INTERNATIONAL STANDARD

ISO/IEC/IEEE 8802-3

Second edition
2017-03-01
AMENDMENT 7
2017-11

Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements —

Part 3:
Standard for Ethernet

AMENDMENT 7: Media access control parameters, physical layers, and management parameters for 2.5 Gb/s and 5 Gb/s operation, types 2.5GBASE-T and 5GBASE-T

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseaux locaux et métropolitains — Prescriptions spécifiques —

Partie 3: Norme pour Ethernet

AMENDEMENT 7: Paramètres de commandes d'accès aux supports, couches physiques et paramètres de gestion en vue d'un fonctionnement à 2,5 Gb/s et à 5 Gb/s, de types 2.5GBASE-T et 5GBASE-T

COPYRIGHT PROTECTED DOCUMENT

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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 contained in its standards.

The main task of ISO/IEC JTC 1 is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is called to the possibility that implementation of this standard may require the use of subject matter covered by patent rights. By publication of this standard, no position is taken with respect to the existence or validity of any patent rights in connection therewith. ISO/IEEE is not responsible for identifying essential patents or patent claims for which a license may be required, for conducting inquiries into the legal validity or scope of patents or patent claims or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance or a Patent Statement and Licensing Declaration Form, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard 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 ISO or the IEEE Standards Association.

ISO/IEC/IEEE 8802-3:2017/Amd.7 was prepared by the LAN/MAN of the IEEE Computer Society (as IEEE STD 802.3bz-2016). It was adopted by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems,* in parallel with its approval by the ISO/IEC national bodies, under the "fast-track procedure" defined in the Partner Standards Development Organization cooperation agreement between ISO and IEEE. IEEE is responsible for the maintenance of this document with participation and input from ISO/IEC national bodies.

IEEE Standard for Ethernet

Amendment 7: Media Access Control Parameters, Physical Layers, and Management Parameters for 2.5 Gb/s and 5 Gb/s Operation, Types 2.5GBASE-T and 5GBASE-T

iTeh Standards
(https://standards.iteh.ai)
Document Preview

LAN/MAN Standards Committee
of the
IEEE Computer Society

Approved 22 September 2016

IEEE-SA Standards Board

Abstract: Ethernet Media Access Control (MAC) parameters, Physical Layer specifications, and management objects for the transfer of Ethernet format frames at 2.5 Gb/s and 5 Gb/s over balanced twisted-pair transmission media used in structured cabling are defined in this amendment to IEEE Std 802.3-2015.

Keywords: 2.5G/5GBASE-T, amendment, Auto-Negotiation, Ethernet, IEEE 802.3™, IEEE 802.3bz™, Physical Coding Sublayer (PCS), Physical Medium Attachment (PMA) sublayer, structured cabling, XGMII

iTeh Standards
(https://standards.iteh.ai)
Document Preview

ISO/IEC/IEEE 8802-3:2017/Amd 7:2017
https://standards.iteh.ai/catalog/standards/iso/2e3c65fc-99df-4f35-b4ae-0d287cf25eee/iso-iec-ieee-8802-3-2017-amd-7-2017

Important Notices and Disclaimers Concerning IEEE Standards Documents

IEEE documents are made available for use subject to important notices and legal disclaimers. These notices and disclaimers, or a reference to this page, appear in all standards and may be found under the heading "Important Notice" or "Important Notices and Disclaimers Concerning IEEE Standards Documents."

Notice and Disclaimer of Liability Concerning the Use of IEEE Standards Documents

IEEE Standards documents (standards, recommended practices, and guides), both full-use and trial-use, are developed within IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association ("IEEE-SA") Standards Board. IEEE ("the Institute") develops its standards through a consensus development process, approved by the American National Standards Institute ("ANSI"), which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute and participate without compensation from IEEE. While IEEE administers the process and establishes rules to promote fairness in the consensus development process, 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.

IEEE does not warrant or represent the accuracy or content of the material contained in its standards, and expressly disclaims all warranties (express, implied and statutory) not included in this or any other document relating to the standard, including, but not limited to, the warranties of: merchantability; fitness for a particular purpose; non-infringement; and quality, accuracy, effectiveness, currency, or completeness of material. In addition, IEEE disclaims any and all conditions relating to: results; and workmanlike effort. IEEE standards documents are supplied "AS IS" and "WITH ALL FAULTS."

Use of an IEEE standard is wholly voluntary. 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.

In publishing and making its standards available, IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity nor is IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing any IEEE Standards document, should rely upon his or her own independent judgment in the exercise of reasonable care in any given circumstances or, as appropriate, seek the advice of a competent professional in determining the appropriateness of a given IEEE standard.

IN NO EVENT SHALL IEEE BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO: PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE PUBLICATION, USE OF, OR RELIANCE UPON ANY STANDARD, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE AND REGARDLESS OF WHETHER SUCH DAMAGE WAS FORESEEABLE.

Translations

The IEEE consensus development process involves the review of documents in English only. In the event that an IEEE standard is translated, only the English version published by IEEE should be considered the approved IEEE standard.

Official statements

A statement, written or oral, that is not processed in accordance with the IEEE-SA Standards Board Operations Manual shall not be considered or inferred to be the official position of IEEE or any of its committees and shall not be considered to be, or be relied upon as, a formal position of 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 of IEEE.

Comments on standards

Comments for revision of IEEE Standards documents are welcome from any interested party, regardless of membership affiliation with IEEE. However, IEEE does not provide consulting information or advice pertaining to IEEE Standards documents. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Since IEEE standards represent a consensus of concerned interests, it is important that any responses to comments and questions also receive 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 comments or questions except in those cases where the matter has previously been addressed. For the same reason, IEEE does not respond to interpretation requests. Any person who would like to participate in revisions to an IEEE standard is welcome to join the relevant IEEE working group.

Comments on standards should be submitted to the following address:

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

Laws and regulations

Users of IEEE Standards documents should consult all applicable laws and regulations. Compliance with the provisions of any IEEE Standards document 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

IEEE draft and approved standards are copyrighted by IEEE under U.S. and international copyright laws. They are made available by IEEE and are adopted 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 these documents available for use and adoption by public authorities and private users, IEEE does not waive any rights in copyright to the documents.

Photocopies

Subject to payment of the appropriate fee, IEEE will grant users a limited, non-exclusive license to photocopy portions of any individual standard for company or organizational internal use or individual, non-commercial use only. To arrange for payment of licensing fees, 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.

Updating of IEEE Standards documents

Users of IEEE Standards documents 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.

Every IEEE standard is subjected to review at least every ten years. When a document is more than ten years old and has not undergone a revision process, 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 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-SA Website at http://standards.ieee.org or contact IEEE at the address listed previously. For more information about the IEEE-SA or IOWA's standards development process, visit the IEEE-SA Website at http://standards.ieee.org.

Errata

Errata, if any, for all IEEE standards can be accessed on the IEEE-SA Website at the following URL: http://standards.ieee.org/findstds/errata/index.html. Users are encouraged to check this URL for errata periodically.

Patents

Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken by the IEEE with respect to the existence or validity of any patent rights in connection therewith. If a patent holder or patent applicant has filed a statement of assurance via an Accepted Letter of Assurance, then the statement is listed on the IEEE-SA Website at http://standards.ieee.org/about/sasb/patcom/patents.html. Letters of Assurance may indicate whether the Submitter is willing or unwilling to grant licenses under patent rights without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination to applicants desiring to obtain such licenses.

Essential Patent Claims may exist for which a Letter of Assurance has not been received. 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 standard 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 P802.3bz Working Group ballot. Individuals may have not voted, voted for approval, disapproval, or abstained on this amendment.

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

David Chalupsky, *IEEE P802.3bz 2.5G/5GBASE-T Task Force Chair*
George Zimmerman, *IEEE P802.3bz 2.5G/5GBASE-T Task Force Editor-in-Chief*

Eric Baden
Amrik Bains
Thananya Baldwin
Denis Beaudoin
Christian Beia
Michael Bennett
Vipul Bhatt
William Bliss
Brad Booth
Martin Bouda
Ralf-Peter Braun
Theodore Brillhart
Paul Brooks
Matthew Brown
Jairo Bustos Heredia
Adrian Butter
Juan-Carlos Calderon
J. Martin Carroll
Clark Carty
Craig Chabot
Geoffrey Chacon Simon
Mandeep Chadha
Jacky Chang
Xin Chang
Ahmad Chini
Keng Hua Chuang
Peter Cibula
Christopher R. Cole
Shaoan Dai
John D'Ambrosia
Yair Darshan
Piers Dawe
Wael Diab
Eric DiBiaso
Daniel Dillow
Chris Diminico
Thuyen Dinh
Curtis Donahue
Dan Dove
Mike Dudek
Nick Duer
David Dwelley
Frank Effenberger

Shahar Feldman
German Feyh
Alan Flatman
Matthias Fritsche
Richard Frosch
Andrew Gardner
Ali Ghiasi
Joel Goergen
Steven Gorshe
James Graba
Robert Grow
Mark Gustlin
Marek Hajduczenia
Bernie Hammond
Takehiro Hayashi
Yasuo Hidaka
Brian Holden
Rita Horner
Bernd Horrmeyer
Victor Hou
Yasuhiro Hyakutake
Hideki Isono
Tom Issenhuth
Kenneth Jackson
Andrew Jimenez
Chad Jones
Peter Jones
Manabu Kagami
Upen Kareti
Keisuke Kawahara
Yasuaki Kawatsu
Michael Kelsen
Yong Kim
Jonathan King
Scott Kipp
Michael Klempa
Shigeru Kobayashi
Keisuke Kojima
Paul Kolesar
Tom Kolze
Glen Kramer
Hans Lackner
Jeffrey Lapak

Miklos Lukacs
Kent Lusted
Jeffery Maki
David Malicoat
James Malkemus
Yonatan Malkiman
Arthur Marris
Takeo Masuda
Kirsten Matheus
Erdem Matoglu
Laurence Matola
Brett McClellan
Thomas McDermott
John McDonough
Richard Mei
Richard Mellitz
Bryan Moffitt
Ardeshir Mohammadian
Leo Montreuil
Paul Mooney
Dale Murray
Henry Muyshondt
Edward Nakamoto
Gary Nicholl
Paul Nikolich
Kevin Noll
Mark Nowell
David Ofelt
Tom Palkert
Hui Pan
Sesha Panguluri
Carlos Pardo
Petar Pepeljugoski
Gerald Pepper
Ruben Perez De Aranda Alonso
Michael Peters
Rick Pimpinella
William Powell
Richard Prodan
Rick Rabinovich
Adee Ran
Alon Regev
Duane Remein
Victor Renteria

6

Martin Rossbach	Robert Stone	Sterling A. Vaden
Christopher Roth	Junqing Sun	Stefano Valle
Salvatore Rotolo	Steve Swanson	Paul Vanderlaan
Vineet Salunke	Andre Szczepanek	Robert Wagner
Sam Sambasivan	William Szeto	Roy Wang
Edward Sayre	Bharat Tailor	Xinyuan Wang
Dieter Schicketanz	Akio Tajima	Matthias Wendt
Fred Schindler	Takayuki Tajima	Oded Wertheim
Peter Scruton	Satoshi Takahashi	Martin White
Hossein Sedarat	Kohichi Tamura	Natalie Wienckowski
Naoshi Serizawa	Alexander Tan	Ludwig Winkel
Megha Shanbhag	Mehmet Tazebay	Peter Wu
Stephen Shellhammer	Brian Teipen	Yu Xu
Ramin Shirani	Geoffrey Thompson	Jun Yi
Tom Skaar	Pirooz Tooyserkani	Lennart Yseboodt
Jeff Slavick	Albert Tretter	Ting-Fa Yu
Scott Sommers	Stephen Trowbridge	Hayato Yuki
Tom Souvignier	Yoshihiro Tsukamoto	Andrew Zambell
Edward Sprague	Mike Tu	Yan Zhuang
Peter Stassar		Helge Zinner

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

Iwan Adhicandra	Rita Horner	Rick Pimpinella
Thomas Alexander	C. Huntley	William Powell
Dale Amason	Noriyuki Ikeuchi	Adee Ran
Pete Anslow	Sergiu Iordanescu	Alon Regev
Lee Armstrong	Atsushi Ito	Maximilian Riegel
Eric Baden	Raj Jain	Robert Robinson
Gennaro Boggia	Peter Jones	Benjamin Rolfe
Christian Boiger	Adri Jovin	Frank Schewe
Ralf-Peter Braun	Piotr Karocki	Dieter Schicketanz
Nancy Bravin	Stuart Kerry	Hossein Sedarat
Theodore Brillhart	Yongbum Kim	Omer Sella
Jairo Bustos Heredia	Scott Kipp	Takeshi Shimizu
William Byrd	Geoff Ladwig	Thomas Starai
Steven B. Carlson	Mark Laubach	Walter Struppler
Juan Carreon	David J. Law	Mitsutoshi Sugawara
Clark Carty	Jon Lewis	Junqing Sun
Mandeep Chadha	Arthur H. Light	Patrik Sundstrom
David Chalupsky	William Lo	James Theodoras
Keith Chow	Michael Lynch	Geoffrey Thompson
Peter Cibula	Elvis Maculuba	Michael Thompson
Charles Cook	Valerie Maguire	Mark-Rene Uchida
Rodney Cummings	Arthur Marris	Alexander Umnov
Shaoan Dai	Michael Maytum	Sterling Vaden
John D'Ambrosia	Mick McCarthy	Dmitri Varsanofiev
Janos Farkas	Brett McClellan	Prabodh Varshney
German Feyh	Thomas McDermott	George Vlantis
Matthias Fritsche	Richard Mellitz	Lisa Ward
Yukihiro Fujimoto	John Messenger	Stephen Webb
Devon Gayle	Bryan Moffitt	Hung-Yu Wei
Joel Goergen	Michael Newman	Ludwig Winkel
Zhigang Gong	Charles Ngethe	Peter Wu
James Graba	Mark Nowell	Dayin Xu
Randall Groves	Satoshi Obara	Jun Xu
Marek Hajduczenia	Thomas Palkert	Oren Yuen
Jerome Henry	Bansi Patel	Zhen Zhou
Marco Hernandez	Arumugam Paventhan	George Zimmerman
David Hess	Ruben Perez De Aranda Alonso	
Werner Hoelzl	Michael Peters	

When the IEEE-SA Standards Board approved this standard on 22 September 2016, it had the following membership:

Jean-Philippe Faure, *Chair*
Ted Burse, *Vice Chair*
John D. Kulick, *Past Chair*
Konstantinos Karachalios, *Secretary*

iTeh Standards
(https://standards.iteh.ai)
Document Preview

ISO/IEC/IEEE 8802-3:2017/Amd 7:2017
https://standards.iteh.ai/catalog/standards/iso/2e3c65fc-99df-4f35-b4ae-0d287cf25eee/iso-iec-ieee-8802-3-2017-amd-7-2017

Introduction

This introduction is not part of IEEE Std 802.3bz-2016, IEEE Standard for Ethernet—Amendment 7: Media Access Control Parameters, Physical Layers, and Management Parameters for 2.5 Gb/s and 5 Gb/s Operation, Types 2.5GBASE-T and 5GBASE-T.

IEEE Std 802.3™ was first published in 1985. Since the initial publication, many projects have added functionality or provided maintenance updates to the specifications and text included in the standard. Each IEEE 802.3 project/amendment is identified with a suffix (e.g., IEEE Std 802.3ba™-2010).

The half duplex Media Access Control (MAC) protocol specified in IEEE Std 802.3-1985 is Carrier Sense Multiple Access with Collision Detection (CSMA/CD). This MAC protocol was key to the experimental Ethernet developed at Xerox Palo Alto Research Center, which had a 2.94 Mb/s data rate. Ethernet at 10 Mb/s was jointly released as a public specification by Digital Equipment Corporation (DEC), Intel and Xerox in 1980. Ethernet at 10 Mb/s was approved as an IEEE standard by the IEEE Standards Board in 1983 and subsequently published in 1985 as IEEE Std 802.3-1985. Since 1985, new media options, new speeds of operation, and new capabilities have been added to IEEE Std 802.3. A full duplex MAC protocol was added in 1997.

Some of the major additions to IEEE Std 802.3 are identified in the marketplace with their project number. This is most common for projects adding higher speeds of operation or new protocols. For example, IEEE Std 802.3u™ added 100 Mb/s operation (also called Fast Ethernet), IEEE Std 802.3z added 1000 Mb/s operation (also called Gigabit Ethernet), IEEE Std 802.3ae added 10 Gb/s operation (also called 10 Gigabit Ethernet), IEEE Std 802.3ah™ specified access network Ethernet (also called Ethernet in the First Mile) and IEEE Std 802.3ba added 40 Gb/s operation (also called 40 Gigabit Ethernet) and 100 Gb/s operation (also called 100 Gigabit Ethernet). These major additions are all now included in and are superseded by IEEE Std 802.3-2015 and are not maintained as separate documents.

At the date of IEEE Std 802.3bz-2016 publication, IEEE Std 802.3 is composed of the following documents:

IEEE Std 802.3-2015

Section One—Includes Clause 1 through Clause 20 and Annex A through Annex H and Annex 4A. Section One includes the specifications for 10 Mb/s operation and the MAC, frame formats and service interfaces used for all speeds of operation.

Section Two—Includes Clause 21 through Clause 33 and Annex 22A through Annex 33E. Section Two includes management attributes for multiple protocols and speed of operation as well as specifications for providing power over twisted pair cabling for multiple operational speeds. It also includes general information on 100 Mb/s operation as well as most of the 100 Mb/s Physical Layer specifications.

Section Three—Includes Clause 34 through Clause 43 and Annex 36A through Annex 43C. Section Three includes general information on 1000 Mb/s operation as well as most of the 1000 Mb/s Physical Layer specifications.

Section Four—Includes Clause 44 through Clause 55 and Annex 44A through Annex 55B. Section Four includes general information on 10 Gb/s operation as well as most of the 10 Gb/s Physical Layer specifications.

Section Five—Includes Clause 56 through Clause 77 and Annex 57A through Annex 76A. Clause 56 through Clause 67 and Clause 75 through Clause 77, as well as associated annexes, specify subscriber

access and other Physical Layers and sublayers for operation from 512 kb/s to 10 Gb/s, and defines services and protocol elements that enable the exchange of IEEE Std 802.3 format frames between stations in a subscriber access network. Clause 68 specifies a 10 Gb/s Physical Layer specification. Clause 69 through Clause 74 and associated annexes specify Ethernet operation over electrical backplanes at speeds of 1000 Mb/s and 10 Gb/s.

Section Six—Includes Clause 78 through Clause 95 and Annex 83A through Annex 93C. Clause 78 specifies Energy-Efficient Ethernet. Clause 79 specifies IEEE 802.3 Organizationally Specific Link Layer Discovery Protocol (LLDP) type, length, and value (TLV) information elements. Clause 80 through Clause 95 and associated annexes includes general information on 40 Gb/s and 100 Gb/s operation as well the 40 Gb/s and 100 Gb/s Physical Layer specifications. Clause 90 specifies Ethernet support for time synchronization protocols.

IEEE Std 802.3bw-2015

Amendment 1—This amendment includes changes to IEEE Std 802.3-2015 and adds Clause 96. This amendment adds 100 Mb/s Physical Layer (PHY) specifications and management parameters for operation on a single balanced twisted-pair copper cable.

IEEE Std 802.3by-2016

Amendment 2—This amendment includes changes to IEEE Std 802.3-2015 and adds Clause 105 through Clause 112, Annex 109A, Annex 109B, Annex 110A, Annex 110B, and Annex 110C. This amendment adds MAC parameters, Physical Layers, and management parameters for the transfer of IEEE 802.3 format frames at 25 Gb/s.

IEEE Std 802.3bq-2016

Amendment 3—This amendment includes changes to IEEE Std 802.3-2015 and adds Clause 113 and Annex 113A. This amendment adds new Physical Layers for 25 Gb/s and 40 Gb/s operation over balanced twisted-pair structured cabling systems.

IEEE Std 802.3bp-2016

Amendment 4—This amendment includes changes to IEEE Std 802.3-2015 and adds Clause 97 and Clause 98. This amendment adds point-to-point 1 Gb/s Physical Layer (PHY) specifications and management parameters for operation on a single balanced twisted-pair copper cable in automotive and other applications not utilizing the structured wiring plant.

IEEE Std 802.3br-2016

Amendment 5—This amendment includes changes to IEEE Std 802.3-2015 and adds Clause 99. This amendment adds a MAC Merge sublayer and a MAC Merge Service Interface to support for Interspersing Express Traffic over a single link.

IEEE Std 802.3bn-2016

Amendment 6—This amendment adds the Physical Layer specifications and management parameters for symmetric and/or asymmetric operation of up to 10 Gb/s on point-to-multipoint Radio Frequency (RF) distribution plants comprising either amplified or passive coaxial media. It also extends the operation of Ethernet Passive Optical Networks (EPON) protocols, such as Multipoint Control Protocol (MPCP) and Operation Administration and Management (OAM).