INTERNATIONAL STANDARD

ISO/IEC 8802-3

ANSI/IEEE Std 802.3

Fourth edition
1993-07-08

Information technology — Local and metropolitan area networks —

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

Technologie de l'information — Réseaux locaux et métropolitains —

Partie 3: Accès multiple par sruveillance du signal et détection de collision et spécifications pour la couche physique

Reference number
ISO/IEC 8802-3:1993 (E)
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ISO/IEC 8802-3:1993 (E)
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Std 802.3, 1993 Edition

International Standard ISO/IEC 8802-3 : 1993
ANSI/IEEE Std 802.3, 1993 Edition

(This edition contains ANSI/IEEE Std 802.3-1988, ANSI/IEEE Std 802.3c-1985, ANSI/IEEE Std 802.3d-1987, ANSI/IEEE Std 802.3b-1985, ANSI/IEEE Std 802.3e-1987, ANSI/IEEE Std 802.3h-1990, ANSI/IEEE Std 802.3i-1990, and corrections resulting from Maintenance Ballot #1)

Information technology— Local and metropolitan area networks—

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

Sponsor

Technical Committee on Computer Communications of the IEEE Computer Society

Abstract: This Local and Metropolitan Area Network standard, ISO/IEC 8802-3 : 1993 [ANSI/IEEE Std 802.3, 1993 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, and 10BASE-T are included. System considerations for multisegment 10 Mb/s baseband networks are provided. Layer and sublayer interface specifications are aligned to the ISO Open Systems Interconnection Basic Reference Model and 8802 models. The 8802-3 internal model is defined and used.

Keywords: data processing, information interchange, local area networks, mode of data transmission, network interconnection, models

Adopted as an International Standard by the International Organization for Standardization and by the International Electrotechnical Commission

Published by The Institute of Electrical and Electronics Engineers, Inc.

International Standard ISO/IEC 8802-3 : 1993

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and nongovernmental, in liaison with ISO and IEC, also take part in the work.

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

In 1985, IEEE Standard 802.3-1985 was adopted by ISO Technical Committee 97, *Information processing systems*, as draft International Standard ISO/DIS 8802-3. Following the procedures described above, the Standard was subsequently approved by ISO and published as ISO 8802-3 : 1989, incorporating ISO 8802-3/DAD 1 which had resulted from the adoption by ISO in 1987 of ANSI/IEEE Std 802.3a.

A further revision was subsequently approved by ISO/IEC JTC 1 in 1990, incorporating ISO/IEC 8802-3/Amendments 2 and 5.

A third edition, published in 1992, incorporated ISO/IEC 8802-3/Amendments 3 and 4.

This fourth edition cancels and replaces ISO/IEC 8802-3 : 1992 and incorporates ISO/IEC 8802-3/Amendment 6, *Maintenance Ballot*; Amendment 7, *Layer management*; and Amendment 9, *System considerations for multisegment 10 Mb/s baseband networks and Twisted-pair medium attachment unit (MAU) and baseband medium, type 10BASE-T*. These amendments were approved in 1992.

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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During the preparation of this International Standard, information was gathered on patents upon which application of this standard might depend. Relevant patents were identified as belonging to Xerox Corporation. However, ISO and IEC cannot give authoritative or comprehensive information about evidence, validity or scope of patent and like rights. The patent-holder has stated that licenses will be granted under reasonable terms and conditions and communications on this subject should be addressed to

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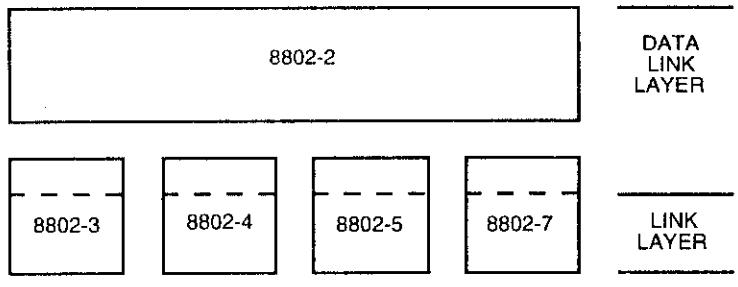
Foreword to International Standard ISO/IEC 8802-3 : 1993

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



This family of standards deals with the Physical and Data Link layers as defined by the ISO Open Systems Interconnection Basic Reference Model (ISO 7498 : 1984). The access standards define four types of medium access technologies and associated physical media, each appropriate for particular applications or system objectives. Other types are under investigation.

The standards defining these technologies are as follows:

(1) ISO/IEC 8802-3 [ANSI/IEEE Std 802.3, 1993 Edition], a bus utilizing CSMA/CD as the access method,
(2) ISO/IEC 8802-4 [ANSI/IEEE Std 802.4-1990], a bus utilizing token passing as the access method,
(3) ISO/IEC 8802-5 [ANSI/IEEE Std 802.5-1992], a ring utilizing token passing as the access method,
(4) ISO 8802-7, a ring utilizing slotted ring as the access method.

ISO 8802-2 [ANSI/IEEE Std 802.2-1989], *Logical Link Control protocol*, is used in conjunction with the medium access standards.

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 MAC service boundary.

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

The main body of this standard serves for both the ISO/IEC 8802-3 and ANSI/IEEE Std 802.3 standards. ISO/IEC and IEEE each have unique foreword sections. The Annex applies to the IEEE standard only. The Appendixes serve as useful reference material to both standards.

ANSI/IEEE Std 802.3, 1993 Edition

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Comments on standards and requests for interpretations should be addressed to:

Secretary, IEEE Standards Board
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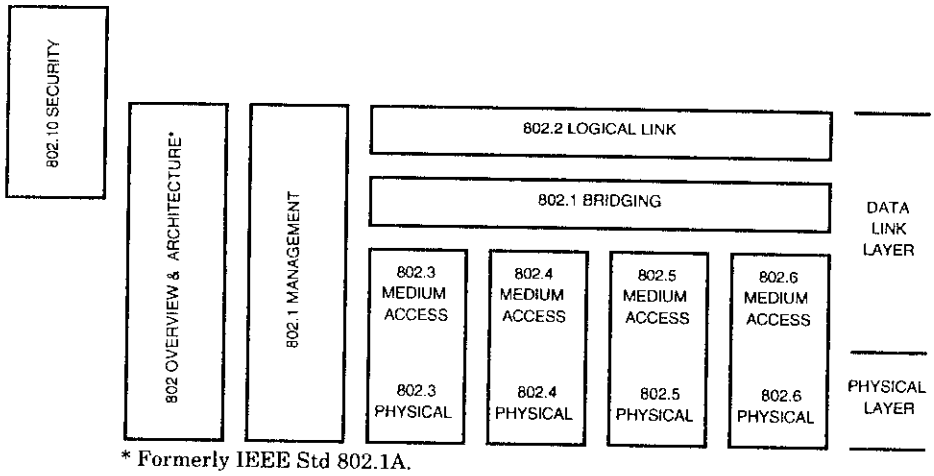
Foreword to ANSI/IEEE Std 802.3, 1993 Edition

(This Foreword is not a part of this International Standard or of ANSI/IEEE 802.3, 1993 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 (ISO) Open Systems Interconnection Basic Reference Model (ISO 7498 : 1984). 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.

The standards defining these technologies 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.
- IEEE Std 802.1B: LAN/MAN Management. Defines an Open System Interconnection (OSI) management-compatible architecture, and services and protocol elements for use in a LAN/MAN environment for performing remote management.
- ISO/IEC 10038 : 1993 [ANSI/IEEE Std 802.1D] MAC Bridging. Specifies an architecture and protocol for the interconnection of IEEE 802 LANs below the MAC service boundary.
- IEEE Std 802.1E: 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.
- ISO 8802-2 [ANSI/IEEE Std 802.2]: Logical Link Control
- ISO/IEC 8802-3 [ANSI/IEEE Std 802.3]: CSMA/CD Access Method and Physical Layer Specifications

[†]The 802 Architecture and Overview Specification, originally known as IEEE Std 802.1A, has been renumbered as IEEE Std 802. This has been done to accommodate recognition of the base standard in a family of standards. References to IEEE Std 802.1A should be considered as references to IEEE Std 802.

- ISO/IEC 8802-4 [ANSI/IEEE Std 802.4]: Token Bus Access Method and Physical Layer Specifications
- ISO/IEC 8802-5 [ANSI/IEEE Std 802.5]: Token Ring Access Method and Physical Layer Specifications
- IEEE Std 802.6: Metropolitan Area Network Access Method and Physical Layer Specifications
- IEEE Std 802.10: Interoperable Local Area Network Security, *Currently Contains* Secure Data Exchange (SDE)

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

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

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

Conformance Test Methodology

Another standards series, identified by the number 1802, has been established to identify the conformance test methodology documents for the 802 family of standards. This makes the correspondence between the various 802 standards and their applicable conformance test requirements readily apparent. 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.

ISO/IEC 8802-3 : 1993 (ANSI/IEEE Std 802.3, 1993 Edition)

This edition of the standard defines 10 Mb/s baseband and broadband implementations and a 1 Mb/s baseband implementation of the Physical Layer using the CSMA/CD access method. It is anticipated that future editions of the standard may provide additional implementations of the physical layer to support different needs (for example, media, and data rates).

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.

Readers wishing to know the state of revisions should contact

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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

When the IEEE 802.3 Working Group approved the original standard (ANSI/IEEE Std 802.3-1985) in 1983, it had the following membership:

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The ECMA TC24 Committee on Communication Protocols also provided helpful input in the development of this standard.

When the IEEE 802.3 Working Group approved ANSI/IEEE Std 802.3a-1988 (Section 10) in November 1984, it had the following membership:

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ANSI/IEEE Std 802.3c-1985 was approved by the American National Standards Institute on June 4, 1986.

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The IEC TC83 Committee on Information Technology Equipment also provided very helpful input to the development of the FOIRL Standard (9.9).

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ANSI/IEEE Std 802.3d-1987 was approved by the American National Standards Institute on February 9, 1989.

The following persons were on the balloting committee that approved ANSI/IEEE Std 802.3a-1988 (Section 10) for submission to the IEEE Standards Board:

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When the IEEE Standards Board approved ANSI/IEEE Std 802.3-1988 on June 9, 1988, and ANSI/IEEE Std 802.3a-1988 (Section 10) on October 20, 1988, it had the following membership:

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ANSI/IEEE Std 802.3-1988 and ANSI/IEEE Std 802.3a-1988 were approved by the American National Standards Institute on January 12, 1989.

When the IEEE 802.3 Working Group approved ANSI/IEEE Std 802.3c-1985 (9.1–9.8) in July 1985, it had the following membership:

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Charles Brill
Juan Bulnes
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Paul Eastman
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Gregory Ennis
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Richard Gumpertz
Hacene Hariti
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Fred Huang
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The following persons were on the balloting committee that approved ANSI/IEEE Std 802.3c-1985 (9.1–9.8) for submission to the IEEE Standards Board:

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Kilnam Chon
T. Ricky Chow
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David Cohen
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Nobushiro Hamada
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Jim P. Hong
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George Parowski
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When the IEEE 802.3 Working Group approved ANSI/IEEE Std 802.3b-1985 (Section 11), it had the following membership:

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Patrick S. McIntosh
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Thomas L. Phinney
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David Potter
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Gary S. Robinson
Marya Repko
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Gian Paolo Rossi
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S. 1. Samoylenko
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Oscar Sepulveda
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Tom Stack
Carel M. Stillebroer
Fred Strauss
Bart W. Stuck
Tatsuya Suda
Peter Sugar
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Daniel T. W. Sze
Ahmed N. Tantaui
Mario Tokoro
H. C. Torng
Donald F. Towsley
Wei-Tek Tsai
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When the IEEE Standards Board approved ANSI/IEEE Std 802.3b-1985 (Section 11) on September 19, 1985, it had the following membership:

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ANSI/IEEE Std 802.3b-1985 was approved by the American National Standards Institute on February 28, 1986.

When the IEEE 802.3 Working Group approved ANSI/IEEE Std 802.3e-1987 (Section 12) in November 1986, it had the following membership:

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Gianfranco Enrico
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Mark Gerhold
Adi Golbert
Rich Graham
Richard Gumpertz
Hacene Hariti
Lloyd Hasley
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Charles Hoffner
Michael Hughes
Donald Johnson
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Hiroshi Kobayashi
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Po Chen
L. Y. Cheung
Kilnam Chon
W. F. Chow
Michael Coden
A. F. Conrad
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D. E. Crotty
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Michel Diaz
N. I. Dimopoulos
M. G. Duncan
P. M. Elliot
Philip H. Enslow, Jr.
Judith Estrin
John W. Fendrich
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Paul Hutton
Richard Iliff
E. D. Jenson
Guy Juanole
S. L. Junker
Karl H. Kellermayr
M. Kezunovic
Samuel Kho
S. E. Kille
David Kollm
Takahiko Kuki
Lee LaBarre
Wai-Sum Lai
Lanse M. Leach
Edward Y. Lee
S. E. Levin
R. C. Lightburn
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William D. Livingston
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Joseph F. P. Luhukay
Wo-Shun Luk
Marco Ajmone Marsan
Joseph Massi
Marco Meli
Darrel B. McIndoe
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David S. Millman
Aditya N. Mishra
David E. Morgan
Mike Morganti
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David Morris
H. H. T. Mouftah
Dale N. Murray
R. R. Nelson
J. D. Northcut
Charles Oestereicher
Young Oh
George Parowski
Thomas L. Phinney
David Potter
J. M. Potucek
Marya Repko
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Robert Rosenthal
Gian Paolo Rossi
David J. Rypka
S. I. Samaylenko
Norman F. Schneidewind
Omri Serlin
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Tom Stack
Carel M. Stillebroer
Fred Strauss
Bart W. Stuck
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P. Sugar
Efstathios D. Sykas
Daniel T. W. Sze
Ahmed N. Tantawi
H. C. Torng
D. F. Towsley
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Pearl S. C. Wang
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When the IEEE Standards Board approved ANSI/IEEE Std 802.3e-1987 (Section 12) on June 11, 1987, it had the following membership:

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ANSI/IEEE Std 802.3e-1987 was approved by the American National Standards Institute on December 15, 1987.

When the IEEE 802.3 Working Group approved ANSI/IEEE Std 802.3h-1990 (Section 5), it had the following membership:

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Robert Conte
Bill Cronin
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John DeCramer
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Sanjay Dhawan
Raymond S. Daley
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Harold C. Folts
Harvey Freeman
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Patrick Gonia
Julio Gonzalez Sanz
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Joseph L. Hammond
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ANSI/IEEE Std 802.3i-1990 was approved by the American National Standards Institute on March 11, 1991.

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When the IEEE 802.3 Working Group approved ANSI/IEEE Std 802.3i-1990 (Sections 13 and 14), it had the following membership:

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Kinji Mori
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