INTERNATIONAL STANDARD

ISO/IEC/IEEE 8802-3-1

First edition
2015-08-01

Standard for Management Information Base (MIB) — Definitions for Ethernet — Part 3-1

Norme pour la base d'informations de gestion (MIB) — Définitions pour l'Éthernet — Partie 3-1

Reference number
ISO/IEC/IEEE 8802-3-1:2015(E)

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Published in Switzerland

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

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3 Park Avenue
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USA

IEEE Std 802.3.1™-2013
(Revision of
IEEE Std 802.3.1-2011)

IEEE Std 802.3.1™-2013
(Revision of
IEEE Std 802.3.1-2011)

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

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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 (SMIv2) MIB module specifications formerly produced and published by the Internet Engineering Task Force (IETF), as well as extensions resulting from 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.

Keywords: Ethernet, IEEE 802.3.1™, Management Information Base (MIB), network management, Simple Network Management Protocol (SNMP), Structure of Management Information Version 2 (SMIv2)

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PDF: ISBN 978-0-7381-8432-6 STD98241
Print: ISBN 978-0-7381-8433-3 STDPD98241

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Acknowledgments

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

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Introduction

This introduction is not part of IEEE Std 802.3.1-2013, 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of this standard was based on the managed object definitions provided in IEEE Std 802.3™-2008, which subsumed and superseded IEEE Std 802.3an™-2006, IEEE Std 802.3ap™-2007, IEEE Std 802.3aq™-2006, and IEEE Std 802.3as™-2006.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 Annex F of IEEE Std 802.1AB™-2009.[b] In addition, the initial version of this standard incorporated and updated the MIB module definitions formerly defined in IETF RFC 2108 [B20],[c] IETF RFC 3621 [B27], IETF RFC 3635 [B29], IETF RFC 3637 [B30], IETF RFC 4836 [B35], IETF RFC 4837 [B36], IETF RFC 4878 [B37], and IETF RFC 5066 [B38].

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

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1. Overview

This document supersedes and makes obsolete Annex 30A and Annex 30B of IEEE Std 802.3™-2008, Annex F of IEEE Std 802.1AB™-2009,[1] IETF RFC 2108 [B20],[2] IETF RFC 3621 [B27], IETF RFC 3635 [B29], IETF RFC 3637 [B30], IETF RFC 4836 [B35], IETF RFC 4837 [B36], IETF RFC 4878 [B37], and IETF RFC 5066 [B38].

Ethernet technology, as defined by the IEEE 802.3 Working Group, 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

[1]Information on references can be found in Clause 2.

[2]The numbers in brackets correspond to those of the bibliography in Annex A.

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mean “Ethernet version 2” according to the (DEC, Intel, Xerox) DIX “blue book.” Today and in the context of SNMP management and SMIv2 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.

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 managed object branch and leaf assignments provided in 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 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 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 section 8 of IETF RFC 3410), 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

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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.”

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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.[3]

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.[4]

IEEE Std 802®, IEEE Standard for Local and Metropolitan Area Networks—Architecture and Overview.[5, 6]

IEEE Std 802.1D™, IEEE Standard for Local and Metropolitan Area Networks—Media Access Control (MAC) Bridges.

IEEE Std 802.1AB™-2009, IEEE Standard for Local and Metropolitan Area Networks—Station and Media Access Control Discovery.

IEEE Std 802.3™, IEEE Standard for Ethernet.

IEEE Std 802.9a™-1995, IEEE Standards for Local and Metropolitan Area Networks—Supplement to Integrated Services (IS) LAN Interface at the Medium Access Control (MAC) and Physical (PHY) Layers—Specification of IsLAN16-T.

IETF RFC 1213, Management Information Base for Network Management of TCP/IP-based internets: MIB-II, McCloghrie, K., and Rose, M., Mar. 1991.[7]

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

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

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

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

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

IETF STD 58 (RFC 2580), Conformance Statements for SMIv2, McCloghrie, K., Perkins, D., and Schoenwaelder, J., Apr. 1999.

[3]ANSI publications are available from the American National Standards Institute (http://www.ansi.org/).
[4]ETSI publications are available from the European Telecommunications Standards Institute (http://www.etsi.org/).
[5]IEEE publications are available from The Institute of Electrical and Electronics Engineers (http://standards.ieee.org/).
[6]The IEEE standards or products referred to in this clause are trademarks of The Institute of Electrical and Electronics Engineers, Inc.
[7]IETF documents (i.e., RFCs) are available for download at http://www.rfc-archive.org/.

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

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

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

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

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

IETF RFC 3592, Definitions of Managed Objects for the Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) Interface Type, Tesink, K., Sept. 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).[8]

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.

[8]ITU-T publications are available from the International Telecommunications Union (http://www.itu.int/).

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3. Definitions

For the purposes of this document, the following terms and definitions apply. *The IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause.[9]

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

group: Within the context of the repeater management Management Information Base (MIB) module defined in Clause 7 of IEEE Std 802.3.1-2013: A recommended, but optional, entity defined in Clause 30 of IEEE Std 802.3, in order to support a modular numbering scheme. The classic example allows an implementor to represent field-replaceable units as groups of ports, with the port numbering matching the modular hardware implementation.

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

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

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.

managed repeater: A repeater as defined by IEEE Std 802.3 incorporating a management entity that complies with the Management Information Base (MIB) module definition contained in Clause 7 of IEEE Std 802.3.1-2013.

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.

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

Path Coding violations: In IEEE Std 802.3, the path layer coding violations count is based on block errors and not on 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.

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

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).

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.

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

[9] *The IEEE Standards Dictionary Online* subscription is available at http://www.ieee.org/portal/innovate/products/standard/standards_dictionary.html.

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