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

**Part 1:
Overview of Local Area Network Standards**

*Technologies de l'information — Télécommunications et échange
d'information entre systèmes — Réseaux locaux et métropolitains —
Exigences spécifiques —
Partie 1: Vue d'ensemble des normes de réseaux locaux*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of the joint technical committee is to prepare International Standards. 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 exceptional circumstances, the joint 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 the joint 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.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 8802 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC TR 8802-1, which is a Technical Report of type 3, was prepared by ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*.

This third edition cancels and replaces the second edition (ISO/IEC TR 8802-1:1997), which has been technically revised.

ISO/IEC 8802 consists of the following parts, under the general title *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements*:

- *Part 1: Overview of Local Area Network Standards* [Technical Report]
- *Part 2: Logical link control*
- *Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications*
- *Part 4: Token-passing bus access method and physical layer specifications*
- *Part 5: Token ring access method and physical layer specifications*

- *Part 6: Distributed Queue Dual Bus (DQDB) access method and physical layer specifications*
- *Part 9: Integrated Services (IS) LAN Interface at the Medium Access Control (MAC) and Physical (PHY) Layers*
- *Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications*
- *Part 12: Demand-Priority access method, physical layer and repeater specifications*

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Introduction

This technical report introduces the set of International Standards produced to facilitate the interconnection of information processing systems connected to a Local Area Network (LAN). The LAN is a peer-to-peer communications network provided by a single broadcast domain that enables all end stations to exchange information. As a consequence it does not inherently provide privacy. A LAN is in general owned, used, and operated by a single organisation and falls within a single administrative domain.

In November 1999 a Category C liaison was established between ISO/IEC JTC 1 SC 6 WG 1 and WG 3, and the IEEE 802 LMSC to foster closer collaboration in the standards making process. To that end cooperative working practices have been established such that, both parties are able to contribute their particular and unique strengths to the standards making process without introducing time delays into the other's procedures; and, each has output for which they are responsible which records their involvement in that process.

There are two distinct elements to the cooperative working practice. The first provides the means whereby ISO/IEC JTC 1 National Bodies are able to contribute to the technical work of the IEEE 802 standards developments; and the second, via the IEEE Sponsor ballot process, provides the more formal mechanism whereby ISO/IEC JTC 1 National Bodies can review IEEE 802 work which is nearing completion of the standards process. It is this latter element of procedure which provides input into the revision of this technical report providing the record of ISO/IEC JTC 1 National Body participation in the standards making process.

This technical report therefore provides a source of reference to all International Standards that relate to local area networks; specifically the ISO/IEC 8802 technologies and FDDI; and in addition is the location where ISO/IEC JTC 1 SC 6 involvement in IEEE 802 standards development is recorded and any endorsements to particular IEEE 802 standards are noted.

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

Part 1: Overview of Local Area Network Standards

1 Scope

This technical report provides an introduction to the set of International Standards which describe local area networks, specifically those which make use of the 48-bit MAC address format.

The MAC technologies described in this technical report have in common the ability to provide sufficient capability to support the MAC Service which is defined in ISO/IEC 15802-1.

The scope of this Technical Report is therefore limited to those International Standards which describe processes and procedures resident in the Data Link and Physical Layers of the OSI Basic Reference Model and can be said to relate to local area networks.

This technical report does not itself describe new Service or Protocol definitions. Its intent is to set the context for local area networks which include both the International Standards describing FDDI and the technologies described by the set of ISO/IEC 8802 International Standards.

Additionally this technical report provides the record of cooperative work between ISO/IEC JTC 1 SC 6 WG 1 and the IEEE 802 LMSC as a part of the Category C liaison established in November 1999 either through the usual Fast Track procedures or via the cooperative working procedures described in this technical report.

2 References

NOTE A revised numbering scheme was introduced in 1993 to provide alignment with the numbering scheme used by the IEEE for their LAN/MAN Standards and the basis for this numbering scheme is shown in Annex A.

ISO 7498-3:1997, *Information technology — Open Systems Interconnection — Basic Reference Model: Naming and addressing*

ISO/IEC 8802-2:1998, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 2: Logical link control*

ISO/IEC 8802-3:2000, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications*

ISO/IEC 8802-5:1998, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 5: Token ring access method and physical layer specifications*

ISO/IEC 8802-6:1994, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 6: Distributed Queue Dual Bus (DQDB) access method and physical layer specifications*

ISO/IEC TR 8802-1:2001(E)

ISO/IEC 8802-11:1999, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications*

ISO/IEC 8802-11:1999/Amd.1:2000, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications — Amendment 1: High-speed Physical Layer in the 5 GHz band*

ISO/IEC 8802-12:1998, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 12: Demand-Priority access method, physical layer and repeater specifications*

ISO/IEC 8886:1996 | ITU-T Recommendation X.212, *Information technology — Open Systems Interconnection — Data link service definition*

ISO 9314-1:1989, *Information processing systems — Fibre Distributed Data Interface (FDDI) — Part 1: Token Ring Physical Layer Protocol (PHY)*

ISO 9314-2:1989, *Information processing systems — Fibre Distributed Data Interface (FDDI) — Part 2: Token Ring Media Access Control (MAC)*

ISO/IEC 9314-3:1990, *Information processing systems — Fibre Distributed Data Interface (FDDI) — Part 3: Physical Layer Medium Dependent (PMD)*

ISO/IEC 9314-6:1998, *Information technology — Fibre Distributed Data Interface (FDDI) — Part 6: Station Management (SMT)*

ISO/IEC TR 9577:1999, *Information technology — Protocol identification in the network layer*

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

ISO/IEC 10742:1994, *Information technology — Telecommunications and information exchange between systems — Elements of management information related to OSI Data Link Layer standards*

ISO/IEC 11575:1995, *Information technology — Telecommunications and information exchange between systems — Protocol mappings for the OSI Data Link service*

ISO/IEC 11801:2000, *Information technology — Generic cabling for customer premises*

ISO/IEC TR 11802-1:1997, *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*

ISO/IEC TR 11802-2:1999, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Part 2: Standard Group MAC Addresses*

ISO/IEC TR 11802-5:1997, *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*

ISO/IEC 15802-1:1995, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Common specifications — Part 1: Medium Access Control (MAC) service definition*

ISO/IEC 15802-3:1998, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Common specifications — Part 3: Media Access Control (MAC) Bridges*

ISO/IEC 15802-4:1994, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Common specifications — Part 4: System load protocol*

ISO/IEC 15802-5:1998, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Common specifications — Part 5: Remote Media Access Control (MAC) bridging*

3 Abbreviations

The following abbreviations are used in this Technical Report.

CSMA/CD	Carrier Sense Multiple Access with Collision Detection
DLS	Data Link Service
DQDB	Distributed Queue Dual Bus
DSAP	Destination Service Access Point
FDDI	Fibre-Distributed Data Interface
LAN	Local Area Network
LLC	Logical Link Control
MAC	Media Access Control
MAN	Metropolitan Area Network
MCS	Management Conformance Summary
MICS	Management Information Conformance Statement
MOCS	Managed Object Conformance Statement
MRCS	Managed Relationship Conformance Statement
PHY	Physical Layer
PICS	Protocol Implementation Conformance Statement
PMD	Physical Layer Medium Dependent
SMT	Station Management
SNAP	Sub-network Access Protocol
SSAP	Source Service Access Point

4 ISO/IEC JTC 1 SC 6 WG 1 and IEEE 802 LMSC Co-operative Work

4.1 Introduction

The association between ISO/IEC JTC 1 SC 6 WG 1 and IEEE 802 has over the years been most successful with the development of International Standards for local and metropolitan area networks. This technical report provides an overview of this family of standards together with a full reference list of published International Standards in this area.

However it was recognised that, in its original form, the joint processes of ISO/IEC JTC 1 SC 6 and IEEE 802 introduced a number of additional, and at times, difficult hurdles to be overcome in the production of joint ISO/IEC and IEEE 802 Standards. This largely arose because the two organisations quite reasonably operated with differing timetables which inevitably introduced delay into the publication process and whilst technical discussion was complete the entire process to publication was not finished. This, combined with the undoubted standing of IEEE 802 as the international body that makes LAN standards, led to the debate within the IEEE 802 as to the value of the additional processing of their standards through ISO/IEC.

The main value of making use of ISO/IEC in the development cycle is to benefit from the wider audience that ISO/IEC JTC 1 SC 6 National Body participation is able to offer to the review process. This ensures that in addition to the usual rigorous technical appraisal carried out by the IEEE 802, the opportunity exists for account to be taken of regional and national perspectives which may otherwise be missed. The end result is a specification about which there is overwhelming, indeed global, consensus. To lose this element of the development process would be significant and to some extent would diminish the final product.

4.2 The Cooperative Process

Nominated representatives from ISO/IEC JTC 1 SC 6 National Bodies have been invited by IEEE 802 Working Groups (WG) to participate in their activities as International Observers in their ballot process to review and to comment on draft materials. Any comments received from such a source would then be addressed in the normal way as a part of the 802 WG ballot resolution process.

A liaison will be sent to ISO/IEC JTC 1 SC 6 WG 1 providing the necessary status information and inviting ISO/IEC JTC 1 SC 6 WG 1 to respond as a part of their ballot process when an IEEE 802 WG draft standard progresses to Sponsor ballot, that is, when the IEEE 802 WG has completed its technical work. This provides the opportunity for ISO/IEC JTC 1 SC 6 WG 1 formally to contribute to the work, and through this technical report to record its involvement in the standardisation process.

Additionally, and notwithstanding issues of IEEE 802 LMSC permission and of copyright, the opportunity exists for ISO/IEC JTC 1 SC 6 National Bodies, where it is considered appropriate, to make use of ISO/IEC JTC 1 Fast track procedures for IEEE 802 work. However it is to be hoped that in the majority of cases this technical report will be of sufficient weight to record the involvement and endorsement of ISO/IEC JTC 1 SC 6 National Bodies in the standards making process.

Therefore in the general case this technical report will catalogue both those IEEE 802 standards already published as ISO/IEC International Standards, together with any International Standards approved via the Fast track procedures of ISO/IEC [Clause 2, References] as well as any IEEE 802 standards endorsed via the mechanism of cooperative working described here [Annex B]. New editions of this technical report will record successive endorsements by ISO/IEC of IEEE 802 standards published under these cooperative arrangements together with any commentary agreed by ISO/IEC JTC 1 National Bodies.

4.3 Catalogue of Endorsed Standards

Annex B of this technical report lists those standards that have been developed as a part of the cooperative agreement with the IEEE 802 LMSC together with any agreed commentary. Clause 2 of this technical report provides a full reference list for this endorsed material.

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5 Local Area Network Technologies

5.1 Introduction

The local area network MAC technologies considered in this Technical Report are shown in Table 1.

Table 1 — Local area network MAC technologies and their related International Standards

LAN Technology	Data Transmission Rate	International Standard
CSMA/CD	10Mbit/s / 100Mbit/s / 1000Mbit/s	ISO/IEC 8802-3
Token-passing Ring	4Mbit/s / 16Mbit/s	ISO/IEC 8802-5
DQDB	no upper limit defined	ISO/IEC 8802-6
Wireless LAN	up to 54Mbit/s	ISO/IEC 8802-11
Demand Priority	100Mbit/s	ISO/IEC 8802-12
FDDI	100Mbit/s	ISO/IEC 9314 -1 -2 -3 (-6)

These International Standards are organised along the architectural lines of the OSI Basic Reference model, and in the case of the 8802 LANs into the medium-dependent aspects of the Physical Layer (PHY) and the formats and protocols used by the particular media access control sublayer (MAC).

Figure 1 shows the relationship and dependencies of the various technologies within this overall architecture. This family of International Standards deals with the physical and data link layers as defined by the Open Systems Interconnection Reference Model. It comprises a set of medium access control technologies and associated physical media, each appropriate for particular applications or system objectives.

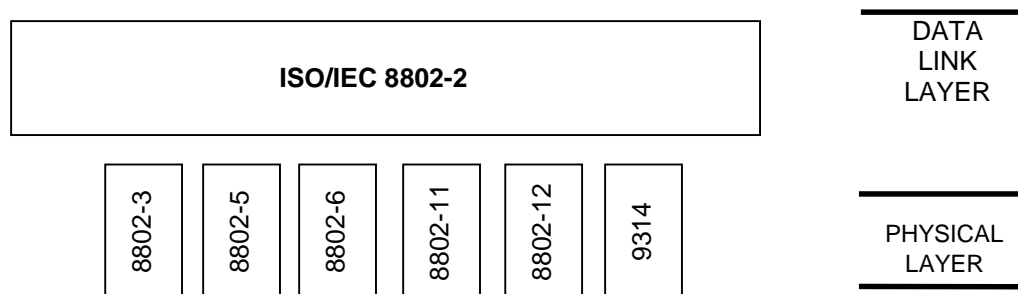


Figure 1 — Relationship of family of International Standards for Local Area Networks

5.2 The LAN Technologies

LANs cover a wide variety of Physical Layer International Standards, physical media, and methods of media access control. The following is a brief synopsis for each of the LAN technologies identified in Table 1, however the reader is referred to the International Standard documents (see Clause 2) for the precise detail for each of the LAN technologies.

5.2.1 CSMA/CD

This form of LAN technology provides two distinct modes of operation, namely half duplex and full duplex, and a given instantiation operates in either half or full duplex mode at any one time.

In half duplex mode Carrier Sense Multiple Access with Collision Detection controls access to the medium by means by which two or more stations share a common transmission medium. To transmit, a station waits (defers) for a quiet period on the medium (that is, no other station is transmitting) and then sends the intended message in bit-serial form. If, after initiating a transmission, the message collides with that of another station, then each transmitting station intentionally sends a few additional bytes to ensure propagation of the collision throughout the system. The station then remains silent for a random amount of time (backoff) before attempting to transmit again.

Full duplex operation allows simultaneous communication between a pair of stations using point-to-point media. It does not require that transmitters defer, nor do they monitor or react to receive activity, as there is no contention for a shared medium in this mode. In this respect, the multiple access (i.e., CSMA/CD) algorithms are unnecessary. Full duplex mode can only be used when all of the following are true; the physical medium is capable of supporting simultaneous transmission and reception without interference; there are exactly two stations connected with a full duplex point-to-point link; and both stations on the LAN are capable of, and have been configured to use, full duplex operation. The most common configuration envisioned for full duplex operation consists of a centralised bridge (or switch) [9.1] with a dedicated LAN connecting each bridge port to a single device; such an architecture being described in ISO/IEC 11801

The CSMA/CD LAN technology is defined for use on 50 ohm coaxial cable (10BASE5 and 10BASE2), on unshielded twisted pair (10BASE-T), and on fibre optic cable (FOIRL and 10BASE-F).

100BASE-T couples the ISO/IEC 8802-3 CSMA/CD MAC with a family of 100 Mbit/s physical layers. While the MAC is readily scaled to these performance levels, specific physical layer standards are required for 100 Mbit/s operation and these include 100BASE-T4, 100BASE-TX and 100BASE-FX.

1000BASE-T provides the ISO/IEC 8802-3 CSMA/CD MAC with a set of 1000 Mbit/s physical layers. As with 100BASE-T, the MAC is readily scaled to these performance levels, the specific physical layer standards of 1000BASE-SX and 1000BASE-LX are required for 1 000 Mbit/s operation.

5.2.2 Token-passing Ring

In a token-passing ring, stations are serially connected to form a logical ring over which data and control information is transmitted and received.

Access to this ring is controlled by a signalling sequence referred to as the “token” which circulates around the ring from station to station.