INTERNATIONAL STANDARD

ISO/IEC 8802-4

ANSI/IEEE Std 802.4

First edition
1990-08-17

Information processing systems — Local area networks —

Part 4 :
Token-passing bus access method and physical layer specifications

Systèmes de traitement de l'information — Réseaux locaux —

Partie 4 : Spécification pour la méthode d'accès et la couche physique relatives au bus à passage de jeton

Reference number
ISO/IEC 8802-4 : 1990 (E)
ANSI/IEEE
Std 802.4-1990

Abstract: This Local Area Network (LAN) standard, ISO/IEC 8802-4 : 1990 [IEEE Std 802.4-1990], deals with all elements of the token-passing bus access method and its associated physical signaling and media technologies. To facilitate interconnection of stations by way of a LAN using the token-passing bus access method, this standard specifies the characteristics of the transmission medium; the signaling method used; the frame formats transmitted; the actions of a station upon receipt of a frame; the services provided at the conceptual interface between the Medium Access Control (MAC) sublayer and the Logical Link Control (LLC) sublayer; and the actions, entities, and values used by management. There are four medium characteristics and signaling methods: 5 and 10 Mb/s phase-coherent FSK; 1, 5, and 10 Mb/s broadband; 10 and 20 Mb/s fiber optic; and 1 Mb/s phase-continuous FSK.

First Printing

ISBN 1-55937-027-0
Library of Congress Catalog Card Number 90-082603

August 17, 1990 *SH12948*

International Standard ISO/IEC 8802-4 : 1990
ANSI/IEEE Std 802.4-1990
(Revision of ANSI/IEEE Std 802.4-1985)

Information processing systems — Local area networks —

Part 4: Token-passing bus access method and physical layer specifications

Sponsor

Technical Committee on Computer Communications
of the
IEEE Computer Society

Approved February 27, 1990

IEEE Standards Board

Approved July 19, 1990

American National Standards Institute

Approved 1990 by the

International Organization for Standardization
and by the
International Electrotechnical Commission

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 8802-4 : 1990

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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 the national bodies for approval before their acceptance as International Standards. They are approved in accordance with procedures requiring at least 75% approval by the national bodies voting.

In 1985, IEEE Std 802.4-1985 was adopted by ISO Technical Committee 97, *Information processing systems*, as draft International Standard ISO/DIS 8802-4. A further revision was subsequently approved by ISO/IEC JTC 1 in the form of this new edition, which is published as International Standard ISO/IEC 8802-4:1990.

For the purpose of assigning global addresses, 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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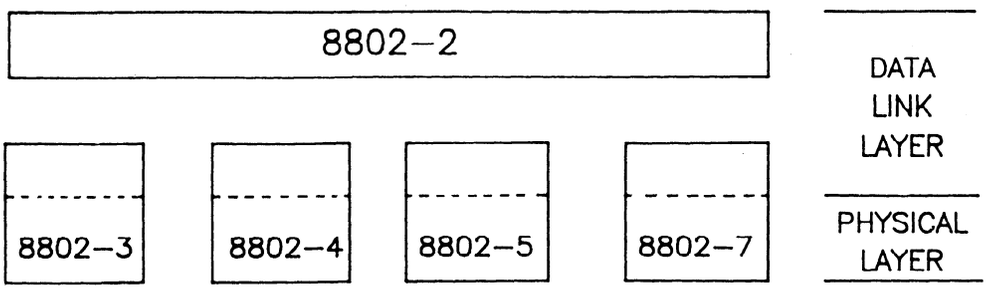
Foreword to International Standard ISO/IEC 8802-4 : 1990

This standard is part of a family of standards for Local Area Networks (LANs). 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 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. The standards defining these technologies are

(1) ISO 8802-3 [IEEE Std 802.3-1988], a bus utilizing CSMA/CD as the access method,

(2) ISO/IEC 8802-4 [IEEE Std 802.4-1990], a bus utilizing token passing as the access method,

(3) ISO 8802-7, a ring utilizing slotted ring as the access method.

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

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 8802-4 : 1990 and IEEE 802.4-1990 standards, except for portions that specifically state that they are not a part of the ISO/IEC standard. Such portions apply to the IEEE standard only. ISO/IEC and IEEE each have unique foreword sections. The Appendixes serve as useful reference material to both standards.

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Summary of Changes

This standard is a major revision of IEEE Std 802.4-1985 (ISO/DIS 8802/4). This revision incorporates the results of over four years of work by the IEEE 802.4 Working Group and by other organizations.

This section of the Foreword summarizes the changes for the reader's convenience.

The management sections, Sections 3 and 9, have been completely rewritten. These revised sections are now in conformance with the work of the IEEE 802 Committee and in alignment, to the extent possible, with other groups working on management standards.

The access control machine (ACM), the heart of the Medium Access Control (MAC) protocol, has been revised. Errors and ambiguities that existed in the previous version were corrected, and enhancements were made to improve error recovery. The intention in revising the ACM was to retain complete interoperability with the ACM described by the previous standard. We believe that intention has been realized.

The name of the request_with_response option has been changed from "immediate response" option to avoid conflicts with other uses of the phrase immediate response (see 6.1.1 and 6.6.2).

Additional MAC Capabilities (6.7) has been added to give implementors suggestions for providing extra MAC features and to give guidance to conformance testers.

The specification of an interface within the Physical Layer for a separate modem has been included as Section 10.

Section 11 has been reserved to retain compatible section numbers and for future additions.

The phase-coherent FSK Physical Layer and medium, described in Sections 12 and 13, underwent revision. Based on implementation experience, the working group found it necessary to make substantive technical changes to the standard. The transmit and receive levels were changed, the preamble pattern and length were changed, and a receiver blanking specification was added. The result of these changes is that the implementations of this revised standard will not interoperate with implementations of the previous standard.

The broadband Physical Layer and medium, described in Sections 14 and 15, underwent minor revisions to clarify the specification and to provide guidance for conformance testing.

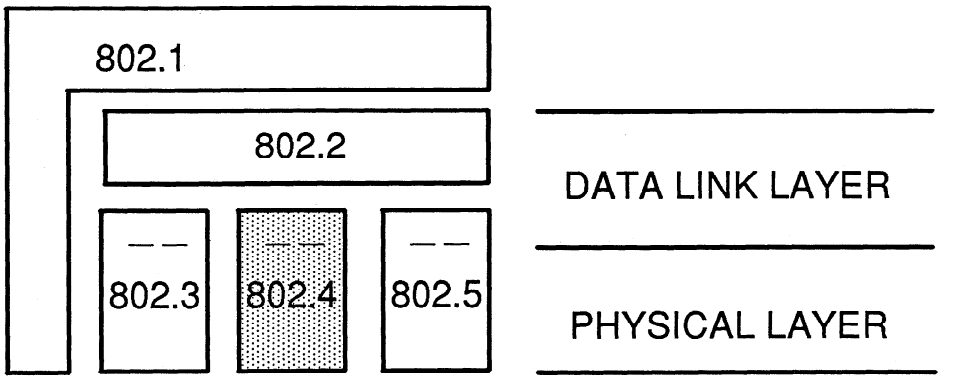
A fiber optic Physical Layer and medium specification has been added as Sections 16 and 17.

The 1 Mb/s phase-continuous FSK Physical Layer and medium specification was moved from Sections 10 and 11 to Sections 18 and 19, to avoid renumbering the more commonly referenced Physical Layer and media sections. The coding of the end delimiter coding pattern was changed to increase the reliability (Hamming distance) of the protocol.

Foreword to IEEE Std 802.4-1990
(Revision of IEEE Std 802.4-1985)

(This Foreword is not a part of ISO/IEC 8802-4 : 1990 or of IEEE Std 802.4-1990.)

This standard is part of a family of standards for Local Area Networks (LANs). The relationship between this standard and other members of the family is shown below. (The numbers in the figure refer to IEEE 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 three types of medium access technologies and associated physical media, each appropriate for particular applications or system objectives. The standards defining these technologies are

(1) IEEE Std 802.3-1988 [ISO 8802-3], a bus utilizing CSMA/CD as the access method,
(2) IEEE Std 802.4-1990 [ISO/IEC 8802-4], a bus utilizing token passing as the access method,
(3) IEEE Std 802.5-1989, a ring utilizing token passing as the access method.

Other access methods (for example, metropolitan area networks and integrated voice-data networks) are under investigation.

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

IEEE 802.1[1] (a series of related standards) describes the relationship among the family of 802 standards and their relationship to the ISO Open Systems Interconnection Basic Reference Model in more detail. IEEE 802.1 will also contain networking management standards and information on internetworking.

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

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[1] IEEE Std 802.1A-1990, Overview and Architecture of Network Standards; IEEE Std 802.1D-1990, MAC (Media Access Control) Bridges; and IEEE Std 802.1E-1990, System Load Protocol have been approved as IEEE Standards, but are not yet published. Other projects in the 802.1 series are currently under development.

This standard was submitted to ISO/IEC JTC1 for consideration as a revision and addendum to the previous edition of the token bus LAN standard, IEEE Std 802.4-1985 (ISO/DIS 8802/4). To facilitate processing of that document, portions that were not appropriate for an international standard were prefaced with a note enclosed in braces {...}.

These same portions contained within the current edition are not a part of the International Standard and are stated as such. These portions are peculiar to the IEEE version of this standard and consist of areas relating to

(1) References to national standards
(2) Recommended frequency allocations for North American CATV systems (see 14.8.4)
(3) Recommendations and guidelines related to safety concerns

This standard contains state-of-the-art material. The area covered by this standard is undergoing evolution. Revisions to this standard may occur either to clarify existing material, to correct possible errors, or to incorporate new, related material.

Readers wishing to know the state of revisions should contact the

Secretary, IEEE Standards Board
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The following were voting members of the IEEE 802.4 Token-Passing Bus Access Method Working Group at the time of approval of this standard:

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Special thanks to the following task group chairmen whose task groups contributed to this revision:

802.4A, Broadband	—	**Donald J. Loughry**
802.4B, Carrier Band	—	**Michael T. Klein**
802.4C, MAC Management	—	**Robert H. Douglas**
802.4D, Physical Management	—	**Michael J. Perkins**
802.4F, MAC Revision	—	**Louis F. Wojnaroski**
and past Chair	—	**Richard M. Collins**
802.4G, DTE-DCE Interface	—	**Clyde A. Boenke**
802.4H, Fiber Optic Media	—	**Robert S. Crowder**
802.4J, Conformance Testing	—	**Paul S. Eastman**
and past Chair	—	**Robert L. Husak** (deceased)

Special thanks to our past chairman, 1983–87, under whose guidance we developed the current draft and reached committee consensus:

Robert H. Douglas, *past Chair*

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The final conditions for approval of this standard were met on February 27, 1990. This standard was conditionally approved by the IEEE Standards Board on February 15, 1990, with the following membership:

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