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ISO/IEC 15802-4

ANSI/IEEE Std 802.1E

First edition
1994-05-16

Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Common specifications —

Part 4:
System load protocol

Technologies de l'information — Télécommunications et échange d'informations entre systèmes — Réseaux de zones locales et métropolitaines — Spécifications communes —

Partie 4: Protocole de charge de système

Reference number
ISO/IEC 15802-4:1994(E)
ANSI/IEEE
Std 802.1E, 1994 edition

Abstract: Services and protocol elements that permit the downloading of memory images to data processing equipment attached to IEEE 802 Local and Metropolitan Area Networks are defined. The protocol makes use of the group addressing capabilities inherent in LAN/MAN technologies to permit simultaneous loading of the same memory image to multiple destination systems. The standard includes the specification of managed objects that permit the operation of the load protocol to be remotely managed.
Keywords: local area networks, management; metropolitan area networks, management; system load protocol

Corrected Edition

In the first printing of this edition, the fifth line of the title on page one of the standard was misprinted. It should have read "Common specifications—" rather than "Specific requirements—". That error has been corrected in this printing.

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ANSI/IEEE Std 802.1m-1993)

Information technology— Telecommunications and information exchange between systems— Local and metropolitan area networks— Common specifications—

Part 4: System load protocol

Sponsor

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International Standard ISO/IEC 15802-4:1994

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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.

In 1993, ANSI/IEEE Std 802.1E-1990 was adopted by ISO/IEC JTC 1, as draft International Standard ISO/IEC DIS 15802-3 (renumbered as ISO/IEC 15802-4). 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 15802-4:1994.

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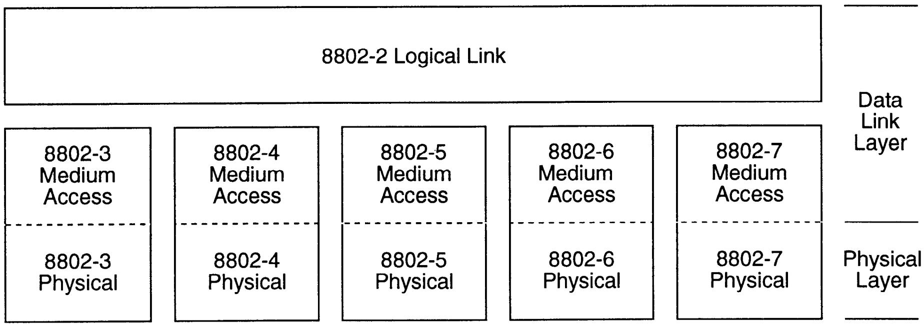
Foreword to International Standard ISO/IEC 15802-4 : 1994

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 five 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:

a) ISO/IEC 8802-3 [ANSI/IEEE Std 802.3, 1993 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. DQDB subnetworks provide a range of telecommunications services within a metropolitan area.
e) 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*, provides for data transfer between medium access standards and network layer protocol.

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 DIS 15802-2 [IEEE Std 802.1B], *LAN/MAN Management,* defines an Open Systems Interconnection (OSI) management-compatible architecture, and service 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 on IEEE 802 LANs.

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

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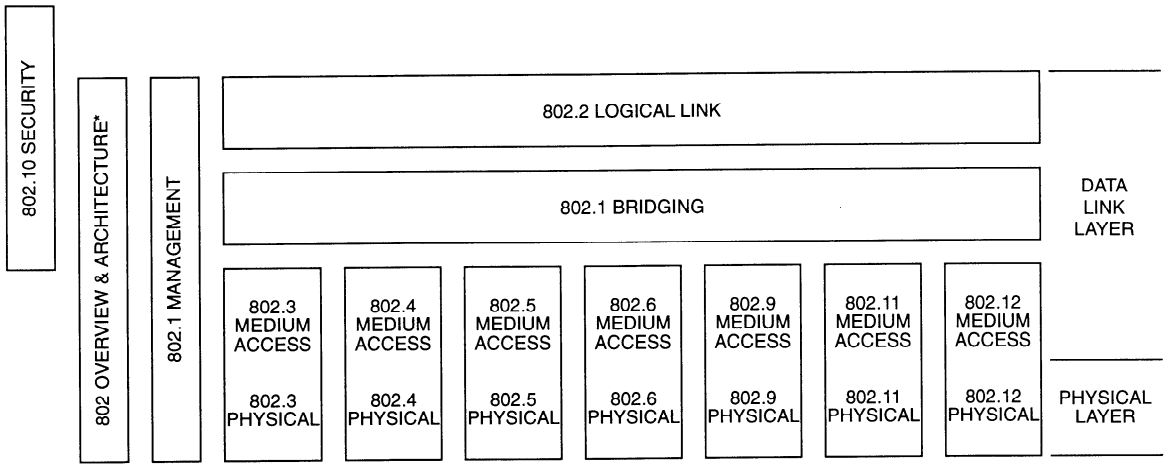
Introduction

(This introduction is not a part of ANSI/IEEE Std 802.1E, 1994 Edition or of ISO/IEC 15802-4 : 1994.)

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.
- ISO/IEC DIS 15802-2 [IEEE Stds 802.1B and 802.1k]: 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 10038 [ANSI/IEEE Std 802.1D]: MAC Bridging. Specifies an architecture and protocol for the interconnection of IEEE 802 LANs below the MAC service boundary.
- ISO/IEC 15802-4 [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

†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 8802-3 [ANSI/IEEE Std 802.3]:	CSMA/CD Access Method and Physical Layer Specifications
• 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
• ISO/IEC 8802-6 [ANSI/IEEE Std 802.6]:	Distributed Queue Dual Bus Access Method/Physical Layer Specifications
• IEEE Std 802.10:	Interoperable LAN/MAN Security, *Currently Contains* Secure Data Exchange

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 following additional working groups have authorized standards projects under development:

• IEEE 802.9	Integrated Services (IS) LAN Interface at the Medium Access Control (MAC) and Physical Layers
• IEEE 802.11	Wireless LAN Medium Access Control (MAC)/Physical Layer Specifications
• IEEE 802.12	Demand Priority Access Method and Physical Layer Specifications

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. 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.

IEEE Std 802.1E, 1994 Edition

This standard defines services and protocol elements that permit the downloading of memory images to data processing equipment attached to IEEE 802 Local and Metropolitan Area Networks. The protocol makes use of the group addressing capabilities inherent in LAN/MAN technologies to permit simultaneous loading of the same memory image to multiple destination systems. The standard includes the specification of managed objects that permit the operation of the load protocol to be remotely managed; these specifications, along with the Protocol Implementation Conformance Statement (PICS) proforma in annex A, were developed as P802.1m/D4, a supplement to IEEE Std 802.1E.

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

Information on the current revision state of this and other IEEE 802 standards may be obtained from:

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IEEE 802 committee working documents are available from:

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*Member Emeritus

IEEE Std 802.1E-1990 was approved by the American National Standards Institute (ANSI) on October 12, 1990.

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* Voting member of the 802.1 Working Group at the time of approval of this document.

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The final conditions for approval of IEEE Std 802.1m-1993 were met on September 29, 1993. This standard was conditionally approved by the IEEE Standards Board on June 17, 1993, with the following membership:

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IEEE Standards Project Editor

IEEE Std 802.1m-1993 was approved by ANSI on February 24, 1994.

Contents

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Local and metropolitan area networks—
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Part 4: System load protocol

1. Overview

Stations in a network may, from time to time, require a portion of their local addressable memory space to be loaded using information held on a remote station. In multivendor networks, the provision of standardized mechanisms to achieve this functionality is desirable.

In order to accommodate efficient loading of multiple stations with the same information at the same time, it is desirable to provide facilities for performing the load process on a multicast basis as well as on a point-to-point basis. The System Load Protocol provides both capabilities.

The protocol assumes two types of device in any load operation:

a) Loadable Device (LD), which is capable of accepting a load from a Load Server.
b) Load Server (LS), which is capable of providing a load for a Loadable Device.

A load operation can be initiated by

a) An LD requesting data from an LS.
b) A third party requesting an LD to accept data by means of a management request, using the Load operation specified in clause 9, and specifically in 9.2.1.3, in the description of the Load operation. When an LD accepts such a request, it will then request data from an LS in the normal manner.

The loadable data is termed an image. An image is broken down into Groups that, in turn, consist of blocks. The protocol allows flexibility in the choice of image and block size. It does not state the number of Groups in an image or the number of octets in a block.

The System Load Protocol relies on IEEE 802.2 Logical Link Control (LLC) Type 1 services (see ISO 8802-2[1]) operating over any compatible MAC and Physical Layer.

The System Load Protocol allows the use of IEEE 802.1B LAN/MAN Management [ISO/IEC DIS 15802-2] to manage aspects of its operation. This use is described in 9.3. In addition, the managed objects have been defined in such a way that it is also possible to use CMIP (ISO/IEC 9596) as the management protocol, as described in 9.4.

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[1]Information on references can be found in clause 3.

The System Load Protocol may be used in conjunction with other management protocols. It provides a load capability not provided by general-purpose management protocols. The general-purpose management protocols provide the capabilities of parameter manipulation, event reporting, and action invocation that support and enhance the load facility. For example, a load of one system might be invoked from another system by means of management intervention.

The following clauses describe

a) The System Load architecture.
b) The services provided by System Load.
c) The semantics and syntax of the System Load Protocol, including the state machines that describe the operation of the System Load Protocol machine.
d) The semantics of the load-related management objects.

Annex C provides further information regarding the application of the protocol.

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented for a given protocol. Such a statement is called a Protocol Implementation Conformance Statement (PICS). Annex A to this International Standard contains the PICS proforma for the System Load Protocol.

2. Scope

The System Load Protocol specification defines a protocol to load the memory of data processing equipment installed on IEEE 802 networks. To this end the specification

a) Defines the protocol data unit (PDU) formats for loading an end system.
b) Defines the protocol for loading an end system.
c) Describes the services required of the end system being loaded (Loadable Device or LD) to successfully complete a load operation.
d) Describes the services required of the end system providing the load (Load Server or LS) to successfully complete a load operation.
e) Defines the semantic aspects of managed objects of the LD and LS that permit the manipulation of the operational parameters of the LD and LS state machines, announcement of load servers, and the third-party initiation of a load.
f) Defines the syntax used when performing management operations via the IEEE 802.1B LAN/MAN Management Protocol (ISO/IEC DIS 15802-2).
g) Defines the syntax used when performing management operations via the CMIP Systems Management Protocol (ISO/IEC 9596-1).

The specification discusses the LS in only as much detail as is necessary to define the loading protocol. Management and LS decisions, such as what to do as a result of LS or LD events or when an LS or Manager fails, are LS and Manager implementation issues and are beyond the scope of this document.

The protocol is specified to convey images consisting of data (in blocks) of unspecified format. The content and format of data blocks are application-specific; this standard does not place any constraints on

a) The form, content, or meaning of the images that may be conveyed by means of the protocol;
b) The manner in which data blocks are processed subsequent to their being received by a loadable device.

This International Standard provides the PICS proforma for the System Load Protocol in compliance with the relevant requirements, and in accordance with the relevant guidance, given in ISO/IEC 9646-2.

3. References

The following standards contain provisions which, through references in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below.

IEEE Std 802-1990, IEEE Standards for Local and Metropolitan Area Networks: Overview and Architecture (ANSI).[2]

IEEE Std 802.1F-1993, IEEE Standards for Local and Metropolitan Area Networks: Common Definitions and Procedures for IEEE 802 Management Information.

ISO 7498-4 : 1989, Information technology—Open Systems Interconnection—Basic Reference Model—Part 4: Management framework.[3]

ISO 8802-2 : 1989 [ANSI/IEEE Std 802.2-1989], Information processing systems—Local area networks—Part 2: Logical link control.

ISO/IEC 8824 : 1990, Information technology—Open Systems Interconnection—Specification of Abstract Syntax Notation One (ASN.1).

ISO/IEC 8825 : 1990, Information technology—Open Systems Interconnection—Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1).

ISO/IEC 9595 : 1991, Information technology—Open Systems Interconnection—Common management information service definition.

ISO/IEC 9596-1 : 1991, Information technology—Open Systems Interconnection—Common management information protocol—Part 1: Specification.

ISO/IEC 9646-1 : 1991, Information technology—Open Systems Interconnection—Conformance testing methodology and framework—Part 1: General concepts.

ISO/IEC 9646-2 : 1991, Information technology—Open Systems Interconnection—Conformance testing methodology and framework—Part 2: Abstract test suite specification.

ISO/IEC 10165-4 : 1992, Information technology—Open Systems Interconnection—Management information services—Structure of management information—Part 4: Guidelines for the definition of managed objects.

ISO/IEC TR 10178, Information technology—Telecommunications and information exchange between systems—The structure and coding of Logical Link Control addresses in Local Area Networks.

ISO/IEC TR 10735, Information technology—Telecommunications and information exchange between systems—Standard Group MAC Addresses.

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[2]IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.

[3]ISO and ISO/IEC publications are available from the ISO Central Secretariat, 1 rue de Varembé, Case Postale 56, CH-1211, Genève 20, Switzerland/Suisse. In the US, they are available from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA.