

TECHNICAL REPORT

ISO/IEC TR 11802-5

ANSI/IEEE
Std 802.1H

First edition
1997-08-15

Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Technical reports and guidelines —

Part 5:

Media Access Control (MAC) Bridging of Ethernet V2.0 in Local Area Networks

*Technologies de l'information — Télécommunications et échange
d'information entre systèmes — Réseaux locaux et métropolitains —
Rapports techniques et lignes directrices —*

*Partie 5: Liant de contrôle d'accès aux supports (MAC) de V2.0 Ethernet
dans les réseaux locaux*

This material is reproduced from ISO documents under International Organization for Standardization (ISO) Copyright License number IHS/ICC/1996. Not for resale. No part of these ISO documents may be reproduced in any form, electronic retrieval system or otherwise, except as allowed in the copyright law of the country of use, or with the prior written consent of ISO (Case postale 56, 1211 Geneva 20, Switzerland, Fax +41 22 734 10 79), IHS or the ISO Licensor's members.



Reference number
ISO/IEC TR 11802-5:1997(E)

ANSI/IEEE
Std 802.1H-1997 edition



Documents

Document Sharing Hub

Abstract: Extensions to the behavior of ISO/IEC 10038 (IEEE 802.1D) media access control (MAC) Bridges, in order to facilitate interoperability in bridged local area networks (LANs) comprising CSMA/CD networks interconnected with other types of LAN using MAC Bridges, where the CSMA/CD networks contain a mixture of ISO/IEC 8802-3 and Ethernet V2.0 end stations, are specified. Additionally, guidelines are provided for the development of nonstandard 802 protocols, with particular emphasis on conversion of existing Ethernet protocols and the behavior to be expected from a Bridge, for the purpose of avoiding future incompatibilities.

Keywords: carrier sense multiple access with collision detection (CSMA/CD), data processing, Ethernet, fibre distributed data interface (FDDI), information interchange, LAN protocols, local area network (LAN), media access control (MAC) bridges, network interconnection, selective translation, selective translation table

The Institute of Electrical and Electronics Engineers, Inc.
345 East 47th Street, New York, NY 10017-2394, USA

Copyright © 1997 by the Institute of Electrical and Electronics Engineers, Inc.
All rights reserved. Published 1997. This printing is by the International Organization for Standardization with special permission of the Institute of Electrical and Electronics Engineers, Inc. Printed in Geneva, Switzerland.

ISBN 1-55937-945-6

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

ISO/IEC Technical Report 11802-5: 1997(E)
ANSI/IEEE Std 802.1H, 1997 Edition

**Information technology—
Telecommunications and information exchange
between systems—**

**Local and metropolitan area networks—
Technical reports and guidelines—**

Part 5: Media Access Control (MAC) Bridging of Ethernet V2.0 in Local Area Networks

Sponsor

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



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.



ISO/IEC TR 11802-5:1997(E)
ANSI/IEEE Std 802.1H, 1997 edition

Foreword

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 non-governmental, 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.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/IEC TR 11802-5, which is a Technical Report of type 3, was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*.



International Organization for Standardization/International Electrotechnical Commission
Case postale 56 • CH-1211 Genève 20 • Switzerland

AVA Documents
Document Sharing Hub

ISO/IEC TR 11802-5:1997(E)
ANSI/IEEE Std 802.1H, 1997 edition

ISO/IEC 11802 consists of the following parts, under the general title *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Technical reports and guidelines*:

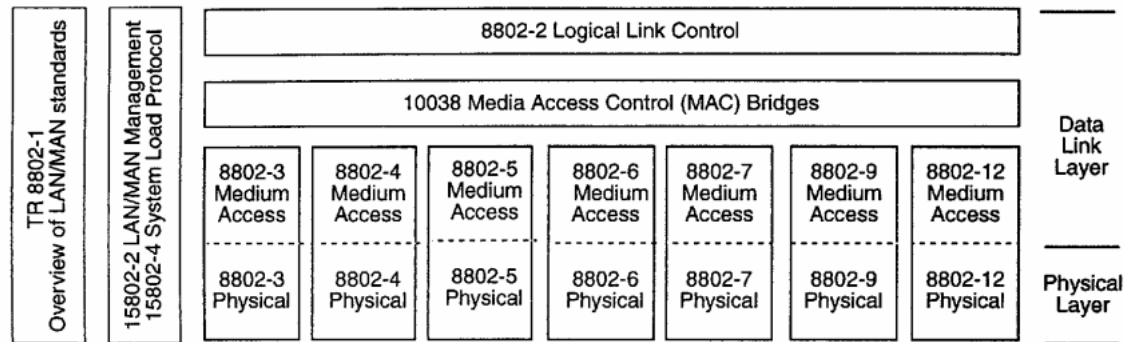
- *Part 1: The structure and coding of Logical Link Control addresses in Local Area Networks* [Technical Report]
- *Part 2: Standard Group MAC Addresses* [Technical Report]
- *Part 4: Token ring access method and physical layer specifications — Fibre optic station attachment*
- *Part 5: Media Access Control (MAC) Bridging of Ethernet V2.0 in Local Area Networks*

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

Registration Authority for ISO/IEC 8802-3
c/o The Institute of Electrical and Electronics Engineers, Inc.
445 Hoes Lane, P.O. Box 1331
Piscataway, NJ 08855-1331
USA

ISO/IEC Technical Report 11802-5: 1997

This Technical Report is part of a family of International Standards for Local and Metropolitan Area Networks. The relationship between this Technical Report, which provides extensions to the behavior of ISO/IEC 10038, 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 several 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], a bus utilizing CSMA/CD as the access method.
- b) ISO/IEC 8802-4 [ANSI/IEEE Std 802.4], a bus utilizing token passing as the access method.
- c) ISO/IEC 8802-5 [ANSI/IEEE Std 802.5], a ring utilizing token passing as the access method.
- d) ISO/IEC 8802-6 [ANSI/IEEE Std 802.6], a dual bus utilizing distributed queuing as the access method.
- e) ISO 8802-7, a ring utilizing slotted ring as the access method.
- f) ISO/IEC 8802-9 [ANSI/IEEE Std 802.9], a unified access method offering global integrated services to the desktop by accessing a variety of networks.
- g) ISO/IEC DIS 8802-12 [ANSI/IEEE Std 802.12], a bus utilizing Demand Priority 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], *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], *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], *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], *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 TR 11802-5: 1997 and ANSI/IEEE Std 802.1H, 1997 Edition, standards. ISO and IEEE each has a unique foreword.

ANSI/IEEE Std 802.1H, 1997 Edition

IEEE Standards documents are developed within the Technical Committees of the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Board. Members of the committees serve voluntarily and without compensation. They are not necessarily members of the Institute. The standards developed within IEEE represent a consensus of the broad expertise on the subject within the Institute as well as those activities outside of IEEE that have expressed an interest in participating in the development of the standard.

Use of an IEEE Standard is wholly voluntary. The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE Standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard. Every IEEE Standard is subjected to review at least every five years for revision or reaffirmation. When a document is more than five years old and has not been reaffirmed, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE Standard.

Comments for revision of IEEE Standards are welcome from any interested party, regardless of membership affiliation with IEEE. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments.

Interpretations: Occasionally questions may arise regarding the meaning of portions of standards as they relate to specific applications. When the need for interpretations is brought to the attention of IEEE, the Institute will initiate action to prepare appropriate responses. Since IEEE Standards represent a consensus of all concerned interests, it is important to ensure that any interpretation has also received the concurrence of a balance of interests. For this reason IEEE and the members of its technical committees are not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration.

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

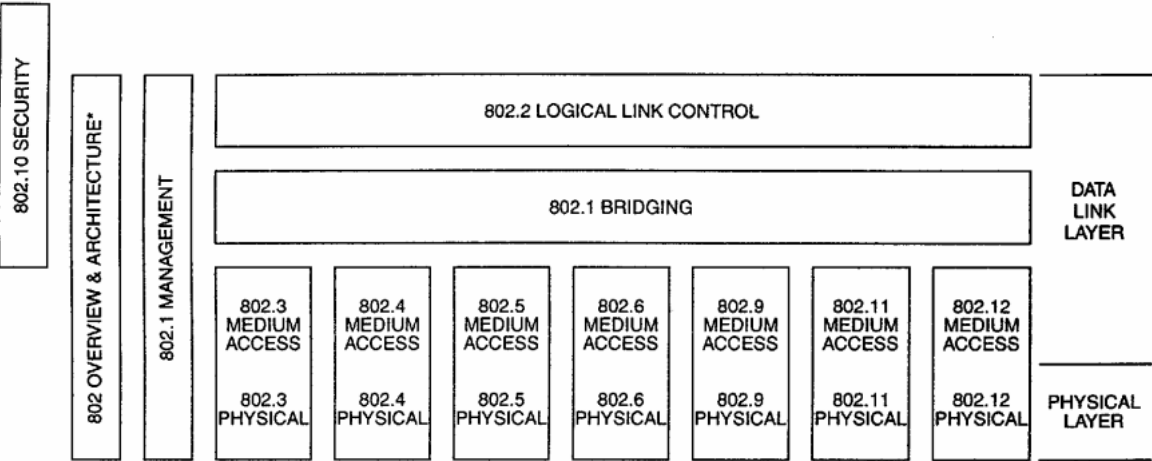
Secretary, IEEE Standards Board
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331
USA

Note: Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken with respect to the existence or validity of any patent rights in connection therewith. The IEEE shall not be responsible for identifying patents for which a license may be required by an IEEE standard or for conducting inquiries into the legal validity or scope of those patents that are brought to its attention.

Authorization to photocopy portions of any individual standard for internal or personal use is granted by the Institute of Electrical and Electronics Engineers, Inc., provided that the appropriate fee is paid to Copyright Clearance Center. To arrange for payment of licensing fee, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; (508) 750-8400. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

Foreword to ANSI/IEEE Std 802.1H, 1997 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.)



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.

The standards defining the access 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.
- 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 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 802.11 *Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications*
- 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 group has authorized standards projects under development:

- 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.

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.

ANSI/IEEE Std 802.1H, 1997 Edition

This document specifies extensions to the behavior of ISO/IEC 10038 (IEEE Std 802.1D) MAC Bridges for use in dealing with Ethernet V2.0 frames.

ISO/IEC 8802-3 (IEEE 802.3) and Ethernet V2.0 frames often share the same LAN media, but the two kinds of frames do not have the same structure. Specifically, Ethernet V2.0 defines the two octets following the MAC addresses as a type, and ISO/IEC 8802-3 defines these same octets as a length. Footnote 7 in 3.2.6 of ISO/IEC 8802-3 : 1993 (footnote 6 in earlier editions) alludes to this difference and points out a way by which ISO/IEC 8802-3 and Ethernet V2.0 MAC frames may be distinguished.

The difference in frame structure means that Ethernet V2.0 frames cannot be directly forwarded by a Bridge to a different type of IEEE 802 LAN (e.g., token ring or FDDI), although they can be forwarded between pairs of LANs that both support Ethernet V2.0 (as, in practice, almost all ISO/IEC 8802-3 LANs do). The Internet Engineering Task Force (IETF) has specified, in RFC1042, a mechanism for conveying the Ethernet-based Internet Protocol (IP) and related protocols over IEEE 802 LANs. This uses the Subnetwork

Access Protocol (SNAP) mechanism specified in IEEE Std 802, with the Ethernet-type values encapsulated in the protocol identifier values of SNAP PDUs. Subsequently, other (non-IP) uses of the RFC1042 mechanism have occurred that were incompatible with the IP protocol suite, and have caused interoperability problems for Bridges wanting to support both.

This recommended practice specifies extensions to the behavior of Bridges in order to facilitate restoration of the interoperability that was lost by such conflicting uses of the RFC1042 mechanism. It also provides guidelines to protocol designers so that they can migrate old Ethernet-based protocols, and design new IEEE 802-based protocols, in such a way that they will interoperate smoothly with Bridges.

Participants

The following is a list of participants in the Interworking effort of the IEEE Project 802.1 Working Group. Voting members at the time of Working Group approval are marked with an asterisk (*).

William P. Lidinsky,* *802.1 Working Group Chair*

Mick Seaman,* *Interworking Task Group Chair*

Floyd Backes*
Robert Barrett*
Amatzia Ben-Artzi
Anthony Berent*
Orna Berry*
Laura Bridge*
Alan Chambers*
Hon Wah Chin
Stephen W. Cooper*
Paul Cowell*

Andy Davis*
Mike Dickerson*
Richard Gilbert
Sharam Hakimi*
John H. Hart*
Anthony A. Jeffree*
Jan-Olof Jemnemo*
Henry D. Keen*
Alan Oppenheimer*
Richard Patti*
Venkat Prasad

Ronald Presti*
Rich Seifert
Steve Senum
Himanshu Shah*
W. Earl Smith
Robin Tasker*
Peter Videcrantz
Trevor Warwick
Amnon Yacoby*
Carolyn Zimmer

The following persons were on the balloting committee:

William B. Adams
Don Aelmore
Kit Athul
Paul W. Campbell
Michael Crumrine
John E. Emrich
Philip H. Enslow
John W. Fendrich
Harvey A. Freeman
Ingrid Fromm
Robert Gagliano
Warren W. Garman
Isaac Ghansah
Harry Gold
Julio Gonzalez-Sanz
Craig Guarnieri
Russell D. Housley
Richard J. Iliff
Anthony A. Jeffree
K. H. Kellermayr
Gary C. Kessler

Youngbum Kim
Lak Ming Lam
Lanse M. Leach
William Lidinsky
Randolph S. Little
Donald C. Loughry
Wen-Pai Lu
Joseph F. P. Luhukay
Peter Martini
Richard McBride
Ann Miller
David S. Millman
C. B. Madhab Mishra
John E. Montague
Kinji Mori
Vikram Punj
Yang Qianli
Philip T. Robinson
Daniel Rosich
Floyd E. Ross
Brian P. Schanning
Norman Schneidewind

Adarshpal S. Sethi
Donald A. Sheppard
Patrick Sheridan
John R. Shoch
Charles Spurgeon
Carel M. Stillebroer
Efsthathiois Sykas
Daniel Sze
Ahmed N. Tantawy
Geoffrey O. Thompson
Robert Tripi
Mark-Rene Uchida
James T. Vorhies
Barry Vornbrock
Donald F. Weir
Alan J. Weissberger
Raymond Wenig
Priya Werahera
Earl J. Whitaker
Jerry A. Wyatt
Oren Yuen