TECHNICAL
REPORT

ISO/IEC
TR 8802-1

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 Committee) 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 Technical Reports of type 3 do not necessarily have to be reviewed until data they provide are considered to be no longer valid or useful.

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

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.

This Technical Report provides a source of reference to all International Standards that relate to local area networks; specifically the ISO/IEC 8802 technologies and FDDI.

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 address format.

The 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.

2 References

NOTE   It was agreed in October 1993 to revise the existing numbering scheme of LAN/MAN International Standards within ISO/IEC JTC 1 to provide alignment with the numbering scheme used by IEEE for their LAN/MAN Standards. The process of introducing the new scheme for new International Standards and the re-numbering of existing International Standards is on-going. Annex A describes the new numbering scheme in detail and indicates how its implementation will proceed.

ISO/IEC 7498-1: 1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model.*

ISO 7498-3: 1989, *Information processing systems – Open Systems Interconnection – Part 3: Naming and addressing.*

ISO/IEC 8802-2: 1994, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 2: Logical link control.*

ISO/IEC 8802-3: 1996, *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 8802-4: 1990, *Information processing systems – Local area networks – Part 4: Token-passing bus access method and physical layer specifications.*

ISO/IEC 8802-5: 1995, *Information technology – Local and metropolitan area networks – Specific requirements – Part 5: Token ring access method and physical layer specifications.*

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

ISO/IEC 8802-9: 1996, *Information technology – Local and metropolitan area networks – Specific requirements – Part 9: Integrated Services (IS) LAN Interface at the Medium Access Control (MAC) and Physical (PHY) Layers.*

ISO/IEC 8802-12:—[1], *Information technology – Local and metropolitan area networks – Specific requirements – Part 12: Demand priority access method, physical layer and repeater specifications.*

ISO/IEC 8886: 1996 I ITU-T Recommendation X.212 (1995), *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:—[1], *Information technology – Fibre Distributed Data Interface (FDDI) – Part 6: Station Management (SMT).*

ISO/IEC TR 9577: 1996, *Information technology – Protocol identification in the network layer.*

ISO/IEC 10038: 1993, *Information technology – Telecommunications and information exchange between systems – Local area networks – Media access control (MAC) bridges.* (In the future to be published as ISO/IEC 15802-3.)

ISO/IEC 10165-4: 1992, *Information technology – Open Systems Interconnection – Structure of management information – Part 4: Guidelines for the definition of management 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 – Provision and mappings for the OSI Data Link service.*

ISO/IEC 11801: 1995, *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.* (Formerly published as ISO/IEC TR 10178.)

ISO/IEC TR 11802-2: 1996, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Technical reports and guidelines – Part 2: Standard Group MAC Addresses.* (Formerly published as ISO/IEC TR 10735.)

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.* (Formerly published as ISO/IEC 10039.)

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:—[1], *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Common specifications – Part 5: Remote MAC bridging.*

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1) To be published.

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 Local Area Network Technologies

4.1 Introduction

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

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

LAN Technology	Data Transmission Rate	International Standard
CSMA/CD	10Mbit/s / 100Mbit/s	ISO/IEC 8802-3
Token-passing Bus	5Mbit/s / 10Mbit/s	ISO/IEC 8802-4
Token-passing Ring	4Mbit/s / 16Mbit/s	ISO/IEC 8802-5
DQDB	no upper limit defined	ISO/IEC 8802-6
Demand Priority	100Mbit/s	ISO/IEC 8802-12
Integrated Services	up to 20.48Mbit/s	ISO/IEC 8802-9
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 technologies and associated physical media, each appropriate for particular applications or system objectives.
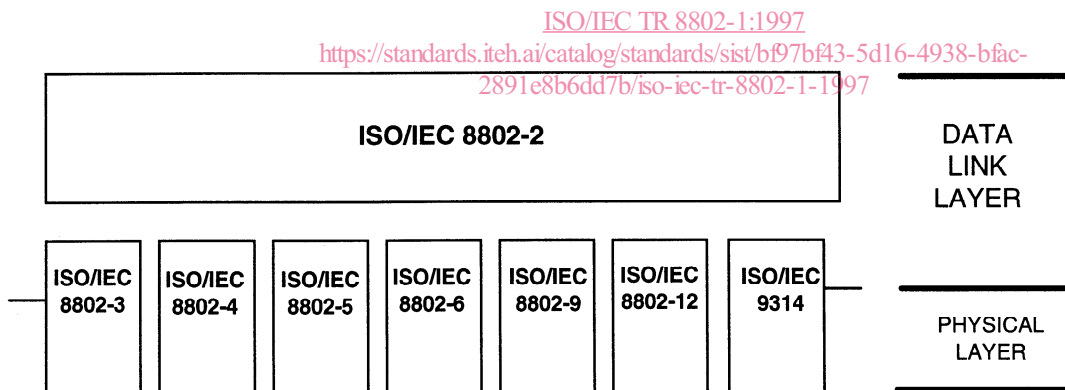

Figure 1 — Relationship of family of International Standards for Local Area Networks

4.2 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.

4.2.1 CSMA/CD

This form of LAN technology, 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. 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 the new performance levels, new physical layer standards are required for 100 Mbit/s operation and these include 100BASE-T4, 100BASE-TX and 100BASE-FX.

4.2.2 Token-passing Bus

This form of LAN technology controls access to the medium through the use of a bus transmitted token which allows the holder to transmit information onto the bus. The token bus LAN technology is defined for use on broadband coaxial cable, on baseband coaxial cable, and on fibre optic cable.

4.2.3 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.

A station desiring to transmit waits until it receives a token. The station changes the token to a start-of-message, transmits its message and, upon completion of the message, releases a new token for use by other stations on the ring.

Token ring is defined for operation on shielded and unshielded twisted pair medium at data rates of 4 and 16 Mbit/s. In addition, token ring may operate using fibre optic cable.

4.2.4 Distributed Queue Dual Bus

DQDB is defined to have the capability to work over the local area and to interoperate with the other local area network technologies. In particular DQDB has the capability to use the 48-bit MAC address format and for that reason it is included in this Overview.

However, DQDB is more often encountered in the Metropolitan Area and it introduces the concept of the Metropolitan Area Network (MAN) where the development of a high speed technology to support connectionless data services is required. Because of the differing environments in which the DQDB MAN will be utilised, a variety of Physical Layer protocols are required. Physical Layer protocols which make use of existing underlying transmission standards have been defined. However it is intended that all Physical Layer specifications (PHY) will be based upon a common framework.

4.2.5 Demand Priority

A Demand Priority LAN comprises three principal components; the end nodes, the repeaters, and the network links. End nodes are typically personal or larger computers but may be special devices, for example bridges. Repeaters are the network controllers which manage the Demand Priority Access Method. The link segments provide the interconnection between a repeater and its connected end nodes or other repeaters.

Demand priority access is a priority-based, round-robin arbitration method where the central network controller (the repeater) regularly polls its connected ports to determine which have transmission requests pending, and whether the transmission request is normal priority (e.g. for data files) or high priority (e.g. for real time voice, video or data).

The medium access protocol provides a means by which stations (end nodes) can communicate with each other over a centrally controlled LAN that offers a choice of several different link media including 100 Ohm balanced cable (4-UTP and 2-TP), 150 Ohm shielded balanced cable (STP), and optical fibre.