value for DHCP-T2, the EQAM MUST set DHCP-T2 to seven-eighths of the duration of the [RFC2131].

6.1.2.1.2.1 DHCPv4 Renew Fields Used by the EQAM

It is possible during the DHCPv4 renew operation that the EQAM will receive updated fields in the DHCP ACK message. If the EQAM is unable to use the updated values of those fields, it may discard the renew operation and restart DHCP.

7 EQAM CONFIGURATION

The EQAM either uses a locally stored configuration or tries to download a configuration file using TFTP from the File Server.

If the EQAM is statically provisioned with its IP Address information and the configuration file download information is also supplied, then it uses the configuration file download mechanism via TFTP as specified below. If the configuration file download information is left out during static provisioning, then the EQAM uses the locally stored configuration.

If the EQAM is dynamically provisioned via DHCPv4 for its IP Address information and the configuration file download information is also supplied through DHCPv4, then it uses the configuration file download mechanism via TFTP as specified below. If the configuration file download information is left out during DHCPv4 provisioning, then the EQAM uses the locally stored configuration.

Figure 7–1 shows the configuration process for the EQAM. The next section defines how an EQAM downloads its configuration file and uses the configuration parameters to initialize its resources.

7.1 Configuration File Download

The EQAM MUST use TFTP to obtain a configuration file from the server(s) identified in the DHCPv4 TFTP Servers option, when provided. The EQAM MUST include the TFTP Blocksize option [RFC2348] when requesting the configuration file. The EQAM MUST request a blocksize of 1428 if using TFTP over IPv4.

There may be more than one value in the DHCPv4 TFTP Servers option in the DHCPACK; the EQAM MUST use the values in this option to obtain its configuration file.

The EQAM MUST use the following procedure to attempt configuration file download:

- Initiate a configuration file download by sending a TFTP read request message for the configuration file to the TFTP server, thus establishing a connection with the server [RFC1350].
- If the EQAM is unable to download the configuration file on the first try successfully, the EQAM MUST retry the TFTP read request as defined below.
- The EQAM MUST use an adaptive timeout based on binary exponential backoff until the EQAM successfully receives the requested file from the server as follows:
 1. Each retry is 2^n second(s) following the previous request, where the EQAM configuration file retry counter, $n = \{0, 1, 2 \dots \text{MaxRetryCounter}-1\}$. The default MaxRetryCounter is 5.
 2. The retry counter $n = 0$ for the first retry, then is incremented by one for each subsequent request until $n = (\text{MaxRetryCounter}-1)$.
- If the EQAM does not successfully acquire the requested configuration file following the attempt with $n = (\text{MaxRetryCounter}-1)$, n is to be reset to 0 and the EQAM moves to next Server IP if present and repeats the above procedure.
- Once the EQAM reaches the end of the DHCPv4 TFTP Servers List, it increments the TFTP retry attempts count by one and repeats the above procedure for each Server IP until TFTP retry attempts count equals MaxRetryAttempt. By default, MaxRetryAttempt must be 3.

If WaitConfigFile value is FALSE (2) after completing the above procedure without successfully downloading a configuration file, the EQAM MUST utilize the locally stored configuration. By default, WaitConfigFile MUST be FALSE(2).

If WaitConfigFile is set to TRUE (1) after completing the above procedure without successfully downloading a configuration file, the EQAM MUST re-start the DHCP process from the beginning.

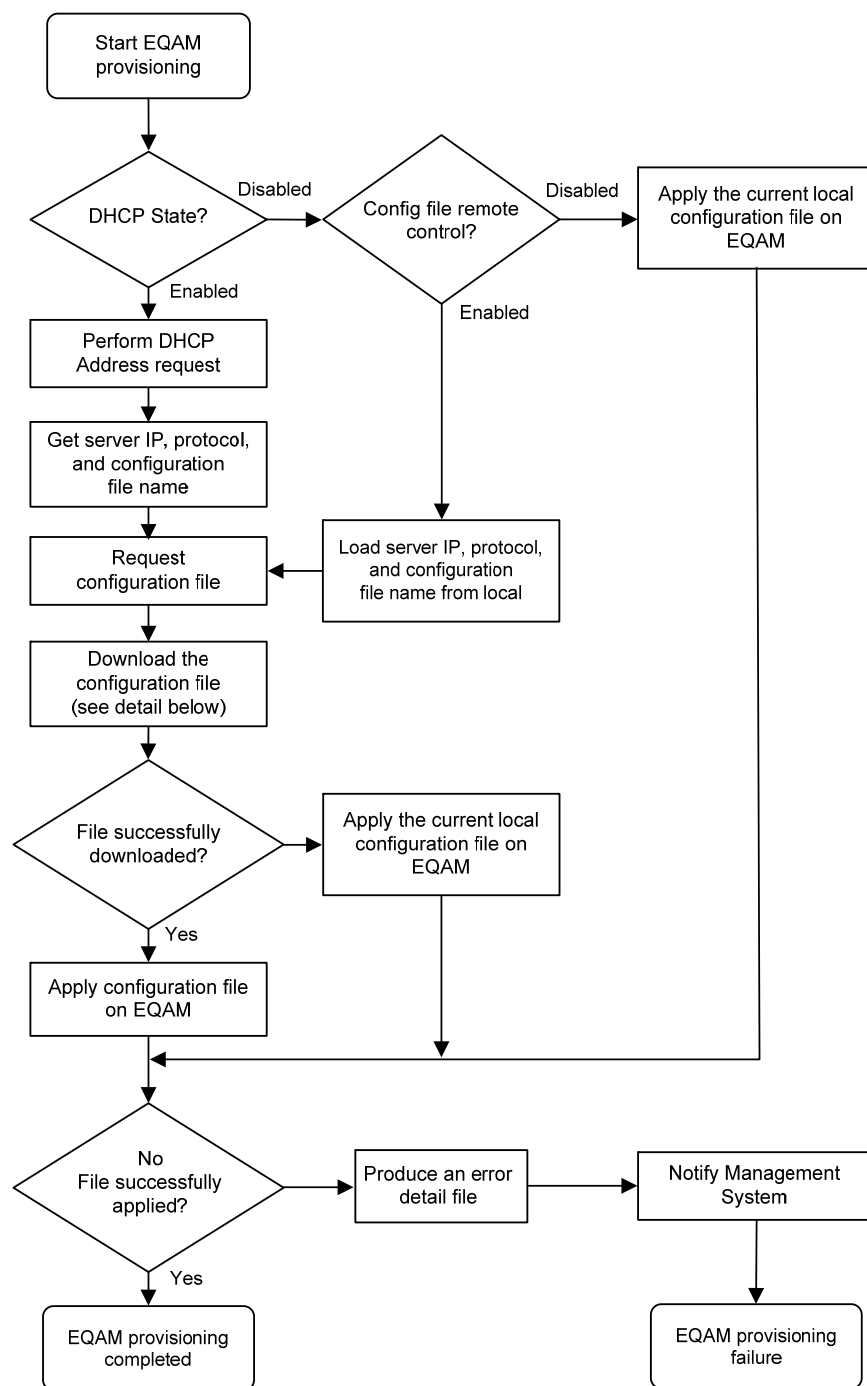


Figure 7-1 - EQAM Configuration Process

7.2 Initial EQAM Configuration

Once the EQAM IP configuration is done and the configuration file remote control is activated, an initial configuration file can be used to set up the EQAM with a known default state.

The initial configuration file contains some basic default configuration values for the individual headend/serving groups (based on the fact that not all headends/serving groups are configured the same) and different types of EQAM equipment (vendor differences, as well as model differences).

7.3 EQAM Configuration with Administrative Interface

Once the EQAM is operational, configuration settings on the EQAM can be modified via an administrative interface. The administrative interface includes a small set of standard SNMP RW objects as described in Annex A, as well as any proprietary interfaces developed by the vendor, e.g., proprietary SNMP MIBs, CLI, WEB interface, etc.

As an example, as part of the staging of a new EQAM within an MSO network, specific information for the EQAM is configured, such as QAM frequencies, TSID values, TSID groups, Serving Group Names, QAM Group Names, DEPI session IDs, etc.

There **MUST** be a configuration option at the EQAM, via an Administrative Interface, to allow the EQAM to store the updated configuration in local non-volatile storage.

There **MUST** be a configuration option at the EQAM, via an Administrative Interface, to allow the EQAM to generate an XML configuration file and upload it via TFTP to a remote configuration file server with a specific file name.

Table 7–1 summarizes the steps involved in modifying the EQAM configuration and uploading it using TFTP.

Table 7–1 - EQAM Configuration with Administrative Interface

	Management System	EQAM	Config Server	Description
1				Administrative interfaces (CLI/SNMP/WEB) used to modify EQAM configuration.
2				EQAM notifies MGT system about reconfiguration.
3				Administrative interface triggers generation and upload of XML file.
4				XML file transfer from EQAM to server to ensure up to date copy.

Given the fact that the EQAM-created XML configuration file contains the most up-to-date configuration information for this particular EQAM, the operator can use this interface to maintain a copy of the configuration details of the EQAM remotely. The same XML file can be used to replace the configuration file pointed to by DHCP (if the EQAM uses DHCP).

7.4 EQAM Configuration with XML File

Often, the vendor may need to make wide scale changes for large numbers of EQAMs in a certain serving group or region. Using the supplied specific interfaces on EQAMs to reconfigure them may prove to be unwieldy in the case of large numbers of EQAMs. Having the ability to modify the specified XML details within the per-EQAM configuration files, and subsequently forcing a re-download/application of the EQAM configuration files to the EQAMs in question, simplifies the configuration change process.

The EQAM MUST support a configuration option via the Administrative Interface in order to trigger the XML configuration file to be downloaded from a remote configuration file server (defined by a specific FILENAME), and subsequently applied to the EQAM configuration. The EQAM may or may not take into account any vendor-specific extensions contained in the configuration file during this update process.

When the downloaded configuration file contains updates to the QAM channel parameter configuration, the EQAM can send an ERMI-1 UPDATE message with a Service Status indicating "maintenance mode" for the particular QAM channel(s) affected. Once there are no active dynamic sessions and no traffic on the static UDP ports for each QAM channel, the channel is taken down, updates made, and then brought up and advertised with a new UPDATE.

Table 7–2 resumes the EQAM configuration step with the XML file.

Table 7-2 - EQAM Configuration With XML File

	Management System	EQAM	Config Server	Description
1				XML configuration file(s) modified by operator on the file server.
2				EQAM administrative interface sets up file transfer detail.
3				EQAM administrative interface triggers download of XML file.
4				XML configuration file is applied on EQAM.
5				EQAM notifies MGT if the configuration file can not be applied correctly.

7.5 Vendor-Specific Extensions

The vendor-specific extensions are a group in the XML file under the "VendorConfig" element. This element MUST include a "vendorId" attribute that uses the value of the private enterprise number (PEN) assigned by IANA. Other specific vendor extensions may be included in the "VendorConfig" element with XML special case "CDATA" construct or with standard XML sub elements. Those extensions are proprietary to the vendor. (The proprietary content is not defined here.)

The vendor configuration is applied first, followed by the standard XML configuration details. For example, if the vendor-specific configuration information contains a frequency of 800 MHz for a particular Downstream QAM channel; the content of the XML configuration would override the vendor-specific configuration, thus ensuring that the standard XML configuration options are always applied. This also applies in the case where an EQAM has a local configuration file, not part of the XML configuration file. The XML configuration file is always applied AFTER the local configuration file is applied.

7.6 XML Configuration File Checksum

The XML configuration file is downloaded and uploaded via TFTP between the EQAM and the file server. There exists a possibility that contents of the XML configuration file may get corrupted or lost during a TFTP transfer.

In order to prevent this from affecting EQAM operation, a simple procedure is defined here that employs the use of a checksum inserted as an XML tag in the XML configuration file.

The EQAM scans the XML configuration file after any TFTP download and if the XML tag for the checksum is present; then the EQAM verifies that the contents of the XML configuration file correspond to the checksum contained within. A [SHA-1] hash-based checksum is specified for use in the XML tag.

If the XML tag containing the checksum is present in the XML configuration file downloaded at the EQAM, the EQAM **MUST** remove the XML checksum tag and validate the contents of the file by re-calculating the [SHA-1] hash-based checksum over the remaining contents of the XML file. If the checksum validation fails, the EQAM **MUST** generate an appropriate event and reject the configuration file that it has downloaded.

The EQAM **MUST** provide a configuration mechanism by which the operator may invoke the EQAM to generate and include the XML checksum tag every time the EQAM generates the XML configuration file. The default value of this configuration is FALSE(2).

The schema for the XML checksum tag is defined in Annex B.2.

7.7 Configuration Error File

The EQAM **SHOULD** validate all the parameters supplied in the configuration file before applying any updates. If error(s) are encountered during configuration, then it **MUST NOT** apply any of the configuration settings from the file. If the configuration file cannot be applied on the EQAM, the EQAM **MUST** continue to operate with the configuration it had in place prior to the download.

When the configuration file cannot be applied on the EQAM, the EQAM **MUST** log an event (EventId 079XXXXX). The error must be in the following comma-separated field format.

Line number, Element/Attribute name, Error description

Example:

123, qamChannelFrequency, wrong value
456, qamId, unknown QAM channel
569, tsOutput, syntax error (missing ">")

The operator will get meaningful debugging information if carriage returns are applied as appropriate in the configuration file.

8 EQAM MANAGEMENT

This section defines the minimum set of managed objects required to be supported by the EQAM.

The requirements described in this specification have priority over other standard organizations' defined MIB modules (e.g., SCTE, IETF). They include MIB objects made mandatory in this specification, whereas the other standards may have defined them as deprecated, obsolete, or as having optional implementation compliances.

Unless otherwise indicated, the other standard organizations' defined 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 EQAM device does not support a deprecated, obsolete, or optional MIB object, the device SNMP Agent **MUST NOT** instantiate the MIB object. If an EQAM device does not support a deprecated, obsolete, or optional MIB object, the device SNMP Agent **MUST** return the corresponding error code on SNMP PDU requests.

8.1 DOCSIS MIB Modules

Table 8–1 - DOCSIS MIB Modules

MIB	OSSI Requirements
DOCSIS M-CMTS Interface MIB: DOCS-IF-M-CMTS-MIB	A compliant EQAM device MUST support the DOCS-IF-M-CMTS-MIB module as described in Annex A.
DOCSIS Time Interface MIB: DTI-MIB	A compliant EQAM device MUST support the DTI-MIB module as described in Annex A.
DOCSIS QAM MIB: DOCS-QAM-MIB	A compliant EQAM device MUST support the DOCS-QAM-MIB module as described in Annex C.
DOCSIS DRF MIB: DOCS-DRF-MIB	A compliant EQAM device MUST support the DOCS-DRF-MIB module as described in Annex A.

8.2 IETF RFC MIB Modules

Table 8–2 - IETF RFC MIB Modules

MIB	OSSI Requirements
SNMPv2 Management Information Base for the Internet Protocol using SMIv2: IP-MIB	A compliant EQAM device MUST support ipNetToMediaTable and ipAddrTable from the ipGroup [RFC2011]. The EQAM-compliant device MAY support other objects of the ipGroup.

MIB	OSSI Requirements
The Interfaces Group MIB using SMIV2: IF-MIB	The Interface MIB [RFC2863] MUST be implemented by compliant M-CMTS Cores, DTI Server, and EQAM devices, as described in Annex A. A compliant EQAM device MUST support the interface Type docsCableMCmtsDownstream for each QAM channel. 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 [RFC2863] of the M-CMTS Downstream interfaces. A compliant EQAM device MUST model the docsCableMCmtsDownstream interfaces at the top of the interface stack with no sub-interfaces.
Layer Two Tunneling Protocol "L2TP" Management Information Base [RFC3371], August 2002.	The DOCS-IF-M-CMTS-MIB provides mechanisms for static configuration of DEPI L2TPv3 tunnels, as well as providing status information on dynamic DEPI L2TPv3 sessions created by other means, such as [ERMI]. The MIB table docsIfMCmtsDepiSessionConfigTable follows a similar structure of Pseudo Wire (PW) MIB [PW-MIB]. Therefore, the current L2TP-MIB [RFC3371] reference to the TUNNEL-MIB [RFC4087] is no longer needed. The current L2TP-MIB is based on L2TP protocol [RFC2661] 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 [RFC3371] is not required for a compliant M-CMTS Core or EQAM.
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	A compliant EQAM device MUST support the SNMP v3 MIBs, as described in Annex A.
Management Information Base (MIB) for the Simple Network Management Protocol (SNMP): SNMPv2-MIB	The EQAM-compliant device MUST support the systemGroup of [RFC3418]. Compliant EQAM and DTI Servers MUST support the MIB object snmpEnableAuthenTraps from the snmpGroup, and the notifications coldStart and authenticationFailure from the snmpBasicNotificationsGroup of [RFC3418].

MIB	OSSI Requirements
Entity MIB: ENTITY-MIB	A Compliant EQAM device MUST support the ENTITY-MIB objects as described in Annex A and [RFC4133]. Compliant QAM and DTI devices are not required to implement Logical Management Entities, as defined in [RFC4133] (e.g., to manage multiple EQAM chassis as logical entities). Therefore, support of MIB objects from entLogical2Group is not required. A Compliant EQAM device MAY implement Logical Management Entities, in which case the entLogical2Group MUST be supported. 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 [RFC4133] 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.
DOCSIS RFI MIB: DOCS-IF-MIB	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.
DOCSIS Cable Device MIB: DOCS-CABLE-DEVICE-MIB	The EQAM device MUST implement the docsDevEventGroup from [RFC4639] as indicated in Annex A.
IP-MIB	The EQAM device MUST implement the IP-MIB [RFC4293] as indicated in Annex A. The EQAM device MUST instantiate a row in the ipIfStatsTable for each Management interface. The EQAM device MAY instantiate a row in the ipIfStatsTable for each Data interface. The EQAM device MUST implement the counters in the IpGroup to reflect Management interface statistics. The EQAM device MAY include the Data interface statistics in the IpGroup counters.

8.3 SCTE MIB Modules

Table 8–3 - SCTE MIB Modules

MIB	OSSI Requirements
Appendix I of SCTE-HMS-QAM-MIB	The EQAM device MUST implement the SCTE-HMS-QAM-MIB from [SCTE-154-2] as defined in Annex A.
Appendix III of SCTE-HMS-MPEG-MIB	The EQAM device MUST implement the SCTE-HMS-MPEG-MIB from [SCTE-154-4] as defined in Annex A.

MIB	OSSI Requirements
A draft extension to the SCTE-HMS-MPEG-MIB [SCTE-154-4]]	Input TS data rate would be added as an extension table. inputTSStatsExtTable Data rate: data rate for the entire input transport stream. Bits per second. Input program stats table Data rate: data rate associated with each individual program. Bits per second. Output program stats table Data rate: data rate associated with each individual program. Bits per second. Dropped packets: Count for dropped packets for each individual program. (Note: Should be same syntax as OutputStatsDroppedPackets, count 32, need to verify). Re-introduce the Video Session Log table. This is optional as per the earlier FT discussions.

9 EQAM FAULT REPORTING

This section defines requirements for remote monitoring/detection, diagnosis, reporting, and correction of problems.

9.1 SNMP Usage

SNMP is used to achieve the goals of fault management: remote detection, diagnosis, reporting, and correction of EQAM faults. The EQAM **MUST** support SNMP management traffic across the Management interface.

The EQAM SNMP access might be restricted by configuration parameters to support the operator's policy goals. Cable operators can use SNMP queries to perform diagnostics and fault classification.

The EQAM sends SNMP notifications to one or more NMSs (subject to operator-imposed policy). The EQAM sends events to a syslog server.

9.2 Event Notification

The EQAM is required to generate asynchronous events that indicate malfunction situations and notify about important events. The methods for reporting events are defined below:

1. Stored in Local Log (docsDevEventTable [RFC4639]).
2. Reported to SNMP entities as an SNMP notification.
3. Sent as a message to a syslog server.

Event Notifications are enabled and disabled by configuration. IETF SNMP notifications normally define specific controls to enable and disable notifications. Events can be reported to local log as a syslog message and/or SNMP notification as defined in docsDevEvControlTable [RFC4639] and Annex A. An EQAM supports event notification functions, including local event logging, syslog (limiting/throttling), and SNMP notification (limiting/throttling), as specified in [RFC4639] and this specification. An EQAM is required to support SNMP trap control, as specified in [RFC4639] and this specification.

9.2.1 Format of Events

The following sections explain in detail how to report these events by any of the three mechanisms (local event logging, SNMP notification, and syslog).

9.2.1.1 Local Event Logging

An EQAM **MUST** maintain Local Log events, defined in Annex A, in both local-volatile storage and local non-volatile storage. An EQAM **MAY** retain them in local non-volatile storage events designated for local volatile storage.

The EQAM **MUST** implement its Local Log as a cyclic buffer with a minimum of 300 entries. The EQAM Local Log non-volatile storage events **MUST** persist across reboots. The EQAM **MUST** provide access to the Local Log events through the docsDevEventTable [RFC4639].

Aside from the procedures defined in this document, event recording conforms to the requirements of [RFC4639]. Event descriptions are defined in English. An EQAM **MUST** implement event descriptors such that no event descriptor is longer than 255 characters, which is the maximum defined for SnmpAdminString [RFC3411].

Events are identical if their EventIds are identical. For identical events occurring consecutively, the EQAM MAY choose to store only a single event. If an EQAM stores as a single event multiple identical events that occur consecutively, the EQAM MUST reflect the most recent event in the event description.

The EventId digit is a 32-bit unsigned integer. EventIds ranging [RFC4639] from 0 to (231 - 1) are reserved by DOCSIS. The EQAM MUST report in the docsDevEvTable [RFC4639] the EventId as a 32-bit unsigned integer, and convert the EventId from the error codes defined in Annex A to be consistent with this number format.

9.2.1.2 SNMP Notifications

An EQAM MUST implement the generic SNMP notifications according to Annex A.

When any event causes a generic SNMP notification occurrence in the EQAM, the EQAM MUST send notifications if throttling/limiting mechanisms defined in [RFC4639] and other limitations [RFC3413] do not restrict notification sending.

An EQAM MUST implement SNMP notifications defined in DOCS-IF3-MIB from Annex A.

The EQAM MUST send notifications for any event if docsDevEvControl object [RFC4639], throttling/limiting mechanism [RFC4639], and [RFC3413] limitations applied later do not restrict notification sending.

9.2.1.3 Syslog message format

When the EQAM sends a syslog message for a defined event, the EQAM MUST send it in the following format:

<level>TIMESTAMP HOSTNAME EQAM[vendor]: <eventId> text vendor-specific-text

In which:

- level is an ASCII representation of the event priority, enclosed in angle brackets, which is constructed as an OR of the default Facility (128) and event priority (0-7). The resulting level ranges between 128 and 135.
- TIMESTAMP and HOSTNAME follow the format of [RFC3164]. The single space after TIMESTAMP is part of the TIMESTAMP field. The single space after HOSTNAME is part of the HOSTNAME field.
- vendor is the vendor name for the vendor-specific syslog messages or DOCSIS for the standard DOCSIS messages.
- eventId is an ASCII representation of the INTEGER number in decimal format, enclosed in angle brackets, which uniquely identifies the type of event. The EQAM MUST equate the eventId with the value stored in the docsDevEvId object in docsDevEventTable. For the standard DOCSIS events this number is converted from the error code using the following rules:
 - The number is an eight-digit decimal number.
 - The first two digits (left-most) are the ASCII code for the letter in the Error code.
 - The next four digits are filled by two or three digits between the letter and the dot in the Error code with zero filling in the gap in the left side.
 - The last two digits are filled by the number after the dot in the Error code with zero filling in the gap in the left side.
- Text contains the textual description for the standard DOCSIS event message, as defined in Annex A.
- Vendor-specific-text contains vendor-specific information. This field is optional.

The EQAM MAY report non-DOCSIS events in the standard syslog message format [RFC3164] rather than the DOCSIS syslog message format defined above.

When the EQAM sends a syslog message for an event not defined in this specification, the EQAM MAY send it according to the format and semantics of the elements defined above.

9.2.2 BIT Values for docsDevEvReporting [RFC4639]

Permissible BIT values for [RFC4639] docsDevEvReporting objects include:

- 1: local(0)
- 2: traps(1)
- 3: syslog(2)
- 4: localVolatile(8)
- 5: stdInterface(9)

Bit-0 means non-volatile Local Log storage and bit-8 are used for volatile Local Log storage (see Section 9.2.1). Bit-1 means SNMP Notifications correspond to both SNMP Trap and SNMP Inform.

The EQAM MUST use the bit-3 value to set both bit-3 and bit-8 for SNMP SET operations on docsDevEvReporting using a one-byte BITS encoded value; therefore, the EQAM reports bit-3 and bit-8 with identical values for SNMP GET operations.

The EQAM MUST use the bit-8 value to set bit-3 and bit-8 for SNMP SET operations, irrespective of the bit-3 value, on docsDevEvReporting using a two or more byte BITS encoded value.

The EQAM MAY support bit-9 in docsDevEvReporting BITS encoding in accordance with [RFC4639] definition.

An EQAM that reports an event by SNMP Notification or syslog MUST also report the event by a Local Log (volatile or non-volatile).

Combinations of docsDevEvReporting with traps(1) and/or syslog(2) bits with no Local Log bits (bit-0, bit-3, or bit-8) set are known as unacceptable combinations.

The EQAM MUST accept any SNMP SET operation to docsDevEvReporting different than the unacceptable combinations.

The EQAM MUST ignore any undefined bits in docsDevEvReporting on SNMP SET operations and report a zero value for those bits.

9.2.3 Standard events for EQAM

The EQAM MUST support either volatile local log, non-volatile local log, or both.

If the EQAM supports both volatile and non-volatile storage, the EQAM MUST maintain the non-volatile storage when both non-volatile Local Log and volatile Local Log bits are set for a specific docsDevEvReporting event priority. If the EQAM supports both volatile and non-volatile storage, the EQAM MAY maintain the volatile storage when both non-volatile Local Log and volatile Local Log bits are set for a specific docsDevEvReporting event priority. When both non-volatile Local Log and volatile Local Log bits are set for a specific docsDevEvReporting event priority, the EQAM MUST NOT report duplicate events in the docsDevEventTable.

Emergency(1) events indicate fatal hardware or software failure that prevent normal system operation (all service are affected).

Alert(2) events indicate a major hardware or software failure that causes some service interruption (no redundancy available).

Critical(3) events indicate a major hardware or software failure that does not cause an interrupt of the normal data flow. This level of event may be also used when some redundant device was automatically activated to replace the defective device.

Error(4) events indicate that an incorrect input signal (external system error) is causing temporary or permanent interruption of the normal data flow.

Warning(5) events indicate a minor failure that does not cause any interrupt of the data flow.

Notice(6) events indicate that a specified alarm condition has been removed.

Information(7) events indicate a milestone or checkpoint in normal operation that could be of particular importance for troubleshooting.

Debug(8) events are reserved for vendor-specific events.

The reporting mechanism for each priority could be changed from the default reporting mechanism by using docsDevEvReporting object of DOCS-CABLE-DEVICE-MIB [RFC4639].

Table 9–1 - Default event reporting mechanism versus priority (non-volatile Local Log support only)

Event Priority	Local Log Non-volatile	SNMP Notification	Syslog	Local Log Volatile
Emergency	Yes	No	No	Not Used
Alert	Yes	No	No	Not Used
Critical	Yes	Yes	Yes	Not Used
Error	Yes	Yes	Yes	Not Used
Warning	Yes	Yes	Yes	Not Used
Notice	Yes	Yes	Yes	Not Used
Informational	No	No	No	Not Used
Debug	No	No	No	Not Used

Table 9–2 - Default event reporting mechanism versus priority (volatile Local Log support only)

Event Priority	Local Log Non-volatile	SNMP Notification	Syslog	Local Log Volatile
Emergency	Not Used	No	No	Yes
Alert	Not Used	No	No	Yes
Critical	Not Used	Yes	Yes	Yes
Error	Not Used	Yes	Yes	Yes
Warning	Not Used	Yes	Yes	Yes
Notice	Not Used	Yes	Yes	Yes
Information	Not Used	No	No	No
Debug	Not Used	No	No	No

Table 9–3 - Default event reporting mechanism versus priority

Event Priority	Local Log Non-volatile	SNMP Notification	Syslog	Local Log Volatile
Emergency	Yes	No	No	No
Alert	Yes	No	No	No
Critical	Yes	Yes	Yes	No
Error	No	Yes	Yes	Yes
Warning	No	Yes	Yes	Yes
Notice	No	Yes	Yes	Yes
Information	No	No	No	No
Debug	No	No	No	No

9.2.4 Event Priorities and Vendor-Specific Events

This specification defines events to most of the Event priority Levels defined by this specification. Vendor-specific events can be defined for any Event Priority Level. Table 9–4 summarizes those considerations.

Table 9–4 - Event Priorities Assignment

Event Priority	EQAM Event Assignment
Emergency	Vendor Specific
Alert	PMI and Vendor Specific (optional*)
Critical	PMI and Vendor Specific (optional*)
Error	PMI and Vendor Specific (optional*)
Warning	PMI and Vendor Specific (optional*)
Notice	PMI and Vendor Specific (optional*)
Information	PMI and Vendor Specific (optional*)
Debug	Vendor Specific
*Note: Vendor-specific optional event definitions are recommended only where the CM/CMTS allows for sufficient storage of such events.	

9.3 List of events

The following list of Events are indications of error conditions at the EQAM.

Process	Sub-Process	CMTS & EQAM Priority	Event Message	Message Notes and Details	Error Code Set	Event ID	Trap Name
EQAM DHCP Provisioning							
Eqam	EQAM-PMI	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>"	Q01.1	81000101	
Eqam	EQAM-PMI	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>"	Q01.2	81000102	
EQAM Configuration File Download							
Eqam	EQAM-PMI	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>"	Q02.1	81000201	
Eqam	EQAM-PMI	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>"	Q02.2	81000202	

Process	Sub-Process	CMTS & EQAM Priority	Event Message	Message Notes and Details	Error Code Set	Event ID	Trap Name
EQAM Configuration File Processing							
Eqam	EQAM-PMI	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>"	E03.1	81000301	
Eqam	EQAM-PMI	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>"	Q03.2	81000302	
EQAM ERMI							
Eqam	EQAM-PMI	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>"	Q04.1	81000401	Session Loss (Unicast or Multicast)
Eqam	EQAM-PMI	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>"	Q03.2	81000302	Link Down Loss of Service
Eqam	EQAM-PMI	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>"	Q03.3	81000303	# of Sessions Lost & # of Sessions fail-over

Process	Sub-Process	CMTS & EQAM Priority	Event Message	Message Notes and Details	Error Code Set	Event ID	Trap Name
Eqam	EQAM-PMI	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>"	Q03.4	81000304	Excessive network jitter in session, jitter buffer overflow

Annex A Detailed MIB Requirements (normative)

The abbreviations and rules in Table A–1 apply in this Annex.

Table A–1 - MIB Implementation Support

Requirement Type	Table Notation	Description
Deprecated	D	Deprecated objects are optional. 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., 'noSuchObject' for SNMPv2c).
Mandatory	M	The object must be implemented correctly according to the MIB definition.
Not Applicable	NA	Not applicable to the device.
Not Supported	N-Sup	An agent must instantiate such object and must respond with the appropriate error/exception condition (e.g., 'noSuchObject' for SNMPv2c).
Optional	O	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., 'noSuchObject' for SNMPv2c).
Obsolete	Ob	In SNMP convention, obsolete objects should not be implemented. This specification allows vendors to implement or not implement obsolete objects. If a vendor chooses to implement an obsoleted object, the object must be implemented correctly according to the MIB definition. If a vendor chooses not to implement the obsoleted object, the SNMP agent must not instantiate such object and must respond with the appropriate error/exception condition (e.g., 'noSuchObject' for SNMPv2c).
Should	S	Should. A vendor SHOULD implement the object. If a vendor implements the object, the object MUST be implemented correctly according to the MIB definition. If a vendor does not 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).

Table A–2 - SNMP Access Requirements

SNMP Access Type	Table Notation	Description
N-Acc	Not Accessible	The object is not accessible and is usually an index in a table
Read Create	RC	The access of the object MUST be implemented as Read-Create
Read Write	RW	The access of the object MUST be implemented as Read-Only
Read Only	RO	The access of the object MUST be implemented as Read-Write
Read Create or Read Only	RC/RO	The access of the object MUST be implemented as either Read-Create or Read-Only as described in the MIB definition

SNMP Access Type	Table Notation	Description
Read Write / Read Only	RW/RO	The access of the object MUST be implemented as either Read-Write or Read-Only as described in the MIB definition
Accessible for SNMP Notifications	Acc-FN	These objects are used for SNMP Notifications by the CMTS and CM SNMP Agents
Accessible through SNMP Trap	ATRAP	These objects are accessible through SNMP traps.

A.1 Object Model schema Definition

The table below lists the EQAM device compliance requirements summary.

Table A-3 - Requirements

DOCS-IF-MIB [RFC4546]				
docsIfDownstreamChannelTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsIfDownChannelId	NA		NA	
docsIfDownChannelFrequency	M	RO	M	RO
docsIfDownChannelWidth	M	RO	M	RO
docsIfDownChannelModulation	M	RO	M	RO
docsIfDownChannelInterleave	M	RO	M	RO
docsIfDownChannelPower	M	RO	M	RO
docsIfDownChannelAnnex	O	RO	O	RO
SCTE-HMS-QAM-MIB [SCTE-154-2]				
qamChannelTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
qamChannelModulationFormat	O	RO	M	RO
qamChannelInterleaverLevel	O	RO	M	RO
qamChannelInterleaverMode	O	RO	M	RO
qamChannelPower	O	RO	M	RO
qamChannelSquelch	O	RO	M	RO
qamChannelContWaveMode	O	RO	M	RO
qamChannelAnnexMode	O	RO	M	RO

qamChannelCommonTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
qamChannelCommonOutputBw	O	RO	M	RO
qamChannelCommonUtilization	O	RO	M	RO
qamConfigTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
qamConfigIndex	O	N-Acc	M	N-Acc
qamConfigQamChannelIdMin	O	RO	M	RO
qamConfigQamChannelIdMax	O	RO	M	RO
qamConfigIPAddrType	O	RO	M	RO
qamConfigIPAddr	O	RO	M	RO
qamConfigUdpPortRangeMin	O	RO	M	RO
qamConfigUdpPortRangeMax	O	RO	M	RO
qamConfigOutputProgNoMin	O	RO	M	RO
qamConfigOutputProgNoMax	O	RO	M	RO
SCTE-HMS-MPEG-MIB [SCTE-154-4]				
mpegDigitalInputs				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegLossOfSignalTimeout	O	RO	M	RO
mpegInputTSTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegInputTSIndex	O	N-Acc	M	N-Acc
mpegInputTSType	O	RO	M	RO
mpegInputTSConnectionType	O	RO	M	RO
mpegInputTSConnection	O	RO	M	RO
mpegInputTSPsiDetected	O	RO	M	RO
mpegInputTSStartTime	O	RO	M	RO
mpegInputTSResourceAllocated	O	RO	M	RO
mpegInputTSNumPrograms	O	RO	M	RO
mpegInputTSRate	O	RO	M	RO
mpegInputTSMaxRate	O	RO	M	RO
mpegInputTSPatVersion	O	RO	M	RO
mpegInputTSCatVersion	O	RO	M	RO
mpegInputTSNitPid	O	RO	M	RO
mpegInputTSNumEmms	O	RO	M	RO

mpegInputTSTSID	O	RO	M	RO
mpegInputTSLock	O	RO	O	RO
mpegInputProgTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegInputProgIndex	O	N-Acc	M	N-Acc
mpegInputProgNo	O	RO	M	RO
mpegInputProgPmtVersion	O	RO	M	RO
mpegInputProgPmtPid	O	RO	M	RO
mpegInputProgPcrPid	O	RO	M	RO
mpegInputProgEcmPid	O	RO	M	RO
mpegInputProgNumElems	O	RO	M	RO
mpegInputProgNumEcms	O	RO	M	RO
mpegInputProgCaDescr	O	RO	M	RO
mpegInputProgScte35Descr	O	RO	O	RO
mpegInputProgScte18Descr	O	RO	O	RO
mpegProgESTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegProgESIndex	O	N-Acc	M	N-Acc
mpegProgESPID	O	RO	M	RO
mpegProgESType	O	RO	M	RO
mpegProgESCaDescr	O	RO	M	RO
mpegProgESScte35Descr	O	RO	O	RO
mpegProgESScte18Descr	O	RO	O	RO
mpegInputStatsTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegInputStatsPcrJitter	O	RO	M	RO
mpegInputStatsMaxPacketJitter	O	RO	M	RO
mpegInputStatsPcrPackets	O	RO	M	RO
mpegInputStatsNonPcrPackets	O	RO	M	RO
mpegInputStatsUnexpectedPackets	O	RO	M	RO
mpegInputStatsContinuityErrors	O	RO	M	RO
mpegInputStatsSyncLossPackets	O	RO	M	RO

mpegInputUdpOriginationTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegInputUdpOriginationIndex	O	N-Acc	M	N-Acc
mpegInputUdpOriginationId	O	N-Acc	M	N-Acc
mpegInputUdpOriginationInetAddrType	O	RO	M	RO
mpegInputUdpOriginationSrcInetAddr	O	RO	M	RO
mpegInputUdpOriginationDestInetAddr	O	RO	M	RO
mpegInputUdpOriginationDestPort	O	RO	M	RO
mpegInputUdpOriginationActive	O	RO	M	RO
mpegInputUdpOriginationIfIndex	O	RO	M	RO
mpegInputUdpOriginationPacketsDetected	O	RO	M	RO
mpegInputUdpOriginationRank	O	RO	M	RO
mpegOutputs	O	RO	M	RO
mpegInsertPacketTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegInsertPacketIndex	O	N-Acc	M	N-Acc
mpegInsertPacketListId	O	RO	M	RO
mpegInsertPacketImmediateExecution	O	RO	M	RO
mpegInsertPacketStartTime	O	RO	M	RO
mpegInsertPacketRepeat	O	RO	M	RO
mpegInsertPacketContinuousFlag	O	RO	M	RO
mpegInsertPacketRate	O	RO	M	RO
mpegInsertPacketDeviceIndex	O	RO	M	RO
mpegOutputStatsTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegOutputStatsDroppedPackets	O	RO	M	RO
mpegOutputStatsFifoOverflow	O	RO	M	RO
mpegOutputStatsFifoUnderflow	O	RO	M	RO
mpegOutputStatsDataRate	O	RO	M	RO
mpegOutputStatsAvailableBandwidth	O	RO	M	RO
mpegOutputStatsChannelUtilization	O	RO	M	RO
mpegOutputStatsTotalPackets	O	RO	M	RO

mpegOutputTSTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegOutputTSIndex	O	N-Acc	M	N-Acc
mpegOutputTSType	O	RO	M	RO
mpegOutputTSConnectionType	O	RO	M	RO
mpegOutputTSConnection	O	RO	M	RO
mpegOutputTSNumPrograms	O	RO	M	RO
mpegOutputTSTSID	O	RO	M	RO
mpegOutputTSNitPid	O	RO	M	RO
mpegOutputTSCaPid	O	RO	M	RO
mpegOutputTSCatInsertRate	O	RO	M	RO
mpegOutputTSPatInsertRate	O	RO	M	RO
mpegOutputTSPmtInsertRate	O	RO	M	RO
mpegOutputTSStartTime	O	RO	M	RO
mpegOutputProgTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegOutputProgIndex	O	N-Acc	M	N-Acc
mpegOutputProgNo	O	RO	M	RO
mpegOutputProgPmtVersion	O	RO	M	RO
mpegOutputProgPmtPid	O	RO	M	RO
mpegOutputProgPcrPid	O	RO	M	RO
mpegOutputProgEcmPid	O	RO	M	RO
mpegOutputProgNumElems	O	RO	M	RO
mpegOutputProgNumEcms	O	RO	M	RO
mpegOutputProgCaDescr	O	RO	M	RO
mpegOutputProgScte35Descr	O	RO	O	RO
mpegOutputProgScte18Descr	O	RO	O	RO
mpegOutputProgElemStatsTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegOutputProgElemStatsIndex	O	N-Acc	M	N-Acc
mpegOutputProgElemStatsPid	O	RO	M	RO
mpegOutputProgElemStatsElemType	O	RO	M	RO
mpegOutputProgElemStatsDataRate	O	RO	O	RO

mpegOutputUdpDestinationTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegOutputUdpDestinationIndex	NA		NA	
mpegOutputUdpDestinationId	NA		NA	
mpegOutputUdpDestinationInetAddrType	NA		NA	
mpegOutputUdpDestinationSrcInetAddr	NA		NA	
mpegOutputUdpDestinationDestInetAddr	NA		NA	
mpegOutputUdpDestinationDestPort	NA		NA	
mpegOutputUdpDestinationIfIndex	NA		NA	
mpegProgramMappingTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegProgramMappingIndex	O	N-Acc	M	N-Acc
mpegProgramMappingOutputProgIndex	O	RO	M	RO
mpegProgramMappingOutputTSIndex	O	RO	M	RO
mpegProgramMappingInputProgIndex	O	RO	M	RO
mpegProgramMappingInputTSIndex	O	RO	M	RO
mpegVideoSessionTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegVideoSessionIndex	O	N-Acc	M	N-Acc
mpegVideoSessionPhyMappingIndex	O	RO	M	RO
mpegVideoSessionPIDRemap	O	RO	M	RO
mpegVideoSessionMode	O	RO	M	RO
mpegVideoSessionState	O	RO	M	RO
mpegVideoSessionProvMethod	O	RO	M	RO
mpegVideoSessionEncryptionType	O	RO	M	RO
mpegVideoSessionEncryptionInfo	O	RO	M	RO
mpegVideoSessionBitRate	O	RO	M	RO
mpegVideoSessionID	O	RO	M	RO
mpegVideoSessionSelectedInput	O	RO	M	RO
mpegVideoSessionSelectedOutput	O	RO	M	RO

mpegVideoSessionPtrTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
mpegVideoSessionPtrInputProgIndex	O	N-Acc	M	N-Acc
mpegVideoSessionPtrInputTSIndex	O	RO	M	RO
mpegVideoSessionPtrInputTSConnType	O	RO	M	RO
mpegVideoSessionPtrInputTSConnection	O	RO	M	RO
mpegVideoSessionPtrOutputProgIndex	O	RO	M	RO
mpegVideoSessionPtrOutputTSIndex	O	RO	M	RO
mpegVideoSessionPtrOutputTSConnType	O	RO	M	RO
mpegVideoSessionPtrOutputTSConnection	O	RO	M	RO
mpegVideoSessionPtrStatus	O	RO	M	RO
DOCS-DRF-MIB [M-OSSI]				
docsDrfDownstreamTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsDrfDownstreamPhyDependencies	NA		NA	
docsDrfDownstreamCapabTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsIfMCmtsEqamDownstreamCapabFrequency	M	RO	O	RO
docsIfMCmtsEqamDownstreamCapabBandwidth	M	RO	O	RO
docsIfMCmtsEqamDownstreamCapabPower	M	RO	O	RO
docsIfMCmtsEqamDownstreamCapabModulation	M	RO	O	RO
docsIfMCmtsEqamDownstreamCapabInterleaver	M	RO	O	RO
docsIfMCmtsEqamDownstreamCapabJ83Annex	M	RO	O	RO
docsIfMCmtsEqamDownstreamCapabConcurrentServices	M	RO	O	RO
docsIfMCmtsEqamDownstreamCapabServicesTransport	M	RO	O	RO
docsIfMCmtsEqamDownstreamCapabMuting	M	RO	O	RO
docsDrfGroupDependencyTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsDrfGroupDependencyPhyParam	M	N-Acc	O	N-Acc
docsDrfGroupDependencyPhysicalIndex	M	N-Acc	O	N-Acc
docsDrfGroupDependencyGroupID	M	RO	O	RO
docsDrfGroupDependencyType	M	RO	O	RO

docsDrfChannelBlockTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsDrfChannelBlockPhysicalIndex	M	N-Acc	M	N-Acc
docsDrfChannelBlockNumberChannels	M	RO	M	RO
docsDrfChannelBlockCfgNumberChannels	M	RO	M	RO
docsDrfChannelBlockMute	M	RO	M	RO
docsDrfChannelBlockTestType	M	RO	M	RO
docsDrfChannelBlockTestIfIndex	M	RO	M	RO
DOCS-IF-M-CMTS-MIB [M-OSSI]				
docsIfMCmtsEqamDownstreamTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsIfMCmtsEqamDownstreamTSID	M	RO	M	RO
docsIfMCmtsEqamDownstreamPhyDependencies	M	RO	M	RO
docsIfMCmtsEqamDownstreamDevicePhyParamLock	M	RO	M	RO
docsIfMCmtsEqamDownstreamDeviceConfigPhyParamLock	M	RO	M	RO
docsIfMCmtsEqamDownstreamAllocationType	M	RO	M	RO
docsIfMCmtsEqamDownstreamAllocationStatus	M	RO	M	RO
docsIfMCmtsEqamDownstreamAllocationTimeout	M	RO	M	RO
docsIfMCmtsEqamDownstreamDRRPAdvertizing	M	RO	M	RO
docsIfMCmtsEqamDownstreamUdpPortMapping	M	RO	M	RO
docsIfMCmtsEqamGlobCfgDownTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsIfMCmtsEqamGlobCfgDownIndex	M	N-Acc	O	N-Acc
docsIfMCmtsEqamGlobCfgDownPhysicalIndex	M	RC	O	RC
docsIfMCmtsEqamGlobCfgDownBandwidth	M	RC	O	RC
docsIfMCmtsEqamGlobCfgDownPower	M	RC	O	RC
docsIfMCmtsEqamGlobCfgDownModulation	M	RC	O	RC
docsIfMCmtsEqamGlobCfgDownInterleave	M	RC	O	RC
docsIfMCmtsEqamGlogCfgDownAnnex	M	RC	O	RC
docsIfMCmtsEqamGlobCfgDownSymbolRateM	M	RC	O	RC
docsIfMCmtsEqamGlobCfgDownSymbolRateN	M	RC	O	RC
docsIfMCmtsEqamGlobCfgDownLockParams	M	RC	O	RC
docsIfMCmtsEqamGlobCfgDownExecutionCode	M	RO	O	RO
docsIfMCmtsEqamGlobCfgDownErrorsCount	M	RO	O	RO
docsIfMCmtsEqamGlobCfgDownRowStatus	M	RC	O	RC

docsIfMCmtsDepsessionConfigTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsIfMCmtsDepsessionConfigIndex	M	N-Acc	NA	
docsIfMCmtsDepsessionConfigCableMacIfIndex	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigCableDownIfIndex	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigAddrType	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigLocalAddr	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigRemoteAddr	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigL2TPv3HeaderType	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigMethod	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigTSID	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigDEPIMode	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigRsrcAllocReq	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigCinPhbldPolicy	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigSyncEnabled	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigSyncInterval	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigPhyParamsFlag	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigChannelFrequency	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigChannelModulation	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigChannelInterleave	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigChannelPower	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigChannelAnnex	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigChannelSymbolRateM	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigChannelSymbolRateN	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigChannelOutputRate	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigChannelBurstSize	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigStorage	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigRowStatus	M	RC/RO	NA	
docsIfMCmtsDepsessionConfigChannelId	N-Sup		NA	
docsIfMCmtsDepsessionInfoTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsIfMCmtsDepsessionInfoCfgIndex	M	RO	NA	
docsIfMCmtsDepsessionInfoUdpPort	M	RO	NA	
docsIfMCmtsDepsessionInfoMaxPayload	M	RO	NA	
docsIfMCmtsDepsessionInfoPathPayload	M	RO	NA	
docsIfMCmtsDepsessionInfoIncludeDOCSISMsgs	M	RO	NA	

docsIfMCmtsDepsSessionInfoRsrcAllocResp	M	RO	NA	
docsIfMCmtsDepsSessionInfoConnCtrlID	M	RO	NA	
docsIfMCmtsDepsSessionInfoEQAMSessionID	M	RO	NA	
docsIfMCmtsDepsSessionInfoOwner	M	RO	NA	
docsIfMCmtsDepsSessionInfoState	M	RO	NA	
docsIfMCmtsDepsSessionInfoErrorCode	M	RO	NA	
docsIfMCmtsDepsSessionInfoCreationTime	M	RO	NA	
docsIfMCmtsDepsSessionInfoStorage	M	RO	NA	
docsIfMCmtsDepsRsrcAllocTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsIfMCmtsDepsRsrcAllocIndex	O	RC/RO	NA	
docsIfMCmtsDepsRsrcAllocSeq	O	RC/RO	NA	
docsIfMCmtsDepsRsrcAllocPhbId	O	RC/RO	NA	
docsIfMCmtsDepsRsrcAllocFlowId	O	RC/RO	NA	
docsIfMCmtsDepsRsrcAllocUdpPort	O	RC/RO	NA	
docsIfMCmtsDepsRsrcAllocPolicyScnTags	O	RC/RO	NA	
docsIfMCmtsDepsRsrcAllocStorage	O	RC/RO	NA	
docsIfMCmtsDepsRsrcAllocRowStatus	O	RC/RO	NA	
docsIfMCmtsDepsSessionStatsTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsIfMCmtsDepsSessionInfoOutOfSequencePkts	M	RO	NA	
docsIfMCmtsDepsSessionCinLatency				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsIfMCmtsDepsSessionCinLatencyInterval	M	RO	NA	
docsIfMCmtsDepsSessionCinLatencyThrshld	M	RO	NA	
docsIfMCmtsDepsSessionCinEventLevel	M	RO	NA	
docsIfMCmtsDepsSessionCinLastValue	M	RO	NA	
docsIfMCmtsDepsSessionCinLastValueIfIndex	M	RO	NA	
docsIfMCmtsDepsSessionCinLatencyValueLastTime	M	RO	NA	
docsIfMCmtsDepsSessionCinLatency				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsIfMCmtsDepsSessionCinLatencyPerfIntervalSeq	O	RO	O	RO
docsIfMCmtsDepsSessionCinLatencyPerfValue	O	RO	O	RO
docsIfMCmtsDepsSessionCinLatencyTime	O	RO	O	RO

docsIfMCmtsDepsPhbPolicyTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsIfMCmtsDepsPhbPolicyTag	NA		NA	
docsIfMCmtsDepsPhbPolicySCN	NA		NA	
docsIfMCmtsDepsPhbPolicyCinPhbld	NA		NA	
docsIfMCmtsDepsPhbPolicyStorage	NA		NA	
docsIfMCmtsDepsPhbPolicyRowStatus	NA		NA	
docsIfMCmtsQosServiceFlowExtTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsIfMCmtsQosServiceFlowExtDepsFlowId	NA		NA	
docsIfMCmtsQosServiceFlowExtCinPhbld	NA		NA	
docsIfMCmtsQosServiceFlowExtDepsIfIndex	NA		NA	
DTI-MIB [M-OSSI]				
dtiProtocolTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
dtiProtocolEntityType	M	RO	O	RO
dtiProtocolClientClockType	M	RO	O	RO
dtiProtocolServerStatusFlag	M	RO	O	RO
dtiProtocolClientStatusFlag	M	RO	O	RO
dtiProtocolServerToDState	M	RO	O	RO
dtiProtocolServerToDType	M	RO	O	RO
dtiProtocolServerToDValue	M	RO	O	RO
dtiProtocolServerCableAdvanceFlag	M	RO	O	RO
dtiProtocolServerCableAdvanceValue	M	RO	O	RO
dtiProtocolClientPhaseError	M	RO	O	RO
dtiProtocolClientVersion	M	RO	O	RO
dtiProtocolClientPathTraceability	M	RO	O	RO
dtiProtocolControlTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
dtiProtocolControlTimeInterval	NA		NA	
dtiProtocolControlErrorRateInterval	M	RO	O	RO
dtiProtocolControlJitterTimeInterval	NA		NA	
dtiProtocolControlTestMode	NA		NA	
dtiProtocolControlToDValue	NA		NA	

dtiProtocolPerformanceTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
dtiProtocolPerformanceDelay	NA		NA	
dtiProtocolPerformanceFrameErrorRate	M	RO	O	RO
dtiProtocolPerformancePeakToPeakJitter	NA		NA	
dtiProtocolPerformanceWander35Second	NA		NA	
dtiProtocolPerformanceWanderTSeconds	NA		NA	
dtiProtocolPerformanceFrameErrorRateScale	M	RO	O	RO
dtiPathTraceabilityTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
dtiPathTraceabilityIndex	M	RO	O	RO
dtiPathTraceabilityRootServerInetAddrType	M	RO	O	RO
dtiPathTraceabilityRootServerInetAddr	M	RO	O	RO
dtiPathTraceabilityRootServerOutPhyIdx	M	RO	O	RO
dtiPathTraceabilityServerInetAddrType	M	RO	O	RO
dtiPathTraceabilityServerInetAddr	M	RO	O	RO
dtiPathTraceabilityServerOutPhyIdx	M	RO	O	RO
dtiPathTraceabilityRootServerProtVersion	M	RO	O	RO
dtiPathTraceabilityServerProtVersion	M	RO	O	RO
dtiProtocolClientFsmStatsTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
dtiProtocolClientFsmStatsT3Count	M	RO	O	RO
dtiProtocolClientFsmStatsT4Count	M	RO	O	RO
dtiProtocolClientFsmStatsT6Count	M	RO	O	RO
dtiProtocolClientFsmStatsT7Count	M	RO	O	RO
dtiProtocolClientFsmStatsNormalActiveTime	M	RO	O	RO
dtiProtocolClientFsmStatsHoldoverActiveTime	M	RO	O	RO
DOCS-CABLE-DEVICE-MIB [RFC4639]				
docsDevBase				
docsDevEventGroup				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsDevEvControl	M	RO	M	RO
docsDevEvThrottleAdminStatus	M	RO	M	RO
docsDevEvThrottleInhibited	M	RO	M	RO

docsDevEvThrottleThreshold	M	RO	M	RO
docsDevEvThrottleInterval	M	RO	M	RO
docsDevEvControlTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsDevEvPriority	M	N-Acc	M	N-Acc
docsDevEvReporting	M	RO	M	RO
docsDevEvControlTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	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
docsDevSoftware				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsDevSwFilename	M	RW	M	RW
docsDevSwAdminStatus	M	RW	M	RW
docsDevSwOperStatus	M	RO	M	RO
docsDevSwCurrentVers	M	RO	M	RO
docsDevSwServerAddressType	M	RO	M	RO
docsDevSwServerAddress	M	RO	M	RO
docsDevSwServerTransportProtocol	M	RO	M	RO
docsDevServer				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsDevServerConfigFile	M	RW	M	RW
docsDevServerDhcpAddressType	M	RO	M	RO
docsDevServerDhcpAddress	M	RO	M	RO
docsDevServerTimeAddressType	M	RO	M	RO
docsDevServerTimeAddress	M	RO	M	RO
docsDevServerConfigTftpAddressType	M	RW	M	RW
docsDevServerConfigTftpAddress	M	RW	M	RW

EQAM-MIB Annex C				
docsQamControlTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
Reset	M	RW	M	RW
InitCause	M	RO	M	RO
SaveCfg	M	RW	M	RW
UploadCfg	M	RW	M	RW
docsQamNotify				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsQamResetnotify	M	Notify	M	Notify
IF-MIB [RFC2863]				
Interfaces				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
ifNumber	M	RO	M	RO
IfTableLastChange	M	RO	M	RO
ifTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	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	M	RO
ifInUcastPkts	M	RO	M	RO
ifInNUcastPkts	M	RO	M	RO
ifInDiscards	M	RO	M	RO
ifInErrors	M	RO	M	RO
ifInUnknownProtos	M	RO	M	RO
ifOutOctets	M	RO	M	RO
ifOutUcastPkts	M	RO	M	RO
ifOutNUcastPkts	M	RO	M	RO

ifOutDiscards	M	RO	M	RO
ifOutErrors	M	RO	M	RO
ifOutQLen	M	RO	M	RO
ifSpecific	M	RO	M	RO
ifXTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
ifName	M	RO	M	RO
ifInMulticastPkts	M	RO	M	RO
ifInBroadcastPkts	M	RO	M	RO
ifOutMulticastPkts	M	RO	M	RO
ifOutBroadcastPkts	M	RO	M	RO
ifHcInOctets	M	RO	M	RO
ifHcInUcastPkts	M	RO	M	RO
ifHcInMulticastPkts	M	RO	M	RO
ifHcInBroadcastPkts	M	RO	M	RO
ifHcOutOctets	M	RO	M	RO
ifHcOutUcastPkts	M	RO	M	RO
ifHcOutMulticastPkts	M	RO	M	RO
ifHcOutBroadcastPkts	M	RO	M	RO
ifLinkUpDownTrapEnable	M	RO	M	RO
ifHighSpeed	M	RO	M	RO
ifPromiscuousMode	M	RO	M	RO
ifConnectorPresent	M	RO	M	RO
ifAlias	M	RO	M	RO
ifCounterDiscontinuityTime	M	RO	M	RO
ifStackTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
ifStackHigherLayer	M	N-Acc	M	N-Acc
ifStackLowerLayer	M	N-Acc	M	N-Acc
ifStackStatus	M	RC/RO	M	RC/RO
ifMIBObjects				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
ifStackLastChange	M	RC/RO	M	RC/RO

snmpTraps				
Notification	M-CMTS EQAM	Access	VIDEO EQAM	Access
linkup	M		M	
linkDown	M		M	
ENTITY-MIB [RFC4133]				
entPhysicalTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
entPhysicalIndex	M	N-Acc	M	N-Acc
entPhysicalDescr	M	RO	M	RO
entPhysicalVendorType	M	RO	M	RO
entPhysicalContainedIn	M	RO	M	RO
entPhysicalClass	M	RO	M	RO
entPhysicalParentRelPos	M	RO	M	RO
entPhysicalName	M	RO	M	RO
entPhysicalHardwareRev	M	RO	M	RO
entPhysicalFirmwareRev	M	RO	M	RO
entPhysicalSoftwareRev	M	RO	M	RO
entPhysicalSerialNum	M	RO	M	RO
entPhysicalMfgName	M	RO	M	RO
entPhysicalModelName	M	RO	M	RO
entPhysicalAlias	M	RO	M	RO
entPhysicalAssetID	M	RO	M	RO
entPhysicalIsFRU	M	RO	M	RO
entPhysicalMfgDate	M	RO	M	RO
entPhysicalUris	M	RO	M	RO
entAliasMappingTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
entAliasLogicalIndexOrZero	M	N-Acc	M	N-Acc
entAliasMappingIdentifier	M	RO	M	RO
entPhysicalContainsTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
entPhysicalChildIndex	M	RO	M	RO

SNMPv2-MIB [RFC3418]				
System Group				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
sysDescr	M	RO	M	RO
sysObjectID	M	RO	M	RO
sysUpTime	M	RO	M	RO
sysContact	M	RO	M	RO
sysName	M	RW	M	RW
sysLocation	M	RW	M	RW
sysServices	M	RO	M	RO
sysORLastChange	M	RO	M	RO
sysORTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	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				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
snmpEnableAuthenTraps	M	RO	M	RO
IP-MIB [RFC4293]				
ipSystemStatsTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
ipSystemStatsIPVersion	O	N-Acc	O	N-Acc
ipSystemStatsInReceives	O	RO	O	RO
ipSystemStatsHCInReceives	O	RO	O	RO
ipSystemStatsInOctets	O	RO	O	RO
ipSystemStatsHCInOctets	O	RO	O	RO
ipSystemStatsInHdrErrors	O	RO	O	RO
ipSystemStatsInNoRoutes	O	RO	O	RO
ipSystemStatsInAddrErrors	O	RO	O	RO
ipSystemStatsInUnknownProtos	O	RO	O	RO
ipSystemStatsInTruncatedPkts	O	RO	O	RO
ipSystemStatsInForwDatagrams	O	RO	O	RO

ipSystemStatsHCInForwDatagrams	O	RO	O	RO
ipSystemStatsReasmReqds	O	RO	O	RO
ipSystemStatsReasmOKs	O	RO	O	RO
ipSystemStatsReasmFails	O	RO	O	RO
ipSystemStatsInDiscards	O	RO	O	RO
ipSystemStatsInDelivers	O	RO	O	RO
ipSystemStatsHCInDelivers	O	RO	O	RO
ipSystemStatsOutRequests	O	RO	O	RO
ipSystemStatsHCOutRequests	O	RO	O	RO
ipSystemStatsOutNoRoutes	O	RO	O	RO
ipSystemStatsOutForwDatagrams	O	RO	O	RO
ipSystemStatsHCOutForwDatagrams	O	RO	O	RO
ipSystemStatsOutDiscards	O	RO	O	RO
ipSystemStatsOutFragReqds	O	RO	O	RO
ipSystemStatsOutFragOKs	O	RO	O	RO
ipSystemStatsOutFragFails	O	RO	O	RO
ipSystemStatsOutFragCreates	O	RO	O	RO
ipSystemStatsOutTransmits	O	RO	O	RO
ipSystemStatsHCOutTransmits	O	RO	O	RO
ipSystemStatsOutOctets	O	RO	O	RO
ipSystemStatsHCOutOctets	O	RO	O	RO
ipSystemStatsInMcastPkts	O	RO	O	RO
ipSystemStatsInMcastOctets	O	RO	O	RO
ipSystemStatsHCInMcastOctets	O	RO	O	RO
ipSystemStatsOutMcastPkts	O	RO	O	RO
ipSystemStatsHCOutMcastPkts	O	RO	O	RO
ipSystemStatsOutMcastOctets	O	RO	O	RO
ipSystemStatsHCOutMcastOctets	O	RO	O	RO
ipSystemStatsInBcastPkts	O	RO	O	RO
ipSystemStatsHCInBcastPkts	O	RO	O	RO
ipSystemStatsOutBcastPkts	O	RO	O	RO
ipSystemStatsHCOutBcastPkts	O	RO	O	RO
ipSystemStatsDiscontinuityTime	O	RO	O	RO
ipSystemStatsRefreshRate	O	RO	O	RO
ipIfStatsEntry (Mandatory for management port only)				
Access	M-CMTS EQAM	Access	VIDEO EQAM	Access
ipIfStatsIPVersion	S	N-Acc	S	N-Acc

ipIfStatsIfIndex	S	N-Acc	S	N-Acc
ipIfStatsInReceives	S	RO	S	RO
ipIfStatsHCInReceives	O	RO	O	RO
ipIfStatsInOctets	O	RO	O	RO
ipIfStatsHCInOctets	O	RO	O	RO
ipIfStatsInHdrErrors	S	RO	S	RO
ipIfStatsInNoRoutes	O	RO	O	RO
ipIfStatsInAddrErrors	S	RO	S	RO
ipIfStatsInUnknownProtos	S	RO	S	RO
ipIfStatsInTruncatedPkts	O	RO	O	RO
ipIfStatsInForwDatagrams	S	RO	S	RO
ipIfStatsHCInForwDatagrams	O	RO	O	RO
ipIfStatsReasmReqds	S	RO	S	RO
ipIfStatsReasmOKs	S	RO	S	RO
ipIfStatsReasmFails	S	RO	S	RO
ipIfStatsInDiscards	S	RO	S	RO
ipIfStatsInDelivers	S	RO	S	RO
ipIfStatsHCInDelivers	O	RO	O	RO
ipIfStatsOutRequests	S	RO	S	RO
ipIfStatsHCOutRequests	O	RO	O	RO
ipIfStatsOutForwDatagrams	O	RO	O	RO
ipIfStatsHCOutForwDatagrams	O	RO	O	RO
ipIfStatsOutDiscards	S	RO	S	RO
ipIfStatsOutFragReqds	O	RO	O	RO
ipIfStatsOutFragOKs	S	RO	S	RO
ipIfStatsOutFragFails	S	RO	S	RO
ipIfStatsOutFragCreates	S	RO	S	RO
ipIfStatsOutTransmits	O	RO	O	RO
ipIfStatsHCOutTransmits	O	RO	O	RO
ipIfStatsOutOctets	O	RO	O	RO
ipIfStatsHCOutOctets	O	RO	O	RO
ipIfStatsInMcastPkts	S	RO	S	RO
ipIfStatsHCInMcastPkts	O	RO	O	RO
ipIfStatsInMcastOctets	O	RO	O	RO
ipIfStatsHCInMcastOctets	O	RO	O	RO
ipIfStatsOutMcastPkts	S	RO	S	RO
ipIfStatsHCOutMcastPkts	O	RO	O	RO

ipIfStatsOutMcastOctets	O	RO	O	RO
ipIfStatsHCOutMcastOctets	O	RO	O	RO
ipIfStatsInBcastPkts	S	RO	S	RO
ipIfStatsHCInBcastPkts	O	RO	O	RO
ipIfStatsOutBcastPkts	S	RO	S	RO
ipIfStatsHCOutBcastPkts	O	RO	O	RO
ipIfStatsDiscontinuityTime	S	RO	S	RO
ipIfStatsRefreshRate	S	RO	S	RO
ipAddressTable				
Access	M-CMTS EQAM	Access	VIDEO EQAM	Access
ipAddressAddrType	S	N-Acc	S	N-Acc
ipAddressAddr	S	N-Acc	S	N-Acc
ipAddressIfIndex	S	RC	S	RC
ipAddressType	S	RC	S	RC
ipAddressPrefix	S	RC	S	RC
ipAddressOrigin	S	RC	S	RC
ipAddressStatus	S	RC	S	RC
ipAddressCreated	S	RC	S	RC
ipAddressLastChanged	S	RC	S	RC
ipAddressRowStatus	S	RC	S	RC
ipAddressStorageType	S	RC	S	RC
ipNetToPhysicalTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
ipNetToPhysicalIfIndex	S	N-Acc	S	N-Acc
ipNetToPhysicalNetAddressType	S	N-Acc	S	N-Acc
ipNetToPhysicalNetAddress	S	N-Acc	S	N-Acc
ipNetToPhysicalPhysAddress	S	RC	S	RC
ipNetToPhysicalLastUpdated	S	RC	S	RC
ipNetToPhysicalType	O	RC	O	RC
ipNetToPhysicalState	O	RC	O	RC
ipNetToPhysicalRowStatus	S	RC	S	RC

SNMP-VIEW-BASED-ACM-MIB [RFC3415]				
vacmContextTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
vacmContextName	O	RO	O	RO
vacmSecurityToGroupTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
vacmSecurityModel	O	N-Acc	O	N-Acc
vacmSecurityName	O	N-Acc	O	N-Acc
vacmGroupName	O	RC/RO	O	RC/RO
vacmSecurityToGroupStorageType	O	RC/RO	O	RC/RO
vacmSecurityToGroupStatus	O	RC/RO	O	RC/RO
vacmAccessTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
vacmAccessContextPrefix	O	N-Acc	O	N-Acc
vacmAccessSecurityModel	O	N-Acc	O	N-Acc
vacmAccessSecurityLevel	O	N-Acc	O	N-Acc
vacmAccessContextMatch	O	RC/RO	O	RC/RO
vacmAccessReadViewName	O	RC/RO	O	RC/RO
vacmAccessWriteViewName	O	RC/RO	O	RC/RO
vacmAccessNotifyViewName	O	RC/RO	O	RC/RO
vacmAccessStorageType	O	RC/RO	O	RC/RO
vacmAccessStatus	O	RC/RO	O	RC/RO
vacmViewSpinLock	O	RO	O	RO
vacmViewTreeFamilyTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
vacmViewTreeFamilyViewName	O	N-Acc	O	N-Acc
vacmViewTreeFamilySubtree	O	N-Acc	O	N-Acc
vacmViewTreeFamilyMask	O	RC/RO	O	RC/RO
vacmViewTreeFamilyType	O	RC/RO	O	RC/RO
vacmViewTreeFamilyStorageType	O	RC/RO	O	RC/RO
vacmViewTreeFamilyStatus	O	RC/RO	O	RC/RO

SNMP-COMMUNITY-MIB [RFC3584]				
snmpCommunityTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
snmpCommunityIndex	O	N-Acc	O	N-Acc
snmpCommunityName	O	RC/RO	O	RC/RO
snmpCommunitySecurityName	O	RC/RO	O	RC/RO
snmpCommunityContextEngineID	O	RC/RO	O	RC/RO
snmpCommunityContextName	O	RC/RO	O	RC/RO
snmpCommunityTransportTag	O	RC/RO	O	RC/RO
snmpCommunityStorageType	O	RC/RO	O	RC/RO
snmpCommunityStatus	O	RC/RO	O	RC/RO
snmpTargetExtTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
snmpTargetAddrTMask	O	RC/RO	O	RC/RO
snmpTargetAddrMMS	O	RC/RO	O	RC/RO
snmpTrapAddress	O	ACC-FN	O	ACC-FN
snmpTrapCommunity	O	ACC-FN	O	ACC-FN
SNMP Management Framework Architecture [RFC3411]				
snmpEngine Group				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
snmpEngineID	O	RO	O	RO
snmpEngineBoots	O	RO	O	RO
snmpEngineTime	O	RO	O	RO
snmpEngineMaxMessageSize	O	RO	O	RO
SNMP Message Processing and Dispatching MIB [RFC3412]				
snmpMPDStats				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
snmpUnknownSecurityModels	O	RO	O	RO
snmpInvalidMsgs	O	RO	O	RO
snmpUnknownPDUHandlers	O	RO	O	RO
SNMP Applications [RFC3413]				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
snmpTargetSpinLock	O	RO	O	RO

snmpTargetAddrTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
snmpTargetAddrName	O	N-Acc	O	N-Acc
snmpTargetAddrTDomain	O	RC/RO	O	RC/RO
snmpTargetAddrTAddress	O	RC/RO	O	RC/RO
snmpTargetAddrTimeout	O	RC/RO	O	RC/RO
snmpTargetAddrRetryCount	O	RC/RO	O	RC/RO
snmpTargetAddrTagList	O	RC/RO	O	RC/RO
snmpTargetAddrParams	O	RC/RO	O	RC/RO
snmpTargetAddrStorageType	O	RC/RO	O	RC/RO
snmpTargetAddrRowStatus	O	RC/RO	O	RC/RO
snmpTargetParamsTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
snmpTargetParamsName	O	N-Acc	O	N-Acc
snmpTargetParamsMPModel	O	RC/RO	O	RC/RO
snmpTargetParamsSecurityModel	O	RC/RO	O	RC/RO
snmpTargetParamsSecurityName	O	RC/RO	O	RC/RO
snmpTargetParamsSecurityLevel	O	RC/RO	O	RC/RO
snmpTargetParamsStorageType	O	RC/RO	O	RC/RO
snmpTargetParamsRowStatus	O	RC/RO	O	RC/RO
snmpUnavailableContexts	O	RC/RO	O	RC/RO
snmpUnknownContexts	O	RC/RO	O	RC/RO
snmpNotifyTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
snmpNotifyName	O	N-Acc	O	N-Acc
snmpNotifyTag	O	RC/RO	O	RC/RO
snmpNotifyType	O	RC/RO	O	RC/RO
snmpNotifyStorageType	O	RC/RO	O	RC/RO
snmpNotifyRowStatus	O	RC/RO	O	RC/RO
snmpNotifyFilterProfileTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
snmpNotifyFilterProfileName	O	RC/RO	O	RC/RO
snmpNotifyFilterProfileStorType	O	RC/RO	O	RC/RO
snmpNotifyFilterProfileRowStatus	O	RC/RO	O	RC/RO

snmpNotifyFilterTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
snmpNotifyFilterSubtree	O	N-Acc	O	N-Acc
snmpNotifyFilterMask	O	RC/RO	O	RC/RO
snmpNotifyFilterType	O	RC/RO	O	RC/RO
snmpNotifyFilterStorageType	O	RC/RO	O	RC/RO
snmpNotifyFilterRowStatus	O	RC/RO	O	RC/RO
SNMP-USER-BASED-SM-MIB [RFC3414]				
usmStats				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
usmStatsUnsupportedSecLevels	O	RO	O	RO
usmStatsNotInTimeWindows	O	RO	O	RO
usmStatsUnknownUserNames	O	RO	O	RO
usmStatsUnknownEngineIDs	O	RO	O	RO
usmStatsWrongDigests	O	RO	O	RO
usmStatsDecryptionErrors	O	RO	O	RO
usmUser				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
usmUserSpinLock	O	RO	O	RO
usmUserTable				
Objects	M-CMTS EQAM	Access	VIDEO EQAM	Access
usmUserEngineID	O	N-Acc	O	N-Acc
usmUserName	O	N-Acc	O	N-Acc
usmUserSecurityName	O	RC/RO	O	RC/RO
usmUserCloneFrom	O	RC/RO	O	RC/RO
usmUserAuthProtocol	O	RC/RO	O	RC/RO
usmUserAuthKeyChange	O	RC/RO	O	RC/RO
usmUserOwnAuthKeyChange	O	RC/RO	O	RC/RO
usmUserPrivProtocol	O	RC/RO	O	RC/RO
usmUserPrivKeyChange	O	RC/RO	O	RC/RO
usmUserOwnPrivKeyChange	O	RC/RO	O	RC/RO
usmUserPublic	O	RC/RO	O	RC/RO
usmUserStorageType	O	RC/RO	O	RC/RO

DOCS-EQAM-MIB Annex C				
docsEQamControl				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamControlReset	M	RO	M	RO
docsEQamControlInitCause	M	RO	M	RO
docsEQamControlSaveCfg	M	RO	M	RO
docsEQamControlUploadCfg	M	RO	M	RO
docsEQamNMSAccessTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamNMSAccessTable	N-Sup		N-Sup	
docsEQamNMSAccessEntry	N-Sup		N-Sup	
docsEQamNMSAccessIndex	N-Sup		N-Sup	
docsEQamNMSAccessIpAddress	N-Sup		N-Sup	
docsEQamNMSAccessIpAddressPrefix	N-Sup		N-Sup	
docsEQamNMSAccessControl	N-Sup		N-Sup	
docsEQamNMSAccessNotifVersion	N-Sup		N-Sup	
docsEQamNMSAccessCommunityString	N-Sup		N-Sup	
docsEQamNMSAccessRowStatus	N-Sup		N-Sup	
docsEQamTime				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamTimeNtpMaster	M	RO	M	RO
docsEQamTimeNtpBackup	M	RO	M	RO
docsEQamTimeTimeZone	M	RO	M	RO
docsEQamTimeDaylightSaving	M	RO	M	RO
docsEQamSyslogServerTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamSyslogServerTable	M	N-Acc	M	N-Acc
docsEQamSyslogServerEntry	M	N-Acc	M	N-Acc
docsEQamSyslogServerIndex	M	N-Acc	M	N-Acc
docsEQamSyslogServer	M	RO	M	RO
docsEQamSyslogServerInetAddressType	M	RO	M	RO
docsEQamSyslogServerInetAddress	M	RO	M	RO
docsEQamSyslogServerEnabled	M	RO	M	RO
docsEQamSyslogServerRowStatus	N-Sup		N-Sup	

docsEQamRegistrationTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamRegistrationTable	M	N-Acc	M	N-Acc
docsEQamRegistrationEntry	M	N-Acc	M	N-Acc
docsEQamRegistrationErmName	M	N-Acc	M	N-Acc
docsEQamRegistrationErmAddressType	M	RO	M	RO
docsEQamRegistrationErmAddress	M	RO	M	RO
docsEQamRegistrationErmPort	M	RO	M	RO
docsEQamRegistrationErmConnectionType	M	RO	M	RO
docsEQamRegistrationHoldTimer	M	RO	M	RO
docsEQamRegistrationConnRetryTimer	M	RO	M	RO
docsEQamRegistrationNextHopAddressDomain	M	RO	M	RO
docsEQamRegistrationCompAddress	M	RO	M	RO
docsEQamRegistrationStreamingZone	M	RO	M	RO
docsEQamRegistrationId	M	RO	M	RO
docsEQamRegistrationCost	M	RO	M	RO
docsEQamRegistrationCompName	M	RO	M	RO
docsEQamRegistrationRowStatus	N-Sup		N-Sup	
docsEQamTSInputCfg				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamTSInputCfgUnicastSessionLossTimeout	M	RO	M	RO
docsEQamTSInputCfgMulticastSessionLossTimeout	M	RO	M	RO
docsEQamTSInputCfgJitterTolerance	M	RO	M	RO
docsEQamTSOutputCfg				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamTSOutputCfgCatInsertRate	M	RO	M	RO
docsEQamTSOutputCfgPatInsertRate	M	RO	M	RO
docsEQamTSOutputCfgPmtInsertRate	M	RO	M	RO
docsEQamReservedUdpTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamReservedUdpTable	M	N-Acc	M	N-Acc
docsEQamReservedUdpEntry	M	N-Acc	M	N-Acc
docsEQamReservedUdpMapIndex	M	N-Acc	M	N-Acc
docsEQamReservedUdpMapStartingPort	M	RO	M	RO

docsEQamReservedUdpMapCount	M	RO	M	RO
docsEQamReservedUdpMap	N-Sup		N-Sup	
docsEQamReservedPidRangeTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamReservedPidRangeTable	M	N-Acc	M	N-Acc
docsEQamReservedPidRangeEntry	M	N-Acc	M	N-Acc
docsEQamReservedPidRangeIndex	M	N-Acc	M	N-Acc
docsEQamReservedPidRangeStartingPid	M	RO	M	RO
docsEQamReservedPidRangeCount	M	RO	M	RO
docsEQamReservedPidRangeDescription	M	RO	M	RO
docsEQamReservedPidRangeRowStatus	N-Sup		N-Sup	
docsEQamEdgeInputTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamEdgeInputTable	M	N-Acc	M	N-Acc
docsEQamEdgeInputEntry	M	N-Acc	M	N-Acc
docsEQamEdgeInputName	M	N-Acc	M	N-Acc
docsEQamEdgeInputIpAddressType	M	RO	M	RO
docsEQamEdgeInputIpAddress	M	RO	M	RO
docsEQamInputRegistrationTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamInputRegistrationTable	M	N-Acc	M	N-Acc
docsEQamInputRegistrationEntry	M	N-Acc	M	N-Acc
docsEQamInputRegistrationGroupName	M	RO	M	RO
docsEQamInputRegistrationBandwidth	M	RO	M	RO
docsEQamInputRegistrationErmName	M	RO	M	RO
docsEQamInputRegistrationRowStatus	N-Sup		N-Sup	
docsEQamRFPortTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamRFPortTable	M	N-Acc	M	N-Acc
docsEQamRFPortEntry	M	N-Acc	M	N-Acc
docsEQamRFPortName	M	N-Acc	M	N-Acc
docsEQamRFPortAdminStatus	M	RO	M	RO
docsEQamRFPortPower	M	RO	M	RO
docsEQamRFPortFrequency	M	RO	M	RO

docsEQamRFPortModulation	M	RO	M	RO
docsEQamRFPortInterleaverMode	M	RO	M	RO
docsEQamRFPortInterleaveLevel	M	RO	M	RO
docsEQamRFPortAnnex	M	RO	M	RO
docsEQamRFPortSpectrumInversion	M	RO	M	RO
docsEQamRFPortLockParameters	M	RO	M	RO
docsEQamRFPortcfgNumberChannels	M	RO	M	RO
docsEQamRFPortNumberChannels	M	RO	M	RO
docsEQamRFPortLockRowStatus	N-Sup		N-Sup	
docsEQamFiberNodeTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamFiberNodeTable	M	N-Acc	M	N-Acc
docsEQamFiberNodeEntry	M	N-Acc	M	N-Acc
docsEQamFiberNodeName	M	RO	M	RO
docsEQamFiberNodeRowStatus	N-Sup		N-Sup	
docsEQamChannelTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamChannelTable	M	N-Acc	M	N-Acc
docsEQamChannelEntry	M	N-Acc	M	N-Acc
docsEQamChannelPhysName	M	N-Acc	M	N-Acc
docsEQamChannelRFPortPhysName	M	RO	M	RO
docsEQamChannelAdminStatus	M	RO	M	RO
docsEQamChannelPower	M	RO	M	RO
docsEQamChannelFrequency	M	RO	M	RO
docsEQamChannelModulation	M	RO	M	RO
docsEQamChannelInterleaverMode	M	RO	M	RO
docsEQamChannelInterleaverLevel	M	RO	M	RO
docsEQamChannelAnnex	M	RO	M	RO
docsEQamChannelSpectrumInversion	M	RO	M	RO
docsEQamChannelName	M	RO	M	RO
docsEQamChannelGroupName	M	RO	M	RO
docsEQamChannelErmName	M	RO	M	RO
docsEQamChannelLockParameters	M	RO	M	RO
docsEQamChannelAllocationType	M	RO	M	RO
docsEQamChannelERRPAdvertizing	M	RO	M	RO

docsEQamChannelDepsUdpPortMapping	M	RO	M	RO
docsEQamChannelRowStatus	N-Sup		N-Sup	
docsEQamDEPICfg				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamDEPICfgDepsSessionLossTO	M	RO	M	RO
docsEQamTSOutput				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamTSOutputTSID	M	RO	M	RO
docsEQamTSOutputNitPid	M	RO	M	RO
docsEQamTSOutputCaPid	M	RO	M	RO
docsEQamSessionLogCtr				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamSessionLogCtrlMaxSize	M	RO	M	RO
docsEQamSessionLogCtrlCurrentSize	M	RO	M	RO
docsEQamSessionLogCtrlAging	M	RO	M	RO
docsEQamSessionLogCtrlClearAll	M	RO	M	RO
docsEQamSessionLogCtrlType	M	RO	M	RO
docsEQamSessionLogTable				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamSessionLogTable	M	N-Acc	M	N-Acc
docsEQamSessionLogEntry	M	N-Acc	M	N-Acc
docsEQamSessionLogIndex	M	N-Acc	M	N-Acc
docsEQamSessionLogId	M	RO	M	RO
docsEQamSessionLogInputIfIndex	M	RO	M	RO
docsEQamSessionLogOutputIfIndex	M	RO	M	RO
docsEQamSessionLogInputContinuityErrors	M	RO	M	RO
docsEQamSessionLogInputSyncLossPkts	M	RO	M	RO
docsEQamSessionLogOutputTotalPkts	M	RO	M	RO
docsEQamSessionLogOutputDroppedPkts	M	RO	M	RO
docsEQamSessionLogOutputFifoOverflow	M	RO	M	RO
docsEQamSessionLogOutputFifoUnderflow	M	RO	M	RO
docsEQamSessionLogMode	M	RO	M	RO
docsEQamSessionLogStartTime	M	RO	M	RO
docsEQamSessionLogStopTime	M	RO	M	RO

docsEQamSessionLogInputAddrType	M	RO	M	RO
docsEQamSessionLogInputSrcInetAddr	M	RO	M	RO
docsEQamSessionLogInputSrcPort	M	RO	M	RO
docsEQamSessionLogInputDstInetAddr	M	RO	M	RO
docsEQamSessionLogInputDstPort	M	RO	M	RO
docsEQamNotify				
Object	M-CMTS EQAM	Access	VIDEO EQAM	Access
docsEQamNotify	M	Notif	M	Notif
docsDevEvLevel	M	Notif	M	Notif
docsDevEvId	M	Notif	M	Notif
docsDevEvText	M	Notif	M	Notif
HostName	M	Notif	M	Notif
MgmtInetAddressType	M	Notif	M	Notif
MgmtInetAddress	M	Notif	M	Notif

A.2 IF-MIB ifTable MIB-Object details

Table A-4 - IF-MIB ifTable MIB-Object details

IF-MIB Object details for Cable Device using 1000 Mbps Ethernet	CMTS-Downstream M-CMTS Core, M-CMTS EQAM	EQAM GigE	DTI/ M-CMTS/ EQAM Client
ifIndex	(n)	(n)	(n)
ifType	229	6	other(1)
ifSpeed	~64-QAM=30,341,646 ~256-QAM=42,884,296	1000,000,000	5,000,000
ifHighSpeed	~64-QAM=30 ~256-QAM=42	1000	5
ifPhysAddress	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)
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)
ifMtu	1464, (n)	1500, (n)	256
ifInOctets	0	(n)	(n)
ifHCInOctets	0	(n)	(n)
ifOutOctets	(n)	(n)	(n)
ifHCOctets	(n)	(n)	(n)
ifInUcastPkts	0	(n)	(n)
ifHCInUcastPkts	0	(n)	(n)

IF-MIB Object details for Cable Device using 1000 Mbps Ethernet	CMTS-Downstream M-CMTS Core, M-CMTS EQAM	EQAM GigE	DTI/ M-CMTS/ EQAM Client
ifInMulticastPkts	0	(n)	(n)
ifHCInMulticastPkts	0	(n)	(n)
ifInBroadcastPkts	0	(n)	(n)
ifHCInBroadcastPkts	0	(n)	(n)
ifInDiscards	0	(n)	(n)
ifInErrors	0	(n)	(n)
ifInUnknownProtos	0	(n)	(n)
ifOutUcastPkts	(n)	(n)	(n)
ifHCOOutUcastPkts	(n)	(n)	(n)
ifOutMulticastPkts	(n)	(n)	(n)
ifHCOOutMulticastPkts	(n)	(n)	(n)
ifOutBroadcastPkts	(n)	(n)	(n)
ifHCOOutBroadcastPkts	(n)	(n)	(n)
ifOutDiscards	(n)	(n)	(n)
ifOutErrors	(n)	(n)	(n)
ifPromiscuousMode	True(1), false(2)	True(1), false(2)	True(1), false(2)

Annex B Description of the XML based configuration file

The following section describes the XML configuration file elements and attributes. When it's applicable, the attribute name and value match the one referenced in the specified MIB. Figure B–1 represents the QAM config file object Model with the elements definitions thereafter. The corresponding XML schemas definitions are in Section B.2.

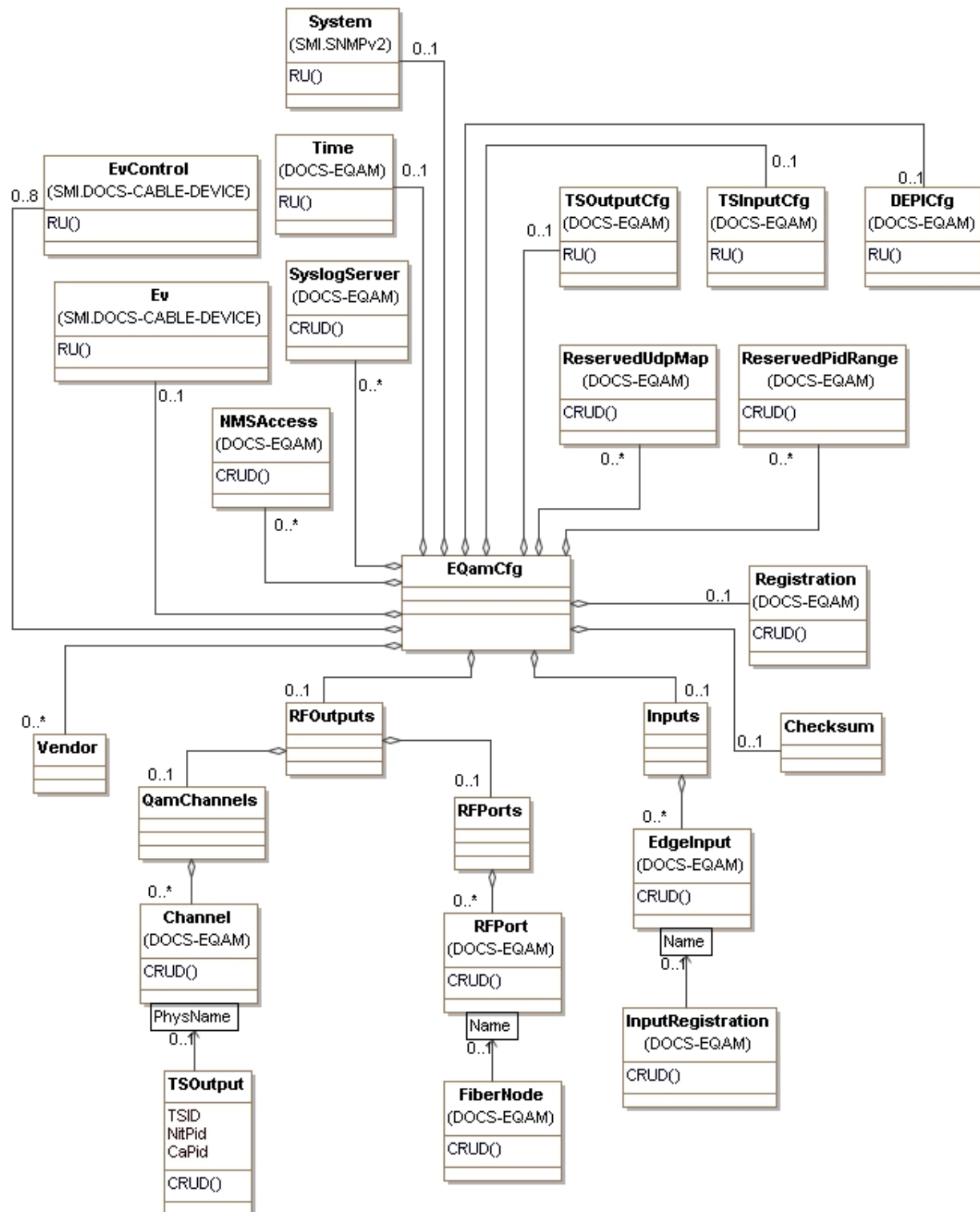


Figure B-1 - XML Configuration Object Model

B.1 EqamCfg

Below is the description of the XML config file elements.

Annex B.2 contains the XML Schema definition of the config file structure defined in this section. Note that the majority of the definitions of this XML config file come from the EQAM object model defined in Annex C. Also, since this XML config file has the purpose of writing the EQAM configuration, any read-only element referenced from Annex C or any other source is skipped in the schema definition.

Whenever the schema references object from SNMP Modules, the following rules apply:

- SNMP RowStatus is not added as part of the XML elements and attributes
- SNMP Extension tables become children elements of the parent table.
- InetAddressType elements are not included in the XML schema.

Table B-1 - EQamCfg Config File elements

Element Name	Multiplicity	Description
System	0..1	EQAM identification
NMSAccess	0..*	Network Management System SNMP Access Control See NMSAccess Object in Annex C.
Time	0..1	EQAM time setting See Time Object in Annex C.
SyslogServer	0..*	SysLog Server information See SyslogServer Object in Annex C.
Ev	0..1	Control event logging rates. Corresponds to the scalar set of objects under the object identifier docsDevEvent of [RFC4639].
EvControl	0..*	Event destination control Corresponds to the table docsDevEvControlTable of [RFC4639].
Registration	1..*	Registration with the Edge Resource Manager (ERM). See Registration Object in Annex C.
TSInputCfg	0..1	Global input TS parameters See TSInputCfg Object in Annex C.
TSOuputCfg	0..1	Global output TS parameters See TSOuputCfg Object in Annex C.
ReservedUdpMap	0..*	Reserved PID Ranges See ReservedUdpMap Object in Annex C.
ReservedPidRange	0..*	Reserved PID Ranges See ReservedPidRange Object in Annex C.
Inputs	0..1	Describes the inputs for the EQAM.

Element Name	Multiplicity	Description
RFOutputs	0..1	Describes the outputs for the EQAM. See NMSAccess Object in Annex C.
Vendor	0..*	Vendor-specific extensions
Checksum	0..1	XML file checksum Config File integrity check.

B.1.1 System

This object represents the EQAM general information.

- Object Operations:
None

Table B-2 - System Object

Attribute Name	Type	Access	Type Constraints	Units	Default
sysName	AdminString	CRUD			
sysContact	AdminString	CRUD			
sysLocation	AdminString	CRUD			

- sysContact
The contact person according to [RFC3418].
- sysName
The system name according to [RFC3418].
- sysLocation
The system location according to [RFC3418].

B.1.2 Inputs

Elements:

Table B-3 - Inputs elements

Name	Multiplicity	Description
EdgeInputs	0..1	Configuration of input Interfaces See EdgeInputs Object in Annex C.

B.1.2.1 Edgelnputs**Elements:****Table B-4 - Edgelnputs elements**

Name	Multiplicity	Description
InputRegistration	0..1	Configuration of input Interfaces Resource Management parameters. See InputRegistration Object in Annex C.

B.1.3 RFOutputs**Elements:****Table B-5 - RFOutputs elements**

Name	Multiplicity	Description
RFPorts	0..1	Configuration of RF output ports
QamChannels	0..1	Configuration of QAM channels

B.1.3.1 RFPorts**Elements:****Table B-6 - RFPorts elements**

Name	Multiplicity	Description
RFPort	0..*	Configuration of an RF output port See RFPort Object in Annex C.

B.1.3.1.1 RfPort**Elements:****Table B-7 - RFPort elements**

Name	Multiplicity	Description
FiberNode	0..*	Configuration of Fiber Nodes connected to the RF Ports See FiberNode Object in Annex C.

B.1.3.2 QamChannels**Elements:****Table B-8 - QamChannels elements**

Name	Multiplicity	Description
Channel	0..*	QAM channel Configuration See Channel Object in Annex C.

B.1.3.2.1 Channel**Elements:****Table B-9 - Channel elements**

Name	Multiplicity	Description
StaticUdpMap	0..*	Static Mapping of UDP ports for the QAM Channel See StaticUdpMap Object in Annex C.
TsOutput	0..1	OutgoingTransport Stream configuration parameters for the QAM Channel See TsOutput in Annex C.

B.1.4 Vendor Object

This object represent the vendor specific extension for the QAM config file.

- Object Operations:
None

Table B-10 - Vendor Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Id	unsignedInt	RU			

- Id
This attribute Indicates the value of the private enterprise number (PEN) assigned by IANA.

B.1.5 Checksum Object

This object represent the checksum information about the config file.

- Object Operations:
None

Table B-11 - Checksum Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Type	Enum	RU	crc32(1)		
Value	hexBinary	RU			

- **Type**
This attribute Indicates the Checksum type and version of the value contained in the attribute 'Value'.
The value 'crc32' indicates a CRC-32 checksum.
- **Value**
This attribute corresponds to the [SHA-1] Checksum applied to the entire config file.

B.2 Configuration File XML Schema Definition

B.2.1 EQAM-CFG_1.0.XSD

```
<?xml version="1.0"?>
<schema targetNamespace="urn:cablelabs:namespaces:docsis:mha:xsd:EQAM-CFG:1.0"
  xmlns:this="urn:cablelabs:namespaces:docsis:mha:xsd:EQAM-CFG:1.0"
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:DOCS-EQAM="urn:cablelabs:namespaces:docsis:mha:xsd:EQAM:1.0"
  xmlns:DOCS-CABLE-DEVICE="urn:cablelabs:namespaces:smi:xsd:DOCS-CABLE-
DEVICE:RFC4639"
  xmlns:SNMPv2="urn:cablelabs:namespaces:smi:xsd:SNMPv2:RFC3418"
  elementFormDefault="qualified">
  <import namespace="urn:cablelabs:namespaces:docsis:mha:xsd:EQAM:1.0"
schemaLocation="http://www.cablelabs.com/namespaces/docsis/hma/xsd/EQAM_1.0.XSD"/>
  <import namespace="urn:cablelabs:namespaces:smi:xsd:DOCS-CABLE-DEVICE:RFC4639"
schemaLocation="http://www.cablelabs.com/namespaces/smi/xsd/DOCS-CABLE-
DEVICE_RFC4639.XSD"/>
  <import namespace="urn:cablelabs:namespaces:smi:xsd:SNMPv2:RFC3418"
schemaLocation="http://www.cablelabs.com/namespaces/smi/SNMPv2_RFC3418.XSD"/>
  <complexType name="EQamCfg">
    <sequence>
      <element ref="DOCS-EQAM:NMSAccess" minOccurs="0"
maxOccurs="unbounded"/>
      <element ref="SNMPv2:System" minOccurs="0"/>
      <element ref="DOCS-EQAM:Registration" minOccurs="0"/>
      <element ref="DOCS-EQAM:Time" minOccurs="0"/>
      <element ref="DOCS-EQAM:SessionLogCtrl" minOccurs="0"/>
      <element ref="this:Vendor" minOccurs="0" maxOccurs="unbounded"/>
      <element ref="this:Inputs" minOccurs="0"/>
      <element ref="this:RFOutputs" minOccurs="0"/>
      <element ref="DOCS-CABLE-DEVICE:Ev" minOccurs="0"/>
      <element ref="DOCS-CABLE-DEVICE:EvControl" minOccurs="0"
maxOccurs="8"/>
      <element ref="DOCS-EQAM:SyslogServer" minOccurs="0"
maxOccurs="unbounded"/>
      <element ref="DOCS-EQAM:TSOutputCfg" minOccurs="0"/>
      <element ref="DOCS-EQAM:TSInputCfg" minOccurs="0"/>
      <element ref="DOCS-EQAM:ReservedUdpMap" minOccurs="0"
maxOccurs="unbounded"/>
      <element ref="DOCS-EQAM:ReservedPidRange" minOccurs="0"
maxOccurs="unbounded"/>
      <element ref="DOCS-EQAM:DEPICfg" minOccurs="0"/>
      <element ref="this:Checksum" minOccurs="0"/>
    </sequence>
  </complexType>
  <element name="EQamCfg" type="this:EQamCfg"/>

  <complexType name="Vendor">
    <sequence>
      <attribute name="Id" type="unsignedInt" use="required"/>
    </sequence>
  </complexType>
  <element name="Vendor" type="this:Vendor"/>

  <complexType name="Inputs">
    <sequence>
```



```

        <element ref="DOCS-EQAM:EdgeInput" minOccurs="0"
maxOccurs="unbounded"/>
    </sequence>
</complexType>
<element name="Inputs" type="this:Inputs"/>

    <complexType name="RFOutputs">
        <sequence>
            <element ref="this:RFPorts" minOccurs="0"/>
            <element ref="this:QamChannels" minOccurs="0"/>
        </sequence>
    </complexType>
    <element name="RFOutputs" type="this:RFOutputs"/>

    <complexType name="QamChannels">
        <sequence>
            <element ref="DOCS-EQAM:Channel" minOccurs="0"
maxOccurs="unbounded"/>
        </sequence>
    </complexType>
    <element name="QamChannels" type="this:QamChannels"/>
    <complexType name="RFPorts">
        <sequence>
            <element ref="DOCS-EQAM:RFPort" minOccurs="0"
maxOccurs="unbounded"/>
        </sequence>
    </complexType>
    <element name="RFPorts" type="this:RFPorts"/>

    <complexType name="Checksum">
        <sequence>
            <attribute name="Type" type="int" use="required"/>
            <attribute name="Value" type="hexBinary" use="required"/>
        </complexType>
    <element name="Checksum" type="this:Checksum"/>
</schema>

```

B.2.2 EQAM_1.0.XSD

```

<?xml version="1.0"?>
<schema
    targetNamespace="urn:cablelabs:namespaces:docsis:mha:xsd:EQAM:1.0"
    xmlns:this="urn:cablelabs:namespaces:docsis:mha:xsd:EQAM:1.0"
    xmlns="http://www.w3.org/2001/XMLSchema"
    elementFormDefault="qualified">
    <complexType name="Control">
        <attribute name="Reset" type="boolean" use="optional" default="false"/>
        <attribute name="InitCause" use="optional" default="none">
            <simpleType>
                <restriction base="string">
                    <enumeration value="nms"/>
                    <enumeration value="none"/>
                    <enumeration value="unknown"/>
                </restriction>
            </simpleType>
        </attribute>
        <attribute name="SaveCfg" type="string" use="optional" default=""/>
        <attribute name="UploadCfg" type="string" use="optional" default=""/>
    </complexType>
    <element name="Control" type="this:Control"/>

    <complexType name="Notify">
        <attribute name="docsDevEvLevel" type="unsignedInt" use="optional"/>
        <attribute name="docsDevEvId" type="unsignedInt" use="optional"/>
        <attribute name="docsDevEvText" type="string" use="optional"/>
        <attribute name="HostName" type="string" use="optional"/>
    </complexType>

```

```

        <attribute name="MgmtInetAddressType" type="this:InetAddressType"
use="optional"/>
        <attribute name="MgmtInetAddress" type="string" use="optional"/>
    </complexType>
    <element name="Notify" type="this:Notify"/>

    <complexType name="SessionLogCtrl">
        <attribute name="MaxSize" type="unsignedInt" use="optional"
default="100"/>
        <attribute name="CurrentSize" type="unsignedInt" use="optional"/>
        <attribute name="Aging" type="unsignedInt" use="optional"
default="10080"/>
        <attribute name="ClearAll" type="boolean" use="optional"
default="false"/>
        <attribute name="Type" use="optional" default="sessionsWithExceptions">
            <simpleType>
                <restriction base="string">
                    <enumeration value="allSessions"/>
                    <enumeration value="sessionsWithExceptions"/>
                </restriction>
            </simpleType>
        </attribute>
    </complexType>
    <element name="SessionLogCtrl" type="this:SessionLogCtrl"/>

    <complexType name="NMSAccess">
        <attribute name="Index" type="unsignedInt" use="optional"/>
        <attribute name="IpAddressType" type="this:InetAddressType"
use="optional"/>
        <attribute name="IpAddress" type="hexBinary" use="optional"/>
        <attribute name="IpAddressPrefix" type="unsignedInt" use="optional"
default="0"/>
        <attribute name="Control" use="optional" default="readOnly">
            <simpleType>
                <restriction base="string">
                    <enumeration value="readOnly"/>
                    <enumeration value="readWrite"/>
                    <enumeration value="rowWithNotif"/>
                    <enumeration value="rwWithNotif"/>
                    <enumeration value="notifOnly"/>
                </restriction>
            </simpleType>
        </attribute>
        <attribute name="NotifVersion" use="optional" default="trapV2c">
            <simpleType>
                <restriction base="string">
                    <enumeration value="trapV1"/>
                    <enumeration value="trapV2c"/>
                    <enumeration value="Inform"/>
                </restriction>
            </simpleType>
        </attribute>
        <attribute name="CommunityString" type="string" use="optional"/>
    </complexType>
    <element name="NMSAccess" type="this:NMSAccess"/>

    <complexType name="Time">
        <attribute name="NtpMaster" type="hexBinary" use="optional"/>
        <attribute name="NtpBackup" type="hexBinary" use="optional"/>
        <attribute name="TimeZone" type="string" use="optional" default="00"/>
        <attribute name="DaylightSaving" type="string" use="optional"/>
    </complexType>
    <element name="Time" type="this:Time"/>

    <complexType name="SyslogServer">
        <attribute name="Index" type="unsignedInt" use="optional"/>

```

```

        <attribute name="InetAddressType" type="this:InetAddressType"
use="optional"/>
        <attribute name="InetAddress" type="hexBinary" use="optional"/>
        <attribute name="Enabled" type="boolean" use="optional" default="false"/>
    </complexType>
    <element name="SyslogServer" type="this:SyslogServer"/>

    <complexType name="Registration">
        <attribute name="ErmName" type="string" use="optional"/>
        <attribute name="ErmAddressType" type="this:InetAddressType"
use="optional"/>
        <attribute name="ErmAddress" type="hexBinary" use="optional"/>
        <attribute name="ErmPort" type="unsignedInt" use="optional" default="0"/>
        <attribute name="ErmConnectionType" use="optional" default="client">
            <simpleType>
                <restriction base="string">
                    <enumeration value="client"/>
                    <enumeration value="server"/>
                    <enumeration value="clientAndServer"/>
                </restriction>
            </simpleType>
        </attribute>
        <attribute name="HoldTimer" type="unsignedInt" use="optional"
default="3"/>
        <attribute name="ConnRetryTimer" type="unsignedInt" use="optional"/>
        <attribute name="NexthopAddressDomain" type="unsignedInt"
use="optional"/>
        <attribute name="CompAddress" type="string" use="optional" default=""/>
        <attribute name="StreamingZone" type="string" use="optional"
default=""/>
        <attribute name="Id" type="unsignedInt" use="optional"/>
        <attribute name="Cost" type="unsignedInt" use="optional" default="0"/>
        <attribute name="CompName" type="string" use="optional" default=""/>
    </complexType>
    <element name="Registration" type="this:Registration"/>

    <complexType name="TSOutputCfg">
        <attribute name="CatInsertRate" type="unsignedByte" use="optional"/>
        <attribute name="PatInsertRate" type="unsignedByte" use="optional"/>
        <attribute name="PmtInsertRate" type="unsignedByte" use="optional"/>
    </complexType>
    <element name="TSOutputCfg" type="this:TSOutputCfg"/>

    <complexType name="TSInputCfg">
        <attribute name="UnicastSessionLossTimeout" type="unsignedInt"
use="optional"/>
        <attribute name="MulticastSessionLossTimeout" type="unsignedInt"
use="optional"/>
        <attribute name="JitterTolerance" type="unsignedInt" use="optional"/>
    </complexType>
    <element name="TSInputCfg" type="this:TSInputCfg"/>

    <complexType name="ReservedUdpMap">
        <attribute name="Index" type="unsignedInt" use="optional"/>
        <attribute name="StartingPort" type="unsignedInt" use="optional"
default="0"/>
        <attribute name="Count" type="unsignedInt" use="optional" default="0"/>
    </complexType>
    <element name="ReservedUdpMap" type="this:ReservedUdpMap"/>

    <complexType name="ReservedPidRange">
        <attribute name="Index" type="unsignedInt" use="optional"/>
        <attribute name="StartingPid" type="unsignedInt" use="optional"
default="0"/>
        <attribute name="Count" type="unsignedInt" use="optional" default="0"/>
        <attribute name="Description" type="string" use="optional" default=""/>
    </complexType>

```

```

<element name="ReservedPidRange" type="this:ReservedPidRange"/>
<complexType name="EdgeInput">
  <sequence>
    <element ref="this:InputRegistration" minOccurs="0"/>
  </sequence>
  <attribute name="Name" type="" use="optional"/>
  <attribute name="InetAddressType" type="this:InetAddressType"
use="optional"/>
  <attribute name="InetAddress" type="hexBinary" use="optional"/>
</complexType>
<element name="EdgeInput" type="this:EdgeInput"/>

<complexType name="InputRegistration">
  <attribute name="GroupName" type="string" use="optional" default=""/>
  <attribute name="Bandwidth" type="unsignedInt" use="optional"
default="0"/>
  <attribute name="ErmName" type="string" use="optional" default=""/>
</complexType>
<element name="InputRegistration" type="this:InputRegistration"/>

<complexType name="RFPort">
  <sequence>
    <element ref="this:FiberNode" minOccurs="0"
maxOccurs="unbounded"/>
  </sequence>
  <attribute name="Name" type="" use="optional"/>
  <attribute name="AdminStatus" type="boolean" use="optional" default="disabled">
    <simpl
  <restriction base="string">
    <enumeration value="enabled"/>
    <enumeration value="disabled"/>
  </restriction>
  </simpleType>
</attribute>
  <attribute name="Power" type="int" use="optional" default="0"/>
  <attribute name="Frequency" type="unsignedInt" use="optional"
default="0"/>
  <attribute name="Modulation" type="string" use="optional"
default="qam256"/>
  <attribute name="InterleaverMode" type="string" use="optional"
default="unknown"/>
  <attribute name="InterleaveLevel" type="string" use="optional" default="level1">
    <simpl
  <restriction base="string">
    <enumeration value="level1"/>
    <enumeration value="level2"/>
  </restriction>
  </simpleType>
</attribute>
  <attribute name="Annex" type="string" use="optional" default="AnnexB">
    <simpl
  <restriction base="string">
    <enumeration value="AnnexA"/>
    <enumeration value="AnnexB"/>
    <enumeration value="AnnexC"/>
    <enumeration value="other"/>
  </restriction>
  </simpleType>
</attribute>
  <attribute name="SpectrumInversion" type="boolean" use="optional"
default="false"/>
  <attribute name="LockParameters" type="hexBinary" use="optional"/>
  <attribute name="cfgNumberChannels" type="unsignedInt" use="optional"/>
  <attribute name="NumberChannels" type="unsignedInt" use="optional"/>
</complexType>
<element name="RFPort" type="this:RFPort"/>

```

```

<complexType name="FiberNode">
  <attribute name="Name" type="" use="optional"/>
</complexType>
<element name="FiberNode" type="this:FiberNode"/>

<complexType name="Channel">
  <sequence>
    <element ref="this:TSOutput" minOccurs="0"/>
    <element ref="this:StaticUdpMap" minOccurs="0"
maxOccurs="unbounded"/>
  </sequence>
  <attribute name="PhysName" type="string" use="optional"/>
  <attribute name="RFPortPhysName" type="string" use="optional"/>
  <attribute name="AdminStatus" type="int" use="optional"/>
  <attribute name="Power" type="unsignedInt" use="optional"/>
  <attribute name="Frequency" type="unsignedInt" use="optional"/>
  <attribute name="Modulation" type="int" use="optional"/>
  <attribute name="InterleaverMode" type="int" use="optional"/>
  <attribute name="InterleaverLevel" type="int" use="optional"/>
  <attribute name="Annex" use="optional">
    <simpleType>
      <restriction base="string">
        <enumeration value="AnnexA"/>
        <enumeration value="AnnexB"/>
        <enumeration value="AnnexC"/>
        <enumeration value="other"/>
      </restriction>
    </simpleType>
  </attribute>
  <attribute name="SpectrumInversion" type="boolean" use="optional"/>
  <attribute name="Name" type="string" use="optional" default=""/>
  <attribute name="GroupName" type="string" use="optional" default=""/>
  <attribute name="ErmName" type="string" use="optional" default=""/>
  <attribute name="LockParameters" type="hexBinary" use="optional"/>
  <attribute name="AllocationType" use="optional" default="any">
    <simpleType>
      <restriction base="string">
        <enumeration value="docsisOnly"/>
        <enumeration value="videoOnly"/>
        <enumeration value="any"/>
      </restriction>
    </simpleType>
  </attribute>
  <attribute name="ERRPAdvertizing" type="boolean" use="optional"
default="true"/>
  <attribute name="DepiUdpPortMapping" type="unsignedInt" use="optional"
default="0"/>
</complexType>
<element name="Channel" type="this:Channel"/>

<complexType name="DEPICfg">
  <attribute name="DepiSessionLossTO" type="unsignedInt" use="optional"
default="0"/>
</complexType>
<element name="DEPICfg" type="this:DEPICfg"/>

<complexType name="TSOutput">
  <attribute name="TSID" type="unsignedInt" use="optional" default="0"/>
  <attribute name="NitPid" type="unsignedByte" use="optional" default="0"/>
  <attribute name="CaPid" type="unsignedByte" use="optional" default="0"/>
</complexType>
<element name="TSOutput" type="this:TSOutput"/>

<complexType name="StaticUdpMap">
  <attribute name="StartingPort" type="unsignedInt" use="optional"/>
  <attribute name="Count" type="unsignedInt" use="optional"/>

```

```

</complexType>
<element name="StaticUdpMap" type="this:StaticUdpMap"/>

<simpleType name="InetAddressType">
  <restriction base="string">
    <enumeration value="unknown"/>
    <enumeration value="ipv4"/>
    <enumeration value="ipv6"/>
    <enumeration value="dns"/>
  </restriction>
</simpleType>
</schema>

```

B.2.3 DOCS-CABLE-DEVICE_RFC4639.XSD

```

<?xml version="1.0"?>
<schema targetNamespace="urn:cablelabs:namespaces:smi:xsd:DOCS-CABLE-DEVICE:RFC4639"
  xmlns:this="urn:cablelabs:namespaces:smi:xsd:DOCS-CABLE-DEVICE:RFC4639"
  xmlns="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">
  <complexType name="EvControl">
    <sequence/>
    <attribute name="EvPriority" type="int" use="optional"/>
    <attribute name="EvReporting" type="hexBinary" use="optional"/>
  </complexType>
  <element name="EvControl" type="this:EvControl"/>

  <complexType name="Ev">
    <sequence/>
    <attribute name="SyslogAdress" type="hexBinary" use="optional"/>
    <attribute name="ThrottleAdminstatus" type="int" use="optional"/>
    <attribute name="ThrottleThreshold" type="int" use="optional"/>
    <attribute name="ThrottleInterval" type="unsignedInt" use="optional"/>
    <attribute name="EcContro" type="" use="optional"/>
  </complexType>
  <element name="Ev" type="this:Ev"/>
</schema>

```

B.2.4 SNMPv2_RFC3418.XSD

```

<?xml version="1.0"?>
<schema targetNamespace="urn:cablelabs:namespaces:smi:xsd:SNMPv2:RFC3418"
  xmlns:this="urn:cablelabs:namespaces:smi:xsd:SNMPv2:RFC3418"
  xmlns="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">
  <complexType name="System">
    <sequence/>
    <attribute name="Name" type="" use="optional"/>
    <attribute name="Contact" type="unsignedInt" use="optional"/>
    <attribute name="Location" type="unsignedInt" use="optional"/>
  </complexType>
  <element name="System" type="this:System"/>
</schema>

```

Annex C DOCS-EQAM Management Requirements

C.1 DOCS-EQAM Object Model Overview

This section defines the management model of the EQAM device. In particular, this section defines the EQAM object model that defines the SNMP management requirements defined in Annex A and C.2, as well as the XML Config file Schema definition in Annex B.

Unless specified, the EQAM MUST NOT persist operator configuration data using the data models herein described.

C.2 DOCS-EQAM Object Model Definitions

C.2.1 DOCS-EQAM Object Model Data Types

There are no defined data types in this object model.

C.2.2 DOCS-EQAM Object Model Class Diagram

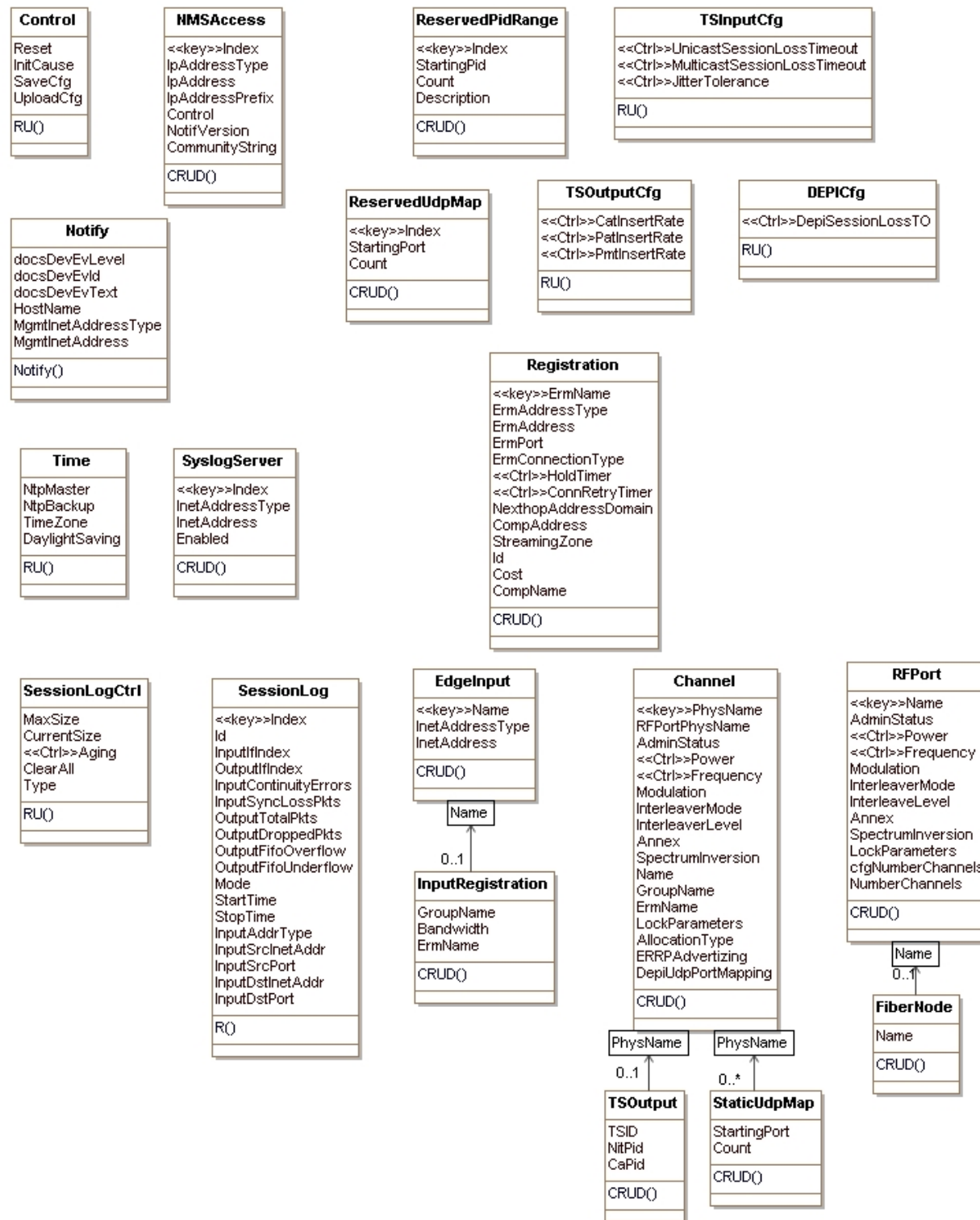


Figure C-1 - QAM Object Model Diagram

C.2.3 DOCS-EQAM Object Model Description

C.2.3.1 Control Object

This object represents general control objects for the EQAM operation.

- Object Operations:
None

Table C-1 - Control Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Reset	Boolean	RU			false
InitCause	Enum	R	nms(1) none(2) unknown(3)		'none'
SaveCfg	AdminString	RU			''
UploadCfg	AdminString	RU			''

- Reset
This attribute controls the administrative reset of the EQAM device. If set to 'true' the EQAM is reinitialized. This attribute always report the value 'reset'. When the EQAM is instructed to reset itself, it MUST execute the following sequence of events:
 - Gracefully tear down all sessions if any, i.e., send a session status update to the ERM that will trigger a teardown for each active session to the SRM/ERM.
 - Shut down all processes/tasks.
 - Restart.
- InitCause
This attribute indicates the reason for the last reinitialization.
- SaveCfg
This attribute provides a mechanism to save the current EQAM configuration in the EQAM file system. A set to a non-zero length string representing a valid local file name, the current running configuration is saved into the file name specified. File names including directory paths are optional.
- UploadCfg
This attribute provides a mechanism to upload the EQAM config file to the configuration server. When set to a URI, the EQAM performs an upload of the current config file being used. TFTP URL is a required URI type. Other URI types maybe supported by the EQAM.

C.2.3.2 NMSAccess Object

This object represents the SNMP Access control configuration of the EQAM.

- Object Operations:
None

Table C-2 - NMSAccess Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	unsignedInt	key			
IpAddressType	InetAddressType	CRUD			'unknown'
IpAddress	InetAddress	CRUD			"H
IpAddressPrefix	InetAddressPrefixLength	CRUD			0
Control	Enum	CRUD	readOnly(1) readWrite(2) roWithNotif(3) rwWithNotif(4) notifOnly(5)		'readOnly'
NotifVersion	Enum	CRUD	trapV1(1) trapV2c(2) Inform(3)		'trapV2c'
CommunityString	Enum AdminString	CRUD			""

- **Index**
This key represents the unique identifier of an instance in this object.
- **IpAddressType**
This attribute represents the address type of the 'IpAddress' attribute.
- **IpAddress**
This attribute represents the IP address or IP prefix authorized for NMS access to the SNMP agent in the EQAM.
- **IpAddressPrefix**
This attribute represents the subnet-prefix to be applied to the 'ipAddress' attribute.
- **Control**
This attribute provides the access control options for the NMS. The valid values include:
 'readOnly' provides read-only access.
 'readWrite' provides read and write access.
 'roWithNotif' provides read access and SNMP notification transmission.
 'rwWithNotif' provides read, write, and SNMP notification transmission.
 'tNotifOnly' provides SNMP notification transmission.
 When an event has an associated SNMP notification definition, the device sends SNMP notifications to all NMS indicated by a valid unicast 'IpAddress' and 'IpAddressPrefix' of all FF octets. Other combinations of 'IpAddress' and 'IpAddressPrefix' are invalid.
- **NotifVersion**
This attribute represents the SNMP trap or notification version.
- **CommunityString**
This attribute represents the community string to be matched for SNMP access from the NMS specified.

C.2.3.3 Time Object

This object represents the configuration of ToD.

- Object Operations:
None

Table C-3 - Time Object

Attribute Name	Type	Access	Type Constraints	Units	Default
NtpMaster	InetAddress	CRUD			"H
NtpBackup	InetAddress	CRUD			"H
TimeZone	AdminString	CRUD			"00"
DaylightSaving	AdminString	CRUD			""

- NtpMaster**
This attribute represents the Master NTP server. This element is not required in case ToD is acquired via DHCP. If DHCP options for ToD are provided and this element is present, the EQAM selects this element.
- NtpBackup**
This attribute represents the backup NTP Server in case the master NTP fails.
- TimeZone**
This attribute represents the offset value to the local time to arrive at UTC Time. The value has the following format:
hh[:mm] - the hour
(0 <= hh <= 24) - required, minutes
(0 <= mm <= 59) -the mm (minutes) is optional. The hour can be preceded by a minus sign (-).
- DaylightSaving**
This attribute indicates when to change to and from daylight saving (or summer) time. The value has the form: date1/time1,date2/time2,offset. The first date describes when the change from standard to daylight saving time occurs, and the second date describes when the change back happens.

Each time field describes when, in current local time, the change to the other time is made. The format of date is the following: m.w.d - The dth day (0 <= d <= 6) of week w of month m of the year (1 <= w <= 5, 1 <= m <= 12, where week 5 means 'the last d day in month m', which may occur in the fourth or fifth week). Week 1 is the first week in which the dth day occurs. Day zero is Sunday.

The time format is the following: hh:mm - The offset value is the value you must add to the local time to arrive at UTC Time during the daylight saving time. The offset value has the following format: hh[:mm].

C.2.3.4 SyslogServer Object

This object represents the syslog server's configuration.

- Object Operations:
None

Table C-4 - SyslogServer Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	unsignedInt	key			

Attribute Name	Type	Access	Type Constraints	Units	Default
InetAddressType	InetAddressType	CRUD			'unknown'
InetAddress	InetAddress	CRUD			""
Enabled	boolean	CRUD			'false'

- **Index**
This key represents the unique identifier of an instance in this object.
- **InetAddressType**
This attribute indicates the address type of the syslog server IP address. 'dns' support is optional.
- **InetAddress**
This attribute represents the IP address of the syslog server. If DNS is supported, this attribute can contain the FQDN of the syslog server.
- **Enabled**
Indicates if the syslog server is user for sending syslog messages or is disabled.

C.2.3.5 Registration Object

This object represents the configuration of the ERRP protocol.

- **Object Operations:**
None

Table C-5 - Registration Object

Attribute Name	Type	Access	Type Constraints	Units	Default
ErmName	AdminString	key			
ErmAddressType	InetAddressType	CRUD			'unknown'
ErmAddress	InetAddress	CRUD			"H
ErmPort	InetPortNumber	CRUD			0
ErmConnectionType	Enum	CRUD	client(1) server(2) clientAndServer(3)		'client'
HoldTimer	unsignedInt	CRUD		seconds	3
ConnRetryTimer	unsignedInt	CRUD		seconds	20
NexthopAddressDomain	unsignedInt	CRUD	0 3..60		
CompAddress	AdminString	CRUD			""
StreamingZone	AdminString	CRUD			""
Id	unsignedInt	CRUD			0
Cost	unsignedInt	CRUD			0
CompName	AdminString	CRUD			""

- **ErmName**

This key represents the name of the ERM related to this registration instance. This is an internal reference for associating, e.g., QAM channels and input interfaces to an ERM.
- **ErmAddressType**

This attribute represents the InetAddress of the ERM.
- **ErmAddress**

This attribute represents the IP Address of the ERM.
- **ErmPort**

This attribute represents the TCP port number used to reach the ERM.
- **ErmConnectionType**

This attribute represents the type of TCP connection that must be supported by the EQAM. The value can be one of the following:

 - 'client' indicates that the EQAM has to initiate the TCP connection with the ERM.
 - 'server' indicates that the EQAM has to wait the TCP connection from the ERM.
 - 'clientAndServer' indicates that both EQAM or either EQAM or ERM can initiate the TCP connection.
- **HoldTimer**

This attribute represents the number of seconds that the sender proposes for the value of the hold timer. Upon receipt of an OPEN message, the EQAM MUST calculate the value of the Hold Timer by using the smaller of its configured Hold Time and the Hold Time received in the OPEN message.

The Hold Time MUST be either zero or at least three seconds. An implementation MAY reject connections on the basis of the Hold Time. The calculated value indicates the maximum number of seconds that may elapse between the receipt of successive KEEPALIVE and/or UPDATE messages by the sender.
- **ConnRetryTimer**

This attribute represents the time in seconds for the connect retry timer. The exact value of the connect retry timer is a local matter, but should be sufficiently large to allow TCP initialization.
- **NextHopAddressDomain**

This attribute represents the address domain number of the next-hop server. The NextHopServer specifies the address to which a manager should use to connect to the component in order to control the resource specified in the reachable route. This parameter is used in the ERRP NextHopServer attribute.
- **CompAddress**

This attribute represents the ERRP NextHopServer attribute. This field contains a string that conforms to the following syntax: CompAddress = host[:port] host = An FQDN, or an IPv4 address using the textual representation defined in section 2.1 of [RFC1123, or an IPv6 address using the textual representation defined in section 2.2 of [RFC4291] and enclosed in '[' and ']' characters. port = numerical value (1-65535). If the port is empty or not given, the default port 6069 is assumed.
- **StreamingZone**

This attribute represents the Streaming Zone within which the component operates. This parameter is used in the ERRP OPEN message. StreamingZone Name is a mandatory parameter when supporting video applications. The capability is optional when signaling DOCSIS only resources.

The value is to be set to the string that represents the StreamingZone Name, i.e., <region>. The characters comprising the string are in the set within TEXT defined in section 15.1 of [RFC2326]. Implementations must

support minimum string lengths of 64; however, the composition of the string used is defined by implementation agreements specified by the service provider.

- Id

This attribute represents the unique identifier for the EQAM device within its Streaming Zone. This value may be set to the 4-octet value of an IPv4 address assigned to that device. This ID value is determined on startup and must be the same for all peer connections. This parameter is used in the ERRP OPEN message header.

- Cost

This attribute represents the static cost for use of this resource.

- CompName

The name of the component for which the data in the update message applies. This parameter is used in the ERRP OPEN message. Component Name is a mandatory parameter when supporting video applications. The capability is optional when signaling DOCSIS only resources.

The value is to be set to the string that represents the Component Name, i.e., <region>.<localname>. The characters comprising the string are in the set within TEXT defined in section 15.1 of [RFC2326]. Implementations must support minimum string lengths of 64; however the composition of the string used is defined by implementation agreements specified by the service provider.

C.2.3.6 TSInputCfg Object

This object represents EQAM global configuration of input transport streams.

- Object Operations:

None

Table C-6 - TSInputCfg Object

Attribute Name	Type	Access	Type Constraints	Units	Default
UnicastSessionLossTimeout	unsignedInt	RU		Milliseconds	40
MulticastSessionLossTimeout	unsignedInt	RU		milliseconds	40
JitterTolerance	unsignedInt	RU		milliseconds	

- UnicastSessionLossTimeout

This attribute represents the loss of signal timeout in milliseconds for unicast input streams. See [SCTE-154-4] mpegLossOfSignalTimeout.

- MulticastSessionLossTimeout

This attribute represents the loss of signal timeout in milliseconds for the multicast input streams.

- JitterTolerance

This attribute represents the acceptable delay variation in millisecond for incoming streams. The jitter option sets the size of a dejittering buffer that absorbs the input jitter of a session.

C.2.3.7 TSOuputCfg Object

This object represents EQAM global configuration of output transport streams.

- Object Operations:

None

Table C-7 - TSOutputCfg Object

Attribute Name	Type	Access	Type Constraints	Units	Default
CatInsertRate	unsignedByte	RU	0..32	tables/seconds	10
PatInsertRate	unsignedByte	RU	0..32	tables/seconds	10
PmtInsertRate	unsignedByte	RU	0..32	tables/seconds	10

- CatInsertRate

This attribute represents the CAT insertion rate expressed in tables/second (See [SCTE-154-4] mpegOutputTSCatInsertRate).

- PatInsertRate

This attribute represents the PAT table interval expressed in tables/second (See [SCTE-154-4] mpegOutputTSPatInsertRate).

- PmtInsertRate

This attribute represents the PMT table interval expressed in tables/second (See [SCTE-154-4] mpegOutputTSPatInsertRate).

C.2.3.8 ReservedUdpMap Object

This object represents reserved ports to be used for non-video applications.

- Object Operations:

None

Table C-8 - ReservedUdpMap Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	unsignedInt	Key			
StartingPort	unsignedInt	CRUD			0
Count	unsignedInt	CRUD			0

- Index

This key represents the unique identifier of an instance in this object.

- StartingPort

This attribute represents the port range start value for non-video applications reserved UDP ports.

- Count

This attribute represents the number of reserved UDP ports starting from 'StartingPort' attribute value.

C.2.3.9 ReservedPidRange Object

This object represents reserved PID range to not be used on ERM assignments.

- Object Operations:

None

Table C-9 - ReservedPidRange Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	unsignedInt	key			
StartingPid	HePIDValue	CRUD			0
Count	unsignedInt	CRUD			0
Description	AdminString	CRUD			""

- **Index**
This key represents the unique identifier of an instance in this object.
- **StartingPid**
This attribute represents the PID range starts for other applications reserved PIDs.
- **Count**
This attribute represents the number of reserved PIDs starting from 'StartingPid' attribute value.
- **Description**
This attribute represents the description associated with a PID range configured instance.

C.2.3.10 DEPICfg Object

This object represents the configuration of M-CMTS DEPI parameters.

- **Object Operations:**
None

Table C-10 - DEPICfg Object

Attribute Name	Type	Access	Type Constraints	Units	Default
DepiSessionLossTO	unsignedInt	RU		seconds	0

- **DepiSessionLossTO**
This attribute indicates the Timeout in seconds the EQAM waits after a QAM channel session is terminated to advertize the QAM channel as idle to the ERM. This attribute is only meaningful for dynamic DEPI session allocation, not for static sessions.

C.2.3.11 Edgelnput Object

This object represents the configuration of Input Edge parameters.

- **Object Operations:**
None

Table C-11 - Edgelnput Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Name	AdminString	key			
IpAddressType	InetAddress	CRUD			'unknown'

Attribute Name	Type	Access	Type Constraints	Units	Default
IpAddress	InetAddress	CRUD			"H"

- **Name**
This key represents the Input interface name. This name corresponds to the [RFC4133], ENTITY-MIB entPhysicalName.
- **IpAddressType**
This attribute represents the IP address type of the 'IpAddress' attribute.
- **IpAddress**
This attribute represents the IP address of the Edge interface. If not included, the EQAM should use DHCP to acquire the IP address of the Edge input interface.

C.2.3.12 InputRegistration Object

This object represents the configuration of Edge ERRP parameters.

- **Object Operations:**
None

Table C-12 - InputRegistration

Attribute Name	Type	Access	Type Constraints	Units	Default
GroupName	AdminString	CRUD			""
Bandwidth	unsignedInt	CRUD			0
ErmName	AdminString	CRUD			""

- **GroupName**
This attribute represents the name of the Edge Input Group associated with this input. This parameter is used in the ERRP Edge Input attribute.
- **Bandwidth**
This attribute represents the bandwidth of the edge input to be advertized. If zero or not present, the EQAM advertizes the full bandwidth of the edge input.
- **ErmName**
This attribute represents the ERM where the QAM channel is advertised. If empty, the QAM channel is not advertised.

C.2.3.13 RFPort Object

This object represents the configuration of RF ports. The parameters configured in a RF port applies to all the QAM channels within the RF Port, unless explicit EQAM configuration is defined.

- **Object Operations:**
None

Table C-13 - RFPort Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Name		key			
AdminStatus	Enum	CRUD	enabled(1) disabled(2)		'enabled'
Power	TenthdBmV	CRUD		TenthdBmV	0
Frequency	unsignedInt	CRUD		Hertz	0
Modulation	Enum	CRUD	QAMChannelModulationFormat		'qam256'
InterleaverMode	Enum	CRUD	QAMChannelInterleaveMode		'unknown'
InterleaveLevel	Enum	CRUD	level1(1) level2(2)		'level1'
Annex	Enum	CRUD	annexA(1) annexB(2) annexC(3) other (4)		'annexB'
SpectrumInversion	boolean	CRUD			'false'
LockParameters	EnumBits	CRUD	frequency(0) bandwidth(1) power(2) modulation(3) interleaver(4) j83Annex(5) symbolRate(6) mute(7)		"H"
cfgNumberChannels	unsignedInt	CRUD			
NumberChannels	unsignedInt	R			

- **Name**
This key represents the RF port identifier. It corresponds to [RFC4133], ENTITY-MIB entPhysicalName.
- **AdminStatus**
This attribute represents the administrative state of the RF Port. Setting this element to 'disable' results in the RF port being muted. By default this element reports 'disabled'.
- **Power**
This attribute represents the power level for the QAM channels in the containment level.
- **Frequency**
This attribute represents the first carrier of the configured carriers within the RF port.
- **Modulation**
This attribute represents the Modulation type for the QAM channels in the containment level.

- **InterleaverMode**
This attribute represents the Interleave mode for the QAM channels in the containment level.
- **InterleaveLevel**
This attribute represents the interleaver level for FEC coding for the QAM channels in the containment level.
- **Annex**
This attribute represents the ITU J.83 Annex mode for the QAM channels in the containment level.
- **SpectrumInversion**
This attribute represents the QAM Signal Spectrum inversion. A value of 'true' indicates channel spectrum is inverted.
- **LockParameters**
This attribute represents the PHY parameters Lock state of the QAM channels in the RF Port containment level for DEPI initiated PHY parameters updates. This parameter is only required for M-CMTS QAMs.
- **cfgNumberChannels**
This attribute represents the number of QAM channels to configure in the channel block. By default all the channels in the RF port are configured.
- **NumberChannels**
This attribute indicates the total number of QAM channels within the RF.

C.2.3.14 FiberNode Object

This object represents the list of Fiber Nodes the RF port reaches.

- **Object Operations:**
None

Table C-14 - FiberNode Object

Attribute Name	Type	Access	Type Constraints	Units	Default
Name	AdminString	CRUD			""

- **Name**
This attribute represents the Fiber Node Name associated with the RF Port

C.2.3.15 Channel Object

This object represents the configuration of QAM channels.

- **Object Operations:**
None

Table C-15 - Channel Object

Attribute Name	Type	Access	Type Constraints	Units	Default
PhysName	AdminString	Key			
RFPortPhysName	AdminString	R			

Attribute Name	Type	Access	Type Constraints	Units	Default
AdminStatus	Enum	CRUD	enabled(1) disabled(2)		'enabled'
Power	unsignedInt	CRUD		TenthdB mV	0
Frequency	unsignedInt	CRUD		Hertz	0
Modulation	Enum	CRUD	QAMChannelModulationFormat		'qam256'
InterleaverMode	Enum	CRUD	QAMChannelInterleaveMode		'unknown'
InterleaverLevel	Enum	CRUD	level1(1) level2(2)		'level1'
Annex	Enum	CRUD	annexA(1) annexB(2) annexC(3) other (4)		'annexB'
SpectrumInversion	boolean	CRUD			'false'
Name	AdminString	CRUD			''
GroupName	AdminString	CRUD			''
ErmName	AdminString	CRUD			''
LockParameters	EnumBits	R	frequency(0) bandwidth(1) power(2) modulation(3) interleaver(4) j83Annex(5) symbolRate(6) mute(7)		"H"
AllocationType	Enum	CRUD	docsisOnly(1) videoOnly(2) any(3)		'any'
ERRPAdvertizing	boolean	CRUD			'true'
DepiUdpPortMapping	InetPortNumber	CRUD			0

- PhysName

This attribute represents the QAM channel identifier. It corresponds to [RFC4133], ENTITY-MIB entPhysicalName.

- RFPortPhysName

This attribute represents the RF port identifier of the QAM channel. It corresponds to [RFC4133], ENTITY-MIB entPhysicalName.

- AdminStatus

This attribute represents the administrative state of the QAM channel. Setting this element to 'disable' results in the RF port being muted. By default this element reports 'disabled'.

- **Power**
This attribute represents the power level for the QAM channel.
- **Frequency**
This attribute represents the carrier frequency of the QAM channel.
- **Modulation**
This attribute represents the Modulation type for the QAM channel.
- **InterleaverMode**
This attribute represents the Interleave mode of the QAM channel.
- **InterleaverLevel**
This attribute represents the interleaver level for FEC coding of the QAM channel.
- **Annex**
This attribute represents the ITU J.83 Annex mode of the QAM channel.
- **SpectrumInversion**
This attribute represents the QAM Signal Spectrum inversion. A value 'true' indicates channel spectrum is inverted.
- **Name**
This attribute represents the name of the QAM channel. This parameter is used in the ERRP QAM Name attribute.
- **GroupName**
This attribute represents the address field in the WithdrawnRoute and ReachableRoutes ERRP attributes.
- **ErmName**
This attribute represents the ERM where the QAM channel is advertised. If empty, the QAM channel is not advertised.
- **LockParameters**
This attribute represents the PHY parameters Lock state of the QAM channels for DEPI-initiated PHY parameters updates. This parameter is only required for M-CMTS QAMs.
- **AllocationType**
This attribute indicates the mechanisms authorized to reserve and control the QAM channels. The possible values are:
 - 'docsisOnly' - the QAM channel can be allocated statically or dynamically to DOCSIS.
 - 'videoOnly' - the QAM channel can be allocated statically or dynamically to video.
 - 'any' - indicates the QAM channel can be allocated statically or dynamically to video and/or DOCSIS.
- **ERRPAdvertising**
CM - This attribute represents the ERRP advertisement state of the QAM channel. If set to 'true', the QAM channel is advertised; otherwise it is not advertised. This is primarily useful when statically configuring the QAM channels and when the QAM channel is not made part of the ERM channel list.
- **DepiUdpPortMapping**
This attribute represents the static UDP port assignment for a DEPI UDP tunnel. The value zero indicates there is not static mapping or it is not applicable.

C.2.3.16 TSOutput Object

This object represents transport stream configuration parameters for QAM channels.

- Object Operations:
None

Table C-16 - TSOutput Object

Attribute Name	Type	Access	Type Constraints	Units	Default
TSID	unsignedInt	CRUD			0
NitPid	unsignedByte	CRUD			0
CaPid	unsignedByte	CRUD			0

- TSID
This attribute represents the TSID of the output transport stream. See [SCTE-154-4] mpegOutputTSTSID.
- NitPid
This attribute represents the NIT PID of the outgoing transport stream. See [SCTE-154-4] mpegOutputTSNitPid.
- CaPid
This attribute represents the CA PID of the outgoing transport stream. See [SCTE-154-4] mpegOutputTSCaPid.

C.2.3.17 StaticUdpMap Object

This object represents the UDP port ranges used for static video sessions.

- Object Operations:
None

Table C-17 - StaticUdpMap Object

Attribute Name	Type	Access	Type Constraints	Units	Default
StartingPort	unsignedInt	CRUD			0
Count	unsignedInt	CRUD			0

- StartingPort
This attribute represents the UDP port range start value for static session.
- Count
This attribute represents the number of reserved UDP ports starting from 'StartingPort' attribute value.

C.2.3.18 SessionLogCtrl Object

This object defines the control mechanisms for the 'SessionLog' object.

- Object Operations:
None

Table C-18 - SessionLogCtrl

Attribute Name	Type	Access	Type Constraints	Units	Default
MaxSize	unsignedInt	RU			100
CurrentSize	unsignedInt	R			
Aging	unsignedInt	RU		seconds	10080
ClearAll	boolean	RU			'false'
Type	Enum	RU	allSessions(1) sessionsWithExceptions(2)		'sessionsWithExceptions'

- **MaxSize**
This attribute represents the maximum number of mpeg session entries that the 'SessionLog' can report. Upon a set operation, the lower value between the set value and the supported number of log entries is used.
- **CurrentSize**
This attribute represents the current number of mpeg session entries in the 'SessionLog'.
- **Aging**
This attribute represents the Aging threshold for the 'SessionLog'. Periodically, a process scans through 'SessionLog' and removes those sessions that have a 'SessionLog::StopTime' greater than this threshold in minutes. A value of 0 means no aging out log entries.
- **ClearAll**
This attribute provides a control to clear the 'Session log'. If set to 'true', all entries from the 'SessionLog' object are removed. Reading this attribute always returns 'false'.
- **Type**
This attribute indicates which type of videos sessions are reported in the 'SessionLog' object. The value 'allSessions' indicates all video sessions are reported in the 'SessionLog'. The value 'sessionsWithExceptions' indicates that video sessions are reported when either of the conditions below occur:
 - The Continuity Errors or Synch Loss Packets of the associated session is greater than zero.
 - The Dropped packets, FIFO Overflow or FIFO Underflow is greater than zero.

C.2.3.19 SessionLog Object

This object represents the list of terminated MPEG video sessions. All parameters values reported for a session are determined at the time of the session deletion.

- **Object Operations:**
None

Table C-19 - SessionLog

Attribute Name	Type	Access	Type Constraints	Units	Default
Index	unsignedInt	Key			
Id	unsignedInt	R			
InputIfIndex	InterfaceIndex	R			
OutputIfIndex	InterfaceIndex	R			

Attribute Name	Type	Access	Type Constraints	Units	Default
InputContinuityErrors	Counter32	R			
InputSyncLossPkts	Counter32	R			
OutputTotalPkts	Counter64	R			
OutputDroppedPkts	Counter32	R			
OutputFifoOverflow	Counter32	R			
OutputFifoUnderflow	Counter32	R			
Mode	Enum	R	other(1) passThrough(2) multiplexing(3)		
StartTime	dateTime	R			
StopTime	dateTime	R			
InputAddrType	InetAddressType	R			
InputSrcInetAddr	InetAddress	R			
InputSrcPort	InetPortNumber	R			
InputDstInetAddr	InetAddress	RU			
InputDstPort	InetPortNumber	RU			

- Index

This key represents the unique identifier of an instance in this object. This attribute's behavior consists of an incremental value. If the maximum number of instances is reached, the log instance with the lower key value is deleted and the new instance is added.

- Id

This attribute identifies the MPEG Session Id of this entry.

- InputIfIndex

This attribute identifies the interface index of the mpeg source stream.

- OutputIfIndex

This attribute identifies the interface index of the mpeg output stream.

- InputContinuityErrors

This attribute indicates the total number of continuity counter errors for the session. See [SCTE-154-4] mpegInputStatsContinuityErrors for details of the count definition.

- InputSyncLossPkts

This attribute indicates the total number of MPEG packets that had missing a sync byte for the session. See [SCTE-154-4] mpegInputStatsSyncLossPackets for details of the count definition.

- OutputTotalPkts

This attribute indicates the total number of MPEG output packets for the session.

- OutputDroppedPkts

This attribute indicates the total number of MPEG output packets dropped for the session.

- **OutputFifoOverflow**
This attribute indicates the total number of FIFO overflows of the session.
- **OutputFifoUnderflow**
This attribute indicates the total number of FIFO underflows of the session.
- **Mode**
This attribute indicates the type of session. See [SCTE-154-4] docsQamVideoSessionMode for definitions of the type of sessions.
- **StartTime**
This attribute indicates the date and time when the session was setup.
- **StopTime**
This attribute indicates the date and time when the session was deleted.
- **InputAddrType**
This attribute indicates the address type associated with the input transport stream of the session. The value 'unknown' indicates no IP transport associated to the transport stream. The value 'dns' is not used.
- **InputSrcInetAddr**
This attribute indicates the source address of the IP flow contained in the session. For Multicast, it represents the Source Specific Multicast IP Address of the UDP IP flow. For unicast, UDP IP flows is either the value 0.0.0.0 if the IP source address is unknown or irrelevant for the origination transport stream.
- **InputSrcPort**
This attribute indicates the source port of the UDP IP flow of the input transport stream.
- **InputDstInetAddr**
This attribute indicates the destination address of the IP flow contained in the session. For multicast, it represents the group address of the SSM origination input TS. For unicast, UDP IP flows is either the value 0.0.0.0 if the IP destination address is unknown or irrelevant for the origination input stream.
- **InputDstPort**
This attribute indicates the UDP destination port of the UDP IP flow of the input transport stream.

C.2.3.20 *Notify Object*

This object corresponds to a generic notification used by the EQAM to send events.

- **Object Operations:**
None

Table C-20 - Notify Object

Attribute Name	Type	Access	Type Constraints	Units	Default
EvLevel	unsignedInt	Notify			
docsDevEvId	unsignedInt	Notify			
docsDevEvText	AdminString	Notify			
sysName	AdminString	Notify			

Attribute Name	Type	Access	Type Constraints	Units	Default
MgmtInetAddressType	InetAddressType	Notify			
MgmtInetAddress	InetAddress	Notify			

- **EvLevel**
This attribute represents the event level of the event.
Reference: docsEvLevel from DOCS-CABLE-DEVICE-MIB
- **docsDevEvId**
This attribute represents the event id of the event.
Reference: docsEvId from DOCS-CABLE-DEVICE-MIB
- **docsDevEvText**
This attribute represents the text of the Event.
Reference: docsEvText from DOCS-CABLE-DEVICE-MIB
- **HostName**
Reference: sysName from SNMPv2-MIB.
- **MgmtInetAddressType**
This attribute represents the address type of the EQAM management IP address.
- **MgmtInetAddress**
This attribute represents that the EQAM management IP address or the FQDN if DNS is supported,

C.3 EQAM MIB Module

DOCS-EQAM-MIB DEFINITIONS ::= BEGIN

```

IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
    NOTIFICATION-TYPE,
    Unsigned32,
    Counter32,
    Counter64
        FROM SNMPv2-SMI
    OBJECT-GROUP,
    MODULE-COMPLIANCE
        FROM SNMPv2-CONF
    SnmpAdminString
        FROM SNMP-FRAMEWORK-MIB
    TruthValue,
    DateAndTime,
    RowStatus
        FROM SNMPv2-TC
    InetAddressType,
    InetAddress,
    InetPortNumber
        FROM INET-ADDRESS-MIB
    InterfaceIndex
        FROM IF-MIB
    TenthdBmV
        FROM DOCS-IF-MIB
    docsDevEvLevel,
    docsDevEvId,

```

```

docsDevEvText      FROM DOCS-CABLE-DEVICE-MIB

sysName            FROM SNMPv2-MIB

HePIDValue,
QAMChannelInterleaveMode,
QAMChannelModulationFormat
                  FROM SCTE-HMS-HEADENDIDENT-TC-MIB
clabProjDocsis     FROM CLAB-DEF-MIB;

docsEqamMib MODULE-IDENTITY
LAST-UPDATED "200812090000Z" -- December 09, 2008
ORGANIZATION "Cable Television Laboratories, Inc."
CONTACT-INFO
    "Broadband Network Services
     Cable Television Laboratories, Inc.
     858 Coal Creek Circle,
     Louisville, CO 80027, USA
     Phone: +1 303-661-9100
     Email: mibs@cablelabs.com"
DESCRIPTION
    "This MIB module contains the EQAM
     management requirements."
REVISION "200812090000Z" -- Dec 09, 2008
DESCRIPTION
    "Initial version, published as part of the CableLabs
     Edge QAM Provisioning and Management Interface
     Specification CM-SP-EQAM-PMI-I01-081209
     Copyright 1999-2008 Cable Television Laboratories, Inc.
     All rights reserved."
 ::= { clabProjDocsis 24 }

-- Textual Conventions

-- Object Definitions
docsEqamNotifications OBJECT IDENTIFIER ::= { docsEqamMib 0 }

docsEqamNotificationObjects OBJECT IDENTIFIER ::= { docsEqamNotifications 1 }

docsEqamNotifyMgmtInetAddressType OBJECT-TYPE
SYNTAX      InetAddressType
MAX-ACCESS  accessible-for-notify
STATUS      current
DESCRIPTION
    "This attribute represents the address type of the EQAM management IP
address."
 ::= { docsEqamNotificationObjects 1 }

docsEqamNotifyMgmtInetAddress OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  accessible-for-notify
STATUS      current
DESCRIPTION
    "This attribute represents the EQAM management IP address, or the FQDN if DNS
is supported."
 ::= { docsEqamNotificationObjects 2 }

docsEqamNotify NOTIFICATION-TYPE
OBJECTS {
    docsDevEvLevel,
    docsDevEvId,
    docsDevEvText,
    sysName,
    docsEqamNotifyMgmtInetAddressType,

```

```

        docsEqamNotifyMgmtInetAddress
    }
    STATUS current
    DESCRIPTION
        "This object corresponds to a generic notification used by the EQAM to
        send events.

        This notification sends additional information about
        the as follows.
        - docsDevEvLevel
          This attribute represents the event level of the event.
          Reference: docsDevEvLevel from DOCS-CABLE-DEVICE-MIB.

        - docsDevEvId
          This attribute represents the event id of the event.
          Reference: docsDevEvId from DOCS-CABLE-DEVICE-MIB.

        - docsDevEvText
          This attribute represents the event text of the event.
          Reference: docsDevEvText from DOCS-CABLE-DEVICE-MIB.

        - docsEqamNotifyMgmtInetAddressType.
          See definition within this MIB Module

        - docsEqamNotifyMgmtInetAddress
          See definition within this MIB Module

    ::= { docsEqamNotifications 2 }

docsEqamObjects OBJECT IDENTIFIER ::= { docsEqamMib 1 }

docsEqamControl OBJECT IDENTIFIER ::= { docsEqamObjects 1 }

docsEqamControlReset OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This attribute controls the administrative reset of the EQAM device.
        If set to 'true' the EQAM is reinitialized. This attribute always report the
        value 'reset'.
        When the EQAM is instructed to reset itself, it MUST execute the following sequence of
        events:
        - Gracefully tear down all sessions if any, i.e., send a session status update to the
        ERM that will trigger a teardown for each active session to the SRM/ERM.
        - Shut down all processes/tasks.
        - Restart."
    DEFVAL { false }
    ::= { docsEqamControl 1 }

docsEqamControlInitCause OBJECT-TYPE
    SYNTAX      INTEGER
                { nms(1),
                  none(2),
                  unknown(3)
                }
    MAX-ACCESS  read-only

    STATUS      current
    DESCRIPTION
        "This attribute indicates the reason for the last reinitialization."
    DEFVAL { none }
    ::= { docsEqamControl 2 }

docsEqamControlSaveCfg OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-write

```

```

STATUS      current
DESCRIPTION
    "This attribute provides a mechanism to save the current EQAM configuration in
the EQAM file system. A set to a non-zero length string representing a valid local
file name, the current running configuration is saved into the file name specified.
File names including directory paths are optional."
DEFVAL { "" }
::= {docsEqamControl 3 }

docsEqamControlUploadCfg OBJECT-TYPE
SYNTAX      SnmpAdminString
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This attribute provides a mechanism to upload the EQAM config file to the
configuration server. When set to a URI, the EQAM performs an upload of the current
config file being used. TFTP URL is a required URI type. Other URI types maybe
supported by the EQAM."
DEFVAL { "" }
::= {docsEqamControl 4 }

docsEqamTime OBJECT IDENTIFIER ::= { docsEqamObjects 2 }

docsEqamTimeNtpMaster OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This attribute represents the Master NTP server. This element is not required
in case ToD is acquired via DHCP.
If DHCP options for ToD are provided and this element is present, the EQAM selects
this element."
DEFVAL { 'H' }
::= {docsEqamTime 1 }

docsEqamTimeNtpBackup OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This attribute represents the backup NTP Server in case the master NTP
fails."
DEFVAL { 'H' }
::= {docsEqamTime 2 }

docsEqamTimeTimeZone OBJECT-TYPE
SYNTAX      SnmpAdminString
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This attribute represents the offset value to the local time to arrive at UTC
Time. The value has the following format: hh[:mm]
The hour (0 <= hh <= 24) is required,
minutes (0 < mm <= 59)
The mm (minutes) is optional.
The hour can be preceded by a minus sign (-)."
DEFVAL { '00' }
::= {docsEqamTime 3 }

docsEqamTimeDaylightSaving OBJECT-TYPE
SYNTAX      SnmpAdminString
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This attribute indicates when to change to and from daylight saving (or
summer) time.
The value has the form:

```

date1/time1,date2/time2,offset

The first date describes when the change from standard to daylight saving time occurs, and the second date describes when the change back happens. Each time field describes when, in current local time, the change to the other time is made.

The format of date is the following:

m.w.d

The dth day ($0 \leq d \leq 6$) of week w of month m of the year ($1 \leq w \leq 5$, $1 \leq m \leq 12$, where week 5 means 'the last d day in month m', which may occur in the fourth or fifth week). Week 1 is the first week in which the dth day occurs. Day zero is Sunday.

The time format is the following: hh:mm

The offset value is the value you must add to the local time to arrive at UTC Time during the daylight saving time. The offset value has the following format: hh[:mm]."

DEFVAL { "" }

::= { docsEqamTime 4 }

docsEqamSyslogServerTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsEqamSyslogServerEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This object represents the syslog server's configuration."

::= { docsEqamObjects 3 }

docsEqamSyslogServerEntry OBJECT-TYPE

SYNTAX DocsEqamSyslogServerEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The Conceptual row of docsEqamSyslogServerTable"

INDEX {

docsEqamSyslogServerIndex

}

::= { docsEqamSyslogServerTable 1 }

DocsEqamSyslogServerEntry ::= SEQUENCE {

docsEqamSyslogServerIndex

Unsigned32,

docsEqamSyslogServerInetAddressType

InetAddressType,

docsEqamSyslogServerInetAddress

InetAddress,

docsEqamSyslogServerEnabled

TruthValue,

docsEqamSyslogRowStatus

RowStatus

}

docsEqamSyslogServerIndex OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This key represents the unique identifier of an instance in this object."

::= { docsEqamSyslogServerEntry 1 }

docsEqamSyslogServerInetAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This attribute indicates the address type of the syslog server IP address.

'dns' support is optional."

DEFVAL { unknown }

::= { docsEqamSyslogServerEntry 2 }

```

docsEqamSyslogServerInetAddress    OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the IP address of the syslog server. If DNS is
        supported, this attribute can contain the FQDN of the syslog server."
    DEFVAL { 'H' }
    ::= { docsEqamSyslogServerEntry 3 }

docsEqamSyslogServerEnabled        OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "Indicates if the syslog server is user for sending syslog messages or is
        disabled."
    DEFVAL { false }
    ::= { docsEqamSyslogServerEntry 4 }

docsEqamSyslogRowStatus            OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
    ::= { docsEqamSyslogServerEntry 5 }

docsEqamRegistrationTable          OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsEqamRegistrationEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object represents the configuration of the ERRP protocol."
    ::= { docsEqamObjects 4 }

docsEqamRegistrationEntry          OBJECT-TYPE
    SYNTAX      DocsEqamRegistrationEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of docsEqamRegistrationTable"
    INDEX {
        docsEqamRegistrationErmName
    }
    ::= { docsEqamRegistrationTable 1 }

DocsEqamRegistrationEntry ::= SEQUENCE {
    docsEqamRegistrationErmName
        SnmpAdminString,
    docsEqamRegistrationErmAddressType
        InetAddressType,
    docsEqamRegistrationErmAddress
        InetAddress,
    docsEqamRegistrationErmPort
        InetPortNumber,
    docsEqamRegistrationErmConnectionType
        INTEGER,
    docsEqamRegistrationHoldTimer
        Unsigned32,
    docsEqamRegistrationConnRetryTimer
        Unsigned32,
    docsEqamRegistrationNextHopAddressDomain
        Unsigned32,
    docsEqamRegistrationCompAddress
        SnmpAdminString,

```

```

docsEqamRegistrationStreamingZone
    SnmpAdminString,
docsEqamRegistrationId
    Unsigned32,
docsEqamRegistrationCost
    Unsigned32,
docsEqamRegistrationCompName
    SnmpAdminString,
docsEqamRegistrationRowStatus
    RowStatus
}

docsEqamRegistrationErmName      OBJECT-TYPE
SYNTAX      SnmpAdminString
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "This key represents the name of the ERM related to this registration
instance. This is an internal reference for associating e.g. QAM channels and input
interfaces to an ERM."
 ::= {docsEqamRegistrationEntry 1 }

docsEqamRegistrationErmAddressType  OBJECT-TYPE
SYNTAX      InetAddressType
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This attribute represents the InetAddress of the ERM."
DEFVAL { unknown }
 ::= {docsEqamRegistrationEntry 2 }

docsEqamRegistrationErmAddress      OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This attribute represents the IP Address of the ERM"
DEFVAL { 'H }
 ::= {docsEqamRegistrationEntry 3 }

docsEqamRegistrationErmPort         OBJECT-TYPE
SYNTAX      InetPortNumber
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This attribute represents the TCP port number used to reach the ERM."
DEFVAL { 0 }
 ::= {docsEqamRegistrationEntry 4 }

docsEqamRegistrationErmConnectionType  OBJECT-TYPE
SYNTAX      INTEGER
            {
                client(1),
                server(2),
                clientAndServer(3)
            }
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This attribute represents the type of TCP connection that must be supported
by the EQAM. The value can be one of the following:

'client' indicates that the EQAM has to initiate the TCP connection with the ERM.

'server' indicates that the EQAM has to wait the TCP connection from the ERM."

```


'clientAndServer' indicates that both EQAM or either EQAM or ERM can initiate the TCP connection.

```
"
    DEFVAL { client }
    ::= {docsEqamRegistrationEntry 5 }
```

docsEqamRegistrationHoldTimer OBJECT-TYPE

```
SYNTAX      Unsigned32
UNITS       "seconds"
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
```

"This attribute represents the number of seconds that the sender proposes for the value of the hold timer.

Upon receipt of an OPEN message, the EQAM MUST calculate the value of the Hold Timer by using the smaller of its configured Hold Time and the Hold Time received in the OPEN message.

The Hold Time MUST be either zero or at least three seconds. An implementation MAY reject connections on the basis of the Hold Time. The calculated value indicates the maximum number of seconds that may elapse between the receipt of successive KEEPALIVE and/or UPDATE messages by the sender."

```
DEFVAL { 3 }
::= {docsEqamRegistrationEntry 6 }
```

docsEqamRegistrationConnRetryTimer OBJECT-TYPE

```
SYNTAX      Unsigned32
UNITS       "seconds"
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
```

"This attribute represents the time in seconds for the connect retry timer. The exact value of the connect retry timer is a local matter, but should be sufficiently large to allow TCP initialization."

```
DEFVAL { 20 }
::= {docsEqamRegistrationEntry 7 }
```

docsEqamRegistrationNextHopAddressDomain OBJECT-TYPE

```
SYNTAX      Unsigned32
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
```

"This attribute represents the address domain number of the next-hop server. The NextHopServer specifies the address to which a manager should use to connect to the component in order to control the resource specified in the reachable route. This parameter is used in the ERRP NextHopServer attribute."

```
DEFVAL { 0 }
::= {docsEqamRegistrationEntry 8 }
```

docsEqamRegistrationCompAddress OBJECT-TYPE

```
SYNTAX      SnmpAdminString
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
```

"This attribute represents the ERRP NextHopServer attribute. This field contains a string that conforms to the following syntax:

CompAddress = host[:port]

host = An FQDN, or an IPv4 address using the textual representation defined in Section 2.1 of [RFC1123], or an IPv6 address using the textual representation defined in Section 2.2 of [RFC4291] and enclosed in '[' and ']' characters.

port = numerical value (1-65535). If the port is empty or not given, the default port 6069 is assumed.

```
"
    DEFVAL { "" }
```

```

 ::= {docsEqamRegistrationEntry 9 }

docsEqamRegistrationStreamingZone    OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the Streaming Zone within which the component
        operates.
        This parameter is used in the ERRP OPEN message. StreamingZone Name is a mandatory
        parameter when supporting video applications. The capability is optional when
        signaling DOCSIS only resources. The value is to be set to the string that represents
        the StreamingZone Name i.e. <region>;.

        The characters comprising the string are in the set within TEXT defined in section
        15.1 of [RFC2326]. Implementations must support minimum string lengths of 64; however
        the composition of the string used is defined by implementation agreements specified
        by the service provider."
    DEFVAL { "" }
    ::= {docsEqamRegistrationEntry 10 }

docsEqamRegistrationId    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the unique identifier for the EQAM device within
        its Streaming Zone. This value may be set to the 4-octet value of an IPv4 address
        assigned to that device. This ID value is determined on startup and must be the same
        for all peer connections. This parameter is used in the ERRP OPEN message header."
    DEFVAL { 0 }
    ::= {docsEqamRegistrationEntry 11 }

docsEqamRegistrationCost    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the static cost for use of this resource."
    DEFVAL { 0 }
    ::= {docsEqamRegistrationEntry 12 }

docsEqamRegistrationCompName    OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The name of the component for which the data in the update message applies.
        This parameter is used in the ERRP OPEN message.

        Component Name is a mandatory parameter when supporting video applications. The
        capability is optional when signaling DOCSIS only resources. The value is to be set
        to the string that represents the Component Name i.e. <region>;.<localname>;
        The characters comprising the string are in the set within TEXT defined in section
        15.1 of [RFC2326]. Implementations must support minimum string lengths of 64; however
        the composition of the string used is defined by implementation agreements specified
        by the service provider.
        "
    DEFVAL { "" }
    ::= {docsEqamRegistrationEntry 13 }

docsEqamRegistrationRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current

```

```

    DESCRIPTION
        "The status of this instance."
    ::= { docsEqamRegistrationEntry 14 }

docsEqamTSInputCfg      OBJECT IDENTIFIER ::= { docsEqamObjects 5 }

docsEqamTSInputCfgUnicastSessionLossTimeout    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "milliseconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This attribute represents the loss of signal timeout in milliseconds for
        unicast input streams. See SCTE-154-4 mpegLossOfSignalTimeout."
    DEFVAL { 40 }
    ::= { docsEqamTSInputCfg 1 }

docsEqamTSInputCfgMulticastSessionLossTimeout    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "milliseconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This attribute represents the loss of signal timeout in milliseconds for the
        multicast input streams."
    DEFVAL { 40 }
    ::= { docsEqamTSInputCfg 2 }

docsEqamTSInputCfgJitterTolerance    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "milliseconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This attribute represents the acceptable delay variation in millisecond for
        incoming streams. The jitter option sets the size of a dejittering buffer that absorbs
        the input jitter of a session."
    DEFVAL { 40 }
    ::= { docsEqamTSInputCfg 3 }

docsEqamTSOutputCfg      OBJECT IDENTIFIER ::= { docsEqamObjects 6 }
docsEqamTSOutputCfgCatInsertRate    OBJECT-TYPE
    SYNTAX      Unsigned32 (0..32)
    UNITS       "tables/second"
    MAX-ACCESS  read-write

    STATUS      current
    DESCRIPTION
        "This attribute represents the CAT insertion rate expressed in tables/second
        (See SCTE-154-4 mpegOutputTSCatInsertRate)."
    DEFVAL { 10 }
    ::= { docsEqamTSOutputCfg 1 }

docsEqamTSOutputCfgPatInsertRate    OBJECT-TYPE
    SYNTAX      Unsigned32 (0..32)
    UNITS       "tables/second"
    MAX-ACCESS  read-write

    STATUS      current
    DESCRIPTION
        "This attribute represents the PAT table interval expressed in tables/second
        (See SCTE-154-4 mpegOutputTSPatInsertRate)."
    DEFVAL { 10 }
    ::= { docsEqamTSOutputCfg 2 }

```

```

docsEqamTSOutputCfgPmtInsertRate    OBJECT-TYPE
    SYNTAX      Unsigned32 (0..32)
    UNITS       "tables/second"
    MAX-ACCESS  read-write

    STATUS      current
    DESCRIPTION
        "This attribute represents the PMT table interval expressed in tables/second
        (See SCTE-154-4 mpegOutputTSPatInsertRate)."
```

DEFVAL { 10 }

::= { docsEqamTSOutputCfg 3 }

```

docsEqamReservedUdpMapTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsEqamReservedUdpMapEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object represents reserved ports to be used for non-video applications."
    ::= { docsEqamObjects 7 }
```

```

docsEqamReservedUdpMapEntry    OBJECT-TYPE
    SYNTAX      DocsEqamReservedUdpMapEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of docsEqamReservedUdpMapTable"
    INDEX {
        docsEqamReservedUdpMapIndex
    }
    ::= { docsEqamReservedUdpMapTable 1 }
```

```

DocsEqamReservedUdpMapEntry ::= SEQUENCE {
    docsEqamReservedUdpMapIndex
        Unsigned32,
    docsEqamReservedUdpMapStartingPort
        Unsigned32,
    docsEqamReservedUdpMapCount
        Unsigned32,
    docsEqamReservedUdpMapRowStatus
        RowStatus
}
```

```

docsEqamReservedUdpMapIndex    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This key represents the unique identifier of an instance in this object."
    ::= { docsEqamReservedUdpMapEntry 1 }
```

```

docsEqamReservedUdpMapStartingPort    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the port range start value for non-video
        applications reserved UDP ports."
    DEFVAL { 0 }
    ::= { docsEqamReservedUdpMapEntry 2 }
```

```

docsEqamReservedUdpMapCount    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
```

```

        "This attribute represents the number of reserved UDP ports starting from
        'StartingPort' attribute value."
        DEFVAL { 0 }
        ::= { docsEqamReservedUdpMapEntry 3 }

docsEqamReservedUdpMapRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
        ::= { docsEqamReservedUdpMapEntry 4 }

docsEqamReservedPidRangeTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsEqamReservedPidRangeEntry
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "This object represents reserved PID range to not be used on ERM assignments."
    ::= { docsEqamObjects 8 }

docsEqamReservedPidRangeEntry OBJECT-TYPE
    SYNTAX      DocsEqamReservedPidRangeEntry
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of docsEqamReservedPidRangeTable"
    INDEX {
        docsEqamReservedPidRangeIndex
    }
    ::= { docsEqamReservedPidRangeTable 1 }

DocsEqamReservedPidRangeEntry ::= SEQUENCE {
    docsEqamReservedPidRangeIndex
        Unsigned32,
    docsEqamReservedPidRangeStartingPid
        HePIDValue,
    docsEqamReservedPidRangeCount
        Unsigned32,
    docsEqamReservedPidRangeDescription
        SnmpAdminString,
    docsEqamReservedPidRangeRowStatus
        RowStatus
}

docsEqamReservedPidRangeIndex OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "This key represents the unique identifier of an instance in this object."
    ::= { docsEqamReservedPidRangeEntry 1 }

docsEqamReservedPidRangeStartingPid OBJECT-TYPE
    SYNTAX      HePIDValue
    MAX-ACCESS   read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the PID range starts for other applications
        reserved PIDs."
    DEFVAL { 0 }
    ::= { docsEqamReservedPidRangeEntry 2 }

docsEqamReservedPidRangeCount OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS   read-create

```

```

    STATUS      current
    DESCRIPTION
        "This attribute represents the number of reserved PIDs starting from
        'StartingPid' attribute value."
    DEFVAL { 0 }
    ::= { docsEqamReservedPidRangeEntry 3 }

docsEqamReservedPidRangeDescription OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the description associated with a PID range
        configured instance."
    DEFVAL { "" }
    ::= { docsEqamReservedPidRangeEntry 4 }

docsEqamReservedPidRangeRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
    ::= { docsEqamReservedPidRangeEntry 5 }

docsEqamDEPICfg OBJECT IDENTIFIER ::= { docsEqamObjects 9 }
docsEqamDEPICfgDepsessionLossto OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "seconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This attribute indicates the Timeout in seconds the EQAM waits after a QAM
        channel session is terminated to advertize the QAM channel as idle to the ERM.
        This attribute is only meaningful for dynamic DEPI session allocation, not for static
        sessions."
    DEFVAL { 0 }
    ::= { docsEqamDEPICfg 1 }

docsEqamEdgeInputTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsEqamEdgeInputEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object represents the configuration of Input Edge parameters."
    ::= { docsEqamObjects 10 }

docsEqamEdgeInputEntry OBJECT-TYPE
    SYNTAX      DocsEqamEdgeInputEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of docsEqamEdgeInputTable"
    INDEX {
        docsEqamEdgeInputName
    }
    ::= { docsEqamEdgeInputTable 1 }

DocsEqamEdgeInputEntry ::= SEQUENCE {
    docsEqamEdgeInputName
        SnmpAdminString,
    docsEqamEdgeInputInetAddressType
        InetAddressType,
    docsEqamEdgeInputInetAddress
        InetAddress,
    docsEqamEdgeInputRowStatus
        RowStatus

```

```

    }

docsEqamEdgeInputName      OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "This key represents the Input interface name. This name corresponds to the
        RFC4133, ENTITY-MIB entPhysicalName."
    ::= { docsEqamEdgeInputEntry 1 }

docsEqamEdgeInputInetAddressType  OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS   read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the IP address type of the 'IpAddress' attribute."
    DEFVAL { unknown }
    ::= { docsEqamEdgeInputEntry 2 }

docsEqamEdgeInputInetAddress      OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS   read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the IP address of the Edge interface. If not
        included, the EQAM should use DHCP to acquire the IP address of the Edge input
        interface."
    DEFVAL { 'H }
    ::= { docsEqamEdgeInputEntry 3 }

docsEqamEdgeInputRowStatus  OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
    ::= { docsEqamEdgeInputEntry 4 }

docsEqamInputRegistrationTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsEqamInputRegistrationEntry
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "This object represents the configuration of Edge ERRP parameters."
    ::= { docsEqamObjects 11 }

docsEqamInputRegistrationEntry  OBJECT-TYPE
    SYNTAX      DocsEqamInputRegistrationEntry
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of docsEqamInputRegistrationTable"
    INDEX {
        docsEqamEdgeInputName
    }
    ::= { docsEqamInputRegistrationTable 1 }

DocsEqamInputRegistrationEntry ::= SEQUENCE {
    docsEqamInputRegistrationGroupName
        SnmpAdminString,
    docsEqamInputRegistrationBandwidth
        Unsigned32,
    docsEqamInputRegistrationErmName
        SnmpAdminString,
    docsEqamInputRegistrationRowStatus
        RowStatus

```

```

    }

docsEqamInputRegistrationGroupName    OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the name of the Edge Input Group associated with
        this input.  This parameter is used in the ERRP Edge Input attribute."
    DEFVAL { "" }
    ::= { docsEqamInputRegistrationEntry 1 }

docsEqamInputRegistrationBandwidth    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the bandwidth of the edge input to be advertized.
        If zero or not present, the EQAM advertize the full bandwidth  of the edge input."
    DEFVAL { 0 }
    ::= { docsEqamInputRegistrationEntry 2 }

docsEqamInputRegistrationErmName      OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the ERM where the QAM channel is advertised. If
        empty, the QAM channel is not advertized. "
    DEFVAL { "" }
    ::= { docsEqamInputRegistrationEntry 3 }

docsEqamInputRegistrationRowStatus    OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
    ::= { docsEqamInputRegistrationEntry 4 }

docsEqamRFPortTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsEqamRFPortEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object represents the configuration of RF ports.
        The parameters configured in a RF port applies to all the QAM channels within the RF
        Port, unless explicit EQAM configuration is defined"
    ::= { docsEqamObjects 12 }

docsEqamRFPortEntry    OBJECT-TYPE
    SYNTAX      DocsEqamRFPortEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of docsEqamRFPortTable"
    INDEX {
        docsEqamRFPortName
    }
    ::= { docsEqamRFPortTable 1 }

DocsEqamRFPortEntry ::= SEQUENCE {
    docsEqamRFPortName
        SnmpAdminString,
    docsEqamRFPortAdminStatus
        INTEGER,
    docsEqamRFPortPower

```



```

        TenthdBmV,
docsEqamRFPortFrequency
        Unsigned32,
docsEqamRFPortModulation
        QAMChannelModulationFormat,
docsEqamRFPortInterleaverMode
        QAMChannelInterleaveMode,
docsEqamRFPortInterleaveLevel
        INTEGER,
docsEqamRFPortAnnex
        INTEGER,
docsEqamRFPortSpectrumInversion
        TruthValue,
docsEqamRFPortLockParameters
        BITS,
docsEqamRFPortCfgNumberChannels
        Unsigned32,
docsEqamRFPortNumberChannels
        Unsigned32,
docsEqamRFPortRowStatus
        RowStatus
    }

docsEqamRFPortName      OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "This key represents the RF port identifier. It corresponds to RFC4133,
ENTITY-MIB entPhysicalName."
    ::= {docsEqamRFPortEntry 1 }

docsEqamRFPortAdminStatus  OBJECT-TYPE
    SYNTAX      INTEGER
        {
            enabled(1),
            disabled(2)
        }
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "This attribute represents the administrative state of the RF Port. Setting
this element to 'disable' results in the RF port being muted. By default this element
reports 'disabled'."
    DEFVAL { enabled }
    ::= {docsEqamRFPortEntry 2 }

docsEqamRFPortPower      OBJECT-TYPE
    SYNTAX      TenthdBmV
    UNITS       "TenthdBmV"
    MAX-ACCESS   read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the power level for the QAM channels in the
containment level."
    DEFVAL { 0 }
    ::= {docsEqamRFPortEntry 3 }

docsEqamRFPortFrequency  OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "Hertz"
    MAX-ACCESS   read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the first carrier of the configured carriers within
the RF port."
    DEFVAL { 0 }

```

```

::= {docsEqamRFPortEntry 4 }

docsEqamRFPortModulation      OBJECT-TYPE
    SYNTAX      QAMChannelModulationFormat
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the Modulation type for the QAM channels in the
containment level."
    DEFVAL {qam256 }
    ::= {docsEqamRFPortEntry 5 }

docsEqamRFPortInterleaverMode OBJECT-TYPE
    SYNTAX      QAMChannelInterleaveMode
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the Interleave mode for the QAM channels in the
containment level."
    DEFVAL {unknown }
    ::= {docsEqamRFPortEntry 6 }

docsEqamRFPortInterleaveLevel OBJECT-TYPE
    SYNTAX      INTEGER
                {
                    level1(1),
                    level(2)
                }
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the interleaver level for FEC coding for the QAM
channels in the containment level."
    DEFVAL { level1 }
    ::= {docsEqamRFPortEntry 7 }

docsEqamRFPortAnnex          OBJECT-TYPE
    SYNTAX      INTEGER
                {
                    unknown(1),
                    other(2),
                    annexA(3),
                    annexB(4),
                    annexC(5)
                }
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the ITU J.83 Annex mode for the QAM channels in the
containment level."
    DEFVAL { annexB }
    ::= {docsEqamRFPortEntry 8 }

docsEqamRFPortSpectrumInversion OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the QAM Signal Spectrum inversion. A value 'true'
indicates channel spectrum is inverted."
    DEFVAL { false }
    ::= {docsEqamRFPortEntry 9 }

docsEqamRFPortLockParameters 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
        "This attribute represents the PHY parameters Lock state of the QAM channels n
the RF Port containment level for DEPI initiated PHY parameters updates. This
parameter is only required for M-CMTS QAMs."
    DEFVAL { 'H' }
    ::= { docsEqamRFPortEntry 10 }

docsEqamRFPortcfgNumberChannels OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the number of QAM channels to configure in the
channel block.
        By default all the channels in the RF port are condigured."
    ::= { docsEqamRFPortEntry 11 }

docsEqamRFPortNumberChannels OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "channels"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This attribute indicates the total number of QAM channels within the RF."
    ::= { docsEqamRFPortEntry 13 }

docsEqamRFPortRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
    ::= { docsEqamRFPortEntry 14 }

docsEqamFiberNodeTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsEqamFiberNodeEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This object represents the list of Fiber Nodes the RF port reaches."
    ::= { docsEqamObjects 13 }

docsEqamFiberNodeEntry OBJECT-TYPE
    SYNTAX      DocsEqamFiberNodeEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of docsEqamFiberNodeTable"
    INDEX {
        docsEqamRFPortName
    }
    ::= { docsEqamFiberNodeTable 1 }

DocsEqamFiberNodeEntry ::= SEQUENCE {
    docsEqamFiberNodeName
        SnmpAdminString,
    docsEqamFiberNodeRowStatus

```

```

        RowStatus
    }

docsEqamFiberNodeName OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "This attribute represents the Fiber Node Name associated with the RF Port"
    DEFVAL { "" }
    ::= { docsEqamFiberNodeEntry 1 }

docsEqamFiberNodeRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The status of this instance."
    ::= { docsEqamFiberNodeEntry 2 }

docsEqamChannelTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsEqamChannelEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "This object represents the configuration of QAM channels."
    ::= { docsEqamObjects 14 }

docsEqamChannelEntry OBJECT-TYPE
    SYNTAX      DocsEqamChannelEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "The Conceptual row of docsEqamChannelTable"
    INDEX {
        docsEqamChannelPhysName
    }
    ::= { docsEqamChannelTable 1 }

DocsEqamChannelEntry ::= SEQUENCE {
    docsEqamChannelPhysName
        SnmpAdminString,
    docsEqamChannelRFPortPhysName
        SnmpAdminString,
    docsEqamChannelAdminStatus
        INTEGER,
    docsEqamChannelPower
        Unsigned32,
    docsEqamChannelFrequency
        Unsigned32,
    docsEqamChannelModulation
        QAMChannelModulationFormat,
    docsEqamChannelInterleaverMode
        QAMChannelInterleaveMode,
    docsEqamChannelInterleaverLevel
        INTEGER,
    docsEqamChannelAnnex
        INTEGER,
    docsEqamChannelSpectrumInversion
        TruthValue,
    docsEqamChannelName
        SnmpAdminString,
    docsEqamChannelGroupName
        SnmpAdminString,
    docsEqamChannelErmName
        SnmpAdminString,
    docsEqamChannelLockParameters

```

```

        BITS,
docsEqamChannelAllocationType
        INTEGER,
docsEqamChannelERRPAdvertizing
        TruthValue,
docsEqamChannelDepiUdpPortMapping
        InetPortNumber,
docsEqamChannelRowStatus
        RowStatus
    }

docsEqamChannelPhysName    OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This key represents the QAM channel identifier. It corresponds to RFC4133,
ENTITY-MIB entPhysicalName."
    ::= {docsEqamChannelEntry 1 }

docsEqamChannelRFPortPhysName    OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the RF port identifier of the QAM channel. It
corresponds to RFC4133, ENTITY-MIB entPhysicalName."
    DEFVAL { "" }
    ::= {docsEqamChannelEntry 2 }

docsEqamChannelAdminStatus    OBJECT-TYPE
    SYNTAX      INTEGER
        {
            enabled(1),
            disabled(2)
        }
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the administrative state of the QAM channel.
Setting this element to 'disable' results in the RF port being muted. By default this
element reports 'disabled'."
    DEFVAL { enabled }
    ::= {docsEqamChannelEntry 3 }

docsEqamChannelPower    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "TenthdBmV"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the power level for the QAM channel"
    DEFVAL { 0 }
    ::= {docsEqamChannelEntry 4 }

docsEqamChannelFrequency    OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "Hertz"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the carrier frequency of the QAM channel."
    DEFVAL { 0 }
    ::= {docsEqamChannelEntry 5 }

docsEqamChannelModulation    OBJECT-TYPE
    SYNTAX      QAMChannelModulationFormat

```

```

MAX-ACCESS read-create
STATUS current
DESCRIPTION
    "This attribute represents the Modulation type for the QAM channel."
DEFVAL { qam256 }
::= {docsEqamChannelEntry 6 }

docsEqamChannelInterleaverMode OBJECT-TYPE
SYNTAX QAMChannelInterleaveMode
MAX-ACCESS read-create
STATUS current
DESCRIPTION
    "This attribute represents the Interleave mode of the QAM channel."
DEFVAL { unknown }
::= {docsEqamChannelEntry 7 }

docsEqamChannelInterleaverLevel OBJECT-TYPE
SYNTAX INTEGER
{
    level1(1),
    level(2)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
    "This attribute represents the interleaver level for FEC coding of the QAM
channel."
DEFVAL { level1 }
::= {docsEqamChannelEntry 8 }

docsEqamChannelAnnex OBJECT-TYPE
SYNTAX INTEGER
{
    unknown(1),
    other(2),
    annexA(3),
    annexB(4),
    annexC(5)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
    "This attribute represents the ITU J.83 Annex mode of the QAM channel."
DEFVAL { annexB }
::= {docsEqamChannelEntry 9 }

docsEqamChannelSpectrumInversion OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION
    "This attribute represents the QAM Signal Spectrum inversion. A value 'true'
indicates channel spectrum is inverted."
DEFVAL { false }
::= {docsEqamChannelEntry 10 }

docsEqamChannelName OBJECT-TYPE
SYNTAX SnmpAdminString
MAX-ACCESS read-create
STATUS current
DESCRIPTION
    "This attribute represents the name of the QAM channel. This parameter is used
in the ERRP QAM Name attribute."
DEFVAL { "" }
::= {docsEqamChannelEntry 11 }

docsEqamChannelGroupName OBJECT-TYPE

```

```

SYNTAX      SnmpAdminString
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This attribute represents the address field in the WithdrawnRoute and
    ReachableRoutes ERRP attributes. "
DEFVAL { "" }
 ::= {docsEqamChannelEntry 12 }

docsEqamChannelErmName      OBJECT-TYPE
SYNTAX      SnmpAdminString
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This attribute represents the ERM where the QAM channel is advertised. If
    empty, the QAM channel is not advertized."
DEFVAL { "" }
 ::= {docsEqamChannelEntry 13 }

docsEqamChannelLockParameters      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
    "This attribute represents the PHY parameters Lock state of the QAM channels
    for DEPI initiated PHY parameters updates. This parameter is only required for M-CMTS
    QAMs."
DEFVAL { 'H' }
 ::= {docsEqamChannelEntry 14 }

docsEqamChannelAllocationType      OBJECT-TYPE
SYNTAX      INTEGER
            {
                docsisOnly(1),
                videoOnly(2),
                any(3)
            }
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This attribute indicates the mechanisms authorized to reserve and control the
    QAM channels. The possible values are:

    'docsisOnly': the QAM channel can be allocated statically or dynamically to DOCSIS.

    'videoOnly'  the QAM channel can be allocated statically or dynamically to video.

    'any' indicates the he QAM channel can be allocated statically or dynamically to
    video and/or DOCSIS."
DEFVAL { any }
 ::= {docsEqamChannelEntry 15 }

docsEqamChannelERRPAdvertizing      OBJECT-TYPE
SYNTAX      TruthValue
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION

```

"CM This attribute represents the ERRP advertisement state of the QAM channel. If set to 'true' the QAM channel is advertised, otherwise is not advertised. This is primarily useful when configuring QAM channels statically and not desire to make the channel part of the ERM channel list. "

```
DEFVAL { true }
::= {docsEqamChannelEntry 16 }
```

docsEqamChannelDepiUdpPortMapping OBJECT-TYPE

```
SYNTAX      InetPortNumber
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
```

"This attribute represents the static UDP port assignment for a DEPI UDP tunnel. The value zero indicates there is not static mapping or not applicable. "

```
DEFVAL { 0 }
::= {docsEqamChannelEntry 17 }
```

docsEqamChannelRowStatus OBJECT-TYPE

```
SYNTAX      RowStatus
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
```

"The status of this instance."

```
::= { docsEqamChannelEntry 18 }
```

docsEqamTSOutputTable OBJECT-TYPE

```
SYNTAX      SEQUENCE OF DocsEqamTSOutputEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
```

"This object represent transport stream configuration parameters for QAM channels."

```
::= { docsEqamObjects 15 }
```

docsEqamTSOutputEntry OBJECT-TYPE

```
SYNTAX      DocsEqamTSOutputEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
```

"The Conceptual row of docsEqamTSOutputTable"

```
INDEX {
    docsEqamChannelPhysName
}
```

```
::= {docsEqamTSOutputTable 1 }
```

DocsEqamTSOutputEntry ::= SEQUENCE {

```
docsEqamTSOutputTSID
    Unsigned32,
docsEqamTSOutputNitPid
    Unsigned32,
docsEqamTSOutputCaPid
    Unsigned32,
docsEqamTSOutputRowStatus
    RowStatus
}
```

docsEqamTSOutputTSID OBJECT-TYPE

```
SYNTAX      Unsigned32
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
```

"This attribute represents the TSID of the output transport stream. See SCTE-154-4 mpegOutputTSTSID."

```
DEFVAL { 0 }
::= {docsEqamTSOutputEntry 1 }
```



```

docsEqamTSOutputNitPid    OBJECT-TYPE
    SYNTAX      Unsigned32 (0..255)
    MAX-ACCESS   read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the NIT PID of the outgoing transport stream. See
    SCTE-154-4 mpegOutputTSNitPid."
    DEFVAL { 0 }
    ::= { docsEqamTSOutputEntry 2 }

docsEqamTSOutputCaPid     OBJECT-TYPE
    SYNTAX      Unsigned32 (0..255)
    MAX-ACCESS   read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the CA PID of the outgoing transport stream. See
    SCTE-154-4 mpegOutputTSCaPid."
    DEFVAL { 0 }
    ::= { docsEqamTSOutputEntry 3 }

docsEqamTSOutputRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
    ::= { docsEqamTSOutputEntry 4 }

docsEqamStaticUdpMapTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsEqamStaticUdpMapEntry
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "This object represent the UDP port ranges used for static video sessions."
    ::= { docsEqamObjects 16 }

docsEqamStaticUdpMapEntry OBJECT-TYPE
    SYNTAX      DocsEqamStaticUdpMapEntry
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "The Conceptual row of docsEqamStaticUdpMapTable"
    INDEX {
        docsEqamChannelPhysName
    }
    ::= { docsEqamStaticUdpMapTable 1 }

DocsEqamStaticUdpMapEntry ::= SEQUENCE {
    docsEqamStaticUdpMapStartingPort
        Unsigned32,
    docsEqamStaticUdpMapCount
        Unsigned32,
    docsEqamStaticUdpMapRowStatus
        RowStatus
}

docsEqamStaticUdpMapStartingPort OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS   read-create
    STATUS      current
    DESCRIPTION
        "This attribute represents the UDP port range start value for static
    session."
    DEFVAL { 0 }
    ::= { docsEqamStaticUdpMapEntry 1 }

docsEqamStaticUdpMapCount    OBJECT-TYPE

```

```

SYNTAX      Unsigned32
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This attribute represents the number of reserved UDP ports starting from
    'StartingPort' attribute value."
DEFVAL { 0 }
 ::= { docsEqamStaticUdpMapEntry 2 }

docsEqamStaticUdpMapRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this instance."
    ::= { docsEqamStaticUdpMapEntry 3 }

docsEqamSessionLogCtrl    OBJECT IDENTIFIER ::= { docsEqamObjects 17 }
docsEqamSessionLogCtrlMaxSize OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "entries"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This attribute represents the maximum number of mpeg session entries that the
        'SessionLog' can report."

Upon a set operation, the lower value between the set value and the supported number
of log entries is used."
    DEFVAL { 0 }
    ::= { docsEqamSessionLogCtrl 1 }

docsEqamSessionLogCtrlCurrentSize OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "entries"
    MAX-ACCESS  read-only

    STATUS      current
    DESCRIPTION
        "This attribute represents the current number of mpeg session entries in the
        'SessionLog'."
    ::= { docsEqamSessionLogCtrl 2 }

docsEqamSessionLogCtrlAging OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "seconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This attribute represents the Aging threshold for the 'SessionLog'.
        Periodically, a process scans through 'SessionLog' and removes those sessions that
        have a 'SessionLog::StopTime' greater than this threshold in minutes. A value of 0
        means no aging out log entries."
    DEFVAL { 10080 }
    ::= { docsEqamSessionLogCtrl 3 }

docsEqamSessionLogCtrlClearAll OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This attribute provides a control to clear the 'Session log'.
        If set to 'true', all entries from the 'SessionLog' object are removed. Reading this
        attribute always returns 'false'."
    DEFVAL { false }
    ::= { docsEqamSessionLogCtrl 4 }

```

docsEqamSessionLogCtrlType OBJECT-TYPE

SYNTAX INTEGER
 {
 allSessions(1),
 sessionsWithExceptions(2)
 }

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This attribute indicates which type of videos sessions are reported in the 'SessionLog' object.

The value 'allSessions' indicates all video sessions are reported in the 'SessionLog'

The value 'sessionsWithExceptions' indicates that video sessions are reported when either of the conditions below occur:

- The Continuity Errors or Synch Loss Packets of the associated session is greater than zero.
- The Dropped packets, FIFO Overflow or FIFO Underflow is greater than zero."

DEFVAL { sessionsWithExceptions }

::= { docsEqamSessionLogCtrl 5 }

docsEqamSessionLogTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsEqamSessionLogEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This object represent the list of terminated MPEG video sessions.

All parameters values reported for a session are determined at the time of the session deletion."

::= { docsEqamObjects 18 }

docsEqamSessionLogEntry OBJECT-TYPE

SYNTAX DocsEqamSessionLogEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The Conceptual row of docsEqamSessionLogTable"

INDEX {
 docsEqamSessionLogIndex
}

::= { docsEqamSessionLogTable 1 }

DocsEqamSessionLogEntry ::= SEQUENCE {

docsEqamSessionLogIndex

Unsigned32,

docsEqamSessionLogId

Unsigned32,

docsEqamSessionLogInputIfIndex

InterfaceIndex,

docsEqamSessionLogOutputIfIndex

InterfaceIndex,

docsEqamSessionLogInputContinuityErrors

Counter32,

docsEqamSessionLogInputSyncLossPkts

Counter32,

docsEqamSessionLogOutputTotalPkts

Counter64,

docsEqamSessionLogOutputDroppedPkts

Counter32,

docsEqamSessionLogOutputFifoOverflow

Counter32,

docsEqamSessionLogOutputFifoUnderflow

Counter32,

docsEqamSessionLogMode

INTEGER,

docsEqamSessionLogStartTime

```

        DateAndTime,
docsEqamSessionLogStopTime
        DateAndTime,
docsEqamSessionLogInputAddrType
        InetAddressType,
docsEqamSessionLogInputSrcInetAddr
        InetAddress,
docsEqamSessionLogInputSrcPort
        InetPortNumber,
docsEqamSessionLogInputDstInetAddr
        InetAddress,
docsEqamSessionLogInputDstPort
        InetPortNumber
    }

docsEqamSessionLogIndex    OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This key represents the unique identifier of an instance in this object.
This attribute's behavior consist of an incremental value. If the maximum number of
instances is reached the log instance with the lower key value is deleted and the new
instance is added."
    ::= {docsEqamSessionLogEntry 1 }

docsEqamSessionLogId      OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This attribute identifies the MPEG Session Id of this entry."
    ::= {docsEqamSessionLogEntry 2 }

docsEqamSessionLogInputIfIndex    OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This attribute identifies the interface index of the mpeg source stream."
    ::= {docsEqamSessionLogEntry 3 }

docsEqamSessionLogOutputIfIndex    OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This attribute identifies the interface index of the mpeg output stream."
    ::= {docsEqamSessionLogEntry 4 }

docsEqamSessionLogInputContinuityErrors    OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "errors"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This attribute indicates the total number of continuity counter errors for
the session. See SCTE154-4 mpegInputStatsContinuityErrors for details of the count
definition."
    ::= {docsEqamSessionLogEntry 5 }

docsEqamSessionLogInputSyncLossPkts    OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "packets"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION

```

"This attribute indicates the total number of MPEG packets that had missing sync byte for the session. See SCTE 154-4 mpInputStatsSyncLossPackets for details of the count definition."

::= {docsEqamSessionLogEntry 6 }

docsEqamSessionLogOutputTotalPkts OBJECT-TYPE

SYNTAX Counter64

UNITS "packets"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This attribute indicates the total number of MPEG output packets for the session."

::= {docsEqamSessionLogEntry 7 }

docsEqamSessionLogOutputDroppedPkts OBJECT-TYPE

SYNTAX Counter32

UNITS "packets"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This attribute indicates the total number of MPEG output packets dropped for the session."

::= {docsEqamSessionLogEntry 8 }

docsEqamSessionLogOutputFifoOverflow OBJECT-TYPE

SYNTAX Counter32

UNITS "overflows"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This attribute indicates the total number of FIFO overflows of the session."

::= {docsEqamSessionLogEntry 9 }

docsEqamSessionLogOutputFifoUnderflow OBJECT-TYPE

SYNTAX Counter32

UNITS "underflows"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This attribute indicates the total number of FIFO underflows of the session."

::= {docsEqamSessionLogEntry 10 }

docsEqamSessionLogMode OBJECT-TYPE

SYNTAX INTEGER

```
{
    other(1),
    passThrough(2),
    multiplexing(3)
}
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This attribute indicates the type of session. See SCTE 154-4 docsQamVideoSessionMode for definitions of the type of sessions."

::= {docsEqamSessionLogEntry 11 }

docsEqamSessionLogStartTime OBJECT-TYPE

SYNTAX DateAndTime

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This attribute indicates the date and time when the session was setup."

::= {docsEqamSessionLogEntry 12 }

docsEqamSessionLogStopTime OBJECT-TYPE

SYNTAX DateAndTime

```

MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "This attribute indicates the date and time when the session was deleted."
 ::= {docsEqamSessionLogEntry 13 }

docsEqamSessionLogInputAddrType OBJECT-TYPE
    SYNTAX InetAddressType
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "This attribute indicates the address type associated with the input transport
        stream of the session. The value 'unknown' indicates no IP transport associated to the
        transport stream. The value 'dns' is not used."
    ::= {docsEqamSessionLogEntry 14 }

docsEqamSessionLogInputSrcInetAddr OBJECT-TYPE
    SYNTAX InetAddress
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "This attribute indicates the source address of the IP flow contained in the
        session.
        For Multicast it represents the Source Specific Multicast IP Address of the UDP IP
        flow.
        For unicast UDP IP flows is either the value 0.0.0.0 if the IP source address is
        unknown or irrelevant for the origination transport stream."
    ::= {docsEqamSessionLogEntry 15 }

docsEqamSessionLogInputSrcPort OBJECT-TYPE
    SYNTAX InetPortNumber
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "This attribute indicates the source port of the UDP IP flow of the input
        transport stream."
    ::= {docsEqamSessionLogEntry 16 }

docsEqamSessionLogInputDstInetAddr OBJECT-TYPE
    SYNTAX InetAddress
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "This attribute indicates the destination address of the IP flow contained in
        the session.
        For multicast it represents the group address of the SSM origination input TS. For
        unicast UDP IP flows is either the value 0.0.0.0 if the IP destination address is
        unknown or irrelevant for the origination input stream."
    ::= {docsEqamSessionLogEntry 17 }

docsEqamSessionLogInputDstPort OBJECT-TYPE
    SYNTAX InetPortNumber
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "This attribute indicates the UDP destination port of the UDP IP flow of the
        input transport stream."
    ::= {docsEqamSessionLogEntry 18 }

-- Conformance Definitions
docsEqamMibConformance OBJECT IDENTIFIER ::= { docsEqamMib 2 }
docsEqamMibCompliances OBJECT IDENTIFIER ::= { docsEqamMibConformance 1 }
docsEqamMibGroups OBJECT IDENTIFIER ::= { docsEqamMibConformance 2 }

docsEqamFullCompliance MODULE-COMPLIANCE
    STATUS current

```

```

DESCRIPTION
    "The compliance statement for the full implementation of
    the MIB Module."
MODULE -- this MODULE
MANDATORY-GROUPS {
    docsEqamGroup
}
::= { docsEqamMibCompliances 1 }

docsEqamFullCompliance MODULE-COMPLIANCE
STATUS      current
DESCRIPTION
    "The compliance statement for the read-only implementation of
    the MIB Module."
MODULE -- this MODULE
MANDATORY-GROUPS {
    docsEqamReadGroup
}
::= { docsEqamMibCompliances 2 }

docsEqamReadGroup OBJECT-GROUP
OBJECTS {
    docsEqamControlReset,
    docsEqamControlInitCause,
    docsEqamControlSaveCfg,
    docsEqamControlUploadCfg,
    docsEqamSessionLogId,
    docsEqamSessionLogInputIfIndex,
    docsEqamSessionLogOutputIfIndex,
    docsEqamSessionLogInputContinuityErrors,
    docsEqamSessionLogInputSyncLossPkts,
    docsEqamSessionLogOutputTotalPkts,
    docsEqamSessionLogOutputDroppedPkts,
    docsEqamSessionLogOutputFifoOverflow,
    docsEqamSessionLogOutputFifoUnderflow,
    docsEqamSessionLogMode,
    docsEqamSessionLogStartTime,
    docsEqamSessionLogStopTime,
    docsEqamSessionLogInputAddrType,
    docsEqamSessionLogInputSrcInetAddr,
    docsEqamSessionLogInputSrcPort,
    docsEqamSessionLogInputDstInetAddr,
    docsEqamSessionLogInputDstPort,
    docsEqamNotifyMgmtInetAddressType,
    docsEqamNotifyMgmtInetAddress,
    docsEqamSessionLogCtrlMaxSize,
    docsEqamSessionLogCtrlCurrentSize,
    docsEqamSessionLogCtrlAging,
    docsEqamSessionLogCtrlClearAll,
    docsEqamSessionLogCtrlType,
    docsEqamTimeNtpMaster,
    docsEqamTimeNtpBackup,
    docsEqamTimeTimeZone,
    docsEqamTimeDaylightSaving,
    docsEqamSyslogServer,
    docsEqamSyslogServerInetAddressType,
    docsEqamSyslogServerInetAddress,
    docsEqamSyslogServerEnabled,
    docsEqamSyslogRowStatus,
    docsEqamRegistrationErmAddressType,
    docsEqamRegistrationErmAddress,
    docsEqamRegistrationErmPort,
    docsEqamRegistrationErmConnectionType,
    docsEqamRegistrationHoldTimer,
    docsEqamRegistrationConnRetryTimer,
    docsEqamRegistrationNextHopAddressDomain,
    docsEqamRegistrationCompAddress,

```

```

docsEqamRegistrationStreamingZone,
docsEqamRegistrationId,
docsEqamRegistrationCost,
docsEqamRegistrationCompName,
docsEqamRegistrationRowStatus,
docsEqamTSOutputCfgCatInsertRate,
docsEqamTSOutputCfgPatInsertRate,
docsEqamTSOutputCfgPmtInsertRate,
docsEqamTSInputCfgUnicastSessionLossTimeout,
docsEqamTSInputCfgMulticastSessionLossTimeout,
docsEqamTSInputCfgJitterTolerance,
docsEqamReservedUdpMapStartingPort,
docsEqamReservedUdpMapCount,
docsEqamReservedUdpMapRowStatus,
docsEqamReservedPidRangeStartingPid,
docsEqamReservedPidRangeCount,
docsEqamReservedPidRangeDescription,
docsEqamReservedPidRangeRowStatus,
docsEqamEdgeInputInetAddressType,
docsEqamEdgeInputInetAddress,
docsEqamEdgeInputRowStatus,
docsEqamInputRegistrationGroupName,
docsEqamInputRegistrationBandwidth,
docsEqamInputRegistrationErmName,
docsEqamInputRegistrationRowStatus,
docsEqamRFPortAdminStatus,
docsEqamRFPortPower,
docsEqamRFPortFrequency,
docsEqamRFPortModulation,
docsEqamRFPortInterleaveMode,
docsEqamRFPortInterleaveLevel,
docsEqamRFPortAnnex,
docsEqamRFPortSpectrumInversion,
docsEqamRFPortLockParameters,
docsEqamRFPortCfgNumberChannels,
docsEqamRFPortNumberChannels,
docsEqamRFPortRowStatus,
docsEqamFiberNodeName,
docsEqamFiberNodeRowStatus,
docsEqamChannelRFPortPhysName,
docsEqamChannelAdminStatus,
docsEqamChannelPower,
docsEqamChannelFrequency,
docsEqamChannelModulation,
docsEqamChannelInterleaveMode,
docsEqamChannelInterleaveLevel,
docsEqamChannelAnnex,
docsEqamChannelSpectrumInversion,
docsEqamChannelName,
docsEqamChannelGroupName,
docsEqamChannelErmName,
docsEqamChannelLockParameters,
docsEqamChannelAllocationType,
docsEqamChannelERRPAdvertizing,
docsEqamChannelDepiUdpPortMapping,
docsEqamChannelRowStatus,
docsEqamDEPICfgDepiSessionLossT0,
docsEqamTSOutputTSID,
docsEqamTSOutputNitPid,
docsEqamTSOutputCaPid,
docsEqamTSOutputRowStatus,
docsEqamStaticUdpMapStartingPort,
docsEqamStaticUdpMapCount,
docsEqamStaticUdpMapRowStatus
}
STATUS      current
DESCRIPTION

```



```
"Group of objects for the full implementation
of the MIB module."
 ::= { docsEqamGroups 1 }

docsEqamReadGroup OBJECT-GROUP
  OBJECTS {
    docsEqamControlReset,
    docsEqamControlInitCause,
    docsEqamControlSaveCfg,
    docsEqamControlUploadCfg,
    docsEqamSessionLogId,
    docsEqamSessionLogInputIfIndex,
    docsEqamSessionLogOutputIfIndex,
    docsEqamSessionLogInputContinuityErrors,
    docsEqamSessionLogInputSyncLossPkts,
    docsEqamSessionLogOutputTotalPkts,
    docsEqamSessionLogOutputDroppedPkts,
    docsEqamSessionLogOutputFifoOverflow,
    docsEqamSessionLogOutputFifoUnderflow,
    docsEqamSessionLogMode,
    docsEqamSessionLogStartTime,
    docsEqamSessionLogStopTime,
    docsEqamSessionLogInputAddrType,
    docsEqamSessionLogInputSrcInetAddr,
    docsEqamSessionLogInputSrcPort,
    docsEqamSessionLogInputDstInetAddr,
    docsEqamSessionLogInputDstPort,
    docsEqamNotifyMgmtInetAddressType,
    docsEqamNotifyMgmtInetAddress,
    docsEqamSessionLogCtrlMaxSize,
    docsEqamSessionLogCtrlCurrentSize,
    docsEqamSessionLogCtrlAging,
    docsEqamSessionLogCtrlClearAll,
    docsEqamSessionLogCtrlType,
    docsEqamTimeNtpMaster,
    docsEqamTimeNtpBackup,
    docsEqamTimeTimeZone,
    docsEqamTimeDaylightSaving,
    docsEqamSyslogServer,
    docsEqamSyslogServerInetAddressType,
    docsEqamSyslogServerInetAddress,
    docsEqamSyslogServerEnabled,
    docsEqamRegistrationErmAddressType,
    docsEqamRegistrationErmAddress,
    docsEqamRegistrationErmPort,
    docsEqamRegistrationErmConnectionType,
    docsEqamRegistrationHoldTimer,
    docsEqamRegistrationConnRetryTimer,
    docsEqamRegistrationNexthopAddressDomain,
    docsEqamRegistrationCompAddress,
    docsEqamRegistrationStreamingZone,
    docsEqamRegistrationId,
    docsEqamRegistrationCost,
    docsEqamRegistrationCompName,
    docsEqamTSOutputCfgCatInsertRate,
    docsEqamTSOutputCfgPatInsertRate,
    docsEqamTSOutputCfgPmtInsertRate,
    docsEqamTSInputCfgUnicastSessionLossTimeout,
    docsEqamTSInputCfgMulticastSessionLossTimeout,
    docsEqamTSInputCfgJitterTolerance,
    docsEqamReservedUdpMapStartingPort,
    docsEqamReservedUdpMapCount,
    docsEqamReservedPidRangeStartingPid,
    docsEqamReservedPidRangeCount,
    docsEqamReservedPidRangeDescription,
    docsEqamEdgeInputInetAddressType,
    docsEqamEdgeInputInetAddress,
```

```

docsEqamInputRegistrationGroupName,
docsEqamInputRegistrationBandwidth,
docsEqamInputRegistrationErmName,
docsEqamRFPortAdminStatus,
docsEqamRFPortPower,
docsEqamRFPortFrequency,
docsEqamRFPortModulation,
docsEqamRFPortInterleaverMode,
docsEqamRFPortInterleaveLevel,
docsEqamRFPortAnnex,
docsEqamRFPortSpectrumInversion,
docsEqamRFPortLockParameters,
docsEqamRFPortCfgNumberChannels,
docsEqamRFPortNumberChannels,
docsEqamFiberNodeName,
docsEqamChannelRFPortPhysName,
docsEqamChannelAdminStatus,
docsEqamChannelPower,
docsEqamChannelFrequency,
docsEqamChannelModulation,
docsEqamChannelInterleaverMode,
docsEqamChannelInterleaveLevel,
docsEqamChannelAnnex,
docsEqamChannelSpectrumInversion,
docsEqamChannelName,
docsEqamChannelGroupName,
docsEqamChannelErmName,
docsEqamChannelLockParameters,
docsEqamChannelAllocationType,
docsEqamChannelERRPAdvertizing,
docsEqamChannelDepiUdpPortMapping,
docsEqamDEPICfgDepiSessionLossTO,
docsEqamTSOutputTSID,
docsEqamTSOutputNitPid,
docsEqamTSOutputCaPid,
docsEqamStaticUdpMapStartingPort,
docsEqamStaticUdpMapCount
}
STATUS      current
DESCRIPTION
    "Group of objects for the read-only implementation
    of the MIB module."
::= { docsEqamGroups 2 }
END

```

Appendix I Acknowledgements

On behalf of the cable industry and our member companies, CableLabs would like to thank the following individuals who contributed to the development of this specification:

Contributor	Company Affiliation
Ian Wheelock	ARRIS
Tom Williams	ARRIS
Charlie Bergren	CableLabs
Eduardo Cardona	CableLabs
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Greg White	CableLabs
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Walt Michel	Comcast
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Chuck Hasek	Time Warner Cable

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