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**Std 802.9**

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

**Part 9:**

**Integrated Services (IS) LAN Interface at the  
Medium Access Control (MAC) and Physical  
(PHY) Layers**

*Technologies de l'information — Télécommunications et échange  
d'information entre systèmes — Réseaux locaux et métropolitains —  
Exigences spécifiques —*

*Partie 9: Interface LAN pour services intégrés (IS) aux couches de contrôle  
d'accès au support (MAC) et physique (PHY)*



Reference number  
ISO/IEC 8802-9:1996(E)  
ANSI/IEEE  
Std 802.9-1996 edition

**Abstract:** A unified access method that offers integrated services (IS) to the desktop for a variety of publicly and privately administered backbone networks (e.g., ANSI FDDI, IEEE 802.x, and ISDN) is defined. In addition, the interface at the MAC sublayer and the PHY Layer is specified.

**Keywords:** access unit (AU), data link layer, hybrid multiplexer (HMUX), integrated services digital network (ISDN), integrated services terminal equipment (ISTE), layer management entity, local area network (LAN), logical link control, managed object, management information base (MIB), medium access control (MAC) sublayer, metropolitan area network (MAN), physical (PHY) layer, physical medium dependent, physical signalling, private switching network, protocol data unit (PDU), service access point, time division multiplexer (TDM)

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ANSI/IEEE Std 802.9, 1996 Edition

Information technology—  
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Specific requirements—

# Part 9: Integrated Services (IS) LAN Interface at the Medium Access Control (MAC) and Physical (PHY) Layers

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## International Standard ISO/IEC 8802-9: 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.

In 1995, ANSI/IEEE Std 802.9-1994 was adopted by ISO/IEC JTC 1, as draft International Standard ISO/IEC DIS 8802-9. 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 8802-9: 1996.

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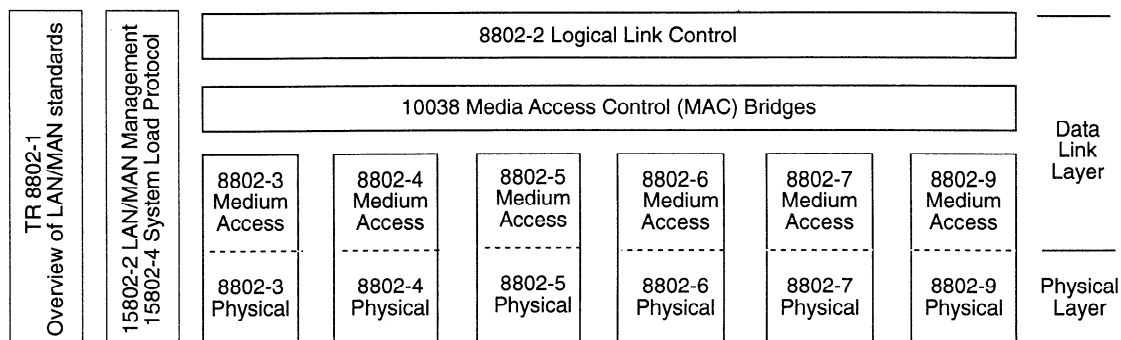
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## Foreword to International Standard ISO/IEC 8802-9: 1996

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 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.

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 8802-9: 1996 and ANSI/IEEE Std 802.9, 1996 Edition standards. ISO and IEEE each have a unique foreword.

## ANSI/IEEE Std 802.9, 1996 Edition

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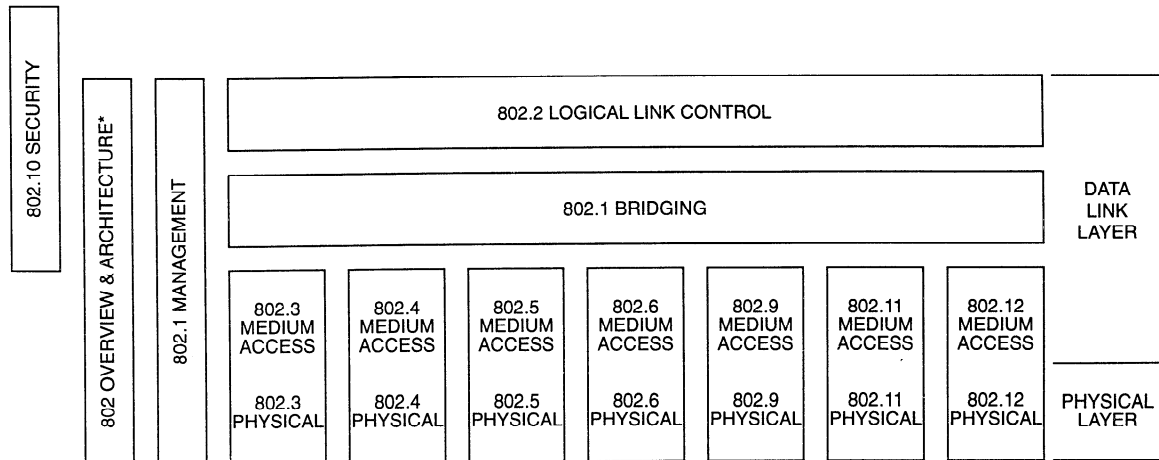
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## Foreword to ANSI/IEEE Std 802.9, 1996 Edition

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.

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      *Token Ring Access Method and Physical Layer Specifications*  
[ISO/IEC 8802-5]
- ANSI/IEEE Std 802.6      *Distributed Queue Dual Bus Access Method and Physical Layer Specifications*  
[ISO/IEC 8802-6]
- ANSI/IEEE Std 802.9      *Integrated Services (IS) LAN Interface at the Medium Access Control (MAC) and Physical (PHY) Layers*  
[ISO/IEC 8802-9]
- 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*

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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, 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 802.9, 1996 Edition

The ongoing work of the IEEE 802 committee has resulted in standards for data communications in a local area network (LAN) environment. As office workstations have proliferated, however, the demand for LANs has substantially increased. This has led to the inevitable diversification in market requirements.

Since the typical office worker requires access to both data and voice services, among others, at the desktop, there has been a growing trend toward integrated services (IS), namely voice, data, and video. Due to the increasing need for facsimile, image transfer, and video services, these services are included in the general category of the integration of voice and data services. Such integration offers potential economies to the business customer in terms of reduced components (one port per station instead of two or more), and in simpler management and maintenance (one network instead of two or more).

The provision of voice service is generally effected using unshielded twisted-pair wire. Not only is this medium widespread in typical office environments, but it is also inexpensive and easy to install and



maintain. In the vast majority of installations, there is spare capacity, and in these cases, the use of such a medium is essentially free since the need for rewiring is significantly reduced. Moreover, with existing technology, it is possible to provide medium- to high-performance data service over the unshielded twisted-pair wire. This places special emphasis on the use of the unshielded twisted-pair wire to provide IS services. This standard extends the scope and capability of existing twisted-pair wiring and thus reduces the incentive for overlay wiring systems.

With respect to the provision of integrated services, there has been ongoing work in other standards bodies, notably, the International Telecommunication Union–Telecommunication Standardization Sector (ITU-T) on the provision of such services through integrated services digital networks (ISDNs). While the principal focus has been the provision of such services using public networks, efforts are under way [notably, in the European Computer Manufacturers Association (ECMA)] to extend such services to customer premises networks.

This standard defines a unified access method that offers global integrated services to the desktop by accessing a variety of publicly and privately administered backbone networks (e.g., ANSI FDDI, IEEE 802.x<sup>1</sup>, and ISDN). This standard will enable integrated services terminal adapters (ISTEs) to be attached to IEEE 802.9 LANs and will allow them to communicate with other IS stations as well as data-only stations, voice-only stations, and premises-based networks offering ISDN services. In addition, it specifies the use of unshielded telephone twisted pair as the primary medium of distribution.

The use of terminal adaptor (TA) devices will permit the direct coupling of native mode terminal devices such as data-only modules, voice modules, and ISDN basic rate terminals to the IEEE 802.9 interface. This standard has been designed to accommodate the adaptation of ISDN basic rate station devices and IEEE 802.x station devices to the IEEE 802.9 interface. In summary, this standard represents the integration of IEEE 802 services and ISDN services.

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

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<sup>1</sup>IEEE 802.x refers to the entire family of IEEE 802 standards.

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This standard was approved by the American National Standards Institute on 15 March 1995.

**Note that editorial changes were made to the IEEE standard to accommodate concerns raised during the ISO/IEC JTC 1 balloting process. These are indicated in the text by a change bar (such as shown at the left of this paragraph).**

# Contents

CHAPTER	PAGE
1. Overview .....	1
1.1 Scope and purpose .....	1
1.2 Notation.....	2
1.3 Service model.....	6
1.4 Document organization.....	11
2. References .....	13
3. Definitions.....	19
4. Abbreviations.....	23
5. Architecture.....	29
5.1 Overview and basic concepts.....	29
5.2 Application areas .....	32
5.3 Layers and layer service boundaries .....	33
6. Frame structure .....	41
6.1 Overview.....	41
6.2 Numbering convention.....	41
6.3 Order of bit transmission .....	42
6.4 Order of octet transmission for fields which span more than one octet.....	42
6.5 TDM frame structure .....	42
6.6 Packet frame structure.....	54
7. Service specification .....	59
7.1 Packet services .....	59
7.2 Convergence of services .....	70
7.3 Management services.....	82
8. Detailed specification of the medium access control (MAC) sublayer .....	97
8.1 Overview of the MAC sublayer.....	97
8.2 The ISLAN MAC protocol engine model .....	97
8.3 P channel access control .....	102
8.4 Timing relationship of TDM frames exchanged between the ISTE and the AU.....	131
9. Detailed specification of the Physical (PHY) Layer.....	133
9.1 Overview.....	133
9.2 HMUX sublayer.....	133
9.3 PS sublayer.....	162
9.4 PMD sublayer for 4.096 Mb/s application.....	178
9.5 PMD sublayer for higher rate (20.48 Mb/s) application.....	190
9.6 Connector .....	207
9.7 Powering considerations .....	209

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CHAPTER	PAGE
9.8 Medium cable characteristics—4.096 Mb/s PMD .....	210
9.9 Medium cable characteristics—20.48 Mb/s PMD .....	213
10. ISLAN layer management .....	215
10.1 Introduction .....	215
10.2 Characteristics of the ISLAN interface relevant to management .....	215
10.3 OSI network management framework .....	216
10.4 Relationship of IEEE 802.9 subnetwork management entities .....	220
10.5 ISDN network management information exchange .....	222
10.6 Management transport channels within the IEEE 802.9 interface .....	223
10.7 The structure of OSI management information .....	224
10.8 OSI management functional areas in the ISLAN environment .....	230
10.9 Inheritance hierarchy for ISLAN management .....	231
10.10 The containment hierarchy for ISLAN management .....	235
10.11 The OSI registration hierarchy for ISLAN layer management .....	236
10.12 The definition of the ISLAN systems MOs .....	238
10.13 Definition of the ISLAN layer MO classes .....	239
10.14 Management of the ISDN user/network interface in the ISLAN .....	251
10.15 MIB tables .....	262
11. Signalling and ISDN management scope .....	271
11.1 Introduction .....	271
11.2 General overview of the service .....	272
11.3 Requirements for signalling support .....	273
11.4 CCITT Q.931 architecture overview .....	275
11.5 P channel call control procedures .....	283
11.6 Interface between CCITT Q.931 and the HMC .....	286
11.7 Addressing .....	287
11.8 Configuration topologies .....	287
11.9 ISDN management functions .....	288
ANNEX	
Annex A (normative) Protocol implementation conformance statement (PICS) proforma .....	291
Annex B (normative) Managed object conformance statement (MOCS) .....	293
Annex C (normative) GDMO and ASN.1 specification of management information .....	295
Annex D (normative) Recommendations for signalling procedures .....	357
Annex E (informative) Architecture of the access unit (AU) and guidelines for implementation .....	377
Annex F (informative) Sequence and description language (SDL) description of the information flow across layers .....	383
Annex G (informative) Multimedia security control provision in IEEE 802.9 ISLAN .....	399
Annex H (informative) Address interworking across an IEEE 802.9 network .....	401
Annex I (informative) Support of cell relay bearer service .....	421

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[ISO/IEC 8802-9:1996](https://standards.iteh.ai/catalog/standards/sist/ea1ae15a-415c-4ad7-8f49-fb1ceff31004/iso-iec-8802-9-1996)

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

## **Part 9: Integrated Services (IS) LAN Interface at the Medium Access Control (MAC) and Physical (PHY) Layers**

### **1. Overview**

#### **1.1 Scope and purpose**

The scope of this International Standard is to

- Develop an ISLAN interface at the medium access control (MAC) sublayer and the Physical (PHY) Layer compatible with IEEE 802.x<sup>1</sup> and ISDN standards and architectures
- Develop an ISLAN interface that operates independently from the backbone network
- Focus upon unshielded twisted-pair wiring as the primary distribution medium
- Enable implementation of IS terminal equipment (ISTE) that accesses IEEE 802 LAN and ISDN services through a common interface

The body of this International Standard

- Defines the service provided by the MAC sublayer to the IEEE 802 Logical Link Control (LLC) sublayer and management, and describes the services provided by the PHY Layer to the MAC sublayer and management in terms of service primitives and associated parameters
- Describes the services provided by the Physical Layer (PHY MUX) to support a basic rate interface (BRI) ISDN in terms of service primitives and associated parameters
- Describes the services provided by the PHY MUX to the isochronous channels
- Specifies the MAC functions that allow ISTE access to one another and to LANs providing IEEE 802 services and/or ISDN services
- Specifies the frame format for the MAC frame
- Defines the MAC protocol
- Specifies the channel structure and frame format of the time division multiplexed (TDM) frame

<sup>1</sup>IEEE 802.x refers to the entire family of IEEE 802 standards.