DRAFT AMENDMENT ISO/IEC DIS 8802-3/Amd.4
IEEE Std 802.3ak-2004

Attributed to ISO/IEC JTC 1 by the Central Secretariat (see page iii)

Voting begins on
2004-06-16

Voting terminates on
2004-11-16

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION
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FAST-TRACK PROCEDURE

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

Part 3:
Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications

AMENDMENT 4: Physical layer and management parameters for 10Gb/s operation, type 10GBASE-CX4

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

Partie 3: Accès multiple par surveillance du signal et détection de collision (CSMA/CD) et spécifications pour la couche physique

AMENDEMENT 4: Paramètres pour la couche physique et la gestion pour l'operation à 10Gb/s, type 10GBASE-CX4

ICS 35.110

In accordance with the provisions of Council Resolution 21/1986 this DIS is circulated in the English language only.

Conformément aux dispositions de la Résolution du Conseil 21/1986, ce DIS est distribué en version anglaise seulement.

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NOTE FROM ITTF

This draft International Standard is submitted for JTC 1 national body vote under the Fast-Track Procedure.

In accordance with Resolution 30 of the JTC 1 Berlin Plenary 1993, the proposer of this document recommends assignment of ISO/IEC 8802-3/Amd.4 to JTC 1/SC 6.

“FAST-TRACK” PROCEDURE

1 Any P-member and any Category A liaison organization of ISO/IEC JTC 1 may propose that an existing standard from any source be submitted directly for vote as a DIS. The criteria for proposing an existing standard for the fast-track procedure are a matter for each proposer to decide.

2 The proposal shall be received by the ITTF which will take the following actions.

2.1 To settle the copyright and/or trade mark situation with the proposer, so that the proposed text can be freely copied and distributed within JTC 1 without restriction.

2.2 To assess in consultation with the JTC 1 secretariat which SC is competent for the subject covered by the proposed standard and to ascertain that there is no evident contradiction with other International Standards.

2.3 To distribute the text of the proposed standard as a DIS. In case of particularly bulky documents the ITTF may demand the necessary number of copies from the proposer.

3 The period for combined DIS voting shall be six months. In order to be accepted the DIS must be supported by 75 % of the votes cast (abstention is not counted as a vote) and by two-thirds of the P-members voting of JTC 1.

4 At the end of the voting period, the comments received, whether editorial only or technical, will be dealt with by a working group appointed by the secretariat of the relevant SC.

5 If, after the deliberations of this WG, the requirements of 3 above are met, the amended text shall be sent to the ITTF by the secretariat of the relevant SC for publication as an International Standard.

If it is impossible to agree to a text meeting the above requirements, the proposal has failed and the procedure is terminated.

In either case the WG shall prepare a full report which will be circulated by the ITTF.

6 If the proposed standard is accepted and published, its maintenance will be handled by JTC 1.

IEEE Standards

IEEE Std 802.3ak™-2004
(Amendment to IEEE Std 802.3™-2002
as amended by
IEEE Stds 802.3ae™-2002,
802.3af™-2003,
and 802.3aj™-2003)

802.3ak™

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

Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications

Amendment: Physical Layer and Management Parameters for 10Gb/s Operation, Type 10GBASE-CX4

IEEE Computer Society

Sponsored by the
LAN/MAN Standards Committee

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IEEE Std 802.3ak™-2004
(Amendment to IEEE Std 802.3™-2002)

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

Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications

Amendment: Physical Layer and Management Parameters for 10Gb/s Operation, Type 10GBASE-CX4

Sponsor

LAN/MAN Standards Committee
of the
IEEE Computer Society

Approved 9 February 2004

IEEE-SA Standards Board

Abstract: This amendment to IEEE Std 802.3-2002 as amended by IEEE Std 802.3ae-2002, IEEE Std 802.3af-2003 and IEEE Std 802.3aj-2003 specifies a new physical layer medium dependent sublayer interface for 10Gb/s Ethernet. 10GBASE-CX4 specifies an equipment interconnect based on the 10 Gigabit Attachment Unit Interface (XAUI) for up to 15m of balanced shielded cabling.

Keywords: 802.3ak, 10GBASE-CX4,10 Gigabit Ethernet, cable assembly, physical medium dependent (PMD) sublayer, XAUI

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Introduction to IEEE Std 802.3ak-2004

(This introduction is not part of IEEE Std 802.3ak-2004, IEEE Standard for Information technology— Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements CSMA/CD Access Method and Physical Layer Specifications Amendment: Physical Layer and Management Parameters for 10Gb/s Operation, Type 10GBASE-CX4.)

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 802.3ae™). A historical listing of all projects that have added to or modified IEEE Std 802.3 follows as a part of this introductory material. The listing is in chronological order of project initiation and for each project describes: subject, clauses added (if any), approval dates, and committee officers.

The media access control (MAC) protocol specified in IEEE Std 802.3 is Carrier Sense Multiple Access with Collision Detection (CSMA/CD). This MAC protocol was included in the experimental Ethernet developed at Xerox Palo Alto Research Center. While the experimental Ethernet had a 2.94 Mb/s data rate, IEEE Std 802.3-1985 specified operation at 10 Mb/s. Since 1985 new media options, new speeds of operation, and new protocol capabilities have been added to IEEE Std 802.3.

Some of the major additions to IEEE Std 802.3 are identified 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 802.3x™ specified full duplex operation and a flow control protocol, IEEE Std 802.3z™ added 1000 Mb/s operation (also called Gigabit Ethernet) and IEEE Std 802.3ad specified link aggregation. These major additions are all now included in IEEE Std 802.3-2002 and are not available as separate documents.

Recent additions such as IEEE Std 802.3ae (also called 10 Gigabit Ethernet) and IEEE Std 802.3af™ (also called Power over Ethernet) are currently published as separate documents. These recent amendments are part of IEEE Std 802.3 and they are dependent on and reference information published in IEEE Std 802.3-2002.

At the date of IEEE Std 802.3ak publication, IEEE Std 802.3 is comprised of the following documents:

IEEE Std 802.3-2002

Section One—Includes Clause 1 through Clause 20 and Annexes A through H. 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 Clause32 and Annexes 22A through 32A. Section Two includes the specifications for 100 Mb/s operation and management attributes for multiple protocols and operational speeds.

Section Three—Includes Clause 34 through Clause 43 and Annexes 36A through 43C. Section Three includes the specifications for 1000 Mb/s operation.

IEEE Std 802.3ae-2002

Includes changes to IEEE Std 802.3-2002, and adds Clauses 44 through 53 and Annexes 44A through 50A. This amendment includes specifications for 10 Gb/s operation.

IEEE Std 802.3af-2003

Includes changes to IEEE Std 802.3-2002, and adds Clause 33 and Annexes 33A through 33E. This amendment includes specifications for the provision of power over 10BASE-T, 100BASE-TX and 1000BASE-T cabling.

IEEE Std 802.3aj™ -2003

Includes changes to IEEE Std 802.3-2002 and IEEE Std 802.3ae-2002.

IEEE Std 802.3ak-2004

Includes changes to IEEE Std 802.3-2002, and IEEE Std 802.3ae-2002, and adds Clause 54. This amendment adds 10GBASE-CX4 specifications for 10 Gb/s operation over balanced shielded cabling.

IEEE 802.3 will continue to evolve. Revisions are anticipated to the above standards within the next few years to integrate approved changes into IEEE 802.3, to clarify existing material, to correct possible errors, and to incorporate new related material.

Conformance test methodology

An additional standard, IEEE Std 1802.3™ provides conformance test information for 10BASE-T.

IEEE Std 802.3ak-2004

IEEE Std 802.3ak-2004, Physical Layer and Management Parameters for 10Gb/s Operation, Type 10GBASE-CX4 is an amendment to IEEE Std 802.3. It includes changes to both IEEE Std 802.3-2002 and IEEE Std 802.3ae-2002. In a few cases, text published in IEEE Std 802.3-2002 is modified by IEEE Std 802.3ae-2002 and is subsequently modified by IEEE Std 802.3ak-2004. IEEE Std 802.3ak-2004 does not include any modifications to the text of IEEE Std 802.3af-2003 and IEEE Std 802.3aj-2003.

Historical listing of IEEE Std 802.3 projects

Included in IEEE Std 802.3-2002

IEEE Std 802.3 document	Date approved by IEEE and ANSI	Officers at the time of working group ballot
802.3-1985, Original 10 Mb/s standard, MAC, PLS, AUI, 10BASE5	23 June 1983 (IEEE) 31 December 1984 (ANSI)	**Donald C. Loughry,** *Working Group Chair*
802.3a-1988 (Clause 10), 10 Mb/s MAU 10BASE2	15 November 1985 (IEEE) 28 December 1987 (ANSI)	**Donald C. Loughry,** *Working Group Chair* **Alan Flatman,** *Task Force Chair*
802.3b-1985 (Clause 11), 10 Mb/s Broadband MAU, 10BROAD36	19 September 1985 (IEEE) 28 February 1986 (ANSI)	**Donald C. Loughry,** *Working Group Chair* **Menachem Abraham,** *Task Force Chair*
802.3c-1985 (9.1–9.8), 10 Mb/s Baseband Repeater	12 December 1985 (IEEE) 4 June 1986 (ANSI)	**Donald C. Loughry,** *Working Group Chair* **Geoffrey O. Thompson,** *Task Force Chair*
802.3d-1987 (9.9), 10 Mb/s Fiber MAU, FOIRL	10 December 1987 (IEEE) 9 February 1989 (ANSI)	**Donald C. Loughry,** *Working Group Chair* **Steven Moustakas,** *Task Force Chair*
802.3e-1987 (Clause 12), 1 Mb/s MAU and Hub 1BASE5	11 June 1987 (IEEE) 15 December 1987 (ANSI)	**Donald C. Loughry,** *Working Group Chair* **Robert Galin,** *Task Force Chair*
802.3h-1990 (Clause 5), 10 Mb/s Layer Management, DTEs	28 September 1990 (IEEE) 11 March 1991 (ANSI)	**Donald C. Loughry,** *Working Group Chair* **Andy J. Luque,** *Task Force Chair*
802.3i-1990 (Clauses 13 and 14), 10 Mb/s UTP MAU, 10 BASE-T	28 September 1990 (IEEE) 11 March 1991 (ANSI)	**Donald C. Loughry**, *Working Group Chair* **Patricia Thaler,** *Task Force Chair (initial)* **Richard Anderson,** *Task Force Chair (final)*

IEEE Std 802.3 document	Date approved by IEEE and ANSI	Officers at the time of working group ballot
802.3j-1993 (Clauses 15–18), 10 Mb/s Fiber MAUs 10BASE-FP, FB, and FL	15 September 1993 (IEEE) 15 March 1994 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Keith Amundsen,** *Task Force Chair (initial)* **Frederick Scholl,** *Task Force Chair (final)* **Michael E. Lee,** *Technical Editor*
802.3k-1993 (Clause 19), 10 Mb/s Layer Management, Repeaters	17 September 1992 (IEEE) 8 March 1993 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Joseph S. Skorupa,** *Task Force Chair* **Geoffrey O. Thompson,** *Vice Chair and Editor*
802.3*l*-1992 (14.10), 10 Mb/s PICS Proforma 10BASE-T MAU	17 September 1992 (IEEE) 23 February 1993 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Mike Armstrong,** *Task Force Chair and Editor* **Paul Nikolich,** *Vice Chair* **William Randle,** *Editorial Coordinator*
802.3m-1995, Maintenance 2	21 September 1995 (IEEE) 16 July 1996 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Gary Robinson,** *Maintenance Chair*
802.3n-1995, Maintenance 3	21 September 1995 (IEEE) 4 April 1996 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Gary Robinson,** *Maintenance Chair*
802.3p-1993™ (Clause 20), Management, 10 Mb/s Integrated MAUs	17 June 1993 (IEEE) 4 January 1994 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Joseph S. Skorupa,** *Task Force Chair* **Geoffrey O. Thompson,** *Vice Chair and Editor*
802.3q-1993™ (Clause 5), 10 Mb/s Layer Management, GDMO Format	17 June 1993 (IEEE) 4 January 1994 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Joseph S. Skorupa,** *Task Force Chair* **Geoffrey O. Thompson,** *Vice Chair and Editor*
802.3r-1996 (8.8), Type 10BASE5 Medium Attachment Unit PICS proforma	29 July 1996 (IEEE) 6 January 1997 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Imre Juhász**, *Task Force Chair* **William Randle,** *Task Force Editor*
802.3s-1995, Maintenance 4	21 September 1995 (IEEE) 8 April 1996 (ANSI)	**Geoffrey O. Thompson,** *Working Group Chair* **Gary Robinson,** *Maintenance Chair*
802.3t-1995, 120 Ω informative annex to 10BASE-T	14 June 1995 (IEEE) 12 January 1996 (ANSI)	**Geoffrey O. Thompson,** *Working Group Chair* **Jacques Christ,** *Task Force Chair*
802.3u-1995 (Clauses 21–30), Type 100BASE-T MAC parameters, Physical Layer, MAUs, and Repeater for 100 Mb/s Operation	14 June 1995 (IEEE) 4 April 1996 (ANSI)	**Geoffrey O. Thompson,** *Working Group Chair* **Peter Tarrant,** *Task Force Chair (Phase 1)* **Howard Frazier,** *Task Force Chair (Phase 2)* **Paul Sherer,** *Editor-in-Chief (Phase 1)* **Howard Johnson,** *Editor-in-Chief (Phase 2)* **Colin Mick,** *Comment Editor*
802.3v-1995, 150 Ω informative annex to 10BASE-T	12 December 1995 (IEEE) 16 July 1996 (ANSI)	**Geoffrey O. Thompson,** *Working Group Chair* **Larry Nicholson,** *Task Force Chair*
802.3x-1997 and 802.3y-1997 (Revisions to 802.3, Clauses 31 and 32), Full Duplex Operation and Type 100BASE-T2	20 March 1997 (IEEE) 5 September 1997 (ANSI)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Rich Seifert,** *Task Force Chair and Editor (802.3x)* **J. Scott Carter,** *Task Force Chair (802.3y)* **Colin Mick**, *Task Force Editor (802.3y)*
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 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Howard M. Frazier, Jr.,** *Task Force Chair and Editor* **Howard W. Johnson,** *Task Force Editor*

IEEE Std 802.3 document	Date approved by IEEE and ANSI	Officers at the time of working group ballot
802.3aa-1998, Maintenance 5	25 June 1998 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **Colin Mick**, *Task Force Editor (100BASE-T Maintenance)*
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 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Robert M. Grow,** *Working Group Secretary* **George Eisler**, *Task Force Chair* **Colin Mick**, *Task Force Editor*
802.3ac-1998, Frame Extensions for Virtual Bridged Local Area Network (VLAN) Tagging on 802.3 Networks	16 September 1998 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Andy J. Luque,** *Working Group Secretary* **Ian Crayford,** *Task Force Chair* **Rich Seifert,** *Task Force Editor*
802.3ad-2000 (Clause 43), Aggregation of Multiple Link Segments	30 March 2000 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Robert M. Grow,** *Working Group Secretary* **Steven Haddock,** *Task Force Chair* **Tony Jeffree,** *Co-Editor* **Rich Seifert,** *CoEditor*
802.3-2002 (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 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Robert M. Grow,** *Working Group Secretary*

Temporarily published as separate documents

IEEE Std 802.3 document	Date approved by IEEE and ANSI	Officers at the time of working group ballot
802.3ae-2002,(Clauses 44–53) Media Access Control (MAC) Parameters, Physical Layers, and Management Parameters for 10 Gb/s Operation	13 June 2002 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Robert M. Grow,** *Working Group Secretary* **R. Jonathan Thatcher,** *Task Force Chair* **Stephen Haddock,** *Task Force Vice Chair* **Bradley J. Booth,** *Task Force Editor* **Lacreshia Laningham,** *Task Force Assistant Editor* **Benjamin Brown,** *Logic Track Chair* **Walter Thirion,** *Optical Track Chair*
802.3af-2003, (Clause 33) Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI)	12 June 2003 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair—Phase 1* **Robert M. Grow,** *Working Group Chair—Phase 2* **David J. Law,** *Working Group Vice Chair* **Robert M. Grow,** *Secretary—Phase 1* **Steven B. Carlson,** *Secretary—Phase 2* **Steven B. Carlson,** *Task Force Chair* **Michael S. McCormack,** *Editor—Phase 1* **John J. Jetzt,** *Editor—Phase 2* **Chad M. Jones,** *Comment Editor*

IEEE Std 802.3 document	Date approved by IEEE and ANSI	Officers at the time of working group ballot
802.3aj-2003, Maintenance 7	11 September 2003 (IEEE)	**Robert M. Grow,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair, Task Force Chair* **Steven B. Carlson,** *Working Group Secretary* **Catherine K. N. Berger,** *Task Force Editor*
802.3ak-2004, Physical Layer and Management Parameters for 10Gb/s Operation, Type 10GBASE-CX4	9 February 2004 (IEEE)	**Robert M. Grow,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Steven B. Carlson,** *Working Group Secretary* **Daniel J. Dove,** *Task Force Chair* **Howard A. Baumer,** *Task Force Editor*

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

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