

# IEEE Standard for Ethernet

IEEE Computer Society

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USA

**IEEE Std 802.3™-2018**  
(Revision of  
IEEE Std 802.3-2015)

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(Revision of  
IEEE Std 802.3-2015)

# **IEEE Standard for Ethernet**

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

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**Abstract:** Ethernet local area network operation is specified for selected speeds of operation from 1 Mb/s to 400 Gb/s using a common media access control (MAC) specification and management information base (MIB). The Carrier Sense Multiple Access with Collision Detection (CSMA/CD) MAC protocol specifies shared medium (half duplex) operation, as well as full duplex operation. Speed specific Media Independent Interfaces (MIIs) allow use of selected Physical Layer devices (PHY) for operation over coaxial, twisted pair or fiber optic cables, or electrical backplanes. System considerations for multisegment shared access networks describe the use of Repeaters that are defined for operational speeds up to 1000 Mb/s. Local Area Network (LAN) operation is supported at all speeds. Other specified capabilities include: various PHY types for access networks, PHYs suitable for metropolitan area network applications, and the provision of power over selected twisted pair PHY types.

**Keywords:** 2.5 Gigabit Ethernet; 5 Gigabit Ethernet; 10 Gigabit Ethernet; 25 Gigabit Ethernet; 40 Gigabit Ethernet; 100 Gigabit Ethernet; 200 Gigabit Ethernet; 400 Gigabit Ethernet; attachment unit interface; AUI; Auto-Negotiation; Backplane Ethernet; data processing; DTE Power via the MDI; Energy Efficient Ethernet; EPoC; EPON; EPON Protocol over Coax; Ethernet; Ethernet in the First Mile; Ethernet passive optical network; express traffic; Fast Ethernet; Gigabit Ethernet; IEEE 802.3™; information exchange; LAN; local area network; management; MDI; medium dependent interface; media independent interface; MIB; MII; MPMC; multi-point MAC control; PCS; PHY; physical coding sublayer; Physical Layer; physical medium attachment; physical medium dependent; PMA; PMD; PoDL; Power over Data Lines; Power over Ethernet; reconciliation sublayer; repeater; RS; type field; VLAN tag

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## Participants

The following individuals were officers and members of the IEEE 802.3 working group at the beginning of the IEEE 802.3cj working group ballot.

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**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*  
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## Historical participants

The following individuals participated in the IEEE 802.3 working group during various stages of the standard's development. Since the initial publication, many IEEE standards have added functionality or provided updates to material included in this standard. Included is a historical list of participants who have dedicated their valuable time, energy, and knowledge to the creation of this material:

<b>IEEE Std 802.3 document</b>	<b>Date approved by IEEE</b>	<b>Working Group officers, Task Force Chair, and Task Force Editors as listed in the document</b>
IEEE Std 802.3-1985, Original 10 Mb/s standard, MAC, PLS, AUI, 10BASE5	23 June 1983	<b>Donald C. Loughry</b> , <i>Working Group Chair</i>
IEEE Std 802.3b-1985 (Clause 11), 10 Mb/s Broadband MAU, 10BROAD36	19 September 1985	<b>Donald C. Loughry</b> , <i>Working Group Chair</i> <b>Menachem Abraham</b> , <i>Task Force Chair</i>
IEEE Std 802.3a-1988 (Clause 10), 10 Mb/s MAU 10BASE2	15 November 1985	<b>Donald C. Loughry</b> , <i>Working Group Chair</i> <b>Alan Flatman</b> , <i>Task Force Chair</i>
IEEE Std 802.3c-1985 (9.1–9.8), 10 Mb/s Baseband Repeater	12 December 1985	<b>Donald C. Loughry</b> , <i>Working Group Chair</i> <b>Geoffrey O. Thompson</b> , <i>Task Force Chair</i>
IEEE Std 802.3e-1987 (Clause 12), 1 Mb/s MAU and Hub 1BASE5	11 June 1987	<b>Donald C. Loughry</b> , <i>Working Group Chair</i> <b>Robert Galin</b> , <i>Task Force Chair</i>
IEEE Std 802.3d-1987 (9.9), 10 Mb/s Fiber MAU, FOIRL	10 December 1987	<b>Donald C. Loughry</b> , <i>Working Group Chair</i> <b>Steven Moustakas</b> , <i>Task Force Chair</i>
IEEE Std 802.3h-1990 (Clause 5), 10 Mb/s Layer Management, DTEs	28 September 1990	<b>Donald C. Loughry</b> , <i>Working Group Chair</i> <b>Andy J. Luque</b> , <i>Task Force Chair</i>
IEEE Std 802.3i-1990 (Clauses 13 and 14), 10 Mb/s UTP MAU, 10 BASE-T	28 September 1990	<b>Donald C. Loughry</b> , <i>Working Group Chair</i> <b>Patricia Thaler</b> , <i>Task Force Chair (initial)</i> <b>Richard Anderson</b> , <i>Task Force Chair (final)</i>
IEEE Std 802.3k-1993 (Clause 19), 10 Mb/s Layer Management, Repeaters	17 September 1992	<b>Patricia Thaler</b> , <i>Working Group Chair</i> <b>Joseph S. Skorupa</b> , <i>Task Force Chair</i> <b>Geoffrey O. Thompson</b> , <i>Vice Chair and Editor</i>
IEEE Std 802.3l-1992 (14.10), 10 Mb/s PICS Proforma 10BASE-T MAU	17 September 1992	<b>Patricia Thaler</b> , <i>Working Group Chair</i> <b>Mike Armstrong</b> , <i>Task Force Chair and Editor</i> <b>Paul Nikolich</b> , <i>Vice Chair</i> <b>William Randle</b> , <i>Editorial Coordinator</i>

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IEEE Std 802.3p-1993 (Clause 20), Management, 10 Mb/s Integrated MAUs	17 June 1993	<b>Patricia Thaler</b> , <i>Working Group Chair</i> <b>Joseph S. Skorupa</b> , <i>Task Force Chair</i> <b>Geoffrey O. Thompson</b> , <i>Vice Chair and Editor</i>
IEEE Std 802.3q-1993 (Clause 5), 10 Mb/s Layer Management, GDMO Format	17 June 1993)	<b>Patricia Thaler</b> , <i>Working Group Chair</i> <b>Joseph S. Skorupa</b> , <i>Task Force Chair</i> <b>Geoffrey O. Thompson</b> , <i>Vice Chair and Editor</i>
IEEE Std 802.3j-1993 (Clauses 15–18), 10 Mb/s Fiber MAUs 10BASE-FP, 10BASE-FB, and 10BASE-FL	15 September 1993	<b>Patricia Thaler</b> , <i>Working Group Chair</i> <b>Keith Amundsen</b> , <i>Task Force Chair (initial)</i> <b>Frederick Scholl</b> , <i>Task Force Chair (final)</i> <b>Michael E. Lee</b> , <i>Technical Editor</i>
IEEE Std 802.3t-1995, 120 $\Omega$ informative annex to 10BASE-T	14 June 1995	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair</i> <b>Jacques Christ</b> , <i>Task Force Chair</i>
IEEE Std 802.3u-1995 (Clauses 21–30), Type 100BASE-T MAC parameters, Physical Layer, MAUs, and Repeater for 100 Mb/s Operation	14 June 1995	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair</i> <b>Peter Tarrant</b> , <i>Task Force Chair (Phase 1)</i> <b>Howard Frazier</b> , <i>Task Force Chair (Phase 2)</i> <b>Paul Sherer</b> , <i>Task Force Editor-in-Chief (Phase 1)</i> <b>Howard Johnson</b> , <i>Task Force Editor-in-Chief (Phase 2)</i>
IEEE Std 802.3m-1995, Maintenance 2	21 September 1995	<b>Patricia Thaler</b> , <i>Working Group Chair</i> <b>Gary Robinson</b> , <i>Maintenance Chair</i>
IEEE Std 802.3n-1995, Maintenance 3	21 September 1995	<b>Patricia Thaler</b> , <i>Working Group Chair</i> <b>Gary Robinson</b> , <i>Maintenance Chair</i>
IEEE Std 802.3s-1995, Maintenance 4	21 September 1995	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair</i> <b>Gary Robinson</b> , <i>Maintenance Chair</i>
IEEE Std 802.3v-1995, 150 $\Omega$ informative annex to 10BASE-T	12 December 1995	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair</i> <b>Larry Nicholson</b> , <i>Task Force Chair</i>
IEEE Std 802.3r-1996 (8.8), Type 10BASE5 Medium Attachment Unit PICS proforma	29 July 1996	<b>Patricia Thaler</b> , <i>Working Group Chair</i> <b>Imre Juhász</b> , <i>Task Force Chair</i> <b>William Randle</b> , <i>Task Force Editor</i>
IEEE Std 802.3x-1997 and IEEE Std 802.3y-1997 (Revisions to IEEE Std 802.3, Clauses 31 and 32), Full-Duplex Operation and Type 100BASE-T2	20 March 1997	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Rich Seifert</b> , <i>Task Force Chair and Editor (802.3x)</i> <b>J. Scott Carter</b> , <i>Task Force Chair (802.3y)</i> <b>Colin Mick</b> , <i>Task Force Editor (802.3y)</i>
IEEE Std 802.3z-1998 (Clauses 34–39, 41–42), Type 1000BASE-X MAC Parameters, Physical Layer, Repeater, and Management Parameters for 1000 Mb/s Operation	25 June 1998	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Howard M. Frazier, Jr.</b> , <i>Task Force Chair</i> <b>Howard W. Johnson</b> , <i>Task Force Editor</i>
IEEE Std 802.3aa-1998, Maintenance 5	25 June 1998	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair</i> <b>Colin Mick</b> , <i>Task Force Editor</i>
IEEE Std 802.3ac-1998, Frame Extensions for Virtual Bridged Local Area Network (VLAN) Tagging on IEEE 802.3 Networks	16 September 1998	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Andy J. Luque</b> , <i>Working Group Secretary</i> <b>Ian Crayford</b> , <i>Task Force Chair</i> <b>Rich Seifert</b> , <i>Task Force Editor</i>
IEEE Std 802.3ab-1999 (Clause 40), Physical Layer Parameters and Specifications for 1000 Mb/s Operation Over 4 Pair of Category 5 Balanced Copper Cabling, Type 1000BASE-T	26 June 1999	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Robert M. Grow</b> , <i>Working Group Secretary</i> <b>George Eisler</b> , <i>Task Force Chair</i> <b>Colin Mick</b> , <i>Task Force Editor</i>



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IEEE Std 802.3ad-2000 (Clause 43), Aggregation of Multiple Link Segments	30 March 2000	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Robert M. Grow</b> , <i>Working Group Secretary</i> <b>Steven Haddock</b> , <i>Task Force Chair</i> <b>Tony Jeffree</b> , <i>Task Force Co-Editor</i> <b>Rich Seifert</b> , <i>Task Force Co-Editor</i>
IEEE Std 802.3-2002 (IEEE 802.3ag, Maintenance 6, Revision of the base), Carrier Sense Multiple Access with Collision Detection (CSMA/CD) access method and Physical Layer specifications	14 January 2002	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Robert M. Grow</b> , <i>Working Group Secretary</i>
IEEE Std 802.3ae-2002, (Clauses 44–53) Media Access Control (MAC) Parameters, Physical Layers, and Management Parameters for 10 Gb/s Operation	13 June 2002	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Robert M. Grow</b> , <i>Working Group Secretary</i> <b>R. Jonathan Thatcher</b> , <i>Task Force Chair</i> <b>Stephen Haddock</b> , <i>Task Force Vice Chair</i> <b>Bradley J. Booth</b> , <i>Task Force Editor</i>
IEEE Std 802.3af-2003, (Clause 33) Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI)	12 June 2003	<b>Geoffrey O. Thompson</b> , <i>Working Group Chair (Phase 1)</i> <b>Robert M. Grow</b> , <i>Working Group Chair (Phase 2)</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Robert M. Grow</b> , <i>Working Group Secretary (Phase 1)</i> <b>Steven B. Carlson</b> , <i>Working Group Secretary (Phase 2)</i> <b>Steven B. Carlson</b> , <i>Task Force Chair</i> <b>Michael S. McCormack</b> , <i>Task Force Editor (Phase 1)</i> <b>John J. Jetzt</b> , <i>Task Force Editor (Phase 2)</i>
IEEE Std 802.3aj-2003, Maintenance 7	11 September 2003	<b>Robert M. Grow</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair, Task Force Chair</i> <b>Steven B. Carlson</b> , <i>Working Group Secretary</i> <b>Catherine K. N. Berger</b> , <i>Task Force Editor</i>
IEEE Std 802.3ak-2004, Physical Layer and Management Parameters for 10Gb/s Operation, Type 10GBASE-CX4	9 February 2004	<b>Robert M. Grow</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Steven B. Carlson</b> , <i>Working Group Secretary</i> <b>Daniel J. Dove</b> , <i>Task Force Chair</i> <b>Howard A. Baumer</b> , <i>Task Force Editor</i>
IEEE Std 802.3ah-2004, Media Access Control Parameters, Physical Layers, and Management Parameters for Subscriber Access Networks	6 April 2005	<b>Robert M. Grow</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Steven B. Carlson</b> , <i>Working Group Secretary</i> <b>Howard Frazier</b> , <i>Task Force Chair</i> <b>Wael W. Diab</b> , <i>Task Force Editor-in-Chief</i> <b>Hugh Barrass</b> , <i>Task Force Vice-Chair</i>
IEEE Std 802.3-2005 (IEEE 802.3REVam, Revision of the base), Carrier Sense Multiple Access with Collision Detection (CSMA/CD) access method and Physical Layer specifications	9 June 2005	<b>Robert M. Grow</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair, Task Force Chair, Task Force Chief Editor</i> <b>Wael W. Diab</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i>
IEEE Std 802.3an-2006, Physical Layer and Management Parameter for 10 Gb/s Operation, Type 10GBASE-T	8 June 2006	<b>Robert M. Grow</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Wael William Diab</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Bradley Booth</b> , <i>Task Force Chair</i> <b>Sanjay Kasturia</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3-2005/Cor 1-2006 (IEEE 802.3au), DTE Power via MDI Isolation corrigendum	8 June 2006	<b>Robert M. Grow</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair, Task Force Chair, and Task Force Editor</i> <b>Wael W. Diab</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i>

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IEEE Std 802.3aq-2006, Physical Layer and Management Parameters for 10 Gb/s Operation, Type 10GBASE-LRM	15 September 2006	<b>Robert M. Grow</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Wael William Diab</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>David G. Cunningham</b> , <i>Task Force Chair</i> <b>Nick Weiner</b> , <i>Task Force Editor</i>
IEEE Std 802.3as-2006, Frame format extensions	15 September 2006	<b>Robert M. Grow</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair</i> <b>Wael William Diab</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Kevin Q Daines</b> , <i>Task Force Chair</i> <b>Glenn W. Parsons</b> , <i>Task Force Editor</i>
IEEE Std 802.3ap-2007, Ethernet Operation over Electrical Backplanes	22 March 2007	<b>Robert M. Grow</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice-Chair</i> <b>Wael W. Diab</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Bradley Booth</b> , <i>Working Group Treasurer</i> <b>Adam Healey</b> , <i>Task Force Chair</i> <b>Schelto vanDoorn</b> , <i>Task Force Editor-in-Chief (Phase 1)</i> <b>Ilango S. Ganga</b> , <i>Task Force Editor-in-Chief (Phase 2)</i>
IEEE Std 802.3-2005/Cor 2-2007 (IEEE 802.3aw), 10GBASE-T corrigendum	7 June 2007	<b>Robert M. Grow</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair, Task Force Chair, and Task Force Editor</i> <b>Wael W. Diab</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Bradley Booth</b> , <i>Working Group Treasurer</i>
IEEE Std 802.3-2008 (IEEE 802.3ay), Maintenance #9 (Revision of the base), Carrier Sense Multiple Access with Collision Detection (CSMA/CD) access method and Physical Layer specifications	26 September 2008	<b>Robert M. Grow</b> , <i>Working Group Chair</i> <b>David J. Law</b> , <i>Working Group Vice Chair, Task Force Chair, and Task Force Editor</i> <b>Wael William Diab</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Bradley Booth</b> , <i>Working Group Treasurer</i>
IEEE Std 802.3at-2009 Data Terminal Equipment (DTE) Power via the Media Dependent Interface (MDI) Enhancements	11 September 2009	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Wael William Diab</b> , <i>Working Group Vice Chair</i> <b>Adam Healey</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Bradley Booth</b> , <i>Working Group Treasurer</i> <b>Mike McCormack</b> , <i>Task Force Chair</i> <b>D. Matthew Landry</b> , <i>Task Force Chief Editor</i>
IEEE Std 802.3av-2009 Physical Layer Specifications and Management Parameters for 10 Gb/s Passive Optical Networks	11 September 2009	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Wael William Diab</b> , <i>Working Group Vice Chair</i> <b>Adam Healey</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Bradley Booth</b> , <i>Working Group Treasurer</i> <b>Glen Kramer</b> , <i>Task Force Chair</i> <b>Duane Remein</b> , <i>Task Force Chief Editor</i>
IEEE Std 802.3bc-2009 Ethernet Organizationally Specific Type, Length, Value (TLVs)	11 September 2009	<b>David J. Law</b> , <i>Working Group Chair and Task Force Editor</i> <b>Wael W. Diab</b> , <i>Working Group Vice Chair and Task Force Chair</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Adam Healey</b> , <i>Working Group Secretary</i> <b>Bradley Booth</b> , <i>Working Group Treasurer</i>
IEEE Std 802.3-2008/Cor 1-2009 (IEEE 802.3bb) Pause Reaction Delay Corrigendum.	9 December 2009	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Wael William Diab</b> , <i>Working Group Vice-Chair</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Adam Healey</b> , <i>Working Group Secretary</i> <b>Bradley Booth</b> , <i>Working Group Treasurer</i>

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IEEE Std 802.3ba Media Access Control Parameters, Physical Layers, and Management Parameters for 40 Gb/s and 100 Gb/s Operation	17 June 2010	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Wael William Diab</b> , <i>Working Group Vice-Chair</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Adam Healey</b> , <i>Working Group Secretary</i> <b>Bradley Booth</b> , <i>Working Group Treasurer</i> <b>John D'Ambrosia</b> , <i>Task Force Chair</i> <b>Ilango S. Ganga</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3az-2010 Media Access Control Parameters, Physical Layers, and Management Parameters for Energy-Efficient Ethernet	30 September 2010	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Wael William Diab</b> , <i>Working Group Vice Chair</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Adam Healey</b> , <i>Working Group Secretary</i> <b>Bradley Booth</b> , <i>Working Group Treasurer</i> <b>Michael Bennett</b> , <i>Task Force Chair</i> <b>Sanjay Kasturia</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3bg-2011 Physical Layer and Management Parameters for Serial 40 Gb/s Ethernet Operation Over Single-Mode Fiber	31 March 2011	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Wael William Diab</b> , <i>Working Group Vice-Chair</i> <b>Adam Healey</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>Mark Nowell</b> , <i>Task Force Chair</i> <b>Pete Anslow</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3bf-2011 Media Access Control (MAC) Service Interface and Management Parameters to Support Time Synchronization Protocols	16 May 2011	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Wael William Diab</b> , <i>Working Group Vice-Chair</i> <b>Adam Healey</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>Steven B. Carlson</b> , <i>Task Force Chair</i> <b>Marek Hajduczenia</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3bd-2011 MAC Control Frame for Priority-based Flow Control	16 June 2011	<b>Tony Jeffree</b> , <i>IEEE 802.1 Working Group Chair</i> <b>Paul Congdon</b> , <i>IEEE 802.1 Working Group Vice Chair</i> <b>David J. Law</b> , <i>IEEE 802.3 Working Group Chair</i> <b>Wael W. Diab</b> , <i>IEEE 802.3 Working Group Vice Chair</i> <b>Pat Thaler</b> , <i>Data Center Bridging Task Group Chair</i>
IEEE Std 802.3-2012 (IEEE 802.3ah), Maintenance #10 (Revision of the base), Standard for Ethernet	28 December 2012	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Wael William Diab</b> , <i>Working Group Vice-Chair, Task Force Chair, and Task Force Editor-in-Chief</i> <b>Adam Healey</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i>
IEEE Std 802.3bk-2013 Physical Layer Specifications and Management Parameters for Extended Ethernet Passive Optical Networks	23 August 2013	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Wael William Diab</b> , <i>Working Group Vice-Chair</i> <b>Adam Healey</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>Marek Hajduczenia</b> , <i>Task Force Chair</i> <b>Susumu Nishihara</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3bj-2014 Physical Layer Specifications and Management Parameters for 100 Gb/s Operation Over Backplanes and Copper Cables	12 June 2014	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Wael William Diab</b> , <i>Working Group Vice-Chair (initial)</i> <b>Adam Healey</b> , <i>Working Group Secretary, (initial), Task Force Editor-in-Chief (initial), Working Group Vice-Chair (final), and Task Force Chair (final)</i> <b>Peter Anslow</b> , <i>Working Group Secretary (final)</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>John D'Ambrosia</b> , <i>Task Force Chair (initial)</i> <b>Matthew Brown</b> , <i>Task Force Editor-in-Chief (final)</i>
IEEE Std 802.3bm-2015 Physical Layer Specifications and Management Parameters for 40 Gb/s and 100 Gb/s Operation Over Fiber Optic Cables	16 February 2015	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair</i> <b>Pete Anslow</b> , <i>Working Group Secretary and Task Force Editor-in-Chief</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>Dan Dove</b> , <i>Task Force Chair</i> <b>Kapil Shrikhande</b> , <i>Task Force Vice-Chair</i>

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IEEE Std 802.3-2015 (IEEE 802.3bx), Maintenance #11 (Revision of the base), Standard for Ethernet	3 September 2015	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair, Task Force Chair, and Task Force Editor-in-Chief</i> <b>Pete Anslow</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i>
IEEE Std 802.3bw-2015 Physical Layer Specifications and Management Parameters for 100 Mb/s Operation over a Single Balanced Twisted Pair Cable (100BASE-T1)	26 October 2015	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair</i> <b>Pete Anslow</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary and Task Force Chair, Phase 2</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>Thomas Hogenmüller</b> , <i>Task Force Chair, Phase 1</i> <b>Mehmet Tazebay</b> , <i>Task Force Vice-Chair</i> <b>Curtis Donahue</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3by-2016 Media Access Control Parameters, Physical Layers, and Management Parameters for 25 Gb/s Operation	30 June 2016	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair</i> <b>Pete Anslow</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>Mark Nowell</b> , <i>Task Force Chair</i> <b>Matthew Brown</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3bq-2016 Physical Layers and Management Parameters for 25 Gb/s and 40 Gb/s Operation, Types 25GBASE-T and 40GBASE-T	30 June 2016	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair</i> <b>Pete Anslow</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>David Chalupsky</b> , <i>Task Force Chair</i> <b>George Zimmerman</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3bp-2016 Physical Layer Specifications and Management Parameters for 1 Gb/s Operation over a Single Twisted-Pair Copper Cable	30 June 2016	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair</i> <b>Pete Anslow</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary and Task Force Chair</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>Marek Hajduczenia</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3br-2016 Specification and Management Parameters for Interspersing Express Traffic	30 June 2016	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair</i> <b>Pete Anslow</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>Ludwig Winkel</b> , <i>Task Force Chair</i> <b>Patricia Thaler</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3bn-2016 Physical Layer Specifications and Management Parameters for Ethernet Passive Optical Networks Protocol over Coax	22 September 2016	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair</i> <b>Pete Anslow</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>Mark Laubach</b> , <i>Task Force Chair</i> <b>Duane Remein</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3bz-2016 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	22 September 2016	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair</i> <b>Pete Anslow</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>David Chalupsky</b> , <i>Task Force Chair</i> <b>George Zimmerman</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3bu-2016 Physical Layer and Management Parameters for Power over Data Lines (PoDL) of Single Balanced Twisted-Pair Ethernet	7 December 2016	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair</i> <b>Pete Anslow</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>Dave Dwelley</b> , <i>Task Force Chair, Phase 1</i> <b>Dan Dove</b> , <i>Task Force Chair, Phase 2</i> <b>Andy Gardner</b> , <i>Task Force Editor-in-Chief</i>

<b>IEEE Std 802.3 document</b>	<b>Date approved by IEEE</b>	<b>Working Group officers, Task Force Chair, and Task Force Editors as listed in the document</b>
IEEE Std 802.3bv-2017 Physical Layer Specifications and Management Parameters for 1000 Mb/s Operation Over Plastic Optical Fiber	14 February 2017	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair</i> <b>Pete Anslow</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>Robert M. Grow</b> , <i>Task Force Chair</i> <b>Rubén Pérez-Aranda</b> , <i>Task Force Editor-in-Chief</i>
IEEE Std 802.3-2015/Cor 1-2017 (IEEE 802.3ce) Multilane Timestamping	23 March 2017	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair, Task Force Chair, and Task Force Editor-in-Chief</i> <b>Pete Anslow</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i>
IEEE Std 802.3bs-2017 Media Access Control Parameters, Physical Layers, and Management Parameters for 200 Gb/s and 400 Gb/s Operation	6 December 2017	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair</i> <b>Pete Anslow</b> , <i>Working Group Secretary and Task Force Editor-in-Chief</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>John D'Ambrosia</b> , <i>Task Force Chair</i>
IEEE Std 802.3cc-2017 Physical Layer and Management Parameters for Serial 25 Gb/s Ethernet Operation Over Single-Mode Fiber	6 December 2017	<b>David J. Law</b> , <i>Working Group Chair</i> <b>Adam Healey</b> , <i>Working Group Vice-Chair</i> <b>Pete Anslow</b> , <i>Working Group Secretary</i> <b>Steven B. Carlson</b> , <i>Working Group Executive Secretary</i> <b>Valerie Maguire</b> , <i>Working Group Treasurer</i> <b>David Lewis</b> , <i>Task Force Chair</i> <b>Kohichi R. Tamura</b> , <i>Task Force Editor-in-Chief</i>

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Michael Elswick	Richard Frosch	Robert M. Grow	Rajmohan Hegde
Paul "Skip" Ely	Hongyan Fu	Robert Gudz	Wolfgang Heidasch
Richard Ely	Judy Fuess	Andreas Gulle	Ronen Heldman
Kent English	Yukihiro Fujimoto	Karunakar Gulukota	David Helster
Gregory Ennis	Atsuhisa Fukuoka	Ajay Gummalla	Ariel Hendel
Gianfranco Enrico	John Fuller	Richard Gumpertz	Itzik Hendel
Brian S. Ensign	Darrell Furlong	Sudhakar Gundubogula	Susan Hennenfent
Simone Erba	Michael Furlong	Craig Gunther	Carl Herman
Norman Erbacher	Mel Gable	Bin Guo	Ken Herrity
Tooraj Esmailian	Robert D. Gaglianella	Yong Guo	Pierre Herve
Nick Esser	Justin Gaither	Sandeep Gupta	David Hess
Daniel Essig	Robert Galin	Sudhir Gupta	James H. Hesson
David Estes	Sharad Gandhi	Tanmay Gupta	John Hickey
Judith Estrin	Tom Gandy	Mitch Gusat	Chip Hicks
Jim Everitt	Ilango S. Ganga	Jonas Gustafsson	Yasuo Hidaka
Steve Evitts	Robin Gangopadhya	Mark Gustlin	Tetsuya Higuchi
John F. Ewen	Xiao Ming Gao	Paul J. Gyugyi	Olli-Pekka Hiironen
Richard Fabbri	Andrea Garavaglia	Russ Gyurek	John Hill
Siavash Fallahi	Clete Gardenhour	Steven Haas	Tricia Hill
Josef Faller	Andrew Gardner	Michael Hackert	Sammy Hindi
Sabina Fanfoni	Mike Gardner	Tariq Haddad	William Hingston
Arash Farhoodfar	Geoffrey M. Garner	Stephen Haddock	Henry Hinrichs
Ramin Farjad	Claude Gauthier	Atikem Haile-Mariam	David Hinzl
Janos Farkas	Denton Gentry	Marek Hajduzenia	Riu Hirai
Rebecca Farley	John George	Sharam Hakimi	Kengo Hirano
Donald Fedyk	Floyd H. Gerhardt	Clive Hallatt	Ryan Hirth
Eldon Feist	Keith Gerhardt	Hiroshi Hamano	Charlie Hochstedler
Daniel Feldman	Mark Gerhold	Farid Hamidy	Charles Hoffner
Shahar Feldman	Anoop Ghanwani	Kevin Hamilton	Jay Hoge
Dongning Feng	Ali Ghiasi	Bernie Hammond	Thomas Hogenmueller
Feifei (Felix) Feng	Sajol Ghoshal	Benny Hanigal	David Hoglund
Severn Ferdun	Dimitrios Giannakopoulos	Greg Hankins	Brian Holden
Jean-Loup Ferrant	Giorgio Giaretta	Charaf Hanna	Bryan Hoover
Mark Feuertraeter	Pat Gilliland	G. Y. Hanna	Gregory Hopkins
German Feyh	George Ginis	Chris Hansen	Keith Hopwood
Jens Fiedler	Joel Goergen	Johannes Hansen	Rita Horner

Steven E. Horowitz	Michael D. Johas Teener	Tuan Khuu	C Kumar
Bernd Hormmeyer	Richard John	Gary Kidwell	Pankaj Kumar
Michael Horvat	Donald C. Johnson	Keti Kilcrease	Vinod Kumar
Yoshifumi Hotta	Howard Johnson	Bob Kilgore	Ted Kummert
Victor Hou	John Johnson	Chan Kim	Aniruddha Kundu
Stanley Hronik	Mize Johnson	Dae Young Kim	David Kung
Henry Hsiaw	Scott Johnson	Jin H. Kim	Albert Kuo
Jacob Hsu	Cristopher Jolly	Seung-Hwan Kim	Jeffrey Kuo
Rui Hua	Chad Jones	Su-Hyung Kim	David Kurcharczyk
Fred Huang	Nick Jones	Yongbum Kim	Christopher Kurker
Liang-wei Huang	Peter Jones	Eric Kimber	Yasuyuki Kuroda
Xi Huang	William W. Jones	Mark Kimber	Hidetsune Kurokawa
Xingang Huang	Ulf Jonsson	Myles Kimmitt	Toshihiko Kusano
Charles Hudson	Bheom-Soon Joo	Marc Kimpe	Gerard Kuyt
Chuck Hudson	Seong-Soon Joo	Mitsunobu Kimura	Bengt Kvist
Todd Hudson	Anthony Jordan	John Kincaid	Bruce Kwan
Michael Hughes	Thomas K. Jørgensen	Bill Kind	Alan Kwentus
Walter K. Hurwitz	Antony Joseph	Jonathan P. King	Lee LaBarre
Dean Huumala	Juan Jover	Neal King	Adel Henry Labib
Thong Huynh	Imre Juhász	Brian Kinnard	Richard LaCerte
Yasuhiro Hyakutake	Jason Julyan	Scott G. Kipp	Hans Lackner
David W. Hyer	Kwi-Yung Jung	Paul Kish	Gadi Lahat
Haruhiko Ichino	Dieter W. Junkers	Tadayoshi Kitayama	Kari Laihonon
Hiroki Ikeda	Paul Jury	Philippe Klein	Ashvin Lakshmikantha
Nicholas Ilyadis	David Kabal	Michael Klempa	Lowell D. Lamb
Jonathan Ingham	Jayant Kadambi	Avi Kliger	Lawrence J. Lamers
James Innis	Manabu Kagami	Richard Knight	Erik Lander
Romain Insler	Vic Kairis	Curtis Knittle	D. Matthew Landry
Scott Irwin	Shinkyo Kaku	Dylan Ko	Brett Lane
Kazuhiko Ishibe	Omer Kal	Mike Ko	William Lane
Osamu Ishida	Mohan Kalkunte	Hiroshi Kobayashi	Gordon Langlands
Hideki Isono	Amrit Kalla	Shigeru Kobayashi	Daun Langston
Tom Issenhuth	Joel S. Kalman	Shoukei Kobayashi	Jeffrey Lapak
Hirotake Iwadata	Matt Kaltenbach	Satoshi Kodama	Ed Lare
Mitsuru Iwaoka	Puru Kamat	Daniel Koehler	Ferdinando Lari
Kenneth Jackson	Ron Kao	Henricus Koeman	Efstathios Larios
Steve Jackson	Hadriel Kaplan	David J. Koenen	Loren Larsen
Krista S Jacobsen	Rainer Kaps	Christine Koenig	Wayne Larsen
Michael R. Jacobson	Roger Karam	David E. Kohl	Donald C. Larson
Mike Jacobson	Abhay Karandikar	Keisuke Kojima	Ryan Latchman
Ajit Jadeja	Jaime Kardontchik	Srinivas Kola	Tony Lau
John M. Jaeger	Upen Kareti	Paul F. Kolesar	Mark Laubach
Brent Jaffa	Yuji Kasai	Steven Koller	Tony Lauck
Raj Jain	Allen Kasey	Tom Kolze	Bruce LaVigne
Rajeev Jain	Prakash Kashyap	Kishan Rao Konda	David J. Law
David V. James	Sanjay Kasturia	Masashi Kono	Eric Lawrence
Eric Jang	Toyoyuki Kato	David Kooistra	Michael Lawton
Woo-Hyuk Jang	Harold W. Katz	Derek Koonce	John Laynor
Stephen Janshego	Boris Katzenberg	Paul Kopera	Greg Le Cheminant
Jonathan Jedwab	Dave Kaufman	Keith Kosanovich	Yannick Le Goff
Tony Jeffree	Sumesh Kaul	Leonid Koshevoy	My Le
George D. Jelatis	Keisuke Kawahara	Josef Kosilek	Quang Le
Ernie Jensen	Yasuaki Kawatsu	Donald E. Kotas	Michael Lebar
John Jetzt	Kevin Kayser	William F. Kous	Greg LeCheminant
Jack L. Jewell	William Keasler	Tetsu Koyama	Arthur Lee
Pankaj Jha	James Keeley	Seiji Kozaki	Changoo Lee
Hongtao Jiang	Hal Keen	Josef Kozilek	Chun-Tsung Lee
Jessica Xin Jiang	Paul Kellam	Glen Koziuk	Dong-Soo Lee
Qiaofeng Jiang	N. Patrick Kelly	Glen Kramer	Eugene Lee
Wenbin Jiang	Michael Kelsen	Daniel Krent	Fu-Ho Lee
Ni Jie	Joe Kennedy	Subi Krishnamurthy	Han Hyub Lee
Andrew C. Jimenez	John J. Kenny	Lars Paul Krolner	Hyeong Ho Lee
Robert Jin	Scott Kesler	Joerg-R Kropp	Jack Lee
Thomas K. Joergensen	Dawson Kesling	Simon Kropveld	Kyusang Lee
Clarence Joh	Lior Khermosh	George Kubovcik	Michael Lee



Wesley Lee	Rick Loveless	Philip L. McCarron	Gabriel Montenegro
Ying Lee	Raul Lozano	Frank McCarthy	Juan Montojo
Vincent Lefebvre	Ken Lu	Mick McCarthy	Leo Montreuil
Richard Lefkowitz	Fred A. Lucas	C. Phillip McClay	Cindy Montstream
Amir Lehr	James A. Lucas	Brett McClellan	Paul Mooney
Hanan Leizerovich	Miklos Lukacs	Kelly McClellan	Charles Moore
Brian E. Lemoff	Meilissa R. Lum	Mike McConnell	Paul B. Moore
John Lemon	Andy J. Luque	John McCool	Robert Moore
Richard Lena	Kent Lusted	Michael S. McCormack	Andy Moorwood
Andreas Lenkisch	Sharon Lutz	Gary McCoy	Matthew Mora
Lisa Leo	Jeffrey Lynch	Thomas Mcdermott	Octavio Morales
Robert H. Leonowich	Mark Lynn	Andy McDonald	Kazuyuki Mori
Michael Lerer	Eric R. Lynskey	John McDonough	Shohei Moriwaki
Warayot Lertniphonphun	Ian Lyon	Jerry McDowell	Robert L. Morrell
Amir Leshem	Henning Lysdal	Jim McGrath	John Morris
Andre Lessard	Gael Mace	Chris McGugan	Robert Mortonson
Raymond W. K. Leung	Ben Mack-Crane	Alan McGuire	Simon Moseley
Tommy Leung	Brian MacLeod	James McIntosh	Jack Moses
Avinoam Levy	Kenneth MacLeod	Keith McKechnie	Steven Moustakas
Van Lewing	Sam Madani	Donna McMaster	Harald Mueller
David Lewis	Zahy Madgar	Larry McMillan	Thomas Mueller
Jon Lewis	Anthony Magee	Martin McNarney	Wayne A. Mueller
Richard Lewis	Joseph Maggiolino	Tim McShane	Robert Muir
Lei Li	Randall Magliozzi	Greg McSorley	Ron Muir
Mike Peng Li	Valerie Maguire	James D. McVey	Shankar Mukherjee
Shaohua Li	Ariel Maislos	Grahame Measor	Shimon Muller
Sam Liang	Rabih Makarem	Marcel Medina	Eric Multanen
Thomas Lichtenegger	Jeffery J. Maki	Mounir Meghelli	Carrie Munson
William P. Lidinsky	David Malicoat	Mukesh Mehta	Ken Murakami
Jane Lim	James Malkemus	Richard Y. Mei	Denis Murphy
Seyoun Lim	Yonatan Malkiman	Wolfgang Meier	Thomas Murphy
John O. Limb	Edwin Mallette	Vince Melendy	Brian Murray
Alex Lin	Trey Malpass	Richard Mellitz	Dale Murray
Chan-De Lin	Daniel Maltbie	Avraham Menachem	Narayan Murthy
George Lin	Jeff Mandin	Menucher Menuchery	Samba Murthy
Ray Lin	Jim Mangin	Mark Merrill	Angela Muscat
Ru Jian Lin	Bob Marchetti	John Messenger	Robert Musk
Yoseph L. Linde	Luciano Marchitto	Jo Beth Metzger	Jim Muth
Wayne Lindquist	Carlo Mariotti	Steve Metzger	Henry Muysshondt
Thomas A. Lindsay	Arthur Marris	Jeffrey Meyer	Yaron Nachman
Laurie Lindsey	Charles Marsh	Yossi Meyouhas	Gerard Nadeau
Robert Lingle	Robert Marshall	Amir Mezer	James Nadolny
Marina Lipshteyn	Robert A. Marsland	Tremont Miao	Takeshi Nagahori
Alexander Liu	Arlen Martin	Joseph Micallef	Ken Naganuma
Cathy Liu	Arlon Martin	Thomas Michaelis	Hari Naidu
Chang-Chi Liu	David W. Martin	Richard Michalowski	Wendell Nakamine
Dekun Liu	Jeff Martin	Colin Mick	Edward Nakamoto
Fengkun Liu	Chris Mash	Phil Miguelez	Karl Nakamura
Hai-Feng Liu	Koichiro Mashiko	Martin R. Milbury	Nersi Nazari
James liu	Scott Mason	Jim Millar	W. P. Neblett
Zhenyu Liu	Takeo Masuda	Bruce D. Miller	Erwan Nedellec
William D. Livingston	Kirsten Matheus	C. Kenneth Miller	Jay Neer
William Lo	Thomas Mathey	Larry D. Miller	Darcy Nelson
Martin Lobel	Ziad Albert Matni	Brian Misek	James Nelson
Terry Lockyer	Erdem Matoglu	Jacob (Kobi) Mizrahi	Kristian Nelson
Hugh Logan	Laurence Matola	Fanny Mlinarsky	Trung Nguyen
Moiz Lokhandwala	Naoki Matsuda	Reza Moattar	Thinh Nguyenphu
Larry Lomelino	Shougo Matsuda	Merrick Moeller	Henry T. Nicholas
Leland Long	Hideyuki Matsuo	Bryan Moffitt	Gary Nicholl
Sherry J. Lorei	Bob Matthys	Fred Mohamadi	Larry Nicholson
Jahan Lotfi	Bret A. Matz	Ardehsir Mohammadian	Allan Nielsen
James A. Lott	Bob Mayer	Dirk S. Mohl	Paul Nikolich
Dennis Lou	Joseph Mazor	Mart L. Molle	David Nim
Don Loughry	David S. McCallum	Ray Mompont	Glenn Nishida
Bob Love	Kent McCammon	John Monson	Susumu Nishihara

Shinji Nishimura	Earl Parsons	William Powell	Steven Robinson
George Noh	Elwood T. Parsons	Gideon Prat	Stuart Robinson
Kazuhiro Nojima	Glenn W. Parsons	Bernd Prediger	Timothy Rock
John Nolan	Vasu Parthasarathy	Robert S. Printis	Michael Rodensky
Kevin Nolish	Joel Paslaski	Max Pritikin	A. Rodriguez
Kevin Noll	Jerry Pate	Richard Prodan	Carlos Rodriguez
Takumi Nomura	Bhavesh Patel	John Proffitt	Josef Roese
Michael Nootbaar	Dipak M. Patel	Steve Pryor	Shawn Rogers
Ronald Nordin	Piyush Patel	Haoli Qian	Derek Rohde
Bob Norton	Pravin Patel	William Quackenbush	Dan Romascanu
Bob Noseworthy	Sandeep Patel	Holger Quast	Tume Römer
Ahmad Nouri	Shashi Patel	Tomas J. Quigley	Albrecht Rommel
Mark Nowell	Vijay Pathak	Jim Quilici	David Roos
Ivan Oakley	Martin Patoka	Patrick W. Quinn	Robert Rosenthal
Satoshi Obara	Aidan Paul	John Quirk	Floyd Ross
John Oberstar	Prasun K. Paul	Rick Rabinovich	Tam Ross
J. Michael O'Connor	Alex Pavlovsky	Jerry K. Radcliffe	Martin Rossbach
David Ofelt	John Payne	Ted Rado	Christopher Roth
Gourgen Oganessyan	Tony Peatfield	Sreen Raghavan	Michael Rothenberg
Ichiro Ogura	Anthony Peck	Saifur Rahman	Salvatore Rotolo
Stephen Oh	Neil Peers	Syed Rahman	Jessy Rouyer
Steven O'Hara	Jan P. Peeters-Weem	Jurgen Rahn	Tony Rowell
Peter Ohlén	Arkadiy Peker	Mohammad Rajabzadeh	Archana Roy
Raj Ojha	Joseph Pelissier	Purva Rajkotia	Larry Rubin
Mitsuji Okada	Jim Pelster	Shlomo Rakib	Paul F. Russo
Vladimir Oksman	Wanquan Peng	Naresh Raman	Bill Ryan
Guy P. Oliveira	Y. Lisa Peng	Brian Ramelson	Hyunsurk (Eric) Ryu
Chris Oliver	Petar Pepeljugoski	Brian J. Ramsey	Khosrow Sadeghi
Lloyd Oliver	Gerald Pepper	Adee Ran	Jonathan Sadler
David Olsen	Ruben Perez De Aranda Alonso	Karen Randall	Naoto Saeki
Bengt-Erik Olsson	Drew D. Perkins	William Randle	Dalit Sagi
Mike Oltmanns	Randy Perrie	Randy K. Rannow	Ali Sajassi
Barry O'Mahony	Gerry Pesavento	Ram Rao	Ed Sakaguchi
Padraig O'Mathuna	Michael Peters	Sailesh K. Rao	Toshiaki Sakai
Keith Onodera	William R. Peters	Jennifer G. Rasimas	Hisaya Sakamoto
Toshio Ooka	Brian Peterson	Dan Rausch	Dolors Sala
Philip Orlik	David Peterson	Peter Rautenberg	Jorge Salinger
Aidan O'Rourke	John Petrilla	Eric Rawson	Peter Sallaway
Valy Ossman	Phong Pham	Robert Reed	Joseph Salowey
Akihiro Otaka	Abhijit Phanse	Ivan Reede	Panagiotis Saltzidis
Michael O'Toole	Thomas L. Phinney	Alon Regev	Vineet Salunke
Tony O'Toole	Jean Picard	Dennis Rehm	Michael M. Salzman
Michel Ouellette	David Piede	Eugene Reilly	Moni Samaan
George Oughton	David Piehler	Jim Reinstedler	Sam Sambasivan
George Oulundsen	Roy Pierce	Maurice Reintjes	Fred Sammartino
Pat Overs	Robert Pieters	Duane Remein	Henry Samuelli
Kazuyuki Ozawa	Antti Pietilainen	Andreas Rendel	Anthony Sanders
Paul Pace	Christian Pietsch	Lawrence Rennie	Gianluca Sanità
Robert R. Pace	Velu C. Pillai	Victor Renteria	Mark Sankey
Charles Palanzo	Rick Pimpinella	Tamir Reshef	Concita Saracino
Thomas Palkert	Neven Pischl	Michael Ressler	Arindam Sarkar
Tom Palkert	Armin Pitzer	Pedro Reviriego	Bill Sarles
Hui Pan	Ed Pivonka	Bill Reysen	F. Sarles
Sujan Pandey	Timothy R. Plunkett	Behrooz Rezvani	Akira Sasaki
Sesha Panguluri	Rainer Poehmerer	June-Koo (Kevin) Rhee	Yasuo Sasaki
Donald Pannell	David Poisner	Jamal Riani	Stan Sassower
Bill Panos	Peter Pondillo	Dave Richkas	Ramesh Sastry
Gabriel D Papanreda	Petre Popescu	Joseph Rickert	Satish Sathe
Carlos Pardo	Hayim Porat	Poldi (Pavlick) Rimboim	John Sauer
Keshab K. Parhi	Jeff Porter	John Ritger	Raj Savara
Jisang Park	Carl R. Posthuma	Paul Rivett	Olindo Savi
Moon Park	Bill Poston	Ramez Rizk	T. Shannon Sawyer
Jim Parker	David Potter	Anthony Rizzolo	Sabit Say-Otun
Gavin Parnaby	Kimberly Potttratz	Iain Robertson	Edward Sayre
Bidyut Parruck	Scott R. Powell	Gary Robinson	J. David Schell

Dieter W. Schicketanz	Nathan Silberman	Leonard Stencil	Katsuhisa Tawa
Frederick Schindler	Tim Simmons	Gary Stephens	Ken Taylor
Ronald Schmidt	Scott Simon	Claus Stetter	Mark Taylor
Matthew Schmitt	Jesse Simsarian	Ronald Steudler	Mehmet Tazebay
Tom Schmitt	Bharat Singh	Daniel Stevens	Tim Teckman
Stefan Schneelee	Charan J. Singh	Donald S. Stewart	Brian Teipen
Peter Schoenmaker	Paramjeet (P. J.) Singh	Heath Stewart	Antonio L. Teixeira
Frederick Scholl	Semir Sirazi	Dean M. Stoddart	Vivek Telang
Thomas Schramm	Ramesh Sivakolundu	Daniel P. Stokesberry	José Tellado
Thomas Schrans	Tom Skaar	Mario Stoltz	Patricia A. Thaler
Walter Schreuer	Joseph Skorupa	Robert Stone	R. Jonathan Thatcher
Ted Schroeder	James P. Skoutas	Christopher Stook	Sashisekaran Thiagarajan
Scott Schube	Jeff Slavick	Olaf Storaasli	Walter Thirion
Benjamin Schultz	Dinah Sloan	Steve Storozum	Geoffrey O. Thompson
Klaus Schulz	Tom Slykhouse	David Stover	Douglas Thomson
David Schwartz	Andrew Smith	Rick Strohmayer	Lars E. Thon
Peter Schwartz	Daniel Smith	Stephen Strong	David Thorne
Peter Scruton	David A. Smith	Richard Stuart	Ao Ting
Harvey R. Scull	Eric Smith	Thomas Suermann	Alan Tipper
Anthony Seaman	Grant Smith	Jun Sugawa	Nathan Tobol
Michael Seaman	Michael Smith	Alan Sugg	John Todd
Shawn Searles	Robert Smith	Robert Sultan	Bruce Tolley
Hossein Sedarat	Robert W. Smith	Ron Sulyma	Carlos A. Tomaszewski
Stephn Sedio	Steve Smith	Robert Summers	Peter Tomaszewski
Ted Seely	Robert Snyder	Ken F. Sumner	Pirooz Tooyserkani
Brian Seemann	Dror Sofer	Junqing Sun	Paul Torgerson
Khorvash (Kory) Sefidvash	Ran Soffer	Karthik Sundareshan	Luis Torres
Richard Seifert	Joe Solomon	Tetsuyuki Suzuki	Rick Townsend
Alexander Seiger	Gregory Somer	Hiroshi Suzuki	Hidehiro Toyoda
Katsutoshi Seki	Scott Sommers	Ken-ichi Suzuki	Mario Träber
Oren Sela	Yoshiaki Sone	Muneyoshi Suzuki	Nathan Tracy
Steve Selee	Jaeyeon Song	Naoki Suzuki	Mario Traeber
Lee Sendelbach	Jian Song	Daniel Svensson	Hiep Tran
Shoichiro Seno	Xiaolu Song	Steve Swanson	Matthew Traverso
Murat Serbay	Massimo Sorbara	Norman L. Swenson	David Tremblay
Naoshi Serizawa	David Sorensen	Andre Szczepanek	Francois Tremblay
Koichiro Seto	Michel Sorenson	Daniel Sze	Albert Tretter
Farhad Shafai	Walter Sotelo	William Szeto	Stephen J. Trowbridge
Haim Shafir	Stephen Soto	Tad Szostak	Thomas E. Truman
Amit Shah	Walt Soto	Richard Taborek	Wen-Cheng Tseng
Sunil Shah	Tom Souvignier	Dimitry Taich	Shinji Tsuji
Vadim Shain	Fulvio Spagna	Bharat Tailor	Yoshihiro Tsukamoto
Abhijit Shanbhag	Bryan Sparrowhawk	Akio Tajima	Eddie Tsumura
Megha Shanbhag	Ben Speiser	Takayuki Tajima	Mike Tu
Ron Shani	Gary Spencer	Tomoo Takahara	Zbigniew Turlej
Masood Shariff	Edward Sprague	Eiichi Takahashi	Brad Turner
Stephen Shellhammer	Michael Spratt	Hidenori Takahashi	Edward Turner
Bazhong Shen	Nurit Sprecher	Satoshi Takahashi	Wendell Turner
Sam Shen	Matthew B. Squire	Kiyoto Takahata	Bulent Tusiray
Ben Sheppard	Atul Srivastava	Noriyuki Takeda	Jacob Twersky
Paul Sherer	David Srodzinski	Martin Takessian	Bor-long Twu
Robbie Shergill	Matthew St Peter	Motoyuki Takizawa	Marcos Tzannes
Siddharth Sheth	Joseph St. Amand	Kohichi Tamura	Kiyoshi Uematsu
Masayuki Shigematsu	David N. Stacy	Alexander Tan	Alan Ugolini
Cheng-Chung Shih	Clayton Stanford	Keiji Tanaka	Herbert Uhl
Hyungsoo Shin	Thomas Staniec	Toshiki Tanaka	Jayshree Ullal
Jong-Yoon Shin	Patrick H. Stanley	Wen-Tsung Tang	John Ulm
Ramin Shirani	Kevin Stanton	Sandray Tarana	Steven Ulrich
Mizuki Shirao	Nick Stapleton	Victor J. Tarassov	Ed Ulrichs
Zion Shoheit	Graham Starkins	Peter Tarrant	Alexander Umnov
Larry Shorthill	Peter Stassar	Mike Tate	Gottfried Ungerboeck
Avadhani Shridhar	Peter Staub	Tsutomu Tatsuta	Musa Unmehopa
Kapil Shrikhande	Margit Stearns	Jim Tatum	Sterling A. Vaden
Martin Siegmund	Henk Steenman	James M. Tavacoli	Todd Vafiades
Som Sikdar	David E. Stein	Sadry Tavana	Stefano Valle

Magesh Valliappan	Robert Wang	Erica Williamson	Doug Yoder
Nicholas Van Bavel	Roy Wang	Robert S. Williamson	Tetsuya Yokomoto
David J. Van Goor	Tongtong Wang	Roger Wilmarth	Nobushige Yokota
Peter Van Laanen	Xiaofeng Wang	Joris Wils	Tae-Whan Yoo
Erik van Oosten	Xinyuan Wang	Izumi Wilson	Bin Yeong Yoon
Paul Z. Vanderlaan	Yun-Che Wang	Mike Wincn	Chong Ho Yoon
Schelto J. vanDoorn	Zhong Feng Wang	Mark Wingrove	Jason Yorks
Dono Van-Mierop	Ken Ward	Ludwig Winkel	Osamu Yoshihara
Andre VanSchyndel	Tim Warland	Darin Winterton	Takashi Yoshikawa
Nicola Varanese	David Warren	Mike Witkowski	George Young
Albert Vareljian	Jeff Warren	Kevin Witt	Ken Young
Kumaran Veerayah	Marc Warshaw	Andrew Witzner	Leonard Young
V. Kumar Venkatavaraton	Ted Washburn	John Wolcott	Nariman Yousefi
Ramakrishna Vepa	Yuji Watanabe	Jonghwa Won	Lennart Yseboodt
G�rard Vergnaud	Bruce Watson	King Won	Ben Yu
Bill Verheggen	Robert Watson	Shin-Hee Won	Hong Yu
Iain Verigin	Markus Weber	Ching Wong	Mark Yu
Robert Verne	Dong Wei	David Wong	Ting-Fa Yu
Anoop Vetteth	Yuehua Wei	Don Wong	Liquan Yuan
Nader Vijeh	Jason Weil	Edward Wong	Hayato Yuki
Ron Vilozny	Lyle Weiman	Leo Wong	Garold Yurko
John Visser	Nick Weiner	Percy Wong	Nick Zades
Balasubramanian Vittal	Brian Weis	Bill Woodruff	Nelson Zagalsky
Ionel Marius Vladan	Alan Weissberger	Paul Woodruff	Andrew Zambell
Yurii Vlasov	Andrew Weitzner	Ted K. Woodward	Meiyan Zang
David Vogel	Moti Weizman	Chien-Hsien Wu	Hank Zannini
Moshe Voloshin	Brian Welch	Choa-Ping Wu	Jamie Zartman
Brian Von Herzen	Jim Welch	Guangsheng Wu	Li Zeng
John von Voros	Yang Wen	Peter Wu	Huanlin Zhang
Manoj Wadekar	Matthias Wendt	Robert Wu	James Zhang
William Wager	Fred Weniger	Markus Wucher	Jin Zhang
Martin Wagner	Oded Wertheim	Stefan M. Wurster	Jing-fan Zhang
Robert Wagner	Jason Wertz	Dayin Xu	Wenyu Zhao
P. E. Wainwright	Willem Wery	Yu Xu	Lizhi Zhong
Ikuo Wakayama	Alan Wetzel	Ariel Yagil	Qiwen Zhong
Clinton Walker	David White	Michael Yam	Igor Zhovnirovsky
Dylan Walker	Hugh E. White	Masaki Yamada	Yan Zhuang
Rick Walker	Lawrence White	Hajime Yamashita	Martin Zielinski
Bill Wall	Martin White	Shuntaro Yamazaki	George Zimmerman
Edward Walter	Tony Whitlow	Howard Yang	Helge Zinner
Chang Jung Wang	Bill Wiedemann	Steven Yang	Pavel Zivny
Chenxi Wang	Joseph A. Wiencko	Yinglin (Frank) Yang	Bob Zona
Chiung Hung Wang	Natalie Wienckowski	Ronald Yara	Mo R. Zonoun
Greg Wang	Bert Wijnen	Masaki Yasukawa	Glen Zorn
Haifei Wang	Bruce Williams	Jun Yi	Gaoling Zou
Peter Wang	Richard Williams	Lee Chung Yiu	

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

Thomas Alexander	Christel Hunter	Michael Peters
Richard Alfvén	C. Huntley	David Piehler
Nobumitsu Amachi	Noriyuki Ikeuchi	Rick Pimpinella
Dale Amason	Sergiu Iordanescu	Adee Ran
Pete Anslow	Osamu Ishida	R.K. Rannow
Butch Anton	Atsushi Ito	Alon Regev
Stefan Aust	Raj Jain	James Reilly
Eric Baden	SangKwon Jeong	Maximilian Riegel
Christian Boiger	Peter Jones	Robert Robinson
Ralf-Peter Braun	Piotr Karocki	Alexander Rysin
Nancy Bravin	Stuart Kerry	Frank Schewe
Matthew Brown	Yongbum Kim	Kapil Shrikhande
Demetrio Jr Bucaneg	Jonathan King	Jeff Slavick
Gary Burrell	Mark Laubach	Daniel Smith
Jairo Bustos Heredia	David J. Law	Thomas Starai
William Byrd	Hyeong Ho Lee	Peter Stassar
Steven B. Carlson	Hanan Leizerovich	Heath Stewart
Juan Carreon	David Lewis	Walter Struppler
Chan Chen	Jon Lewis	Mitsutoshi Sugawara
Keith Chow	Kent Lusted	Kohichi Tamura
Keng Hua Chuang	Michael Lynch	David Tepen
Charles Cook	Elvis Maculuba	David Thompson
Rodney Cummings	Valerie Maguire	Geoffrey O. Thompson
Piers J. G. Dawe	Jeffery Maki	Michael Thompson
Michael Dudek	Roger Marks	David Tremblay
Sourav Dutta	Arthur Marris	Stephen Trowbridge
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## Introduction

This introduction is not part of IEEE Std 802.3-2018, IEEE Standard for Ethernet.

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 802.3-2018 publication, IEEE Std 802.3 is composed of the following documents:

### IEEE Std 802.3-2018

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 include general information on 40 Gb/s and 100 Gb/s operation as well as 40 Gb/s and 100 Gb/s Physical Layer specifications. Clause 90 specifies Ethernet support for time synchronization protocols.

Section Seven—Includes Clause 96 through Clause 115 and Annex 97A through Annex 115A. Clause 96 through Clause 98, Clause 104, and associated annexes, specify Physical Layers and optional features for 100 Mb/s and 1000 Mb/s operation over a single twisted pair. Clause 100 through Clause 103, as well as associated annexes, specify Physical Layers for the operation of the EPON protocol over coaxial distribution networks. Clause 105 through Clause 114 and associated annexes include general information on 25 Gb/s operation as well as 25 Gb/s Physical Layer specifications. Clause 99 specifies a MAC merge sublayer for the interspersing of express traffic. Clause 115 and its associated annex specify a Physical Layer for 1000 Mb/s operation over plastic optical fiber.

Section Eight—Includes Clause 116 through Clause 126 and Annex 119A through Annex 120E. Clause 116 through Clause 124 and associated annexes include general information on 200 Gb/s and 400 Gb/s operation as well as 200 Gb/s and 400 Gb/s Physical Layer specifications. Clause 125 and Clause 126 include general information on 2.5 Gb/s and 5 Gb/s operation as well as 2.5 Gb/s and 5 Gb/s Physical Layer specifications.

A companion document IEEE Std 802.3.1 describes Ethernet management information base (MIB) modules for use with the Simple Network Management Protocol (SNMP). IEEE Std 802.3.1 is updated to add management capability for enhancements to IEEE Std 802.3 after approval of the enhancements.

IEEE Std 802.3 will continue to evolve. New Ethernet capabilities are anticipated to be added within the next few years as amendments to this standard.



## Acknowledgments

Grateful acknowledgment is made for portions of this standard reprinted with permission from Broadcom Corporation, OPEN Alliance BroadR-Reach® (OABR) Physical Layer Transceiver Specification For Automotive Applications V3.2, June 24, 2014, © 2014.

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# IEEE Standard for Ethernet

## SECTION ONE

This section includes Clause 1 through Clause 20, Annex A through Annex H, and Annex 4A.

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# IEEE Standard for Ethernet

**Section One:** This section includes Clause 1 through Clause 20, Annex A through Annex H, and Annex 4A.

## 1. Introduction

### 1.1 Overview

This is an international standard for Local and Metropolitan Area Networks (LANs and MANs), employing CSMA/CD as the shared media access method and the IEEE 802.3 (Ethernet) protocol and frame format for data communication. This international standard is intended to encompass several media types and techniques for a variety of MAC data rates as shown in Figure 1–1 and in 4.4.2.

#### 1.1.1 Scope

This standard defines Ethernet local area, access and metropolitan area networks. Ethernet is specified at selected speeds of operation; and uses a common media access control (MAC) specification and management information base (MIB). The Carrier Sense Multiple Access with Collision Detection (CSMA/CD) MAC protocol specifies shared medium (half duplex) operation, as well as full duplex operation. Speed specific Media Independent Interfaces (MIIs) provide an architectural and optional implementation interface to selected Physical Layer entities (PHY). The Physical Layer encodes frames for transmission and decodes received frames with the modulation specified for the speed of operation, transmission medium and supported link length. Other specified capabilities include: control and management protocols, and the provision of power over selected twisted pair PHY types.

#### 1.1.2 Basic concepts

This standard provides for two distinct modes of operation: half duplex and full duplex. A given IEEE 802.3 instantiation operates in either half or full duplex mode at any one time. The term “CSMA/CD MAC” is used throughout this standard synonymously with “802.3 MAC,” and may represent an instance of either a half duplex or full duplex mode data terminal equipment (DTE), even though full duplex mode DTEs do not implement the CSMA/CD algorithms traditionally used to arbitrate access to shared-media LANs.