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Information technology – Fibre Distributed Data Interface (FDDI) –

Part 9: Low-cost fibre physical layer medium dependent (LCF-PMD)

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INFORMATION TECHNOLOGY – FIBRE DISTRIBUTED DATA INTERFACE (FDDI) –

Part 9: Low-cost fibre physical layer medium dependent (LCF-PMD)

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. 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.

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

International standard ISO/IEC 9314-9 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

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

Annexes A, B, C, D, E, F and G are for information only.

ISO/IEC 9314 consists of the following parts, under the general title *Information technology – Fibre Distributed Data Interface (FDDI)*:

- Part 1: *Token Ring Physical Layer Protocol (PHY)*
- Part 2: *Token Ring Media Access Control (MAC)*
- Part 3: *Physical Layer Medium Dependent (PMD)*
- Part 4: *Single Mode Fibre Physical Layer Medium Dependent (SMF-PMD)*
- Part 5: *Hybrid Ring Control (HRC)*
- Part 6: *Station Management (SMT)*
- Part 7: *Physical Layer Protocol (PHY-2)*
- Part 8: *Media Access Control-2 (MAC-2)*
- Part 13: *Conformance Test Protocol Implementation – Conformance Statement (CT-PICS) Proforma*
- Part 20: *Abstract Test Suite for FDDI – Physical Medium Dependent Conformance Testing (PMD-ATS) ¹⁾*
- Part 21: *Abstract Test Suite for FDDI – Physical Layer Protocol Conformance Testing (PHY-ATS) ¹⁾*
- Part 25: *Abstract test suite for FDDI – Station Management Conformance Testing (SMT-ATS)*
- Part 26: *Abstract Test Suite for FDDI – Media Access Control Conformance Testing (MAC-ATS) ¹⁾*

¹⁾ To be published.

INTRODUCTION

The Fibre Distributed Data Interface (FDDI) is intended for use in a high-performance general purpose multi-station network and is designed for efficient operation with a peak data rate of 100 Mbit/s. It uses a Token Ring architecture with optical fibre as the primary transmission medium. FDDI provides for hundreds of stations operating over an extent of tens of kilometers.

The FDDI Part: Token ring low-cost physical layer medium dependent (LCF-PMD) standard specifies the lower sublayer of the Physical Layer for FDDI. As such it specifies the power levels and characteristics of the optical transmitter and receiver, and the interface optical signal requirements including jitter. LCF-PMD also specifies the connector receptacle footprint, the requirements of conforming FDDI optical fibre cabling, and the permissible bit error rates.

LCF-PMD is one of a set of alternative international standard PMDs for FDDI. This set includes the original PMD, the Single Mode Fibre PMD (SMF-PMD), and the Twisted-Pair PMD (TP-PMD).

The set of FDDI standards includes the following standards:

- a) a FDDI Part: token ring physical layer protocol (PHY), which specifies the upper sublayer of the physical layer for the FDDI, including the data encode/decode, framing and clocking, as well as the elasticity buffer, smoothing, and repeat filter functions;
- b) a FDDI Part: token ring media access control (MAC), which specifies the lower sublayer of the data link layer for FDDI, including the access to the medium, addressing, data checking, and data framing;
- c) a FDDI Part: token ring station management (SMT), which specifies the local portion of the system management application process for FDDI, including the control required for proper operation of a station in an FDDI ring.

INFORMATION TECHNOLOGY – FIBRE DISTRIBUTED DATA INTERFACE (FDDI) –

Part 9: Low-cost fibre physical layer medium dependent (LCF-PMD)

1 Scope

This part of ISO/IEC 9314 specifies the requirements for the Fibre Distributed Data Interface (FDDI); token ring low-cost fibre physical layer medium dependent (LCF-PMD).

FDDI provides a high-bandwidth (100 Mbit/s), general-purpose interconnection among computers and peripheral equipment using fibre optics as the primary transmission medium. FDDI can be configured to support a sustained data transfer rate of at least 80 Mbit/s (10 Mbyte/s). FDDI provides connectivity for many nodes distributed over distances of several kilometers in extent. Default values for FDDI are calculated on the basis of 1 000 physical links and a total fibre path length of 200 km (typically corresponding to 500 nodes and 100 km of dual fibre cable).

FDDI consists of:

- a) a Physical Layer (PL), which is divided into two sublayers
 - 1) A Physical Layer, Medium Dependent (PMD) sublayer (ISO/IEC 9314-3), with several alternative medium choices, which provides the digital baseband point-to-point communication between nodes in the FDDI network. The PMD provides all services necessary to transport a suitably coded digital bit stream from node to node. The PMD defines and characterizes the medium 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.

The original PMD standard (ISO/IEC 9314-3), called PMD, defines attachment to multi-mode fibre up to 2 km, while this LCF-PMD, optically interoperable with the original PMD, defines low-cost attachments to multi-mode fibre up to 500 m. Additional PMD sublayer standards are for attachment to single mode fibre (SMF-PMD), and twisted-pair up to 100 m (TP-PMD);
 - 2) A Physical Layer Protocol (PHY) sublayer (ISO/IEC 9314-1), and its enhancement, (PHY-2), 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 medium is encoded by the PHY using a group transmission code;
- b) a Data Link Layer (DLL), which is divided into two or more sublayers
 - 1) An optional Hybrid Ring Control (HRC) (ISO/IEC 9314-5), which provides multiplexing of packet and circuit switched data on the shared FDDI medium. HRC comprises two internal components, a Hybrid Multiplexer (H-MUX) and an Isochronous MAC (I-MAC). H-MUX maintains a synchronous 125 µs cycle structure and multiplexes the packet and circuit switched data streams, and I-MAC provides access to circuit switched channels;
 - 2) A Media Access Control (MAC) (ISO/IEC 9314-2), and its enhancement (MAC-2), which provides fair and deterministic access to the medium, address recognition, and generation and verification of frame check sequences. Its primary function is the delivery of packet data, including frame generation, repetition, and removal;

- 3) An optional Logical Link Control (LLC), which provides a common protocol for any required packet data adaptation services between MAC and the Network Layer. LLC is not specified by FDDI;
 - 4) An optional Circuit Switching Multiplexer (CS-MUX), which provides a common protocol for any required circuit data adaptation services between I-MAC and the Network Layer. CS-MUX is not specified by FDDI;
- c) a Station Management (SMT), which provides the control necessary at the node level to manage the processes under way in the various FDDI layers such that a node may work cooperatively on a ring. SMT provides services such as control of configuration management, fault isolation and recovery, and scheduling policies.

FDDI LCF-PMD is a supporting document to FDDI PHY and FDDI PHY-2 which should be read in conjunction with it. The FDDI SMT document should be read for information pertaining to supported FDDI node and network configurations. The original FDDI PMD should be read for issues relating to FDDI LCF-PMD to FDDI PMD optical interoperability.

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

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 9314. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 9314 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60793-1-1, *Optical fibres – Part 1-1: Generic specification – General*

IEC 60793-1-2, *Optical fibres – Part 1: Generic specification – Section 2: Measuring methods for dimensions*

IEC 60793-1-4, *Optical fibres – Part 1: Generic specification – Section 4: Measuring methods for transmission and optical characteristics*

IEC 60793-2, *Optical fibres – Part 2: Product specifications*

IEC 60874-14, *Connectors for optical fibres and cables – Part 14: Sectional specification for fibre optic connector – Type SC*

IEC 60874-19, *Connectors for optical fibres and cables – Part 19: Sectional specification for fibre optic connector – Type SC-D(uplex)*

ISO/IEC 11801:1995, *Information technology – Generic cabling for customer premises*

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

ISO/IEC 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: Token Ring Physical Layer, Medium Dependent (PMD)*