

Cable Data Services DOCSIS® Provisioning of EPON Specifications

DPoE Operations and Support System Interface Specification

DPoE-SP-OSSlv1.0-C01-160830

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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 Introduction¹

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. 2G-EPON, as described Annex A of [DPoE-SP-PHYv1.0], uses the same 1G upstream as 1G-EPON (operates at the effective rate of 1 Gbps), but provides a 2G downstream (operates at the effective rate of 2 Gbps). With the exception of requirements specified in Annex A of [DPoE-SP-PHYv1.0], 2G-EPON is expected to meet all of the requirements specified for 1G-EPON. 10G-EPON technology 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, 2G-EPON, and 10G-EPON are compatible with [SCTE 174] (RFoG).

The EPON protocol [802.3] supports a centralized operator-based controller architecture, with the controller commonly referred to as the Optical Line Terminal (OLT), 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.

At the time development efforts around the DPoE specifications started, there were no standard management interfaces for the ongoing operations and maintenance of the network, including fault management, performance management, security, etc. Operators already had fully working and scaled-out systems that solve these challenges for DOCSIS networks. One of the primary goals for DPoE specifications was therefore 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;

¹ Revised per OSSv1.0-N-14.0157-1 and OSSv1.0-N-14.0183-1 on 6/24/14 by JB.

- 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 [OSSlv3.0], 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 Specifications²

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.
DPoE-SP-OAMv1.0	DPoE OAM Extensions Specification	Extensions beyond [802.3] 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.

² Revised per OSSlv1.0-N-14.0157-1 on 6/24/14 by JB.

Document	Document Title	Description
DPoE-SP-OSSv1.0	DPoE Operations and Support System Interface Specification	Specifications for support of a subset of DOCSIS 3.0 OSS functionality with additional EPON requirements.
DPoE-SP-DEMARCV1.0	DPoE Demarcation Device Specification	Specifications to support the DEMARC Auto-Configuration process to discover and provision a demarcation device connected to a DPoE ONU.

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.

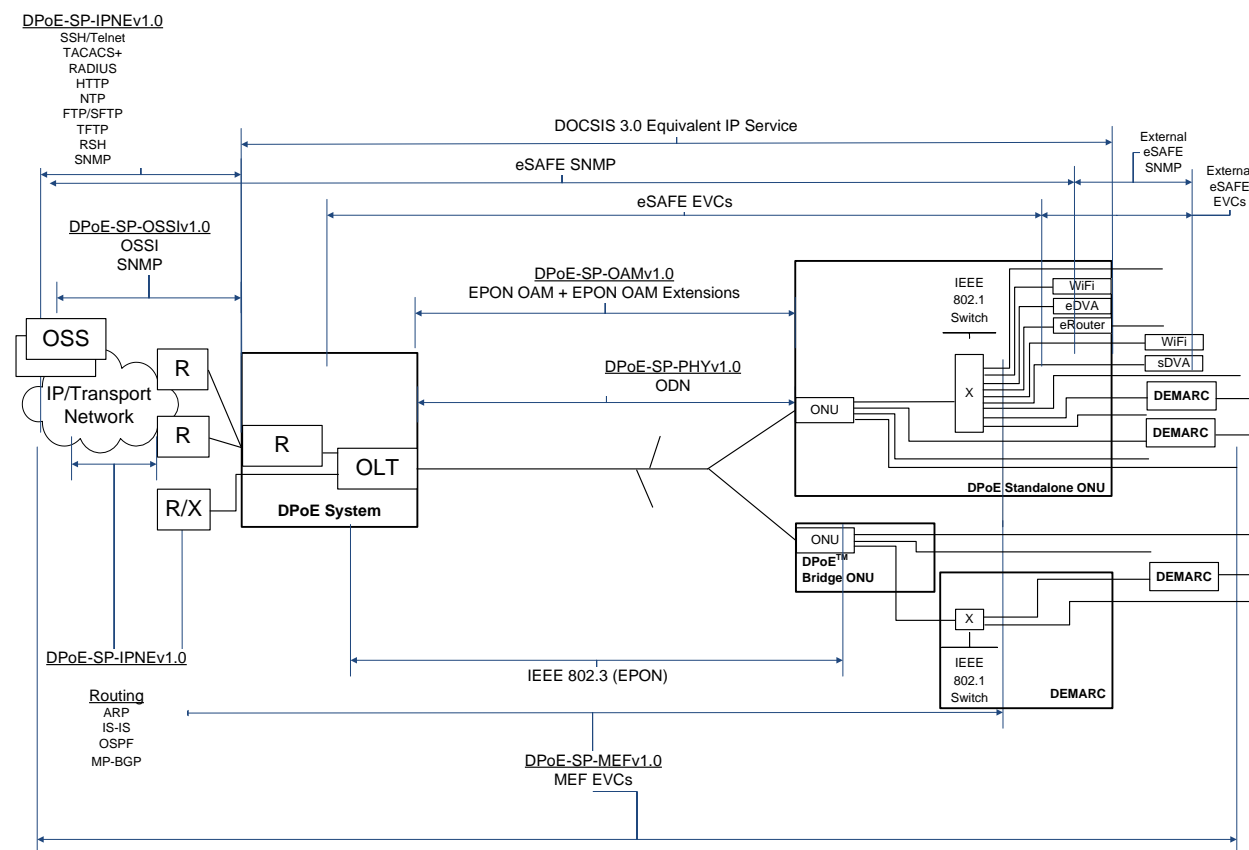


Figure 1 - DPoE Reference Architecture

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_0) or downstream (C_S) classification, respectively.

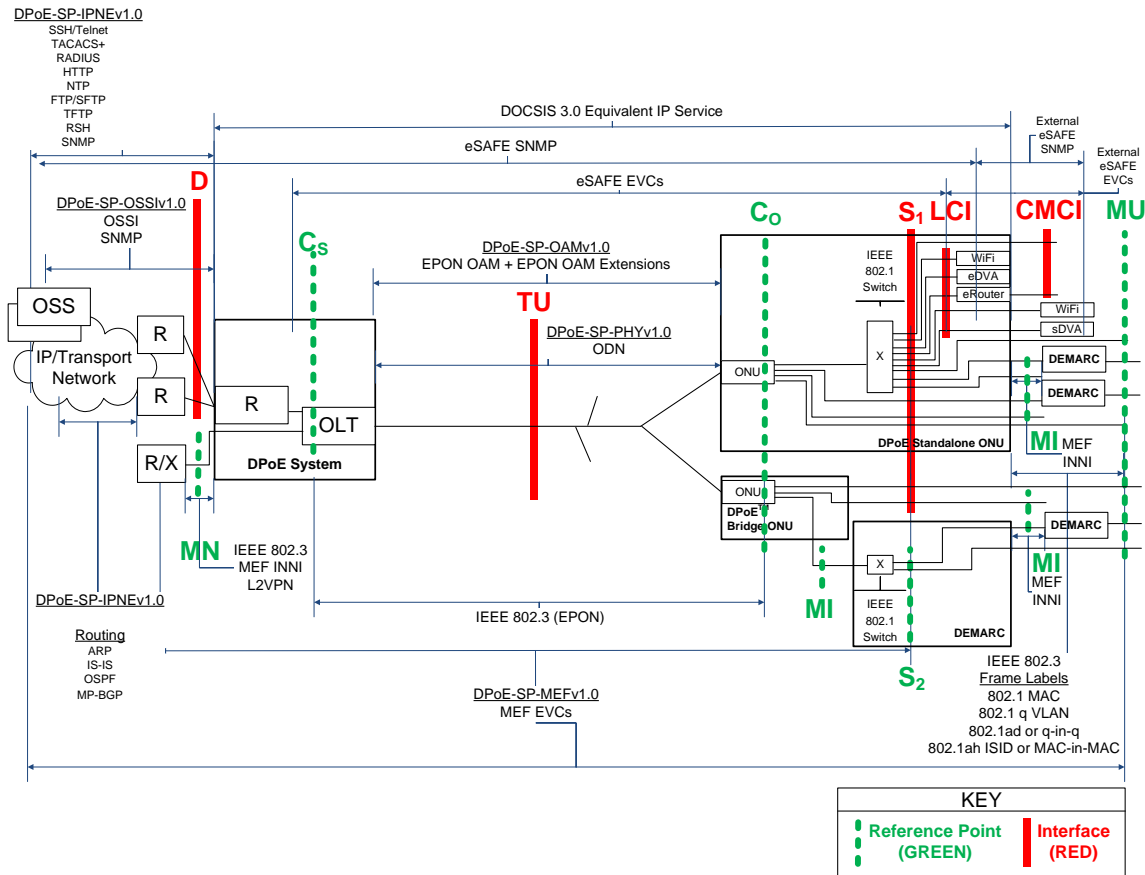


Figure 2 - DPoE Interfaces and Reference Points

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.
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 References³

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 802.3-2012, IEEE Standard for Ethernet, December 2012.
[802.3ah]	IEEE 802.3ah™-2004: IEEE Standard for Information technology-Telecommunications and information systems-Local and metropolitan area networks-Specific requirements, Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications, Amendment: Media Access Control Parameters, Physical Layers, and Management Parameters for Subscriber Access Networks, now part of [802.3].
[802.3av]	IEEE 802.3av™-2009, IEEE Standard for Information technology-Telecommunications and information systems-Local and metropolitan area networks-Specific requirements, Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications Amendment 1: Physical Layer Specifications and Management Parameters for 10Gb/s Passive Optical Networks, now part of [802.3].
[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.
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[DPoE-SP-SECv1.0]	DPoE-SP-SECv1.0, DOCSIS Provisioning of EPON, Security and Certificate Specification, Cable Television Laboratories, Inc.
[OSSv2.0]	Data-Over-Cable Service Interface Specifications, Operations Support System Interface Specification, CM-SP-OSSv2.0, Cable Television Laboratories, Inc.
[OSSv3.0]	Data-Over-Cable Service Interface Specifications, Operations Support System Interface Specification, CM-SP-OSSv3.0, Cable Television Laboratories, Inc.

³ Revised per OSSv1.0-N-14.0157-1 on 6/24/14 by JB.

[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.
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[RFC 4188]	IETF RFC 4188, K. Norseth, Ed. and E. Bell, Ed., Definitions of Managed Objects for Bridges, September 2005.
[RFC 4293]	IETF RFC 4293, Management Information Base for the Internet Protocol (IP), S. Routhier, April 2006.
[RFC 4639]	IETF RFC 4639, R. Woundy and K. Marez, Cable Device Management Information Base for Data-Over-Cable Service Interface Specification (DOCSIS) Compliant Cable Modems and Cable Modem Termination Systems, December 2006.

2.2 Informative References

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[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.
[DPoE-SP-DEMARCV1.0]	DPoE-SP-DEMARCV1.0, DOCSIS Provisioning of EPON, DPoE Demarcation Device 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.
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[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.
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[RFC 3418]	IETF RFC 3418, Management Information Base (MIB) for the Simple Network Management Protocol (SNMP), R. Presuhn, Ed., June 2000.
[RFC 3419]	IETF RFC 3419, Textual Conventions for Transport Addresses, M. Daniele, J. Schoenwaelder, December 2002.
[RFC 3433]	IETF RFC 3433, Entity Sensor Management Information Base, A. Bierman, D. Romascanu, K.C. Norseth, December 2002.
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[RFC 3927]	IETF RFC 3927, Dynamic Configuration of IPv4 Link-Local Addresses, S. Cheshire, B. Aboba, E. Guttman, May 2005.
[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.
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[SCTE 174]	ANSI/SCTE 174 2010, Radio Frequency over Glass Fiber-to-the-Home Specification.
[YD/T 1993.1-2009]	CCSA Technical requirements for access network 2Gbps Ethernet passive optical network (2G-EPON) Part1 : Compatible mode

[YD/T 1993.2-2010] CCSA Technical requirements for access network 2Gbps Ethernet passive optical network (2G-EPON)Part 2:Co-exist mode

2.3 Reference Acquisition⁴

- 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>
- CCSA, China Communications Standards Association, 52# Hua Yuan Bei Road, Haidian District, Beijing, P.R.China 100083, Telephone : +86-10-62302645,Fax : +86-10-62301849, Internet: <http://www.ccsa.org.cn/english/>
- 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/>

⁴ Revised per OSSlv1.0-N-14.0183-1 on 6/26/14 by JB.

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).

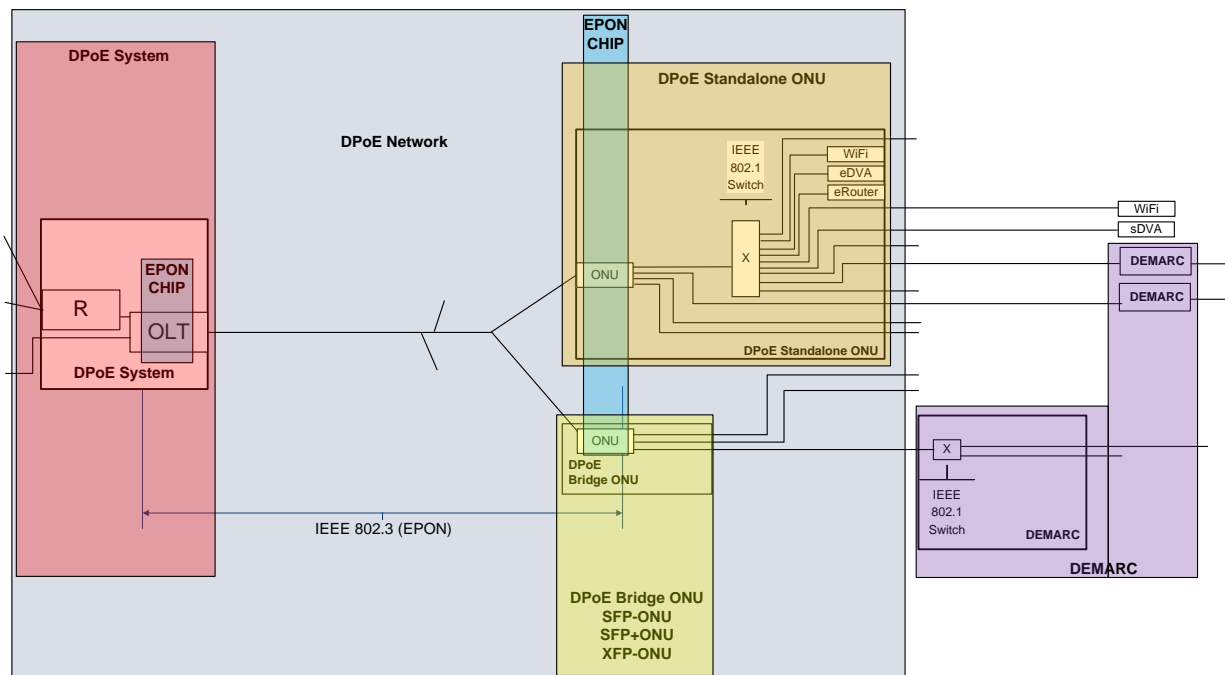


Figure 3 - DPoE Elements

3.2 Other Terms⁵

1G-EPON	EPON as first defined in [802.3ah] , now part of [802.3]
2G-EPON	EPON as defined in Annex A, 2G-EPON System Definition, of [DPoE-SP-PHYv1.0]
10G-EPON	EPON as first defined in [802.3ah], now part of [802.3].
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 1G-EPON, 2G-EPON, and 10G-EPON collectively
EPON Operations and Maintenance Messaging (OAM)	EPON OAM messaging as defined in [802.3] 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

⁵ Revised per OSSv1.0-N-14.0157-1 and OSSv1.0-N-14.0183-1 on 6/26/14 by JB.

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 OSS

The primary goal for the DOCSIS Provisioning of EPON OSS 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.

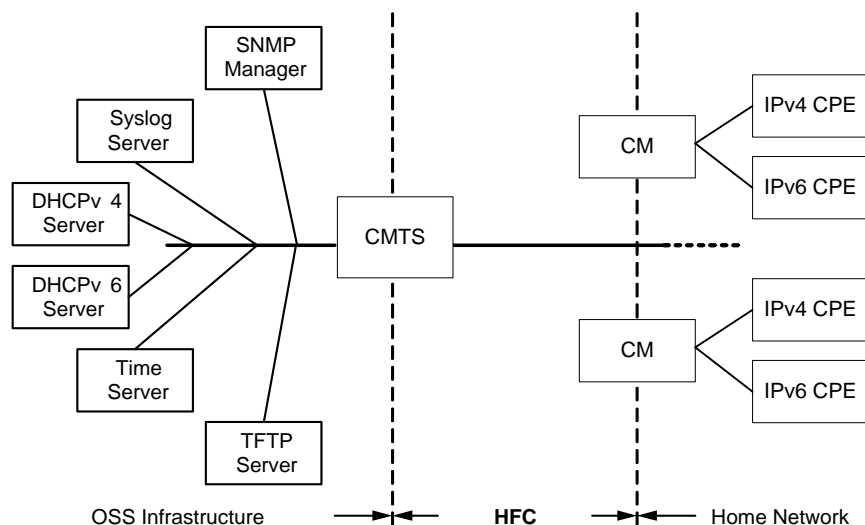


Figure 4 - DOCSIS OSS Overview

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.

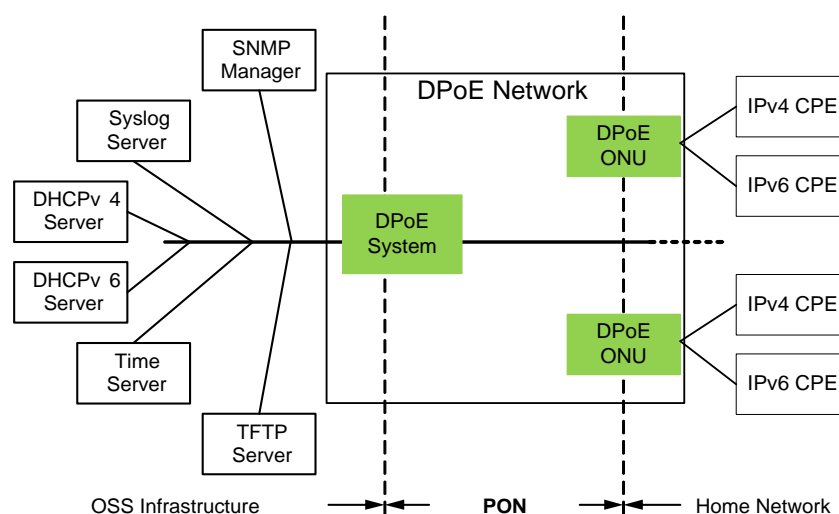


Figure 5 - DPoE OSS Overview

Because the DPoE specifications were designed to support an existing market of ONUs 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.

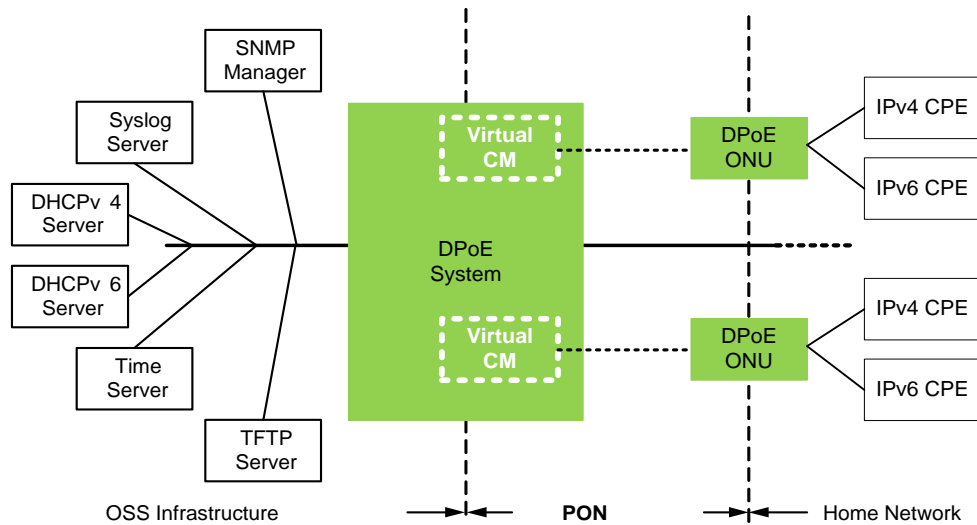


Figure 6 - DPoE Virtual CM (vCM) Concept

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 [OSSlv3.0].

This section includes summary requirements, explicit non-requirements (those items that are not applicable to DPoE), and notable differences between the [OSSlv3.0] specification and the DPoE System.

The following sections conform to the outline and section headings found in the [OSSlv3.0] document to more clearly provide a mapping of the DPoE OSSI requirements to the [OSSlv3.0] requirements. When references are made in this specification to the "corresponding section in [OSSlv3.0]", the corresponding section is the section with the same section heading or title, but not necessarily the same section number.

6.2 Overview

[OSSlv3.0] 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

[OSSlv3.0] 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.
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.

Features	Management Functional Area	OSI layer	NE	Description
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.

[OSSlv3.0] 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 [OSSlv3.0], 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.

[OSSv3.0] was also updated to replace the use of NmAccess configuration objects to support SNMPv1 and v2c management of CMs, because the NmAccess framework had been deprecated by the IETF. [OSSv3.0] 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

[OSSv3.0] 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 Protocol⁶

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 SNMPv1 and 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 SHOULD implement the SNMPv3 protocol.

The vCM SHOULD 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

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⁶ Revised per OSSIV1.0-N-12.0027-1 on 5/11/12 by JS.

6.4 OSSI Management Objects

6.4.1 SNMP Management Information Bases (MIBs)⁷

This section in [OSSv3.0] 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 [OSSv3.0] 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 [OSSv3.0] specification as mandatory.

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

The following requirements were adapted from the [OSSv3.0] specification.

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

The vCM 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.

The vCM 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 the vCM implements a deprecated, obsolete, or additional MIB object, the vCM 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.

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

- The vCM MUST NOT instantiate the MIB object.
- The vCM 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 Others⁸

The corresponding section in the [OSSv3.0] 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 and vCMs.

6.4.1.2 IETF RFCs⁹

The corresponding section in the [OSSv3.0] 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 and vCMs.

⁷ Revised per OSSv1.0-N-12.0015-1 on 5/7/12 by JS.

⁸ Revised per OSSv1.0-N-12.0015-1 on 5/7/12 by JS.

⁹ Revised per OSSv1.0-N-12.0015-1 on 5/7/12 by JS.

6.4.1.3 *Managed Object Requirements*¹⁰

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.

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

The vCM **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** 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.

¹⁰ Revised per OSSIV1.0-N-12.0015-1 on 5/7/12 by JS.

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 [OSSv3.0] 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 [OSSv3.0] specification details specific requirements on how the three mechanisms are used by DOCSIS devices.

6.5.1.2.1.1 Local Logging¹¹

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 vCM **MUST** provide access to the Local Log events through the docsDevEventTable [RFC 4639]. 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 vCM **MUST** implement event descriptors that are no longer than 255 characters. 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 vCM **MAY** choose to store only a single event. If the vCM stores as a single event multiple identical events that occur consecutively, the vCM **MUST** reflect in the event description

¹¹ Revised per OSSv1.0-N-12.0015-1 on 5/7/12 by JS.

the most recent event. 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 [OSSlv3.0].

The DPoE System MUST support the SNMP Notifications defined in DOCS-DIAG-MIB [OSSlv3.0].

A vCM MUST support the SNMP Notifications defined in DOCS-IF3-MIB [OSSlv3.0].

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 docsDevEvReporting¹²

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.

If the DPoE System supports both volatile and non-volatile storage, 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.

¹² Revised per OSSv1.0-N-13.0086-1 on 7/18/13 by JB.

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 [OSSlv3.0] specification.

6.5.1.2.4 Standard DOCSIS Events for CMTS

The [OSSlv3.0] 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 [OSSv3.0] specification.

6.5.1.2.5 Event Priorities for DOCSIS and Vendor-Specific Events

This section of the [OSSv3.0] 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 vCMs.

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 [OSSv3.0] 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 [OSSlv3.0] 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 [OSSlv3.0] specification.

6.5.1.5 Non-SNMP Fault Management Protocols

The [OSSlv3.0] 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 [OSSlv3.0] 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 a 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 Download¹³

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 DPOE System 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].

¹³ Revised per OSSlv1.0-N-12.0015-1 on 5/7/12 by JS.

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 [OSSv3.0] 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 [OSSv3.0] 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 [OSSlv3.0] 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 [OSSlv3.0] 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 [OSSlv3.0] 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 [OSSlv3.0] 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 [OSSlv3.0] 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 [OSSlv3.0] 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 an "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 Reset¹⁴

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 DPOE System 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 vCM SNMP Agent to zero

When the vCM or DPOE ONU 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 vCM 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 Management¹⁵

The DPoE System MUST provide SNMP responses in accordance with the SNMP framework defined in [RFC 3411] through [RFC 3416].

The vCM MUST provide SNMP responses in accordance with the SNMP framework defined in [RFC 3411] through [RFC 3416].

6.5.5.1 DPoE System SNMP Modes of Operation¹⁶

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

-
- The DPoE System MUST process SNMP v1/v2c Packets as described in [RFC 3411] through [RFC 3415], and [RFC 3584].
- If the DPoE System supports the SNMPv3 protocol, it MUST process SNMP v3 Packets 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 DPoE System MUST support the SNMP-COMMUNITY-MIB [RFC 3584] which 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].

¹⁴ Revised per OSSv1.0-N-12.0015-1 on 5/7/12 by JS.

¹⁵ Revised per OSSv1.0-N-12.0015-1 on 5/7/12 by JS.

¹⁶ Revised per OSSv1.0-N-13.0108-1 on 10/18/13 by JB.

- The DPoE System SHOULD support the SNMP-USER-BASED-SM-MIB [RFC 3414] and SNMP-VIEW-BASED-ACM-MIB [RFC 3415] to control SNMPv3 packets.
- The DPoE System MUST support SNMP Notification destinations as 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 DPOE System SNMP Access Control Configuration¹⁷

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

6.5.5.3 vCM SNMP Modes of Operation¹⁸

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

A vCM SHOULD support SNMPv3 [RFC 3414].

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

6.5.5.4 vCM SNMP Access Control Configuration¹⁹

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 SHOULD 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.

¹⁷ Revised per OSSIV1.0-N-12.0027-1 on 5/11/12 by JS.

¹⁸ Revised per OSSIV1.0-N-12.0027-1 on 5/11/12 by JS.

¹⁹ Revised per OSSIV1.0-N-12.0027-1 on 5/11/12 by JS.

6.6.2 Console Access

[OSSv3.0] 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 is 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

[OSSv3.0] 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 Filtering²⁰

Protocol Filtering in the DPoE System MUST be implemented as described in Annex F of [OSSv3.0], 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 [OSSv3.0], 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.
- A DPoE System MUST ignore TLV 11 with the docsDevFilterIpDefault SNMP object with the value of 'discard', if this value is not supported.
- 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 [OSSv3.0], 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 [OSSv3.0] 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.

²⁰ Revised per OSSv1.0-N-14.0151-1 on 6/2/14 by JB.

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	Title	Applicability to the DPoE OSSI Specification
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 [OSSlv3.0] 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 [OSSlv3.0] 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 [OSSlv3.0] 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 [OSSlv3.0] 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 [OSSlv3.0] 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 [OSSlv3.0] 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 [OSSlv3.0]. 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	PDU/s/sec	1
Maximum OAM Rate	Int	1 .. 255	PDU/s/sec	30
OAM Response Timeout	Int	1 .. 255	secs	1

6.8.1.2 EPON Interfaces²¹

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	up down testing See [RFC 2863]	NA	up
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
Table Note: ¹ Per ONU' indicates that FEC will be enabled or disabled based on how the ONU is provisioned.				

6.8.1.2.2 2G-EPON Interface²²

A DPoE System that supports 2G-EPON **MUST** support configuration of the following attributes for each 2G-EPON downstream interface:

Attribute Name	Type	Value Range	Units	Default Value
Admin State	ENUM	up down testing See [RFC 2863]	NA	up
Speed	ENUM	1 Gbps 2 Gbps DS/1 Gbps US	NA	1 Gbps

²¹ Revised per OSSlv1.0-N-11.0002-1 on 5/17/11 by JB.

²² Added per OSSlv1.0-N-14.0183-1 on 6/26/14 by JB.

Attribute Name	Type	Value Range	Units	Default Value
Upstream FEC 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
Table Note: ¹ Per ONU indicates that FEC will be enabled or disabled based on how the ONU is provisioned.				

6.8.1.2.3 10G-EPON Interface²³

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	up down testing See [RFC 2863]	NA	up
Speed	ENUM	10 Gbps DS/1 Gbps US 10 Gbps	NA	10 Gbps
Upstream FEC Mode	ENUM	If "Speed" attribute returns the value of "10 Gbps DS/1 Gbps US" Disabled Enabled	NA	Disabled
		If "Speed" attribute returns the value of "10 Gbps" Enabled	N/A	Enabled
Downstream FEC Mode	ENUM	Enabled	NA	Enabled
Number of LLIDs	Int	1 .. 255	NA	150

6.8.1.2.4 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

6.8.1.2.5 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

²³ Revised per OSSv1.0-N-12.0053-1 on 2/21/13 by JB.

Attribute Name	Type	Value Range	Units	Default Value
Deregistration Timeout	Int	0 .. 232 – 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 ²⁴

The DPoE System MUST support the list of MIBs as required by [OSSv3.0] except where noted in the following tables. The DPoE System MUST support the list of MIBs required of the CMTS. The vCM MUST support the list of MIBs required of the CM, as required by [OSSv3.0] except where noted in the following tables, on behalf of the attached ONU device.

The informative Table 6 provides a high-level summary of the applicability of each DOCSIS MIB from [OSSv3.0] 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. The sub-sections, which follow, contain the detailed normative requirements for each of the MIBs listed in Table 6.

In Table 5, the relationship between the DOCSIS 3.0 OSSI Annex A MIB requirement notation and the DPoE MIB requirement notation used throughout this section is provided.

For more detail on how specific MIB objects are supported within a MIB Module, see the corresponding section for the MIB Modules themselves in [OSSv3.0]. If this specification defines the MIB table as required and the MIB objects are not further defined (Heading level 3) in this specification, refer to the DOCSIS MIB requirements from [OSSv3.0]. The MIB objects are to be supported as specified in the DOCSIS Annex A “Detailed MIB Requirements” [OSSv3.0]. Table 3 provides one example of a Heading level 2 MIB requirement table. In this example, mibATable is required to be supported according to the OSSv3.0 Annex A requirements [OSSv3.0] for both the vCM and DPoE System. In addition, mibBTable is not applicable to the vCM and is not to be implemented in the DPoE System.

Table 3 - Heading Level 2 Example MIB Requirements Table

Table Name	vCM	DPoE System	Comments
mibATable	MUST	MUST	
mibBTable		MUST NOT	Operator feedback is that this table is not applicable to an EPON network.

The following sections are adapted from the corresponding MIB tables included in Annex A in [OSSv3.0]. Each MIB Module section (Heading level 2) 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 vCM column indicates whether the table/group/object is to be supported for the vCM as specified in [OSSv3.0]. The DPoE System column indicates whether the table/group/object is to be supported for the DPoE System as specified in [OSSv3.0].

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 or vCM.

For some tables within a MIB Module, more implementation details are provided to lend guidance to how to support the table objects. When needed, sub-sections (Heading level 3) are provided for the MIB to provide these details. If this specification further defines MIB object details (Heading level 3) in the sub-sections below, these details and requirements supersede those specified in [OSSv3.0]. Table 4 provides one example of a Heading level 3 MIB requirement table. In this example, mibATable is expanded to show the individual MIB object requirements, for the objects within the table, for both the vCM and DPoE System. In this case, mibAAttribute1 is required to be implemented in the DPoE System but optional in the vCM while mibAAttribute2 is required to be implemented in the vCM but is not to be implemented in the DPoE System. The key difference here is that the mibATable individual object requirements were not taken from DOCSIS OSSI Annex A since they were explicitly defined within a Heading level 3 section in the DPoE specification.

²⁴ Revised per OSSv1.0-N-11.0003-1 on 5/17/11 by JB. Revised Section 7 MIB Table headings per OSSv1.0-N-11.0036-1 on 5/24/12. Revised per OSSv1.0-N-13.0088-3 on 7/18/13 by JB.

Table 4 - Heading Level 3 Example MIB Requirements Table

Object	vCM	DPoE System	Comments
mibATable	MUST	MUST	
mibAEntry	MUST	MUST	
mibAAAttribute1	MAY	MUST	
mibAAAttribute2	MUST	MUST NOT	

Table 5 - Relationship between OSSlv3.0 MIB Requirement Notation and DPoE Specifications

OSSlv3.0 Requirement Type	OSSlv3.0 Table Notation	DPoE MIB Requirement Mapping	Description
Deprecated	D	Not Used	This convention is not used in the DPoE Specification.
Mandatory	M	MUST	This mapping indicates the MIB Module/Table/Group/Object is required to be supported in the DPoE Specification.
Not Applicable	NA	MUST NOT	This mapping indicates the MIB Module/Table/Group/Object is not to be implemented in the DPoE Specification.
Not Supported	N-Sup	MUST NOT	This mapping indicates the MIB Module/Table/Group/Object is not to be implemented in the DPoE Specification.
-	-	SHOULD NOT	This mapping indicates the MIB Module/Table/Group/Object should not be implemented since it is not applicable to the current version of the DPoE Specification.
Optional	O	MAY/SHOULD	This mapping indicates the MIB Module/Table/Group/Object is optional to implement in the DPoE Specification. A vendor can choose to implement or not to implement the item.
Obsolete	Ob	Not Used	This convention is not used in the DPoE Specification.

Table 6 - Relationship between OSSlv3.0 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.

MIB	From	vCM	DPoE System	Comment
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	
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	

7.1 BRIDGE-MIB ([RFC 4188])²⁵

Table Name	vCM	DPoE System	Comments
dot1dBase	MUST	MUST	
dot1dBasePortTable	MUST	MUST	
dot1dStp	SHOULD NOT	MUST	As support for STP is currently not required for a DPoE ONU, the objects within this group are not applicable for vCMs.
dot1dStpPortTable	SHOULD NOT	MUST	As support for STP is currently not required for a DPoE ONU, this table is not applicable for vCMs.
dot1dTp	MUST	MUST	
dot1dTpFdbTable	MUST	MUST	
dot1dTpPortTable	SHOULD NOT	MUST	As support for STP is currently not required for a DPoE ONU, there are no bridge management frames to be counted for this table; therefore this table is not applicable for vCMs.
dot1dStaticTable	SHOULD NOT	MUST	

²⁵ Revised per OSSv1.0-N-12.0008-1 on 4/16/12 and OSSv1.0-N-12.0040-1 on 8/13/12 by JB.

7.2 CLAB-TOPO-MIB ([OSSlv3.0] Annex Q)

Table Name	vCM	DPoE System	Comments
clabTopoFiberNodeCfgTable		MUST NOT	Operator feedback is that this table is not applicable to an EPON network.
clabTopoChFnCfgTable		MUST NOT	Operator feedback is that this table is not applicable to an EPON network.

7.3 DOCS-CABLE-DEVICE-MIB ([RFC 4639])²⁶

Table Name	vCM	DPoE System	Comments
docsDevBase	MUST	MUST	
docsDevServer	MUST		
docsDevCpe	MUST		
docsDevCpeTable	MUST		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	MUST		
docsDevNmAccessTable	MUST	MUST	These objects will be used by operators to use SNMPv1/v2 to manage their networks.
docsDevSoftware	MUST	MAY	
docsDevEvent	MUST	MUST	
docsDevEvControlTable	MUST	MUST	
docsDevEventTable	MUST	MUST	
docsDevFilter	MUST	MUST NOT	
docsDevFilterLLCTable	MUST	MUST NOT	
docsDevFilterIpTable	MUST	MUST NOT	
docsDevFilterPolicyTable	MUST NOT	MUST NOT	Operators feel that these are all deprecated and replaced with versions that support IPv6.
docsDevFilterTosTable	MUST NOT	MUST NOT	Operators feel that these are all deprecated and replaced with versions that support IPv6.

7.3.1 docsDevBase²⁷

Object	vCM	DPoE System	Comments
docsDevRole	MUST	MUST	A vCM MUST return a value of 'cm' for docsDevRole. A DPoE System MUST support the values of 'cmntsActive' and 'cmntsBackup' (depending on the current role of the DPoE System).
docsDevDateTime	MUST	MUST	Set to the same value for the DPoE System and the vCMs on the DPoE System.
docsDevResetNow	MUST	MUST	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	MUST	MUST	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.

²⁶ Revised per OSSlv1.0-N-12.0039-1 on 8/13/12 by JB.

²⁷ Revised per OSSlv1.0-N-12.0008-1, per OSSlv1.0-N-12.0014-1 on 4/16/12 and per OSSlv1.0-N-13.0095-1 on 7/18/13 by JB.

Object	vCM	DPoE System	Comments
docsDevSTPControl	MUST	MAY	A vCM MUST support the values of 'noStFilterBpdu' and 'noStPassBpdu'. A vCM MUST NOT support setting this value to 'stEnabled'.
docsDevIgmppModeControl	SHOULD NOT	SHOULD NOT	Not supported in this version.
docsDevMaxCpe	MUST	SHOULD NOT	For the vCM, this is set to the value specified via the modem configuration file

7.3.2 docsDevServer²⁸

Object	vCM	DPoE System	Comments
docsDevServerBootState	MUST		See Section 7.3.2.1 for additional information.
docsDevServerDhcp	MUST		
docsDevServerTime	SHOULD NOT		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	MUST		
docsDevServerConfigFile	MUST		
docsDevServerDhcpAddressType	MUST		
docsDevServerDhcpAddress	MUST		
docsDevServerTimeAddressType	SHOULD NOT		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	SHOULD NOT		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	MUST		
docsDevServerConfigTftpAddress	MUST		

7.3.2.1 docsDevServerBootState Object Mappings

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

²⁸ Revised per OSSlv1.0-N-12.0014-1 on 4/16/12 and per OSSlv1.0-N-12.0039-1 on 8/13/12 by JB.

CM State	Original Comment (as defined in DOCS-CABLE-DEVICE-MIB)	DPoE Applicability
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 docsDevSoftware²⁹

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

7.3.4 docsDevFilterLLCTable³⁰

Object	vCM	DPoE System	Comments
docsDevFilterLLCUnmatchedAction	MUST	MUST NOT	
docsDevFilterLLCTable	MUST	MUST NOT	
docsDevFilterLLCEntry	MUST	MUST NOT	
docsDevFilterLLCIndex	MUST	MUST NOT	
docsDevFilterLLCStatus	MUST	MUST NOT	
docsDevFilterLLCIfIndex	MUST	MUST NOT	
docsDevFilterLLCProtocolType	MUST	MUST NOT	
docsDevFilterLLCProtocol	MUST	MUST NOT	
docsDevFilterLLCMatches	SHOULD	MUST NOT	

²⁹ Revised per OSSv1.0-N-12.0014-1 on 4/16/12 and per OSSv1.0-N-12.0039-1 on 8/13/12 by JB.

³⁰ Revised per OSSv1.0-N-12.0014-1 on 4/16/12 by JB.

7.3.5 docsDevFilterIpTable³¹

Object	vCM	DPoE System	Comments
docsDevFilterIpDefault	MUST	MUST NOT	A vCM MUST support a value of 'accept' for docsDevFilterIpDefault. A vCM MAY support a value of 'discard' for docsDevFilterIpDefault. A DPoE System MUST ignore TLV 11 with the docsDevFilterIpDefault SNMP object with the value of 'discard', if this value is not supported.
docsDevFilterIpTable	MUST	MUST NOT	
docsDevFilterIpEntry	MUST	MUST NOT	
docsDevFilterIpIndex	MUST	MUST NOT	
docsDevFilterIpStatus	MUST	MUST NOT	
docsDevFilterIpControl	MUST	MUST NOT	A vCM MUST support the values of 'accept' and 'discard' for docsDevFilterIpControl. A vCM MAY support a value of 'policy' for docsDevFilterIpControl.
docsDevFilterIpIndex	MUST	MUST NOT	A vCM MUST apply all inbound (docsDevFilterIpDirection '1') filter entries associated with docsDevFilterIpIndex containing the value of '2' (CATV-MAC) or '3' (RF-Down) to the D-ONU Network (PON) Port OAM ingress rules (0xD7/0x501). A vCM MUST apply all outbound (docsDevFilterIpDirection '2') filter entries associated with docsDevFilterIpIndex containing the value of '2' (CATV-MAC) or '4' (RF-Up) to all D-ONU User (UNI) Port OAM ingress rules (0xD7/0x501).
docsDevFilterIpDirection	MUST	MUST NOT	
docsDevFilterIpBroadcast	MUST	MUST NOT	A vCM MUST support a value of 'false' for docsDevFilterIpBroadcast. A vCM MAY support a value of 'true' MAY for docsDevFilterIpBroadcast.
docsDevFilterIpSaddr	MUST	MUST NOT	
docsDevFilterIpSmask	MUST	MUST NOT	
docsDevFilterIpDaddr	MUST	MUST NOT	
docsDevFilterIpDmask	MUST	MUST NOT	
docsDevFilterIpProtocol	MUST	MUST NOT	
docsDevFilterIpSourcePortLow	MUST	MUST NOT	
docsDevFilterIpSourcePortHigh	MUST	MUST NOT	
docsDevFilterIpDestPortLow	MUST	MUST NOT	
docsDevFilterIpDestPortHigh	MUST	MUST NOT	
docsDevFilterIpMatches	MUST	MUST NOT	A vCM SHOULD implement docsDevFilterIpMatches.
docsDevFilterIpTos	MUST	MUST NOT	
docsDevFilterIpTosMask	MUST	MUST NOT	
docsDevFilterIpContinue	MUST NOT	MUST NOT	
docsDevFilterIpPolicyId	MUST NOT	MUST NOT	

The appropriate mapping between *docsDevFilterIP* filter, *docsDevFilterIpDirection*, and DPoE OAM object context for OAM Port Ingress Rules (0xD7/0501) is provided in the following table:

docsDevFilterIpIndex	docsDevFilterIpDirection	DPoE Port Ingress Rules Mapping (0xD7/0x0501)
2 (CATV-MAC)	1 (Inbound)	Network (PON) Port
2 (CATV-MAC)	2 (Outbound)	All User (UNI) Ports

³¹ Revised per OSSlv1.0-N-14.0151-1 and OSSlv1.0-N-14.0158-3 on 7/8/14 by JB.

3 (RF-Down)	1 (Inbound)	Network (PON) Port
4 (RF-Up)	2 (Outbound)	All User (UNI) Ports

Applying all docsDevFilterIp entries associated with the CATV-MAC and RF in this manner eliminates the need to replicate filter entries for all possible User Ports and maintains the same structure of CM configuration files used in traditional DOCSIS.

7.4 DOCS-DIAG-MIB ([OSSlv3.0] ANNEX Q)

Table Name	vCM	DPoE System	Comments
docsDiagLogGlobal		MUST	
docsDiagLogTriggersCfg		MUST	
docsDiagLogTable		MUST	
docsDiagLogDetailTable		MUST	

7.4.1 docsDiagLogTriggersCfg³²

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

7.4.2 docsDiagLogTable³³

Object	vCM	DPoE System	Comments
docsDiagLogTable		MUST	
docsDiagLogEntry		MUST	
docsDiagLogCmMacAddr		MUST	
docsDiagLogLastUpdateTime		MUST	
docsDiagLogCreateTime		MUST	
docsDiagLogLastRegTime		MUST	

³² Revised per OSSlv1.0-N-12.0014-1 on 4/16/12 by JB.

³³ Revised per OSSlv1.0-N-12.0014-1 on 4/16/12 by JB. Revised per OSSlv1.0-N-13.0112-1-on 3/7/14 by JB.

Object	vCM	DPoE System	Comments
docsDiagLogRegCount		MUST	
docsDiagLogRangingRetryCount		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsDiagLogRangingRetryCount.

7.4.3 docsDiagLogDetailTable³⁴

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

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

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

³⁴ Revised per OSSlv1.0-N-12.0014-1 on 4/16/12 by JB.

7.5.1 docsBpi2CmtsBaseEntryTable³⁵

Object	vCM	DPoE System	Comments
docsBpi2CmtsBaseEntryTable		MUST	There is an entry in this table for the MAC Domain Interface Index associated with each EPON (TU) interface on the DPoE System.
docsBpi2CmtsBaseEntryEntry		MUST	
docsBpi2CmtsDefaultAuthLifetime		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of '604800' for docsBpi2CmtsDefaultAuthLifetime.
docsBpi2CmtsDefaultTEKLifetime		MUST	Is used in DPoE Networks to configure the Encryption Key Exchange Timeout. Default is 600 seconds.
docsBpi2CmtsDefaultSelfSignedManufCertTrust		MUST	
docsBpi2CmtsCheckCertValidityPeriods		MUST	
docsBpi2CmtsAuthentInfos		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsAuthentInfos.
docsBpi2CmtsAuthRequests		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsAuthRequests.
docsBpi2CmtsAuthReplies		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsAuthReplies.
docsBpi2CmtsAuthRejects		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsAuthRejects.
docsBpi2CmtsAuthInvalids		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsAuthInvalids.
docsBpi2CmtsSAMapRequests		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsSAMapRequests.
docsBpi2CmtsSAMapReplies		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsBpi2CmtsSAMapReplies.
docsBpi2CmtsSAMapRejects		MUST	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	DPoE System	Comments
docsIfCmMacTable	MUST		Need to provide an entry for backwards compatibility but MAC address is the only useful entry, but it is an important one.
docsIfCmStatusTable	MUST		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		MUST	It may be used by operators who haven't transitioned to DOCS-IF3-MIB yet.
docsIfCmtsServiceTable		MUST	

³⁵ Revised per OSSIV1.0-N-12.0014-1 on 4/16/12 by JB.

Table Name	vCM	DPoE System	Comments
docslfCmtsMacToCmTable		MUST	
docslfCmtsChannelUtilizationTable		MUST	Operators like to know their channel utilizations for monitoring/planning purposes.
docslfDownstreamChannelTable	SHOULD NOT	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.
docslfUpstreamChannelTable	SHOULD NOT	SHOULD NOT	Similar to the comment above for the downstream.
docslfSignalQualityTable	SHOULD NOT	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.
docslfCmtsMacTable		SHOULD NOT	
docslfCmtsStatusTable		SHOULD NOT	
docslfCmtsDownChannelCounterTable		SHOULD NOT	This table was added so the operator could compute utilization on a system that didn't have the docslfCmtsChannelUtilizationTable, because that table came later. Therefore, this table can be skipped if the utilization table is supported.
docslfCmtsUpChannelCounterTable		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 docslfCmtsChannelUtilizationTable is supported.
docslfQosProfileTable	MUST NOT	MUST NOT	There is no need to support 1.0 CoS in a DPoE Network.
docslfCmServiceTable	MUST NOT		No relevance to EPON, because there is no contention region except for DISCOVERY, and there are no statistics exposed there.
docslfCmtsModulationTable		MUST NOT	This seems like it would be completely useless/not-applicable for EPON.

7.6.1 docslfCmMacTable³⁶

Object	vCM	DPoE System	Comments
docslfCmMacTable	MUST		
docslfCmMacEntry	MUST		
docslfCmCmtsAddress	MUST		Set to the MAC Address of the EPON (TU) interface on the DPoE System connected to the DPoE ONU.
docslfCmCapabilities	MUST		A vCM MUST return a value of '00' for docslfCmCapabilities.
docslfCmRangingRespTimeout	MAY		Obsolete object – replaced by the docslfCmRangingTimeout object.
docslfCmRangingTimeout	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmRangingTimeout.

7.6.2 docslfCmStatusTable³⁷

Object	vCM	DPoE System	Comments
docslfCmStatusTable	MUST		

³⁶ Revised per OSSv1.0-N-12.0014-1 on 4/16/12 and by OSSv1.0-N-12.0039-1 on 8/13/12 by JB.

³⁷ Revised per OSSv1.0-N-12.0014-1 on 4/16/12 by JB.

Object	vCM	DPoE System	Comments
docslfCmStatusEntry	MUST		
docslfCmStatusValue	MUST		See following section for details on the implementation of this object for DPoE Networks.
docslfCmStatusCode	MUST		
docslfCmStatusTxPower	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusTxPower.
docslfCmStatusResets	MUST		
docslfCmStatusLostSyncs	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusLostSyncs.
docslfCmStatusInvalidMaps	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusInvalidMaps.
docslfCmStatusInvalidUcids	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusInvalidUcids.
docslfCmStatusInvalidRangingResponses	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusInvalidRangingResponses.
docslfCmStatusInvalidRegistrationResponses	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusInvalidRegistrationResponses.
docslfCmStatusT1Timeouts	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusT1Timeouts.
docslfCmStatusT2Timeouts	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusT2Timeouts.
docslfCmStatusT3Timeouts	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusT3Timeouts.
docslfCmStatusT4Timeouts	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusT4Timeouts.
docslfCmStatusRangingAborted	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusRangingAborted.
docslfCmStatusDocsisOperMode	MUST		A vCM MUST return a value of 'docsis11' for docslfCmStatusDocsisOperMode.
docslfCmStatusModulationType	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of 'unknown' for docslfCmStatusModulationType.
docslfCmStatusEqualizationData	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of length zero for docslfCmStatusEqualizationData.
docslfCmStatusUCCs	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusUCCs.
docslfCmStatusUCCFails	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslfCmStatusUCCFails.

7.6.2.1 docslfCmStatusValue Mappings

Reported by the DPoE System on behalf of the vCM

CM State	Original Comment (as defined in DOCSIS RFlv2)	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.
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 docslfCmtsCmStatusTable³⁸

Object	vCM	DPoE System	Comments
docslfCmtsCmStatusTable	NA	MUST	Although deprecated by [OSSv3.0], it is still going to be supported for DPoE Networks.
docslfCmtsCmStatusEntry		MUST	
docslfCmtsCmStatusIndex		MUST	Contains the registration identifier assigned by the DPoE System to the vCM.
docslfCmtsCmStatusMacAddress		MUST	Contains the MAC address that identifies the DPoE ONU for the vCM.
docslfCmtsCmStatusIpAddress		MUST	Contains the IP Address assigned to the vCM.
docslfCmtsCmStatusDownChannelIndex		MUST	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.
docslfCmtsCmStatusUpChannelIndex		MUST	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.

³⁸ Revised per OSSv1.0-N-12.0014-1 on 4/16/12 by JB.

Object	vCM	DPoE System	Comments
docslfCmtsCmStatusRxPower		MUST	The object reports power in tenths of a dBmV. EPON power is typically expressed units of uWatts.
docslfCmtsCmStatusTimingOffset		MUST	The value provided here is the RTT for the ONU with the units converted to the DOCSIS units (6.25 microsecs/64).
docslfCmtsCmStatusEqualizationData		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of length zero for docslfCmtsCmStatusEqualizationData.
docslfCmtsCmStatusValue		MUST	See following section for details on the implementation of this object for DPoE Networks.
docslfCmtsCmStatusUnerrored		MUST	
docslfCmtsCmStatusCorrecteds		MUST	
docslfCmtsCmStatusUncorrectables		MUST	
docslfCmtsCmStatusSignalNoise		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docslfCmtsCmStatusSignalNoise.
docslfCmtsCmStatusMicroreflections		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docslfCmtsCmStatusMicroreflections.
docslfCmtsCmStatusExtUnerrored		MUST	
docslfCmtsCmStatusExtCorrecteds		MUST	
docslfCmtsCmStatusExtUncorrectables		MUST	
docslfCmtsCmStatusDocsisRegMode		MUST	The DPoE System MUST return a value of 'docsis11' for docslfCmtsCmStatusDocsisRegMode.
docslfCmtsCmStatusModulationType		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of 'unknown' for docslfCmtsCmStatusModulationType.
docslfCmtsCmStatusInetAddressType		MUST	
docslfCmtsCmStatusInetAddress		MUST	
docslfCmtsCmStatusValueLastUpdate		MUST	Set to the value of DPoE System's sysUpTime value when the docslfCmtsCmStatusValue for this instance changes.
docslfCmtsCmStatusHighResolutionTimingOffset		MUST	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 docslfCmtsCmStatusValue 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.

CMTS State for CM	Original Comment (as defined in DOCS-IF-MIB [RFC 4546])	DPoE Applicability
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.
registeredBPInitializing(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 docslfCmtsServiceTable³⁹

Object	vCM	DPoE System	Comments
docslfCmtsServiceTable		MUST	Although defined as a read-write table, for DPoE Networks this table need only be supported as a read-only table.
docslfCmtsServiceEntry		MUST	
docslfCmtsServiceId		MUST	
docslfCmtsServiceCmStatusIndex		MUST	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.
docslfCmtsServiceAdminStatus		MUST	Used to disable or delete SIDs. The DPoE System SHOULD return a value of 'enabled' for docslfCmtsServiceAdminStatus.
docslfCmtsServiceQosProfile		MUST	Does not apply to DPoE because this only applies to 1.0 CoS. The DPoE System MUST return a value of zero for docslfCmtsServiceQosProfile.
docslfCmtsServiceCreateTime		MUST	Set to the value of DPoE System's sysUpTime value when the SID is created.
docslfCmtsServiceInOctets		MUST	
docslfCmtsServiceInPackets		MUST	
docslfCmtsServiceNewCmStatusIndex		MUST	Contains the registration identifier assigned by the DPoE System to the vCM associated with the SID.

7.6.5 docslfCmtsChannelUtilizationTable⁴⁰

Object	vCM	DPoE System	Comments
docslfCmtsChannelUtilizationTable		MUST	This table is indexed by Interface Index, docslfCmtsChannelUtilType, and docslfCmtsChannelUtilId. Depending on the value of docslfCmtsChannelUtilType, the Interface Index value corresponds to the logical downstream or upstream interface associated with the EPON (TU) interface.
docslfCmtsChannelUtilizationEntry		MUST	

³⁹ Revised per OSSv1.0-N-12.0014-1 on 4/16/12 by JB.

⁴⁰ Revised per OSSv1.0-N-12.0014-1 on 4/16/12 by JB.

Object	vCM	DPoE System	Comments
docsIfCmtsChannelUtilfType		MUST	Set to docsCableDownstream for the logical downstream interface or docsCableUpstream for the logical upstream interface.
docsIfCmtsChannelUtilId		MUST	Specifies the channel identifier. This value should be set to one (i.e., one channel in the downstream or upstream direction).
docsIfCmtsChannelUtilization		MUST	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 ([OSSlv3.0] Annex Q)⁴¹

Table Name	vCM	DPoE System	Comments
docsIf3CmStatusTable	MUST		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	SHOULD NOT		Not needed for the current version. Could be used to support more than one capability in the future.
docsIf3CmtsCmRegStatusTable		MUST	Must be implemented because some of the fields are valid for DPoE ONUs. The addressing objects are the more valuable objects.
docsIf3CmtsCmCtrlCmd		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	MUST		Operators feel that this is probably used as a TLV 11 OID.
docsIf3CmtsEventCtrlTable		MUST	
docsIf3CmtsEventNotif		MUST	
docsIf3CmEventNotif	MUST		
docsIf3MdNodeStatusTable		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		SHOULD NOT	If the concept of a channel identifier is kept for DPoE Networks, then this table should be supported.
docsIf3MdUsSgStatusTable		SHOULD NOT	If the concept of a channel identifier is kept for DPoE Networks, then this table should be supported.
docsIf3CmStatusUsTable	SHOULD NOT		Operators feel that similar information is needed for EPON troubleshooting, but are not sure if this is the right table.
docsIf3CmtsCmUsStatusTable		SHOULD NOT	Operators feel that similar information is needed for EPON troubleshooting, but are not sure if this is the right table.
docsIf3MdCfgTable		MUST	Only docsIf3MdCfgEarlyAuthEncrCtrl needs to be implemented as defined by [DPoE-SP-SECv1.0]
docsIf3DsChSetTable		SHOULD NOT	Could be provided so that DPoE Networks can have a single DS channel in a Channel set.
docsIf3UsChSetTable		SHOULD NOT	Could be provided so that DPoE Networks can have a single US channel in a Channel set.
docsIf3CmDpvStatsTable	SHOULD NOT		This version of DPoE specifications does not support DOCSIS DPV.

⁴¹ Revised per OSSlv1.0-N-13.0082-1 on 7/18/13 by JB.

Table Name	vCM	DPoE System	Comments
docslf3MdChCfgTable		SHOULD NOT	This table isn't needed in the short-term, but may be needed in future versions.
docslf3CmMdCfgTable	SHOULD NOT		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.
docslf3MdUsToDsChMappingTable		MUST NOT	Not applicable for EPON.
docslf3BondingGrpCfgTable		MUST NOT	No bonding is supported or needed in an EPON network.
docslf3DsBondingGrpStatusTable		MUST NOT	No bonding is supported or needed in an EPON network.
docslf3UsBondingGrpStatusTable		MUST NOT	No bonding is supported or needed in an EPON network.
docslf3RccCfgTable		MUST NOT	This appears to be completely related to the DOCSIS PHY (and support for multiple US channels).
docslf3RxChCfgTable		MUST NOT	More configuration objects related to multiple US channel support.
docslf3RxModuleCfgTable		MUST NOT	More configuration objects related to multiple US channel support.
docslf3RccStatusTable		MUST NOT	No RCCs to report.
docslf3RxChStatusTable	MUST NOT	MUST NOT	No RCCs and no Receive Channels to report status on.
docslf3RxModuleStatusTable	MUST NOT	MUST NOT	No RCCs, and no Receive Modules.
docslf3SignalQualityExtTable	MUST NOT	MUST NOT	Specific to DOCSIS PHY.
docslf3CmtsSignalQualityExtTable		MUST NOT	Specific to DOCSIS PHY.
docslf3CmtsSpectrumAnalysisMeasTable		MUST NOT	Specific to DOCSIS PHY.
docslf3UsChExtTable	MUST NOT	MUST NOT	Specific to DOCSIS PHY.

7.7.1 docslf3CmStatusTable⁴²

Object	vCM	DPoE System	Comments
docslf3CmStatusTable	MUST		
docslf3CmStatusEntry	MUST		
docslf3CmStatusValue	MUST		See following section for details on the implementation of this object for DPoE Networks.
docslf3CmStatusCode	MUST		
docslf3CmStatusResets	MUST		
docslf3CmStatusLostSyncs	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslf3CmStatusLostSyncs.
docslf3CmStatusInvalidMaps	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslf3CmStatusInvalidMaps.
docslf3CmStatusInvalidUcds	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslf3CmStatusInvalidUcds.
docslf3CmStatusInvalidRangingRsps	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslf3CmStatusInvalidRangingRsps.
docslf3CmStatusInvalidRegRsps	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docslf3CmStatusInvalidRegRsps.

⁴² Revised per OSSv1.0-N-12.0014-1 on 4/16/12 by JB.

Object	vCM	DPoE System	Comments
docsIf3CmStatusT1Timeouts	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIf3CmStatusT1Timeouts.
docsIf3CmStatusT2Timeouts	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIf3CmStatusT2Timeouts.
docsIf3CmStatusUCCsSuccesses	MUST		Does not apply to DPoE Networks. A vCM MUST return a value of zero for docsIf3CmStatusUCCsSuccesses.
docsIf3CmStatusUCCFails	MUST		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.
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.

CM State	Original Comment (as defined in DOCS-IF3-MIB)	Applicability to DPoE
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.
bpilnit	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 docsIf3CmtsCmRegStatusTable⁴³

Object	vCM	DPoE System	Comments
docsIf3CmtsCmRegStatusTable		MUST	
docsIf3CmtsCmRegStatusEntry		MUST	
docsIf3CmtsCmRegStatusId		MUST	Contains the registration identifier assigned by the DPoE System to the vCM.
docsIf3CmtsCmRegStatusMacAddr		MUST	Contains the MAC Address that identifies the DPoE ONU for the vCM.
docsIf3CmtsCmRegStatusIPv6Addr		MUST	Not applicable to this version of DPoE specifications. Return 'all zeros' address.
docsIf3CmtsCmRegStatusIPv6LinkLocal		MUST	Not applicable to this version of DPoE specifications. Return 'all zeros' address.
docsIf3CmtsCmRegStatusIPv4Addr		MUST	Contains the IP address assigned to the vCM.
docsIf3CmtsCmRegStatusValue		MUST	See following section for details on the implementation of this object for DPoE Networks.

⁴³ Revised per OSSv1.0-N-12.0014-1 on 4/16/12 by JB.

Object	vCM	DPoE System	Comments
docslf3CmtsCmRegStatusMdIflIndex		MUST	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.
docslf3CmtsCmRegStatusMdCmSgld		MUST	Not applicable to this version of DPoE specifications. The DPoE System MUST return a value of zero for docslf3CmtsCmRegStatusMdCmSgld.
docslf3CmtsCmRegStatusRcpld		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docslf3CmtsCmRegStatusRcpld.
docslf3CmtsCmRegStatusRccStatusId		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docslf3CmtsCmRegStatusRccStatusId.
docslf3CmtsCmRegStatusRcsld		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docslf3CmtsCmRegStatusRcsld.
docslf3CmtsCmRegStatusTcsld		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docslf3CmtsCmRegStatusTcsld.
docslf3CmtsCmRegStatusQosVersion		MUST	The DPoE System MUST return a value of 'docsis11' for docslf3CmtsCmRegStatusQosVersion.
docslf3CmtsCmRegStatusLastRegTime		MUST	
docslf3CmtsCmRegStatusAddrResolutionReqs		MUST	

7.7.2.1 CmtsCmRegState Textual Convention/ docslf3CmtsCmRegStatusValue

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.

CMTS State for CM	Original Comment (as defined in DOCS-IF3-MIB)	Applicability to DPoE
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.
bpilnit	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 docslf3CmtsCmCtrlCmd⁴⁴

Object	vCM	DPoE System	Comments
docslf3CmtsCmCtrlCmd		MUST	
docslf3CmtsCmCtrlCmdMacAddr		MUST	MAC Address of DPoE ONU to which to direct the request.
docslf3CmtsCmCtrlCmdMuteUsChld		MUST	Not applicable to DPoE Networks. Applies to use of RF Mute command. The DPoE System MUST return a value of zero for docslf3CmtsCmCtrlCmdMuteUsChld.
docslf3CmtsCmCtrlCmdMuteInterval		MUST	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 docslf3CmtsCmCtrlCmdMuteInterval.
docslf3CmtsCmCtrlCmdDisableForwarding		MUST	
docslf3CmtsCmCtrlCmdCommit		MUST	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 docslf3CmtsCmCtrlCmdDisableForwarding.

7.8 DOCS-IFEXT2-MIB ([OSSlv3.0] 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	DPoE System	Comments
docslfExt2CmtsUpChannelTable		MUST NOT	SCDMA is not supported for EPON.
docslfExt2CmMscStatusTable	MUST NOT		SCDMA is not supported for EPON.
docslfExt2CmtsMscGlobalEnable		MUST NOT	SCDMA is not supported for EPON.

⁴⁴ Revised per OSSlv1.0-N-12.0014-1 on 4/16/12 by JB.

Table Name	vCM	DPoE System	Comments
docsIfExt2CmtsCmMscStatusTable		MUST NOT	SCDMA is not supported for EPON.
docsIfExt2CmtsUpChannelMscTable		MUST NOT	SCDMA is not supported for EPON.

7.9 DOCS-MCAST-AUTH-MIB ([OSSlv3.0] Annex Q)

Table Name	vCM	DPoE System	Comments
docsMcastAuthCtrl		SHOULD NOT	Multicast is not supported in the current version of the specification.
docsMcastAuthCmtsCmStatusTable		SHOULD NOT	Multicast is not supported in the current version of the specification.
docsMcastAuthProfileSessRuleTable		SHOULD NOT	Multicast is not supported in the current version of the specification.
docsMcastAuthStaticSessRuleTable		SHOULD NOT	Multicast is not supported in the current version of the specification.
docsMcastAuthProfilesTable		SHOULD NOT	Multicast is not supported in the current version of the specification.

7.10 DOCS-MCAST-MIB ([OSSlv3.0] Annex Q)

Table Name	vCM	DPoE System	Comments
docsMcastCmtsGrpCfgTable		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		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		SHOULD NOT	Multicast is not supported in the current version of the specification.
docsMcastCmtsGrpEncryptCfgTable		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		MUST NOT	PHS is not supported for EPON.
docsMcastCmtsReplSessTable		MUST NOT	
docsMcastDsidPhsTable		MUST NOT	PHS is not supported for EPON.

7.11 DOCS-QOS3-MIB ([OSSlv3.0] Annex Q)

Table Name	vCM	DPoE System	Comments
docsQosPktClassTable	MUST	MUST	
docsQosParamSetTable	MUST	MUST	Not all parameters apply to EPON. (See the comments for docsQosServiceFlowTable table.)
docsQosServiceFlowTable	MUST	MUST	This table is supported, but not all objects apply. For instance, there is no DSID or Channel Set ID.
docsQosServiceFlowStatsTable	MUST	MUST	
docsQosServiceFlowLogTable		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.

Table Name	vCM	DPoE System	Comments
docsQosServiceClassTable		MUST	
docsQosCmtsMacToSrvFlowTable		MUST	
docsQosGrpServiceFlowTable		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		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.
docsQosDynamicServiceStatsTable	SHOULD NOT	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		MUST NOT	This is not applicable to EPON.
docsQosPhsTable	MUST NOT	MUST NOT	PHS is not applicable to EPON.
docsQosServiceFlowSidClusterTable	MUST NOT	MUST NOT	No upstream channel bonding in EPON, so this is not needed.
docsQosUpChCounterExtTable		MUST NOT	This is not applicable to EPON.
docsQosServiceFlowCcfStatsTable		MUST NOT	This is not applicable to EPON.
docsQosCmServiceUsStatsTable	MUST NOT		This is not applicable to EPON.
docsQosCmtsDsidTable		MUST NOT	No downstream bonding in EPON, so this is not needed.
docsQosCmtsDebugDsidTable		MUST NOT	No downstream bonding in EPON.
docsQosCmtsDebugDsidStatsTable		MUST NOT	No downstream bonding in EPON.
docsQosCmDsidTable	MUST NOT		No downstream bonding in EPON.

7.11.1 docsQosPktClassTable⁴⁵

Object	vCM	DPoE System	Comments
docsQosPktClassTable	MUST	MUST	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	MUST	MUST	
docsQosPktClassId	MUST	MUST	
docsQosPktClassDirection	MUST	MUST	
docsQosPktClassPriority	MUST	MUST	
docsQosPktClassIpTosLow	MUST	MUST	
docsQosPktClassIpTosHigh	MUST	MUST	
docsQosPktClassIpTosMask	MUST	MUST	
docsQosPktClassIpProtocol	MUST	MUST	
docsQosPktClassIpSourceAddr	MUST	MUST	
docsQosPktClassIpSourceMask	MUST	MUST	
docsQosPktClassIpDestAddr	MUST	MUST	
docsQosPktClassIpDestMask	MUST	MUST	

⁴⁵ Revised per OSSlv1.0-N-12.0014-1 on 4/16/12 by JB.

Object	vCM	DPoE System	Comments
docsQosPktClassSourcePortStart	MUST	MUST	
docsQosPktClassSourcePortEnd	MUST	MUST	
docsQosPktClassDestPortStart	MUST	MUST	
docsQosPktClassDestPortEnd	MUST	MUST	
docsQosPktClassDestMacAddr	MUST	MUST	
docsQosPktClassDestMacMask	MUST	MUST	
docsQosPktClassSourceMacAddr	MUST	MUST	
docsQosPktClassEnetProtocolType	MUST	MUST	<p>A vCM MUST support a value of 'ethertype(1)' for docsQosPktClassEnetProtocolType. The DPoE System MUST support a value of 'ethertype(1)' for docsQosPktClassEnetProtocolType.</p> <p>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.</p> <p>A vCM MAY support other values for docsQosPktClassEnetProtocolType. The DPoE System MAY support other values for docsQosPktClassEnetProtocolType.</p>
docsQosPktClassEnetProtocol	MUST	MUST	
docsQosPktClassUserPriLow	MUST	MUST	
docsQosPktClassUserPriHigh	MUST	MUST	
docsQosPktClassVlanId	MUST	MUST	
docsQosPktClassState	MUST	MUST	<p>Only 'active' is currently supported for DPoE Networks. The DPoE System MUST return a value of 'active' for docsQosPktClassState.</p> <p>A vCM MUST return a value of 'active' for docsQosPktClassState.</p>
docsQosPktClassPkts	MUST	MUST	<p>If the capability is not supported the DPoE System MUST return a value of 'zero' for docsQosPktClassPkts.</p> <p>If the capability is not supported the vCM MUST return a value of 'zero' for docsQosPktClassPkts</p>
docsQosPktClassBitMap	MUST	MUST	
docsQosPktClassIpAddrType	MUST	MUST	<p>Only 'ipv4' is currently supported for DPoE Networks. The DPoE System MUST return a value of 'ipv4' for docsQosPktClassIpAddrType.</p> <p>A vCM MUST return a value of 'ipv4' for docsQosPktClassIpAddrType.</p>
docsQosPktClassFlowLabel	MUST	MUST	<p>Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsQosPktClassFlowLabel.</p> <p>A vCM MUST return a value of zero for docsQosPktClassFlowLabel.</p>
docsQosPktClassCmInterfaceMask	MUST	MUST	

7.11.2 docsQosParamSetTable⁴⁶

Object	vCM	DPoE System	Comments
docsQosParamSetTable	MUST	MUST	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	MUST	MUST	
docsQosParamSetServiceClassName	MUST	MUST	
docsQosParamSetPriority	MUST	MUST	
docsQosParamSetMaxTrafficRate	MUST	MUST	
docsQosParamSetMaxTrafficBurst	MUST	MUST	
docsQosParamSetMinReservedRate	MUST	MUST	
docsQosParamSetMinReservedPkt	MUST	MUST	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	MUST	MUST	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	MUST	MUST	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.
docsQosParamSetMaxConcatBurst47	MUST	MUST	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosParamSetMaxConcatBurst. A vCM MUST return a value of zero for docsQosParamSetMaxConcatBurst.
docsQosParamSetSchedulingType	MUST	MUST	Only 'undefined' should be reported for downstream parameter sets. Only 'bestEffort' and 'realTimePollingService' are supported in DPoE Networks for upstream parameter sets.
docsQosParamSetNomPollInterval	MUST	MUST	
docsQosParamSetTolPollJitter	MUST	MUST	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	MUST	MUST	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.

⁴⁶ Revised per OSSv1.0-N-12.0014-1 on 4/16/12 by JB. Revised per OSSv1.0-N-13.0110-1 on 3/7/14 by JB.⁴⁷ Revised per OSSv1.0-N-12.0033-1 on 5/11/12 by JS and OSSv1.0-N-12.0036-1 on 5/24/12 by JB.

Object	vCM	DPoE System	Comments
docsQosParamSetNomGrantInterval	MUST	MUST	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.
docsQosParamSetTolGrantJitter	MUST	MUST	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	MUST	MUST	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	MUST	MUST	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	MUST	MUST	
docsQosParamSetMaxLatency	MUST	MUST	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	MUST	MUST	
docsQosParamSetRequestPolicyOct	MUST	MUST	The only bit field that is supported by DPoE specifications is 'piggybackReqWithData'.
docsQosParamSetBitMap	MUST	MUST	Only those TLVs in the bitfield which are supported by DPoE specifications should be set.
docsQosParamSetServiceFlowId	MUST	MUST	
docsQosParamSetRequiredAttrMask	MUST	MUST	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	MUST	MUST	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	MUST	MUST	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 System	Comments
docsQosParamSetAppld	MUST	MUST	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsQosParamSetAppld. A vCM MUST return a value of zero for docsQosParamSetAppld.
docsQosParamSetMultiplierContentionReqWindow	MUST	MUST	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	MUST	MUST	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	MUST	MUST	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	MUST	MUST	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	MUST	MUST	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	MUST	MUST	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	MUST	MUST	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	MUST	MUST	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 docsQosServiceFlowTable⁴⁸

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

⁴⁸ Revised per OSSlv1.0-N-12.0014-1 on 4/16/12 and per OSSlv1.0-N-13.0072-1 on 7/18/13 by JB.

7.11.4 docsQosServiceFlowStatsTable⁴⁹

Object	vCM	DPoE System	Comments
docsQosServiceFlowStatsTable	MUST	MUST	
docsQosServiceFlowStatsEntry	MUST	MUST	
docsQosServiceFlowPkts	MUST	MUST	
docsQosServiceFlowOctets	MUST	MUST	
docsQosServiceFlowTimeCreated	MUST	MUST	
docsQosServiceFlowTimeActive	MUST	MUST	
docsQosServiceFlowPHSUnknowns	MUST	MUST	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	MUST	MUST	
docsQosServiceFlowPolicedDelayPkts	MUST	MUST	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 docsQosServiceClassTable⁵⁰

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

⁴⁹ Revised per OSSv1.0-N-12.0014-1 on 4/16/12 by JB.

⁵⁰ Revised per OSSv1.0-N-12.0014-1 on 4/16/12 by JB, OSSv1.0-N-12.0033-1 on 5/11/12 by JS and OSSv1.0-N-12.0036-1 by JB on 5/24/12.

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

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

7.11.6 docsQosCmtsMacToSrvFlowTable⁵¹

Object	vCM	DPoE System	Comments
docsQosCmtsMacToSrvFlowTable		MUST	
docsQosCmtsMacToSrvFlowEntry		MUST	
docsQosCmtsCmMac		MUST	Contains the MAC address assigned to the DPoE ONU corresponding to the vCM.
docsQosCmtsServiceFlowId		MUST	Contains the Service Flow Identifier associated with the vCM.
docsQosCmtsIfIndex		MUST	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 ([OSSlv3.0] Annex Q)⁵²

Table Name	vCM	DPoE System	Comments
docsSecCmtsServerCfg		MUST	
docsSecCmtsEncrypt		MUST	
docsSecCmtsSavControlCmAuthEnable		MUST	
docsSecSavCmAuthTable		MUST	
docsSecSavCfgListTable		MUST	
docsSecSavStaticListTable		MUST	
docsSecCmtsCmSavStatsTable		MUST	
docsSecCmtsCertificateCertRevocationMethod		MUST	This is needed in support of CM certificate authentication.
docsSecCmtsCertRevocationList		MUST	This is needed in support of CM certificate authentication.
docsSecCmtsOnlineCertStatusProtocol		MUST	This is needed in support of CM certificate authentication.
docsSecCmtsCmEaeExclusionTable		MUST NOT	EAE is not supported for DPoE Networks.
docsSecCmtsCmBpi2EnforceExclusionTable		MUST NOT	BPI+ is not applicable to DPoE Networks.

⁵¹ Revised per OSSlv1.0-N-12.0014-1 on 4/16/12 by JB.

⁵² Revised per OSSlv1.0-N-13.0068-1 on 2/21/13 and per OSSlv1.0-N- 13.0112-1 on 3/10/14 by JB.

7.12.1 docsSecCmtsServerCfg

Table Name	vCM	DPoE System	Comments
docsSecCmtsServerCfgTftpOptions		MUST	Not applicable to DPoE Networks. The DPoE System MUST return a value of "H" for docsSecCmtsServerCfgTftpOptions. The MIB Object 'docsSecCmtsServerCfgTftpOptions' MUST only support an SNMP Access Type of RO.
docsSecCmtsServerCfgConfigFileLearningEnable		MUST	Not applicable to DPoE Networks because there can be no mismatch between the contents of the modem configuration file and a REG-REQ. The DPoE System MUST always return a value of 'false' for docsSecCmtsServerCfgConfigFileLearningEnable. The MIB Object 'docsSecCmtsServerCfgConfigFileLearningEnable' MUST only support an SNMP Access Type of RO.

7.12.2 docsSecCmtsEncrypt

Table Name	vCM	DPoE System	Comments
docsSecCmtsEncryptEncryptAlgPriority		MUST	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, the DPoE System MUST always return an empty list for docsSecCmtsEncryptEncryptAlgPriority. The MIB Object docsSecCmtsEncryptEncryptAlgPriority MUST only support an SNMP Access Type of RO.

7.13 DOCS-SUBMGT3-MIB ([OSSlv3.0] Annex Q)

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

7.13.1 docsSubMgt3Base⁵³

Object	vCM	DPoE System	Comments
docsSubmgt3Base		MUST	
docsSubmgt3BaseCpeMaxIpv4Def		MUST	

⁵³ Revised per OSSlv1.0-N-12.0014-1 on 4/16/12 by JB.

Object	vCM	DPoE System	Comments
docsSubmgt3BaseCpeMaxIpv6PrefixDef		MUST	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BaseCpeMaxIpv6PrefixDef.
docsSubmgt3BaseCpeActiveDef		MUST	
docsSubmgt3BaseCpeLearnableDef		MUST	
docsSubmgt3BaseSubFilterDownDef		MUST	
docsSubmgt3BaseSubFilterUpDef		MUST	
docsSubmgt3BaseCmFilterDownDef		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsSubmgt3BaseCmFilterDownDef.
docsSubmgt3BaseCmFilterUpDef		MUST	Does not apply to DPoE Networks. The DPoE System MUST return a value of zero for docsSubmgt3BaseCmFilterUpDef.
docsSubmgt3BasePsFilterDownDef		MUST	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BasePsFilterDownDef.
docsSubmgt3BasePsFilterUpDef		MUST	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BasePsFilterUpDef.
docsSubmgt3BaseMtaFilterDownDef		MUST	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BaseMtaFilterDownDef.
docsSubmgt3BaseMtaFilterUpDef		MUST	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BaseMtaFilterUpDef.
docsSubmgt3BaseStbFilterDownDef		MUST	Not supported in this version of DPoE specifications. The DPoE System MUST return a value of zero for docsSubmgt3BaseStbFilterDownDef.
docsSubmgt3BaseStbFilterUpDef		MUST	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	DPoE System	Comments
entPhysicalTable	MUST	MUST	
entAliasMappingTable	MUST	MUST	
entPhysicalContainsTable	MUST	MUST	
entLastChangeTime	MUST	MUST	

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

Table Name	vCM	DPoE System	Comments
entPhysSensorTable	MUST	MUST	

7.16 EtherLike-MIB ([RFC 3635])

Table Name	vCM	DPoE System	DPoE System
dot3StatsTable	MUST	MUST	
dot3CollTable	MUST	MUST	
dot3ControlTable	MUST	MUST	Only needed for interfaces that support PAUSE.
dot3PauseTable	MUST	MUST	Only needed for interfaces that support PAUSE.

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

Table Name	vCM	DPoE System	Comments
hrDeviceTable	MUST	MUST	
hrMemorySize	MUST	MUST	
hrStorageTable	MUST	MUST	
hrSWRunTable	MUST	MUST	
hrSWRunPerfTable	MUST	MUST	
hrProcessorTable	MUST	MUST	

7.18 IF-MIB ([RFC 2863])⁵⁴

Table Name	vCM	DPoE System	Comments
ifNumber	MUST	MUST	
ifTableLastChange	MUST	MUST	
ifTable	MUST	MUST	
ifXTable	MUST	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	MUST	MUST	
ifStackLastChange	MUST	MUST	
ifRcvAddressTable	MAY	SHOULD NOT	
ifTestTable	MUST NOT	MUST NOT	

7.18.1 DPoE Interface Table Implementation Considerations⁵⁵

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.

⁵⁴ Revised per OSSIV1.0-N-13.0088-3 on 7/18/13 by JB.

⁵⁵ Revised per OSSIV1.0-N-14.0136-1 on 6/2/14 and OSSIV1.0-N-14.0183-1 on 6/26/14 by JB.

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	4000 (1G or 2G) 9000 (10G)	4000 (1G or 2G) 9000 (10G)	4000 (1G) 9000 (10G)
ifSpeed	0	1000000000, 2000000000, 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, 2000, 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	4000 (1G or 2G) 9000 (10G)	4000 (1G or 2G) 9000 (10G)	4000 (1G) 9000 (10G)
ifSpeed	0	1000000000, 2000000000, or 4,294,967,295	1000000000 or 4,294,967,295
ifPhysAddress:	MAC Address of the EPON interface	Empty-String	Empty-String

MIB Objects	vCM MAC Domain	vCM-Downstream	vCM-Upstream
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, 2000, 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	DPoE System	Comments
ipv4GeneralGroup	MUST	MUST	These groups/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	SHOULD NOT	SHOULD NOT	IPv6 is not supported in this version of DPoE specifications.
ipv4InterfaceTable	SHOULD NOT	MUST	
ipv6InterfaceTable	SHOULD NOT	SHOULD NOT	IPv6 is not supported in this version of DPoE specifications.
ipSystemStatsTable	MUST	MUST	
ipIfStatsTable	MUST	MUST	
ipAddressPrefixTable	MUST	MUST	
ipAddressTable	MUST	MUST	
ipNetToPhysicalTable	MUST	MUST	
ipDefaultRouterTable	MUST	MUST	
icmpStatsTable	SHOULD NOT	MUST	
icmpMsgStatsTable	SHOULD NOT	MUST	
ipv6RouterAdvertTable		SHOULD NOT	IPv6 is not supported in this version of DPoE specifications.

7.20 MGMD-STD-MIB

Table Name	vCM	DPoE System	Comments
mgmdRouterInterfaceTable		SHOULD NOT	Multicast is not supported in this version of DPoE specifications.
mgmdRouterCacheTable		SHOULD NOT	Multicast is not supported in this version of DPoE specifications.

7.21 SNMPv2-MIB ([RFC 3418])

Table Name	vCM	DPoE System	Comments
SystemGroup	MUST	MUST	
sysORTable	MUST	MUST	
SNMPGroup	MUST	MUST	
snmpSetGroup	MUST	MUST	

7.22 TCP-MIB ([RFC 4022])

Table Name	vCM	DPoE System	Comments
tcpBaseGroup	MUST	MUST	These groups/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	MUST	MUST	
tcpConnectionTable	MUST	MUST	
tcpListenerTable	MUST	MUST	

7.23 UDP-MIB ([RFC 4113])

Table Name	vCM	DPoE System	Comments
UDPGroup	MUST	MUST	These groups/tables are not as important for the remote device given that IP connectivity to the DPoE ONU is being spoofed by the DPoE System.
udpEndpointTable	MUST	MUST	

8 SUPPORT FOR DOCSIS BUSINESS SERVICES OVER DOCSIS MIBS

8.1 DOCS-L2VPN-MIB (Annex A BSoD – Layer 2 Virtual Private Networks)⁵⁶

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	DPoE System	Comments
docsL2vpnIdToIndexTable		MUST	
docsL2vpnIndexToIdTable		MUST	
docsL2vpnCmTable		MUST	
docsL2vpnVpnCmTable		MUST	
docsL2vpnVpnCmStatsTable		MUST	
docsL2vpnPortStatusTable		SHOULD NOT	<i>The only object reported in this table is the Group SAID for the VPN on a particular CMTS MAC Domain. As the use of Security Association Identifiers is currently not specified in this version, this table need not be supported.</i>
docsL2vpnSfStatusTable		MUST	
docsL2vpnPktClassTable		MUST	
docsL2vpnCmNsiTable		MUST	
docsL2vpnCmVpnCpeTable		SHOULD NOT	<i>This table is required only when implementing multipoint forwarding. Multipoint forwarding is not supported in this version of DPoE specifications.</i>
docsL2vpnVpnCmCpeTable		SHOULD NOT	<i>This table is required only when implementing multipoint forwarding. Multipoint forwarding is not supported in this version of DPoE specifications.</i>
docsL2vpnDot1qTpFdbExtTable		SHOULD NOT	<i>This table is required only when implementing multipoint forwarding. Multipoint forwarding is not supported in this version of DPoE specifications.</i>
docsL2vpnDot1qTpGroupExtTable		SHOULD NOT	<i>This table is required only when implementing multipoint forwarding. Multipoint forwarding is not supported in this version of DPoE specifications.</i>

8.1.1 docsL2vpnCmTable⁵⁷

Object	vCM	DPoE System	Comments
docsL2vpnCmCompliantCapability		MUST	
docsL2vpnCmDutFilteringCapability		MUST	Per the DPoE MULPI specification, Downstream Unencrypted Traffic (DUT) Filtering (TLV 45) is not supported in this version of the specifications. The DPoE System MUST return a value of 'false' for the docsL2vpnCmDutFilteringCapability object.
docsL2vpnCmDutCMIM		MUST	Per the DPoE MULPI specification, Downstream Unencrypted Traffic (DUT) Filtering (TLV 45) is not supported in this version. The DPoE System MUST return a value of '1' for docsL2vpnCmDutCMIM in bit position 0.
docsL2vpnCmDhcpSnooping		MUST	

⁵⁶ Revised per OSSv1.0-N-12.0018-1 on 5/7/12 by JS and per OSSv1.0-N-11.0036-1 on 5/24/12 by JB.

⁵⁷ Added per OSSv1.0-N-12.0014-1 on 5/7/12 by JS and per OSSv1.0-N-11.0036-1 on 5/24/12 by JB.

8.1.2 docsL2vpnVpnCmTable⁵⁸

Object	vCM	DPoE System	Comments
docsL2vpnVpnCmCMIM		MUST	
docsL2vpnVpnCmIndividualSAId		MUST	The concept of a Security Association is not supported in this version in this version of the specifications. The DPoE System MUST return a value of zero for docsL2vpnVpnCmIndividualSAId.
docsL2vpnVpnCmVendorSpecific		MUST	The L2VPN vendor-specific TLV (43.5.43) is not supported in this version in this version of the specifications. The DPoE System MUST return a zero-length octetstring for the docsL2vpnVpnCmVendorSpecific object.

⁵⁸ Revised per OSSlv1.0-N-11.0036-1 on 5/24/12 by JB.

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.
<i>BPKM</i>	<i>AUTH-FSM</i>	<i>SHOULD NOT</i>	<i>SHOULD NOT</i>	<i>Auth Reject – Unauthorized SAID<TAGS></i>	<i>66030104</i>	<i>SAIDs are not applicable to DPoE Networks.</i>
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.
<i>BPKM</i>	<i>AUTH-FSM</i>	<i>MUST NOT</i>	<i>MUST NOT</i>	<i>Auth Reject – Time of Day not acquired<TAGS></i>	<i>66030109</i>	<i>TOD is not needed in a DPoE System.</i>
<i>BPKM</i>	<i>AUTH-FSM</i>	<i>MUST NOT</i>	<i>MUST NOT</i>	<i>Auth Reject – EAE disabled<TAGS></i>	<i>66030110</i>	<i>EAE cannot be disabled in DPoE Networks.</i>
BPKM	AUTH-FSM	MUST	MUST	CM Certificate Error<TAGS>	66030111	

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
BPKM	AUTH-FSM	MUST NOT	MUST NOT	Auth Invalid – No Information<TAGS>	66030202	<i>This is not applicable to DPoE Networks.</i>
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	<i>No BPI key exchange in DPoE Networks.</i>
BPKM	AUTH-FSM	MUST NOT	MUST NOT	Auth Invalid – Message (Key Request) Authentication Failure<TAGS>	66030207	<i>No BPI key exchange in DPoE Networks.</i>
BPKM	AUTH-FSM	MUST NOT	MUST NOT	Unsupported Crypto Suite<TAGS>	66030300	<i>There is no way for the OLT to determine if an ONU cannot support the intended crypto suite.</i>
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	<i>No Traffic Key exchange in DPoE Networks.</i>
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	<i>No Traffic Key exchange in DPoE Networks.</i>
BPKM	TEK-FSM	MUST NOT	MUST NOT	TEK Invalid – Invalid Key Sequence Number<TAGS>	66050206	<i>No Traffic Key exchange in DPoE Networks.</i>
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.

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
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 ⁵⁹

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	

⁵⁹ Revised per OSSIV1.0-N-11.0004-1 on 5/17/11 by JB.

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
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.
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	

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
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 NOT		ToD request sent- No Response received<TAGS>	68000403	TOD is not applicable to DPoE Networks.
TOD		MUST NOT		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.

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
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	
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.

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
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.
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 Supports	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.
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.

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 – 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.
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.

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 – 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.
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	

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
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	
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	

Process	Sub-Process	vCM Supports	System Supports	Event Message	Event ID	Comments
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	
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 [OSSlv3.0] 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

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 [OSSv2.0] specification.

The DPoE System **MUST** support the generation of Type 1 Subscriber Usage Billing records as defined by the [OSSv3.0] specification.

The DPoE System **MUST** support the generation of Type 2 (Optimized Format) Subscriber Usage Billing records as defined by the [OSSv3.0] 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

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Contributor	Company Affiliation
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Appendix III Revision History

III.1 Engineering Changes Incorporated into DPoE-SP-OSSlv1.0-I02-120614

ECN	ECN Date	Summary	
OSSlv1.0-N-11.0002-1	04/14/2011	Alignment of AdminState to RFC 2863	Brian Hedstrom
OSSlv1.0-N-11.0003-1	04/14/2011	Remove DOCSIS OSSlv3 support columns from MIB Tables	Andrew Chagnon
OSSlv1.0-N-11.0004-1	05/05/2011	ToD Event Requirements are incorrect	Andrew Chagnon
OSSlv1.0-N-12.0008-1	03/02/2012	Modify requirements for docsDevStpControl & BRIDGE-MIB Support for vCMs	Andrew Chagnon
OSSlv1.0-N-12.0014-1	03/09/2012	Updates to DOCSISv3.0 MIB applicability	Jason Schnitzer
OSSlv1.0-N-12.0015-1	3/15/2012	Clarify requirements for DPoE System and vCMs	Andrew Chagnon
OSSlv1.0-N-12.0018-1	4/5/2012	Update requirements for support of DOCS-L2VPN-MIB tables	Andrew Chagnon
OSSlv1.0-N-12.0027-1	5/10/2012	SNMPv3 Requirement Relaxation within DPOE OSSl	Kirk Erichsen
OSSlv1.0-N-12.0033-1	5/10/2012	Removal of Max Concatenated burst requirement as per MULPI	Karthik Sundaresan
OSSlv1.0-N-12.0036-1	5/24/2012	MIB Tables - Minor clarifications and corrections	Karthik Sundaresan

III.2 Engineering Changes Incorporated into DPoE-SP-OSSlv1.0-I03-120830

ECN	ECN Date	Summary	
OSSlv1.0-N-12.0039-1	7/5/2012	Clarify various MIB support requirements	Andrew Chagnon
OSSlv1.0-N-12.0040-1	7/26/2012	Remove DOCSIS OSSlv3 support columns from MIB Tables	Andrew Chagnon

III.3 Engineering Changes Incorporated into DPoE-SP-OSSlv1.0-I04-130328

ECN	ECN Date	Summary	
OSSlv1.0-N-12.0053-1	11/29/2012	Removal of optional requirement for 10G-EPON FEC	Marek Hajduczenia
OSSlv1.0-N-13.0068-1	02/21/2013	Reference to docsSecCmtsCertificateRevocationMethod should be docsSecCmtsCertificateCertRevocationMethod	Andrew Chagnon

III.4 Engineering Changes Incorporated into DPoE-SP-OSSlv1.0-I05-130808

ECN	ECN Date	Summary	
OSSlv1.0-N-13.0072-1	3/21/2013	Return value for docsQosServiceFlowAttrAssignSuccess should be 'false'	Andrew Chagnon
OSSlv1.0-N-13.0082-1	5/30/2013	Add Support for EAE Ctrl MIB	Stuart Hoggan
OSSlv1.0-N-13.0086-1	6/20/2013	Clarify local log memory type(s)	Steve Burroughs
OSSlv1.0-N-13.0088-3	7/11/2013	Clarify Implementation of DOCSISv3.0 MIB Objects referred to in DPoEv1.0 OSSl Spec. and add required MIB Object ifStackLastChange.	Dave Setzke
OSSlv1.0-N-13.0095-1	7/11/2013	Change docsDevBase MIB Objects to agree with DOCSISv3.0 requirements	Dave Setzke

III.5 Engineering Change Incorporated into DPoE-SP-OSSlv1.0-I06-131114

ECN	ECN Date	Summary	
OSSlv1.0-N-13.0108-1	10/17/2013	Align DPoE System OSSlv1.0 SNMPv3 requirements with DOCSISv3.0	Dave Setzke

III.6 Engineering Changes Incorporated into DPoE-SP-OSSIV1.0-I07-140327

ECN	ECN Date	Summary	
OSSIV1.0-N-13.0110-1	12/12/2013	Clarify docsQosPktClassPkts MIB Object requirement	Dave Setzke
OSSIV1.0-N-13.0112-1	01/17-2014	Clarify requirements specified in Section 7.12 and 7.4.2	Dave Setzke

III.7 Engineering Changes Incorporated into DPoE-SP-OSSIV1.0-I08-140807

ECN	ECN Date	Summary	
OSSIV1.0-N-14.0136-1	3/27/2014	Support for larger MTUs	Marek Hajduczenia
OSSIV1.0-N-14.0151-1	5/15/2014	docsDevFilterIpDefault and DPoE System behavior	Marek Hajduczenia
OSSIV1.0-N-14.0157-1	7/10/14	Alignment and cleanup of 802.3 references	Marek Hajduczenia
OSSIV1.0-N-14.0158-2	7/10/14	Interpretation of docsDevFilterIpIndex = 2 (CATV MAC), 3 (RF-Down) and 4 (RF-Up) values	Marek Hajduczenia
OSSIV1.0-N-14.0183-1	7/10/14	DPoEv1 OSSIV Edits to Support 2G-EPON	Joe Solomon
