

**BS 7233 :
Part 1 : 1990
ISO 9314-1 :
1989**

Fibre Distributed Data Interface (FDDI)

Part 1. Specification for token ring physical layer protocol (PHY)

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Information Systems Technology Standards Policy Committee (IST/-) to Technical Committee IST/6, upon which the following bodies were represented:

Association for Payment Clearing Services
 British Computer Society Ltd.
 British Telecommunications plc
 Business Equipment and Information Technology Association
 Department of Trade and Industry (Information Technology Division)
 Department of Trade and Industry (National Physical Laboratory)
 Electricity Supply Industry in England and Wales
 Electronic Engineering Association
 HM Treasury (Central Computer and Telecommunications Agency)
 Information Technology Users' Standards Association
 Inter-universities Computing Committee
 Joint Network Team
 LAMSAC
 National Computing Centre Ltd.
 National Health Services
 OFTEL (Office of Telecommunications)
 Post Office
 Telecommunication Engineering and Manufacturing Association
 Telecommunications Managers' Association
 User Standards Forum for Information Technology (Institute of Data Processing Management)

This British Standard, having been prepared under the direction of the Information Systems Technology Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 30 November 1990

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The following BSI references relate to the work on this standard:
 Committee reference IST/6
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Amendments issued since publication

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Fibre Distributed Data Interface (FDDI) —
Part 1. Token Ring Physical Layer Protocol (PHY)

NOTE. The European Committee for Standardization (CEN) has accepted ISO 9314-1 : 1989 as a European Standard designated as EN 29314-1 : 1993. This amendment implements EN 29314-1 : 1993 as a British Standard in the BS EN series.

Implementation of European Standard

Front cover

Delete the existing outside front cover and substitute the attached.

AMD 8330/February 1995

National foreword

At the end of paragraph 1 insert the following new paragraph.

'In 1993 the European Committee for Standardization (CEN) accepted ISO 9314-1 : 1989 as European Standard EN 29314-1 : 1993. As a consequence of implementing the European Standard this British Standard is renumbered as BS EN 29314-1 and any reference to BS 7233 : Part 1 : 1990 should be read as a reference to BS EN 29314-1'.

AMD 8330/February 1995

New EN title page and foreword

Immediately after the national foreword insert the attached new EN title page and foreword page.

AMD 8330/February 1995

Information processing systems —

Fibre Distributed Data Interface (FDDI) —

Part 1. Token Ring Physical Layer Protocol (PHY)

The European Standard EN 29314-1 : 1993 has the status of a
British Standard

UDC 681.3.01 : 621.39 : 666.189.21 : 666.22

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Descriptors: Data processing, information interchange, network interconnection, optical fibres, computer interfaces, communication procedures, physical layer, protocols

English version

Information processing systems — Fibre Distributed Data
Interface (FDDI) —
Part 1: Token Ring Physical Layer Protocol (PHY)

(ISO 9314-1 : 1989)

Systèmes de traitement de l'information —
Interface de données distribuées sur fibre (FDDI)

—
Partie 1: Protocole de la couche physique de
l'anneau à jeton
(ISO 9314-1 : 1989)

Informationsverarbeitungssysteme — Verteilte
Datenschnittstelle mit Lichtwellenleitern (FDDI)

—
Teil 1: Protokoll für die Bitübertragungsschicht
(PHY)
(ISO 9314-1 : 1989)

This European Standard was approved by CEN on 1993-10-20. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

On the proposal of the CEN Central Secretariat, the Technical Board decided to submit the International Standard: *Information processing systems — Fibre Distributed Data Interface (FDDI) — Part 1: Token Ring Physical Layer Protocol (PHY)* (ISO 9314-1 : 1989) to the formal vote.

The result of the formal vote was positive.

For the time being, this document exists only in English.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 1994, and conflicting national standards shall be withdrawn at the latest by April 1994.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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National foreword

This Part of BS 7233, prepared under the direction of the Information Systems Technology Standards Policy Committee, is identical with ISO 9314-1 : 1989 'Information processing systems — Fibre Distributed Data Interface (FDDI) — Part 1 : Token ring physical layer protocol (PHY)' published by the International Organization for Standardization (ISO).

This Part of BS 7233 on the FDDI physical layer protocol is intended for use in a high-performance multistation network. This protocol is designed to be effective at 100 Mbit/s using a Token ring architecture and fibre optics as the transmission medium over distances of several kilometres in extent.

Cross-references

International standard	Corresponding British Standard
ISO 9314-2 : 1989	BS 7233 : Part 2 : 1990 ¹⁾
ISO 9314-3 ¹⁾	BS 7233 : Part 3 : 1990 ¹⁾

Compliance with a British Standard does not of itself confer immunity from legal obligations.

¹⁾ In preparation.

Information processing systems — Fibre Distributed Data Interface (FDDI) —

Part 1 : Token Ring Physical Layer Protocol (PHY)

1 Scope

This part of ISO 9314 specifies the Physical Layer Protocol (PHY), the upper sublayer of the Physical Layer, for Fibre Distributed Data Interface (FDDI).

FDDI provides a high-bandwidth (100 Mbit/s), general-purpose interconnection among computers and peripheral equipment using fibre optics as the transmission medium. FDDI can be configured to support a sustained transfer rate of approximately 80 Mbit/s (10 Mbyte/s). It may not meet the response time requirements of all unbuffered high-speed devices. FDDI establishes connections among many stations distributed over distances of several kilometers in a token ring configuration. Default values for FDDI were calculated on the basis of 1 000 physical links and a total fibre path length of 200 km (typically corresponding to 500 stations and 100 km of dual fibre cable).

FDDI consists of:

(a) A Physical Layer (PL), which is divided into two sublayers:

(1) A Physical Medium Dependent (PMD), which provides the digital baseband point-to-point communication between stations in the FDDI network. The PMD provides all services necessary to transport a suitably coded digital bit stream from station to station. The PMD defines and characterizes the fibre-optic drivers and receivers, medium-dependent code requirements, cables, connectors, power budgets, optical bypass provisions, and physical-hardware-related characteristics. It specifies the point of interconnectability for conforming FDDI attachments.

(2) A Physical Layer Protocol (PHY), which provides connection between the PMD and the Data Link Layer. PHY establishes clock synchronization with the upstream code-bit data stream and decodes this incoming code-bit stream into an equivalent symbol stream for use by the higher layers. PHY provides encoding and decoding between data and control indicator symbols and code bits, medium conditioning and initializing, the synchronization of incoming and outgoing code-bit clocks, and the delineation of octet boundaries as required for the transmission of information to or from higher layers. Information to be transmitted on the interface medium is encoded by the PHY into a grouped transmission code. The definition of PHY is contained in this part of ISO 9314.

(b) A Data Link Layer (DLL), which controls the accessing of the medium and the generation and verification of frame check sequences to ensure the proper delivery of valid data to the higher layers. DLL also concerns itself with the generation and recognition of device addresses and the peer-to-peer associations within the FDDI network. For the purpose of the PHY definition contained in this part of ISO 9314,

references to DLL are made in terms of the Media Access Control (MAC) entity, which is the lowest sublayer of DLL.

(c) A Station Management (SMT)¹⁾, which provides the control necessary at the station level to manage the processes under way in the various FDDI layers such that a station may work cooperatively on a ring. SMT provides services such as control of configuration management, fault isolation and recovery, and scheduling procedures.

The definition of PHY as contained in this part of ISO 9314 is designed to be as independent as possible from the actual physical medium.

ISO 9314 specifies the interfaces, functions, and operations necessary to ensure interoperability between conforming FDDI implementations. This part of ISO 9314 is a functional description. Conforming implementations may employ any design technique that does not violate interoperability.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9314. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9314 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

ISO 9314-3: ----²⁾, *Information processing systems - Fibre Distributed Data Interface (FDDI) - Part 3: Token Ring Physical Layer, Medium Dependent (PMD)*.

3 Definitions

For the purposes of this part of ISO 9314, the following definitions apply:

3.1 code bit: The smallest signalling element used by the Physical Layer for transmission on the medium.

3.2 code group: The specific sequence of five code bits representing a DLL symbol.

3.3 concentrator: A node on the FDDI ring, which in turn provides connections for additional conforming FDDI stations so that they may communicate with other attachments to the FDDI ring. A concentrator has two Physical Layer entities and may or may not have one or more Data Link Layer entities.

3.4 Connection Management (CMT): That portion of the Station Management (SMT) function that controls network insertion, removal, and connection of PHY and MAC entities within a station.

¹⁾ SMT will form the subject of a future part of ISO 9314.

²⁾ To be published.

3.5 entity: An active element within an Open System Interconnection (OSI) layer, or sublayer; or SMT, in a specific station.

3.6 fibre optics: A technology whereby signals are transmitted over an optical waveguide medium through the use of light-generating transmitters and light-detecting receivers.

3.7 frame: A Protocol Data Unit transmitted between cooperating MAC entities on a ring, consisting of a variable number of octets.

3.8 nonreturn to zero (NRZ): A technique in which a polarity level high, or low, represents a logical "1" (one), or "0" (zero).

3.9 nonreturn to zero invert on ones (NRZI): A technique in which a polarity transition represents a logical "1" (one). The absence of a polarity transition denotes a logical "0" (zero).

3.10 physical connection: The full-duplex physical layer association between adjacent PHY entities (in concentrators, repeaters, or stations) in an FDDI ring, i.e., a pair of Physical Links.

11 physical link: The simplex path (via PMD and attached medium) from the transmit function of one PHY entity to the receive function of an adjacent PHY entity (in concentrators, repeaters, or stations) in an FDDI ring.

12 primitive: An element of the services provided by one entity to another.

13 Protocol Data Unit (PDU): Information delivered as a unit between peer entities that may contain control information, address information and data (e.g., a Service Data Unit from a higher layer).

14 receive: The action of a station of accepting a frame, token, or control sequence from a medium.

15 repeat: The act of a station in receiving a code-bit stream (e.g., frame or token) from an adjacent station and placing it on the medium to the next station. The station repeating the code-bit stream examines it and may copy it into a buffer and modify control indicators as appropriate.

3.16 ring: Two or more stations in which information is passed sequentially between active stations, each station in turn examining or copying the information, finally returning it to the originating station.

3.17 Service Data Unit (SDU): The unit of data transfer between a service user and a service provider.

3.18 services: The services provided by one entity to a higher entity or to SMT.

3.19 station: An addressable logical and physical node on a ring capable of transmitting, repeating, and receiving information.

3.20 Station Management (SMT): The entity within a station on the ring that monitors station activity and exercises overall appropriate control of station activity.

3.21 symbol: The smallest signalling element used by the Data Link Layer (DLL). The symbol set consists of 16 data symbols and 8 control symbols. Each symbol corresponds to a specific sequence of code bits (code group) to be transmitted by the Physical Layer.