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

ISO/IEC 8802-3:1996
Part 3:
Carrier sense multiple access with collision
detection (CSMA/CD) access method and
physical layer specifications

*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*



Abstract: This Local and Metropolitan Area Network standard, ISO/IEC 8802-3: 1996 [ANSI/IEEE Std 802.3, 1996 Edition], specifies the media access control characteristics for the Carrier Sense Multiple Access with Collision Detection (CSMA/CD) access method. It also specifies the media, Medium Attachment Unit (MAU) and physical layer repeater unit for 10 Mb/s baseband and broadband systems, and it provides a 1 Mb/s baseband implementation. Specifications for MAU types 10BASE5, 10BASE2, FOIRL (fiber optic inter-repeater link), 10BROAD36, 1BASE5, 10BASE-T, and 10BASE-F are included. System considerations for multisegment 10 Mb/s baseband networks are provided. Layer and sublayer interface specifications are aligned to the ISO/IEC Open Systems Interconnection Basic Reference Model and 8802 models. The 8802-3 internal model is defined and used.

Keywords: attachment unit interface (AUI), data processing, Ethernet, information interchange, local area networks; local area networks, management; mode of data transmission, network interconnection, models, repeater

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International Standard ISO/IEC 8802-3: 1996

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In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. 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.

The first international edition of this standard was published as ISO 8802-3 : 1989. New editions were published in 1990, 1992, and 1993.

This fifth edition cancels and replaces the fourth edition (ISO/IEC 8802-3: 1993), which has been technically revised.

For the purpose of assigning organizationally unique identifiers, the Institute of Electrical and Electronics Engineers, Inc., USA, has been designated by the ISO Council as the Registration Authority. Communications on this subject should be addressed to

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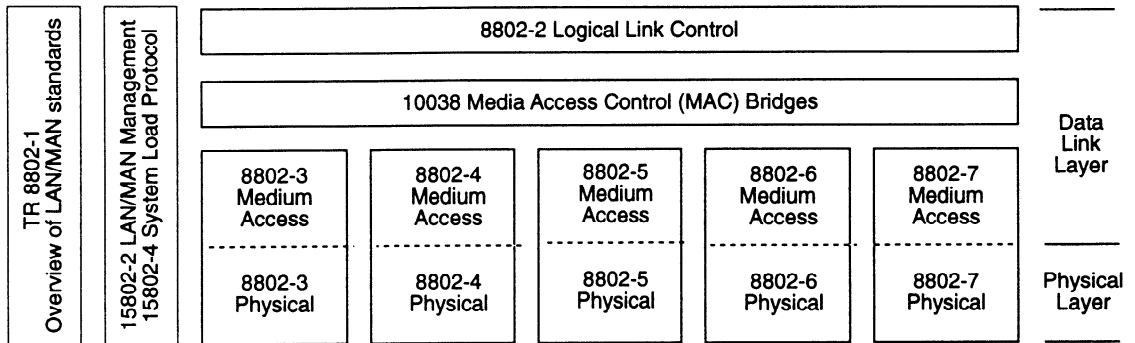
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Foreword to International Standard ISO/IEC 8802-3: 1996

This International Standard is part of a family of International Standards for Local and Metropolitan Area Networks. The relationship between this International Standard and the other members of the family is shown below. (The numbers in the figure refer to ISO Standard numbers.)



This family of International Standards deals with the Physical and Data Link layers as defined by the ISO/IEC Open Systems Interconnection Basic Reference Model (ISO/IEC 7498-1: 1994). The access standards define five types of medium access technologies and associated physical media, each appropriate for particular applications or system objectives. Other types are under investigation.

The International Standards defining the access technologies are as follows:

- a) ISO/IEC 8802-3 [ANSI/IEEE Std 802.3, 1996 Edition], a bus utilizing CSMA/CD as the access method.
- b) ISO/IEC 8802-4 [ANSI/IEEE Std 802.4-1990], a bus utilizing token passing as the access method.
- c) ISO/IEC 8802-5 [ANSI/IEEE Std 802.5-1992], a ring utilizing token passing as the access method.
- d) ISO/IEC 8802-6 [ANSI/IEEE Std 802.6, 1994 Edition], a dual bus utilizing distributed queuing as the access method.
- e) ISO 8802-7, a ring utilizing slotted ring as the access method.

ISO/IEC TR 8802-1 provides an overview of the LAN/MAN standards, along with details of their document numbering.

ISO/IEC 8802-2 [ANSI/IEEE Std 802.2, 1994 Edition], *Logical Link Control*, is used in conjunction with the medium access standards to provide the data link layer service to network layer protocols.

ISO/IEC 10038 [ANSI/IEEE Std 802.1D, 1993 Edition], *Media Access Control (MAC) bridges*, specifies an architecture and protocol for the interconnection of IEEE 802 LANs below the level of the logical link control protocol.

ISO/IEC 15802-2 [ANSI/IEEE Std 802.1B, 1995 Edition], *LAN/MAN Management*, defines an Open Systems Interconnection (OSI) management-compatible architecture, and services and protocol elements for use in a LAN/MAN environment for performing remote management.

ISO/IEC 15802-4 [ANSI/IEEE Std 802.1E, 1994 Edition], *System Load Protocol*, specifies a set of services and protocol for those aspects of management concerned with the loading of systems in ISO/IEC LAN/MAN environments.

The main body of the International Standard serves for both the ISO/IEC 8802-3: 1996 and IEEE Std 802.3, 1996 Edition standards. ISO and IEEE each have a unique foreword.

ANSI/IEEE Std 8802-3, 1996 Edition

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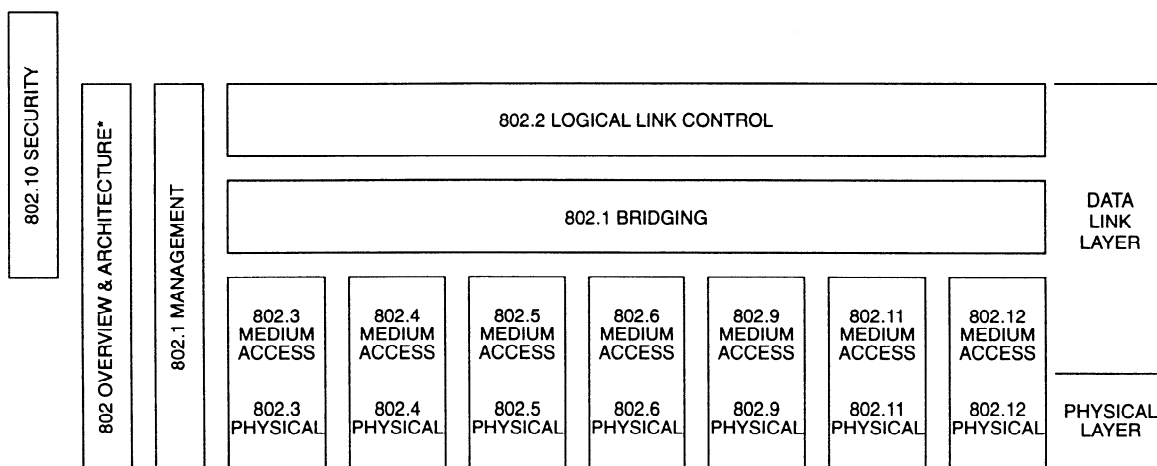
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Foreword to ANSI/IEEE Std 8803-3, 1996 Edition

This standard is part of a family of standards for local and metropolitan area networks. The relationship between the standard and other members of the family is shown below. (The numbers in the figure refer to IEEE standard numbers.)



* Formerly IEEE Std 802.1A.

This family of standards deals with the Physical and Data Link layers as defined by the International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) Open Systems Interconnection Basic Reference Model (ISO/IEC 7498-1:1994). The access standards define several types of medium access technologies and associated physical media, each appropriate for particular applications or system objectives. Other types are under investigation.

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The standards defining the technologies noted above are as follows:

- IEEE Std 802 *Overview and Architecture.* This standard provides an overview to the family of IEEE 802 Standards. This document forms part of the 802.1 scope of work.
- ANSI/IEEE Std 802.1B and 802.1k [ISO/IEC 15802-2] *LAN/MAN Management.* Defines an Open Systems Interconnection (OSI) management-compatible architecture, and services and protocol elements for use in a LAN/MAN environment for performing remote management.
- ANSI/IEEE Std 802.1D [ISO/IEC 10038] *MAC Bridging.* Specifies an architecture and protocol for the interconnection of IEEE 802 LANs below the MAC service boundary.
- ANSI/IEEE Std 802.1E [ISO/IEC 15802-4] *System Load Protocol.* Specifies a set of services and protocol for those aspects of management concerned with the loading of systems on IEEE 802 LANs.
- ANSI/IEEE Std 802.2 [ISO/IEC 8802-2] *Logical Link Control*
- ANSI/IEEE Std 802.3 [ISO/IEC 8802-3] *CSMA/CD Access Method and Physical Layer Specifications*
- ANSI/IEEE Std 802.4 [ISO/IEC 8802-4] *Token Passing Bus Access Method and Physical Layer Specifications*

- ANSI/IEEE Std 802.5 [ISO/IEC 8802-5] *Token Ring Access Method and Physical Layer Specifications*
- ANSI/IEEE Std 802.6 [ISO/IEC 8802-6] *Distributed Queue Dual Bus Access Method and Physical Layer Specifications*
- ANSI/IEEE Std 802.9 [ISO/IEC DIS 8802-9] *Integrated Services (IS) LAN Interface at the Medium Access Control (MAC) and Physical (PHY) Layers*
- ANSI/IEEE Std 802.10 *Interoperable LAN/MAN Security*
- ANSI/IEEE Std 802.12 *Demand Priority Access Method, Physical Layer and Repeater Specifications*

In addition to the family of standards, the following is a recommended practice for a common Physical Layer technology:

- IEEE Std 802.7 *IEEE Recommended Practice for Broadband Local Area Networks*

The following additional working groups have authorized standards projects under development:

- IEEE 802.11 *Wireless LAN Medium Access Control (MAC) Sublayer and Physical Layer Specifications*
- IEEE 802.14 *Standard Protocol for Cable-TV Based Broadband Communication Network*

The reader of this standard is urged to become familiar with the complete family of standards.

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Conformance test methodology

An additional standards series, identified by the number 1802, has been established to identify the conformance test methodology documents for the 802 family of standards. Thus the conformance test documents for 802.3 are numbered 1802.3, the conformance test documents for 802.5 will be 1802.5, and so on. Similarly, ISO will use 18802 to number conformance test standards for 8802 standards.

ANSI/IEEE Std 802.3, 1996 Edition

This standard contains state-of-the-art material. The area covered by this standard is undergoing evolution. Revisions are anticipated to this standard within the next few years to clarify existing material, to correct possible errors, and to incorporate new related material. Details on the contents of this standard are provided on the following pages.

The IEEE 802.3 Working Group acknowledges and appreciates that many concepts embodied in this standard are based largely upon the CSMA/CD access method earlier described in *The Ethernet* specification as written jointly by individuals from Xerox Corporation, Digital Equipment Corporation, and Intel Corporation. Appreciation is also expressed to Robert M. Metcalfe and David R. Boggs for their pioneering work in establishing the original concepts.

Participants

Working group members

The following individuals participated in the 802.3 working group during various stages of the standard's development. The superscripted letters by each name indicate the document(s) each participant worked on (a = 802.3a, b = 802.3b, etc.). The superscripted letter "o" indicates the original standard (ANSI/IEEE Std 802.3-1985). Complete identification of the documents is included in the officer listing on pages x–xi. Note that working group participation for IEEE Std 802.3r-1995 or 802.3u-1995 is not included in this edition, nor for the maintenance revisions 2, 3, or 4 (802.3m, n, and s).

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Additional individuals who contributed actively in the development of the original standard (ANSI/IEEE Std 802.3-1985) throughout its elaboration were

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The ECMA TC24 Committee on Communication Protocols also provided helpful input in the development of the original standard. The IEC TC83 Committee on Information Technology Equipment also provided very helpful input to the development of the FOIRL standard (802.3d-1987, 9.9).

Officers

The following individuals served as officers of IEEE 802.3 during the development of the standard:

ANSI/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 , <i>Working Group Chair</i>
802.3a-1988 (clause 10), 10 Mb/s MAU 10BASE2	15 November 1985 (IEEE) 28 December 1987 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i> Alan Flatman , <i>Task Force Chair</i>
802.3b-1985 (clause 11), 10 Mb/s Broadband MAU, 10BROAD36	19 September 1985 (IEEE) 28 February 1986 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i> Menachem Abraham , <i>Task Force Chair</i>
802.3c-1985 (9.1–9.8), 10 Mb/s Baseband Repeater	12 December 1985 (IEEE) 4 June 1986 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i> Geoffrey O. Thompson , <i>Task Force Chair</i>
802.3d-1987 (9.9), 10 Mb/s Fiber MAU, FOIRL	10 December 1987 (IEEE) 9 February 1989 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i> Steven Moustakas , <i>Task Force Chair</i>
802.3e-1987 (clause 12), 1 Mb/s MAU and Hub 1BASE5	11 June 1987 (IEEE) 15 December 1987 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i> Robert Galin , <i>Task Force Chair</i>
802.3h-1990 (clause 5), 10 Mb/s Layer Management, DTEs	28 September 1990 (IEEE) 11 March 1991 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i> Andy J. Luque , <i>Task Force Chair</i>
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 , <i>Working Group Chair</i> Patricia Thaler , <i>Task Force Chair (initial)</i> Richard Anderson , <i>Task Force Chair (final)</i>
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 , <i>Working Group Chair</i> Keith Amundsen , <i>Task Force Chair (initial)</i> Frederick Scholl , <i>Task Force Chair (final)</i> Michael E. Lee , <i>Technical Editor</i>
802.3k-1993 (clause 19), 10 Mb/s Layer Management, Repeaters	17 September 1992 (IEEE) 8 March 1993 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Joseph S. Skorupa , <i>Task Force Chair</i> Geoffrey O. Thompson , <i>Vice Chair and Editor</i>

ANSI/IEEE Std 802.3 document	Date approved by IEEE and ANSI	Officers at the time of working group ballot
802.3l-1992 (14.10), 10 Mb/s PICS Proforma 10BASE-T MAU	17 September 1992 (IEEE) 23 February 1993 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Mike Armstrong , <i>Task Force Chair and Editor</i> Paul Nikolich , <i>Vice Chair</i> William Randle , <i>Editorial Coordinator</i>
802.3m-1995, Maintenance 2	21 September 1995 (IEEE) 16 July 1996 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Gary Robinson , <i>Maintenance Chair</i>
802.3n-1995, Maintenance 3	21 September 1995 (IEEE) 4 April 1996 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Gary Robinson , <i>Maintenance Chair</i>
802.3p-1993 (clause 20), Management, 10 Mb/s Integrated MAUs	17 June 1993 (IEEE) 4 January 1994 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Joseph S. Skorupa , <i>Task Force Chair</i> Geoffrey O. Thompson , <i>Vice Chair and Editor</i>
802.3q-1993 (clause 5), 10 Mb/s Layer Management, GDMO Format	17 June 1993 (IEEE) 4 January 1994 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Joseph S. Skorupa , <i>Task Force Chair</i> Geoffrey O. Thompson , <i>Vice Chair and Editor</i>
802.3s-1995, Maintenance 4	21 September 1995 (IEEE) 8 April 1996 (ANSI)	Geoffrey O. Thompson , <i>Working Group Chair</i> Gary Robinson , <i>Maintenance Chair</i>
802.3t-1995, 120 Ω informative annex to 10BASE-T	14 June 1995 (IEEE) 12 January 1996 (ANSI)	Geoffrey O. Thompson , <i>Working Group Chair</i> Jacques Christ , <i>Task Force Chair</i>
802.3v-1995, 150 Ω informative annex to 10BASE-T	12 December 1995 (IEEE) 16 July 1996 (ANSI)	Geoffrey O. Thompson , <i>Working Group Chair</i> Larry Nicholson , <i>Task Force Chair</i>

Two other supplements, IEEE Std 802.3u-1995, *Media Access Control (MAC) Parameters, Physical Layer, Medium Attachment Units, and Repeater for 100 Mb/s Operation, Type 100BASE-T* and 802.3r-1995, *Protocol Impementation Conformance Statement (PICS) Proforma, Type 10BASE5 MAU*, have been approved by IEEE but are not included in this edition.

Balloting group members

On the following pages, members of balloting groups for the parts of IEEE Std 802.3 included in this edition are listed. Note that balloting groups for maintenance revisions 2, 3, and 4 (802.3m, n, and s) are not included.

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