Superseded

Cable Data Services

DOCSIS® Provisioning of EPON Specifications

DPoE™ Operations and Support System Interface Specification

DPoE-SP-OSSIv1.0-I01-110225

ISSUED

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Document Status Sheet

Document Control Number:	DPoE-SP-OSSIv1.0-I01-110225			
Document Title:	DPoE™ Operations and Support System Interface Specification			
Revision History:	I01 - Released 02/25/11			
Date:	February 25, 2011			
Status:	~~Work in Progress~~	~~Draft~~	**Issued**	~~Closed~~
Distribution Restrictions:	~~Author Only~~	~~CL/Member~~	~~CL/ Member/ Vendor~~	**Public**

Key to Document Status Codes

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

Trademarks

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1 INTRODUCTION

Comcast Corporation, Time Warner Cable, and Bright House Networks collaborated to develop the interoperability requirements to support business services products using Ethernet Passive Optical Network (EPON) as an access technology.

DOCSIS Provisioning of EPON (DPoE) is a joint effort of operators, vendors, and suppliers to support EPON technology using existing DOCSIS-based back office systems and processes.

Ethernet PON or EPON is an [802.3] standard for a passive optical network (PON). A PON is a specific type of multi-access optical network. A multi-access optical network is an optical fiber based network technology that permits more than two network elements to transmit and receive on the same fiber. Appendix I in [DPoE-SP-ARCHv1.0] has a more detailed explanation of multi-access optical networks.

This version of the DPoE specifications is focused on DOCSIS-based provisioning and operations of Internet Protocol (IP) using DOCSIS High Speed Data (HSD), or IP(HSD) for short, and Metro Ethernet Forum (MEF) services. DPoE Networks offer IP(HSD) services functionally equivalent to DOCSIS networks, where the DPoE System acts like a DOCSIS CMTS and the DPoE System and DPoE Optical Network Unit (ONU) to appear to act like a DOCSIS CM.

1.1 DPoE Technology Introduction

DPoE technology was established with the following common requirements already developed by operators. Each of the participant operators had previously selected 1G-EPON and 10G-EPON as the appropriate technology for one or more applications. EPON is a widely-deployed technology with a sufficient and large supply of vendors offering a variety of products for each component of the access network. 10G-EPON technology is now becoming available and is backwards compatible with 1G-EPON. A 1G-EPON network can be incrementally upgraded to 10G-EPON, adding or replacing ONUs one at a time if required. 1G-EPON and 10G-EPON are compatible with [SCTE 174] (RFoG).

The EPON protocol [802.3ah] and the amendment for 10G-EPON [802.3av] support a centralized operator-based controller (OLT) architecture with low cost Layer 2 access devices (ONU). The basic service mapping architecture in EPON is to map Ethernet (or IP) frame header information (such as addresses, IP DiffServ Code Points, Ethernet Q tag, S-VLAN/C-VLAN ID, ISID, bridge address, or other marking) to a logical circuit called a Logical Link Identifier (LLID) in [802.3ah]. The service function is similar to that used in DOCSIS networks in many ways because it is based on a centralized scheduler and uses an LLID which functions like an SID, supports both unicast and broadcast, and has other similarities.

Existing [802.3ah] EPON systems do interoperate within the strict definitions of 1G-EPON. Experience with lab testing, field trials, and deployments has shown operators that 1G-EPON OLT and ONU systems typically only interoperate with a single port ONU. This is because [802.3ah] specifies the interfaces on the PON (the DPoE TU interface) but does not specify any of the other system interfaces. For example, an OLT from vendor A will register an ONU from vendor B, but it is not possible to construct a VLAN from the DPoE MN interface to an S interface. This is a well-recognized limitation of [802.3ah]. The challenge is that neither 1G-EPON nor 10G-EPON specify OAMP to forward traffic between NNI ports and the PON, or UNI ports and the PON. This is not different from other Ethernet standards. For example, if two Ethernet switches from two different vendors are connected, each switch must typically be configured independently. The challenge for EPON is that the remote device (the ONU) cannot be reached, and therefore cannot be configured. A solution to this problem must then be based on developing a common (standard) method of reaching the controller for the ONU, identifying the ONU capabilities, and providing that information to the OLT so that it can configure a working end to forwarding service (in both directions).

Even if EPON had solved that provisioning challenge, there are no standard management interfaces for the ongoing operations and maintenance of the network, including fault management, performance management, security, etc. Operators already have fully working and scaled-out systems that solve these challenges for DOCSIS networks. One of the primary goals for DPoE specifications is to use the existing DOCSIS back office infrastructure to scale up EPON-based business services.

1.2 Scope

This specification identifies requirements for the adaptation or additions to DOCSIS specifications that are required to support DPoE Networks related to the Operations Support System functional area.

This specification also:

- Provides interoperability with existing DOCSIS-based back-end provisioning and management systems for EPON-based devices;
- Re-uses as much of the existing DOCSIS OSSI specification as possible while providing requirements that document how existing OSSI requirements for CMTS and CM devices will be mapped to the DPoE System and DPoE ONU (Optical Network Unit) devices;
- Re-uses and extends the existing DOCSIS L2VPN specification [L2VPN] to support DPoE based Metro Ethernet Forum (MEF) services;
- Specifies interoperable implementations for various DPoE vendors.

Due to operator requirements, some features specified in [OSSIv3.0], such as IPDR, support for IPv6 addresses, and support for DOCSIS Multicast, were deemed out of scope for this version of the specification.

1.3 Goals

Collectively, the operators started the DPoE specification development to accomplish the following objectives:

- Identify and document the common requirements for triple play services for business customers over EPON.
- Adapt DOCSIS-based back office provisioning and operations models to EPON. This is the core objective of DPoE specifications.
- Develop consensus on additional requirements above and beyond DOCSIS specifications to take advantage of the capabilities of EPON. These are focused in the area of Ethernet services and MEF integration.
- Continue to leverage the supply chain and economic benefits of a large base of suppliers and high-volume supply chain in optics, subsystems, and network systems based on a commodity EPON technology. Doing so requires adapting operator processes and networks to the EPON system rather than making any changes to the EPON systems.
- Positioning DPoE specifications to continue to leverage those same benefits for 10G-EPON.
- Work with the established EPON vendor community to assure that these strategies can be effective to mutually develop DPoE Networks, and to create a marketplace for success for multiple vendors to provide solutions for the variety of needs within the operator environment.

1.4 Requirements

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

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

1.5 Organization of Specifications

The DPoE specifications are organized around existing DOCSIS specifications. The purpose of matching DPoE specification documents to existing CableLabs DOCSIS, IEEE, IETF, and MEF requirements is to facilitate the mapping of services from existing DOCSIS infrastructure to DPoE infrastructure, and to provide an organization that will be easy to maintain as related (referenced) standards, recommendations, or specifications undergo independent changes.

There are two types of documents in the DPoE specifications. The first includes informative and requirements documents called specifications that detail the specific requirements for products claiming compliance with the specifications. The DPoE specifications also include a new kind of document that does not fit into any of the above categories. The IP Network Elements (IP NE) Requirements [DPoE-SP-IPNEv1.0] are a set of common requirements for the management of IP network elements that operators have developed, which are above and beyond the requirements in DOCSIS specifications, but are nonetheless required in DOCSIS CMTS products today. These are not specifications because no new protocols or algorithms are provided. Most of the requirements in IP NE are existing requirements based on IEEE, IETF, or other network management standards.

The DPoE documents are detailed in Section 1.6 of this document and duplicated, for reference, in each of the DPoE specifications.

1.6 DPoE Specifications

This document is one in a series of eight (8) documents comprising the DPoE specifications. Collectively these documents represent the operators' requirements for EPON-based commercial services.

Table 1 - DPoE Specifications

Document	Document Title	Description
DPoE-SP-ARCHv1.0	DPoE Architecture Specification	DOCSIS Provisioning of EPON introduction, architecture, and narrative. Specifies fundamental architectural requirements (those that apply to more than one specification). Explains the purpose of each document below.

Document	Document Title	Description
DPoE-SP-OAMv1.0	DPoE OAM Extensions Specification	Extensions beyond [802.3ah] and [802.3av] requirements.
DPoE-SP-PHYv1.0	DPoE Physical Layer Specification	Using the EPON PHY, the DPoE PHY specification makes mandatory some options within EPON and adds some additional requirements.
DPoE-SP-SECv1.0	DPoE Security and Certificate Specification	Specifications for support for DOCSIS network and system interfaces to provide transparent support of DOCSIS device authentication, code verification, and additional security for a DPoE implementation.
DPoE-SP-IPNEv1.0	DPoE IP Network Element Requirements	Best practices and operator requirements for IP network element management and operations. This document includes CMTS-like IP router requirements. This document recommends practices not currently covered by any existing DOCSIS specifications.
DPoE-SP-MULPIv1.0	DPoE MAC and Upper Layer Protocols Requirements	Specifications for support of a subset of DOCSIS 3.0 MULPI functionality with additional EPON requirements.
DPoE-SP-MEFv1.0	DPoE Metro Ethernet Forum Specification	Specifications for Metro Ethernet services added to DOCSIS static configuration provisioning model.
DPoE-SP-OSSIv1.0	DPoE Operations and Support System Interface Specification	Specifications for support of a subset of DOCSIS 3.0 OSSI functionality with additional EPON requirements.

1.7 Reference Architecture

The DPoE reference architecture identifies the elements that a DPoE Network minimally requires to illustrate and communicate the physical hardware and logical software interfaces between the functional subsystems of the DPoE architecture. The principal elements in the architecture are the DPoE System that resides in the operator network, and the DPoE ONU which may be an off the shelf EPON ONU, EPON SFP-ONU, or an EPON ONU with additional subsystems. The remaining elements in the architecture are existing servers and systems in the operator's network. All of the server elements have connectivity through an IP (TCP/IP) network. Transport of bearer traffic, and (in some cases) Layer 2 OAM signaling are available through either IP or Layer 2 Ethernet-based Network Interfaces.

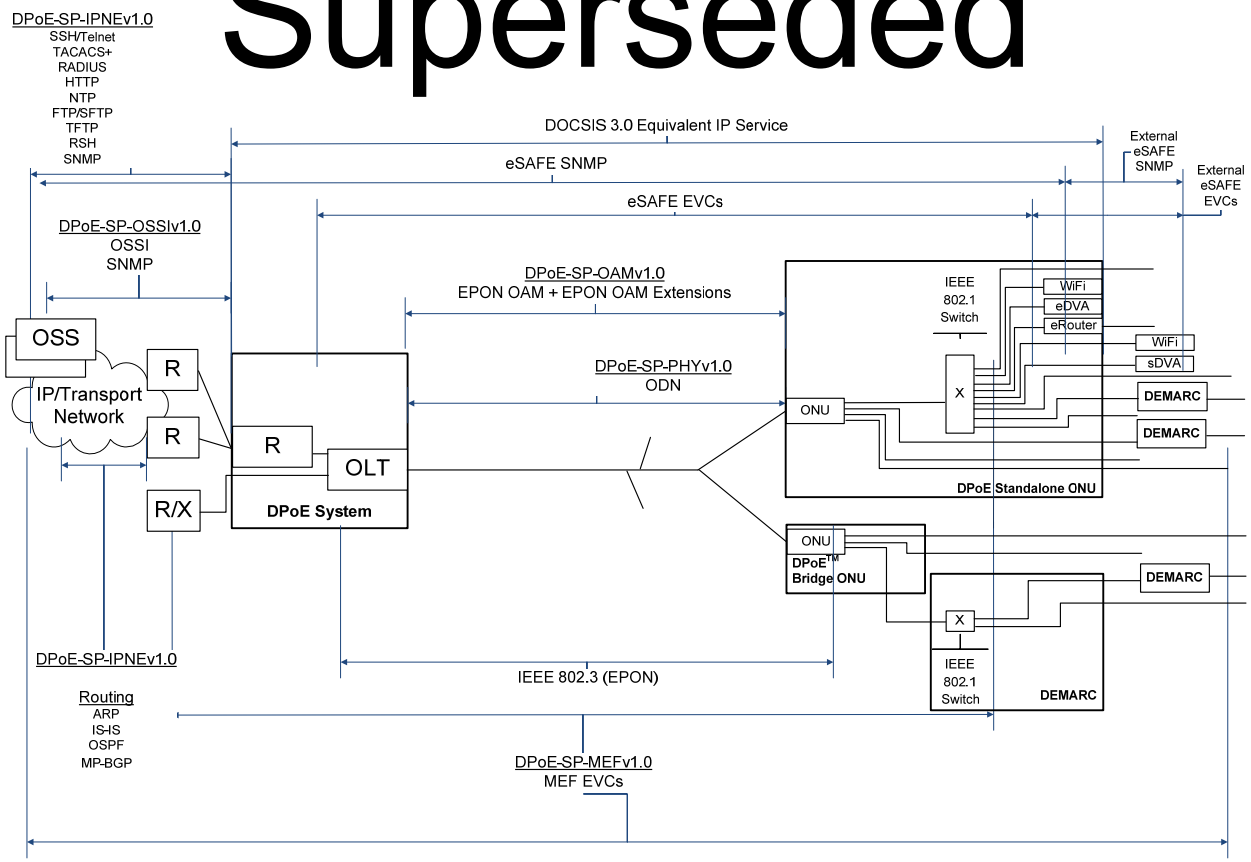

Figure 1 - DPoE Reference Architecture

1.8 DPoE Interfaces and Reference Points

The DPoE interfaces and reference points provide a basis for the description and enumeration of DPoE specifications for the DPoE architecture. Each interface or reference point indicates a point between separate sub-systems. The reference points have protocols that run across them, or have a common format of bearer traffic (with no signaling protocol). All of the interfaces are bi-directional interfaces that support two-way communications. The protocols in DPoE specifications operate within different layers based on the [802.3], [802.1], IETF, MEF, and CableLabs specifications. The C reference points are uni-directional for upstream (C_O) or downstream (C_S) classification, respectively.

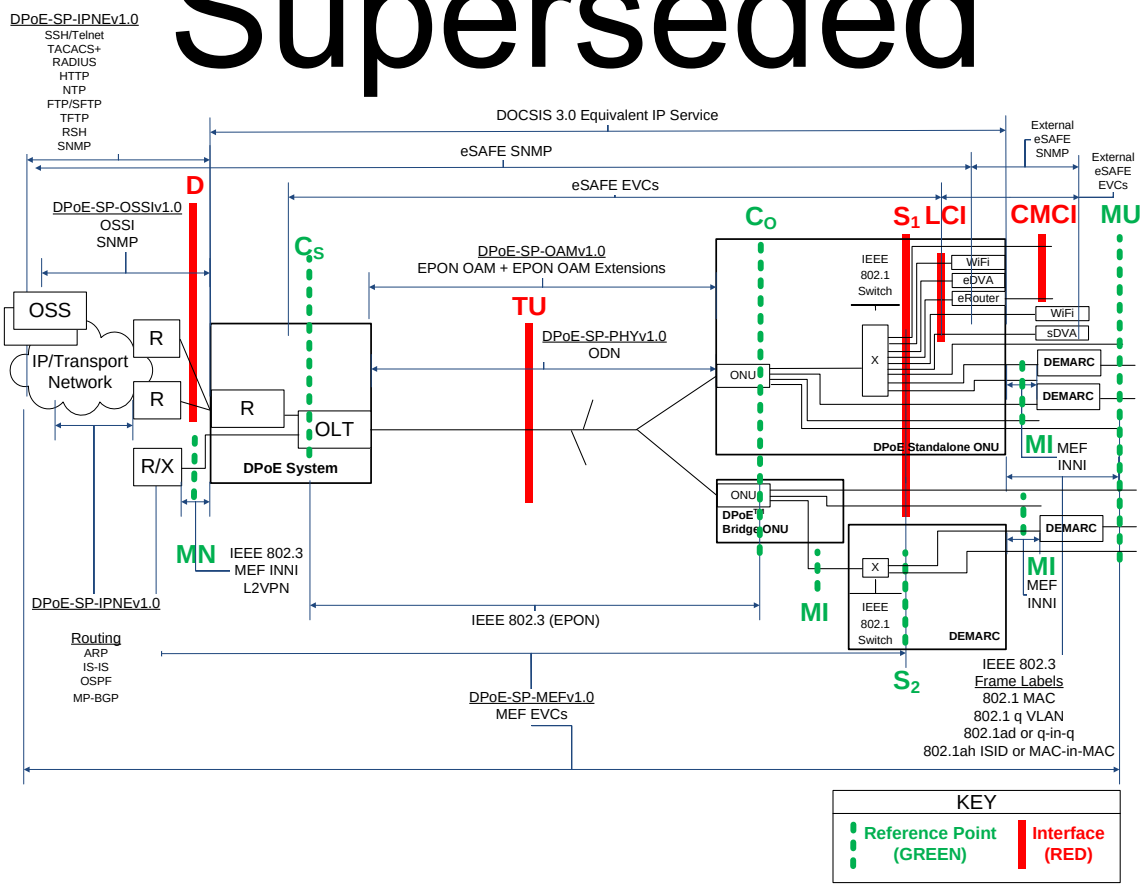

Figure 2 - DPoE Interfaces and Reference Points

Table 2 - DPoE Interface and Reference Point Descriptions

Interface or Reference Point		Interface or Reference Point Description
MN		The MN interface is an [802.3] interface for Ethernet (or MEF or L2VPN emulated) services only. It serves the role of a MEF INNI or L2VPN NSI. It is an NNI for Metro Ethernet services only.
D		The D interface is the DOCSIS IP NNI interface. It is an operator network facing interface, sometimes called a Network to Network Interface (NNI) or Network Systems Interface (NSI) in DOCSIS specifications. The D interface allows a DPoE System to communicate with an IP network. The D interface carries all IP management traffic including OSSI and IP NE traffic. The D interface carries all DOCSIS IP service traffic.
TU		The TU interface is a short form of expressing the interface between the DPoE System and the DPoE ONU.
C		The C reference point is used for explanation of traffic ingress to a DPoE classifier.
	C_O	The C_O reference point is used for explanation of traffic ingress to a DPoE ONU upstream classifier.
	C_S	The C_S reference point is used for explanation of traffic ingress to a DPoE System downstream classifier.

Interface or Reference Point		Interface or Reference Point Description
S		The S interface is an IEEE 802 interface. The S interface may be an internal interface (such as [802.3] across a GMII SERDES or XGMII interface in an SFP-ONU, SFP+ONU or XFP-ONU) or it may be an external Ethernet interface. S_1 is an interface for a DPoE Standalone ONU. S_2 is a reference point used for explanation of services with the DPoE Bridge ONU.
	S_1	The S_1 interfaces are the general case of all interfaces on a DPoE Standalone ONU. S_1 interfaces may be CMCI, LCI, MI, or MU interfaces.
	S_2	The S_2 reference point is used for explanation of traffic ingress to and egress from interfaces on a DEMARC device in a DPoE System. Although there are no specifications or requirements for the S_2 reference point, informative text refers to the S_2 reference point to provide the full context for the use of a DPoE Bridge ONU in a DEMARC device providing Metro Ethernet services.
LCI		The Logical CPE Interface (LCI) interface is an eDOCSIS interface as defined in [eDOCSIS]. The eDOCSIS architecture is [802.1d] MAC based according to the DOCSIS 3.0 specifications; however, DOCSIS L2VPN clearly supports [802.1q] switching. In practice, therefore, the eDOCSIS interface consists of a DOCSIS classifier and [802.1] switch as illustrated. The function of a DOCSIS classifier is in part replaced by forwarding (tagging and encapsulation) in MEF and in part covered by classifiers in [DPoE-SP-MULPIv1.0].
CMCI		CMCI is the DPoE interface equivalent of the DOCSIS Cable Modem CPE Interface as defined in [CMCIv3.0]. This is the service interface for DOCSIS-based IP services.
MI		MI is usually an S interface (or S reference point) that operates as a MEF INNI. A DPoE ONU that provides a MEF INNI has an MI interface. A DPoE ONU can have MU as an interface and an MI reference point on different S interfaces in a single DPoE ONU. The MI interface or reference point is an [802.3] interface (or reference point) between a DPoE ONU and a DEMARC device.
MU		MU is usually an S interface (or S reference point) that operates as a MEF UNI. A DPoE ONU that directly provides a MEF UNI (MU) interface has MU as an interface. A DPoE ONU can have MU as an interface and an MI reference point on different S interfaces in a single DPoE ONU. The MU interface or reference point is an [802.3] interface (or reference point) between a DPoE ONU or a DEMARC device and a customer's equipment.

2 REFERENCES

2.1 Normative References

In order to claim compliance with this specification, it is necessary to conform to the following standards and other works as indicated, in addition to the other requirements of this specification. Notwithstanding, intellectual property rights may be required to use or implement such normative references. At the time of publication, the editions indicated were valid. All references are subject to revision, and users of this document are encouraged to investigate the possibility of applying the most recent editions of the documents listed below. References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific. For a non-specific reference, the latest version applies.

[802.1]	Refers to entire suite of IEEE 802.1 standards unless otherwise specified.
[802.1d]	IEEE Std 802.1d™-2004, IEEE Standard for Local and Metropolitan Area Networks: Media Access Control (MAC) Bridges
[802.1q]	IEEE Std. 802.1q-2009, IEEE Standard for Local and Metropolitan Area Networks-Virtual Bridged Local Area Networks, January 2010.
[802.3]	IEEE 802.3-2008, Carrier Sense Multiple Access with Collision Detection (CSMA/CD) access method and Physical Layer specifications, January 2008.
[802.3ah]	IEEE 802.3ah™-2004: Amendment to IEEE 802.3™-2005: Media Access Control Parameters, Physical Layers, and Management Parameters for Subscriber Access Networks, now part of [802.3].
[802.3av]	IEEE Std. 802.3av-2009, IEEE Standard for Information Technology-Part 3: Amendment 1: Physical Layer Specifications and Management Parameters for 10Gb/s Passive Optical Networks, October 2009.
[DPoE-SP-IPNEv1.0]	DPoE-SP-IPNEv1.0, DOCSIS Provisioning of EPON, IP Network Element Requirements, Cable Television Laboratories, Inc.
[DPoE-SP-MEFv1.0]	DPoE-SP-MEFv1.0, DOCSIS Provisioning of EPON, Metro Ethernet Forum Specification, Cable Television Laboratories, Inc.
[DPoE-SP-MULPIv1.0]	DPoE-SP-MULPIv1.0, DOCSIS Provisioning of EPON, MAC and Upper Layer Protocols Requirements, Cable Television Laboratories, Inc.
[DPoE-SP-OAMv1.0]	DPoE-SP-OAMv1.0, DOCSIS Provisioning of EPON, OAM Extensions Specification, Cable Television Laboratories, Inc.
[DPoE-SP-PHYv1.0]	DPoE-SP-PHYv1.0, DOCSIS Provisioning of EPON, Physical Layer Specification, Cable Television Laboratories, Inc.
[DPoE-SP-SECv1.0]	DPoE-SP-SECv1.0, DOCSIS Provisioning of EPON, Security and Certificate Specification, Cable Television Laboratories, Inc.
[OSSIv2.0]	Data-Over-Cable Service Interface Specifications, Operations Support System Interface Specification, CM-SP-OSSIv2.0, Cable Television Laboratories, Inc.
[OSSIv3.0]	Data-Over-Cable Service Interface Specifications, Operations Support System Interface Specification, CM-SP-OSSIv3.0, Cable Television Laboratories, Inc.
[RFC 2579]	IETF RFC 2579, Textual Conventions for SMIv2, K. McCloghrie, J. Schoenwaelder, J. Case, M. Rose, S. Waldbusser, April 1999.
[RFC 2863]	IETF RFC 2863, The Interfaces Group MIB, K. McCloghrie, F. Kastenholz, June 2000.

[RFC 3164] IETF RFC 3164, C. Lonvick, The BSD syslog Protocol, August 2001.

[RFC 3411] IETF RFC 3411/STD0062, D. Harrington, et al., An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks, December 2002.

[RFC 3413] IETF RFC 3413/STD0062, D. Levi, et al., Simple Network Management Protocol (SNMP) Applications, December 2002.

[RFC 3414] IETF RFC 3414/STD0062, U. Blumenthal and B. Wijnen, User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3), December 2002.

[RFC 3415] IETF RFC 3415, B. Wijnen, et al., View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP), December 2002.

[RFC 3416] IETF RFC 3416, R. Presuhn, Ed., Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP), December 2002.

[RFC 3584] IETF RFC 3584, R. Frye, et al., Coexistence between Version 1, Version 2, and Version 3 of the Internet-Standard and Network Management Framework, March 2000.

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2.2 Informative References

This specification uses the following informative references.

[802.1ag] IEEE Std 802.1ag–2007, IEEE Standard for Local and metropolitan Area Networks – Virtual Bridged Local Area Networks Amendment 5: Connectivity Fault Management, December 2007.

[CMCIv3.0] Data-Over-Cable Service Interface Specifications, Cable Modem to Customer Premise Equipment Interface Specification, CM-SP-CMCIv3.0, Cable Television Laboratories, Inc.

[DOCSIS] Refers to entire suite of DOCSIS 3.0 specifications unless otherwise specified.

[DPoE-SP-ARCHv1.0] DPoE-SP-ARCHv1.0, DOCSIS Provisioning of EPON, DPoE Architecture Specification, , Cable Television Laboratories, Inc.

[eDOCSIS] Data-Over-Cable Service Interface Specifications, eDOCSIS Specification, CM-SP-eDOCSIS, Cable Television Laboratories, Inc.

[IPDR/BSR] IPDR Business Solution Requirements - Network Data Management Usage (NDM-U), Version 3.5.0.1, IPDR.org, November 2004.

[IPDR/SP v2.3] IPDR/SP Protocol Specification, Version 2.3, IPDR.org, March 2007.

[IPDR/SP] IPDR/SP Protocol Specification, Version 2.1, IPDR.org, November 2004.

[L2VPN] Data-Over-Cable Service Interface Specifications, Layer 2 Virtual Private Networks, CM-SP-L2VPN, Cable Television Laboratories, Inc.

[MULPIv3.0] Data-Over-Cable Service Interface Specifications, MAC and Upper Layer Protocols Interface Specification, CM-SP-MULPIv3.0, Cable Television Laboratories, Inc.

[PC EMv1.0] PacketCable 1.0 Event Messages Specification, PKT-SP-EM-C01-071129, November 29, 2007, Cable Television Laboratories, Inc.,

[RFC 2790] IETF RFC 2790, Host Resources MIB, S. Waldbusser, P. Grillo, March 2000

[RFC 3014] IETF RFC 3014, Notification Log MIB, R. Kavasseri, November 2000.

[RFC 3417] IETF RFC 3417/STD0062, Transport Mappings for the Simple Network Management Protocol, R. Presuhn, Ed., December 2002.

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[RFC 3433] IETF RFC 3433, Entity Sensor Management Information Base, A. Bierman, D. Romascanu, K.C. Norseth, December 2002

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[RFC 4022] IETF RFC 4022, Management Information Base for the Transmission Control Protocol (TCP) , R. Raghunarayan, Ed., March 2005

[RFC 4113] IETF RFC 4113, Management Information Base for the User Datagram Protocol (UDP), B. Fenner, J. Flick, June 2005

[RFC 4131] IETF RFC 4131, Management Information Base for Data Over Cable Service Interface Specification (DOCSIS) Cable Modems and Cable Modem Termination Systems for Baseline Privacy, S. Green, K. Ozawa, E. Cardona, Ed., A. Katsnelson, September 2005.

[RFC 4133] IETF RFC 4133, Entity MIB (Version 3), A. Bierman, K. McCloghrie, August 2005

[RFC 4546] IETF RFC 4546 Radio Frequency (RF) Interface Management Information Base for Data over Cable Service Interface Specifications (DOCSIS) 2.0, D. Raftus, E. Cardona, June 2006.

[RFC 4837] IETF RFC 4837, Managed Objects of Ethernet Passive Optical Networks (EPON), L. Khermosh, July 2007.

[SCTE 174] SCTE 174 2010, Radio Frequency over Glass Fiber-to-the-Home Specification.

2.3 Reference Acquisition

- Cable Television Laboratories, Inc., 858 Coal Creek Circle, Louisville, CO 80027;
  Phone +1-303-661-9100; Fax +1-303-661-9199; http://www.cablelabs.com
- Internet Engineering Task Force (IETF) Secretariat, 48377 Fremont Blvd., Suite 117, Fremont, California 94538, USA, Phone: +1-510-492-4080, Fax: +1-510-492-4001, http://www.ietf.org

- Institute of Electrical and Electronics Engineers (IEEE), +1-800-422-4633 (USA and Canada); http://www.ieee.org
- IPDR, 13 Mizzenmast Road, Nantucket, MA, 02554; Phone +1-508-325-6169; Fax +1-508-325-6169. Internet: http://www.ipdr.org
- SCTE, Society of Cable Telecommunications Engineers Inc., 140 Philips Road, Exton, PA 19341 Phone: +1-800-542-5040, Fax: +1-610-363-5898, Internet: http://www.scte.org/

3 TERMS AND DEFINITIONS

3.1 DPOE ELEMENTS

DPoE Network This term means the entire network described in Figure 3 from the D or MN interface to the LCI, S, MI, or MU interface (see Figure 2 for interface and reference points), depending on the service being described. In no case does the term DPoE Network ever include a DEMARC device.

DPoE System This term means all of the collected elements that provide the DPoE function within the operator's network facilities. This includes the EPON OLT function, DOCSIS service functions required for the D interface, Metro Ethernet service functions required for the MN interface, and IP NE element management, routing and forwarding functions specified in [DPoE-SP-IPNEv1.0]. The DPoE System is depicted in Figure 3.

DPoE ONU This term means a DPoE-capable ONU that complies with all of the DPoE specifications. There are two types of DPoE ONUs. These are the DPoE Standalone ONU and the DPoE Bridge ONU.

DPoE Standalone ONU This term means a DPoE ONU that is a standalone ONU capable of providing IP or Ethernet services directly to customer premise equipment or transport of traffic to an external DEMARC device.

DPoE Bridge ONU This term means a DPoE ONU that is capable of [802.1] forwarding but cannot do all of the encapsulation functions required to be a DPoE Standalone ONU. Examples include an SFP-ONU and some simple EPON chipset-only based ONUs.

DEMARC Short form of "Demarcation Device." This term means the device, owned and operated by the operator that provides the demarcation (sometimes called the UNI interface) to the customer. Some architectures describe this device as the CPE (as in DOCSIS, DSL, or Broadband Forum Models) or the NID (as in the MEF model).

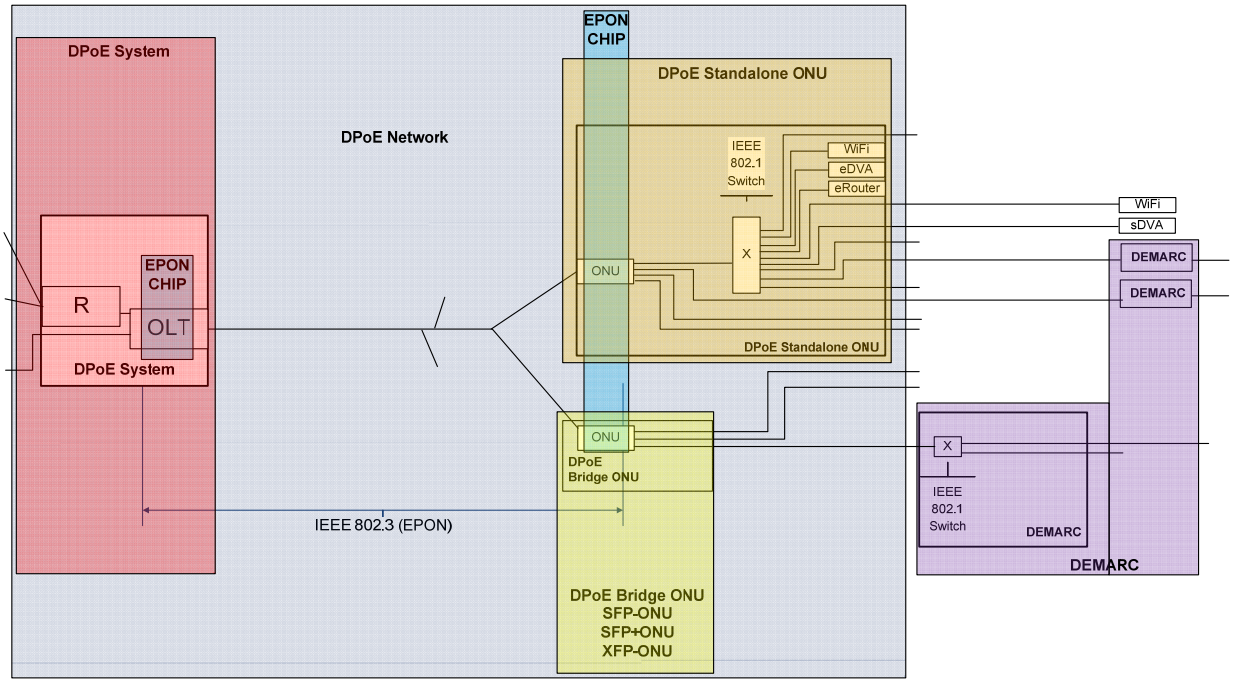

Figure 3 - DPoE Elements

3.2 Other Terms

1G-EPON	EPON as defined in [802.3ah]
10G-EPON	EPON as defined in [802.3ah] and amended in [802.3av]
Cable Modem CPE Interface	CMCI as defined in [MULPIv3.0]
Customer Premise Equipment (CPE)	Customer Premise Equipment as defined in [DOCSIS]
Multi-Layer Switching (MLS)	A switch that can switch based on Layer 2, Layer 3, Layer 4, etc.
Ethernet Passive Optical Network (EPON)	Refers to both 1G-EPON and 10G-EPON collectively
EPON Operations and Maintenance Messaging (OAM)	EPON OAM messaging as defined in [802.3ah] and [DPoE-SP-OAMv1.0]; Ethernet OAM is not the same as EPON OAM; Ethernet OAM is [802.1ag]
Logical CPE Interface	LCI as defined in [eDOCSIS]
Network Interface Device (NID)	A DEMARC device in DPoE specifications

4 ABBREVIATIONS AND ACRONYMS

This specification uses the following abbreviations:

BSoD Business Services over DOCSIS

CM Cable Modem

CMCI Cable Modem to CPE Interface

CMTS Cable Modem Termination System

CoS Class of Service

CPE Customer Premise Equipment

DPoE DOCSIS Provisioning of EPON

DPoE-OAM DOCSIS Provisioning of EPON OAM

eCM embedded Cable Modem

eDVA embedded Digital Voice Adapter

ENNI External Network to Network Interface

EPON Ethernet Passive Optical Network

eSAFE embedded Service/Application Functional Entity

EVC Ethernet Virtual Connection

FEC Forward error correction

Gbps Gigabits per second (as used in the industry)

INNI Internal Network to Network Interface

IP Internet Protocol

LCI Logical CPE Interface as defined in [eDOCSIS]

LLID Logical Link IDentifier

MEF Metro Ethernet Forum

MEN Metro Ethernet Network

MI MEF INNI Interface at a customer premise

MN MEF INNI Interface to operators MEN

MPCP Multi-Point Control Protocol

MSC Maximum Scheduled Codes

MU MEF UNI Interface

NID Network Interface Device

NNI Network to Network Interface

OAM EPON Operations Administration and Maintenance messaging

ODN Optical Distribution Network

OLT Optical Line Termination

ONU Optical Network Unit

OSC	Optical Splitter Combiner
OSSI	Operations Support System Interface
PHY	PHYsical Layer
PON	Passive Optical Network
QoS	Quality of Service
R	IP Router
RFC	Request For Comments
RS	Reconciliation Sublayer
SFP	Small Form-factor Pluggable
SFP+	Small Form-factor Pluggable Plus (+)
SSD	Secure Software Download
UNI	User Network Interface
vCM	virtual Cable Modem
X	IEEE Ethernet Switch (Generic)
XFP	X Form-factor Pluggable

5 DPOE PROVISIONING OF EPON OSSI

The primary goal for the DOCSIS Provisioning of EPON OSSI is that the EPON components, as much as possible, appear as existing DOCSIS components to the existing DOCSIS Operations Support System (OSS) Infrastructure.

Figure 4 summarizes the primary systems and elements involved in existing DOCSIS networks. The OSS Infrastructure contains the servers used to provision, manage, authorize, and control the network.

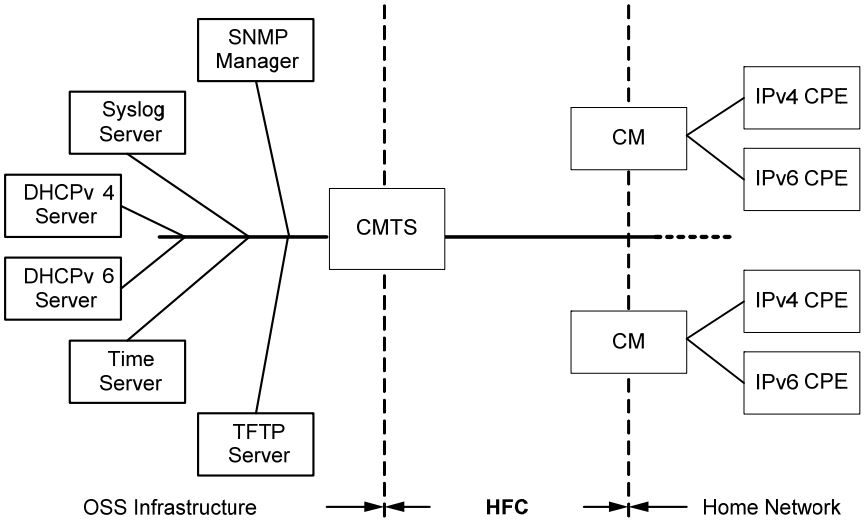

Figure 4 - DOCSIS OSSI Overview

In the DPoE Network (as shown in Figure 5), the same OSS Infrastructure components are used to manage and provision the DPoE headend device (DPoE System) containing the OLT with EPON interfaces as well as the DPoE ONU devices.

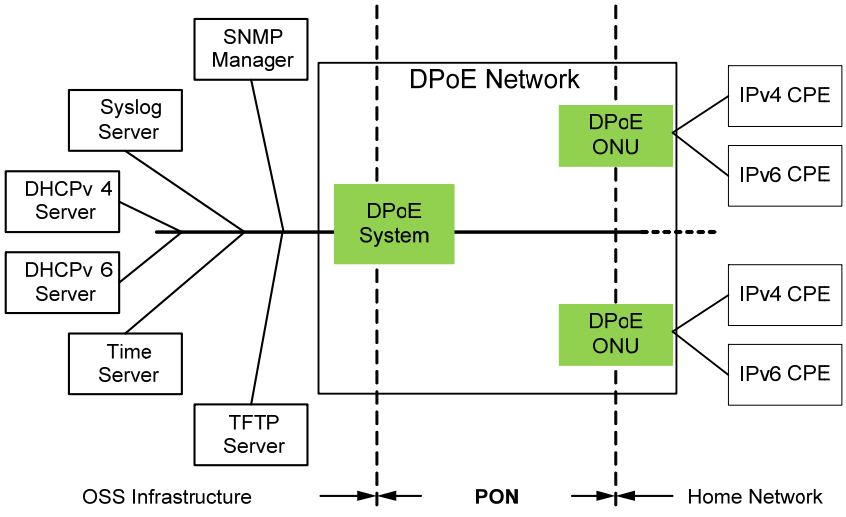

Figure 5 - DPoE OSSI Overview

Because the DPoE specifications were designed to support an existing market of CMs that do not contain an IP stack, DPoE ONUs need not be directly addressable using IP. This specification requires that the DPoE System MUST obtain an IP address and modem provisioning file from the OSS provisioning systems on behalf of the ONU as part of the modem registration process outlined in [DPoE-SP-MULPIv1.0].

Further, the DPoE System MUST provide management capabilities on behalf of the ONU for all IP-based management functions when the OSS management systems direct management requests to a given ONU. The concept of a "virtual CM" (vCM) is introduced in this specification to represent the IP-addressable management entity maintained and controlled within the DPoE System. When the DPoE System receives management requests for a vCM, it converts those requests into the appropriate DPoE OAM requests and sends the OAM requests to the DPoE ONU as needed. See [DPoE-SP-OAMv1.0] for a full description of the DPoE OAM messaging. The vCM is used to map requirements that were previously required of the DOCSIS CM to requirements on the DPoE System.

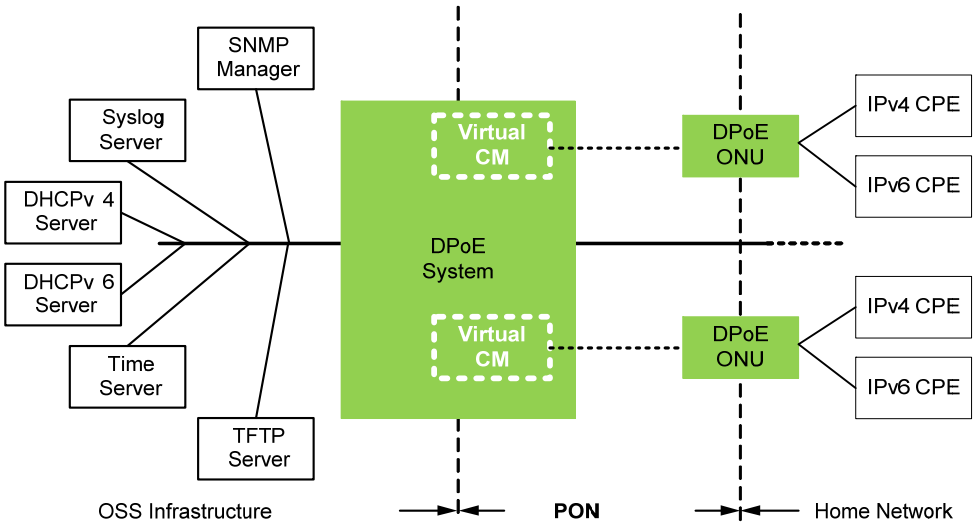

Figure 6 - DPoE Virtual CM (vCM) Concept

6 OSSI REQUIREMENTS

This section captures all of the requirements on the DPoE System and DPoE ONU based on the existing DOCSIS OSSI specification along with EPON-specific requirements.

Requirements in this specification may also be introduced based on requirements from other DPoE specifications, when those specifications need to modify the existing DOCSIS management model. This specification, in turn, also generates requirements on the DPoE OAM specification [DPoE-SP-OAMv1.0] for those OAM messages transmitted between the DPoE System and DPoE ONU used to satisfy OSSI requirements.

6.1 DOCSIS OSSI Requirements

This section summarizes the requirements on the DPoE System and the DPoE ONU as specified in the DOCSIS 3.0 Operations Support System Interface Specification [OSSIv3.0].

This section includes summary requirements, explicit non-requirements (those items that are not applicable to DPoE), and notable differences between the [OSSIv3.0] specification and the DPoE System.

The following sections conform to the outline and section headings found in the [OSSIv3.0] document to more clearly provide a mapping of the DPoE OSSI requirements to the [OSSIv3.0] requirements. When references are made in this specification to the "corresponding section in [OSSIv3.0]", the corresponding section is the section with the same section heading or title, but not necessarily the same section number.

6.2 Overview

[OSSIv3.0] describes the key management features introduced in DOCSIS 3.0 and categorizes the features into the five conceptual categories of management, which are typically referred to as the FCAPS model, represented by the management categories of Fault, Configuration, Accounting, Performance, and Security.

6.2.1 DOCSIS 3.0 OSSI Key Features

[OSSIv3.0] was updated to provide management support for the major features summarized in the following table. The table has been modified with italicized text to note which features are applicable to the DPoE Network. References to the CMTS NE (Network Element) imply requirements on the DPoE System, and references to CM imply requirements on the DPoE System acting as a proxy for the DPoE ONU.

Features	Management Functional Area	OSI layer	NE	Description
Multiple Upstream Channels per port	Configuration	PHY	CMTS	Provisioning physical upstream ports that support multiple upstream receivers according to their capabilities. *Support for multiple EPON channels is outside of the scope for this version of DPoE specifications.*
Plant Topology		PHY MAC	CMTS	Provisioning flexible arrangements of US/DS channels for channel bonding configuration to reflect HFC plant topology. *Channel bonding is not supported by the DPoE specifications.*

Features	Management Function Area	OSI Layer	NE	Description
Enhanced Diagnostics	Fault	PHY MAC Network	CMTS	Detailed log of different conditions associated with the CM registration state and operation that may indicate plant problems affecting service availability. *Diagnostics related to the modem registration state will be supported by DPoE Networks to ensure compatibility across the DOCSIS infrastructure.*
Enhanced Performance Data Collection	Performance	PHY MAC Network	CMTS	IPDR streaming of large statistical data sets, such as CMTS CM Status information, with less performance impact on the CMTS resources. *Support for IPDR is outside of the scope for this version of DPoE specifications.*
Enhanced Signal Quality Monitoring		PHY	CMTS	To gather information on narrow band ingress and distortion affecting the quality of the RF signals. *As this applies to the monitoring of the RF network, this feature is not applicable to DPoE Networks. There are complementary physical layer attributes for EPON that can be used by operators in monitoring the quality of the EPON network. The specification of these attributes is presently considered outside the scope of this version of DPoE specifications.*
Usage Based Billing	Accounting	PHY MAC Network	CMTS	Update SAMIS to 3.0 specification requirements. *Support for IPDR is outside of the scope for this version of DPoE specifications.*
Enhanced Security	Configuration Fault Performance Security	MAC Network	CM CMTS	Updates to management models to support the DOCSIS 3.0 security features. *As documented in the SEC specification, a subset of these features will be supported by DPoE Networks.*
IPv6	Configuration Fault Performance	Network	CM CMTS	Updates to management models to support IPv6 provisioning, CM IP stack management, CMTS and CM IP Filtering requirements. *Support for IPv6 is outside of the scope for this version of DPoE specifications.*
Channel Bonding	Configuration Fault Performance	PHY MAC	CM CMTS	Update existing management models and include new events to support DS and US channel bonding. *There is currently no need for channel bonding in EPON networks and will not be supported by DPoE specifications.*
IP Multicast	Configuration Fault Performance	MAC Network	CM CMTS	Update existing management modes to support new multicast capabilities such as SSM, IGMP v3, MLD v1 and v2. *Support for the management of IP Multicast is outside of the scope for this version of DPoE specifications.*

[OSSIv3.0] was also updated to the various IETF RFCs (IP MIB, TCP MIB, etc.) to refer to those versions of the RFCs that support IPv6 addresses as well as IPv4 addresses. Although this version of the DPoE specifications does not support IPv6, support for the updated RFCs is required by this specification.

6.2.1.1 Fault Management Features

The DOCSIS 3.0 fault management requirements were extended to include:

- Detailed events for the new DOCSIS 3.0 features.
- A new diagnostic tool that enables detection of unstable CM operations (repeated CM registrations or station maintenance retries).

The list of DOCSIS events supported by DPoE Networks is listed in Section 9.

Support for the managed objects defined in the DOCS-DIAG-MIB, as specified in [OSSIv3.0], is identified in Section 7.3.1.

6.2.1.2 Configuration Management Features

The configuration of DOCSIS features uses CM configuration files and CMTS policies. The reporting of configuration state information is done via SNMP MIB objects. This model provides a CM standard configuration with minimal operator intervention. DPoE specifications support the same provisioning model by re-using the existing CM configuration files and CMTS configuration objects/policies, and mapping those objects and attributes to the corresponding EPON objects and attributes. In a similar fashion, DPoE specifications support DOCSIS state information by mapping EPON state information to the DOCSIS SNMP MIBs.

The DOCSIS 3.0 configuration requirements include:

- Updates to CM configuration parameters to support IPv6 and channel bonding, enhanced security, and IP multicast.
- Updates to CMTS configuration in support of multiple upstream channels per port, HFC plant topology, channel bonding, security, IPv6, and IP multicast.
- Security enhancements for the CM provisioning process, such as TFTP proxy, configuration file learning, certificate revocation list, etc.

As mentioned previously, this version of the DPoE specifications does not currently support DOCSIS 3.0 features, such as channel bonding or IPv6, so the corresponding TLVs and CM SNMP MIB objects are not supported in this version of the DPoE specifications. For the same reason, the DPoE System also will not support the configuration of those features.

6.2.1.3 Performance Management Features

The DOCSIS 3.0 performance management requirements include:

- An efficient mechanism for collecting large data sets as described above. The identified data sets are:
  - The CMTS resident CM status information.
  - Additional granularity of Quality of Service (QoS) statistics for bonded and non-bonded channels to aid in network capacity planning and dimensioning.
  - Enhanced signal quality monitoring for granular plant status.
- Minimizing redundant information collection associated with differing services provided by the CMTS (statistics for PacketCable™ voice may incorporate large data sets for DOCSIS PHY and MAC).
- Support for CM and CMTS host resource statistics, such as memory and CPU utilization.

This version of the DPoE specifications does not support the use of IPDR for the reporting of large data sets of performance data.

6.2.1.4 Security Management Features

DOCSIS 3.0 added new features to strengthen the confidentiality of user data over the HFC network, and the authenticity of CMs using features such as software upgrade, to improve the protection of the DOCSIS network against theft of service and denial of service attacks.

Support for the DOCSIS-related security features is documented in the [DPoE-SP-SECv1.0] specification.

[OSSIv3.0] was also updated to replace the use of NmAccess configuration objects to support SNMPv1and v2c management of CMs, because the NmAccess framework had been deprecated by the IETF. [OSSIv3.0] defined new configuration file TLVs (TLV 53 sub-TLVs) that are compatible with the SNMPv3 framework, while still supporting SNMP v1 and v2c access controls.

Support for the SNMP Coexistence TLVs is specified in [DPoE-SP-MULPIv1.0].

6.2.1.5 Accounting Management Features

[OSSIv3.0] defines the support for the collection of usage information for use in a billing interface known as Subscriber Accounting Management Interface Specification (SAMIS). SAMIS uses the business model defined by the TeleManagement Forum (formerly IPDR.org) and IPDR streaming protocol [IPDR/SP] for the reliable and resource-efficient transmission of accounting data. Extensions are required for SAMIS to support IPv6, channel bonding, and IP Multicast.

IPDR and SAMIS are not supported in this version of the DPoE specifications.

6.3 OSSI Management Protocols

6.3.1 SNMP Protocol

The SNMP protocol was selected by [OSSIv3.0] as the primary communication protocol for management of data-over-cable services. Although SNMPv3 offers certain security advantages over previous SNMP versions, many existing management systems do not fully support SNMPv3, necessitating support of the theoretically less secure but more ubiquitous SNMPv1and SNMPv2c protocols.

The DPoE System MUST provide an SNMP Agent to provide management access to supported DPoE System MIBs. The DPoE System, on behalf of the attached ONUs, MUST provide an SNMP Agent to provide management access to the supported CM MIBs for the vCM. Each vCM MUST appear as a separate management entity to external management applications. Each vCM MUST respond to management requests using the IP address assigned to the vCM during address assignment as specified in the [DPoE-SP-MULPIv1.0] specification.

The vCM MUST support restrictions on the ability to set CM MIB object values based on modem configuration file attributes.

The DPoE System MUST implement the SNMPv3 protocol.

The vCM MUST implement the SNMPv3 protocol.

The DPoE System MUST implement the SNMPv1 and SNMPv2c protocols.

The vCM MUST implement the SNMPv1 and SNMPv2c protocols.

6.3.1.1 Requirements for IPv6

Several transport domains were initially defined for SNMP (see [RFC 3417]). To support IPv6, [RFC 3419] adds a new set of transport domains, not only for SNMP, but for any application protocol.

Support for SNMP over IPv6 is outside of the scope for this version of the DPoE specifications.

6.3.2 IPDR Protocol

Support for IPDR is outside of the scope of the current version of the DPoE specifications. For more information about the use of IPDR within a DOCSIS environment, refer to Section 6.2 in [OSSIv3.0].

6.3.2.1 Introduction

This section intentionally left blank.

6.3.2.2 CMTS Usage of IPDR Standards

This section intentionally left blank.

6.3.2.3 IP Detail Record (IPDR) Standard

This section intentionally left blank.

6.3.2.4 IPDR Streaming Model

This section intentionally left blank.

6.3.2.5 CMTS IPDR Specifications Support

This section intentionally left blank.

6.3.2.6 Requirements for IPv6

This section intentionally left blank.

6.3.2.7 Data Collection Methodologies for DOCSIS IPDR Service Definitions

This section intentionally left blank.

6.4 OSSI Management Objects

6.4.1 SNMP Management Information Bases (MIBs)

This section in [OSSIv3.0] defines the set of managed objects required to support the management of a CM or CMTS, as well as general requirements for expected SNMP Agent behavior for DOCSIS devices.

The [OSSIv3.0] specification has priority over the IETF MIBs and all objects. Though deprecated or optional in an IETF MIB, an object can be required by the [OSSIv3.0] specification as mandatory.

For the list of DOCSIS OSSI MIBs that will be supported by the DPoE System, see Section 7 in this document.

The following requirements were adapted from the [OSSIv3.0] specification. Unless otherwise noted, all of the requirements that refer to the DPoE System refer not only to the SNMP Agent for the DPoE System, but also to the SNMP Agent(s) provided by the DPoE System for management of the vCMs under its control.

The DPoE System MAY augment the required MIBs with objects from other standard or vendor-specific MIBs where appropriate.

The DPoE System MUST implement the MIB requirements in accordance with this specification, regardless of the value of an IETF MIB object's status (e.g., deprecated or optional). If not required by this specification, deprecated, obsolete, or additional objects are optional. If the DPoE System implements a deprecated, obsolete, or additional MIB object, the DPoE System MUST implement the MIB object correctly according to the MIB definition.

If the DPoE System does not implement a deprecated, obsolete, or additional MIB object, the following conditions MUST be met:

- The DPoE System MUST NOT instantiate the MIB object.
- The DPoE System MUST respond with the appropriate error/exception condition, such as noSuchObject for SNMPv2c, when an attempt to access the MIB object is made.

6.4.1.1 IETF Drafts and Others

The corresponding section in the [OSSIv3.0] specification contains a table listing the new DOCSIS MIBs (Annexes) that were introduced for DOCSIS 3.0. Rather than repeat the table here, Section 7 in this document contains the support expectations for the DPoE System.

6.4.1.2 IETF RFCs

The corresponding section in the [OSSIv3.0] specification contains a table listing the IETF RFCs that need to be supported for DOCSIS 3.0. Rather than repeat the table here, Section 7 in this document contains the support expectations for the DPoE System.

6.4.1.3 Managed Object Requirements

The corresponding section in the [OSSIv3.0] specification contains a few general requirements on the expectations for MIB compliance for DPoE Systems (CMTS in DOCSIS) and DPoE ONU or vCM (which resides in the DPoE System) devices.

The following requirements were adapted from the [OSSIv3.0] specification. Unless otherwise noted, all of the requirements that refer to the DPoE System refer not only to the SNMP Agent for the DPoE System, but also to the SNMP Agent(s) provided by the DPoE System for management of the vCMs under its control.

The DPoE System MUST implement the compliance and syntax of the MIB objects as specified in Section 7 in this document.

The DPoE System MUST support a minimum of 10 available SNMP table rows, unless otherwise specified by the RFC or DOCSIS specifications.

A vCM MUST support a minimum of 10 available SNMP table rows, unless otherwise specified by the RFC or DOCSIS specifications.

The DPoE System's minimum number of available SNMP table rows SHOULD mean rows (per table) that are available to support device configuration.

The vCM's minimum number of available SNMP table rows SHOULD be mean rows (per table) that are available to support device configuration.

The DPoE System used (default) SNMP table row entries MUST NOT apply to the minimum number of available SNMP table rows. The vCM used (default) SNMP table row entries MUST NOT apply to the minimum number of available SNMP table rows. That is, if the device instantiates a certain number of table rows as part of its default configuration, it must support an additional number of minimum rows beyond the default rows.

In the [OSSIv3.0] specification, this section contains a series of sub-sections that contain detailed implementation requirements for each of the DOCSIS 3.0 MIBs. For the DPoE System, these requirements are captured in Section 7.

6.4.2 IPDR Service Definition Schemas

Much like the MIBs section, each of the following sub-sections focuses on requirements for each service definition. Each sub-section contains requirements on the Records Collection and Template Negotiation functions.

IPDR service definition schemas are not required, because IPDR is not supported in this version of the DPoE specifications.

6.5 OSSI for PHY, MAC and Network Layers

6.5.1 Fault Management

This section of the [OSSIv3.0] specification defines the requirements for remote monitoring/detection, diagnosis, reporting, and correction of problems.

6.5.1.1 SNMP Usage

The use of SNMP is defined as the primary mechanism to achieve the goals of fault management: remote detection, diagnosis, reporting, and correction of network faults. The DPoE System MUST support SNMP management for vCMs as long as the CM has become operational. However, there is no requirement to support SNMP management on the CMCI interfaces on the DPoE ONU.

The DPoE System MUST be able to generate SNMP Notifications to one or more trap receivers.

The DPoE System MUST be able to generate events to a syslog server.

The vCM MUST be able to generate SNMP Notifications to one or more trap receivers.

The vCM MUST be able to generate events to a syslog server.

6.5.1.2 Event Notification

A DPoE System is required to generate asynchronous events that indicate malfunction situations and notify about important events. The three methods for reporting events are defined as:

- Local Log storage (docsDevEventTable from [RFC 4639]).
- SNMP Notifications.
- Syslog messages.

The [OSSIv3.0] specification defines the support of DOCSIS specific events as well as IETF events. DOCSIS specific events are usually delivered in the form of SNMP notifications. The delivery of IETF Notifications to local log or syslog servers is optional.

Event notifications are enabled and disabled by configuration. The generation of IETF SNMP notifications is usually controlled by separate SNMP MIB objects (e.g., ifLinkUpDownTrapEnable).

The generation of DOCSIS specific events and the method used to report the events are controlled by the docsDevEvControlTable from [RFC 4639] as well as the CmEventCtrl and the CmtsEventCtrl objects defined in the DOCS-IF3-MIB.

When the DPoE System generates an event on behalf of a vCM, the source address for the event is the address associated with the vCM, not the source address of the DPoE System.

The vCM MUST generate events using the source address for the vCM and not the source address for the DPoE System.

6.5.1.2.1 Format of Events

This section of the [OSSIv3.0] specification details specific requirements on how the three mechanisms are used by DOCSIS devices.

6.5.1.2.1.1 Local Logging

Local logging refers to the ability of a network device to store events in both volatile and non-volatile storage within the device. The contents of the local logs also need to be made available to management systems via SNMP queries. Storing events in local, persistent storage also can be used when failed equipment is returned for analysis (e.g., RMA).

A vCM MUST maintain Local Log events in both local-volatile storage and local non-volatile storage. The actual implementation of the non-volatile storage for the vCMs is vendor-specific (i.e., each vCM need not have a separate log file). The only requirement is that the log messages persist beyond the lifetime of the vCM and DPoE System.

The DPoE System MUST maintain Local Log events for system-specific events in local-volatile storage or local non-volatile storage, or both. The DPoE System MAY retain in local non-volatile storage events designated for local volatile storage. The DPoE System MAY retain, in local volatile storage, events designated for local non-volatile storage.

A vCM MUST implement a Local Log as a cyclic buffer with a minimum of ten entries. The DPoE System MUST implement its Local Log for system-specific events as a cyclic buffer. A vCM's Local Log for non-volatile storage events MUST persist across reboots. The DPoE System Local Log for system-specific events MAY persist across reboots. The DPoE System MUST provide access to the Local Log events through the docsDevEventTable [RFC 4639].

The DPoE System MUST implement event descriptors that are no longer than 255 characters.

Each DOCSIS event is identified by a 32-bit unsigned integer. Events are identical if their EventIds are identical. For identical events occurring consecutively, the DPoE System MAY choose to store only a single event. If the DPoE System stores as a single event multiple identical events that occur consecutively, the DPoE System MUST reflect in the event description the most recent event.

The docsDevEvIndex object from [RFC 4639] provides relative ordering of events in the log. When the DPoE System reboots, the contents of the non-volatile log MUST be synchronized with the contents of the non-volatile log in the following manner:

- The values of docsDevEvIndex maintained in the non-volatile log are renumbered starting at one.
- The local volatile log is initialized with the contents of the non-volatile log.
- The value of the last restored non-volatile docsDevEvIndex plus one will be used as the first value for events recorded in the new active session's local volatile log.

When a vCM reboots, the contents of the non-volatile log MUST be synchronized with the contents of the non-volatile log in the following manner:

- The values of docsDevEvIndex maintained in the non-volatile log are renumbered starting at one.
- The local volatile log is initialized with the contents of the non-volatile log.
- The value of the last restored non-volatile docsDevEvIndex plus one will be used as the first value for events recorded in the new active session's local volatile log.

A vCM MUST support the ability to empty the contents of the volatile and non-volatile event log based on operator request.

6.5.1.2.1.2 SNMP Notifications

A vCM operating in SNMP v1/v2c NmAccess mode MUST support SNMPv1 and SNMPv2c traps as defined in [RFC 3416].

The DPoE System operating in SNMP Coexistence mode MUST support the SNMP notification types 'trap' and 'inform' as defined in [RFC 3416] and [RFC 3413].

A vCM operating in SNMP Coexistence mode MUST support the SNMP notification types 'trap' and 'inform' as defined in [RFC 3416] and [RFC 3413].

The DPoE System MUST support the SNMP Notifications defined in DOCS-IF3-MIB [OSSIv3.0].

The DPoE System MUST support the SNMP Notifications defined in DOCS-DIAG-MIB [OSSIv3.0].

A vCM MUST support the SNMP Notifications defined in DOCS-IF3-MIB [OSSIv3.0].

6.5.1.2.1.3 SYSLOG Message Format

When a vCM sends a syslog message for a DOCSIS-defined event, it MUST use the following format:

<level>CABLEMODEM[vendor]: <eventId> text vendor-specific-text

When the DPoE System sends a syslog message for a system-specific event, it MUST use the following format:

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

Where:

- 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 [RFC 3164]. 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 DPoE System MUST set 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 2 or 3 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.
- vendor-specific-text contains vendor-specific information. This field is optional.

The DPoE System MAY report non-DOCSIS events in the standard syslog message format [RFC 3164] rather than the defined DOCSIS syslog message format.

6.5.1.2.2 Bit Values for docsDevEv Reporting

The following BIT values are defined for the docsDevEvReporting object in [RFC 4639] to control the reporting mechanism for a particular event:

BIT	Value	Description
0	local(0)	Indicates non-Volatile Local Log
1	traps(1)	Indicates SNMP Notifications
2	syslog(2)	Indicates Syslog
8	localVolatile(8)	Indicates Volatile Local Log
9	stdInterface(9)	Indicates that [RFC 3413] and [RFC 3014] are being used to control event reporting

The DPoE System MAY support the use of bit-9 in docsDevEvReporting to control event reporting.

The DPoE System MUST also report an event via the Local Log (volatile or non-volatile) when generating an event using SNMP Notification or syslog.

The DPoE System MUST reject and report a 'Wrong Value' error for SNMP v2c/v3 PDUs or a 'BadValue' error for SNMPv1 PDUs if a set to docsDevEvReporting is tried while setting traps(1) and/or syslog(2) with no Local Log bits also set.

The DPoE System MUST ignore any undefined bits in docsDevEvReporting on SNMP Set operations and report a zero value for those bits.

The DPoE System MUST maintain non-volatile storage when both non-volatile Local Log and volatile Local Log bits are set for a specific docsDevEvReporting event priority. The DPoE System 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 DPoE System MUST NOT report duplicate events in the docsDevEventTable.

6.5.1.2.3 Standard DOCSIS Events for CMs

The DOCS-CABLE-DEVICE-MIB [RFC 4639] defines the following eight priority levels for use by DOCSIS devices.

Event	Priority	Description
Emergency	1	Reserved for vendor-specific 'fatal' hardware or software errors that prevents normal system operation and causes the reporting system to reboot.
Alert	2	A serious failure, which causes the reporting system to reboot, but it is not caused by hardware or software malfunctioning.
Critical	3	A serious failure that requires attention and prevents the device from transmitting data, but could be recovered without rebooting the system.
Error	4	A failure occurred that could interrupt the normal data flow, but will not cause the modem to re-register.
Warning	5	A failure occurred that could interrupt the normal data flow, but will not cause the modem to re-register. 'Warning' level is assigned to events that both CM and CMTS have information about.
Notice	6	The event is important, but is not a failure
Informational	7	The event is of marginal importance and is not failure, but could be helpful for tracing the normal modem operation.
Debug	8	Reserved for vendor-specific non-critical events.

During vCM initialization, the vCM MUST support the following default event reporting mechanisms:

Event Priority	Local Log Non-volatile	SNMP Notification	Syslog	Local Log Volatile
Emergency	MUST	MAY	MAY	MAY
Alert	MUST	MAY	MAY	MAY
Critical	MUST	MAY	MAY	MAY
Error	MAY	MUST	MUST	MUST
Warning	MAY	MAY	MAY	MAY
Notice	MAY	MUST	MUST	MUST
Informational	MAY	MAY	MAY	MAY
Debug	MAY	MAY	MAY	MAY

A vCM MAY implement default reporting mechanisms above the minimum reporting requirements.

A vCM MUST support the modification of the default reporting mechanism by using the docsDevEvReporting object defined in DOCS-CABLE-DEVICE-MIB [RFC 4639].

A vCM MUST format notifications in accordance with Annex D of the [OSSIv3.0] specification.

6.5.1.2.4 Standard DOCSIS Events for CMTS

The [OSSIv3.0] specification uses the same event priorities for CMTS-generated events as CM-generated events; however, it specifies additional restrictions on the use of the priorities.

The 'Error' priority level is used by the DPoE System to indicate problems with a group of DPoE ONUs.

The 'Critical' priority level indicates a problem that affects the whole system operation but is not a faulty condition of the DPoE System.

During initialization of the DPoE System, the DPoE System MUST support the following default event reporting mechanisms for SNMP and Syslog:

Event Priority	SNMP Notification	Syslog
Emergency	MAY	MAY
Alert	MAY	MAY
Critical	MUST	MUST
Error	MUST	MUST
Warning	MUST	MUST
Notice	MUST	MUST
Informational	MAY	MAY
Debug	MAY	MAY

During initialization of the DPoE System, the DPoE System MUST support the following default event reporting mechanisms for Local Logging. The requirements on Local Logging vary depending on whether the DPoE System supports a volatile or non-volatile Local Logging mechanism:

Event Priority	Local Log Non-volatile (if only present)	Local Log Volatile (if only present)	Local Log Non-volatile (if both present)	Local Log Volatile (if both present)
Emergency	MUST	MUST	MUST	MAY
Alert	MUST	MUST	MUST	MAY
Critical	MUST	MUST	MUST	MAY
Error	MUST	MUST	MAY	MUST
Warning	MUST	MUST	MAY	MUST
Notice	MUST	MUST	MAY	MUST
Informational	MAY	MAY	MAY	MAY
Debug	MAY	MAY	MAY	MAY

The DPoE System MAY implement default reporting mechanisms above the minimum reporting requirements.

The DPoE System MAY support the modification of the default reporting mechanism by using the docsDevEvReporting object defined in DOCS-CABLE-DEVICE-MIB [RFC 4639].

The DPoE System MUST format notifications in accordance with Annex D of the [OSSIv3.0] specification.

6.5.1.2.5 Event Priorities for DOCSIS and Vendor-Specific Events

This section of the [OSSIv3.0] specification defines the use of the Event Priorities for DOCSIS and vendor-specific events for DOCSIS devices.

The use of the Emergency Event Priority is reserved for all vendor-specific events generated by the DPoE System.

The Alert through Informational Event Priorities can be used for both DOCSIS and vendor-specific events generated by the vCM.

The Alert Event Priority is reserved for all vendor-specific events generated by the DPoE System for those events related to the operation of the DPoE System, and not for events generated by the vCM.

The Critical through Informational Event Priorities can be used for both DOCSIS and vendor-specific events generated by the DPoE System.

The use of the Debug Event Priority is reserved for all vendor-specific events generated by the DPoE System.

6.5.1.3 Throttling, Limiting, and Priority for Event, Trap, and Syslog

The DPoE System MUST support SNMP TRAP/INFORM and syslog throttling and limiting as described in DOCS-CABLE-DEVICE-MIB for event messages generated by the DPoE System.

The vCM MUST support SNMP TRAP/INFORM and syslog throttling and limiting as described in DOCS-CABLE-DEVICE-MIB for event messages generated by the vCM.

6.5.1.4 SNMPv3 Notification Receiver Config File TLV

This section of the [OSSIv3.0] specification details the processing requirements for the SNMPv3 Notification Receiver TLV when present in the configuration file. The SNMPv3 Notification Receiver TLV is used to configure SNMPv3 tables for notification transmission.

A vCM MUST process the SNMPv3 Notification Receiver TLV only if the vCM is in SNMP Coexistence Mode.

Based on the SNMPv3 Notification Receiver TLV, a vCM MUST create entries in the following tables in order to cause the desired trap transmission:

- snmpNotifyTable
- snmpTargetAddrTable
- snmpTargetAddrExtTable
- snmpTargetParamsTable
- snmpNotifyFilterProfileTable
- snmpNotifyFilterTable
- snmpCommunityTable
- usmUserTable
- vacmContextTable
- vacmSecurityToGroupTable
- vacmAccessTable
- vacmViewTreeFamilyTable

A vCM MUST NOT set to 'active' an entry created using the SNMPv3 Notification Receiver TLV that does not satisfy the corresponding [RFC 3413] requirements to do so. This type of misconfiguration does not stop the vCM from registering; however, the SNMP notification process may not work as expected.

6.5.1.4.1 Mapping of TLV Fields into Created SNMPv3 Table Rows

This section of the [OSSIv3.0] specification describes how the SNMPv3 Notification Receiver TLV elements are used to populate the corresponding SNMPv3 tables.

A vCM MUST implement the population of SNMPv3 tables as described in the corresponding section of the [OSSIv3.0] specification.

6.5.1.5 Non-SNMP Fault Management Protocols

The [OSSIv3.0] specification provides for the use of other tools and techniques to examine faults at the different protocol layers.

The DPoE System MUST support IP end-station generation of ICMP error messages and processing of all ICMP messages for IP addresses on any of its D interfaces.

A vCM MUST support IP end-station generation of ICMP error messages and processing of all ICMP messages.

Due to the lack of a native IP stack on the DPoE ONU, the DPoE ONU will not respond to ICMP Echo Request messages received on its CMCI interfaces targeted towards the vCM's management IP address. A vCM MUST respond to ICMP Echo Requests on behalf of the attached DPoE ONUs.

6.5.2 Configuration Management

The [OSSIv3.0] specification defines two categories of configuration information: non-operational and operational.

Non-operational changes occur when a management application issues a modify command to a DPoE System, and the change doesn't affect the operating environment. An example of a non-operational change is the modification of the system contact for the DPoE System. Operational changes are those that affect the behavior of the system.

The DPoE System MUST support the use of the SNMP protocol interface for the modification of operational and non-operational information. A vCM MUST support the use of the SNMP protocol interface for the modification of operational and non-operational information.

The DPoE System MUST support other configuration mechanisms, such as a Command Line Interface as defined in [DPoE-SP-IPNEv1.0].

6.5.2.1 Version Control

A vCM MUST support the docsDevSwCurrentVers MIB object from the DOCS-CABLE-DEVICE-MIB to report the current firmware version of the DPoE ONU.

A vCM MUST report the sysDescr object value using the following fields and format:

Type	Value
HW_REV	<Hardware Version>
VENDOR	<Vendor Name>
BOOTR	<Boot ROM Version>
SW_REV	<Software Version>
MODEL	<Model Number>

A vCM MUST report each Type field and corresponding Value field separated with a colon followed by a single space and each Type-Value pair is separated by a semicolon followed by a single blank space. The format is show below:

HW_REV: <value>; VENDOR: <value>; BOOTR: <value>; SW_REV: <value>; MODEL: <value>

A vCM MUST report a value of 'NONE' if the field is not supported on the DPoE ONU.

Other string data may be included in the sysDescr field, but a vCM MUST delimit the formatted string specified above by an opening "<" and closing ">" to clearly identify the mandatory version fields.

The DPoE System MUST support the sysDescr field, but its content and format is vendor-specific.

6.5.2.2 System Configuration

A vCM MUST support system configuration by configuration file, configuration-file-based SNMP encoded objects, and SNMP Set operations. A vCM MUST support any valid configuration file as defined in the [DPoE-SP-MULPIv1.0] specification.

The DPoE System MUST support system configuration via SNMP Set operations for objects under its control.

6.5.2.3 Secure Software Download

A vCM MUST use the Secure Software Download (SSD) process documented in [DPoE-SP-SECv1.0] to upgrade the firmware for the DPoE ONU.

The vCM MUST support both the SNMP-initiated and configuration-file-initiated methods to trigger the Secure Software Download. A vCM MAY support either one or both methods to trigger Secure Software Download.

To support an SNMP-initiated upgrade, a vCM MUST have a valid X.509 code verification certificate on behalf of the DPoE ONU.

If the docsDevSwAdminStatus (from the DOCS-CABLE-DEVICE-MIB) object on the vCM is set to 'ignoreProvisioningUpgrade', the vCM MUST ignore any software download configuration setting and not attempt a configuration-file-initiated upgrade. A vCM MUST preserve the value of the docsDevSwAdminStatus object across reset/reboots of the vCM and, by extension, the DPoE System.

A vCM MUST use 'allowProvisioningUpgrade' as the default value for the docsDevSwAdminStatus object until it is over-written by 'ignoreProvisioningUpgrade' after a successful SNMP-initiated software upgrade or is modified by an external manager.

A vCM MUST preserve the value of the docsDevSwOperStatus object for the vCM across reset/reboots of the vCM.

After a vCM has completed a configuration-file-initiated secure software upgrade, a vCM MUST cause the DPoE ONU to reboot and become operational using the correct software image as described in [DPoE-SP-MULPIv1.0]. After the vCM has registered following a reboot after a configuration-file-initiated secure software upgrade, the vCM MUST satisfy the following requirements:

- The vCM MUST report 'allowProvisioningUpgrade' as the value for the docsDevSwAdminStatus object.
- The vCM SHOULD report the filename of the software currently operating on the DPoE ONU as the value for the docsDevSwFilename object.
- The vCM SHOULD report the IP address of the software download server containing the software currently running on the DPoE ONU as the value for the docsDevSwServerAddress.
- The vCM MUST report 'completeFromProvisioning' as the value for the docsDevSwOperStatus object.
- The vCM MUST report the current version of the software that is operating on the DPoE ONU as the value for the docsDevSwCurrentVers object.

After the vCM has completed an SNMP-initiated secure software upgrade, the vCM MUST cause the DPoE ONU to reboot and become operational using the correct software image as described in [DPoE-SP-MULPIv1.0]. After

the vCM has registered following a reboot, after an SNMP-initiated secure software upgrade, the vCM MUST satisfy the following requirements:

- The vCM MUST report 'ignoreProvisioningUpgrade' as the value for the docsDevSwAdminStatus object.
- The vCM SHOULD report the filename of the software currently operating on the DPoE ONU as the value for the docsDevSwFilename object.
- The vCM SHOULD report the IP address of the Software Download server containing the software currently running on the DPoE ONU as the value for the docsDevSwServerAddress.
- The vCM MUST report 'completeFromMgmt' as the value for the docsDevSwOperStatus object.
- The vCM MUST report the current version of the software that is operating on the DPoE ONU as the value for the docsDevSwCurrentVers object.

If the vCM suffers a loss of power or resets during an SNMP-initiated upgrade, the vCM MUST resume the upgrade without manual intervention. While the upgrade is in progress, the vCM MUST report 'inProgress' as the value for the docsDevSwOperStatus object.

In the case where the vCM reaches the maximum number of TFTP Download Retries as specified in [DPoE-SP-MULPIv1.0], the vCM MUST behave as specified in [DPoE-SP-MULPIv1.0]. In the case where the vCM successfully downloads an image that is not intended for the DPoE ONU associated with the vCM, the vCM MUST behave as specified in [DPoE-SP-MULPIv1.0].

In the case where the vCM successfully downloads an image that is determined to be corrupted, the vCM MUST reject the corrupted image. The vCM MAY re-attempt to download if the maximum number of TFTP Download Retries has not been reached. If the vCM does not retry, the DPoE ONU MUST continue to run the last known working firmware image and proceed to an operational state. The vCM MUST generate two notifications: one to notify that the vCM has reached the maximum number of retries, and another to notify that the image is damaged.

For the failure scenarios listed above, the vCM MUST satisfy the following requirements:

- The vCM MUST report 'allowProvisioningUpgrade' as the value for the docsDevSwAdminStatus object.
- The vCM MUST report the filename of the software image that failed the upgrade process as the value for the docsDevSwFilename object.
- The vCM MUST report the IP address of the Software Download server containing the software image that failed the upgrade process as the value for the docsDevSwServerAddress.
- The vCM MUST report 'other' as the value for the docsDevSwOperStatus object.
- The vCM MUST report the current version of the software that is operating on the DPoE ONU as the value for the docsDevSwCurrentVers object.

6.5.2.4 CM Configuration Files, TLV-11 and MIB OIDs/Values

The following sections of the [OSSIv3.0] specification define the use of CM configuration file TLV-11 elements and the rules for translating TLV-11 elements into SNMP PDU varbinds (SNMP MIB OID/instance and MIB OID/instance value combinations).

A vCM is expected to satisfy all requirements related to CM configuration file processing. The existing CM configuration file TLV-11 elements are still applicable to the configuration and operation of the vCM.

6.5.2.4.1 CM Configuration File TLV-11 Element Translation (to SNMP PDU)

A vCM is required to translate CM configuration file TLV-11 elements into a single SNMP PDU containing MIB OID/instance and value components (SNMP varbinds). Once a single SNMP PDU is constructed, the vCM

processes the SNMP PDU and determines if the CM configuration passes or fails based on the rules for CM configuration file processing.

In accordance with [RFC 3416], the single, generated SNMP PDU will be treated "as if simultaneous" and the vCM MUST behave consistently, regardless of the order in which TLV-11 elements appear in the CM configuration file or in the SNMP PDU.

The CM configuration file cannot contain duplicate TLV-11 elements (SNMP MIB objects with identical OIDs). If the configuration file received by the vCM contains duplicate TLV-11 elements, the vCM MUST reject the configuration file.

A vCM MUST support the 'createAndGo' row creation method (as defined in [RFC 2579]).

A vCM MAY support the 'createAndWait' row creation method (as defined in [RFC 2579]). If 'createAndWait' is supported, the intended result is to create an SNMP table row that will remain in the 'notReady' or 'notInService' state until a non-configuration SNMP PDU is received to update the SNMP table row status.

6.5.2.4.2 CM Configuration File TLV-11 Elements Not Supported by the CM

If the CM configuration file contains SNMP OIDs that are not supported by the vCM, then the vCM MUST ignore those SNMP varbinds and treat them as if they were not present.

If the vCM does not support 'createAndWait' row states, the vCM MUST ignore those objects in the associated table row.

If any CM configuration file TLV-11 elements are ignored, the vCM MUST report them via the configured notification mechanisms after the vCM is registered.

6.5.2.4.3 CM State After CM Configuration File Processing Success

After the vCM successfully processes the CM configuration file, the vCM MUST use the appropriate OAM messages, as defined in [DPoE-SP-OAMv1.0], to configure the DPoE ONU to transition the vCM to an operational state.

6.5.2.4.4 CM State After CM Configuration File Processing Failure

If any CM configuration file-generated SNMP varbind performs an illegal set operation, the vCM MUST reject the configuration file. The vCM MUST NOT proceed with the registration process.

6.5.2.5 IPDR Exporter Configuration

The [OSSIv3.0] specification allows for the possibility of a management interface to configure the following aspects related to IPDR Streaming:

- Authorized collectors' access list.
- Redundant collector policies for streaming sessions.
- Configuration of time intervals for exporting.
- IPDR/SP KeepAlive ackSequenceInterval and ackTimeInterval parameters.
- Configurable document boundaries using session start/stop messages (both for time interval and event sessions with topology services).
- Configuration of single service in multiple sessions that use different export methodologies (ad-hoc/event or ad-hoc/time).

IPDR is not supported in this version of the DPoE specifications.

6.5.3 Accounting Management

The [OSSIv3.0] specification defines an accounting management interface for subscriber usage-based applications called Subscriber Account Management Interface Specification (SAMIS). SAMIS enables vendors of cable modems and cable modem termination systems to address the operational requirements of subscriber account management in a uniform and consistent manner.

Subscriber account management described here refers to the following business processes and terms:

- Class of Service Provisioning Processes, which are involved in the automatic and dynamic provisioning and enforcement of subscribed class of policy-based Service Level Agreements (SLAs).
- Usage-Based Billing Processes, which are involved in the processing of bills based on services rendered to, and consumed by, paying subscribers. This specification focuses primarily on bandwidth-centric usage-based billing scenarios. It complements the PacketCable Event Messages Specifications [PC EMv1.0].

6.5.3.1 Subscriber Usage Billing and Class of Services

This section of the [OSSIv3.0] specification defines the high-level functional requirements for support of the SAMIS interface using IPDR.

Support for IPDR and usage billing are not supported in this version of the DPoE specifications.

6.5.3.2 DOCSIS Subscriber Usage Billing Requirements

The DPoE System is not required to support subscriber usage billing by implementing SAMIS, based on the TM Forum's BSR specification version 3.5 [IPDR/BSR], in this version of the DPoE specifications.

6.5.4 Performance Management

The [OSSIv3.0] specification provides high-level requirements on the monitoring of the MAC and PHY interfaces using the standard interface statistics (via the IF-MIB [RFC 2863]). The DPoE System will continue to support these same statistics to provide continuity from the DOCSIS systems for the corresponding EPON interfaces.

To monitor behavior at the LLC layer, the performance management focus is on bridge traffic management via the BRIDGE-MIB [RFC 4188] as supported on the modem. The vCM also will support the BRIDGE-MIB by using DPoE OAM messages to retrieve the appropriate statistics from the DPoE ONU.

The [OSSIv3.0] specification emphasizes the importance of supporting the CMTS diagnostic log capabilities (DOCS-DIAG-MIB) to provide early detection of modem and plant problems. The DPoE System also will support the DOCS-DIAG-MIB to provide similar functionality to existing DOCSIS systems.

The [OSSIv3.0] specification also emphasizes the importance of supporting the objects in the DOCS-IF-MIB [RFC 4546] to track DOCSIS PHY and MAC layer attributes, such as signal-to-noise ratios, micro-reflections, and ranging retry requests. Due to the differences between the DOCSIS PHY and MAC layers and the EPON PHY and MAC layers, support for these statistics will not be possible in the DPoE Network.

6.5.4.1 Treatment and Interpretation of MIB Counters

The [OSSIv3.0] specification defines the expected behavior for all counter statistics supported by DOCSIS devices. There are specific requirements for the behavior of counter attributes in the following cases:

Case 1: The state of an interface changes resulting in a "interface counter discontinuity" as defined in [RFC 2863].

When the state of an interface changes for a vCM, the ifCounterDiscontinuityTime for the affected interface MUST be set to the current value of sysUpTime and all counters on the interface set to zero. Setting the ifAdminStatus for an interface is not considered an interface reset.

When the state of an interface changes for the DPoE System, the ifCounterDiscontinuityTime for the affected interface MUST be set to the current value of sysUpTime and all counters on the interface set to zero. Setting the ifAdminStatus for an interface is not considered an interface reset.

Case 2: SNMP Agent Reset

An SNMP Agent Reset is defined as the reinitialization of the SNMP Agent when the device being managed by the SNMP Agent is rebooted or reset.

When the device is rebooted, the DPoE System MUST:

- set the value of sysUpTime to zero.
- set all interface ifCounterDiscontinuityTime values to zero.
- set all interface counters to zero.
- set all other counters maintained by the CM SNMP Agent to zero.

When the device is rebooted, the vCM MUST:

- set the value of sysUpTime to zero.
- set all interface ifCounterDiscontinuityTime values to zero.
- set all interface counters to zero.
- set all other counters maintained by the CM SNMP Agent to zero.

Case 3: Counter Rollover

When a counter reaches the maximum value for its precision within the DPoE System, then the counter value MUST roll over to zero when incremented.

When a counter reaches the maximum value for its precision within a vCM, then the counter value MUST roll over to zero when incremented.

6.5.5 Security Management

The DPoE System MUST provide SNMP responses in accordance with the SNMP framework defined in [RFC 3411] through [RFC 3416] for the SNMP Agent used to manage the DPoE System, as well as for the SNMP Agent used to manage the vCMs within its control.

6.5.5.1 CMTS SNMP Modes of Operation

The DPoE System MUST support SNMP Coexistence Mode subject to the following requirements and limitations:

- SNMP v1/v2c/v3 Packets are processed as described in [RFC 3411] through [RFC 3415], and [RFC 3584].
- SNMP Access control is determined by the SNMP-COMMUNITY-MIB [RFC 3584] and SNMP-TARGET-MIB [RFC 3413], SNMP-VIEW-BASED-ACM-MIB [RFC 3415], and SNMP-User-Based-SM-MIB [RFC 3414].
- The SNMP-COMMUNITY-MIB [RFC 3584] controls SNMPv1/v2c packet community string associations to a security name to select entries for access control in the SNMP-VIEW-BASED-ACM-MIB [RFC 3415].

- The SNMP-USER-BASED-SM-MIB [RFC 3414] and SNMP-VIEW-BASED-ACM-MIB [RFC 3415] control SNMPv3 packets.
- SNMP Notification destinations are specified in the SNMP-TARGET-MIB and SNMP-NOTIFICATION-MIB [RFC 3413].

The DPoE System MAY support SNMPv3 with AES encryption as defined in [RFC 3826].

6.5.5.2 CMTS SNMP Access Control Configuration

The DPoE System MUST support the SNMPv3 key change mechanism defined in [RFC 3414].

6.5.5.3 CM SNMP Modes of Operation

A vCM MUST support SNMPv1, SNMPv2c, and SNMPv3, as well as SNMP-Coexistence [RFC 3584].

A vCM access control configuration MUST support SNMPv1v2c in NmAccess mode as well as SNMP-Coexistence mode.

6.5.5.4 CM SNMP Access Control Configuration

This section in the [OSSIv3.0] specification defines the expected behavior for SNMP access control for the modem as configured by the modem configuration file. Further, it defines the expected support for the SNMP Kickstart process used to provide a set of access controls for a modem.

A vCM MUST support the SNMPv3 Kickstart process.

See the [OSSIv3.0] specification for more details on the expected support for SNMPv3 agent implementations, as well as the expected behavior when running in SNMP coexistence mode.

6.5.5.5 IPDR Streaming Protocol Security Model

The [OSSIv3.0] specification includes no additional security requirements for the use of IPDR/SP beyond those which are already specified in the [IPDR/SP] specification.

6.6 OSSI for CMCI

This section of the [OSSIv3.0] specification defines the operational mechanisms needed to support the transmission of data-over-cable services between a CM and Customer Premise Equipment (CPE).

6.6.1 SNMP Access Via CMCI

The [OSSIv3.0] specification provides for dual-stack management of the modem using SNMP over IPv4 and IPv6 as controlled by the modem provisioning file. This version of the DPoE specifications does not specify IPv6 requirements.

[OSSIv3.0] also specifies the possibility of SNMP management prior to successful modem registration. Because the DPoE ONU does not have a native SNMP stack accessible via the CMCI interface, there is no requirement to support SNMP access to the ONU from the CMCI interface.

[OSSIv3.0] also contains requirements regarding the use of special IP addresses, such as 192.168.100.1, link-local methods as defined in [RFC 3927], and IPv6 link-local addresses to provide SNMP management access via the CMCI interface. As above, these requirements do not apply to the DPoE System or the DPoE ONU itself.

6.6.2 Console Access

[OSSIv3.0] contains requirements indicating that access to the console port on the CM is prohibited. A console port is defined as a communication path that allows the user to issue commands that affect the modem's configuration or operational status.

The DPoE ONU SHOULD NOT allow a communication path that permits a user to issue commands to or modify the configuration or operational status of the DPoE ONU or eCM if it a DPoE Standalone ONU. DPoE Standalone ONUs with eSAFEs MAY allow a communication path that permits a user or operator to issue commands to or modify the configuration or operational status of the eSAFE only, but not the eCM.

6.6.3 CM Diagnostic Capabilities

[OSSIv3.0] provides for the possibility of a diagnostic interface on the modem to be used for debugging or troubleshooting.

The DPoE ONU MAY have a diagnostic interface for debugging and troubleshooting purposes.

The DPoE ONU's diagnostic interface SHOULD be disabled by default after registration has been completed.

The DPoE ONU MAY provide additional controls that will enable the operator to alter or customize the diagnostic interface, such as by the configuration process, or management through the setting of a proprietary MIB.

6.6.4 Protocol Filtering

Protocol Filtering in the DPoE System MUST be implemented as described in Annex F of [OSSIv3.0], with the following exceptions:

- Legacy Filters (as specified in the DOCS-CABLE-DEVICE_MIB) are not required.
- Downstream Filtering (as specified in the DOCS-SUBMGT3-MIB) is required.
- Upstream Filtering (as specified in the DOCS-SUBMGT3-MIB) is optional.

Protocol Filtering in the DPoE ONU MUST be implemented as described in Annex F of [OSSIv3.0], with the following exceptions:

- Legacy IP Policy Filters are not required.
- A value of 'accept' for docsDevFilterIpDefault MUST be supported. Support for a value of 'discard' is not required.
- Upstream Drop Classifiers are not required to support IPv6 filtering in the current version of the specification.

Protocol Filtering in the vCM MUST be implemented as described in Annex F of [OSSIv3.0], with the following exceptions:

- The ability to add, delete, or modify Upstream Drop Classifiers (UDC) via SNMP is not required because docsQosPktClassTable is a read-only table. UDC changes, therefore, require a reset of the vCM (and the associated DPoE ONU).
- SNMP Access Filters are implemented by the vCM. Because filtering is implemented at the DPoE System, it is unable to filter SNMP traffic from the CMCI interface on the DPoE ONU.

6.7 OSSI for CM Device

The [OSSIv3.0] specification section contains requirements on the use of standard front-panel light-emitting diodes (LEDs) that present straightforward information about the registration state of the CM to facilitate customer support operations.

6.7.1 CM LED Requirements and Operation

The [OSSIv3.0] specification has more detailed requirements on the expectations for the behavior of the LEDs, as well as specific requirements on the minimum five LEDs that should be visible on the CM. Those LEDs are:

- Box: one LED labeled as Power for the overall CM status
- DOCSIS: three LEDs labeled as DS, US, and Online.
- CPE: a minimum of one LED labeled as LINK for the link status for the CPE interface. If the CM has more than one CPE interface, then it should have a separate LED for each link.

Further, there are requirements on the order of the LEDs on the front of the ONU so that customers (or service reps) can view the logical progression of the modem through the registration process (i.e., sync, ranging, and registration).

The following sub-sections contain specific requirements on the LED behavior for the modem, based on the modem's state.

Although it is recognized that providing a uniform and common set of diagnostic LEDs is important, the specification of the LED behavior is outside the scope of this version of the DPoE specifications.

6.7.1.1 Power On, Software Application Image Validation, and Self Test

This section intentionally left blank.

6.7.1.2 Scan for Downstream Channel

This section intentionally left blank.

6.7.1.3 Resolve CM-SG and Range

This section intentionally left blank.

6.7.1.4 Operational

This section intentionally left blank.

6.7.1.5 Data Link and Activity

This section intentionally left blank.

6.7.2 Additional CM Operation Status Visualization Features

The [OSSIv3.0] specification allows vendors to change the LED behavior if the modem is in a proprietary mode of operation. It also requires that external indicators not be used to reveal modem provisioning information.

6.7.2.1 Secure Software Download

The [OSSIv3.0] specification has requirements on the lighting of LEDs when the modem firmware is being upgraded.

Although it is recognized that providing a uniform and common set of diagnostic LEDs is important, the specification of the LED behavior is outside the scope of this version of the DPoE specifications.

6.7.3 OSSI Annexes

The [OSSIv3.0] specification includes several Annex appendices that include requirements or further clarifications on the new objects defined in the [OSSIv3.0] specification. The following table summarizes the applicability of those Annexes to this specification:

Annex	Title	Applicability to the DPoE OSSI Specification
Annex A	Detailed MIB Requirements (Normative)	Covered in this specification.
Annex B	IPDR for DOCSIS Cable Data Systems Subscriber Usage Billing Records	No additional clarifications are needed in this specification because this section provides the actual schema definitions for the SAMIS IPDR schemas.
Annex C	Auxiliary Schemas for DOCSIS IPDR Service Definitions	No additional clarifications are needed in this specification because this section defines the CMTS and CM schemas used in the DOCSIS IPDR schemas.
Annex D	Format and Content for Event, SYSLOG, and SNMP Notification	Covered in this specification in Section 9.
Annex E	Application of MGMD-STD-MIB to DOCSIS 3.0 MGMD Devices	Not applicable to this version of DPoE specifications.
Annex F	Protocol Filtering	Covered in this specification in Section 6.6.4.
Annex G	Diagnostic Log	No additional clarifications are needed in this specification because this section provides more clarifying text on the Diagnostic Log objects.
Annex H	Requirements for DOCS-IFEXT2-MIB	No additional clarifications are needed in this specification because this section just includes the text of the DOCS-IFEXT2-MIB.
Annex I	Load Balancing Requirements	No additional clarifications are needed in this specification because this section provides more clarifying text on the DOCSIS Load Balancing objects.
Annex J	Enhanced Signal Quality Monitoring Requirements	Not applicable to EPON because it focuses on RF network monitoring diagnostics.
Annex K	DOCSIS 3.0 Data Type Definitions	No additional clarifications are needed in this specification because this section just lists the base data types used in the DOCSIS SNMP and IPDR object definitions.
Annex L	Security Requirements	No additional clarifications are needed in this specification because this section provides more clarifying text on the DOCSIS Security objects added in the [OSSIv3.0] specification.
Annex M	Multicast Requirements	Not applicable to this version of DPoE specifications.
Annex N	CM and CMTS Status Reporting Requirements	No additional clarifications are needed in this specification because this section provides more clarifying text on the DOCSIS Monitoring objects added in the [OSSIv3.0] specification.
Annex O	Media Access Control (MAC) Requirements	No additional clarifications are needed in this specification because this section provides more clarifying text on the MAC Layer objects added in the [OSSIv3.0] specification.

Annex	Title	Applicability to the DPoE OSSI Specification
Annex P	Subscriber Management Requirements	No additional clarifications are needed in this specification because this section provides more clarifying text on the Subscriber Management objects added in the [OSSIv3.0] specification.
Annex Q	DOCSIS 3.0 SNMP MIB Modules	No additional clarifications are needed in this specification because this section just contains the actual text of the new MIBS defined in the [OSSIv3.0] specification.
Annex R	IPDR Service Definition Schemas	No additional clarifications are needed in this specification because this section just contains the new IPDR schemas defined in the [OSSIv3.0] specification.

6.8 EPON Requirements

This section captures those OSSI requirements specific to the management and control of the EPON infrastructure.

6.8.1 Provisioning

This section describes requirements for provisioning of the DPoE System that are not already covered by existing DOCSIS or operator requirements.

The Type column defines the OM Data Type for the parameter (e.g., Int, string, etc.). The OM Data Type values are defined in Annex K in the [OSSIv3.0]. An ENUM type indicates that the parameter can only be set to the specific values listed in the Value Range column. For other data types, the Value Range column contains the range of acceptable values for the parameter.

6.8.1.1 General EPON Configuration

The parameters listed in the sections that follow are defined globally on the DPoE System. The DPoE System MUST apply global parameter configurations, as defined for read-write parameters in the sections that follow, across all EPON (TU) interfaces.

6.8.1.1.1 EPON OAM Configuration

This object controls the rate at which OAM messages are sent on the EPON (TU) interface. The DPoE System MAY support the configuration of these attributes.

Attribute Name	Type	Value Range	Units	Default Value
Minimum OAM Rate	Int	1 .. 255	PDUs/sec	1
Maximum OAM Rate	Int	1 .. 255	PDUs/sec	30
OAM Response Timeout	Int	1 .. 255	secs	1

6.8.1.2 EPON Interfaces

Note that the objects defined in Sections 6.8.1.2.1 and 6.8.1.2.2 do not support the association of multiple upstream and downstream 1G and 10G channels to a single, physical EPON interface, because this is not supported in this version of the DPoE specifications.

6.8.1.2.1 1G-EPON Interface

The DPoE System MUST support configuration of the following attributes for each 1G-EPON interface:

Attribute Name	Type	Value Range	Units	Default Value
Admin State	ENUM	Disabled Enabled	NA	Enabled
Upstream FEC (forward error correction) Mode	ENUM	Disabled Enabled Per ONU[1]	NA	Disabled
Downstream FEC Mode	ENUM	Disabled Enabled Per ONU	NA	Disabled
Number of LLIDs	Int	1 .. 255	NA	150
[1] 'Per ONU' indicates that FEC will be enabled or disabled based on how the ONU is provisioned.				

6.8.1.2.2 10G-EPON Interface

The DPoE System MUST support configuration of the following attributes for each 10G-EPON interface:

Attribute Name	Type	Value Range	Units	Default Value
Admin State	ENUM	Disabled Enabled	NA	Enabled
Speed	ENUM	10 Gbps DS/1 Gbps US 10 Gbps	NA	10 Gbps
Upstream FEC Mode	ENUM	Disabled Enabled	NA	Disabled
Downstream FEC Mode	ENUM	Disabled Enabled	NA	Disabled
Number of LLIDs	Int	1 .. 255	NA	150

6.8.1.2.3 Loop Timing

The DPoE System MUST support the following attributes related to Loop Timing for EPON (TU) interfaces:

Attribute Name	Type	Value Range	Units	Default Value
Minimum Propagation Delay	Int	0 .. 65535	16 ns TQ	0
Maximum Propagation Delay	Int	0 .. 65535	16 ns TQ	6250
ONU Delay	Int	3125 .. 65535	16 ns TQ	3125
OLT Up/Down Offset	Int	-32768..32767	16 ns TQ	0
Null Grant Size	Int	16..72	16 ns TQ	42

6.8.1.2.4 MPCP Configuration

The DPoE System MUST support the following attributes related to configuring the use of MPCP on the EPON for EPON (TU) interfaces:

Attribute Name	Type	Value Range	Units	Default Value
Discovery Period	Int	10 .. 65530	msecs	1000
Grant Size in Discovery Gate	Int	84 .. 131070	bytes	16319
Deregistration Timeout	Int	0 .. $2^{32} - 1$	msecs	0

6.8.2 Fault Management

The DPoE System SHOULD support the ability to place the DPoE ONU into Remote Loopback mode as specified by [802.3], Clause 57.

6.8.3 EPON MIBs

The DPoE System SHOULD support [RFC 4837] – Managed Objects of Ethernet Passive Optical Networks (EPON).

7 SUPPORT FOR DOCSIS 3.0 OSSI MIBS

The DPoE System MUST support the list of MIBs as required by [OSSIv3.0] except where noted in the following tables. The DPoE System MUST support the MIBs required of the CMTS. The vCM MUST support the list of MIBs required of the CM, as required by [OSSIv3.0] except where noted in the following tables, on behalf of the attached ONU device.

The following table provides a high-level summary of the applicability of each DOCSIS MIB from [OSSIv3.0] to either the vCM on the DPoE System, or the DPoE System (acting as a CMTS). An X in the column indicates whether the MIB applies to the vCM or the DPoE System.

In Table 3 and subsequent tables with top-level MIB objects (Heading level 2), entries in ***bold italics*** indicate that the MIB is not applicable to the current version of the specification. In Table 3 and subsequent tables with top-level MIB objects (Heading level 2), entries in *italics* indicate that the MIB is not supported by the DPoE specifications.

For more detail on how specific objects are supported within a MIB, see the corresponding section for the MIBs themselves in [OSSIv3.0].

Table 3 - Relationship between OSSIv3.0 MIBS and DPoE Specifications

MIB	From	vCM	DPoE System	Comment
BRIDGE-MIB	RFC 4188	X	X	
CLAB-TOPO-MIB	***Annex Q***		***X***	***Operators do not see the architectural correlation for DPoE Networks.***
DOCS-BPI-MIB	*RFC 3083*			*Not applicable to EPON.*
DOCS-DRF-MIB	*OSSI-M*			*Not applicable to EPON.*
DOCS-CABLE-DEVICE-MIB	RFC 4639	X	X	
DOCS-DIAG-MIB	Annex Q		X	
DOCS-IETF-BPI2-MIB	RFC 4131	X	X	Baseline privacy key exchange does not apply to EPON. AES-128-bit traffic encryption is available.
DOCS-IF-MIB	RFC 4546	X	X	
DOCS-IF3-MIB	Annex Q	X	X	
DOCS-IFEXT2-MIB	*Annex H*			*This is an optional table with little value on the DPoE System. Parameters on CM are not applicable to EPON.*
DOCS-LOADBAL3-MIB	*Annex Q*			*Load balancing doesn't apply to EPON.*
DOCS-MCAST-AUTH-MIB	***Annex Q***		***X***	***Multicast is not supported in this version of DPoE specifications.***
DOCS-MCAST-MIB	***Annex Q***		***X***	***Multicast is not supported in this version of DPoE specifications.***
DOCS-QOS3-MIB	Annex Q	X	X	
DOCS-SEC-MIB	Annex Q		X	
DOCS-SUBMGT3-MIB	Annex Q		X	
ENTITY-MIB	RFC 4133	X	X	
ENTITY-SENSOR-MIB	RFC 3433	X	X	
EtherLike-MIB	RFC 3635	X	X	
HOST-RESOURCES-MIB	RFC 2790	X	X	

MIB	From	vCM	DPoE System	Comment
IF-MIB	RFC 2863	X	X	
IGMP-STD-MIB	***RFC 2933***	***X***	***X***	***Multicast is not supported in this version of DPoE specifications.***
IP-MIB	RFC 4293	X	X	
MGMD-STD-MIB	***RFC 5519***		***X***	***Multicast is not supported in this version of DPoE specifications.***
SNMP Applications	RFC 3413	X	X	
SNMP-COMMUNITY-MIB	RFC 3584	X	X	
SNMP-FRAMEWORK-MIB	RFC 3411	X	X	
SNMP-MPD-MIB	RFC 3412	X	X	
SNMP-USER-BASED-SM-MIB	RFC 3414	X	X	
SNMP-USM-DH-OBJECTS-MIB	RFC 2786	X	X	
SNMP-VIEW-BASED-ACM-MIB	RFC 3415	X	X	
SNMPv2-MIB	RFC 3418	X	X	
TCP-MIB	RFC 4022	X	X	
UDP-MIB	RFC 4113	X	X	

The following sections are adapted from the corresponding tables included in Annex A in [OSSIv3.0]. Each MIB section provides a table that provides a high-level analysis at the table (or group) level of whether the table is applicable to DPoE Elements.

The values in the vCM and DPoE columns correspond to the values taken directly from [OSSIv3.0] for the associated CM and CMTS columns from the original Annex A table. The values in these columns are defined in Table A-1 MIB Implementation Support. They are provided here as a quick reference to the original requirements from [OSSIv3.0]:

M Mandatory

O Optional

D Deprecated

Ob Obsolete

NA Not applicable for the device

The "Supports" column to the right of the vCM column or DPoE column indicates whether the table/group should be supported for the vCM or the DPoE System. The values in these columns override the original requirements from [OSSIv3.0].

The Comments column is used to capture any special implementation comments regarding support for the object (or why the object need not be supported) by the DPoE System.

For some tables within a MIB, more implementation details are provided to lend guidance to how to support the table objects. When needed, sub-sections are provided for the MIB to provide these details.

7.1 BRIDGE-MIB ([RFC 4188])

Table Name	vCM	Supports	DPoE	Supports	Comments
dot1dBase	M	MUST	M	MUST	
dot1dBasePortTable	M	MUST	M	MUST	
dot1dStp	M	MUST	M	MUST	
dot1dStpPortTable	O	MUST	O	MUST	
dot1dTp	M	MUST	M	MUST	
dot1dTpFdbTable	M	MUST	M	MUST	
dot1dTpPortTable	M	MUST	M	MUST	
dot1dStaticTable	O	MUST	O	MUST	

7.2 CLAB-TOPO-MIB ([OSSIv3.0] Annex Q)

Table Name	vCM	Supports	DPoE	Supports	Comments
clabTopoFiberNodeCfgTable	***NA***		***M***	***SHOULD NOT***	***Operator feedback is that this table is not applicable to an EPON network.***
clabTopoChFnCfgTable	***NA***		***O***	***SHOULD NOT***	***Operator feedback is that this table is not applicable to an EPON network.***

7.3 DOCS-CABLE-DEVICE-MIB ([RFC 4639])

Table Name	vCM	Supports	DPoE	Supports	Comments
docsDevBase	M	MUST	O	MUST	
docsDevServer	M	MUST	NA		
docsDevCpe	O	MUST	NA		
docsDevCpeTable	Ob	MUST	NA		Operators feel that these are all deprecated and replaced with versions that support IPv6, but this table could be needed for pre-DOCSIS 3.0 style modem configuration files.
docsDevCpeInetTable	O	MUST	NA		
docsDevNmAccessTable	M	MUST	O	MUST	These objects will be used by operators to use SNMPv1/v2 to manage their networks.
docsDevSoftware	M	MUST	O	MUST	
docsDevEvent	M	MUST	M	MUST	
docsDevEvControlTable	M	MUST	M	MUST	
docsDevEventTable	M	MUST	M	MUST	
docsDevFilter	M	MUST	*O*	*MUST NOT*	
docsDevFilterLLCTable	M	MUST	*O*	*MUST NOT*	
docsDevFilterIpTable	M	MUST	*O*	*MUST NOT*	
docsDevFilterPolicyTable	*D*	*MUST NOT*	*D*	*MUST NOT*	*Operators feel that these are all deprecated and replaced with versions that support IPv6.*
docsDevFilterTosTable	*D*	*MUST NOT*	*D*	*MUST NOT*	*Operators feel that these are all deprecated and replaced with versions that support IPv6.*

7.3.1 docsDevBase

Object	vCM	DPoE	Comments
docsDevRole	M	O	A vCM MUST return a value of 'cm' for docsDevRole. A DPoE System MUST support the values of 'cmtsActive' and 'cmtsBackup' (depending on the current role of the DPoE System).
docsDevDateTime	M	M	Set to the same value for the DPoE System and the vCMs on the DPoE System.
docsDevResetNow	M	O	When set to 'true' for the vCM, the associated DPoE ONU is reset and the vCM within the DPoE System is also re-initialized. When set to 'true' for the DPoE System, the DPoE System is reset.
docsDevSerialNumber	M	O	A vCM MUST set the docsDevSerialNumber object to the Serial Number of the associated DPoE ONU. For the DPoE System, the value is vendor-specific.
docsDevSTPControl	M	O	
docsDevIgmpModeControl	N-Sup	NA	Not supported in this version. Always return 'passive'.
docsDevMaxCpe	M	NA	For the vCM, this is set to the value specified via the modem configuration file. A DPoE System MUST return a value of zero for the docsDevMaxCpe object.

7.3.2 docsDevServer

Object	vCM	DPoE	Comments
docsDevServerBootState	M	NA	See Section 7.3.2.1 for additional information.
docsDevServerDhcp	M	NA	
docsDevServerTime	NA	NA	A vCM SHOULD NOT support the object docsDevServerTime. Because ToD retrieval is not required in this version of DPoE specifications, this object is not required to return a non-zero value for the vCM.
docsDevServerTftp	M	NA	
docsDevServerConfigFile	M	NA	
docsDevServerDhcpAddressType	M	NA	
docsDevServerDhcpAddress	M	NA	
docsDevServerTimeAddressType	NA	NA	A vCM SHOULD NOT support the object docsDevServerTime. Since ToD retrieval is not required in this version of DPoE specifications, this object is not required to return a non-zero value for the vCM.
docsDevServerTimeAddress	NA	NA	A vCM SHOULD NOT support the object docsDevServerTime. Since ToD retrieval is not required in this version of DPoE specifications, this object is not required to return a non-zero value for the vCM.
docsDevServerConfigTftpAddressType	M	NA	
docsDevServerConfigTftpAddress	M	NA	

7.3.2.1 docsDevServerBootState Object Mapping

CM State	Original Comment (as defined in DOCS-CABLE-DEVICE-MIB)	DPoE Applicability
operational(1)	The device has completed loading and processing of configuration parameters, and the CMTS has completed the Registration exchange.	The OLT on the DPoE System and DPoE ONU have been properly configured to support the parameters in the modem configuration file.
disabled(2)	The device was administratively disabled, possibly by being refused network access in the configuration file.	The vCM has been denied access because the modem configuration file cannot be supported by the DPoE System (or DPoE ONU).
waitingForDhcpOffer (3)	A Dynamic Host Configuration Protocol (DHCP) Discover has been transmitted, and no offer has yet been received.	The DPoE System has generated a DHCP Discover on behalf of the vCM.
waitingForDhcpResponse (4)	A DHCP Request has been transmitted, and no response has yet been received.	The DPoE System has generated a DHCP Request on behalf of the vCM.
waitingForTimeServer (5)	A Time Request has been transmitted, and no response has yet been received.	Not applicable to DPoE
waitingForTftp (6)	A request to the TFTP parameter server has been made, and no response received.	The DPoE System has sent a TFTP request to the TFTP server.
refusedByCmts (7)	The Registration Request/Response exchange with the CMTS failed.	Not applicable to DPoE
forwardingDenied (8)	The registration process was completed, but the network access option in the received configuration file prohibits forwarding.	The OLT on the DPoE System and DPoE ONU have been properly configured to support the parameters in the modem configuration file, but the configuration file has blocked network access for the ONU.
other(9)	The registration process reached a point that does not fall into one of the above categories.	
unknown(10)	The device has not yet begun the registration process or is in some other indeterminate state.	The vCM is in the process of initialization.

7.3.3 docsDevSoftware

Object	vCM	DPoE	Comments
docsDevSoftware			This group is only mandatory for the vCM.
docsDevSwServer	D	D	Object has been deprecated. Address of the TFTP Server.
docsDevSwFilename	M	O	
docsDevSwAdminStatus	M	O	If set to 'upgradeFromMgt', then the DPoE System initiates an upgrade for the DPoE ONU associated with the vCM.
docsDevSwOperStatus	M	O	
docsDevSwCurrentVers	M	O	Set to the current firmware revision running on the DPoE ONU associated with the vCM.
docsDevSwServerAddressType	M	O	
docsDevSwServerAddress	M	O	Address of the TFTP Server.
docsDevSwServerTransportProtocol	M	O	A vCM MUST support a value of 'tftp' for docsDevSwServerTransportProtocol. A vCM MAY support a value of 'http' for docsDevSwServerTransportProtocol.

7.3.4 docsDevFilterLLCTable

Object	vCM	DPoE	Comments
docsDevFilterLLCUnmatchedAction	M	O	
docsDevFilterLLCTable	M	O	
docsDevFilterLLCEntry	M	O	
docsDevFilterLLCIndex	M	O	
docsDevFilterLLCStatus	M	O	
docsDevFilterLLCIfIndex	M	O	
docsDevFilterLLCProtocolType	M	O	
docsDevFilterLLCProtocol	M	O	
docsDevFilterLLCMatches	M	O	A vCM SHOULD implement docsDevFilterLLCMatches.

7.3.5 docsDevFilterIpTable

Object	vCM	DPoE	Comments
docsDevFilterIpDefault	M	D	A vCM MUST support a value of 'accept' for docsDevFilterIpDefault. A vCM MAY support a value of 'discard' for docsDevFilterIpDefault.
docsDevFilterIpTable	M	D	
docsDevFilterIpEntry	M	D	
docsDevFilterIpIndex	M	D	
docsDevFilterIpStatus	M	D	
docsDevFilterIpControl	M	D	A vCM MUST support the values of 'accept' and 'discard' for docsDevFilterIpControl. A vCM MAY support a value of 'policy' for docsDevFilterIpControl.
docsDevFilterIpIfIndex	M	D	
docsDevFilterIpDirection	M	D	
docsDevFilterIpBroadcast	M	D	A vCM MUST support a value of 'false' for docsDevFilterIpBroadcast. A vCM MAY support a value of 'true' MAY for docsDevFilterIpBroadcast.
docsDevFilterIpSaddr	M	D	
docsDevFilterIpSmask	M	D	
docsDevFilterIpDaddr	M	D	
docsDevFilterIpDmask	M	D	
docsDevFilterIpProtocol	M	D	
docsDevFilterIpSourcePortLow	M	D	
docsDevFilterIpSourcePortHigh	M	D	
docsDevFilterIpDestPortLow	M	D	
docsDevFilterIpDestPortHigh	M	D	
docsDevFilterIpMatches	M	D	A vCM SHOULD implement docsDevFilterIpMatches.
docsDevFilterIpTos	M	D	
docsDevFilterIpTosMask	M	D	

Object	vCM	DPoE	Comments
docsDevFilterIpContinue	D	D	
docsDevFilterIpPolicyId	D	D	

7.4 DOCS-DIAG-MIB ([OSSIv3.0] ANNEX Q)

Table Name	vCM	Supports	DPoE	Supports	Comments
docsDiagLogGlobal	NA		M	MUST	
docsDiagLogTriggersCfg	NA		M	MUST	
docsDiagLogTable	NA		M	MUST	
docsDiagLogDetailTable	NA		M	MUST	

7.4.1 docsDiagLogTriggersCfg

Object	vCM	DPoE	Comments
docsDiagLogTriggersCfg			
docsDiagLogIncludeTriggers	NA	M	Only Bit 0 (Registration trigger) applies to DPoE Networks. Bit 1 (Ranging Retry trigger) does not apply. The default value should be '80'H.
docsDiagLogEnableAgingTriggers	NA	M	Only Bit 0 (Registration trigger) applies to DPoE Networks. Bit 1 (Ranging Retry trigger) does not apply.
docsDiagLogRegTimeInterval	NA	M	
docsDiagLogRegDetail	NA	M	Only the bits which correspond to the supported states for the CmtsCmRegState TC are supported for DPoE Networks.
docsDiagLogRangingRetryType	NA	M	This object is not applicable to DPoE Networks. The DPoE System MUST return a value of '1' for docsDiagLogRangingRetryType.
docsDiagLogRangingRetryThrhld	NA	M	This object is not applicable to DPoE Networks. The DPoE System MUST return a value of '6' for docsDiagLogRangingRetryThrhld.
docsDiagLogRangingRetryStationMaintNum	NA	M	This object is not applicable to DPoE Networks. The DPoE System MUST return a value of '90' for docsDiagLogRangingRetryStationMaintNum.

7.4.2 docsDiagLogTable

Object	vCM	DPoE	Comments
docsDiagLogTable	NA	M	
docsDiagLogEntry	NA	M	
docsDiagLogCmMacAddr	NA	M	
docsDiagLogLastUpdateTime	NA	M	
docsDiagLogCreateTime	NA	M	
docsDiagLogLastRegTime	NA	M	
docsDiagLogRegCount	NA	M	
docsDiagLogRangingRetryCount	NA	M	Does not apply to DPoE Networks. Return value of zero.

7.4.3 docsDiagLogDetailTable

Object	vCM	DPoE	Comments
docsDiagLogDetailTable	NA	M	
docsDiagLogDetailEntry	NA	M	
docsDiagLogDetailTypeValue	NA	M	Only the supported states for the CmtsCmRegState TC are supported for DPoE Networks for entries in this table.
docsDiagLogDetailCount	NA	M	
docsDiagLogDetailLastUpdate	NA	M	
docsDiagLogDetailLastErrorText	NA	M	

7.5 DOCS-IETF-BPI2-MIB ([RFC 4131])

Table Name	vCM	Supports	DPoE	Supports	Comments
docsBpi2CmtsBaseEntryTable	NA		M	MUST	This table is used to support the configuration of the default key exchange lifetime.
docsBpi2CodeDownloadGroup	M	MUST	NA		These objects need to be supported for Secure Software Download.
docsBpi2CmCryptoSuiteTable	***M***	***SHOULD NOT***	***NA***		***As currently defined, the algorithm objects do not support the algorithms supported by DPoE.***
docsBpi2CmDeviceCertTable	M	MUST	NA		These objects need to be supported to manage certificates.
docsBpi2CmtsProvisionedCmCertTable	NA		M	MUST	These objects need to be supported to manage certificates.
docsBpi2CmtsCACertTable	NA		M	MUST	These objects need to be supported to manage certificates.
docsBpi2CmBaseTable	*M*	*MUST NOT*	*NA*		*BPI will not be used for DPoE Networks so the objects relating to BPI are not needed.*
docsBpi2CmTEKTable	*M*	*MUST NOT*	*NA*		*BPI will not be used for DPoE Networks so the objects relating to BPI are not needed.*
docsBpi2CmIpMulticastMapTable	*M*	*MUST NOT*	*NA*		*BPI will not be used for DPoE Networks so the objects relating to BPI are not needed.*
docsBpi2CmtsAuthEntryTable	*NA*		*M*	*MUST NOT*	*BPI will not be used for DPoE Networks so the objects relating to BPI are not needed.*
docsBpi2CmtsTEKTable	*NA*		*M*	*MUST NOT*	*BPI will not be used for DPoE Networks so the objects relating to BPI are not needed.*
docsBpi2CmtsIpMulticastMapTable	*NA*		*M*	*MUST NOT*	*BPI will not be used for DPoE Networks so the objects relating to BPI are not needed.*
docsBpi2CmtsIpMulticastAuthTable	*NA*		*M*	*MUST NOT*	*BPI will not be used for DPoE Networks so the objects relating to BPI are not needed.*

7.5.1 docsBpi2CmtsBaseEntryTable

Object	vCM	DPoE	Comments
docsBpi2CmtsBaseEntryTable	NA	M	There is an entry in this table for the MAC Domain Interface Index associated with each EPON (TU) interface on the DPoE System.
docsBpi2CmtsBaseEntryEntry	NA	M	
docsBpi2CmtsDefaultAuthLifetime	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of '604800' for docsBpi2CmtsDefaultAuthLifetime.
docsBpi2CmtsDefaultTEKLifetime	NA	M	Is used in DPoE Networks to configure the Encryption Key Exchange Timeout. Default is 600 seconds.
docsBpi2CmtsDefaultSelfSignedManufCertTrust	NA	M	
docsBpi2CmtsCheckCertValidityPeriods	NA	M	
docsBpi2CmtsAuthentInfos	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsAuthentInfos.
docsBpi2CmtsAuthRequests	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsAuthRequests.
docsBpi2CmtsAuthReplies	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsAuthReplies.
docsBpi2CmtsAuthRejects	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsAuthRejects.
docsBpi2CmtsAuthInvalids	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsAuthInvalids.
docsBpi2CmtsSAMapRequests	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsSAMapRequests.
docsBpi2CmtsSAMapReplies	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsSAMapReplies.
docsBpi2CmtsSAMapRejects	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsSAMapRejects.

7.6 DOCS-IF-MIB [RFC 4546]

Table Name	vCM	Supports	DPoE	Supports	Comments
docsIfCmMacTable	M	MUST	NA		Need to provide an entry for backwards compatibility but MAC address is the only useful entry, but it is an important one.
docsIfCmStatusTable	D	MUST	NA		Most of these fields are not applicable. Operator feedback was that the resets object seemed like a quick way to see if there are basic issues.
docsIfCmtsCmStatusTable	NA		M	MUST	It may be used by operators who haven't transitioned to DOCS-IF3-MIB yet.
docsIfCmtsServiceTable	NA		M	MUST	
docsIfCmtsMacToCmTable	NA		M	MUST	
docsIfCmtsChannelUtilizationTable	NA		M	MUST	Operators like to know their channel utilizations for monitoring/planning purposes.
docsIfDownstreamChannelTable	***M***	***SHOULD NOT***	***M***	***SHOULD NOT***	***The objects in this table (frequency, width, modulation) don't apply to EPON, but DPoE specifications may need to provide a parallel table that maps an arbitrary channel ID to a wavelength.***
docsIfUpstreamChannelTable	***M***	***SHOULD NOT***	***M***	***SHOULD NOT***	***Similar to the comment above for the downstream.***
docsIfSignalQualityTable	***M***	***SHOULD NOT***	***M***	***SHOULD NOT***	***Operator feedback was that there must be similar measures that are valuable for optical networks.*** ***However, they would not be provided via this table.***
docsIfCmtsMacTable	***NA***		***M***	***SHOULD NOT***	
docsIfCmtsStatusTable	***NA***		***O***	***SHOULD NOT***	
docsIfCmtsDownChannelCounterTable	***NA***		***O***	***SHOULD NOT***	***This table was added so the operator could compute utilization on a system that didn't have the docsIfCmtsChannelUtilizationTable, because that table came later. Therefore, this table can be skipped if the utilization table is supported.***
docsIfCmtsUpChannelCounterTable	***NA***		***O***	***SHOULD NOT***	***Many of the fields in this table don't make sense for EPON, and the units are in minislots. This table isn't needed if docsIfCmtsChannelUtilizationTable is supported.***
docsIfQosProfileTable	*O*	*MUST NOT*	*O*	*MUST NOT*	*There is no need to support 1.0 CoS in a DPoE Network.*
docsIfCmServiceTable	*M*	*MUST NOT*	*NA*		*No relevance to EPON, because there is no contention region except for DISCOVERY, and there are no statistics exposed there.*
docsIfCmtsModulationTable	*NA*		*M*	*MUST NOT*	*This seems like it would be completely useless/not-applicable for EPON.*

7.6.1 docsIfCmMacTable

Object	vCM	DPoE	Comments
docsIfCmMacTable	M	NA	
docsIfCmMacEntry	M	NA	
docsIfCmCmtsAddress	M	NA	Set to the MAC Address of the EPON (TU) interface on the DPoE System connected to the DPoE ONU.
docsIfCmCapabilities	M	NA	A vCM MUST return a value of '00' for docsIfCmRangingTimeout.
docsIfCmRangingRespTimeout	Ob	NA	Obsolete object – replaced by the following object.
docsIfCmRangingTimeout	M	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmRangingTimeout.

7.6.2 docsIfCmStatusTable

Object	vCM	DPoE	Comments
docsIfCmStatusTable	D	NA	
docsIfCmStatusEntry	D	NA	
docsIfCmStatusValue	D	NA	See following section for details on the implementation of this object for DPoE Networks.
docsIfCmStatusCode	D	NA	
docsIfCmStatusTxPower	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusTxPower.
docsIfCmStatusResets	D	NA	
docsIfCmStatusLostSyncs	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusLostSyncs.
docsIfCmStatusInvalidMaps	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusInvalidMaps.
docsIfCmStatusInvalidUcds	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusInvalidUcds.
docsIfCmStatusInvalidRangingResponses	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusInvalidRangingResponses.
docsIfCmStatusInvalidRegistrationResponses	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusInvalidRegistrationResponses.
docsIfCmStatusT1Timeouts	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusT1Timeouts.
docsIfCmStatusT2Timeouts	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusT2Timeouts.

Object	vCM	DPoE	Comment
docsIfCmStatusT3Timeouts	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusT3Timeouts.
docsIfCmStatusT4Timeouts	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusT4Timeouts.
docsIfCmStatusRangingAborteds	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusRangingAborteds.
docsIfCmStatusDocsisOperMode	D	NA	A vCM MUST return a value of 'docsis11' for docsIfCmStatusDocsisOperMode.
docsIfCmStatusModulationType	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of 'unknown' for docsIfCmStatusModulationType.
docsIfCmStatusEqualizationData	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of length zero for docsIfCmStatusEqualizationData.
docsIfCmStatusUCCs	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusUCCs.
docsIfCmStatusUCCFails	D	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIfCmStatusUCCFails.

7.6.2.1 docsIfCmStatusValue Mappings

Reported by the DPoE System on behalf of the vCM

CM State	Original Comment (as defined in DOCSIS RFIv2)	DPoE Applicability
other(1)	Any state other than below.	
notReady(2)	CM has started up, powered-on, or modem reset is complete.	The vCM is in the process of initialization.
notSynchronized(3)	CM has completed its power-up sequence but has not synchronized.	Not applicable to DPoE Networks.
phySynchronized(4)	CM has recognized a valid DOCSIS Downstream channel.	Not applicable to DPoE Networks.
usParametersAcquired(5)	CM has collected all UCDs with different channel ID fields and has found a suitable channel to begin the ranging process.	Not applicable to DPoE Networks.
rangingComplete(6)	CM has completed initial ranging.	The DPoE System has discovered all of the links configured on the DPoE ONU.
ipComplete(7)	An IP Address has been assigned to the CM.	An IP Address has been assigned to the vCM.
todEstablished(8)	Time-of-Day has been retrieved by the CM.	Not applicable to DPoE Networks.
securityEstablished(9)	If the CM is provisioned to use Baseline Privacy, the CM has completed the BP process.	Not applicable to DPoE Networks.

CM State	Original Comment (as defined in DOCSIS RFIv2)	DPoE Applicability
paramTransferComplete(10)	The CM has obtained its provisioning file from the TFTP server.	The DPoE System has retrieved the modem provisioning file for the vCM.
registrationComplete(11)	CM has completed registration with the CMTS; REG-RSP received from the CMTS (in DOCSIS 1.0), or REG-ACK sent to the CMTS (in DOCSIS 2.0+).	Not applicable to DPoE Networks.
operational(12)	CM is now operational.	The DPoE System and DPoE ONU have been properly configured to support the parameters in the modem configuration file.
accessDenied(13)	CMTS has rejected the CM's REG-REQ and has been denied access.	The vCM has been denied access because the modem configuration file cannot be supported by the DPoE System (or DPoE ONU).

7.6.3 docsIfCmtsCmStatusTable

Object	vCM	DPoE	Comments
docsIfCmtsCmStatusTable	NA	D	Although deprecated by [OSSIv3.0], it is still going to be supported for DPoE Networks.
docsIfCmtsCmStatusEntry	NA	D	
docsIfCmtsCmStatusIndex	NA	D	Contains the registration identifier assigned by the DPoE System to the vCM.
docsIfCmtsCmStatusMacAddress	NA	D	Contains the MAC address that identifies the DPoE ONU for the vCM.
docsIfCmtsCmStatusIpAddress	NA	D	Contains the IP Address assigned to the vCM.
docsIfCmtsCmStatusDownChannelIfIndex	NA	D	Contains the Interface Index value assigned to the logical Downstream Interface on the DPoE System for the EPON (TU) interface connected to the DPoE ONU.
docsIfCmtsCmStatusUpChannelIfIndex	NA	D	Contains the Interface Index value assigned to the logical Upstream Interface on the DPoE System for the EPON (TU) interface connected to the DPoE ONU.
docsIfCmtsCmStatusRxPower	NA	D	The object reports power in tenths of a dBmV. EPON power is typically expressed units of uWatts.
docsIfCmtsCmStatusTimingOffset	NA	D	The value provided here is the RTT for the ONU with the units converted to the DOCSIS units (6.25 microsecs/64).
docsIfCmtsCmStatusEqualizationData	NA	D	Does not apply to DPoE Networks. The DPoE System MUST return a value of length zero for docsIfCmtsCmStatusEqualizationData.
docsIfCmtsCmStatusValue	NA	D	See following section for details on the implementation of this object for DPoE Networks.
docsIfCmtsCmStatusUnerroreds	NA	D	
docsIfCmtsCmStatusCorrecteds	NA	D	
docsIfCmtsCmStatusUncorrectables	NA	D	
docsIfCmtsCmStatusSignalNoise	NA	D	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsIfCmtsCmStatusSignalNoise.

Object	vCM	DPoE	Comments
docsIfCmtsCmStatusMicroreflections	NA	D	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsIfCmtsCmStatusMicroreflections.
docsIfCmtsCmStatusExtUnerroreds	NA	D	
docsIfCmtsCmStatusExtCorrecteds	NA	D	
docsIfCmtsCmStatusExtUncorrectables	NA	D	
docsIfCmtsCmStatusDocsisRegMode	NA	D	The DPoE System MUST return a value of 'docsis11' for docsIfCmtsCmStatusDocsisRegMode.
docsIfCmtsCmStatusModulationType	NA	D	Does not apply to DPoE Networks. The DPoE System MUST return a value of 'unknown' for docsIfCmtsCmStatusModulationType.
docsIfCmtsCmStatusInetAddressType	NA	D	
docsIfCmtsCmStatusInetAddress	NA	D	
docsIfCmtsCmStatusValueLastUpdate	NA	D	Set to the value of DPoE System's sysUpTime value when the docsIfCmtsCmStatusValue for this instance changes.
docsIfCmtsCmStatusHighResolutionTimingOffset	NA	D	The value provided here is the RTT for the ONU with the units converted to the DOCSIS units (6.25 microsecs/(64*256)).

7.6.3.1 docsIfCmtsCmStatusValue Mappings

Reported by the DPoE System for each vCM known to the DPoE System

CMTS State for CM	Original Comment (as defined in DOCS-IF-MIB [RFC 4546])	DPoE Applicability
other(1)	Any state other than below.	
ranging(2)	The CMTS has received an Initial Ranging Request message from the CM, and the ranging process is not yet complete.	The DPoE System has discovered a link on the DPoE ONU.
rangingAborted(3)	The CMTS has sent a Ranging Abort message to the CM.	The DPoE System did not discover all of the links configured on the ONU within the timeout specified by the DOCSIS MULPI T9 timeout value.
rangingComplete(4)	The CMTS has sent a Ranging Complete message to the CM.	The DPoE System has discovered all of the links configured on the DPoE ONU.
ipComplete(5)	The CMTS has received a DHCP reply message and forwarded it to the CM.	An IP Address has been assigned to the vCM.
registrationComplete(6)	The CMTS has sent a Registration Response message to the CM.	Not applicable to DPoE
accessDenied(7)	The CMTS has sent a Registration Aborted message to the CM.	The DPoE System puts the vCM in this state if the modem configuration file cannot be supported by the DPoE System (or DPoE ONU).
operational(8)	Value 8 is considered reserved and should not be defined in future revisions of this MIB module to avoid conflict with documented implementations that support value 8 to indicate operational state after completing the BPI initialization process.	The DPoE System puts the vCM in this state when the OLT on the DPoE System and DPoE ONU have been properly configured to support the parameters in the modem configuration file.

CMTS State for CM	Original Comment (as defined in DOCS-IF-MIB [RFC 4546])	DPoE Applicability
registeredBPIInitializing(9)	Baseline Privacy (BPI) is enabled and the CMTS is in the process of completing BPI initialization. This state MAY last for a significant length of time if failures occur during the initialization process. After completion of BPI initialization, the CMTS will report registrationComplete(6).	Not applicable to DPoE Networks.

7.6.4 docsIfCmtsServiceTable

Object	vCM	DPoE	Comments
docsIfCmtsServiceTable	NA	M	Although defined as a read-write table, for DPoE Networks this table need only be supported as a read-only table.
docsIfCmtsServiceEntry	NA	M	
docsIfCmtsServiceId	NA	M	
docsIfCmtsServiceCmStatusIndex	NA	D	Object has been deprecated due to its limited range (0..65535). Contains the registration identifier assigned by the DPoE System to the vCM associated with the SID.
docsIfCmtsServiceAdminStatus	NA	D	Used to disable or delete SIDs. The DPoE System SHOULD return a value of 'enabled' for docsIfCmtsServiceAdminStatus.
docsIfCmtsServiceQosProfile	NA	M	Does not apply to DPoE because this only applies to 1.0 CoS. The DPoE System MUST return a value of zero for docsIfCmtsServiceQosProfile.
docsIfCmtsServiceCreateTime	NA	D	Set to the value of DPoE System's sysUpTime value when the SID is created.
docsIfCmtsServiceInOctets	NA	D	
docsIfCmtsServiceInPackets	NA	D	
docsIfCmtsServiceNewCmStatusIndex	NA	D	Contains the registration identifier assigned by the DPoE System to the vCM associated with the SID.

7.6.5 docsIfCmtsChannelUtilizationTable

Object	vCM	DPoE	Comments
DocsIfCmtsChannelUtilizationTable	NA	M	This table is indexed by Interface Index, docsIfCmtsChannelUtIfType, and docsIfCmtsChannelUtId. Depending on the value of docsIfCmtsChannelUtIfType, the Interface Index value corresponds to the logical downstream or upstream interface associated with the EPON (TU) interface.
DocsIfCmtsChannelUtilizationEntry	NA	M	
docsIfCmtsChannelUtIfType	NA	M	Set to docsCableDownstream for the logical downstream interface or docsCableUpstream for the logical upstream interface.
docsIfCmtsChannelUtId	NA	M	Specifies the channel identifier. This value should be set to one (i.e., one channel in the downstream or upstream direction).

Object	vCM	DPoE	Comments
docsIfCmtsChannelUtUtilization	NA	M	For DPoE Networks, the channel utilization should be expressed as the percentage of the potential bandwidth for the interface which is being currently used.

7.7 DOCS-IF3-MIB ([OSSIv3.0] Annex Q)

Table Name	vCM	Supports	DPoE	Supports	Comments
docsIf3CmStatusTable	M	MUST	NA		Most of these objects are not applicable to EPON. Some, like resets, can be mapped to corresponding EPON values. Operator feedback was that monitoring resets would also be an important statistic.
docsIf3CmCapabilities	***M***	***SHOULD NOT***	***NA***		***Not needed for the current version.*** ***Could be used to support more than one capability in the future.***
docsIf3CmtsCmRegStatusTable	NA		M	MUST	Must be implemented because some of the fields are valid for DPoE ONUs. The addressing objects are the more valuable objects.
docsIf3CmtsCmCtrlCmd	NA		M	MUST	These commands apply to EPON, with the exception of muting. Operators feel that this object is of particular use for disabling customer access.
docsIf3CmEventCtrlTable	M	MUST	NA		Operators feel that this is probably used as a TLV 11 OID.
docsIf3CmtsEventCtrlTable	NA		M	MUST	
docsIf3CmtsEventNotif	NA		M	MUST	
docsIf3CmEventNotif	M	MUST	NA		
docsIf3MdNodeStatusTable	***NA***		***M***	***SHOULD NOT***	***DPoE*** Networks ***may want to support this table in the future even though the topology is very simple (assuming the concept of a serving group is kept).***
docsIf3MdDsSgStatusTable	***NA***		***M***	***SHOULD NOT***	***If the concept of a channel identifier is kept for DPoE*** Networks***, then this table should be supported.***
docsIf3MdUsSgStatusTable	***NA***		***M***	***SHOULD NOT***	***If the concept of a channel identifier is kept for DPoE*** Networks***, then this table should be supported.***
docsIf3CmStatusUsTable	***M***	***SHOULD NOT***	***NA***		***Operators feel that similar information is needed for EPON troubleshooting, but are not sure if this is the right table.***
docsIf3CmtsCmUsStatusTable	***NA***		***M***	***SHOULD NOT***	***Operators feel that similar information is needed for EPON troubleshooting, but are not sure if this is the right table.***
docsIf3MdCfgTable	***NA***		***M***	***SHOULD NOT***	***Operator feedback was that a number of these items should have a corresponding table in DPoE*** Networks***, but not for this version of the specification.***

Table Name	vCM Supports		DPoE Supports		Comments
docsIf3DsChSetTable	***NA***		***M***	***SHOULD NOT***	***Could be provided so that DPoE*** Networks ***can have a single DS channel in a Channel set.***
docsIf3UsChSetTable	***NA***		***M***	***SHOULD NOT***	***Could be provided so that DPoE*** Networks ***can have a single US channel in a Channel set.***
docsIf3CmDpvStatsTable	***M***	***SHOULD NOT***	***NA***		***This version of DPoE specifications does not support DOCSIS DPV.***
docsIf3MdChCfgTable	***NA***		***M***	***SHOULD NOT***	***This table isn't needed in the short-term, but may be needed in future versions.***
docsIf3CmMdCfgTable	***M***	***SHOULD NOT***	***NA***		***This table is used to override the CM IP provisioning. Because the current version of the specification does not support IPv6, this table is not currently needed.***
docsIf3MdUsToDsChMappingTable	*NA*		*M*	*MUST NOT*	*Not applicable for EPON.*
docsIf3BondingGrpCfgTable	*NA*		*M*	*MUST NOT*	*No bonding is supported or needed in an EPON network.*
docsIf3DsBondingGrpStatusTable	*NA*		*M*	*MUST NOT*	*No bonding is supported or needed in an EPON network.*
docsIf3UsBondingGrpStatusTable	*NA*		*M*	*MUST NOT*	*No bonding is supported or needed in an EPON network.*
docsIf3RccCfgTable	*NA*		*M*	*MUST NOT*	*This appears to be completely related to the DOCSIS PHY (and support for multiple US channels).*
docsIf3RxChCfgTable	*NA*		*M*	*MUST NOT*	*More configuration objects related to multiple US channel support.*
docsIf3RxModuleCfgTable	*NA*		*M*	*MUST NOT*	*More configuration objects related to multiple US channel support.*
docsIf3RccStatusTable	*NA*		*M*	*MUST NOT*	*No RCCs to report.*
docsIf3RxChStatusTable	*M*	*MUST NOT*	*M*	*MUST NOT*	*No RCCS and no Receive Channels to report status on.*
docsIf3RxModuleStatusTable	*M*	*MUST NOT*	*M*	*MUST NOT*	*No RCCs, and no Receive Modules.*
docsIf3SignalQualityExtTable	*M*	*MUST NOT*	*M*	*MUST NOT*	*Specific to DOCSIS PHY.*
docsIf3CmtsSignalQualityExtTable	*NA*		*M*	*MUST NOT*	*Specific to DOCSIS PHY.*
docsIf3CmtsSpectrumAnalysisMeasTable	*NA*		*M*	*MUST NOT*	*Specific to DOCSIS PHY.*
docsIf3UsChExtTable	*M*	*MUST NOT*	*M*	*MUST NOT*	*Specific to DOCSIS PHY.*

7.7.1 docsIf3CmStatusTable

Object	vCM	DPoE	Comments
docsIf3CmStatusTable	M	NA	
docsIf3CmStatusEntry	M	NA	
docsIf3CmStatusValue	M	NA	See following section for details on the implementation of this object for DPoE Networks.
docsIf3CmStatusCode	M	NA	
docsIf3CmStatusResets	M	NA	

Object	vCM	DPoE	Comments
docsIf3CmStatusLostSyncs	M	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIf3CmStatusLostSyncs.
docsIf3CmStatusInvalidMaps	M	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIf3CmStatusInvalidMaps.
docsIf3CmStatusInvalidUcds	M	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIf3CmStatusInvalidUcds.
docsIf3CmStatusInvalidRangingRsps	M	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIf3CmStatusInvalidRangingRsps.
docsIf3CmStatusInvalidRegRsps	M	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIf3CmStatusInvalidRegRsps.
docsIf3CmStatusT1Timeouts	M	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIf3CmStatusT1Timeouts.
docsIf3CmStatusT2Timeouts	M	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIf3CmStatusT2Timeouts.
docsIf3CmStatusUCCsSuccesses	M	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIf3CmStatusUCCsSuccesses.
docsIf3CmStatusUCCFails	M	NA	Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIf3CmStatusUCCFails.

7.7.1.1 CmRegState Textual Convention/docsIf3CmStatusValue

Reported by the DPoE System on behalf of the vCM

CM State	Original Comment (as defined in DOCS-IF3-MIB)	Applicability to DPoE
other	Indicates any state not described below.	
notReady	Indicates that the CM has not started the registration process yet.	The vCM is in the process of initialization.
notSynchronized	Indicates that the CM has not initiated or completed the synchronization of the downstream physical layer.	Not applicable to DPoE Networks.
phySynchronized	Indicates that the CM has completed the synchronization of the downstream physical layer.	Not applicable to DPoE Networks.
dsTopologyResolutionInProgress	Indicates that the CM is attempting to determine its MD-DS-SG.	Not applicable to DPoE Networks.
usParametersAcquired	Indicates that the CM has completed the upstream parameters acquisition or have completed the downstream and upstream service groups resolution, whether the CM is registering in a pre-3.0 or a 3.0 CMTS.	Not applicable to DPoE Networks.
rangingInProgress	Indicates that the CM has initiated the ranging process.	The DPoE System has discovered a link on the ONU.

CM State	Original Comment (Redefined in DOCSIS3-MIB)	Applicability to DPoE
rangingComplete	Indicates that the CM has completed initial ranging and received a Ranging Status of success from the CMTS in the RNG-RSP message.	The DPoE System has discovered all of the Links configured on the DPoE ONU.
eaeInProgress	Indicates that the CM has sent an Auth Info message for EAE.	The DPoE ONU associated with the vCM is currently being authenticated by the DPoE System.
dhcpv4InProgress	Indicates that the CM has sent a DHCPv4 DISCOVER to gain IP connectivity.	The DPoE System has generated a DHCPv4 DISCOVER message to obtain an IPv4 address.
dhcpv6InProgress	Indicates that the CM has sent a DHCPv6 Solicit message.	Not applicable to this version of DPoE specifications.
dhcpv4Complete	Indicates that the CM has received a DHCPv4 ACK message from the CMTS.	An IPv4 address has been assigned to the vCM.
dhcpv6Complete	Indicates that the CM has received a DHCPv6 Reply message from the CMTS.	Not applicable to this version of DPoE specifications.
todEstablished	Indicates that the CM has successfully acquired time of day. If the ToD is acquired after the CM is operational, this value should not be reported.	Not applicable to DPoE Networks.
securityEstablished	Indicates that the CM has successfully completed the BPI initialization process.	The connection to the DPoE ONU has been secured and the DPoE ONU's certificate has been authenticated by the DPoE System.
configFileDownloadComplete	Indicates that the CM has completed the configuration file download process.	The DPoE System has retrieved the modem provisioning file for the vCM.
registrationInProgress	Indicates that the CM has sent a Registration Request (REG-REQ or REG-REQ-MP).	The DPoE System is in the process of sending OAM messages to the DPoE ONU based on the contents of the provisioning file.
registrationComplete	Indicates that the CM has successfully completed the Registration process with the CMTS.	Not applicable to DPoE Networks.
accessDenied	Indicates that the CM has received a registration aborted notification from the CMTS.	The vCM has been denied access because the modem configuration file cannot be supported by the DPoE System (or DPoE ONU).
operational	Indicates that the CM has completed all necessary initialization steps and is operational.	The OLT on the DPoE System and DPoE ONU have been properly configured to support the parameters in the modem configuration file.
bpiInit	Indicates that the CM has started the BPI initialization process as indicated in the CM configuration file. If the CM already performed EAE, this state is skipped by the CM.	Not applicable to DPoE Networks.
forwardingDisabled	Indicates that the registration process was completed, but the network access option in the received configuration file prohibits forwarding.	The OLT on the DPoE System and DPoE ONU have been properly configured to support the parameters in the modem configuration file, but the configuration file has blocked network access for the ONU.
rfMuteAll	Indicates that the CM is instructed to mute all channels in the CM-CTRL-REQ message from CMTS.	Not applicable to DPoE Networks in this version of the specification. It could be used to note when an upstream laser has been administratively disabled.

7.7.2 docsIf3CmtsCmRegStatusTable

Object	vCM	DPoE	Comments
docsIf3CmtsCmRegStatusTable	NA	M	
docsIf3CmtsCmRegStatusEntry	NA	M	
docsIf3CmtsCmRegStatusId	NA	M	Contains the registration identifier assigned by the DPoE System to the vCM.
docsIf3CmtsCmRegStatusMacAddr	NA	M	Contains the MAC Address that identifies the DPoE ONU for the vCM.
docsIf3CmtsCmRegStatusIPv6Addr	NA	M	Not applicable to this version of DPoE specifications. Return 'all zeros' address.
docsIf3CmtsCmRegStatusIPv6LinkLocal	NA	M	Not applicable to this version of DPoE specifications. Return 'all zeros' address.
docsIf3CmtsCmRegStatusIPv4Addr	NA	M	Contains the IP address assigned to the vCM.
docsIf3CmtsCmRegStatusValue	NA	M	See following section for details on the implementation of this object for DPoE Networks.
docsIf3CmtsCmRegStatusMdIfIndex	NA	M	Contains the Interface Index value assigned to the logical MAC Domain on the DPoE System for the EPON (TU) interface connected to the DPoE ONU.
docsIf3CmtsCmRegStatusMdCmSgId	NA	M	Not applicable to this version of DPoE specifications. The DPoE System MUST return a value of zero for docsIf3CmtsCmRegStatusMdCmSgId.
docsIf3CmtsCmRegStatusRcpId	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsIf3CmtsCmRegStatusRcpId.
docsIf3CmtsCmRegStatusRccStatusId	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsIf3CmtsCmRegStatusRccStatusId.
docsIf3CmtsCmRegStatusRcsId	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsIf3CmtsCmRegStatusRcsId.
docsIf3CmtsCmRegStatusTcsId	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsIf3CmtsCmRegStatusTcsId.
docsIf3CmtsCmRegStatusQosVersion	NA	M	The DPoE System MUST return a value of 'docsis11' for docsIf3CmtsCmRegStatusQosVersion.
docsIf3CmtsCmRegStatusLastRegTime	NA	M	
docsIf3CmtsCmRegStatusAddrResolutionReqs	NA	M	

7.7.2.1 CmtsCmRegState Textual Convention, docsIf3CmtsCmRegStateValue

Reported by the DPoE System for each vCM known to the DPoE System

CMTS State for CM	Original Comment (as defined in DOCS-IF3-MIB)	Applicability to DPoE
Other	Indicates any state not described below.	
initialRanging	Indicates that the CMTS has received an Initial Ranging Request message from the CM, and the ranging process is not yet complete.	The DPoE System has discovered a link on the DPoE ONU.
rangingAutoAdjComplete	Indicates that the CM has completed initial ranging and the CMTS sends a Ranging Status of success in the RNG-RSP.	The DPoE System has discovered all of the links configured on the DPoE ONU.
startEae	Indicates that the CMTS has received an Auth Info message for EAE from the CM.	The DPoE ONU associated with the vCM is in the process of being authenticated by the DPoE System.
startDhcpv4	Indicates that the CMTS has received a DHCPv4 DISCOVER message from the CM.	The DPoE System has generated a DHCPv4 DISCOVER message to obtain an IPv4 address for the vCM.
startDhcpv6	Indicates that the CMTS has received a DHCPv6 Solicit message from the CM.	Not applicable to this version of DPoE specifications.
dhcpv4Complete	Indicates that the CMTS has sent a DHCPv4 ACK message to the CM.	An IPv4 address has been assigned to the vCM.
dhcpv6Complete	Indicates that the CMTS has sent a DHCPv6 Reply message to the CM.	Not applicable to this version of DPoE specifications.
startConfigFileDownload	Indicates that the CM has started the config file download. If the TFTP Proxy feature is not enabled, the CMTS may not report this state.	The DPoE System has sent a TFTP request for the provisioning file for the vCM.
configFileDownloadComplete	Indicates that the CM has completed the config file download process. If the TFTP Proxy feature is not enabled, the CMTS is not required to report this state.	The DPoE System has retrieved the modem provisioning file for the vCM.
startRegistration	Indicates that the CMTS has received a Registration Request (REG-REQ or REG-REQ-MP) from the CM.	The DPoE System is in the process of sending OAM messages to the DPoE ONU based on the contents of the provisioning file.
registrationComplete	Indicates that the CMTS has received a Registration Acknowledge (REG-ACK) with a confirmation code of okay/success.	Not applicable to DPoE Networks.
operational	Indicates that the CM has completed all necessary initialization steps and is operational.	The OLT on the DPoE System and DPoE ONU have been properly configured to support the parameters in the modem configuration file.
bpiInit	Indicates that the CMTS has received an Auth Info or Auth Request message as part of BPI Initialization.	Not applicable to DPoE Networks.
forwardingDisabled	Indicates that the registration process was completed, but the network access option in the received configuration file prohibits forwarding.	The OLT on the DPoE System and DPoE ONU have been properly configured to support the parameters in the modem configuration file, but the configuration file has blocked network access for the ONU.
rfMuteAll	Indicates that the CM is instructed to mute all channels in the CM-CTRL-REQ message from CMTS.	Not applicable to this version of DPoE specifications. It could be used to note when an upstream laser has been administratively disabled.

7.7.3 docsIf3CmtsCmCtrlCmd

Object	vCM	DPoE	Comments
docsIf3CmtsCmCtrlCmd			
docsIf3CmtsCmCtrlCmdMacAddr	NA	M	MAC Address of DPoE ONU to which to direct the request.
docsIf3CmtsCmCtrlCmdMuteUsChId	NA	M	Not applicable to DPoE Networks. Applies to use of RF Mute command. The DPoE System MUST return a value of zero for docsIf3CmtsCmCtrlCmdMuteUsChId.
docsIf3CmtsCmCtrlCmdMuteInterval	NA	M	Not applicable to this version of DPoE specifications. Applies to use of RF Mute command. The DPoE System MUST return a value of '1' for docsIf3CmtsCmCtrlCmdMuteInterval.
docsIf3CmtsCmCtrlCmdDisableForwarding	NA	M	
docsIf3CmtsCmCtrlCmdCommit	NA	M	The 'mute' option is not supported by DPoE Networks. 'cmReinit' causes the vCM (and DPoE ONU) to be reset. 'disableForwarding' causes traffic to stop (or start) being forwarded by the DPoE ONU depending on the value of docsIf3CmtsCmCtrlCmdDisableForwarding.

7.8 DOCS-IFEXT2-MIB ([OSSIv3.0] Annex H)

The majority of the objects in this MIB are related to SCDMA support, specifically the Maximum Scheduled Codes (MSC) feature.

Table Name	vCM	Supports	DPoE	Supports	Comments
docsIfExt2CmtsUpChannelTable	*NA*		*O*	*MUST NOT*	*SCDMA is not supported for EPON.*
docsIfExt2CmMscStatusTable	*M*	*MUST NOT*	*NA*		*SCDMA is not supported for EPON.*
docsIfExt2CmtsMscGlobalEnable	*NA*		*M*	*MUST NOT*	*SCDMA is not supported for EPON.*
docsIfExt2CmtsCmMscStatusTable	*NA*		*O*	*MUST NOT*	*SCDMA is not supported for EPON.*
docsIfExt2CmtsUpChannelMscTable	*NA*		*O*	*MUST NOT*	*SCDMA is not supported for EPON.*

7.9 DOCS-MCAST-AUTH-MIB ([OSSIv3.0] Annex Q)

Table Name	vCM	Supports	DPoE	Supports	Comments
docsMcastAuthCtrl	***NA***		***M***	***SHOULD NOT***	***Multicast is not supported in the current version of the specification.***
docsMCastAuthCmtsCmStatusTable	***NA***		***M***	***SHOULD NOT***	***Multicast is not supported in the current version of the specification.***
docsMcastAuthProfileSessRuleTable	***NA***		***M***	***SHOULD NOT***	***Multicast is not supported in the current version of the specification.***
docsMcastAuthStaticSessRuleTable	***NA***		***O***	***SHOULD NOT***	***Multicast is not supported in the current version of the specification.***
docsMcastAuthProfilesTable	***NA***		***M***	***SHOULD NOT***	***Multicast is not supported in the current version of the specification.***

7.10 DOCS-MCAST-MIB ([OSSIv3.0] Annex Q)

Table Name	vCM	Supports	DPoE	Supports	Comments
docsMcastCmtsGrpCfgTable	***NA***		***M***	***SHOULD NOT***	***The DOCSIS model for providing QoS to multicast flows requires this table. Multicast is not supported in the current version of the specification.***
docsMcastCmtsGrpQosCfgTable	***NA***		***M***	***SHOULD NOT***	***The DOCSIS model for providing QoS to multicast flows requires this table. Multicast is not supported in the current version of the specification.***
docsMcastDefGrpSvcClassDef	***NA***		***M***	***SHOULD NOT***	***Multicast is not supported in the current version of the specification.***
docsMcastCmtsGrpEncryptCfgTable	***NA***		***M***	***SHOULD NOT***	***Multicast is not supported in the current version of the specification, but beyond that, it's still unclear if multicast encryption will need to be supported.***
docsMcastCmtsGrpPhsCfgTable	*NA*		*M*	*MUST NOT*	*PHS is not supported for EPON.*
docsMcastCmtsReplSessTable	*NA*		*M*	*MUST NOT*	
docsMcastDsidPhsTable	*NA*		*M*	*MUST NOT*	*PHS is not supported for EPON.*

7.11 DOCS-QOS3-MIB ([OSSIv3.0] Annex Q)

Table Name	vCM	Supports	DPoE	Supports	Comments
docsQosPktClassTable	M	MUST	M	MUST	
docsQosParamSetTable	M	MUST	M	MUST	Not all parameters apply to EPON. (See the comments for docsQosServiceFlowTable table.)
docsQosServiceFlowTable	M	MUST	M	MUST	This table is supported, but not all objects apply. For instance, there is no DSID or Channel Set ID.
docsQosServiceFlowStatsTable	M	MUST	M	MUST	
docsQosServiceFlowLogTable	***NA***		***M***	***SHOULD NOT***	***This table does not seem to be valuable in the presence of the Subscriber Usage records provided by IPDR.*** ***Operators do not need this table in the current version of the specification.***
docsQosServiceClassTable	NA		M	MUST	
docsQosCmtsMacToSrvFlowTable	NA		M	MUST	
docsQosGrpServiceFlowTable	***NA***		***M***	***SHOULD NOT***	***The DOCSIS model for providing QoS to multicast flows requires this table. Multicast is not supported in the current version of the specification.***
docsQosGrpPktClassTable	***NA***		***M***	***SHOULD NOT***	***The DOCSIS model for providing QoS to multicast flows requires this table. Multicast is not supported in the current version of the specification.***

Table Name	vCM Supports		DPoE Supports		Comments
docsQosDynamicServiceStatsTable	***M***	***SHOULD NOT***	***M***	***SHOULD NOT***	***Currently not applicable to EPON. There is no dynamic service messaging defined between the DPoE System and DPoE ONUs in the current version of the specification.***
docsQosUpstreamStatsTable	*NA*		*M*	*MUST NOT*	*This is not applicable to EPON.*
docsQosPhsTable	*M*	*MUST NOT*	*M*	*MUST NOT*	*PHS is not applicable to EPON.*
docsQosServiceFlowSidClusterTable	*M*	*MUST NOT*	*M*	*MUST NOT*	*No upstream channel bonding in EPON, so this is not needed.*
docsQosUpChCounterExtTable	*NA*		*M*	*MUST NOT*	*This is not applicable to EPON.*
docsQosServiceFlowCcfStatsTable	*NA*		*M*	*MUST NOT*	*This is not applicable to EPON.*
docsQosCmServiceUsStatsTable	*M*	*MUST NOT*	*NA*		*This is not applicable to EPON.*
docsQosCmtsDsidTable	*NA*		*M*	*MUST NOT*	*No downstream bonding in EPON, so this is not needed.*
docsQosCmtsDebugDsidTable	*NA*		*M*	*MUST NOT*	*No downstream bonding in EPON.*
docsQosCmtsDebugDsidStatsTable	*NA*		*M*	*MUST NOT*	*No downstream bonding in EPON.*
docsQosCmDsidTable	*M*	*MUST NOT*	*NA*		*No downstream bonding in EPON.*

7.11.1 docsQosPktClassTable

Object	vCM	DPoE	Comments
docsQosPktClassTable	M	M	Note that entries for the new DPoE Classification TLVs for Metro Ethernet services will not be represented in this table for the current version of the specification. Extensions to this MIB to represent those objects could be defined in subsequent revisions.
docsQosPktClassEntry	M	M	
docsQosPktClassId	M	M	
docsQosPktClassDirection	M	M	
docsQosPktClassPriority	M	M	
docsQosPktClassIpTosLow	M	M	
docsQosPktClassIpTosHigh	M	M	
docsQosPktClassIpTosMask	M	M	
docsQosPktClassIpProtocol	M	M	
docsQosPktClassIpSourceAddr	M	M	
docsQosPktClassIpSourceMask	M	M	
docsQosPktClassIpDestAddr	M	M	
docsQosPktClassIpDestMask	M	M	
docsQosPktClassSourcePortStart	M	M	
docsQosPktClassSourcePortEnd	M	M	
docsQosPktClassDestPortStart	M	M	
docsQosPktClassDestPortEnd	M	M	

Object	vCM	DPoE	Comments
docsQosPktClassDestMacAddr	M	M	
docsQosPktClassDestMacMask	M	M	
docsQosPktClassSourceMacAddr	M	M	
docsQosPktClassEnetProtocolType	M	M	A vCM MUST support a value of 'ethertype(1)' for docsQosPktClassEnetProtocolType. The DPoE System MUST support a value of 'ethertype(1)' for docsQosPktClassEnetProtocolType. A vCM MUST NOT support a value of 'mac(3)' for docsQosPktClassEnetProtocolType. The DPoE System MUST NOT support a value of 'mac(3)' for docsQosPktClassEnetProtocolType. The value 'mac(3)' does not apply to DPoE Networks. A vCM MAY support other values for docsQosPktClassEnetProtocolType. The DPoE System MAY support other values for docsQosPktClassEnetProtocolType.
docsQosPktClassEnetProtocol	M	M	
docsQosPktClassUserPriLow	M	M	
docsQosPktClassUserPriHigh	M	M	
docsQosPktClassVlanId	M	M	
docsQosPktClassState	M	M	Only 'active' is currently supported for DPoE Networks. The DPoE System MUST return a value of 'active' for docsQosPktClassState. A vCM MUST return a value of 'active' for docsQosPktClassState.
docsQosPktClassPkts	M	M	A vCM SHOULD implement docsQosPktClassPkts.
docsQosPktClassBitMap	M	M	
docsQosPktClassIpAddrType	M	M	Only 'ipv4' is currently supported for DPoE Networks. The DPoE System MUST return a value of 'ipv4' for docsQosPktClassIpAddrType. A vCM MUST return a value of 'ipv4' for docsQosPktClassIpAddrType.
docsQosPktClassFlowLabel	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosPktClassFlowLabel. A vCM MUST return a value of zero for docsQosPktClassFlowLabel.
docsQosPktClassCmInterfaceMask	M	M	

7.11.2 docsQosParamSetTable

Object	vCM	DPoE	Comments
docsQosParamSetTable	M	M	This table has separate entries (Active, Admitted, Provisioned) for each service flow. For this version of DPoE specifications, all of the entries will be present in the table, but they all will have the 'provisioned' values.
docsQosParamSetEntry	M	M	

Object	vCM	DPoE	Comments
docsQosParamSetServiceClassName	M	M	
docsQosParamSetPriority	M	M	
docsQosParamSetMaxTrafficRate	M	M	
docsQosParamSetMaxTrafficBurst	M	M	
docsQosParamSetMinReservedRate	M	M	
docsQosParamSetMinReservedPkt	M	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosParamSetMinReservedPkt. A vCM MUST return a value of zero for docsQosParamSetMinReservedPkt.
docsQosParamSetActiveTimeout	M	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosParamSetActiveTimeout. A vCM MUST return a value of zero for docsQosParamSetActiveTimeout.
docsQosParamSetAdmittedTimeout	M	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of '200' for docsQosParamSetAdmittedTimeout. A vCM MUST return a value of '200' for docsQosParamSetAdmittedTimeout.
docsQosParamSetMaxConcatBurst	M	M	
docsQosParamSetSchedulingType	M	M	Only 'undefined' should be reported for downstream parameter sets. Only 'bestEffort' and 'realTimePollingService' are supported in DPoE Networks for upstream parameter sets.
docsQosParamSetNomPollInterval	M	M	
docsQosParamSetTolPollJitter	M	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosParamSetTolPollJitter. A vCM MUST return a value of zero for docsQosParamSetTolPollJitter.
docsQosParamSetUnsolicitGrantSize	M	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosParamSetUnsolicitGrantSize. A vCM MUST return a value of zero for docsQosParamSetUnsolicitGrantSize.
docsQosParamSetNomGrantInterval	M	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosParamSetNomGrantInterval. A vCM MUST return a value of zero for docsQosParamSetNomGrantInterval.

Object	vCM	DPoE	Comments
docsQosParamSetTolGrantJitter	M	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosParamSetTolGrantJitter. A vCM MUST return a value of zero for docsQosParamSetTolGrantJitter.
docsQosParamSetGrantsPerInterval	M	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosParamSetGrantsPerInterval. A vCM MUST return a value of zero for docsQosParamSetGrantsPerInterval.
docsQosParamSetTosAndMask	M	M	A vCM MUST support a value of 0x00 for docsQosParamSetTosAndMask. A vCM MAY support other values for docsQosParamSetTosAndMask. The DPoE System MUST support a value of 0x00 for docsQosParamSetTosAndMask. The DPoE System MAY support other values for docsQosParamSetTosAndMask.
docsQosParamSetTosOrMask	M	M	
docsQosParamSetMaxLatency	M	M	Not supported in this version of DPoE. The DPoE System MUST return a value of zero for docsQosParamSetMaxLatency. A vCM MUST return a value of zero for docsQosParamSetMaxLatency.
docsQosParamSetType	M	M	
docsQosParamSetRequestPolicyOct	M	M	The only bit field that is supported by DPoE specifications is 'piggybackReqWithData'.
docsQosParamSetBitMap	M	M	Only those TLVs in the bitfield which are supported by DPoE specifications should be set.
docsQosParamSetServiceFlowId	M	M	
docsQosParamSetRequiredAttrMask	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosParamSetRequiredAttrMask. A vCM MUST return a value of zero for docsQosParamSetRequiredAttrMask.
docsQosParamSetForbiddenAttrMask	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosParamSetForbiddenAttrMask. A vCM MUST return a value of zero for docsQosParamSetForbiddenAttrMask.
docsQosParamSetAttrAggrRuleMask	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosParamSetAttrAggrRuleMask. A vCM MUST return a value of zero for docsQosParamSetAttrAggrRuleMask.

Object	vCM	DPoE	Comments
docsQosParamSetAppId	M	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosParamSetAppId. A vCM MUST return a value of zero for docsQosParamSetAppId.
docsQosParamSetMultiplierContentionReqWindow	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of '8' for docsQosParamSetMultiplierContentionReqWindow. A vCM MUST return a value of '8' for docsQosParamSetMultiplierContentionReqWindow.
docsQosParamSetMultiplierBytesReq	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of '4' for docsQosParamSetMultiplierBytesReq. A vCM MUST return a value of '4' for docsQosParamSetMultiplierBytesReq.
docsQosParamSetMaxReqPerSidCluster	D	D	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosParamSetMaxReqPerSidCluster. A vCM MUST return a value of zero for docsQosParamSetMaxReqPerSidCluster.
docsQosParamSetMaxOutstandingBytesPerSidCluster	D	D	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosParamSetMaxOutstandingBytesPerSidCluster. A vCM MUST return a value of zero for docsQosParamSetMaxOutstandingBytesPerSidCluster.
docsQosParamSetMaxTotBytesReqPerSidCluster	D	D	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosParamSetMaxTotBytesReqPerSidCluster. A vCM MUST return a value of zero for docsQosParamSetMaxTotBytesReqPerSidCluster.
docsQosParamSetMaxTimeInSidCluster	D	D	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosParamSetMaxTimeInSidCluster. A vCM MUST return a value of zero for docsQosParamSetMaxTimeInSidCluster.
docsQosParamSetPeakTrafficRate	M	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosParamSetPeakTrafficRate. A vCM MUST return a value of zero for docsQosParamSetPeakTrafficRate.
docsQosParamSetDsResequencing	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosParamSetDsResequencing. A vCM MUST return a value of zero for docsQosParamSetDsResequencing.

7.11.3 docsQosServiceFlowTable

Object	vCM	DPoE	Comments
docsQosServiceFlowTable	M	M	
docsQosServiceFlowEntry	M	M	
docsQosServiceFlowId	M	M	
docsQosServiceFlowSID	M	M	
docsQosServiceFlowDirection	M	M	
docsQosServiceFlowPrimary	M	M	
docsQosServiceFlowParamSetTypeStatus	M	M	For DPoE Networks, all three bits (active, admitted, provisioned) should be set for entries in this table.
docsQosServiceFlowChSetId	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceFlowChSetId. A vCM MUST return a value of zero for docsQosServiceFlowChSetId.
docsQosServiceFlowAttrAssignSuccess	M	M	Does not apply to DPoE Networks. Return value of 'false'. The DPoE System MUST return a value of zero for docsQosServiceFlowAttrAssignSuccess. A vCM MUST return a value of zero for docsQosServiceFlowAttrAssignSuccess.
docsQosServiceFlowDsid	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceFlowDsid. A vCM MUST return a value of zero for docsQosServiceFlowDsid.
docsQosServiceFlowMaxReqPerSidCluster	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceFlowMaxReqPerSidCluster. A vCM MUST return a value of zero for docsQosServiceFlowMaxReqPerSidCluster.
docsQosServiceFlowMaxOutstandingBytesPerSidCluster	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceFlowMaxOutstandingBytesPerSidCluster. A vCM MUST return a value of zero for docsQosServiceFlowMaxOutstandingBytesPerSidCluster.
docsQosServiceFlowMaxTotBytesReqPerSidCluster	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceFlowMaxTotBytesReqPerSidCluster. A vCM MUST return a value of zero for docsQosServiceFlowMaxTotBytesReqPerSidCluster.
docsQosServiceFlowMaxTimeInSidCluster	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceFlowMaxTimeInSidCluster. A vCM MUST return a value of zero for docsQosServiceFlowMaxTimeInSidCluster.

7.11.4 docsQosServiceFlowStatsTable

Object	vCM	DPoE	Comments
docsQosServiceFlowStatsTable	M	M	
docsQosServiceFlowStatsEntry	M	M	
docsQosServiceFlowPkts	M	M	
docsQosServiceFlowOctets	M	M	
docsQosServiceFlowTimeCreated	M	M	
docsQosServiceFlowTimeActive	M	M	
docsQosServiceFlowPHSUnknowns	M	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceFlowPHSUnknowns. A vCM MUST return a value of zero for docsQosServiceFlowPHSUnknowns.
docsQosServiceFlowPolicedDropPkts	M	M	
docsQosServiceFlowPolicedDelayPkts	M	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosServiceFlowPolicedDelayPkts. A vCM MUST return a value of zero for docsQosServiceFlowPolicedDelayPkts.

7.11.5 docsQosServiceClassTable

Object	vCM	DPoE	Comments
docsQosServiceClassTable	NA	M	
docsQosServiceClassEntry	NA	M	
docsQosServiceClassName	NA	M	
docsQosServiceClassStatus	NA	M	
docsQosServiceClassPriority	NA	M	
docsQosServiceClassMaxTrafficRate	NA	M	
docsQosServiceClassMaxTrafficBurst	NA	M	
docsQosServiceClassMinReservedRate	NA	M	
docsQosServiceClassMinReservedPkt	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosServiceClassMinReservedPkt.
docsQosServiceClassMaxConcatBurst	NA	M	
docsQosServiceClassNomPollInterval	NA	M	
docsQosServiceClassTolPollJitter	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosServiceClassTolPollJitter.
docsQosServiceClassUnsolicitGrantSize	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosServiceClassUnsolicitGrantSize.
docsQosServiceClassNomGrantInterval	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosServiceClassNomGrantInterval.

Object	vCM	vBO	Comments
docsQosServiceClassTolGrantJitter	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosServiceClassTolGrantJitter.
docsQosServiceClassGrantsPerInterval	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosServiceClassGrantsPerInterval.
docsQosServiceClassMaxLatency	NA	M	
docsQosServiceClassActiveTimeout	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosServiceClassActiveTimeout.
docsQosServiceClassAdmittedTimeout	NA	M	Not supported in this version of DPoE specifications. Return value of '200'. The DPoE System MUST return a value of zero for docsQosServiceClassAdmittedTimeout.
docsQosServiceClassSchedulingType	NA	M	The DPoE System MUST return values of bestEffort' or realTimePollingService' for docsQosServiceClassSchedulingType.
docsQosServiceClassRequestPolicy	NA	M	The only bit field which is supported by DPoE specifications is 'piggybackReqWithData'.
docsQosServiceClassTosAndMask	NA	M	
docsQosServiceClassTosOrMask	NA	M	
docsQosServiceClassDirection	NA	M	
docsQosServiceClassStorageType	NA	M	
docsQosServiceClassDSCPOverwrite	NA	M	
docsQosServiceClassRequiredAttrMask	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceClassRequiredAttrMask.
docsQosServiceClassForbiddenAttrMask	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceClassForbiddenAttrMask.
docsQosServiceClassAttrAggrRuleMask	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceClassAttrAggrRuleMask.
docsQosServiceClassAppId	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosServiceClassAppId.
docsQosServiceClassMultiplierContentionReqWindow	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of '8' for docsQosServiceClassMultiplierContentionReqWindow.
docsQosServiceClassMultiplierBytesReq	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of '4' for docsQosServiceClassMultiplierBytesReq.
docsQosServiceClassMaxReqPerSidCluster	NA	D	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceClassMaxReqPerSidCluster.

Object	vCM	DPoE	Comments
docsQosServiceClassMaxOutstandingBytesPerSidCluster	NA	D	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceClassMaxOutstandingBytesPerSidCluster.
docsQosServiceClassMaxTotBytesReqPerSidCluster	NA	D	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceClassMaxTotBytesReqPerSidCluster.
docsQosServiceClassMaxTimeInSidCluster	NA	D	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceClassMaxTimeInSidCluster.
docsQosServiceClassPeakTrafficRate	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosServiceClassPeakTrafficRate.
docsQosServiceClassDsResequencing	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosServiceClassDsResequencing.

7.11.6 docsQosCmtsMacToSrvFlowTable

Object	vCM	DPoE	Comments
docsQosCmtsMacToSrvFlowTable	NA	M	
docsQosCmtsMacToSrvFlowEntry	NA	M	
docsQosCmtsCmMac	NA	M	Contains the MAC address assigned to the DPoE ONU corresponding to the vCM.
docsQosCmtsServiceFlowId	NA	M	Contains the Service Flow Identifier associated with the vCM.
docsQosCmtsIfIndex	NA	M	Contains the Interface Index value assigned to the logical MAC Domain on the DPoE System for the EPON (TU) interface connected to the DPoE ONU.

7.12 DOCS-SEC-MIB ([OSSIv3.0] Annex Q)

Table Name	vCM	Supports	DPoE	Supports	Comments
docsSecCmtsServerCfgTftpOptions	NA		M	MUST	As defined in the MIB, this option should only apply if TFTP Proxy is configured on the CMTS. According to the [DPoE-SP-SECv1.0] spec, TFTP Proxy is not needed for DPoE, but the DPoE System implicitly includes a TFTP Proxy, so perhaps this option should be supported.
docsSecCmtsServerCfgConfigFileLearningEnable	***NA***		***M***	***SHOULD NOT***	***Not applicable to DPoE Networks because there can be no mismatch between the contents of the modem configuration file and a REG-REQ. Return value of 'false'.***

Table Name	vCM	Supports	DPoE	Supports	Comments
docsSecCmtsEncryptAlgPriority	*NA*		*M*	***SHOULD NOT***	***In the current implementation, DPoE Networks are limited in which encryption algorithms can be supported. In the future, there may be support for this object, depending on which encryption algorithms get supported for EPON.*** ***For the current version, return an empty list.***
docsSecCmtsSavControlCmAuthEnable	NA		M	MUST	
docsSecSavCmAuthTable	NA		M	MUST	
docsSecSavCfgListTable	NA		M	MUST	
docsSevSavStaticListTable	NA		M	MUST	
docsSecCmtsCmSavStatsTable	NA		M	MUST	
docsSecCmtsCertificateRevocationMethod	NA		M	MUST	This is needed in support of CM certificate authentication.
docsSecCmtsCertRevocationList	NA		M	MUST	This is needed in support of CM certificate authentication.
docsSecCmtsOnlineCertStatusProtocol	NA		M	MUST	This is needed in support of CM certificate authentication.
docsSecCmtsCmEaeExclusionTable	*NA*		*M*	*MUST NOT*	*EAE is not supported for DPoE Networks.*
docsSecCmtsCmBpi2EnforceExclusionTable	*NA*		*M*	*MUST NOT*	*BPI+ is not applicable to DPoE Networks.*

7.13 DOCS-SUBMGT3-MIB ([OSSIv3.0] Annex Q)

Table Name	vCM	Supports	DPoE	Supports	Comments
docsSubMgt3Base	NA		M	MUST	
docsSubMgt3CpeCtrlTable	NA		M	MUST	
docsSubMgt3CpeIpTable	NA		M	MUST	
docsSubMgt3GrpTable	NA		M	MUST	
docsSubMgt3FilterGrpTable	NA		M	MUST	The DPoE System MUST support downstream filtering. The DPoE System MAY support upstream filtering.

7.13.1 docsSubMgt3Base

Object	vCM	DPoE	Comments
docsSubmgt3Base			
docsSubmgt3BaseCpeMaxIpv4Def	NA	M	
docsSubmgt3BaseCpeMaxIpv6PrefixDef	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BaseCpeMaxIpv6PrefixDef.
docsSubmgt3BaseCpeActiveDef	NA	M	

Object	vCM	DPoE	Comments
docsSubmgt3BaseCpeLearnableDef	NA	M	
docsSubmgt3BaseSubFilterDownDef	NA	M	
docsSubmgt3BaseSubFilterUpDef	NA	M	
docsSubmgt3BaseCmFilterDownDef	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsSubmgt3BaseCmFilterDownDef.
docsSubmgt3BaseCmFilterUpDef	NA	M	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsSubmgt3BaseCmFilterUpDef.
docsSubmgt3BasePsFilterDownDef	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BasePsFilterDownDef.
docsSubmgt3BasePsFilterUpDef	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BasePsFilterUpDef.
docsSubmgt3BaseMtaFilterDownDef	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BaseMtaFilterDownDef.
docsSubmgt3BaseMtaFilterUpDef	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BaseMtaFilterUpDef.
docsSubmgt3BaseStbFilterDownDef	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BaseStbFilterDownDef.
docsSubmgt3BaseStbFilterUpDef	NA	M	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BaseStbFilterUpDef.

7.14 ENTITY-MIB ([RFC 4133])

Table Name	vCM	Supports	DPoE	Supports	Comments
entPhysicalTable	O	MUST	O	MUST	
entAliasMappingTable	O	MUST	O	MUST	
entPhysicalContainsTable	O	MUST	O	MUST	
entLastChangeTime	O	MUST	O	MUST	

7.15 ENTITY-SENSOR-MIB ([RFC 3433])

Table Name	vCM	Supports	DPoE	Supports	Comments
entPhysSensorTable	O	MUST	O	MUST	

7.16 EtherLike-MIB ([RFC 3635])

Table Name	vCM	Supports	DPoE	Supports	Comments
dot3StatsTable	O	MUST	M	MUST	
dot3CollTable	O	MUST	O	MUST	
dot3ControlTable	O	MUST	O	MUST	Only needed for interfaces that support PAUSE.
dot3PauseTable	O	MUST	O	MUST	Only needed for interfaces that support PAUSE.

7.17 HOST-RESOURCES-MIB ([RFC 2790])

Table Name	vCM	Supports	DPoE	Supports	Comments
hrDeviceTable	***O***	***SHOULD NOT***	O	MUST	
hrMemorySize	***O***	***SHOULD NOT***	O	MUST	
hrStorageTable	***O***	***SHOULD NOT***	O	MUST	
hrSWRunTable	***O***	***SHOULD NOT***	***O***	***MAY***	
hrSWRunPerfTable	***O***	***SHOULD NOT***	***O***	***MAY***	
hrProcessorTable	***O***	***SHOULD NOT***	O	MUST	

7.18 IF-MIB ([RFC 2863])

Table Name	vCM	Supports	DPoE	Supports	Comments
ifNumber	M	MUST	M	MUST	
ifTableLastChange	M	MUST	M	MUST	
ifTable	M	MUST	M	MUST	
ifXTable	M	MUST	M	MUST	A vCM MUST support configuration of the ifAlias object on the vCM associated with a DPoE ONU to allow the object to be used to hold the UNI Identifier.
ifStackTable	M	MUST	M	MUST	
ifRcvAddressTable	***O***	***MAY***	***O***	***SHOULD NOT***	
ifTestTable	*D*	*MUST NOT*	*D*	*MUST NOT*	

7.18.1 DPoE Interface Table Implementation Considerations

In Annex A.2 of the [OSSIv3.0] specification, there are specific requirements regarding the population of the ifTable, ifXTable, and the ifStackTable for DOCSIS interfaces. This section describes the expectations for the creation of these DOCSIS interfaces for the DPoE System, as well as differences between DPoE specifications and DOCSIS specifications.

The DPoE System MUST create entries in its ifTable for a MAC Domain interface (ifType=docsCableMacLayer), a Downstream interface (ifType=docsCableDownstream), and an Upstream interface (ifType=docsCableUpstream) for each EPON (TU) interface on the DPoE System. This is needed to provide parity with the existing DOCSIS implementations where DOCSIS MIBs refer to MAC Domain, Downstream, and Upstream interfaces.

The following table describes any special processing for the DPoE System logical interfaces for the ifTable/ifXTable:

MIB Objects	DPoE MAC Domain	DPoE Downstream	DPoE-Upstream
IfTable			
ifIndex	Vendor-specific	Vendor-specific	Vendor-specific
ifDescr	Vendor-specific	Vendor-specific	Vendor-specific
ifType	127	128	129
ifMtu	1600 (1G) 2000 (10G)	1600 (1G) 2000 (10G)	1600 (1G) 2000 (10G)
ifSpeed	0	1000000000 or 4,294,967,295	1000000000 or 4,294,967,295
ifPhysAddress:	MAC Address of the EPON interface	Empty-String	Empty-String
ifAdminStatus: [For DPoE System: When a managed system initializes, all interfaces start with ifAdminStatus in the up(1) state. As a result of either explicit management or configuration information saved via other non-SNMP methods (i.e., CLI commands) retained by the managed system, ifAdminStatus is then changed to either the down(2) or testing(3) states (or remains in the up(1) state).]	up(1), down(2), testing(3)	Follows from MAC Domain	Follows from MAC Domain
ifOperStatus:	up(1), down(2), testing(3), dormant(5), notPresent(6)	Follows from MAC Domain	Follows from MAC Domain
ifXTable			
ifHighSpeed	0	1000 or 10000	1000 or 10000
ifPromiscuousMode	true,false	false	true,false

The DPoE System MUST create entries in its ifStackTable that map the Downstream and Upstream interfaces to their associated MAC Domain interface on the EPON (TU) interface.

A vCM MUST create entries in its ifTable for a MAC Domain interface (ifType=docsCableMacLayer), a Downstream interface (ifType=docsCableDownstream), and an Upstream interface (ifType=docsCableUpStream) for the EPON interface on the DPoE ONU.

The following table describes any special processing for the vCM logical interfaces for the ifTable/ifXTable:

MIB Objects	vCM MAC Domain	vCM-Downstream	vCM-Upstream
IfTable			
ifIndex	2	3	4
ifDescr			
ifType	127	128	129
ifMtu	1600 (1G) 2000 (10G)	1600 (1G) 2000 (10G)	1600 (1G) 2000 (10G)
ifSpeed	0	1000000000 or 4,294,967,295	1000000000 or 4,294,967,295

MIB Objects	vCM MAC Domain	vCM-Downstream	vCM-Upstream
ifPhysAddress:	MAC Address of the EPON interface	Empty-String	Empty-String
ifAdminStatus: [For DPoE System: When a managed system initializes, all interfaces start with ifAdminStatus in the up(1) state. As a result of either explicit management or configuration information saved via other non-SNMP methods (i.e., CLI commands) retained by the managed system, ifAdminStatus is then changed to either the down(2) or testing(3) states (or remains in the up(1) state).]	up(1), down(2), testing(3)	Follows from MAC Domain	Follows from MAC Domain
ifOperStatus:	up(1), down(2), testing(3), dormant(5), notPresent(6)	Follows from MAC Domain	Follows from MAC Domain
ifXTable			
ifHighSpeed	0	1000 or 10000	1000 or 10000
ifPromiscuousMode	true	true	false

A vCM MUST create entries in its ifStackTable that map the Downstream and Upstream interfaces to their associated MAC Domain interface on the EPON interface.

7.19 IP-MIB ([RFC 4293])

Table Name	vCM	Supports	DPoE	Supports	Comments
ipv4GeneralGroup	M	MUST	M	MUST	These tables are not as important for the remote device, especially given that IP connectivity to the DPoE ONU is being spoofed by the DPoE System.
ipv6GeneralGroup2	***M***	***SHOULD NOT***	***M***	***SHOULD NOT***	***IPv6 is not supported in this version of DPoE specifications.***
ipv4InterfaceTable	***M***	***SHOULD NOT***	M	MUST	
ipv6InterfaceTable	***M***	***SHOULD NOT***	***M***	***SHOULD NOT***	***IPv6 is not supported in this version of DPoE specifications.***
ipSystemStatsTable	***O***	***SHOULD NOT***	O	MUST	
ipIfStatsTable	***O***	***SHOULD NOT***	M	MUST	
ipAddressPrefixTable	***O***	***SHOULD NOT***	M	MUST	
ipAddressTable	***O***	***SHOULD NOT***	M	MUST	
ipNetToPhysicalTable	***O***	***SHOULD NOT***	M	MUST	
ipDefaultRouterTable	***O***	***SHOULD NOT***	M	MUST	
icmpStatsTable	***M***	***SHOULD NOT***	M	MUST	
icmpMsgStatsTable	***M***	***SHOULD NOT***	M	MUST	
ipv6RouterAdvertTable	***NA***		***M***	***SHOULD NOT***	***IPv6 is not supported in this version of DPoE specifications.***

7.20 MGMD-STD-MIB

Table Name	vCM	Supports	DPoE	Supports	Comments
mgmdRouterInterfaceTable	***NA***		***M***	***SHOULD NOT***	***Multicast is not supported in this version of DPoE specifications.***
mgmdRouterCacheTable	***NA***		***M***	***SHOULD NOT***	***Multicast is not supported in this version of DPoE specifications.***

7.21 SNMPv2-MIB ([RFC 3418])

Table Name	vCM	Supports	DPoE	Supports	Comments
SystemGroup	M	MUST	M	MUST	
sysORTable	M	MUST	M	MUST	
SNMPGroup	M	MUST	M	MUST	
snmpSetGroup	M	MUST	M	MUST	

7.22 TCP-MIB ([RFC 4022])

Table Name	vCM	Supports	DPoE	Supports	Comments
tcpBaseGroup	***O***	***SHOULD NOT***	O	MUST	These tables are not as important for the remote device given that IP connectivity to the DPoE ONU is being spoofed by the DPoE System.
tcpHCGroup	***O***	***SHOULD NOT***	O	MUST	
tcpConnectionTable	***O***	***SHOULD NOT***	O	MUST	
tcpListenerTable	***O***	***SHOULD NOT***	O	MUST	

7.23 UDP-MIB ([RFC 4113])

Table Name	vCM	Supports	DPoE	Supports	Comments
udpInDatagrams	***O***	***SHOULD NOT***	O	MUST	These tables are not as important for the remote device given that IP connectivity to the DPoE ONU is being spoofed by the DPoE System.
updNoPorts	***O***	***SHOULD NOT***	O	MUST	
udpInErrors	***O***	***SHOULD NOT***	O	MUST	
udpOutDatagrams	***O***	***SHOULD NOT***	O	MUST	
udpEndpointTable	***O***	***SHOULD NOT***	O	MUST	

8 SUPPORT FOR DOCSIS BUSINESS SERVICES OVER DOCSIS MIBS

8.1 DOCS-L2VPN-MIB (Annex A BSoD – Layer 2 Virtual Private Networks)

There are dependencies from this MIB on the Q-BRIDGE-MIB, which is currently not listed on the set of MIBs to be supported by the DPoE System

Table Name	vCM	Supports	DPoE	Supports	Comments
docsL2vpnIdToIndexTable	NA		M	MUST	
docsL2vpnIndexToIdTable	NA		M	MUST	
docsL2vpnCmTable	NA		M	MUST	
docsL2vpnVpnCmTable	NA		M	MUST	
docsL2vpnVpnCmStatsTable	NA		M	MUST	
docsL2vpnPortStatusTable	NA		M	MUST	
docsL2vpnSfStatusTable	NA		M	MUST	
docsL2vpnPktClassTable	NA		M	MUST	
docsL2vpnCmNsiTable	NA		M	MUST	
docsL2vpnCmVpnCpeTable	***NA***		***O***	***SHOULD NOT***	***This table is required only when implementing multipoint forwarding. Multipoint forwarding is not supported in this version of DPoE specifications.***
docsL2vpnVpnCmCpeTable	***NA***		***O***	***SHOULD NOT***	***This table is required only when implementing multipoint forwarding. Multipoint forwarding is not supported in this version of DPoE specifications.***
docsL2vpnDot1qTpFdbExtTable	***NA***		***O***	***SHOULD NOT***	***This table is required only when implementing multipoint forwarding. Multipoint forwarding is not supported in this version of DPoE specifications.***
docsL2vpnDot1qTpGroupExtTable	***NA***		***O***	***SHOULD NOT***	***This table is required only when implementing multipoint forwarding. Multipoint forwarding is not supported in this version of DPoE specifications.***

9 SUPPORTED DOCSIS EVENTS

This section defines those DOCSIS events (as defined in Appendix D of [OSSIv3.0]) that will need to be supported by the DPoE System.

The following tables are adapted from the corresponding table of events defined in Annex D in [OSSIv3.0] and enumerate whether support is required for a particular event by the DPoE System in this version of the specification. Note that not all columns from Annex D are found in the following table, only those columns that help provide context for the event's definition.

Entries in ***bold italics*** indicate that the event is not applicable to the current version of the specification. Entries in *italics* indicate that the event is not supported by the DPoE specifications.

The table columns are:

- **Process** – Process name as defined in Annex D.
- **Sub-Process** – Sub-Process name as defined in Annex D.
- **vCM Supports** – Indicates whether the event should be generated by the DPoE System on behalf of the vCM representing the DPoE ONU.
- **System Supports** – Indicates whether the event should be generated by the DPoE System.
- **Event Message** – Event Message text as defined in Annex D.
- **Event ID** – Event ID for the event as defined in Annex D.
- **Comments** – Used to capture any special implementation comments regarding support for the event within DPoE Networks or why the event need not be supported for DPoE Networks.

9.1 Authentication and Encryption

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
BPKM	AUTH-FSM	MUST	MUST	Auth Reject – No Information<TAGS>	66030102	This event can be used by the DPoE System for modem authentication errors not covered by other Auth Reject event messages.
BPKM	AUTH-FSM	MUST	MUST	Auth Reject – Unauthorized CM<TAGS>	66030103	This event can be generated by the DPoE System if the DPoE System implements a local "black list" which excludes specific DPoE ONU MAC Addresses.
BPKM	***AUTH-FSM***	***SHOULD NOT***	***SHOULD NOT***	***Auth Reject – Unauthorized SAID<TAGS>***	***66030104***	***SAIDs are not applicable to DPoE Networks.***

Process	Sub-Process	vCM Support	System Support	Event Message	Event ID	Comments
BPKM	AUTH-FSM	MUST	MUST	Auth Reject – Permanent Authorization Failure<TAGS>	66030108	Permanent Authorization is used for a number of different error conditions including errors related to the use of the certificates, such as unknown manufacturers, invalid signatures, ASN.1 parsing failures, and certificate revocation.
BPKM	*AUTH-FSM*	*MUST NOT*	*MUST NOT*	*Auth Reject – Time of Day not acquired<TAGS>*	*66030109*	*TOD is not needed in a DPoE System.*
BPKM	*AUTH-FSM*	*MUST NOT*	*MUST NOT*	*Auth Reject – EAE disabled<TAGS>*	*66030110*	*EAE cannot be disabled in DPoE Networks.*
BPKM	AUTH-FSM	MUST	MUST	CM Certificate Error<TAGS>	66030111	
BPKM	*AUTH-FSM*	*MUST NOT*	*MUST NOT*	*Auth Invalid – No Information<TAGS>*	*66030202*	*This is not applicable to DPoE Networks.*
BPKM	*AUTH-FSM*	*MUST NOT*	*MUST NOT*	*Auth Invalid – Unauthorized CM<TAGS>*	*66030203*	
BPKM	*AUTH-FSM*	*MUST NOT*	*MUST NOT*	*Auth Invalid – Unsolicited<TAGS>*	*66030205*	
BPKM	*AUTH-FSM*	*MUST NOT*	*MUST NOT*	*Auth Invalid – Invalid Key Sequence Number<TAGS>*	*66030206*	*No BPI key exchange in DPoE Networks.*
BPKM	*AUTH-FSM*	*MUST NOT*	*MUST NOT*	*Auth Invalid – Message (Key Request) Authentication Failure<TAGS>*	*66030207*	*No BPI key exchange in DPoE Networks.*
BPKM	*AUTH-FSM*	*MUST NOT*	*MUST NOT*	*Unsupported Crypto Suite<TAGS>*	*66030300*	*There is no way for the OLT to determine if an ONU cannot support the intended crypto suite.*
BPKM	AUTH-FSM	MUST		Authorized<TAGS>	66040100	This event can be generated by the DPoE System for the vCM when the DPoE ONU successfully authorizes with the DPoE System.
BPKM	*AUTH-FSM*	*MUST NOT*		*Auth Pend<TAGS>*	*66040200*	
BPKM	*AUTH-FSM*	*MUST NOT*		*Auth Comp<TAGS>*	*66040300*	
BPKM	*AUTH-FSM*	*MUST NOT*		*Stop<TAGS>*	*66040400*	
BPKM	CERTIFICATE REVOCATION		MUST	Failed to retrieve CRL from <P1>	66030400	
BPKM	CERTIFICATE REVOCATION		MUST	Failed to retrieve OCSP status	66030401	
BPKM	CERTIFICATE REVOCATION		MUST	CRL data not available when validating CM certificate chain<TAGS>	66030402	
BPKM	*TEK-FSM*	*MUST NOT*	*MUST NOT*	*Key Reject – No Information<TAGS>*	*66050102*	*No Traffic Key exchange in DPoE Networks.*

Process	Sub-Process	vCM Support	System Support	Event Message	Event ID	Comments
BPKM	***TEK-FSM***	***SHOULD NOT***	***SHOULD NOT***	***Key Reject – Unauthorized SAID<TAGS>***	***66050103***	***SAIDs are not applicable in this version of DPoE specifications.***
BPKM	*TEK-FSM*	*MUST NOT*	*MUST NOT*	*TEK Invalid – No Information<TAGS>*	*66050203*	*No Traffic Key exchange in DPoE Networks.*
BPKM	*TEK-FSM*	*MUST NOT*	*MUST NOT*	*TEK Invalid – Invalid Key Sequence Number<TAGS>*	*66050206*	*No Traffic Key exchange in DPoE Networks.*
Dynamic SA	***SA MAP-FSM***	***SHOULD NOT***		***SA Map State Machine Started<TAGS>***	***66060100***	***SAIDs are not applicable in this version of DPoE specifications.***
Dynamic SA	***SA MAP-FSM***	***SHOULD NOT***	***SHOULD NOT***	***Unsupported Crypto Suite<TAGS>***	***66060200***	***SAIDs are not applicable in this version of DPoE specifications.***
Dynamic SA	***SA MAP-FSM***	***SHOULD NOT***		***Map Request Retry Timeout<TAGS>***	***66060300***	***SAIDs are not applicable in this version of DPoE specifications.***
Dynamic SA	***SA MAP-FSM***	***SHOULD NOT***		***Unmap<TAGS>***	***66060400***	***SAIDs are not applicable in this version of DPoE specifications.***
Dynamic SA	***SA MAP-FSM***	***SHOULD NOT***	***SHOULD NOT***	***Map Reject – Downstream Traffic Flow Not Mapped to BPI+ SAID (EC=8)<TAGS>***	***66060510***	***SAIDs are not applicable in this version of DPoE specifications.***
Dynamic SA	***SA MAP-FSM***	***SHOULD NOT***	***SHOULD NOT***	***Map Reject – Not Authorized for Requested Downstream Traffic Flow (EC=7)<TAGS>***	***66060509***	***SAIDs are not applicable in this version of DPoE specifications.***
Dynamic SA	***SA MAP-FSM***	***SHOULD NOT***	***SHOULD NOT***	***Mapped to Existing SAID<TAGS>***	***66060600***	***SAIDs are not applicable in this version of DPoE specifications.***
Dynamic SA	***SA MAP-FSM***	***SHOULD NOT***	***SHOULD NOT***	***Mapped to New SAID<TAGS>***	***66060700***	***SAIDs are not applicable in this version of DPoE specifications.***
Init (BPI+)	*DOCSIS 1.0 CONFIG FILE*	*MUST NOT*	*MUST NOT*	*Missing BP Configuration Setting TLV Type: <P1><TAGS>*	*66010100*	*Baseline Privacy TLV 17s are not supported by DPoE Networks.*
Init (BPI+)	*DOCSIS 1.0 CONFIG FILE*	*MUST NOT*	*MUST NOT*	*Invalid BP Configuration Setting Value: <P1> for Type: <P2><TAGS>*	*66010200*	*Baseline Privacy TLV 17s are not supported by DPoE Networks.*

9.2 DBC, DCC and UCC

Because Dynamic Bonding Changes (DBC), Dynamic Channel Changes (DCC), and Upstream Channel Changes (UCC) are not applicable to DPoE Networks, these events are not supported. The DPoE System MUST NOT support any of the DBC, DCC, and UCC events defined in Annex D of [OSSIv3.0] since these are not applicable to DPoE Networks. The vCM MUST NOT support any of the DBC, DCC, and UCC events defined in Annex D of [OSSIv3.0] since these are not applicable to DPoE Networks.

9.3 DHCP, TOD and TFTP

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
DHCP		MUST		DHCP RENEW sent – No response for <P1><TAGS>	68010100	
DHCP		MUST		DHCP REBIND sent – No response for <P1><TAGS>	68010200	
DHCP		MUST		DHCP RENEW WARNING – Field invalid in response <P1> option<TAGS>	68010300	
DHCP		MUST		DHCP RENEW FAILED - Critical field invalid in response	68010301	
DHCP		MUST		DHCP REBIND WARNING – Field invalid in response <TAGS>	68010400	
DHCP		MUST		DHCP REBIND FAILED - Critical field invalid in response	68010401	
DHCP		MUST		DHCP Reconfigure received<TAGS>	68010500	
DHCP		MUST		DHCP Renew - lease parameters <P1> modified<TAGS>	68010600	
DHCP		***SHOULD NOT***		***Primary lease failed, IPv4 fallback initiated<TAGS>***	***68010700***	***Dual address assignment is not supported in this version of DPoE specifications.***
Init	DHCP	MUST		DHCP FAILED – Discover sent, no offer received<TAGS>	68000100	
Init	DHCP	MUST		DHCP FAILED – Request sent, No response<TAGS>	68000200	
Init	DHCP	MUST		DHCP WARNING - Non-critical field invalid in response <TAGS>	68000300	
Init	DHCP	MUST		DHCP FAILED – Critical field invalid in response <TAGS>	68000301	
Init	***DHCP***	***SHOULD NOT***		***DHCP failed – RS sent, no RA received<TAGS>***	***68001200***	***IPv6 is not supported in this version of DPoE specifications.***
Init	***DHCP***	***SHOULD NOT***		***DHCP Failed – Invalid RA<TAGS>***	***68001201***	***IPv6 is not supported in this version of DPoE specifications.***
Init	***DHCP***	***SHOULD NOT***		***DHCP failed – DHCP Solicit sent, No DHCP Advertise received<TAGS>***	***68001202***	***IPv6 is not supported in this version of DPoE specifications.***

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
Init	***DHCP***	***SHOULD NOT***		***DHCP failed – DHCP Request sent, No DHCP REPLY received<TAGS>***	***68001203***	***IPv6 is not supported in this version of DPoE specifications.***
Init	***DHCP***	***SHOULD NOT***		***Primary address acquired, secondary failed<TAGS>***	***68001204***	***Dual address assignment is not supported in this version of DPoE specifications.***
Init	***DHCP***	***SHOULD NOT***		***Primary address failed, secondary active<TAGS>***	***68001205***	***Dual address assignment is not supported in this version of DPoE specifications.***
Init	***IPv6 Address Acquisition***	***SHOULD NOT***		***Link-Local address failed DAD<TAGS>***	***68001301***	***IPv6 is not supported in this version of DPoE specifications.***
Init	***IPv6 Address Acquisition***	***SHOULD NOT***		***DHCP lease address failed DAD<TAGS>***	***68001302***	***IPv6 is not supported in this version of DPoE specifications.***
Init	*TOD*	*MUST NOT*		*ToD request sent – No Response received<TAGS>*	*68000401*	*TOD is not applicable to DPoE Networks.*
Init	*TOD*	*MUST NOT*		*ToD Response received – Invalid data format<TAGS>*	*68000402*	*TOD is not applicable to DPoE Networks.*
Init	TFTP	MUST		TFTP failed – Request sent – No Response<TAGS>	68000500	
Init	TFTP	MUST		TFTP failed – configuration file NOT FOUND<TAGS>	68000600	
Init	TFTP	MUST		TFTP Failed – OUT OF ORDER packets<TAGS>	68000700	
Init	TFTP	MUST		TFTP file complete – but failed Message Integrity check MIC<TAGS>	68000800	
Init	TFTP	MUST		TFTP file complete – but missing mandatory TLV<TAGS>	68000900	
Init	TFTP	MUST		TFTP Failed – file too big<TAGS>	68001000	
Init	*TFTP*	*MUST NOT*		*TFTP file complete- but doesn't enable 2.0 Mode – conflicts with current US channel type<TAGS>*	*68001100*	
Init	TFTP	MUST		TFTP Request Retries exceeded, CM unable to register	68001101	
TOD		*MUST*		*ToD request sent- No Response received<TAGS>*	*68000403*	*TOD is not applicable to DPoE Networks.*
TOD		*MUST*		*ToD Response received – Invalid data format<TAGS>*	*68000404*	*TOD is not applicable to DPoE Networks.*

9.4 Secure Software Download

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
SW Upgrade	SW UPGRADE INIT	MUST		SW Download INIT – Via NMS	69010100	
SW Upgrade	SW UPGRADE INIT	MUST		SW Download INIT – Via Config file <P1>	69010200	
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		SW Upgrade Failed during download – Max retry exceed (3)	69010300	
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		SW Upgrade Failed Before Download – Server not Present	69010400	
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		SW upgrade Failed before download – File not Present	69010500	
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		SW upgrade Failed before download –TFTP Max Retry Exceeded	69010600	
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		SW upgrade Failed after download –Incompatible SW file	69010700	
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		SW upgrade Failed after download – SW File corruption	69010800	
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		Disruption during SW download – Power Failure	69010900	
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		Disruption during SW download – RF removed	69011000	Although no RF interfaces exist in DPoE Networks, perhaps this event could be used for EPON network issues.
SW Upgrade	SW UPGRADE SUCCESS	MUST		SW download Successful – Via NMS	69011100	
SW Upgrade	SW UPGRADE SUCCESS	MUST		SW download Successful – Via Config file	69011200	
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		Improper Code File Controls	69020100	
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		Code File Manufacturer CVC Validation Failure	69020200	
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		Code File Manufacturer CVS Validation Failure	69020300	
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		Code File Co-Signer CVC Validation Failure	69020400	

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
SW Upgrade	SW UPGRADE GENERAL FAILURE	MUST		Code File Co-Signer CVS Validation Failure	69020500	
SW Upgrade	VERIFICATION OF CVC	MUST		Improper Configuration File CVC Format	69020600	
SW Upgrade	VERIFICATION OF CVC	MUST		Configuration File CVC Validation Failure	69020700	
SW Upgrade	VERIFICATION OF CVC	MUST		Improper SNMP CVC Format	69020800	
SW Upgrade	VERIFICATION OF CVC	MUST		SNMP CVC Validation Failure	69020900	

9.5 Registration and TLV-11

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
Init	REGISTRATION RESPONSE	MAY		REG-RSP – invalid format or not recognized;<TAGS>	73000100	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	REGISTRATION RESPONSE	MAY		REG RSP not received<TAGS>	73000200	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	REGISTRATION RESPONSE	MAY		REG RSP bad SID <P1><TAGS>	73000300	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Service unavailable – Other<TAGS>*	*73000400*	*This is generated for 1.0-style modem registration, which is not supported for DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Service unavailable – Unrecognized configuration setting<TAGS>*	*73000401*	*This is generated for 1.0-style modem registration, which is not supported for DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Service unavailable – Temporarily unavailable<TAGS>*	*73000402*	*This is generated for 1.0-style modem registration, which is not supported for DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Service unavailable – Permanent<TAGS>*	*73000403*	*This is generated for 1.0-style modem registration, which is not supported for DPoE Networks.*

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Registration rejected authentication failure: CMTS MIC invalid<TAGS>*	*73000500*	*CMTS MIC verification is not needed on the DPoE System.*
Init	*3.0 SPECIFIC REGISTRATION REQUEST*		*MUST NOT*	*Registration authentication failure: REG REQ rejected –TLV parameters do not match learned config file TLV parameters<TAGS>*	*73000501*	*There is no way for this to happen in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*REG REQ has Invalid MAC header<TAGS>*	*73010100*	*This is generated for 1.0-style modem registration, which is not supported for DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*REG REQ has Invalid SID or not in use<TAGS>*	*73010200*	*This is generated for 1.0-style modem registration, which is not supported for DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*REG REQ missed Required TLVs<TAGS>*	*73010400*	*This is generated for 1.0-style modem registration, which is not supported for DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad DS FREQ – Format Invalid<TAGS>*	*73010500*	*There is no DS frequency in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad DS FREQ – Not in use<TAGS>*	*73010501*	*There is no DS frequency in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad DS FREQ – Not Multiple of 62500 Hz<TAGS>*	*73010502*	*There is no DS frequency in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad US CH – Invalid or Unassigned<TAGS>*	*73010600*	*There are no US settings in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad US CH – Change followed with (RE-) Registration REQ<TAGS>*	*73010601*	*There are no US settings in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad US CH – Overload<TAGS>*	*73010700*	*There are no US settings in DPoE Networks.*
Init	REGISTRATION REQUEST		MUST	Network Access has Invalid Parameter<TAGS>	73010800	
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad Class of Service – Invalid Configuration<TAGS>*	*73010900*	*CoS TLVs are not supported in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad Class of Service – Unsupported class<TAGS>*	*73011000*	*CoS TLVs are not supported in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad Class of Service – Invalid class ID or out of range<TAGS>*	*73011100*	*CoS TLVs are not supported in DPoE Networks.*

Process	Sub-Process	vCM Supports	System Support	Event Message	Event ID	Comments
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad Max DS Bit Rate – Invalid Format<TAGS>*	*73011200*	*This event is generated for 1.0-style CoS TLVs, which are not supported in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad Max DS Bit Rate Unsupported Setting<TAGS>*	*73011201*	*This event is generated for 1.0-style CoS TLVs, which are not supported in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad Max US Bit – Invalid Format<TAGS>*	*73011300*	*This event is generated for 1.0-style CoS TLVs, which are not supported in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad Max US Bit Rate – Unsupported Setting<TAGS>*	*73011301*	*This event is generated for 1.0-style CoS TLVs, which are not supported in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad US Priority Configuration – Invalid Format<TAGS>*	*73011400*	*This event is generated for 1.0-style CoS TLVs, which are not supported in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad US Priority Configuration – Setting out of Range<TAGS>*	*73011401*	*This event is generated for 1.0-style CoS TLVs, which are not supported in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad Guaranteed Min US CH Bit rate Configuration setting – Invalid Format<TAGS>*	*73011500*	*This event is generated for 1.0-style CoS TLVs, which are not supported in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad Guaranteed Min US CH Bit rate Configuration setting – Exceed Max US Bit Rate<TAGS>*	*73011501*	*This event is generated for 1.0-style CoS TLVs, which are not supported in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad Guaranteed Min US CH Bit rate Configuration setting – Out of Range<TAGS>*	*73011502*	*This event is generated for 1.0-style CoS TLVs, which are not supported in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad Max US CH Transmit Burst configuration setting – Invalid Format<TAGS>*	*73011600*	*This event is generated for 1.0-style CoS TLVs, which are not supported in DPoE Networks.*
Init	*REGISTRATION REQUEST*		*MUST NOT*	*Bad Max US CH Transmit Burst configuration setting – Out of Range<TAGS>*	*73011601*	*This event is generated for 1.0-style CoS TLVs, which are not supported in DPoE Networks.*
Init	***REGISTRATION REQUEST***		***SHOULD NOT***	***Invalid Modem Capabilities configuration setting<TAGS>***	***73011700***	***Modem Capabilities is not currently supported in DPoE** Networks**, but could be supported in future revisions.***

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
Init	REGISTRATION REQUEST		MUST	Configuration file contains parameter with the value outside of the range<TAGS>	73011800	
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – Unspecified reason<TAGS>	73020100	This event would be generated by the DPoE System if a vCM registration is rejected for some reason not covered by one of the following event messages.
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – Unrecognized configuration setting<TAGS>	73020101	In the DPoE System, this event would be generated if the configuration file contains settings that are unknown.
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – Major service flow error<TAGS>	73020110	
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – Major classifier error<TAGS>	73020111	
Init	*1.1 and 2.0 SPECIFIC REGISTRATION REQUEST*		*MUST NOT*	*REG REQ rejected – Major PHS rule error<TAGS>*	*73020112*	*PHS is not supported for DPoE Networks.*
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – Multiple major errors<TAGS>	73020113	This event is generated by the DPoE System if the modem configuration file contains major service flow and classifier errors.
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – Message syntax error <P1><TAGS>	73020114	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – Primary service flow error <P1><TAGS>	73020115	Generated if a service flow id is not specified or made active.
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – temporary no resource<TAGS>	73020102	This event would be generated if there are not enough resources on the DPoE System to support the modem configuration file.
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – Permanent administrative<TAGS>	73020103	Generated by the DPoE System to indicate that the modem configuration will not be supported unless a change is made to the CMTS configuration.

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – Required parameter not present <P1><TAGS>	73020104	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	*1.1 and 2.0 SPECIFIC REGISTRATION REQUEST*		*MUST NOT*	*REG REQ rejected – Header suppression setting not supported<TAGS>*	*73020105*	*Header suppression is not supported in DPoE Networks.*
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – Multiple errors<TAGS>	73020106	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – duplicate reference-ID or index in message<TAGS>	73020107	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MUST	REG REQ rejected – parameter invalid for context <P1><TAGS>	73020108	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	*1.1 and 2.0 SPECIFIC REGISTRATION REQUEST*		*MUST NOT*	*REG REQ rejected – Authorization failure<TAGS>*	*73020109*	
Init	1.1 and 2.0 SPECIFIC REGISTRATION RESPONSE	MUST		REG RSP contains service flow parameters that CM cannot support <P1><TAGS>	73025100	
Init	1.1 and 2.0 SPECIFIC REGISTRATION RESPONSE	MUST		REG RSP contains classifier parameters that CM cannot support <P1><TAGS>	73025101	
Init	*1.1 and 2.0 SPECIFIC REGISTRATION RESPONSE*	*MUST NOT*		*REG RSP contains PHS parameters that CM cannot support <P1><TAGS>*	*73025102*	*PHS is not supported in DPoE Networks.*
Init	1.1 and 2.0 SPECIFIC REGISTRATION RESPONSE	MAY		Registration RSP rejected unspecified reason<TAGS>	73025103	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	1.1 and 2.0 SPECIFIC REGISTRATION RESPONSE	MAY		Registration RSP rejected message syntax error <P1><TAGS>	73025104	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
Init	1.1 and 2.0 SPECIFIC REGISTRATION RESPONSE	MAY		Registration RSP rejected message too big <P1><TAGS>	73025105	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	2.0 SPECIFIC REGISTRATION RESPONSE	MAY		REG-RSP received after REG-ACK. Returning to 1.x transmit mode<TAGS>	73026100	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	REGISTRATION ACKNOWLEDGEMENT		MUST	REG aborted no REG-ACK<TAGS>	73030100	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	REGISTRATION Acknowledgement		MUST	REG ACK rejected unspecified reason<TAGS>	73030200	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	REGISTRATION ACKNOWLEDGEMENT		MUST	REG ACK rejected message syntax error<TAGS>	73030300	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	TLV-11 PARSING	MUST		TLV-11 – unrecognized OID<TAGS>	73040100	
Init	TLV-11 PARSING	MUST		TLV-11 – Illegal Set operation failed<TAGS>	73040200	
Init	TLV-11 PARSING	MUST		TLV-11 – Failed to set duplicate elements<TAGS>	73040300	
Init	1.1 and 2.0 SPECIFIC REGISTRATION REQUEST		MAY	REG REQ rejected – Message too big <P1><TAGS>	73020116	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	Waiting for REG-RSP or REG-RSP-MP	MAY		T6 Timeout and retries exceeded<TAGS>	73027100	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	CM Complete Registration	MUST		Can not create US Primary Service Flow<TAGS>	73050100	
Init	*CM Complete Registration*	*MUST NOT*		*Received REG-RSP while in REG-HOLD1 state<TAGS>*	*73050200*	
Init	*CM Complete Registration*	*MUST NOT*		*Received REG-RSP while in REG-HOLD2 state<TAGS>*	*73050300*	

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
Init	Waiting for REG-REQ or REG-REQ-MP		MAY	T9 Timeout – Never received REG-REQ or all REG-REQ-MP fragments<TAGS>	73021100	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	*CMTS Registration*		*MUST NOT*	*Missing RCP in REG-REQ or REG-REQ-MP<TAGS>*	*73055100*	*Channel bonding is not supported in DPoE Networks.*
Init	*CMTS Registration*		*MUST NOT*	*Received Non-Queue-Depth Based Bandwidth Request and Multiple Transmit Channel mode is enabled<TAGS>*	*73055200*	*Channel bonding is not supported in DPoE Networks.*
Init	*CMTS Registration*		*MUST NOT*	*Received Queue-Depth Based Bandwidth Request when Multiple Transmit Channel mode is not enabled<TAGS>*	*73055300*	*Channel bonding is not supported in DPoE Networks.*
Init	*CMTS Registration*		*MUST NOT*	*Received REG-ACK with TCS - Partial Service<TAGS>*	*73055400*	*Channel bonding is not supported in DPoE Networks.*
Init	*CMTS Registration*		*MUST NOT*	*Received REG-ACK with RCS - Partial Service<TAGS>*	*73055500*	*Channel bonding is not supported in DPoE Networks.*
Init	CMTS Registration		MAY	T6 Timer expires and Retries Exceeded<TAGS>	73055600	Depending on the implementation of the vCM registration within the DPoE System, this event may not be generated.
Init	*CMTS Registration*		*MUST NOT*	*Initializing Channel Timeout<TAGS>*	*73055700*	*Channel bonding is not supported in DPoE Networks.*
Init	*CMTS Registration*		*MUST NOT*	*REG-REQ-MP received when no MDD present<TAGS>*	*73055800*	*DOCSIS-specific message is not applicable to DPoE Networks.*

9.6 QoS

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
Service Flow	*Service Flow Assignment*		*MUST NOT*	*Attribute Masks for SF (SFID <P1>) do not satisfy those in the SCN <P2>.*	*75010100*	

9.7 General

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
		MUST NOT		*A transmit opportunity was missed because the MAP arrived too late.*	*78000100*	*There are no MAP messages in DPoE Networks.*

9.8 Ranging

Most of the following events do not apply to DPoE Networks as they are specific to the DOCSIS ranging process. However, a few of these events can be provided by the DPoE System to emulate ranging issues when links are lost on the EPON network.

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
Init	*RANGING*	*MUST NOT*		*No Maintenance Broadcasts for Ranging opportunities received – T2 time-out<TAGS>*	*82000100*	
Init	*RANGING*	*MUST NOT*		*No Ranging Response received – T3 time-out<TAGS>*	*82000200*	
Init	*RANGING*	*MUST NOT*		*Ranging Request Retries exhausted<TAGS>*	*82000300*	
Init	*RANGING*	*MUST NOT*		*Received Response to Broadcast Maintenance Request, But no Unicast Maintenance opportunities received – T4 time out<TAGS>*	*82000400*	
Init	*RANGING*	*MUST NOT*		*Started Unicast Maintenance Ranging – No Response received – T3 time-out<TAGS>*	*82000500*	
Init	*RANGING*	*MUST NOT*		*Unicast Maintenance Ranging attempted – No response – Retries exhausted<TAGS>*	*82000600*	
Init	RANGING	MUST		Unicast Ranging Received Abort Response – Re-initializing MAC<TAGS>	82000700	Used to report an interruption in the ranging process as commanded by the DPoE System
Init	*RANGING*	*MUST NOT*		*16 consecutive T3 timeouts while trying to range on upstream channel <P1><TAGS>*	*82000800*	
Init	*RANGING*	*MUST NOT*		*B-INIT-RNG Failure – Retries exceeded<TAGS>*	*82000900*	
Init	*RANGING*		*MUST NOT*	*No Ranging Requests received from POLLED CM (CMTS generated polls);<CM-MAC>;*	*82010100*	
Init	*RANGING*		*MUST NOT*	*Retries exhausted for polled CM (report MAC address). After 16 R101.0 errors<CM-MAC>;*	*82010200*	
Init	*RANGING*		*MUST NOT*	*Unable to Successfully Range CM (report MAC address) Retries Exhausted;<CM-MAC>;*	*82010300*	

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
Init	RANGING		MUST	Failed to receive Periodic RNG-REQ from modem (SID X), timing-out SID;<CM-MAC>	82010400	Used to report a Link Loss from the connected ONU.
Init	*RANGING*		*MUST NOT*	*CM transmitted B-INIT-RNG-REQ with MD-DS-SG ID of zero;<CM-MAC>*	*82010500*	

9.9 Dynamic Services

Dynamic Services are not supported in this version of the DPoE specifications.

9.10 Downstream Acquisition

The Downstream Acquisition section of the events includes events related to DOCSIS SYNC Timing issues, Receive Channel Configuration (RCC), Receive Channel Profiles (RCP), and Upstream Channel Descriptors (UCD). The vCM MUST NOT support any of the Downstream Acquisition events defined in Annex D of [OSSIv3.0] since these are not applicable to DPoE *Networks*.

9.11 Diagnostic Log

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
Diag	LogSize		MUST	Diagnostic log size reached high threshold. Enabled detectors: <P1>;Log maximum size: <P2>.	86000100	
Diag	LogSize		MUST	Diagnostic log size dropped to low threshold. Enabled detectors: <P1>;Log maximum size: <P2>.	86000200	
Diag	LogSize		MUST	Diagnostic log size reached full threshold. Enabled detectors: <P1>;Log maximum size: <P2>.	86000300	

9.12 IPDR

IPDR is not supported in this version of the DPoE specifications.

9.13 Multicast

Multicast is not supported in this version of the DPoE specifications.

9.14 CM-Status Superseded

The CM-Status section of Annex D describes events related to the receipt of CM-STATUS messages from the CM at unexpected times in the DOCSIS ranging and registration process. This message is not supported in this version of the DPoE specifications.

9.15 CM-CTRL

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
CM-CTRL	***CM-CTRL***	***SHOULD NOT***	***SHOULD NOT***	***CM-CTRL – Command: <P1> (if P1= mute Add Interval: <P2> ChannelID: <P3>) (If P1 = forwarding Add Action: <P4>) <TAGS>***	***76000100***	
CM-CTRL	*CM-CTRL*	*MUST NOT*	*MUST NOT*	*CM-CTRL- Invalid message format<TAGS>*	*76000200*	

9.16 Interface Status

These events are defined in the [DPoE-SP-MEFv1.0] specification.

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
Interface Status	Ethernet Interface	MUST	MUST	Ethernet Interface link down	80000101	
Interface Status	Ethernet Interface	MUST	MUST	Ethernet Interface link up	80000102	

Appendix I IPDR Service Definition Schema Support for Future Revisions of DPoE Specifications (Informative)

Much like the MIBs section, each of the following sub-sections focuses on requirements for each service definition. Each sub-section contains requirements on the Records Collection and Template Negotiation functions.

As IPDR support is not currently required in this version of the DPoE specifications, no IPDR Service Definition Schemas need be supported. However, the following sub-sections contain "future-looking" requirements that stretch beyond the current version of the specification (as is done for the SNMP MIBs). These requirements have no bearing on the current revision of the DPoE specifications.

I.1 Requirements for DOCSIS SAMIS Service Definitions

The generation of the Subscriber Usage Billing records is the top priority when generating IPDR records.

The DPoE System MUST support the generation of Subscriber Usage Billing Service records as defined by the [OSSIv2.0] specification.

The DPoE System MUST support the generation of Type 1 Subscriber Usage Billing records as defined by the [OSSIv3.0] specification.

The DPoE System MUST support the generation of Type 2 (Optimized Format) Subscriber Usage Billing records as defined by the [OSSIv3.0] specification.

I.2 Requirements for DOCSIS Spectrum Measurement Service Definition

The DPoE System MUST NOT support generation of the Upstream Spectrum Measurement records.

These records will not be supported, because the reported values (center frequency, bandwidth, number of bins, etc.) have no value in a DPoE Network.

I.3 Requirements for DOCSIS Diagnostic Log Service Definitions

The DPoE System SHOULD support the generation of Diagnostic Log records.

The supported Diagnostic Log triggers will be limited to those CM registration states which are supported by the DPoE System.

I.4 Requirements for CMTS CM Registration Status Service Definitions

The DPoE System SHOULD support the generation of CMTS CM Registration Status Information records.

I.5 Requirements for CMTS CM Upstream Status Service Definitions

The DPoE System SHOULD NOT support the generation of CMTS CM Upstream Status records.

Much of the information reported in this record is not applicable in a DPoE Network (modulation type, SNR, micro-reflections, etc.). However, there are some other fields which could be reported (FEC-related counters) that may have some value.

I.6 Requirements for CMTS Topology Service Definitions

The DPoE System SHOULD NOT support the generation of CMTS Topology records.

The only reason to provide support for these records would be to provide compatibility with applications that are building topology diagrams for operator use.

I.7 Requirements for CPE Service Definitions

The DPoE System SHOULD support the generation of CPE Service records.

I.8 Requirements for CMTS Upstream Utilization Statistics Service Definitions

The DPoE System SHOULD support the generation of CMTS Upstream Utilization Statistics records.

Although some of the fields are not directly applicable, there are some related DPoE counters that will have value to operators.

I.9 Requirements for CMTS Downstream Utilization Statistics Service Definitions

The DPoE System SHOULD support the generation of CMTS Downstream Utilization Statistics records.

I.10 Requirements for CMTS Service Flow Information Service Definitions

The DPoE System SHOULD support the generation of CMTS Service Flow Information Statistics records.

Appendix II Acknowledgments

On behalf of our industry, we would like to thank the following individuals for their contributions to the development of this specification.

Contributor	Company Affiliation
John Dickinson	Bright House Networks
Andrew Chagnon, Drew Davis, James Fletcher, Paul Gray	Broadcom
Mike Holmes	Broadway Networks
Curtis Knittle, Bob Lund, Glenn Russell	CableLabs
Shamim Akhtar, Doug Jones, Mehmet Toy	Comcast
Vladimir Bronstein, James Chen, Hesham ElBakoury	Hitachi Communication Technologies America
Victor Blake	Independent Consultant
Robert Harris, Karen Rice, Ashish Sardesai	Time Warner Cable
Marek Hajduczenia, Nevin Jones, Zang Meiyan	ZTE

In addition to the above, we would like to thank the following individuals who provided subject matter expertise on one or more aspects of the project:

Contributor	Company Affiliation
Edwin Mallette	Bright House Networks
Andrew Dellow, Niki Pantelias, Ricki Li, Paul Runcy, Ed Boyd, Howard Abramson, Matt Hartling	Broadcom
Jianhui Zhou, Wen Li, Fulin Pan	Broadway Networks
Brian Hedstrom, Stuart Hoggan, Greg White, Karthik Sundaresan, Chris Donley	CableLabs
Jason Combs, Saif Rahman, Matt Scully, Bin Wen, Philip Chang, Rashid Siddiqui	Comcast
Dylan Ko, Simon Zhu, Guru Yeleswarapu, Jeff Stribling	Hitachi
Ron daSilva, Mike Kelsen, Shan Huang, Matt Cannon, Tushar Nakhre	Time Warner Cable
Stove Li Zhang, David Chen, Dick Chen	ZTE