

IEEE Standard for Management Information Base (MIB) Definitions for Ethernet

IEEE Computer Society

Sponsored by the
LAN/MAN Standards Committee

IEEE
3 Park Avenue
New York, NY 10016-5997
USA

IEEE Std 802.3.1™-2011

5 July 2011

IEEE Standard for Management Information Base (MIB) Definitions for Ethernet

Sponsor

**LAN/MAN Standards Committee
of the
IEEE Computer Society**

Approved 16 May 2011

IEEE-SA Standards Board

Approved 23 May 2012

American National Standards Institute

Permissions have been granted as follows:^a

Portions of this standard reprinted with permission from Avaya, IETF RFC 2108 Definitions of Managed Objects for IEEE 802.3 Repeater Devices using SMIPv2, © 1997.

Portions of this standard reprinted with permission from Microsemi Corporation, IETF RFC 3621 Definitions Power Ethernet MIB, © 2003.

Portions of this standard reprinted with permission from Avaya, IETF RFC 3621 Definitions Power Ethernet MIB, © 2003.

Portions of this standard reprinted with permission from the Hewlett-Packard Company, IETF RFC 3635 Definitions of Managed Objects for the Ethernet-like Interface Types, © 2003.

Material from IETF RFC 4836 Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs) reprinted with permission from the IETF Trust and the persons identified as the document authors, © 2007.

Portions of this standard reprinted with permission from Edward Beili, IETF RFC 4836 Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs), © 2007.

Material from IETF RFC 4837 Managed Objects of Ethernet Passive Optical Networks (EPON) reprinted with permission from the IETF Trust and the persons identified as the document authors, © 2007.

Portions of this standard reprinted with permission from PMC-Sierra, IETF RFC 4837 Managed Objects of Ethernet Passive Optical Networks (EPON), © 2007.

Material from IETF RFC 4878 Definitions and Managed Objects for Operations, Administration, and Maintenance (OAM) Functions on Ethernet-Like Interfaces reprinted with permission from the IETF Trust and the persons identified as the document authors, © 2007.

Material from IETF RFC 5066 Ethernet in the First Mile Copper (EFMCu) Interfaces MIB reprinted with permission from the IETF Trust and the persons identified as the document authors.

Portions of this standard reprinted with permission from Edward Beili, IETF RFC 5066 Ethernet in the First Mile Copper (EFMCu) Interfaces MIB, © 2007.

^aEvery effort has been made to secure permission to reprint borrowed material contained in this document. If omissions have been made, please bring them to our attention.

Abstract: The Management Information Base (MIB) module specifications for IEEE Std 802.3, also known as Ethernet, are contained in this standard. It includes the Structure of Management Information Version 2 (SMIPv2) MIB module specifications formerly produced and published by the Internet Engineering Task Force (IETF), and the Guidelines for the Definition of Managed Objects (GDMO) MIB modules formerly specified within IEEE Std 802.3, as well as extensions resulting from amendments to IEEE Std 802.3. The SMIPv2 MIB modules are intended for use with the Simple Network Management Protocol (SNMP), commonly used to manage Ethernet.

Keywords: Ethernet, GDMO, IEEE 802.3.1, MIB, network management, SNMP, SMIPv2

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

Copyright © 2011 by the Institute of Electrical and Electronics Engineers, Inc.
All rights reserved. Published 5 July 2011. Printed in the United States of America.

IEEE and 802 are registered trademarks in the U.S. Patent & Trademark Office, owned by The Institute of Electrical and Electronics Engineers, Incorporated.

PDF: ISBN 978-0-7381-6700-8 STD97135
Print: ISBN 978-0-7381-6701-5 STDPD97135

IEEE prohibits discrimination, harassment and bullying. For more information, visit <http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html>.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

IEEE Standards documents are developed within the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE-SA) Standards Board. The IEEE develops its standards through a consensus development process, approved by the American National Standards Institute, which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute and serve without compensation. While the IEEE administers the process and establishes rules to promote fairness in the consensus development process, the IEEE does not independently evaluate, test, or verify the accuracy of any of the information or the soundness of any judgments contained in its standards.

Use of an IEEE Standard is wholly voluntary. The IEEE disclaims liability for any personal injury, property or other damage, of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, or reliance upon this, or any other IEEE Standard document.

The IEEE does not warrant or represent the accuracy or content of the material contained herein, and expressly disclaims any express or implied warranty, including any implied warranty of merchantability or fitness for a specific purpose, or that the use of the material contained herein is free from patent infringement. IEEE Standards documents are supplied “**AS IS.**”

The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE Standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard. Every IEEE Standard is subjected to review at least every five years for revision or reaffirmation, or every ten years for stabilization. When a document is more than five years old and has not been reaffirmed, or more than ten years old and has not been stabilized, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE Standard.

In publishing and making this document available, the IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity. Nor is the IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing this, and any other IEEE Standards document, should rely upon the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

Interpretations: Occasionally questions may arise regarding the meaning of portions of standards as they relate to specific applications. When the need for interpretations is brought to the attention of IEEE, the Institute will initiate action to prepare appropriate responses. Since IEEE Standards represent a consensus of concerned interests, it is important to ensure that any interpretation has also received the concurrence of a balance of interests. For this reason, IEEE and the members of its societies and Standards Coordinating Committees are not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration. A statement, written or oral, that is not processed in accordance with the IEEE-SA Standards Board Operations Manual shall not be considered the official position of IEEE or any of its committees and shall not be considered to be, nor be relied upon as, a formal interpretation of the IEEE. At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position, explanation, or interpretation of the IEEE. Comments for revision of IEEE Standards are welcome from any interested party, regardless of membership affiliation with IEEE. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Recommendations to change the status of a stabilized standard should include a rationale as to why a revision or withdrawal is required.

Comments and recommendations on standards, and requests for interpretations should be addressed to:

Secretary, IEEE-SA Standards Board
445 Hoes Lane
Piscataway, NJ 08854
USA

Authorization to photocopy portions of any individual standard for internal or personal use is granted by the Institute of Electrical and Electronics Engineers, Inc., provided that the appropriate fee is paid to Copyright Clearance Center. To arrange for payment of licensing fee, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; +1 978 750 8400. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

Introduction

This introduction is not part of IEEE Std 802.3.1-2011, IEEE Standard for Management Information Base (MIB) definitions for Ethernet.

The initial version of this standard was based on the managed object definitions provided in IEEE Std 802.3™-2008, which subsumed and superseded IEEE Std 802.3an™-2006, IEEE Std 802.3ap™-2007, IEEE Std 802.3aq™-2006, and IEEE Std 802.3as™-2006. It also includes the Logical Link Discovery Protocol Ethernet extensions provided in IEEE Std 802.1AB™-2009 Annex F. In addition, the initial version of this standard incorporated and updated the MIB module definitions formerly defined in IETF RFC 2108, IETF RFC 3621, IETF RFC 3635, IETF RFC 3637, IETF RFC 4836, IETF RFC 4837, IETF RFC 4878, and IETF RFC 5066.

Notice to users

Laws and regulations

Users of these documents should consult all applicable laws and regulations. Compliance with the provisions of this standard does not imply compliance to any applicable regulatory requirements. Implementers of the standard are responsible for observing or referring to the applicable regulatory requirements. IEEE does not, by the publication of its standards, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

Copyrights

This document is copyrighted by the IEEE. It is made available for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of engineering practices and methods. By making this document available for use and adoption by public authorities and private users, the IEEE does not waive any rights in copyright to this document.

Updating of IEEE documents

Users of IEEE standards should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of amendments, corrigenda, or errata. An official IEEE document at any point in time consists of the current edition of the document together with any amendments, corrigenda, or errata then in effect. In order to determine whether a given document is the current edition and whether it has been amended through the issuance of amendments, corrigenda, or errata, visit the IEEE Standards Association website at <http://ieeexplore.ieee.org/xpl/standards.jsp>, or contact the IEEE at the address listed previously.

For more information about the IEEE Standards Association or the IEEE standards development process, visit the IEEE-SA website at <http://standards.ieee.org>.

Errata

Errata, if any, for this and all other standards can be accessed at the following URL: <http://standards.ieee.org/reading/ieee/updates/errata/index.html>. Users are encouraged to check this URL for errata periodically.

Interpretations

Current interpretations can be accessed at the following URL: <http://standards.ieee.org/reading/ieee/interp/index.html>.

Patents

Attention is called to the possibility that implementation of this amendment may require use of subject matter covered by patent rights. By publication of this amendment, no position is taken with respect to the existence or validity of any patent rights in connection therewith. The IEEE is not responsible for identifying Essential Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patents Claims or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this amendment are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from the IEEE Standards Association.

Participants

The following individuals were officers and members of the IEEE 802.3 working group at the beginning of the IEEE P802.3.1 working group ballot. Individuals may have not voted, voted for approval, disapproval, or abstained on this standard.

David J. Law, *IEEE 802.3 Working Group Chair*
Wael William Diab, *IEEE 802.3 Working Group Vice-Chair*
Steven B. Carlson, *IEEE 802.3 Working Group Executive Secretary*
Adam Healey, *IEEE 802.3 Working Group Secretary*
Valerie Maguire, *IEEE 802.3 Working Group Treasurer*

Howard M. Frazier, *IEEE P802.3.1 MIB Task Force Chair and Editor*
John Hawkins,^b *IEEE P802.3.1 MIB Task Force Assistant Editor*

Ghani Abbas	Dimitrios Giannakopoulos	Jeffery J. Maki
John Abbott	Larry Green	Jeff Mandin
Andrew Ambrose	Michael Grimwood	Arthur Marris
Jon Anderson	Robert M. Grow	Phil McClay
Peter Anslow	Mark Gustlin	Michael S. McCormack
Vittal Balasubramanian	Paul Gyugyi	John McDonough
Thananya Baldwin	Marek Hajduczenia	Jim McGrath
Jim Barnette	Hiroshi Hamano	Greg McSorley
Hugh Barrass	Bernie Hammond	Brian Misek
Denis Beaudoin	Jeffrey Heath	Merrick Moeller
Jonathan Beckwith	Rita Horner	Shimon Muller
Michael Bennett	Nicholas Ilyadis	Edward Nakamoto
Ernest Bergmann	James Innis	Gary Nicholl
Brad Booth	Osamu Ishida	Paul Nikolic
Ralf-Peter Braun	Hirotake Iwadate	George Noh
Dirk Breuer	Qiaofeng Jiang	Ahmad Nouri
Matthew Brown	Chad Jones	Mark Nowell
Robert Busse	Sanjay Kasturia	Satoshi Obara
J. Martin Carroll	Seung-Hwan Kim	David Ofelt
Mandeep Chadha	Yong Kim	Gourgen Oganessyan
David Chalupsky	Mitsunobu Kimura	Raj Ojha
Frank Chang	Jonathan King	George Oulundsen
Joseph Chou	Scott Kipp	Tom Palkert
Terry Cobb	Shoukei Kobayashi	Sesha Panguluri
Christopher R. Cole	David Koenen	Gavin Parnaby
Doug Coleman	Paul Kolesar	Petar Pepeljugoski
Charles Cook	Seiji Kozaki	Gerald Pepper
John Dambrosia	Glen Kramer	John Petrilla
Piers Dawe	Hans Lackner	Velu Pillai
Chris Diminico	Lowell Lamb	Rick Pimpinella
Thomas Dineen	D. Matthew Landry	Scott Powell
Dan Dove	Jeff Lapak	Rick Rabinovich
Mike Dudek	Ryan Latchman	Randy Rannow
Frank Effenberger	Kyusang Lee	Peter Rautenberg
David Estes	David Lewis	Duane Remein
Farzin Firoozmand	Mike Peng Li	Michael Ressler
Alan Flatman	Sharon Lutz	Sam sambasivan
Ilango S. Ganga	Eric Lynskey	Olindo Savi
Ali Ghiasi	Anthony Magee	Frederick Schindler
		Shawn Searles

^bNot a member of the IEEE 802.3 working group at the beginning of the working group ballot.

Murat Serbay
Farhad Shafai
Hyungsoo Shin
Bryan Sparrowhawk
Olaf Storaasli
Alan Sugg
Ken-Ichi Suzuki
Steve Swanson
Andre Szczepanek

Dimitry Taich
Akio Tajima
Hidenori Takahashi
Motoyuki Takizawa
Sashi Thiagarajan
Geoffrey Thompson
Hidehiro Toyoda
Nathan Tracy
Mario Traeber

Matthew Traverso
Stephen Trowbridge
Shinji Tsuji
Brad Turner
Sterling A. Vaden
Paul Vanderlaan
Anoop Vetteth
George Young
George Zimmerman
Pavel Zivny

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

Thomas Alexander
Mark Anderson
Peter Anslow
Lee Armstrong
Jacob Ben Ary
Hugh Barrass
Michael Bennett
Tomo Bogataj
Ralf-Peter Braun
Nancy Bravin
Matthew Brown
William Byrd
James Carlo
Steven B. Carlson
Juan Carreon
Mandeep Chadha
David Chalupsky
Keith Chow
Charles Cook
Fumio Daido
John D'Ambrosia
Wael William Diab
Patrick Diamond
Russell Dietz
Thomas Dineen
Daniel Dove
John Egan
Andrew Fieldsend

C. Fitzgerald
Howard M. Frazier
Yukihiro Fujimoto
Ilango Ganga
Devon Gayle
Eric Gray
Randall Groves
Robert M. Grow
Marek Hajduczenia
Hiroshi Hamano
John Hawkins
Adam Healey
Ryan Hirth
C. Huntley
James Innis
Atsushi Ito
Raj Jain
Junghoon Jee
Shinkyo Kaku
Stuart J. Kerry
Yongbum Kim
Scott Kipp
David Landry
David J. Law
Li Li
Ru Lin
G. Luri

Elvis Maculuba
Valerie Maguire
Jeffery Masters
Phil Mcclay
Brett McClellan
Jonathon Mcclendon
Jose Morales
Charles Ngethe
Satoshi Obara
Sesha Panguluri
Glenn Parsons
Peter Pepeljugoski
Venkatesha Prasad
Robert Robinson
Randall Safier
Bartien Sayogo
Siddharth Sheth
Gil Shultz
Kapil Sood
Matthew Squire
Manikantan Srinivasan
Thomas Starai
Walter Struppler
Geoffrey Thompson
Edward J. Turner
Prabodh Varshney
George Vlantis
Oren Yuen

Acknowledgements

This document was derived in part from several Request for Comments (RFCs) originally published by the Internet Engineering Task Force (IETF). The individuals listed below contributed to the development of those RFCs, and earlier works on the subject matter.

Brian Arnold
Udi Ashkenazi
Ran Atkinson
Mike Ayers
Hugh Barrass
Edward Beili
Avi Berger
Chuck Black
Brad Booth
Al Braga
Ben Brown
John Cook
Kevin Daines
James Davin
Kathryn de Graaf
Wael Willaim Diab
John Flick
Howard M. Frazier
Floyd Gerhardt

Robert M. Grow
Mike Heard
Alfred Hoenes
Jeff Johnson
Frank Kastenholz
Lior Khernosh
Lynn Kubinec
Kam Lam
David J. Law
Leon Long
Mike Lui
Eric Lynskey
David Martin
Keith McCloghrie
Kerry McDonald
Donna McMaster
Steve McRobert
John Messenger

K. C. Norseth
Dave Perkins
Marina Popilov
Randy Presuhn
Mathias Riess
Anil Rijasinghani
Sam Roberts
Dan Romascanu
Marshall Rose
Scott Simon
Andrew Smith
Matt Squire
Louis Steinberg
Kaj Tesink
Jonathan Thatcher
Geoffrey Thompson
Maurice Turcotte
Bert Wijnen
Paul Woodruff

When the IEEE-SA Standards Board approved this standard on 16 May 2011, it had the following membership:

Richard H. Hulett, *Chair*
John Kulick, *Vice Chair*
Robert M. Grow, *Past Chair*
Judith Gorman, *Secretary*

Masayuki Ariyoshi
William Bartley
Ted Burse
Clint Chaplin
Wael Diab
Jean-Philippe Faure
Alexander Gelman
Paul Houzé

Jim Hughes
Joseph L. Koepfinger*
David J. Law
Thomas Lee
Hung Ling
Oleg Logvinov
Ted Olsen

Gary Robinson
Jon Walter Rosdahl
Sam Sciacca
Mike Seavey
Curtis Siller
Phil Winston
Howard L. Wolfman
Don Wright

*Member Emeritus

Also included are the following nonvoting IEEE-SA Standards Board liaisons:

Satish Aggarwal, NRC Representative
Richard DeBlasio, DOE Representative
Michael Janezic, NIST Representative

Catherine Berger
IEEE Project Editor

Kathryn Bennett
IEEE Standards Program Manager, Technical Program Development

Contents

1.	Overview.....	1
1.1	Scope.....	2
1.2	Purpose.....	2
1.3	Internet-Standard Management Framework	2
1.4	Security considerations	2
1.5	Conformance.....	3
2.	Normative references	5
3.	Definitions	7
4.	Abbreviations.....	9
5.	Ethernet logical link discovery protocol (LLDP) extension MIB module	11
5.1	Structure of the IEEE 802.3 LLDP extension MIB	11
5.2	Relationship to other MIBs.....	11
5.3	Security considerations for IEEE 802.3 LLDP extension MIB module.....	14
5.4	MIB module definition	15
6.	Ethernet operations, administration, and maintenance (OAM) MIB module.....	31
6.1	Introduction.....	31
6.2	Overview.....	31
6.2.1	Remote fault indication.....	31
6.2.2	Link monitoring	31
6.2.3	Remote loopback	32
6.2.4	Ethernet OAM protocol data units.....	32
6.3	Relation to other MIB modules	32
6.3.1	Relation to other EFM MIB modules	32
6.3.2	Mapping of IEEE 802.3 managed objects	32
6.4	MIB structure.....	35
6.5	Security considerations for Ethernet operations, administration, and maintenance (OAM) MIB module.....	35
6.6	MIB module definition	36
7.	Ethernet repeater device MIB module	73
7.1	Overview.....	73
7.1.1	Repeater management.....	73
7.1.2	Structure of the MIB	73
7.1.2.1	Basic definitions	73
7.1.2.2	Monitor definitions	73
7.1.2.3	Address tracking definitions	73
7.1.2.4	Top N definitions	73
7.1.3	Relationship to MIB-II.....	74
7.1.3.1	Relationship to the ‘system’ group	74
7.1.3.2	Relationship to the ‘interfaces’ group.....	74
7.2	Topology mapping.....	74
7.3	MIB module definition	74

8.	Ethernet data terminal equipment (DTE) power via medium dependent interface (MDI) MIB module	119
8.1	Introduction.....	119
8.2	Overview.....	119
8.3	MIB structure.....	119
8.4	Security considerations for Ethernet data terminal equipment (DTE) power via medium dependent interface (MDI) MIB module.	119
8.5	MIB module definition	120
9.	Ethernet passive optical networks (EPON) MIB module	133
9.1	Overview.....	133
9.1.1	EPON architecture highlights	133
9.1.1.1	Introduction.....	133
9.1.1.2	Principles of operation	134
9.1.1.3	Physical media	134
9.1.1.4	PMD specifications.....	135
9.1.1.5	Point-to-point emulation	135
9.1.1.6	Principles of the MPCP.....	136
9.1.1.7	Forward error correction (FEC).....	139
9.1.2	Management architecture.....	139
9.2	MIB structure.....	140
9.3	Relationship to other MIB modules.....	144
9.3.1	Relation to the Interfaces Group MIB and Ethernet-like interface MIB	144
9.3.2	Relation to the IEEE 802.3 MAU MIBs.....	150
9.3.3	Relation to the Ethernet OAM MIB	150
9.3.4	Relation to the bridge MIB	150
9.4	Mapping of IEEE 802.3 managed objects	150
9.5	Security considerations for Ethernet passive optical networks (EPON) MIB module.....	153
9.5.1	dot3MpcpAdminState	153
9.5.2	dot3EponFecMode.....	153
9.5.3	dot3ExtPkgObjectReset	153
9.5.4	dot3ExtPkgObjectPowerDown	153
9.5.5	dot3ExtPkgObjectFecEnabled	153
9.5.6	dot3ExtPkgObjectRegisterAction.....	153
9.5.7	dot3ExtPkgObjectReportNumThreshold	153
9.5.8	dot3ExtPkgObjectReportThreshold.....	153
9.5.9	dot3ExtPkgOptIfLowerInputPowerThreshold.....	154
9.5.10	dot3ExtPkgOptIfUpperInputPowerThreshold	154
9.5.11	dot3ExtPkgOptIfLowerOutputPowerThreshold	154
9.5.12	dot3ExtPkgOptIfUpperOutputPowerThreshold	154
9.5.13	dot3ExtPkgOptIfTransmitEnable	154
9.6	MIB module definition	154
10.	Ethernet-like interface MIB module	197
10.1	Introduction.....	197
10.2	Overview.....	197
10.2.1	Relation to MIB-2.....	197
10.2.2	Relation to the Interfaces Group MIB	197
10.2.2.1	ifRcvAddressTable	197
10.2.2.2	ifType.....	198
10.2.2.3	ifXxxOctets	198

10.2.2.4	ifXxxXcastPkts	198
10.2.2.5	ifMtu	200
10.2.2.6	ifSpeed and ifHighSpeed	200
10.2.2.7	ifPhysAddress	201
10.2.2.8	Specific Interfaces Group MIB objects	201
10.2.3	Relation to the IEEE 802.3 MAU-MIB module	203
10.2.4	Mapping of IEEE 802.3 managed objects	203
10.3	Security considerations for Ethernet-like interface MIB module	205
10.4	MIB module definition	205
11.	Ethernet in the First Mile copper (EFMCu) interfaces MIB module	233
11.1	Introduction.....	233
11.2	Relation to other MIB modules	233
11.2.1	Relation to Interfaces Group MIB module	233
11.2.1.1	Layering model	233
11.2.1.2	PME aggregation function (PAF)	236
11.2.1.3	Discovery operation.....	236
11.2.1.4	EFMCu ports initialization	237
11.2.1.5	Usage of ifTable.....	238
11.2.2	Relation to SHDSL MIB module.....	239
11.2.3	Relation to VDSL MIB module.....	239
11.2.4	Relation to Ethernet-Like and MAU MIB modules	239
11.3	MIB structure	240
11.3.1	EFM copper MIB overview	240
11.3.2	Interface stack capability MIB overview	240
11.3.3	PME profiles	240
11.3.4	Mapping of IEEE 802.3 managed objects	241
11.4	Security considerations for Ethernet in the First Mile copper interfaces MIB module	242
11.5	MIB module definition	243
12.	Ethernet wide area network (WAN) interface sublayer (WIS) MIB module	299
12.1	Overview.....	299
12.1.1	Relationship to the SONET/SDH interface MIB	299
12.1.2	Relationship to the Ethernet-like interface MIB	299
12.1.3	Relationship to the IEEE 802.3 MAU MIB	300
12.1.4	Use of the ifTable	300
12.1.4.1	Layering model	300
12.1.4.2	Use of ifTable for LLC layer/MAC sublayer/reconciliation sublayer/physical coding sublayer	300
12.1.4.3	Use of ifTable for SONET/SDH path layer.....	300
12.1.4.4	Use of ifTable for SONET/SDH medium/section/line layer	301
12.1.5	SONET/SDH terminology	301
12.1.6	Mapping of IEEE 802.3 managed objects	301
12.1.7	Mapping of SNMP objects to WIS station management registers	305
12.1.8	Structure of the MIB module	308
12.1.8.1	etherWisDeviceTable.....	308
12.1.8.2	etherWisSectionCurrentTable.....	309
12.1.8.3	etherWisPathCurrentTable.....	309
12.1.8.4	etherWisFarEndPathCurrentTable.....	309
12.2	Security considerations for Ethernet wide area network (WAN) interface sublayer (WIS) MIB module	309
12.3	MIB module definition	310

Annex 12A (informative) Collection of performance data using WIS MDIO registers.....	321
13. Ethernet medium attachment units (MAUs) MIB module	323
13.1 Introduction.....	323
13.2 Overview	323
13.2.1 Relationship to IETF RFC 3636 and IETF RFC 4836	323
13.2.2 Relationship to other MIBs.....	323
13.2.2.1 Relationship to the Interfaces Group MIB.....	324
13.2.2.2 Relationship to the IEEE 802.3 repeater MIB module	324
13.2.3 Management of internal MAUs	324
13.2.4 Mapping of IEEE 802.3 managed objects	324
13.2.5 Addition of new MAU types	326
13.2.5.1 dot3MauType OBJECT-IDENTITIES	326
13.2.5.2 IANAifMauTypeListBits TEXTUAL-CONVENTION.....	326
13.2.5.3 IANAifMauMediaAvailable TEXTUAL-CONVENTION.....	326
13.2.5.4 IANAifMauAutoNegCapBits TEXTUAL-CONVENTION	326
13.2.5.5 JackType TEXTUAL-CONVENTION	327
13.3 Security considerations for Ethernet medium attachment units (MAUs) MIB module	327
13.4 IANA considerations	327
13.5 MIB module definition	327
Annex A (informative) Bibliography	355
Annex B (normative) GDMO specification of IEEE 802.3 managed object classes	359
B.1 DTE MAC entity managed object class	359
B.1.1 DTE MAC entity formal definition.....	359
B.1.2 DTE MAC entity attributes	362
B.1.3 DTE MAC entity actions.....	371
B.2 DTE physical entity managed object class	372
B.2.1 DTE physical entity formal definition	372
B.2.2 DTE physical entity attributes.....	373
B.2.3 DTE physical entity actions	374
B.3 DTE MAC control entity managed object class	375
B.3.1 DTE MAC control entity formal definition	375
B.3.2 DTE MAC Control entity attributes.....	376
B.4 DTE MAC Control function entity managed object class.....	377
B.4.1 DTE MAC Control function entity formal definition	377
B.4.2 DTE MAC Control function entity attributes	384
B.5 Repeater managed object class	384
B.5.1 Repeater, formal definition	384
B.5.2 Repeater attributes	385
B.5.3 Repeater actions	387
B.5.4 Repeater notifications.....	388
B.6 Group managed object class	389
B.6.1 Group, formal definition	389
B.6.2 Group attributes.....	389
B.6.3 Group notifications.....	390
B.7 Repeater port managed object class.....	390
B.7.1 Port, formal definition	390
B.7.2 Port attributes	391
B.7.3 Port actions	396
B.8 MAU managed object class	397

B.8.1	MAU, formal definition	397
B.8.2	MAU attributes	398
B.8.3	MAU actions	403
B.8.4	MAU notifications	404
B.9	AutoNegotiation managed object class	404
B.9.1	AutoNegotiation, formal definition	404
B.9.2	Auto-Negotiation attributes	405
B.9.3	AutoNegotiation actions	407
B.10	ResourceTypeID managed object class	408
B.10.1	ResourceTypeID, formal definition	408
B.11	WIS managed object class	409
B.11.1	WIS, formal definition	409
B.11.2	WIS attributes	410
B.12	PSE managed object class	416
B.12.1	PSE, formal definition	416
B.12.2	PSE attributes	417
B.12.3	PSE actions	420
B.13	Midspace managed object class	420
B.13.1	Midspace attributes	421
B.13.2	Midspace notifications	422
B.14	PSE Group managed object class	422
B.14.1	PSE Group attributes	422
B.14.2	PSE Group notifications	423
B.15	OMP entity formal definition	423
B.15.1	OMP attributes	424
B.16	OAM entity managed object class	426
B.16.1	OAM entity formal definition	426
B.16.2	OAM entity attributes	427
B.16.3	OAM actions	438
B.17	PAF managed object class	438
B.17.1	PAF formal definition	438
B.18	PME managed object class	441
B.18.1	PME formal definition	441
Annex C (normative) GDMO and ASN.1 definitions for management		445
C.1	Common attributes template	445
C.2	ASN.1 module for CSMA/CD managed objects	445

IEEE Standard for Management Information Base (MIB) Definitions for Ethernet

IMPORTANT NOTICE: This standard is not intended to ensure safety, security, health, or environmental protection. Implementers of the standard are responsible for determining appropriate safety, security, environmental, and health practices or regulatory requirements.

This IEEE document is made available for use subject to important notices and legal disclaimers. These notices and disclaimers appear in all publications containing this document and may be found under the heading “Important Notice” or “Important Notices and Disclaimers Concerning IEEE Documents.” They can also be obtained on request from IEEE or viewed at <http://standards.ieee.org/IPR/disclaimers.html>.

1. Overview

This document supersedes and makes obsolete IEEE Std 802.3TM-2008 Annex 30A and Annex 30B, IEEE Std 802.1ABTM-2009 Annex F, IETF RFC 2108, IETF RFC 3621, IETF RFC 3635, IETF RFC 3637, IETF RFC 4836, IETF RFC 4837, IETF RFC 4878, and IETF RFC 5066.¹

Ethernet technology, as defined by the IEEE 802.3 Working Group of the IEEE, continues to evolve, with scalable increases in speed, new types of cabling and interfaces, and new features. This evolution may require changes in the managed objects in order to reflect this new functionality. This document, as with other documents issued by this working group, reflects a certain stage in the evolution of Ethernet technology. In the future, this document might be revised, or new documents might be issued, in order to reflect the evolution of Ethernet technology.

The term “Ethernet-like interfaces” was historically used because the interfaces defined by the IEEE 802.3 Working Group were not considered “Ethernet” per se, but “Ethernet-like”, because “Ethernet” was taken to mean “Ethernet version 2” according to the (DEC, Intel, Xerox) DIX “blue book”. Today and in the context of SNMP management and SMIPv2 MIB modules, “Ethernet,” “Ethernet-like,” and “IEEE 802.3” are synonymous and interchangeable in the marketplace. The term “Ethernet-like” is retained in this document because of its common usage in the SNMP-based network management community.

¹Information on references can be found in Clause 2.

1.1 Scope

This standard contains the Management Information Base (MIB) module specifications for IEEE Std 802.3, also known as Ethernet. It includes the Structure of Management Information Version 2 (SMIv2) MIB module specifications formerly produced and published by the Internet Engineering Task Force (IETF), and the Guidelines for the Definition of Managed Objects (GDMO) MIB modules formerly specified within IEEE Std 802.3, as well as extensions resulting from recent amendments to IEEE Std 802.3. The SMIv2 MIB modules are intended for use with the Simple Network Management Protocol (SNMP), commonly used to manage Ethernet.

1.2 Purpose

The purpose of the standard is to publish the SMIv2 and GDMO MIB module specifications in a single document that is separate from IEEE Std 802.3, and that can be published in a machine-readable format. Future amendments and revisions to IEEE Std 802.3.1 will be performed to update the MIB specifications as required to track future amendments and revisions to IEEE Std 802.3.

1.3 Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of IETF RFC 3410.

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP).

Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This standard specifies MIB modules that are compliant to the SMIv2, which is described in IETF STD 58 (RFC 2578), IETF STD 58 (RFC 2579), and IETF STD 58 (RFC 2580).

1.4 Security considerations

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPSec), there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in a MIB module.

Implementers should consider the security features as provided by the SNMPv3 framework (see IETF RFC 3410, section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

SNMPv3 should be deployed, rather than previous versions of SNMP, and cryptographic security should be enabled. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

Throughout this standard, there are a number of accessible management objects that may be considered sensitive or vulnerable in some network environments. The support for some operations in a non-secure environment without proper protection can have a negative effect on network operations. Such management objects are detailed in the clauses that define them.

The user of these MIB modules should therefore be aware that support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

The readable objects in these MIB modules (i.e., those with MAX-ACCESS other than not-accessible) may be considered sensitive in some environments since, collectively, they provide information about the performance of network interfaces and can reveal some aspects of their configuration. In such environments it is important to control GET and NOTIFY access to these objects and possibly encrypt their values when sending them over the network via SNMP.

1.5 Conformance

Specific conformance statements and compliance statements, written in accordance with IETF STD 58, RFC 2580, are included in each MIB module. They can be found by searching for the text strings “Conformance statements” and “Compliance statements”.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

ANSI T1.231-1997, Layer 1 In-Service Digital Transmission Performance Monitoring.²

ANSI T1.424-2004, Interface Between Networks and Customer Installation—Very-high-bit-rate Digital Subscriber Lines (VDSL) Metallic Interface (DMT Based).

ETSI TS1 101 270-1, (1999) Transmission and Multiplexing (TM); Access transmission systems on metallic access cables; Very high speed Digital Subscriber Line (VDSL); Part 1: Functional requirements.³

IEEE Std 802[®], IEEE Standard for Local and Metropolitan Area Networks: Architecture and Overview.^{4, 5}

IEEE Std 802.1D[™], IEEE Standard for Local and metropolitan area networks Media Access Control (MAC) Bridges.

IEEE Std 802.1AB-2009 Station and Media Access Control Discovery.

IEEE Std 802.3, IEEE Standard for Information technology—Telecommunications and information exchange between 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.

IETF RFC 1213, *Management Information Base for Network Management of TCP/IP-based internets: MIB-II*, McCloghrie, K., and M. Rose, March 1991.⁶

IETF RFC 1516, *Definitions of Managed Objects for IEEE 802.3 Repeater Devices*, McMaster, D., and K. McCloghrie, September 1993.

IETF RFC 2119, *Keywords for use in RFCs to Indicate Requirement Levels*, Bradner, S., March 1997.

IETF RFC 2434, *Guidelines for Writing an IANA Considerations Section in RFCs*, Narten, T. and H. Alvestrand, October 1998.

IETF STD 58 (RFC 2578), *Structure of Management Information Version 2 (SMIv2)*, McCloghrie, K., Perkins, D., and J. Schoenwaelder, April 1999.

IETF STD 58 (RFC 2579), *Textual Conventions for SMIv2*, McCloghrie, K., Perkins, D., and J. Schoenwaelder, April 1999.

²ANSI publications are available from the Sales Department, American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, USA (<http://www.ansi.org>).

³ETSI standards are available from the European Telecommunications Standards Institute at 650, Route des Lucioles, 06921 Sophia-Antipolis Cedex, France (<http://www.etsi.org>).

⁴IEEE publications are available from the Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, Piscataway, NJ 08854, USA (<http://standards.ieee.org/>).

⁵The IEEE standards or products referred to in this clause are trademarks of the Institute of Electrical and Electronics Engineers, Inc.

⁶Internet Requests for Comments (RFCs) are available on the World Wide Web at the following ftp site: [venera.isi.edu](ftp://venera.isi.edu); logon: anonymous; password: user's e-mail address; directory: in-inotes.

IETF STD 58 (RFC 2580), *Conformance Statements for SMIPv2*, McCloghrie, K., Perkins, D., and J. Schoenwaelder, April 1999.

IETF RFC 2856, *Textual Conventions for Additional High Capacity Data Types*, Bierman, A., McCloghrie, K., and R. Presuhn, June 2000.

IETF RFC 2863, *The Interfaces Group MIB*, McCloghrie, K. and F. Kastenholz, June 2000.

IETF RFC 2864, *The Inverted Stack Table Extension to the Interfaces Group MIB*, McCloghrie, K. and G. Hanson, June 2000.

IETF RFC 3410, *Introduction and Applicability Statements for Internet Standard Management Framework*, Case, J., Mundy R., Partain, D. and B. Stewart, December 2002.

IETF RFC 3411, *An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks*, Harrington, D., Presuhn, R. and B. Wijnen, December 2002.

IETF RFC 3592, *Definitions of Managed Objects for the Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) Interface Type*, Tesink, K., September 2003.

ITU-T Recommendation G.983.1, 1998—Optical line systems for local and access networks—Broadband optical access systems based on Passive Optical Networks (PON).⁷

ITU-T Recommendation G.991.2, 2003—Single-pair High-speed Digital Subscriber Line (SHDSL) transceivers.

ITU-T Recommendation G.993.1, 2004—Very High speed Digital Subscriber Line transceivers.

⁷ITU-T publications are available from the International Telecommunications Union, Place des Nations, CH-1211, Geneva 20, Switzerland/Suisse (<http://www.itu.int/>).

3. Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary: Glossary of Terms & Definitions* [B6] should be consulted for terms not defined in this clause.⁸

3.1 agent: An entity, typically implemented in software, which provides remote access to management instrumentation, via the Simple Network Management Protocol (SNMP).

3.2 group: Within the context of the repeater management MIB module defined in Clause 7: A recommended, but optional, entity defined in IEEE Std 802.3, Clause 30, in order to support a modular numbering scheme. The classical example allows an implementor to represent field-replaceable units as groups of ports, with the port numbering matching the modular hardware implementation.

3.3 jack type: The jack connector type, as it appears on the outside of the system. The type of mechanical interface to the transmission medium.

3.4 Loss of Codegroup Delineation: See IEEE Std 802.3 50.3.5.3.

3.5 managed object: an abstract representation of network resources that are managed. A managed object is defined according to the *Structure of Management Information version 2* (SMIv2) defined in IETF STD 58, RFC 2578.

3.6 managed repeater: A repeater as defined by IEEE Std 802.3 incorporating a management entity that complies with the MIB module definition contained in Clause 7 of this document.

3.7 module: A building block in a modular system. In the context of the MIB definitions, a specification of management capabilities related to the system. In the context of a chassis, it typically maps into one ‘slot’; however, the range of configurations may be very large, with several modules entering one slot, or one module covering several slots.

3.8 non-trivial repeater: A repeater as defined by IEEE Std 802.3 having multiple ports.

3.9 Path Coding violations: In IEEE Std 802.3 the path layer coding violations count is based on block errors and not BIP-8 errors, i.e., it is incremented only once for each B3 byte that indicates incorrect parity, regardless of the number of bits in error. Note that Section 8.4.5.1 of ANSI T1.231-1997 allows either path BIP-8 errors or path block errors to be used for the path layer error count.

3.10 repeater system: A managed entity compliant with this standard, and incorporating at least one managed IEEE Std 802.3 repeater.

3.11 repeater-unit: The portion of a repeater that is inboard of its Physical Medium Attachment (PMA)/Physical Signaling Sublayer (PLS), or PMA/Physical Coding Sublayer (PCS).

3.12 Signal Label Mismatch: This defect is called Payload Label Mismatch (PLM) in IEEE Std 802.3. It is reported by setting both the sonetPathSignalLabelMismatch bit in the appropriate instance of sonetPathCurrentStatus (defined in IETF RFC 3592) and the etherWisPathPLM bit in the corresponding instance of etherWisPathCurrentStatus.

3.13 stack: A scalable system in which modularity is achieved by interconnecting a number of different systems.

⁸The numbers in brackets correspond to those of the bibliography in Annex A.

3.14 STS-Path Remote Defect Indication: IEEE Std 802.3 mandates the use of ERDI-P (Enhanced Remote Defect Indication-Path) defined in ANSI T1.231-1997 to signal remote server defects (triggered by path AIS or path LOP) and remote payload defects (triggered by Payload Label Mismatch or Loss of Code-group Delineation). IETF RFC 3592 defines the one-bit RDI-P (Remote Defect Indication-Path), which signals remote server detects (i.e., path AIS and path LOP) only. An implementation of the MIB module defined in Clause 12 sets the sonetPathSTSRDI bit in the appropriate instance of sonetPathCurrentStatus when it receives an ERDI-P server defect indication from the remote end. Both ERDI-P payload defects and ERDI-P server defects are reported in the object etherWisFarEndPathCurrentStatus.

3.15 system: An entity compliant with one or more MIB modules of this standard.

3.16 system interconnect segment: An internal segment allowing interconnection of ports belonging to different physical entities into the same logical managed repeater, bridge, or other system. Examples of implementation might be backplane busses in modular hubs, or chaining cables in stacks of bridges/switches. It is not uncommon for such segments to be a proprietary implementation.

3.17 trivial repeater-unit: An isolated port that can gather statistics.

4. Abbreviations

ACK	acknowledge
AIS	Alarm Indication Signal
ARP	address resolution protocol
ASCII	American Standard Code for Information Interchange
Atn	attenuation
BER	bit error ratio
BIP	bit interleaved parity
BW	bandwidth
CO	central office
CPE	customer premises equipment
CRC	cyclic redundancy check
DTE	data terminal equipment
EFM	Ethernet in the First Mile
EFMCu	EFM copper
ELTE	Ethernet line termination equipment
EPON	Ethernet passive optical network
ERDI-P	enhanced remote defect indication - path
FCS	frame check sequence
FEC	forward error correction
GDMO	Guidelines for Definition of Managed Objects
GMII	gigabit media independent interface
IANA	Internet Assigned Numbers Authority
IETF	Internet Engineering Task Force
IFG	inter-frame gap
ITU	International Telecommunication Union
LAN	local area network
LCD	Loss of Codegroup Deliniation
LLC	logical link control
LLDP	logical link discovery protocol
LLDPDU	logical link discovery protocol data unit
LLID	logical link identifier
LOP	Loss of Pointer
MAC	media access control
MAU	medium attachment unit
Mb/s	megabit per second
MDI	medium dependent interface
MDIO	management data input/output
MII	media independent interface
MP2PE	multipoint-to-point emulation
MPCP	multipoint control protocol
MPCPDU	multipoint control protocol data unit
MTU	maximum transmission unit
NMS	network management system
OAM	operations, administration and maintenance

OAMPDU	operations, administration, and maintenance protocol data unit
OID	object identifier
OLT	optical line terminal
OMP	optical multipoint
ONU	optical network unit
OSI	Open Systems Interconnection
P2MP	point-to-multipoint
P2PE	point-to-point emulation
PAF	PME aggregation function
PBO	power back-off
PCS	physical coding sublayer
PD	powered device
PDU	protocol data unit
PHY	Physical Layer entity
PLM	Payload Label Mismatch
PMA	physical medium attachment
PMD	physical medium dependent
PME	physical medium entity
PON	passive optical network
PSD	power spectral density
PSE	power sourcing equipment
RFC	Request for Comments
ROM	read-only-memory
RS	reconciliation sublayer
RTT	round-trip time
SDH	Synchronous Digital Hierarchy
SLA	service level agreement
SLD	start of LLID delimiter
SMIv2	structure of management information version 2
SNMP	simple network management protocol
SNR	signal to noise ratio
SONET	Synchronous Optical Network
TCPAM	trellis coded pulse amplitude modulation
TDM	time division multiplexing
TDMA	time division multiple access
TLV	type/length/value
TQ	time quanta
WAN	wide area network
WDM	wavelength division multiplexing
WIS	WAN interface sublayer

5. Ethernet logical link discovery protocol (LLDP) extension MIB module

The logical link discovery protocol (LLDP) is defined in IEEE Std 802.1AB-2009 Station and Media Access Control Discovery. Extensions to this protocol for Ethernet are defined in Clause 79 of IEEE Std 802.3.

5.1 Structure of the IEEE 802.3 LLDP extension MIB

Table 5–1 summarizes the particular object groups that are required for each operating mode. The implemented MIB shall comply with the MIB conformance section for the particular operating mode being supported.

Table 5–1—IEEE 802.3 LLDP extension MIB object group conformance requirements

MIB group	Rx mode	Tx mode	Tx/Rx mode
lldpV2Xdot3ConfigGroup	M ^a	M	M
lldpV2Xdot1LocSysGroup	M	—	M
lldpV2Xdot1RemSysGroup	—	M	M
ifGeneralInformationGroup	M	M	M

^aM = Mandatory

Table 5–2 shows the structure of the MIB and the relationship of the MIB objects to the LLDP operational status/control variables, LLDP statistics variables, and TLV variables.

5.2 Relationship to other MIBs

Version 1 of the IEEE 802.3 LLDP extension MIB module is deprecated.

Table 5–2—IEEE 802.3/LLDP extension MIB cross reference

MIB table	MIB object	LLDP reference
<i>Configuration group</i>		
lldpV2Xdot3PortConfigTable		Augments lldpV2PortConfigEntry
	lldpV2Xdot3PortConfigTLVsTxEnable	Normal LLDPDUs
<i>Local devices information group</i>		
lldpV2Xdot3LocPortTable		
	lldpV2LocPortIfIndex	(Table index)
	lldpV2Xdot3LocPortAutoNegSupported	Auto-Negotiation support/status
	lldpV2Xdot3LocPortAutoNegEnabled	Auto-Negotiation support/status
	lldpV2Xdot3LocPortAutoNegAdvertisedCap	Auto-Negotiation advertised
	lldpV2Xdot3LocPortOperMauType	Operational MAU type
lldpV2Xdot3LocPowerTable		
	lldpV2LocPortIfIndex	(Table index)
	lldpV2Xdot3LocPowerPortClass	MDI power support
	lldpV2Xdot3LocPowerMDISupported	MDI power support
	lldpV2Xdot3LocPowerMDIEnabled	MDI power support
	lldpV2Xdot3LocPowerPairControlable	MDI power support
	lldpV2Xdot3LocPowerPairs	PSE power pair
	lldpV2Xdot3LocPowerClass	Power class
lldpV2Xdot3LocMaxFrameSizeTable		
	lldpV2LocPortIfIndex	(Table index)
	lldpV2Xdot3LocMaxFrameSize	Maximum frame size
<i>Remote devices information group</i>		
lldpV2Xdot3RemPortTable		
	lldpV2RemTimeMark	(Table index)
	lldpV2RemLocalIfIndex	(Table index)
	lldpV2RemLocalDestMACAddress	(Table index)
	lldpV2RemIndex	(Table index)
	lldpV2Xdot3RemPortAutoNegSupported	Auto-Negotiation support/status
	lldpV2Xdot3RemPortAutoNegEnabled	Auto-Negotiation support/status
	lldpV2Xdot3RemPortAutoNegAdvertisedCap	Auto-Negotiation advertised
	lldpV2Xdot3RemPortOperMauType	Operational MAU type

Table 5–2—IEEE 802.3/LLDP extension MIB cross reference (continued)

MIB table	MIB object	LLDP reference
lldpV2Xdot3RemPowerTable		
	lldpV2RemTimeMark	(Table index)
	lldpV2RemLocalIfIndex	(Table index)
	lldpV2RemLocalDestMACAddress	(Table index)
	lldpV2RemIndex	(Table index)
	lldpV2Xdot3RemPowerPortClass	MDI power support
	lldpV2Xdot3RemPowerMDISupported	MDI power support
	lldpV2Xdot3RemPowerMDIEnabled	MDI power support
	lldpV2Xdot3RemPowerPairControlable	MDI power support
	lldpV2Xdot3RemPowerPairs	PSE power pair
	lldpV2Xdot3RemPowerClass	Power class
lldpV2Xdot3RemMaxFrameSizeTable		
	lldpV2RemTimeMark	(Table index)
	lldpV2RemLocalIfIndex	(Table index)
	lldpV2RemLocalDestMACAddress	(Table index)
	lldpV2RemIndex	(Table index)
	lldpV2Xdot3RemMaxFrameSize	Maximum frame size

5.3 Security considerations for IEEE 802.3 LLDP extension MIB module

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write.⁹ Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

Setting the object, `lldpV2Xdot3PortConfigTLVsTxEnable`, to incorrect values can result in improper operation of LLDP.

The following readable objects in this MIB module may be considered to be sensitive or vulnerable in some network environments:

a) Objects that are associated with the transmit mode are as follows:

- 1) `lldpV2Xdot3LocPortAutoNegSupported`
- 2) `lldpV2Xdot3LocPortAutoNegEnabled`
- 3) `lldpV2Xdot3LocPortAutoNegAdvertisedCap`
- 4) `lldpV2Xdot3LocPortOperMauType`
- 5) `lldpV2Xdot3LocPowerPortClass`
- 6) `lldpV2Xdot3LocPowerMDISupported`
- 7) `lldpV2Xdot3LocPowerMDIEnabled`
- 8) `lldpV2Xdot3LocPowerPairControlable`
- 9) `lldpV2Xdot3LocPowerPairs`
- 10) `lldpV2Xdot3LocPowerClass`
- 11) `lldpV2Xdot3LocMaxFrameSize`

b) Objects that are associated with the receive mode are as follows:

- 1) `lldpV2Xdot3RemPortAutoNegSupported`
- 2) `lldpV2Xdot3RemPortAutoNegEnabled`
- 3) `lldpV2Xdot3RemPortAutoNegAdvertisedCap`
- 4) `lldpV2Xdot3RemPortOperMauType`
- 5) `lldpV2Xdot3RemPowerPortClass`
- 6) `lldpV2Xdot3RemPowerMDISupported`
- 7) `lldpV2Xdot3RemPowerMDIEnabled`
- 8) `lldpV2Xdot3RemPowerPairControlable`
- 9) `lldpV2Xdot3RemPowerPairs`
- 10) `lldpV2Xdot3RemPowerClass`
- 11) `lldpV2Xdot3RemMaxFrameSize`

This concern applies both to objects that describe the configuration of the local host, as well as for objects that describe information from the remote hosts, acquired via LLDP and displayed by the objects in this MIB module. It is thus also important to control GET and/or NOTIFY access to these objects and possibly to encrypt the values of these objects when sending them over the network via SNMP.

⁹In IETF MIB definitions, the MAX-ACCESS clause defines the type of access that is allowed for particular data elements in the MIB. An explanation of the MAX-ACCESS mapping is given in section 7.3 of IETF STD 58, RFC 2578.

5.4 MIB module definition

In the following MIB definition, should any discrepancy between the DESCRIPTION text and the corresponding definition in 5.2 through 5.3 of this clause occur, the definitions in 5.2 through 5.3 shall take precedence.

An ASCII text version of the MIB definition can be found at the following URL:¹⁰

http://www.ieee802.org/3/be/public/mib_modules/20110202/802dot3dot1C5mib.txt

Two additional modules must be imported when compiling the IEEE 802.3 LLDP extension MIB module, and they can be found at the following URLs:

<http://www.ieee802.org/1/files/public/MIBs/LLDP-V2-MIB-200906080000Z.txt>

<http://www.ieee802.org/1/files/public/MIBs/LLDP-V2-TC-MIB-200906080000Z.txt>

¹⁰Copyright release for MIB modules: Users of this standard may freely reproduce the MIB module contained in this subclause so that it can be used for its intended purpose.


```

IEEE8023-DOT3-LLDP-EXT-V2-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
    Unsigned32,
    org
        FROM SNMPv2-SMI
    TruthValue
        FROM SNMPv2-TC
    MODULE-COMPLIANCE,
    OBJECT-GROUP
        FROM SNMPv2-CONF
    ifGeneralInformationGroup
        FROM IF-MIB
    lldpV2Extensions,
    lldpV2LocPortIfIndex,
    lldpV2RemTimeMark,
    lldpV2RemLocalIfIndex,
    lldpV2RemLocalDestMACAddress,
    lldpV2RemIndex,
    lldpV2PortConfigEntry
        FROM LLDP-V2-MIB
-- http://www.ieee802.org/1/files/public/MIBs/LLDP-V2-MIB-200906080000Z.txt
    LldpV2PowerPortClass
        FROM LLDP-V2-TC-MIB
-- http://www.ieee802.org/1/files/public/MIBs/LLDP-V2-TC-MIB-200906080000Z.txt
;

ieee8023lldpV2Xdot3MIB MODULE-IDENTITY
    LAST-UPDATED "201102020000Z" -- February 2, 2011
    ORGANIZATION "IEEE 802.3 Working Group"
    CONTACT-INFO
        "WG-URL: http://www.ieee802.org/3/index.html
        WG-EMail: STDS-802-3-MIB@LISTSERV.IEEE.ORG

        Contact: Howard Frazier
        Postal: 3151 Zanker Road
              San Jose, CA 95134
              USA
        Tel: +1.408.922.8164
        E-mail: hfrazier@broadcom.com"
    DESCRIPTION
        "The LLDP Management Information Base extension module for
        IEEE 802.3 organizationally defined discovery information.

        In order to assure the uniqueness of the LLDP-MIB,
        ieee8023lldpV2Xdot3MIB is branched from lldpV2Extensions using
        OUI value as the node. An OUI/'company_id' is a 24-bit
        globally unique assigned number referenced by various standards."

    REVISION "201102020000Z" -- February 2, 2011

    DESCRIPTION
        "This revision incorporated changes to the MIB to
        support the use of LLDP with multiple destination MAC
        addresses, and to deprecate the Link Aggregation TLV
        (now moved to the 802.1 extension MIB)."
```

```

 ::= { org ieee(111)
       standards-association-numbers-series-standards(2)
       lan-man-stds(802)ieee802dot3(3) ieee802dot3dot1mibs(1) 5 }

-----
--
-- Organizational Defined Information Extension - IEEE 802.3
--
-----

lldpV2Xdot3Objects    OBJECT IDENTIFIER ::= { ieee8023lldpV2Xdot3MIB 1 }

-- LLDP IEEE 802.3 extension MIB groups
lldpV2Xdot3Config     OBJECT IDENTIFIER ::= { lldpV2Xdot3Objects 1 }
lldpV2Xdot3LocalData  OBJECT IDENTIFIER ::= { lldpV2Xdot3Objects 2 }
lldpV2Xdot3RemoteData OBJECT IDENTIFIER ::= { lldpV2Xdot3Objects 3 }

-----

-- IEEE 802.3 - Configuration
-----

--
-- Version 2 of lldpV2Xdot3PortConfigTable
-- supports use of multiple destination MAC addresses
--

lldpV2Xdot3PortConfigTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF LldpV2Xdot3PortConfigEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "A table that controls selection of LLDP TLVs to be transmitted
         on individual ports."
    ::= { lldpV2Xdot3Config 1 }

lldpV2Xdot3PortConfigEntry OBJECT-TYPE
    SYNTAX      LldpV2Xdot3PortConfigEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "LLDP configuration information that controls the
         transmission of IEEE 802.3 organizationally defined TLVs on
         LLDP transmission capable ports.

        This configuration object augments the lldpV2PortConfigEntry of
        the LLDP-MIB, therefore it is only present along with the port
        configuration defined by the associated lldpV2PortConfigEntry
        entry.

        Each active lldpV2Xdot3PortConfigEntry is restored from non-volatile
        storage (along with the corresponding lldpV2PortConfigEntry)
        after a re-initialization of the management system."

```

```

AUGMENTS { lldpV2PortConfigEntry }
 ::= { lldpV2Xdot3PortConfigTable 1 }

LldpV2Xdot3PortConfigEntry ::= SEQUENCE {
    lldpV2Xdot3PortConfigTLVsTxEnable  BITS
}

lldpV2Xdot3PortConfigTLVsTxEnable  OBJECT-TYPE
    SYNTAX      BITS {
        macPhyConfigStatus(0),
        powerViaMDI(1),
        unused(2), --avoids re-use of the old link agg bit number
        maxFrameSize(3)
    }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The lldpV2Xdot3PortConfigTLVsTxEnable, defined as a bitmap,
        includes the IEEE 802.3 organizationally defined set of LLDP
        TLVs whose transmission is allowed by the local LLDP agent by
        the network management. Each bit in the bitmap corresponds
        to an IEEE 802.3 subtype associated with a specific IEEE
        802.3 optional TLV. The bit 0 is not used since there is
        no corresponding subtype.

        The bit 'macPhyConfigStatus(0)' indicates that the LLDP agent
        should transmit 'MAC/PHY configuration/status TLV'.

        The bit 'powerViaMDI(1)' indicates that the LLDP agent should
        transmit 'Power via MDI TLV'.

        The bit 'unused(2)' is no longer used; this was used for
        the 'Link Aggregation TLV' in the previous version.

        The bit 'maxFrameSize(3)' indicates that the LLDP agent should
        transmit 'Maximum-frame-size TLV'.

        The default value for lldpV2Xdot3PortConfigTLVsTxEnable object
        is an empty set, which means no enumerated values are set.

        The value of this object is restored from non-volatile
        storage after a re-initialization of the management system."
    REFERENCE
        "IEEE Std 802.3 30.12.1.1.1"
    DEFVAL { { } }
    ::= { lldpV2Xdot3PortConfigEntry 1 }

```

```

-----
-- IEEE 802.3 - Local Device Information
-----

```

```

---
--- lldpV2Xdot3LocPortTable: Ethernet Port AutoNeg/Speed/Duplex
---                               Information Table
--- V2 modified to be indexed by ifIndex.
---

```

lldpV2Xdot3LocPortTable OBJECT-TYPE

SYNTAX SEQUENCE OF LldpV2Xdot3LocPortEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table contains one row per port of Ethernet port
 information (as a part of the LLDP 802.3 organizational
 extension) on the local system known to this agent."
 ::= { lldpV2Xdot3LocalData 1 }

lldpV2Xdot3LocPortEntry OBJECT-TYPE

SYNTAX LldpV2Xdot3LocPortEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "Information about a particular port component."
 INDEX { lldpV2LocPortIfIndex }
 ::= { lldpV2Xdot3LocPortTable 1 }

LldpV2Xdot3LocPortEntry ::= SEQUENCE {
 lldpV2Xdot3LocPortAutoNegSupported TruthValue,
 lldpV2Xdot3LocPortAutoNegEnabled TruthValue,
 lldpV2Xdot3LocPortAutoNegAdvertisedCap OCTET STRING,
 lldpV2Xdot3LocPortOperMauType Unsigned32
 }

lldpV2Xdot3LocPortAutoNegSupported OBJECT-TYPE

SYNTAX TruthValue
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The truth value used to indicate whether the given port
 (associated with the local system) supports Auto-negotiation."
 REFERENCE
 "IEEE Std 802.3 30.12.2.1.1"
 ::= { lldpV2Xdot3LocPortEntry 1 }

lldpV2Xdot3LocPortAutoNegEnabled OBJECT-TYPE

SYNTAX TruthValue
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The truth value used to indicate whether port
 Auto-negotiation is enabled on the given port associated
 with the local system."
 REFERENCE
 "IEEE Std 802.3 30.12.2.1.2"
 ::= { lldpV2Xdot3LocPortEntry 2 }

lldpV2Xdot3LocPortAutoNegAdvertisedCap OBJECT-TYPE

SYNTAX OCTET STRING(SIZE(2))
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "This object contains the value (bitmap) of the
 ifMauAutoNegCapAdvertisedBits object (defined in IETF RFC
 3636) which is associated with the given port on the
 local system."
 REFERENCE

```

        "IEEE Std 802.3 30.12.2.1.3"
 ::= { lldpV2Xdot3LocPortEntry 3 }

lldpV2Xdot3LocPortOperMauType OBJECT-TYPE
    SYNTAX      Unsigned32(0..2147483647)
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "An integer value that indicates the operational MAU type
        of the given port on the local system.

        This object contains the integer value derived from the
        list position of the corresponding dot3MauType as listed
        in Clause 13 and is equal to the last number in the
        respective dot3MauType OID.

        For example, if the ifMauType object is dot3MauType1000BaseTHD
        which corresponds to {dot3MauType 29}, the numerical value of
        this field is 29. For MAU types not listed in Clause 13,
        the value of this field shall be set to zero."
    REFERENCE
        "IEEE Std 802.3 30.12.2.1.4"
 ::= { lldpV2Xdot3LocPortEntry 4 }

---
---
--- lldpV2Xdot3LocPowerTable: Power Ethernet Information Table
--- V2 modified to be indexed by ifIndex.
---
---

lldpV2Xdot3LocPowerTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF LldpV2Xdot3LocPowerEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "This table contains one row per port of power ethernet
        information (as a part of the LLDP 802.3 organizational
        extension) on the local system known to this agent."
 ::= { lldpV2Xdot3LocalData 2 }

lldpV2Xdot3LocPowerEntry OBJECT-TYPE
    SYNTAX      LldpV2Xdot3LocPowerEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Information about a particular port component."
    INDEX       { lldpV2LocPortIfIndex }
 ::= { lldpV2Xdot3LocPowerTable 1 }

LldpV2Xdot3LocPowerEntry ::= SEQUENCE {
    lldpV2Xdot3LocPowerPortClass      LldpV2PowerPortClass,
    lldpV2Xdot3LocPowerMDISupported   TruthValue,
    lldpV2Xdot3LocPowerMDIEnabled     TruthValue,
    lldpV2Xdot3LocPowerPairControlable TruthValue,
    lldpV2Xdot3LocPowerPairs          Unsigned32,
    lldpV2Xdot3LocPowerClass          Unsigned32

```

```
}
```

```
lldpV2Xdot3LocPowerPortClass OBJECT-TYPE
```

```
SYNTAX      LldpV2PowerPortClass
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The value that identifies the port Class of the given port
    associated with the local system."
```

```
REFERENCE
```

```
    "IEEE Std 802.3 30.12.2.1.5"
```

```
::= { lldpV2Xdot3LocPowerEntry 1 }
```

```
lldpV2Xdot3LocPowerMDISupported OBJECT-TYPE
```

```
SYNTAX      TruthValue
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The truth value used to indicate whether the MDI power is
    supported on the given port associated with the local system."
```

```
REFERENCE
```

```
    "IEEE Std 802.3 30.12.2.1.6"
```

```
::= { lldpV2Xdot3LocPowerEntry 2 }
```

```
lldpV2Xdot3LocPowerMDIEnabled OBJECT-TYPE
```

```
SYNTAX      TruthValue
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The truth value used to identify whether MDI power is
    enabled on the given port associated with the local system."
```

```
REFERENCE
```

```
    "IEEE Std 802.3 30.12.2.1.7"
```

```
::= { lldpV2Xdot3LocPowerEntry 3 }
```

```
lldpV2Xdot3LocPowerPairControlable OBJECT-TYPE
```

```
SYNTAX      TruthValue
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The truth value is derived from the value of
    pethPsePortPowerPairsControlAbility object (defined in IETF
    RFC 3621) and is used to indicate whether the pair selection
    can be controlled on the given port associated with the
    local system."
```

```
REFERENCE
```

```
    "IEEE Std 802.3 30.12.2.1.8"
```

```
::= { lldpV2Xdot3LocPowerEntry 4 }
```

```
lldpV2Xdot3LocPowerPairs OBJECT-TYPE
```

```
SYNTAX      Unsigned32(1|2)
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "This object contains the value of the pethPsePortPowerPairs
    object (defined in IETF RFC 3621) which is associated with
    the given port on the local system."
```

```
REFERENCE
```

```

        "IEEE Std 802.3 30.12.2.1.9"
 ::= { lldpV2Xdot3LocPowerEntry 5 }

lldpV2Xdot3LocPowerClass OBJECT-TYPE
    SYNTAX      Unsigned32(1|2|3|4|5)
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "This object contains the value of the
        pethPsePortPowerClassifications object (defined in IETF
        RFC 3621) which is associated with the given port on the
        local system."
    REFERENCE
        "IEEE Std 802.3 30.12.2.1.10"
 ::= { lldpV2Xdot3LocPowerEntry 6 }

---
---
--- lldpV2Xdot3LocMaxFrameSizeTable: Maximum Frame Size information
--- V2 modified to be indexed by ifIndex.
---
---
lldpV2Xdot3LocMaxFrameSizeTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF LldpV2Xdot3LocMaxFrameSizeEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "This table contains one row per port of maximum frame
        size information (as a part of the LLDP 802.3 organizational
        extension) on the local system known to this agent."
 ::= { lldpV2Xdot3LocalData 3 }

lldpV2Xdot3LocMaxFrameSizeEntry OBJECT-TYPE
    SYNTAX      LldpV2Xdot3LocMaxFrameSizeEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Maximum Frame Size information about a particular port
        component."
    INDEX       { lldpV2LocPortIfIndex }
 ::= { lldpV2Xdot3LocMaxFrameSizeTable 1 }

LldpV2Xdot3LocMaxFrameSizeEntry ::= SEQUENCE {
    lldpV2Xdot3LocMaxFrameSize      Unsigned32
}

lldpV2Xdot3LocMaxFrameSize OBJECT-TYPE
    SYNTAX      Unsigned32(0..65535)
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "An integer value indicating the maximum supported frame
        size in octets on the given port of the local system."
    REFERENCE
        "IEEE Std 802.3 30.12.2.1.13"
 ::= { lldpV2Xdot3LocMaxFrameSizeEntry 1 }

```

```
-----
-- IEEE 802.3 - Remote Devices Information
-----
```

```
---
---
--- lldpV2Xdot3RemPortTable: Ethernet Information Table
--- V2 modified to be indexed by ifIndex and destination MAC address.
---
---
```

```
lldpV2Xdot3RemPortTable OBJECT-TYPE
```

```
SYNTAX      SEQUENCE OF LldpV2Xdot3RemPortEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "This table contains Ethernet port information (as a part
    of the LLDP 802.3 organizational extension) of the remote
    system."
```

```
::= { lldpV2Xdot3RemoteData 1 }
```

```
lldpV2Xdot3RemPortEntry OBJECT-TYPE
```

```
SYNTAX      LldpV2Xdot3RemPortEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "Information about a particular physical network connection."
```

```
INDEX       { lldpV2RemTimeMark,
               lldpV2RemLocalIfIndex,
               lldpV2RemLocalDestMACAddress,
               lldpV2RemIndex }
```

```
::= { lldpV2Xdot3RemPortTable 1 }
```

```
LldpV2Xdot3RemPortEntry ::= SEQUENCE {
```

```
    lldpV2Xdot3RemPortAutoNegSupported      TruthValue,
```

```
    lldpV2Xdot3RemPortAutoNegEnabled        TruthValue,
```

```
    lldpV2Xdot3RemPortAutoNegAdvertisedCap OCTET STRING,
```

```
    lldpV2Xdot3RemPortOperMauType           Unsigned32
```

```
}
```

```
lldpV2Xdot3RemPortAutoNegSupported OBJECT-TYPE
```

```
SYNTAX      TruthValue
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The truth value used to indicate whether the given port
    (associated with remote system) supports Auto-negotiation."
```

```
REFERENCE
```

```
    "IEEE Std 802.3 30.12.3.1.1"
```

```
::= { lldpV2Xdot3RemPortEntry 1 }
```

```
lldpV2Xdot3RemPortAutoNegEnabled OBJECT-TYPE
```

```
SYNTAX      TruthValue
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

"The truth value used to indicate whether port Auto-negotiation is enabled on the given port associated with the remote system."

REFERENCE

"IEEE Std 802.3 30.12.3.1.2"

::= { lldpV2Xdot3RemPortEntry 2 }

lldpV2Xdot3RemPortAutoNegAdvertisedCap OBJECT-TYPE

SYNTAX OCTET STRING(SIZE(2))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object contains the value (bitmap) of the ifMauAutoNegCapAdvertisedBits object (defined in IETF RFC 3636) which is associated with the given port on the remote system."

REFERENCE

"IEEE Std 802.3 30.12.3.1.3"

::= { lldpV2Xdot3RemPortEntry 3 }

lldpV2Xdot3RemPortOperMauType OBJECT-TYPE

SYNTAX Unsigned32(0..2147483647)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"An integer value that indicates the operational MAU type of the sending device."

This object contains the integer value derived from the list position of the corresponding dot3MauType as listed in Clause 13 and is equal to the last number in the respective dot3MauType OID.

For example, if the ifMauType object is dot3MauType1000BaseTHD which corresponds to {dot3MauType 29}, the numerical value of this field is 29. For MAU types not listed in Clause 13, the value of this field shall be set to zero."

REFERENCE

"IEEE Std 802.3 30.12.3.1.4"

::= { lldpV2Xdot3RemPortEntry 4 }

--- lldpV2Xdot3RemPowerTable: Power Ethernet Information Table

--- V2 modified to be indexed by ifIndex and destination MAC address.

lldpV2Xdot3RemPowerTable OBJECT-TYPE

SYNTAX SEQUENCE OF LldpV2Xdot3RemPowerEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains Ethernet power information (as a part of the LLDP 802.3 organizational extension) of the remote system."

::= { lldpV2Xdot3RemoteData 2 }

lldpV2Xdot3RemPowerEntry OBJECT-TYPE

SYNTAX LldpV2Xdot3RemPowerEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Information about a particular physical network connection."

INDEX { lldpV2RemTimeMark,
 lldpV2RemLocalIfIndex,
 lldpV2RemLocalDestMACAddress,
 lldpV2RemIndex }

::= { lldpV2Xdot3RemPowerTable 1 }

LldpV2Xdot3RemPowerEntry ::= SEQUENCE {

lldpV2Xdot3RemPowerPortClass

LldpV2PowerPortClass,

lldpV2Xdot3RemPowerMDISupported

TruthValue,

lldpV2Xdot3RemPowerMDIEnabled

TruthValue,

lldpV2Xdot3RemPowerPairControlable

TruthValue,

lldpV2Xdot3RemPowerPairs

Unsigned32,

lldpV2Xdot3RemPowerClass

Unsigned32

}

lldpV2Xdot3RemPowerPortClass OBJECT-TYPE

SYNTAX LldpV2PowerPortClass

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value that identifies the port Class of the given port
 associated with the remote system."

REFERENCE

"IEEE Std 802.3 30.12.3.1.5"

::= { lldpV2Xdot3RemPowerEntry 1 }

lldpV2Xdot3RemPowerMDISupported OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The truth value used to indicate whether the MDI power
 is supported on the given port associated with the remote
 system."

REFERENCE

"IEEE Std 802.3 30.12.3.1.6"

::= { lldpV2Xdot3RemPowerEntry 2 }

lldpV2Xdot3RemPowerMDIEnabled OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The truth value used to identify whether MDI power is
 enabled on the given port associated with the remote system."

REFERENCE

"IEEE Std 802.3 30.12.3.1.7"

::= { lldpV2Xdot3RemPowerEntry 3 }

lldpV2Xdot3RemPowerPairControlable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

```

STATUS      current
DESCRIPTION
    "The truth value is derived from the value of
    pethPsePortPowerPairsControlAbility object (defined in IETF
    RFC 3621) and is used to indicate whether the pair selection
    can be controlled on the given port associated with the
    remote system."
REFERENCE
    "IEEE Std 802.3 30.12.3.1.8"
 ::= { lldpV2Xdot3RemPowerEntry 4 }

lldpV2Xdot3RemPowerPairs OBJECT-TYPE
SYNTAX      Unsigned32(1|2)
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "This object contains the value of the pethPsePortPowerPairs
    object (defined in IETF RFC 3621) which is associated with
    the given port on the remote system."
REFERENCE
    "IEEE Std 802.3 30.12.3.1.9"
 ::= { lldpV2Xdot3RemPowerEntry 5 }

lldpV2Xdot3RemPowerClass OBJECT-TYPE
SYNTAX      Unsigned32(1|2|3|4|5)
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "This object contains the value of the
    pethPsePortPowerClassifications object (defined in IETF
    RFC 3621) which is associated with the given port on the
    remote system."
REFERENCE
    "IEEE Std 802.3 30.12.3.1.10"
 ::= { lldpV2Xdot3RemPowerEntry 6 }

---
--- lldpV2Xdot3RemMaxFrameSizeTable: Maximum Frame Size information
--- V2 modified to be indexed by ifIndex and destination MAC address.
---

lldpV2Xdot3RemMaxFrameSizeTable OBJECT-TYPE
SYNTAX      SEQUENCE OF LldpV2Xdot3RemMaxFrameSizeEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "This table contains one row per port/destination
    address pair of maximum frame
    size information (as a part of the LLDP IEEE 802.3
    organizational extension) of the remote system."
 ::= { lldpV2Xdot3RemoteData 3 }

lldpV2Xdot3RemMaxFrameSizeEntry OBJECT-TYPE
SYNTAX      LldpV2Xdot3RemMaxFrameSizeEntry
MAX-ACCESS  not-accessible
STATUS      current

```

```

DESCRIPTION
    "Maximum Frame Size information about a particular port
    component."
INDEX    { lldpV2RemTimeMark,
            lldpV2RemLocalIfIndex,
            lldpV2RemLocalDestMACAddress,
            lldpV2RemIndex }
 ::= { lldpV2Xdot3RemMaxFrameSizeTable 1 }

lldpV2Xdot3RemMaxFrameSizeEntry ::= SEQUENCE {
    lldpV2Xdot3RemMaxFrameSize    Unsigned32
}

lldpV2Xdot3RemMaxFrameSize OBJECT-TYPE
    SYNTAX      Unsigned32(0..65535)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "An integer value indicating the maximum supported frame
        size in octets on the port component associated with the
        remote system."
    REFERENCE
        "IEEE Std 802.3 30.12.3.1.13"
    ::= { lldpV2Xdot3RemMaxFrameSizeEntry 1 }

```

```

-----
-- Conformance statements
-----

```

```

lldpV2Xdot3Conformance OBJECT IDENTIFIER ::= { ieee8023lldpV2Xdot3MIB 2 }
lldpV2Xdot3Compliances OBJECT IDENTIFIER ::= { lldpV2Xdot3Conformance 1 }
lldpV2Xdot3Groups      OBJECT IDENTIFIER ::= { lldpV2Xdot3Conformance 2 }

```

```

-- Compliance statements

```

```

lldpV2Xdot3TxRxCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "A compliance statement for SNMP entities that implement
        the LLDP 802.3 organizational extension MIB.

        This group is mandatory for all agents that implement the
        LLDP 802.3 organizational extension in TX and/or RX mode.

        This version defines compliance requirements for
        V2 of the LLDP MIB."
    MODULE -- this module
        MANDATORY-GROUPS { lldpV2Xdot3ConfigGroup,
                            ifGeneralInformationGroup
        }
    ::= { lldpV2Xdot3Compliances 1 }

lldpV2Xdot3TxCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "The compliance statement for SNMP entities which implement
        the LLDP 802.3 organizational extension MIB.

```

This group is mandatory for agents which implement the LLDP 802.3 organizational extension in the TX mode.

This version defines compliance requirements for V2 of the LLDP MIB."

```
MODULE -- this module
    MANDATORY-GROUPS { lldpV2Xdot3LocSysGroup }
    ::= { lldpV2Xdot3Compliances 2 }
```

```
lldpV2Xdot3RxCompliance MODULE-COMPLIANCE
```

```
STATUS current
```

```
DESCRIPTION
```

"The compliance statement for SNMP entities which implement the LLDP 802.3 organizational extension MIB.

This group is mandatory for agents which implement the LLDP 802.3 organizational extension in the RX mode.

This version defines compliance requirements for V2 of the LLDP MIB."

```
MODULE -- this module
    MANDATORY-GROUPS { lldpV2Xdot3RemSysGroup }
    ::= { lldpV2Xdot3Compliances 3 }
```

```
-- MIB groupings
```

```
lldpV2Xdot3ConfigGroup OBJECT-GROUP
```

```
OBJECTS {
    lldpV2Xdot3PortConfigTLVsTxEnable
}
```

```
STATUS current
```

```
DESCRIPTION
```

"The collection of objects which are used to configure the LLDP 802.3 organizational extension implementation behavior. "

```
::= { lldpV2Xdot3Groups 1 }
```

```
lldpV2Xdot3LocSysGroup OBJECT-GROUP
```

```
OBJECTS {
    lldpV2Xdot3LocPortAutoNegSupported,
    lldpV2Xdot3LocPortAutoNegEnabled,
    lldpV2Xdot3LocPortAutoNegAdvertisedCap,
    lldpV2Xdot3LocPortOperMauType,
    lldpV2Xdot3LocPowerPortClass,
    lldpV2Xdot3LocPowerMDISupported,
    lldpV2Xdot3LocPowerMDIEnabled,
    lldpV2Xdot3LocPowerPairControlable,
    lldpV2Xdot3LocPowerPairs,
    lldpV2Xdot3LocPowerClass,
    lldpV2Xdot3LocMaxFrameSize
}
```

```
STATUS current
```

```
DESCRIPTION
```

"The collection of objects which are used to represent LLDP 802.3 organizational extension Local Device Information."

```
::= { lldpV2Xdot3Groups 2 }
```

```
lldpV2Xdot3RemSysGroup OBJECT-GROUP
```

```
OBJECTS {
    lldpV2Xdot3RemPortAutoNegSupported,
    lldpV2Xdot3RemPortAutoNegEnabled,
    lldpV2Xdot3RemPortAutoNegAdvertisedCap,
    lldpV2Xdot3RemPortOperMauType,
    lldpV2Xdot3RemPowerPortClass,
    lldpV2Xdot3RemPowerMDISupported,
    lldpV2Xdot3RemPowerMDIEnabled,
    lldpV2Xdot3RemPowerPairControlable,
    lldpV2Xdot3RemPowerPairs,
    lldpV2Xdot3RemPowerClass,
    lldpV2Xdot3RemMaxFrameSize
}
STATUS current
DESCRIPTION
    "The collection of objects which are used to represent LLDP
    802.3 organizational extension Local Device Information."
::= { lldpV2Xdot3Groups 3 }

END
```

6. Ethernet operations, administration, and maintenance (OAM) MIB module

6.1 Introduction

The IEEE 802.3ah Ethernet in the First Mile (EFM) Task Force added management capabilities to Ethernet-like interfaces to provide some basic operations, administration and maintenance (OAM) functions. The defined functionality includes discovery, error signaling, loopback, and link monitoring.

This clause defines a MIB module for use with SNMP to manage these Ethernet-like interface capabilities.

6.2 Overview

Ethernet OAM is composed of a core set of functions and a set of optional functional groups as described in IEEE Std 802.3 Clause 57. The core functions include discovery operations (determining if the other end of the link is OAM capable and what OAM functions it supports), state machine implementation, and some critical event flows. The optional functional groups are for (a) link events, (b) remote loopback, and (c) variable retrieval and response. Each optional functional group is controlled by a separate MIB table(s).

Ethernet OAM is complementary with SNMP management in that it provides some basic management functions at layer 2, rather than using layer 3 and above as required by SNMP over an IP infrastructure. Ethernet OAM provides single-hop functionality in that it works only between two directly-connected Ethernet stations. SNMP can be used to manage the Ethernet OAM interactions of one Ethernet station with another.

Ethernet OAM has three functional objectives, which are detailed in the next three subclauses. The definition of a basic Ethernet OAM protocol data unit is given in 6.2.4.

6.2.1 Remote fault indication

Remote fault indication provides a mechanism for one end of an Ethernet link to signal the other end that the receive path is non-operational. Some Ethernet physical layers offer mechanisms to signal this condition at the physical layer. Ethernet OAM added a mechanism so that some Ethernet physical layers can operate in unidirectional mode, allowing frames to be transmitted in one direction even when the other direction is non-operational. Traditionally, Ethernet PHYs do not allow frame transmission in one direction if the other direction is not operational. Using this mode, Ethernet OAM allows frame-based signaling of remote fault conditions while still not allowing higher-layer applications to be aware of the unidirectional capability. This clause includes mechanisms for capturing that fault information and reflecting such information in objects and notifications within the SNMP management framework.

6.2.2 Link monitoring

Ethernet OAM includes event signaling capability so that one end of an Ethernet link can indicate the occurrence of certain important events to the other end of the link. This happens via layer 2 protocols. This clause defines methods for incorporating the occurrence of these layer 2 events, both at the local end and far end of the link, into the SNMP management framework.

Ethernet OAM also includes mechanisms for one Ethernet station to query another directly connected Ethernet station about the status of its Ethernet interface variables and status. This clause does not include mechanisms for controlling how one Ethernet endpoint may use this functionality to query the status or statistics of a peer Ethernet entity.

6.2.3 Remote loopback

Remote loopback is a link state where the peer Ethernet entity echoes every received packet (without modifications) back onto the link. Remote loopback is intrusive in that the other end of the link is not forwarding traffic from higher layers out over the link. This clause defines objects controlling loopback operation and reading the status of the loopback state.

6.2.4 Ethernet OAM protocol data units

An Ethernet OAM protocol data unit is a valid Ethernet frame with a destination Media Access Control (MAC) address equal to the reserved MAC address for Slow Protocols (see Annex 57A of IEEE Std 802.3), a lengthOrType field equal to the reserved type for Slow Protocols, and a Slow Protocols subtype equal to that of the subtype reserved for Ethernet OAM.

OAMPDU is used throughout this clause as an abbreviation for Ethernet OAM protocol data unit. OAMPDUs are the mechanism by which two directly connected Ethernet interfaces exchange OAM information.

6.3 Relation to other MIB modules

The definitions presented here are based on Clause 30 and Clause 57 of IEEE Std 802.3. Note that these clauses describe many of these variables and their effects on the MAC sublayer. In some cases, there is a one-to-one relationship between an object in this clause and an object in the Clause 30 MIB. In other cases, the objects of this clause reflect a more complex entity and are reflected by more than one object in the Clause 30 MIB.

The objects defined in this clause manage OAM functionality introduced as part of the 802.3ah project. These objects do not overlap with the Interfaces Group MIB module defined in IETF RFC 2863, the Ethernet-like interface MIB module defined in Clause 10, or any other MIB module currently used to manage various aspects of an Ethernet interface. The objects defined here are defined for Ethernet-like interfaces only and use the same ifIndex as the associated Ethernet interface. Ethernet OAM can be implemented on any Ethernet-like interface.

6.3.1 Relation to other EFM MIB modules

The Ethernet OAM functionality and MIB module is independent of the other functionality and MIB modules derived from IEEE Std 802.3 for copper and EPON. Ethernet OAM may be implemented (or not) on the new EFM interface types, just as it can on any other Ethernet interface.

6.3.2 Mapping of IEEE 802.3 managed objects

Table 6–1 contains the mapping between managed objects defined in IEEE Std 802.3 Clause 30, and managed objects defined in this clause.

All IEEE 802.3 OAM managed objects are reflected in this MIB module.

Table 6–1—Mapping between IEEE 802.3 managed objects and SNMP objects

IEEE 802.3 managed object	Corresponding SNMP object
oOAM	
.aOAMID	IF-MIB ifIndex
.aOAMAdminState	dot3OamAdminState
.aOAMMode	dot3OamMode
.aOAMDiscoveryState	dot3OamOperStatus
.aOAMRemoteMACAddress	dot3OamPeerMacAddress
.aOAMLocalConfiguration	dot3OamFunctionsSupported
.aOAMRemoteConfiguration	dot3OamPeerFunctionsSupported, dot3OamPeerMode
.aOAMLocalPDUConfiguration	dot3OamMaxOamPduSize
.aOAMRemotePDUConfiguration	dot3OamPeerMaxOamPduSize
.aOAMLocalFlagsField	dot3OamOperStatus, dot3OamEventLogEntry
.aOAMRemoteFlagsField	dot3OamOperStatus, dot3OamEventLogEntry
.aOAMLocalRevision	dot3OamConfigRevision
.aOAMRemoteRevision	dot3OamPeerConfigRevision
.aOAMLocalState	dot3OamLoopbackStatus
.aOAMRemoteState	dot3OamLoopbackStatus
.aOAMRemoteVendorOUI	dot3OamPeerVendorOui
.aOAMRemoteVendorSpecificInfo	dot3OamPeerVendorInfo
.aOAMUnsupportedCodesTx	dot3OamUnsupportedCodesTx
.aOAMUnsupportedCodesRx	dot3OamUnsupportedCodesRx
.aOAMInformationTx	dot3OamInformationTx
.aOAMInformationRx	dot3OamInformationRx
.aOAMUniqueEventNotificationTx	dot3OamUniqueEventNotificationTx
.aOAMUniqueEventNotificationRx	dot3OamUniqueEventNotificationRx
.aOAMDuplicateEventNotificationTx	dot3OamDuplicateEventNotificationTx
.aOAMDuplicateEventNotificationRx	dot3OamDuplicateEventNotificationRx
.aOAMLoopbackControlTx	dot3OamLoopbackControlTx