IEEE Std 802.3™-2005
(Revision of IEEE Std 802.3-2002 including all approved amendments}

IEEE Standard for 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

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Abstract: Ethernet local area network operation is specified for selected speeds of operation from 1 Mb/s to 10 Gb/s using a common media access control (MAC) specification, management information base (MIB), and capability for Link Aggregation of multiple physical links into a single logical link. The Carrier Sense Multiple Access with Collision Detection (CSMA/CD) MAC protocol specifies shared medium (half duplex) operation, as well as full duplex operation. Speed specific Media Independent Interfaces (MIIs) allow use of selected physical layer (PHY) interfaces for operation over coxial, twisted pair or fiber optic cables. System considerations for multisegment shared access networks describe the use of Repeaters which are defined for operational speeds up to 1000 Mb/s. Local Area Network (LAN) operation is supported at all speeds. Other specified capabilities include: various PHY types for access networks, PHYs suitable for metropolitian area network applications, and the provision of power over selected twisted pair PHY types.

Keywords: 10BASE 100BASE 1000BASE 10GBASE 10 Gigabit Ethernet attachment unit interface AUI Auto Negotiation data processing DTE Power via the MDI EPON Ethernet Ethernet in the First Mile Ethernet passive optical network Fast Ethernet Gigabit Ethernet GMII information exchange Link Aggregation local area network management medium dependent interface media independent interface MDI MIB MII XGMII PHY physical coding sublayer physical layer physical medium attachment PMA Power over Ethernet repeater type field VLAN TAG

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Introduction

This introduction is not part of IEEE Std 802.3-2005, IEEE Standard for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements, Part 3: CSMA/CD Access Method and Physical Layer Specifications.

IEEE Std 802.3™ was first published in 1985. Since the initial publication, many projects have added functionality or provided maintenance updates to the specifications and text included in the standard. Each IEEE 802.3 project/amendment is identified with a suffix (e.g., IEEE 802.3ae). A historical listing of all projects that have added to or modified IEEE Std 802.3 follows as a part of this introductory material. The listing is in chronological order of project initiation and for each project describes: subject, clauses added (if any), approval dates, and committee officers.

The media access control (MAC) protocol specified in IEEE Std 802.3 is Carrier Sense Multiple Access with Collision Detection (CSMA/CD). This MAC protocol was included in the experimental Ethernet developed at Xerox Palo Alto Research Center. While the experimental Ethernet had a 2.94 Mb/s data rate, IEEE Std 802.3-1985 specified operation at 10 Mb/s. Since 1985 new media options, new speeds of operation, and new protocol capabilities have been added to IEEE Std 802.3.

Some of the major additions to IEEE Std 802.3 are identified in the marketplace with their project number. This is most common for projects adding higher speeds of operation or new protocols. For example, IEEE Std 802.3u added 100 Mb/s operation (also called Fast Ethernet), IEEE Std 802.3x specified full duplex operation and a flow control protocol, IEEE Std 802.3z added 1000 Mb/s operation (also called Gigabit Ethernet) and IEEE Std 802.3ah specified access network Ethernet (also called Ethernet in the First Mile). These major additions are all now included in IEEE Std 802.3-2005 and are not maintained as separate documents.

With this publication, IEEE Std 802.3 is comprised of the following documents

Section One—Includes Clause 1 through Clause 20 and Annex A through Annex H and 4A. Section One includes the specifications for 10 Mb/s operation and the MAC, frame formats and service interfaces used for all speeds of operation.

Section Two—Includes Clause 21 through Clause 33 and Annex 22A through Annex 33E. Section Two includes the specifications for 100 Mb/s operation and management attributes for multiple protocols and operational speeds as well as specifications for providing power over twisted pair cabling for multiple operational speeds.

Section Three—Includes Clause 34 through Clause 43 and Annex 36A through Annex 43C. Section Three includes the specifications for 1000 Mb/s operation.

Section Four—Includes Clause 44 through Clause 53 and Annex 44A through Annex 50A. Section Four includes the specifications for 10 Gb/s operation.

Section Five—Includes Clause 56 through Clause 67 and Annex 58A through Annex 67A. Section Five defines services and protocol elements that permit the exchange of IEEE Std 802.3 format frames between stations in a subscriber access network.

IEEE 802.3 will continue to evolve. New Ethernet capabilities are anticipated to be added within the next few years as amendments to this standard.

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Conformance test methodology

An additional standard, IEEE Std 1802.3™-2001 provides conformance test information for 10BASE-T.

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Participants

The following is a list of chairs and editors during the development of this revision:

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Wael William Diab, *Working Group Secretary*
Steven B. Carlson, , *Working Group Executive Secretary*
Piers Dawe, *Review Editor*

Historical participants

The following individuals participated in the IEEE 802.3 working group during various stages of the standard's development. Since the initial publication, many IEEE standards have added functionality or provided updates to material included in this standard. Included is a historical list of participants who have dedicated their valuable time, energy, and knowledge to the creation of this material:

IEEE Std 802.3 document	Date approved by IEEE and ANSI	Officers at the time of working group ballot
IEEE Std 802.3-1985, Original 10 Mb/s standard, MAC, PLS, AUI, 10BASE5	23 June 1983 (IEEE)	**Donald C. Loughry,** *Working Group Chair*

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IEEE Std 802.3 document	Date approved by IEEE and ANSI	Officers at the time of working group ballot
	31 December 1984 (ANSI)	
IEEE Std 802.3a-1988 (Clause 10), 10 Mb/s MAU 10BASE2	15 November 1985 (IEEE) 28 December 1987 (ANSI)	**Donald C. Loughry,** *Working Group Chair* **Alan Flatman,** *Task Force Chair*
IEEE Std 802.3b-1985 (Clause 11), 10 Mb/s Broadband MAU, 10BROAD36	19 September 1985 (IEEE) 28 February 1986 (ANSI)	**Donald C. Loughry,** *Working Group Chair* **Menachem Abraham,** *Task Force Chair*
IEEE Std 802.3c-1985 (9.1–9.8), 10 Mb/s Baseband Repeater	12 December 1985 (IEEE) 4 June 1986 (ANSI)	**Donald C. Loughry,** *Working Group Chair* **Geoffrey O. Thompson,** *Task Force Chair*
IEEE Std 802.3d-1987 (9.9), 10 Mb/s Fiber MAU, FOIRL	10 December 1987 (IEEE) 9 February 1989 (ANSI)	**Donald C. Loughry,** *Working Group Chair* **Steven Moustakas,** *Task Force Chair*
IEEE Std 802.3e-1987 (Clause 12), 1 Mb/s MAU and Hub 1BASE5	11 June 1987 (IEEE) 15 December 1987 (ANSI)	**Donald C. Loughry,** *Working Group Chair* **Robert Galin,** *Task Force Chair*
IEEE Std 802.3h-1990 (Clause 5), 10 Mb/s Layer Management, DTEs	28 September 1990 (IEEE)	**Donald C. Loughry,** *Working Group Chair* **Andy J. Luque,** *Task Force Chair*

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	11 March 1991 (ANSI)	
IEEE Std 802.3i-1990 (Clauses 13 and 14), 10 Mb/s UTP MAU, 10 BASE-T	28 September 1990 (IEEE) 11 March 1991 (ANSI)	**Donald C. Loughry,** *Working Group Chair* **Patricia Thaler,** *Task Force Chair (initial)* **Richard Anderson,** *Task Force Chair (final)*
IEEE Std 802.3j-1993 (Clauses 15–18), 10 Mb/s Fiber MAUs 10BASE-FP, FB, and FL	15 September 1993 (IEEE) 15 March 1994 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Keith Amundsen,** *Task Force Chair (initial)* **Frederick Scholl,** *Task Force Chair (final)* **Michael E. Lee,** *Technical Editor*
IEEE Std 802.3k-1993 (Clause 19), 10 Mb/s Layer Management, Repeaters	17 September 1992 (IEEE) 8 March 1993 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Joseph S. Skorupa,** *Task Force Chair* **Geoffrey O. Thompson,** *Vice Chair and Editor*
IEEE Std 802.3*l*-1992 (14.10), 10 Mb/s PICS Proforma 10BASE-T MAU	17 September 1992 (IEEE) 23 February 1993 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Mike Armstrong,** *Task Force Chair and Editor* **Paul Nikolich,** *Vice Chair* **William Randle,** *Editorial Coordinator*
IEEE Std 802.3m-1995, Maintenance 2	21 September 1995 (IEEE)	**Patricia Thaler,** *Working Group Chair* **Gary Robinson,** *Maintenance Chair*

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IEEE Std 802.3n-1995, Maintenance 3	21 September 1995 (IEEE) 4 April 1996 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Gary Robinson,** *Maintenance Chair*
IEEE Std 802.3p-1993™ (Clause 20), Management, 10 Mb/s Integrated MAUs	17 June 1993 (IEEE) 4 January 1994 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Joseph S. Skorupa,** *Task Force Chair* **Geoffrey O. Thompson,** *Vice Chair and Editor*
IEEE Std 802.3q-1993™ (Clause 5), 10 Mb/s Layer Management, GDMO Format	17 June 1993 (IEEE) 4 January 1994 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Joseph S. Skorupa,** *Task Force Chair* **Geoffrey O. Thompson,** *Vice Chair and Editor*
IEEE Std 802.3r-1996 (8.8), Type 10BASE5 Medium Attachment Unit PICS proforma	29 July 1996 (IEEE) 6 January 1997 (ANSI)	**Patricia Thaler,** *Working Group Chair* **Imre Juhász,** *Task Force Chair* **William Randle,** *Task Force Editor*
IEEE Std 802.3s-1995, Maintenance 4	21 September 1995 (IEEE) 8 April 1996 (ANSI)	**Geoffrey O. Thompson,** *Working Group Chair* **Gary Robinson,** *Maintenance Chair*
IEEE Std 802.3t-1995, 120 Ω informative annex to 10BASE-T	14 June 1995 (IEEE) 12 January 1996 (ANSI)	**Geoffrey O. Thompson,** *Working Group Chair* **Jacques Christ,** *Task Force Chair*

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IEEE Std 802.3u-1995 (Clauses 21–30), Type 100BASE-T MAC parameters, Physical Layer, MAUs, and Repeater for 100 Mb/s Operation	14 June 1995 (IEEE) 4 April 1996 (ANSI)	**Geoffrey O. Thompson,** *Working Group Chair* **Peter Tarrant,** *Task Force Chair (Phase 1)* **Howard Frazier,** *Task Force Chair (Phase 2)* **Paul Sherer,** *Editor-in-Chief (Phase 1)* **Howard Johnson,** *Editor-in-Chief (Phase 2)* **Colin Mick,** *Comment Editor*
IEEE Std 802.3v-1995, 150 Ω informative annex to 10BASE-T	12 December 1995 (IEEE) 16 July 1996 (ANSI)	**Geoffrey O. Thompson,** *Working Group Chair* **Larry Nicholson,** *Task Force Chair*
IEEE Std 802.3x-1997 and IEEE Std 802.3y-1997(Revisions to 802.3, Clauses 31 and 32), Full Duplex Operation and Type 100BASE-T2	20 March 1997 (IEEE) 5 September 1997 (ANSI)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Rich Seifert,** *Task Force Chair and Editor (802.3x)* **J. Scott Carter,** *Task Force Chair (802.3y)* **Colin Mick,** *Task Force Editor (802.3y)*
IEEE Std 802.3z-1998™ (Clauses 34–39, 41–42), Type 1000BASE-X MAC Parameters, Physical Layer, Repeater, and Management Parameters for 1000 Mb/s Operation	25 June 1998 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair*

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		Howard M. Frazier, Jr., *Task Force Chair and Editor* **Howard W. Johnson,** *Task Force Editor*
IEEE Std 802.3aa-1998, Maintenance 5	25 June 1998 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **Colin Mick,** *Task Force Editor (100BASE-T Maintenance)*
IEEE Std 802.3ab-1999 (Clause 40), Physical Layer Parameters and Specifications for 1000 Mb/s Operation Over 4 Pair of Category 5 Balanced Copper Cabling, Type 1000BASE-T	26 June 1999 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Robert M. Grow,** *Working Group Secretary* **George Eisler,** *Task Force Chair* **Colin Mick,** *Task Force Editor*
IEEE Std 802.3ac-1998, Frame Extensions for Virtual Bridged Local Area Network (VLAN) Tagging on 802.3 Networks	16 September 1998 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Andy J. Luque,** *Working Group Secretary* **Ian Crayford,** *Task Force Chair* **Rich Seifert,** *Task Force Editor*
IEEE Std 802.3ad-2000 (Clause 43), Aggregation of Multiple Link Segments	30 March 2000 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair*

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IEEE Std 802.3-2002 (802.3ag, Maintenance 6, Revision of the base), Carrier Sense Multiple Access with Collision Detection (CSMA/CD) access method and physical layer specifications	14 January 2002 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Robert M. Grow,** *Working Group Secretary*
IEEE Std 802.3ae-2002,(Clauses 44–53) Media Access Control (MAC) Parameters, Physical Layers, and Management Parameters for 10 Gb/s Operation	13 June 2002 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Robert M. Grow,** *Working Group Secretary* **R. Jonathan Thatcher,** *Task Force Chair* **Stephen Haddock,** *Task Force Vice Chair* **Bradley J. Booth,** *Task Force Editor* **Lacreshia Laningham,** *Task Force Assistant Editor* **Benjamin Brown,** *Logic Track Chair* **Walter Thirion,** *Optical Track Chair*

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IEEE Std 802.3af-2003, (Clause 33) Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI)	12 June 2003 (IEEE)	**Geoffrey O. Thompson,** *Working Group Chair—Phase 1* **Robert M. Grow,** *Working Group Chair—Phase 2* **David J. Law,** *Working Group Vice Chair* **Robert M. Grow,** *Secretary—Phase 1* **Steven B. Carlson,** *Secretary—Phase 2* **Steven B. Carlson,** *Task Force Chair* **Michael S. McCormack,** *Editor—Phase 1* **John J. Jetzt,** *Editor—Phase 2* **Chad M. Jones,** *Comment Editor*
IEEE Std 802.3ah-2004, Media Access Control Parameters, Physical Layers, and Management Parameters for Subscriber Access Networks	6 April 2005 (IEEE)	**Robert M. Grow,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Steven B. Carlson,** *Working Group Secretary* **Howard Frazier,** *Chair EFM Task Force* **Wael W. Diab,** *Editor-in-Chief EFM Task Force* **Hugh Barrass,** *Vice-Chair, EFM Task Force* **Scott Simon,** *Recording Secretary, EFM Task Force* **Behrooz Rezvani,** *Executive Secretary, EFM Task Force*

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IEEE Std 802.3ak-2004, Physical Layer and Management Parameters for 10Gb/s Operation, Type 10GBASE-CX4	9 February 2004 (IEEE)	**Robert M. Grow,** *Working Group Chair* **David J. Law,** *Working Group Vice Chair* **Steven B. Carlson,** *Working Group Secretary* **Daniel J. Dove,** *Task Force Chair* **Howard A. Baumer,** *Task Force Editor*
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Special symbols and operators

Printed Character	Meaning	Font
*	Boolean AND	Symbol
+	Boolean OR, Arithmetic addition	Symbol
^	Boolean XOR	Times New Roman
!	Boolean NOT	Symbol
×	Multiplication	Symbol
<	Less than	Symbol
≤	Less than or equal to	Symbol
>	Greater than	Symbol
≥	Greater than or equal to	Symbol
=	Equal to	Symbol
≠	Not equal to	Symbol
⇐	Assignment operator	Symbol
∈	Indicates membership	Symbol
∉	Indicates nonmembership	Symbol
±	Plus or minus (a tolerance)	Symbol
°	Degrees Celsius	Symbol
Σ	Summation	Symbol
—	Big dash (em dash)	Times New Roman
–	Little dash (en dash), subtraction	Times New Roman
|	Vertical bar	Times New Roman
†	Dagger	Times New Roman
‡	Double dagger	Times New Roman
α	Lower case alpha	Symbol

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Printed Character	Meaning	Font
β	Lower case beta	Symbol
γ	Lower case gamma	Symbol
δ	Lower case delta	Symbol
ε	Lower case epsilon	Symbol
λ	Lambda	Symbol
μ	Micro	Times New Roman
Ω	Omega	Symbol
√	Square root	Symbol

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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

SECTION ONE: This section includes Clause 1 through Clause 20, Annex A through Annex H, and Annex 4A.

1. Introduction

1.1 Overview

This is a comprehensive international standard for Local and Metropolitan Area Networks (LANs and MANs), employing CSMA/CD as the shared media access method and the IEEE 802.3 (Ethernet) protocol and frame format for data communication. This international standard is intended to encompass several media types and techniques for a variety of signal rates. The families of systems supported by this standard are shown in Figure 1-1 and listed in 4.4.2. In addition, it specifies a method for linearly incrementing a system's data rate by aggregating multiple physical links of the same speed into one logical link.

1.1.1 Basic concepts

This standard provides for two distinct modes of operation: half duplex and full duplex. A given IEEE 802.3 instantiation operates in either half or full duplex mode at any one time. The term “CSMA/CD MAC” is used throughout this standard synonymously with “802.3 MAC,” and may represent an instance of either a half duplex or full duplex mode data terminal equipment (DTE), even though full duplex mode DTEs do not implement the CSMA/CD algorithms traditionally used to arbitrate access to shared-media LANs.

1.1.1.1 Half duplex operation

In half duplex mode, the CSMA/CD media access method is the 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 transmits for an additional predefined period to ensure propagation of the collision throughout the system.

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The station remains silent for a random amount of time (backoff) before attempting to transmit again. Each aspect of this access method process is specified in detail in subsequent clauses of this standard.

Half duplex operation can be used with certain media types and configurations as defined by this standard. For allowable configurations, see 4.4.2.

1.1.1.2 Full duplex operation

Full duplex operation allows simultaneous communication between a pair of stations using point-to-point media (dedicated channel). Full duplex operation 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. Full duplex mode can only be used when all of the following are true:

a. The physical medium is capable of supporting simultaneous transmission and reception without interference.

b. There are exactly two stations connected with a full duplex point-to-point link. Since there is no contention for use of a shared medium, the multiple access (i.e., CSMA/CD) algorithms are unnecessary.

c. 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 central bridge (also known as a switch) with a dedicated LAN connecting each bridge port to a single device. Repeaters as defined in this standard are outside the scope of full duplex operation. Full duplex operation constitutes a proper subset of the MAC functionality required for half duplex operation.

1.1.2 Architectural perspectives

There are two important ways to view network design corresponding to the following:

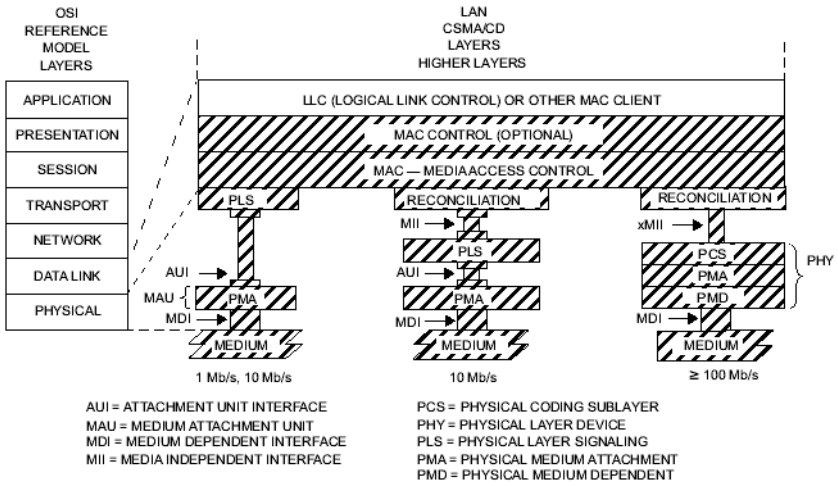
a. *Architecture.* Emphasizing the logical divisions of the system and how they fit together.

b. *Implementation.* Emphasizing actual components, their packaging, and interconnection.

This standard is organized along architectural lines, emphasizing the large-scale separation of the system into two parts: the Media Access Control (MAC) sublayer of the Data Link Layer and the Physical Layer. These layers are intended to correspond closely to the lowest layers of the ISO/IEC Model for Open Systems Interconnection (see Figure 1-1). (See ISO/IEC 7498-1: 1994.[1][1]) The Logical Link Control (LLC) sublayer and MAC sublayer together encompass the functions intended for the Data Link Layer as defined in the OSI model.

1.For information about references, see 1.3.

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NOTE — In this figure, the xMII is used as a generic term for the Media Independent Interfaces for implementations of 100 Mb/s and above. For example: for 100 Mb/s implementations this interface is called MII; for 1 Gb/s implementations it is called GMII; for 10 Gb/s implementations it is called XGMII; etc.

Figure 1-1 — IEEE 802.3 standard relationship to the ISO/IEC Open Systems Interconnection (OSI) reference model

1.1.2.1 Architectural rationale

An architectural organization of the standard has two main advantages:

a. *Clarity*. A clean overall division of the design along architectural lines makes the standard clearer.

b. *Flexibility*. Segregation of medium-dependent aspects in the Physical Layer allows the LLC and MAC sublayers to apply to a family of transmission media.

Partitioning the Data Link Layer allows various media access methods within the family of LAN standards.

The architectural model is based on a set of interfaces that may be different from those emphasized in implementations. One critical aspect of the design, however, shall be addressed largely in terms of the implementation interfaces: compatibility.

1.1.2.2 Compatibility interfaces

The following important compatibility interfaces are defined within what is architecturally the Physical Layer.

a. *Medium Dependent Interfaces (MDI)*. To communicate in a compatible manner, all stations shall adhere rigidly to the exact specification of physical media signals defined in Clause 8 (and beyond) in this standard, and to the procedures that define correct behavior of a station. The medium-independent aspects of the LLC sublayer and the MAC sublayer should not be taken as detracting from this point; communication by way of the ISO/IEC 8802-3 [IEEE Std 802.3] Local Area Network requires complete compatibility at the Physical Medium interface (that is, the physical cable interface).

b. *Attachment Unit Interface (AUI)*. It is anticipated that most DTEs will be located some distance from their connection to the physical cable. A small amount of circuitry will exist in the Medium

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Attachment Unit (MAU) directly adjacent to the physical cable, while the majority of the hardware and all of the software will be placed within the DTE. The AUI is defined as a second compatibility interface. While conformance with this interface is not strictly necessary to ensure communication, it is recommended, since it allows maximum flexibility in intermixing MAUs and DTEs. The AUI may be optional or not specified for some implementations of this standard that are expected to be connected directly to the medium and so do not use a separate MAU or its interconnecting AUI cable. The PLS and PMA are then part of a single unit, and no explicit AUI implementation is required.

c. *Media Independent Interface (MII)*. It is anticipated that some DTEs will be connected to a remote PHY, and/or to different medium dependent PHYs. The MII is defined as a third compatibility interface. While conformance with implementation of this interface is not strictly necessary to ensure communication, it is recommended, since it allows maximum flexibility in intermixing PHYs and DTEs. The MII is optional.

d. *Gigabit Media Independent Interface (GMII)*. The GMII is designed to connect a 1 Gb/s capable MAC or repeater unit to a 1Gb/s PHY. While conformance with implementation of this interface is not strictly necessary to ensure communication, it is recommended, since it allows maximum flexibility in intermixing PHYs and DTEs at 1 Gb/s speeds. The GMII is intended for use as a chip-tochip interface. No mechanical connector is specified for use with the GMII. The GMII is optional.

e. *Ten-bit Interface (TBI)*. The TBI is provided by the 1000BASE-X PMA sublayer as a physical instantiation of the PMA service interface. The TBI is recommended for 1000BASE-X systems, since it provides a convenient partition between the high-frequency circuitry associated with the PMA sublayer and the logic functions associated with the PCS and MAC sublayers. The TBI is intended for use as a chip-to-chip interface. No mechanical connector is specified for use with the TBI. The TBI is optional.

f. *10 Gigabit Media Independent Interface (XGMII)*. The XGMII is designed to connect a 10 Gb/s capable MAC to a 10 Gb/s PHY. While conformance with implementation of this interface is not strictly necessary to ensure communication, it is recommended, since it allows maximum flexibility in intermixing PHYs and DTEs at 10 Gb/s speeds. The XGMII is intended for use as a chip-to-chip interface. No mechanical connector is specified for use with the XGMII. The XGMII is optional.

g. *10 Gigabit Attachment Unit Interface (XAUI)*. The XAUI is designed to extend the connection between a 10 Gb/s capable MAC and a 10 Gb/s PHY. While conformance with implementation of this interface is not strictly necessary to ensure communication, it is recommended, since it allows maximum flexibility in intermixing PHYs and DTEs at 10 Gb/s speeds. The XAUI is intended for use as a chip-to-chip interface. No mechanical connector is specified for use with the XAUI. The XAUI is optional.

h. *10 Gigabit Sixteen-Bit Interface (XSBI)*. The XSBI is provided as a physical instantiation of the PMA service interface for 10GBASE-R and 10GBASE-W PHYs. While conformance with implementation of this interface is not strictly necessary to ensure communication, it is recommended, since it provides a convenient partition between the high-frequency circuitry associated with the PMA sublayer and the logic functions associated with the PCS and MAC sublayers. The XSBI is intended for use as a chip-to-chip interface. No mechanical connector is specified for use with the XSBI. The XSBI is optional.

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1.1.3 Layer interfaces

In the architectural model used here, the layers interact by way of well-defined interfaces, providing services as specified in Clause 2 and Clause 6. In general, the interface requirements are as follows:

a. The interface between the MAC sublayer and its client includes facilities for transmitting and receiving frames, and provides per-operation status information for use by higher-layer error recovery procedures.

b. The interface between the MAC sublayer and the Physical Layer includes signals for framing (carrier sense, receive data valid, transmit initiation) and contention resolution (collision detect), facilities for passing a pair of serial bit streams (transmit, receive) between the two layers, and a wait function for timing.

These interfaces are described more precisely in 4.3. Additional interfaces are necessary to provide for MAC Control services, and to allow higher level network management facilities to interact with these layers to perform operation, maintenance, and planning functions. Network management functions are described in Clause 30.

1.1.4 Application areas

Use of this standard is not restricted to any specific environments or applications.

In the context of this standard, the term “LAN” is used to indicate all networks that utilize the IEEE 802.3 (Ethernet) protocol for communication. These may include (but are not limited to) LANs and MANs.

1.2 Notation

1.2.1 State diagram conventions

The operation of a protocol can be described by subdividing the protocol into a number of interrelated functions. The operation of the functions can be described by state diagrams. Each diagram represents the domain of a function and consists of a group of connected, mutually exclusive states. Only one state of a function is active at any given time (see Figure 1-2).

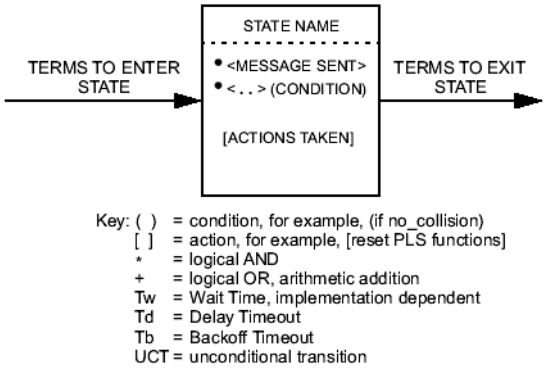


Figure 1-2 — State diagram notation example

Each state that the function can assume is represented by a rectangle. These are divided into two parts by a horizontal line. In the upper part the state is identified by a name in capital letters. The lower part contains

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the name of any ON signal that is generated by the function. Actions are described by short phrases and enclosed in brackets.

All permissible transitions between the states of a function are represented graphically by arrows between them. A transition that is global in nature (for example, an exit condition from all states to the IDLE or RESET state) is indicated by an open arrow. Labels on transitions are qualifiers that must be fulfilled before the transition will be taken. The label UCT designates an unconditional transition. Qualifiers described by short phrases are enclosed in parentheses.

State transitions and sending and receiving of messages occur instantaneously. When a state is entered and the condition to leave that state is not immediately fulfilled, the state executes continuously, sending the messages and executing the actions contained in the state in a continuous manner.

Some devices described in this standard (e.g., repeaters) are allowed to have two or more ports. State diagrams that are capable of describing the operation of devices with an unspecified number of ports require a qualifier notation that allows testing for conditions at multiple ports. The notation used is a term that includes a description in parentheses of which ports must meet the term for the qualifier to be satisfied (e.g., ANY and ALL). It is also necessary to provide for term-assignment statements that assign a name to a port that satisfies a qualifier. The following conventions are used to describe a term-assignment statement that is associated with a transition:

a. The character ":" (colon) is a delimiter used to denote that a term assignment statement follows.

b. The character "⇐" (left arrow) denotes assignment of the value following the arrow to the term preceding the arrow.

The state diagrams contain the authoritative statement of the functions they depict; when apparent conflicts between descriptive text and state diagrams arise, the state diagrams are to take precedence. This does not override, however, any explicit description in the text that has no parallel in the state diagrams.

The models presented by state diagrams are intended as the primary specifications of the functions to be provided. It is important to distinguish, however, between a model and a real implementation. The models are optimized for simplicity and clarity of presentation, while any realistic implementation may place heavier emphasis on efficiency and suitability to a particular implementation technology. It is the functional behavior of any unit that must match the standard, not its internal structure. The internal details of the model are useful only to the extent that they specify the external behavior clearly and precisely.

1.2.2 Service specification method and notation

The service of a layer or sublayer is the set of capabilities that it offers to a user in the next higher (sub)layer. Abstract services are specified here by describing the service primitives and parameters that characterize each service. This definition of service is independent of any particular implementation (see Figure 1-3).

Specific implementations may also include provisions for interface interactions that have no direct end-toend effects. Examples of such local interactions include interface flow control, status requests and indications, error notifications, and layer management. Specific implementation details are omitted from this service specification both because they will differ from implementation to implementation and because they do not impact the peer-to-peer protocols.

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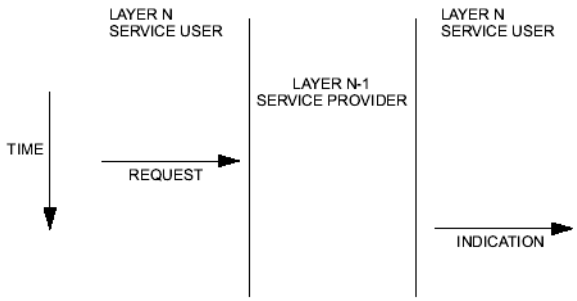


Figure 1-3 — Service primitive notation

1.2.2.1 Classification of service primitives

Primitives are of two generic types:

a. REQUEST. The request primitive is passed from layer N to layer N-1 to request that a service be initiated.

b. INDICATION. The indication primitive is passed from layer N-1 to layer N to indicate an internal layer N-1 event that is significant to layer N. This event may be logically related to a remote service request, or may be caused by an event internal to layer N-1.

The service primitives are an abstraction of the functional specification and the user-layer interaction. The abstract definition does not contain local detail of the user/provider interaction. For instance, it does not indicate the local mechanism that allows a user to indicate that it is awaiting an incoming call. Each primitive has a set of zero or more parameters, representing data elements that shall be passed to qualify the functions invoked by the primitive. Parameters indicate information available in a user/provider interaction; in any particular interface, some parameters may be explicitly stated (even though not explicitly defined in the primitive) or implicitly associated with the service access point. Similarly, in any particular protocol specification, functions corresponding to a service primitive may be explicitly defined or implicitly available.

1.2.3 Physical Layer and media notation

Users of this standard need to reference which particular implementation is being used or identified. Therefore, a means of identifying each implementation is given by a simple, three-field, type notation that is explicitly stated at the beginning of each relevant clause. In general, the Physical Layer type is specified by these fields:

<data rate> <modulation type> <additional distinction>

The data rate, if only a number, is in Mb/s, and if suffixed by a “G”, is in Gb/s. The modulation type (e.g., BASE) indicates how encoded data is transmitted on the medium. The additional distinction may identify characteristics of transmission or medium and, in some cases, the type of PCS encoding used (e.g., “T” for twisted pair, “S” for short wavelength optics, “X” for a block PCS coding used for that speed of operation). Expansions for defined Physical Layer types are included in 1.4.

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1.2.4 Physical Layer message notation

Messages generated within the Physical Layer, either within or between PLS and the MAU (that is, PMA circuitry), are designated by an italic type to designate either form of physical or logical message used to execute the physical layer signaling process (for example, *input_idle or mau_available*).

1.2.5 Hexadecimal notation

Numerical values designated by the 0x prefix indicate a hexadecimal interpretation of the corresponding number. For example: 0x0F represents an 8-bit hexadecimal value of the decimal number 15; 0x00000000 represents a 32-bit hexadecimal value of the decimal number 0; etc.

Numerical values designated with a 16 subscript indicate a hexadecimal interpretation of the corresponding number. For example: $0F_{16}$ represents an 8-bit hexadecimal value of the decimal number 15.

1.3 Normative references

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

- ANSI/EIA-455-95A-2000 Absolute Optical Power Test for Optical Fibers and Cables.[2][1]
- ANSI/EIA/TIA-455-127-1991, FOTP-127 Spectral Characterization of Multimode Laser Diodes.
- ANSI T1.105-1995 Telecommunications—Synchronous Optical Network (SONET)—Basic Description including Multiplex Structure, Rates and Formats.
- ANSI T1.269-2000 Information Interchange—Structure and Representation of Trace Message Formats For The North American Telecommunications System.
- ANSI T1.416-1999 Telecommunications—Network to Customer Installation Interfaces—Synchronous Optical Network (SONET) Physical Layer Specification: Common Criteria.
- ANSI T1.417-2001 Spectrum Management For Loop Transmission Systems.
- ANSI T1.424-2004 Interface between networks and customer installations—Very-high Speed Digital Subscriber Lines (VDSL) Metallic Interface (Trial-Use Standard).
- ANSI T1.601-1992 Telecommunications—Integrated Services Digital Network (ISDN)—Basic Access Interface for Use on Metallic Loops for Application on the Network Side of the NT (Layer 1 Specification).
- ANSI T1.605-1991 Telecommunications—Integrated Services Digital Network (ISDN)—Basic Access Interface for S and T Reference Point (Layer 1 Specification).
- ANSI X3.230-1994 (FC-PH) Information Technology—Fibre Channel—Physical and Signaling Interface.
- ANSI X3.263-1995 Revision 2.2 (1 March 1995), FDDI Twisted Pair—Physical Medium Dependent (TPPMD) (ISO/IEC CD 9314-10).
- ANSI/TIA/EIA-455-175A-92 Chromatic Dispersion Measurement of Single-Mode Optical Fibers by the Differential Phase-Shift Method.

1. ANSI publications are available from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA (http://www.ansi.org/).

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- ANSI/TIA/EIA-455-203-2001 Launched Power Distribution Measurement Procedure for Graded-Index Multimode Transmitters.
- ANSI/TIA/EIA-455-204-2000 Measurement of Bandwidth on Multimode Fiber.
- ANSI/TIA/EIA-526-4A-1997 (OFSTP-4A) Optical Eye Pattern Measurement Procedure.
- ANSI/TIA/EIA-568-A Commercial Building Telecommunications Cabling Standard.
- ANSI/TIA/EIA-568-B:2001 Commercial Building Telecommunications Cabling Standard. ANSI/TIA/EIA-568-B.3-2000; Optical Fiber Cabling Components Standard.
- CISPR 22: 1993 Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.[3][1]
- EIA/JEDEC Standard EIA/JESD8-6 High Speed Transceiver Logic (HSTL), August 1995.[4][2]
- ETSI TS1 101 270-1 (1999) Transmission and Multiplexing (TM); Access transmission systems on metallic access cables; Very high speed Digital Subscriber Line (VDSL); Part 1: Functional requirements.
- ETSI TS 270-2 (2001) Transmission and Multiplexing (TM); Access transmission systems on metallic access cables; Very high speed Digital Subscriber Line (VDSL); Part 2: Transceiver specification.
- IEC 60060 (all parts) High-voltage test techniques.[5][3]
- IEC 60068 Basic environmental testing procedures.
- IEC 60096-1: 1986 Radio-frequency cables, Part 1: General requirements and measuring methods and Amd. 2: 1993.
- IEC 60169-8: 1978 and -16: 1982 Radio-frequency connectors, Part 8: R.F. coaxial connectors with inner diameter of outer conductor 6.5 mm (0.256 in) with bayonet lock—Characteristic impedance 50 ohms (Type BNC); Part 16: R.F. coaxial connectors with inner diameter of outer conductor 7 mm (0.276 in) with screw coupling—Characteristic impedance 50 ohms (75 ohms) (Type N).
- IEC 60603-7: 1990 Connectors for frequencies below 3 MHz for use with printed boards, Part 7: Detail specification for connectors, 8-way, including fixed and free connectors with common mating features, with assessed quality.
- IEC 60793-1: 1995 Optical fibres—Part 1: Generic specification.
- IEC 60793-1-41: 2001 Optical fibres—Part 1-41: Measurement methods and test procedures—Bandwidth.
- IEC 60793-2: 1992 Optical fibres—Part 2: Product specifications.
- IEC 60794-1: 1996 Optical fibre cables—Part 1: Generic specification.
- IEC 60794-2: 1989 Optical fibre cables—Part 2: Product specifications.

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1. CISPR documents are available from the International Electrotechnical Commission, 3 rue de Varembé, Case Postale 131, CH 1211, Genève 20, Switzerland/Suisse (http://www.iec.ch/). CISPR documents are also available in the United States from the American National Standards Institute.
2. EIA publications are available from Global Engineering Documents, 15 Inverness Way East, Englewood, Colorado 80112, USA (http://global.ihs.com/). JEDEC publications are available from JEDEC, 2001 I Street NW, Washington, DC 20006, USA.
3. IEC publications are available from IEC Sales Department, Case Postale 131, 3 rue de Varembé, CH-1211, Genève 20, Switzerland/ Suisse (http://www.iec.ch/). IEC publications are also available in the United States from the American National Standards Institute.

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- IEC 60807-2: 1992 Rectangular connectors for frequencies below 3 MHz, Part 2: Detail specification for a range of connectors with assessed quality, with trapezoidal shaped metal shells and round contacts—Fixed solder contact types.
- IEC 60807-3: 1990 Rectangular connectors for frequencies below 3 MHz, Part 3: Detail specification for a range of connectors with trapezoidal shaped metal shells and round contacts—Removable crimp contact types with closed crimp barrels, rear insertion/rear extraction.
- IEC 60825-1: 2001 Edition 1.2, Consolidated Edition; Safety of Laser Products—Part 1: Equipment classification, requirements and user's guide.
- IEC 60825-2: 1993 Safety of laser products—Part 2: Safety of optical fibre communication systems.
- IEC 60874-1: 1993 Connectors for optical fibres and cables—Part 1: Generic specification.
- IEC 60874-2: 1993 Connectors for optical fibres and cables—Part 2: Sectional specification for fibre optic connector, Type F-SMA.
- IEC 60874-10: 1992 Connectors for optical fibres and cables—Part 10: Sectional specification, Fibre optic connector type BFOC/2,5.
- IEC 60950: 1991 Safety of information technology equipment.
- IEC 61000-4-3 Electromagnetic Compatibility (EMC)—Part 4: Testing and measurement techniques—Section 3: Radiated, radio-frequency, electromagnetic field immunity test.
- IEC 61076-3-101: 1997 Connectors with assessed quality, for use in d.c., low-frequency analogue and in digital high-speed data applications—Part 3: Rectangular connectors—Section 101: Detail specification for a range of shielded connectors with trapezoidal shaped shells and non-removable rectangular contacts on a 1.27 mm × 2.54 mm centre-line.
- IEC 61076-3-113 Ed. 1.0 (draft, 48B/1437/CD, 2 April 2004.) [48B Secretariat 1327] Connectors for electronic equipment—Part 3-113: Screened, serial multi-conductor cable to board connectors suitable for 10 Gbit/sec data rates.[6][1]
- IEC 61076-3-103 (48B/574/NP) Detail specification for rectangular connectors, with assessed quality, 6 and 8 way, fixed and free shielded connectors with ribbon contacts for high speed data applications.
- IEC 61196-1: 1995 Radio-frequency cables—Part 1: Generic specification—General, definitions, requirements and test methods.
- IEC 61280-2-2 (1998) Fiber optic communication sub-system basic test procedures—Part 2-2: Test procedures for digital systems - Optical eye pattern, waveform, and extinction ratio.
- IEC 61754-1:1996 Fibre optic interfaces —Part 1: General and guidance.
- IEC 61753-1-1: 2000 Fibre optic interconnecting devices and passive components performance standard - Part 1-1: General and guidance—Interconnecting devices (connectors).
- IEC 61753-021-2 (2002-07) Fibre optic passive component performance standard—Part 021-2: Fibre optic connectors terminated on single-mode fibre to category C Controlled environment.
- IEC 61753-022-2 Performance standard—Part 022-2: Fibre optic connectors terminated on multimode fibre for Category C—Controlled environment, performance Class M.
- IEC 61754-4: 1997 Fibre optic connector interfaces—Part 4: Type SC connector family.

1.Presently, IEC 61076-3-113 is a committee draft.

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- IEEE Std 802®-2001 IEEE Standards for Local and Metropolitan Area Networks: Overview and Architecture.[7][1]
- IEEE Std 802.1F™-1993 (Reaff 1998) IEEE Standards for Local and Metropolitan Area Networks: Common Definitions and Procedures for IEEE 802 Management Information.[8][2]
- IEEE Std 802.1Q™-1998 IEEE Standard for Local and Metropolitan Area Networks: Virtual Bridged Local Area Networks.
- IEEE Std 802a™-2003 IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture—Amendment 1: Ethertypes for prototype and vendor-specific protocol development.
- IETF RFC 1155 *Structure and Identification of Management Information for TCP/IP-based Internets*, Rose, M., and K. McCloghrie, May 1990.[9][3]
- IETF RFC 1157 *A Simple Network Management Protocol (SNMP)*, Case, J., Fedor, M., Schoffstall, M., and J. Davin, May 1990.
- IETF RFC 1212 *Concise MIB Definitions*, Rose, M., and K. McCloghrie, March 1991.
- IETF RFC 1213 (IETF STD 17) *Management Information Base for Network Management of TCP/IP-based internets: MIB-II*, McCloghrie K., and M. Rose, Editors, March 1991.
- IETF RFC 1215 *A Convention for Defining Traps for use with the SNMP*, M. Rose, March 1991.
- IETF RFC 1901 *Introduction to Community-based SNMPv2*, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, January 1996.
- IETF RFC 2578 *Structure of Management Information for Version 2 of the Simple Network Management Protocol (SNMPv2)*, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, January 1996.
- IETF RFC 2579 *Textual Conventions for Version 2 of the Simple Network Management Protocol (SNMPv2)*, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, January 1996.
- IETF RFC 2580 *Conformance Statements for Version 2 of the Simple Network Management Protocol (SNMPv2)*, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, January 1996.
- IETF RFC 3416 *Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)*, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, January 1996.
- IETF RFC 3417 *Transport Mappings for Version 2 of the Simple Network Management Protocol (SNMPv2)*, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, January 1996.
- IETF RFC 2863 *The Interfaces Group MIB using SMIv2*, McCloghrie, K., and F. Kastenholz, November 1997.
- IETF RFC 2571 *An Architecture for Describing SNMP Management Frameworks*, Harrington, D., Presuhn, R., and B. Wijnen, January 1998.
- IETF RFC 2572 *Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)*, Case, J., Harrington D., Presuhn R., and B. Wijnen, January 1998.

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1. IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA (http://standards.ieee.org/).
2. The IEEE standards or products referred to in this clause are trademarks of the Institute of Electrical and Electronics Engineers, Inc.
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- IETF RFC 2573 *SNMPv3 Applications*, Levi, D., Meyer, P., and B. Stewart, January 1998.
- IETF RFC 2574 *User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)*, Blumenthal, U., and B. Wijnen, January 1998.
- IETF RFC 2575 *View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)*, Wijnen, B., Presuhn, R., and K. McCloghrie, January 1998.
- INCITS-TR-25:1999 —Fibre Channel Methodologies for Jitter Specification.[10][1]
- ISO/IEC 2382-9: 1995 Information technology—Vocabulary—Part 9: Data communication.[11][2]
- ISO/IEC 7498-1: 1994 Information technology—Open Systems Interconnection—Basic Reference Model: The Basic Model.
- ISO/IEC 7498-4: 1989 Information processing systems—Open Systems Interconnection—Basic Reference Model—Part 4: Management Framework.
- ISO/IEC 8824: 1990 Information technology—Open Systems Interconnection—Specification of Abstract Syntax Notation One (ASN.1).
- ISO/IEC 8825: 1990 Information technology—Open Systems Interconnection—Specification of basic encoding rules for Abstract Syntax Notation One (ASN.1).
- 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: Physical Layer Medium Dependent (PMD).
- ISO/IEC 9646-1: 1994 Information technology—Open Systems Interconnection—Conformance testing methodology and framework—Part 1: General concepts.
- ISO/IEC 9646-2: 1994 Information technology—Open Systems Interconnection—Conformance testing methodology and framework—Part 2: Abstract test suite specification.
- ISO/IEC 10040: 1992 Information technology—Open Systems Interconnection—Systems management overview.
- ISO/IEC 10164-1: 1993 Information technology—Open Systems Interconnection—Systems management— Part 1: Object Management Function.
- ISO/IEC 10165-1: 1993 Information technology—Open Systems Interconnection—Management information services—Structure of management information—Part 1: Management Information Model.
- ISO/IEC 10165-2: 1992 Information technology—Open Systems Interconnection—Structure of management information: Definition of management information.

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2. ISO/IEC publications are available from the ISO Central Secretariat, Case Postale 56, 1 rue de Varembé, CH-1211, Genève 20, Switzerland/Suisse (http://www.iso.ch/). ISO publications are also available in the United States from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA (http://www.ansi.org/).

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- ISO/IEC 10165-4: 1992 Information technology—Open Systems Interconnection—Management information services—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 11801: 1995 Information technology—Generic cabling for customer premises.[12][1]
- ISO/IEC 11801: 2002 Information technology—Generic cabling for customer premises.
- 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 15802-2: 1995 [ANSI/IEEE Std 802.1B™-1992 and IEEE Std 802.1k™-1993] Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Common specifications—Part 2: LAN/MAN Management.
- ISO/IEC 15802-3: 1998 [IEEE Std 802.1D™, 1998 Edition) Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Common specifications—Part 3: Media Access Control (MAC) bridges.
- ITU-T Recommendation G.652 2000—Characteristics of a single-mode optical fibre cable.[13][2]
- ITU-T Recommendation G.691 2000—Optical interfaces for single-channel STM-64, STM-256 and other SDH systems with optical amplifiers.
- ITU-T Recommendation G.957 1999—Optical interfaces for equipments and systems relating to the synchronous digital hierarchy (SDH).
- ITU-T Recommendation G.991.2 2001—Amendment 1.
- ITU-T Recommendation G.991.2 2001—Single-Pair High-Speed Digital Subscriber Line (SHDSL) transceivers.
- ITU-T Recommendation G.993.1 2003—Amendment 1.
- ITU-T Recommendation G.993.1 2001—Very High-speed Digital Subscriber Line Foundation.
- ITU-T Recommendation G.994.1 2004—Handshake Procedures For Digital Subscriber Line (DSL) Transceivers.
- ITU-T Recommendation G.975 2000—Optical fibre submarine cable systems—Forward error correction for submarine systems.
- ITU-T Recommendation I.430 1995—Basic user-network interface—Layer 1 specification.
- ITU-T Recommendation O.150 1996—General requirements for instrumentation for performance measurements on digital transmission equipment.
- ITU-T Recommendation O.172 1999—Jitter and wander measuring equipment for digital systems which are based on the synchronous digital hierarchy (SDH).

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1. Previous editions of ISO/IEC standards are available from Deutsches Institut für Normung, Burggrafenstrasse 6, 10787 Berlin, Germany (http://www.din.de).
2. ITU-T publications are available from the International Telecommunications Union, Place des Nations, CH-1211, Geneva 20, Switzerland (http://www.itu.int/).

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- MATLAB Matrix Laboratory Software.[14][1]
- TIA-492AAAC-2002 Detail Specification for 850-nm Laser-Optimized, 50-um core diameter/125-um cladding diameter class Ia graded-index multimode optical fibers.[15][2]

NOTE — Local and national standards such as those supported by ANSI, EIA, IEEE, MIL, NPFA, and UL are not a formal part of this standard except where no international standard equivalent exists. A number of local and national standards are referenced as resource material; these bibliographical references are located in the bibliography in Annex A.[16][3]

1.4 Definitions

The definitions used in this standard are consistent with ISO 2382-9: 1984.

NOTE — A more specific Part 25 pertaining to LAN systems has been approved since the definitions in this standard were established. This standard is ISO/IEC 2382-25: 1992, Information technology—Vocabulary—Part 25: Local area networks.

10BASE2: IEEE 802.3 Physical Layer specification for a 10 Mb/s CSMA/CD local area network over RG 58 coaxial cable. (See IEEE 802.3, Clause 10.)

10BASE5: IEEE 802.3 Physical Layer specification for a 10 Mb/s CSMA/CD local area network over coaxial cable (i.e., thicknet). (See IEEE 802.3, Clause 8.)

10BASE-F: IEEE 802.3 Physical Layer specification for a 10 Mb/s CSMA/CD local area network over fiber optic cable. (See IEEE 802.3, Clause 15.)

10BASE-FB port: A port on a repeater that contains an internal 10BASE-FB Medium Attachment Unit (MAU) that can connect to a similar port on another repeater. (See IEEE 802.3, Clause 9, Figure 15-1b, and Clause 17.)

10BASE-FB segment: A fiber optic link segment providing a point-to-point connection between two 10BASE-FB ports on repeaters. (See link segment IEEE 802.3, Figure 15-1b and Figure 15-2.)

10BASE-FL segment: A fiber optic link segment providing point-to-point connection between two 10BASE-FL Medium Attachment Units (MAUs). (See link segment IEEE 802.3, Figure 15-1c and Figure 15-2.)

10BASE-FP segment: A fiber optic mixing segment, including one 10BASE-FP Star and all of the attached fiber pairs. (See IEEE 802.3, Figure 15-1a, Figure 1-3, and mixing segment.)

10BASE-FP Star: A passive device that is used to couple fiber pairs together to form a 10BASE-FP segment. Optical signals received at any input port of the 10BASE-FP Star are distributed to all of its output ports (including the output port of the optical interface from which it was received). A 10BASE-FP Star is typically comprised of a passive-star coupler, fiber optic connectors, and a suitable mechanical housing. (See IEEE 802.3, 16.5.)

1.For information on MatLab contact: The MathWorks, 24 Park Way, Natick, MA, (http://www.mathworks.com).

2.TIA publications are available from Global Engineering Documents, 15 Inverness Way East, Englewood, Colorado 80112, USA or online at http://www.tiaonline.org.

3.Notes in text, tables, and figures are given for information only, and do not contain requirements needed to implement the standard.

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10BASE-T: IEEE 802.3 Physical Layer specification for a 10 Mb/s CSMA/CD local area network over two pairs of twisted-pair telephone wire. (See IEEE 802.3, Clause 14.)

100BASE-BX10: IEEE 802.3 Physical Layer specification for a 100 Mb/s point-to-point link over one single-mode fiber. The link includes two different specifications for 100BASE-BX10-D and 100BASEBX10- U. (See IEEE 802.3, Clause 58 and Clause 66.)

100BASE-FX: IEEE 802.3 Physical Layer specification for a 100 Mb/s CSMA/CD local area network over two multimode optical fibers. (See IEEE 802.3, Clause 24 and Clause 26.)

100BASE-LX10: IEEE 802.3 Physical Layer specification for a 100 Mb/s point-to-point link over two single-mode optical fibers. (See IEEE 802.3, Clause 58 and Clause 66.)

100BASE-T: IEEE 802.3 Physical Layer specification for a 100 Mb/s CSMA/CD local area network. (See IEEE 802.3, Clause 22 and Clause 28.)

100BASE-T2: IEEE 802.3 specification for a 100 Mb/s CSMA/CD local area network over two pairs of Category 3 or better balanced cabling. (See IEEE 802.3, Clause 32.)

100BASE-T4: IEEE 802.3 Physical Layer specification for a 100 Mb/s CSMA/CD local area network over four pairs of Category 3, 4, and 5 unshielded twisted-pair (UTP) wire. (See IEEE 802.3 Clause 23.)

100BASE-TX: IEEE 802.3 Physical Layer specification for a 100 Mb/s CSMA/CD local area network over two pairs of Category 5 unshielded twisted-pair (UTP) or shielded twisted-pair (STP) wire. (See IEEE 802.3, Clause 24 and Clause 25.)

100BASE-X: IEEE 802.3 Physical Layer specification for a 100 Mb/s CSMA/CD local area network that uses the Physical Medium Dependent (PMD) sublayer and Medium Dependent Interface (MDI) of the ISO/IEC 9314 group of standards developed by ASC X3T12 (FDDI). (See IEEE 802.3, Clause 24.)

1000BASE-BX10: IEEE 802.3 Physical Layer specification for a 1000 Mb/s point-to-point link over one single-mode optical fiber. (See IEEE 802.3, Clause 59 and Clause 66.)

1000BASE-CX: 1000BASE-X over specialty shielded balanced copper jumper cable assemblies. (See IEEE 802.3, Clause 39.)

1000BASE-LX: 1000BASE-X using long wavelength laser devices over multimode and single-mode fiber. (See IEEE 802.3, Clause 38.)

1000BASE-LX10: IEEE 802.3 Physical Layer specification for a 1000 Mb/s point-to-point link over two single-mode or multimode optical fibers. (See IEEE 802.3, Clause 59 and Clause 66.)

1000BASE-PX10: IEEE 802.3 Physical Layer specification for a 1000 Mb/s point to multipoint link over one single-mode optical fiber, with a reach of up to 10 km. (See IEEE 802.3, Clause 60, Clause 65, and Clause 66.)

1000BASE-PX20: IEEE 802.3 Physical Layer specification for a 1000 Mb/s point to multipoint link over one single-mode optical fiber, with a reach of up to 20 km. (See IEEE 802.3, Clause 60, Clause 65, and Clause 66.)

1000BASE-SX: 1000BASE-X using short wavelength laser devices over multimode fiber. (See IEEE 802.3, Clause 38.)

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1000BASE-T: IEEE 802.3 Physical Layer specification for a 1000 Mb/s CSMA/CD LAN using four pairs of Category 5 balanced copper cabling. (See IEEE 802.3, Clause 40.)

1000BASE-X: IEEE 802.3 Physical Layer specification for a 1000 Mb/s CSMA/CD LAN that uses a Physical Layer derived from ANSI X3.230-1994 (FC-PH) [B20][17][1]. (See IEEE 802.3, Clause 36.)

10BROAD36: IEEE 802.3 Physical Layer specification for a 10 Mb/s CSMA/CD local area network over single broadband cable. (See IEEE 802.3, Clause 11.)

10GBASE-CX4: IEEE 802.3 Physical Layer specification for 10 Gb/s using 10GBASE-X encoding over four lanes over shielded balanced copper cabling. (See IEEE 802.3, Clause 54.)

10GBASE-E: IEEE 802.3 PMD specifications for 10 Gb/s serial transmission using extra long wavelength. (See IEEE 802.3, Clause 52.)

10GBASE-ER: IEEE 802.3 Physical Layer specification for 10 Gb/s using 10GBASE-R encoding and 10GBASE-E optics. (See IEEE 802.3, Clause 49 and Clause 52.)

10GBASE-EW: IEEE 802.3 Physical Layer specification for 10Gb/s using 10GBASE-W encoding and 10GBASE-E optics. (See IEEE 802.3, Clause 50 and Clause 52.)

10GBASE-L: IEEE 802.3 PMD specifications for 10 Gb/s serial transmission using long wavelength. (See IEEE 802.3, Clause 52)

10GBASE-LR: IEEE 802.3 Physical Layer specification for 10 Gb/s using 10GBASE-R encoding and 10GBASE-L optics. (See IEEE 802.3, Clause 49 and Clause 52.)

10GBASE-LW: IEEE 802.3 Physical Layer specification for 10 Gb/s using 10GBASE-W encoding and 10GBASE-L optics. (See IEEE 802.3, Clause 50 and Clause 52.)

10GBASE-LX4: IEEE 802.3 Physical Layer specification for 10 Gb/s using 10GBASE-X encoding over four WWDM lanes over multimode fiber. (See IEEE 802.3, Clause 54.)

10GBASE-S: IEEE 802.3 PMD specifications for 10 Gb/s serial transmission using short wavelength. (See IEEE 802.3, Clause 52.)

10GBASE-SR: IEEE 802.3 Physical Layer specification for 10 Gb/s using 10GBASE-R encoding and 10GBASE-S optics. (See IEEE 802.3, Clause 49 and Clause 52.)

10GBASE-SW: IEEE 802.3 Physical Layer specification for 10 Gb/s using 10GBASE-W encoding and 10GBASE-S optics. (See IEEE 802.3, Clause 50 and Clause 52.)

10GBASE-R: An IEEE 802.3 physical coding sublayer for serial 10 Gb/s operation. (See IEEE 802.3, Clause 49.)

10GBASE-W: An IEEE 802.3 physical coding sublayer for serial 10 Gb/s operation that is data-rate and format compatible with SONET STS-192c. (See IEEE 802.3, Clause 49.)

10GBASE-X: An IEEE 802.3 physical coding sublayer for 10 Gb/s operation over XAUI and four lane PMDs. (See IEEE 802.3, Clause 48.)

1.The numbers in brackets preceded by the letter B correspond to those of the bibliography in Annex A.

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10PASS-TS: IEEE 802.3 Physical Layer specification up to 100 Mb/s point-to-point link over single copper wire pair. (See IEEE 802.3, Clause 61 and Clause 62.)

1BASE5: IEEE 802.3 Physical Layer specification for a 1 Mb/s CSMA/CD local area network over two pairs of twisted-pair telephone wire. (See IEEE 802.3, Clause 12.)

2BASE-TL: IEEE 802.3 Physical Layer specification up to 5.696 Mb/s point-to-point link over single copper wire pair. (See IEEE 802.3, Clause 61 and Clause 63.)

10 Gigabit Attachment Unit Interface (XAUI): The interface between two 10 Gigabit Extender Sublayers (XGXS) to extend the reach of the XGMII for 10 Gb/s operation. (See IEEE 802.3, Clause 47.)

10 Gigabit Media Independent Interface (XGMII): The interface between the Reconciliation Sublayer (RS) and the Physical Coding Sublayer (PCS) for 10 Gb/s operation. (See IEEE 802.3, Clause 46.)

10 Gigabit Sixteen-Bit Interface (XSBI): The interface between the Physical Coding Sublayer (PCS) in 10GBASE-R or the WAN Interface Sublayer (WIS) in 10GBASE-W and the Physical Medium Attachment (PMA) sublayer for 10 Gb/s operation. (See IEEE 802.3, Clause 51.)

4D-PAM5: The symbol encoding method used in 1000BASE-T. The four-dimensional quinary symbols (4D) received from the 8B1Q4 data encoding are transmitted using five voltage levels (PAM5). Four symbols are transmitted in parallel each symbol period. (See IEEE 802.3, Clause 40.)

8B/10B transmission code: A dc-balanced octet-oriented data encoding specified in Table 36-1a–e and Table 36-2.

8B1Q4: For IEEE 802.3, the data encoding technique used by 1000BASE-T when converting GMII data (8B-8 bits) to four quinary symbols (Q4) that are transmitted during one clock (1Q4). (See IEEE 802.3, Clause 40.)

ability: A mode that a device can advertise using Auto-Negotiation. For modes that represent a type of data service, a device shall be able to operate that data service before it may advertise this ability. A device may support multiple abilities. (See IEEE 802.3, 28.2.1.2.2.)

Acknowledge Bit: A bit used by IEEE 802.3 Auto-Negotiation to indicate that a station has successfully received multiple identical copies of the Link Codeword. This bit is only set after an identical Link Codeword has been received three times in succession. (See IEEE 802.3, 28.2.1.2.4.)

Actor: The local entity in a Link Aggregation Control Protocol exchange. (See IEEE 802.3, Clause 43.)

advertised ability: An operational mode that is advertised using Auto-Negotiation. (See IEEE 802.3, 28.2.1.2.2.)

agent: A term used to refer to the managed nodes in a network. Managed nodes are those nodes that contain a network management entity (NME), which can be used to configure the node and/or collect data describing operation of that node. The agent is controlled by a network control host or manager that contains both an NME and network management application (NMA) software to control the operations of agents. Agents include systems that support user applications as well as nodes that provide communications services such as front-end processors, bridges, and routers. (See IEEE 802.3, Clause 30.)

agent code: A term used to refer to network management entity software residing in a node that can be used to remotely configure the host system based on commands received from the network control host,

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collect information documenting the operation of the host, and communicate with the network control host. (See IEEE 802.3, Clause 30.)

Aggregation group: A collection of PMEs that may be aggregated according to a particular implementation of the PME aggregation function. (See IEEE 802.3, 61.2.2.)

Aggregation Key: A parameter associated with each port and with each aggregator of an Aggregation System identifying those ports that can be aggregated together. Ports in an Aggregation System that share the same Aggregation Key value are potentially able to aggregate together. (See IEEE 802.3, Clause 43.)

Aggregation Link: An instance of a MAC-Physical Layer-Medium Physical Layer-MAC entity between a pair of Aggregation Systems. (See IEEE 802.3, Clause 43.)

Aggregation Port: An instance of a MAC-Physical Layer entity within an Aggregation System. (See IEEE 802.3, Clause 43.)

Aggregation System: A uniquely identifiable entity comprising (among other things) an arbitrary grouping of one or more ports for the purpose of aggregation. An instance of an aggregated link always occurs between exactly two Aggregation Systems. A physical device may comprise a single Aggregation System or more than one Aggregation System. (See IEEE 802.3, Clause 43.)

agile device: A device that supports automatic switching between multiple Physical Layer technologies. (See IEEE 802.3, Clause 28.)

anomaly: A discrepancy between the actual and desired characteristics of an item. This definition is derived from ANSI T1.416-1999 and ANSI T1.105-1995, which take precedence.

arbitration: In 1000BASE-X, Auto-Negotiation process that ensures proper sequencing of configuration information between link partners using the Physical Coding Sublayer (PCS) Transmit and Receive functions. (See IEEE 802.3, Clause 36 and Clause 37.)

Attachment Unit Interface (AUI): In 10 Mb/s CSMA/CD, the interface between the Medium Attachment Unit (MAU) and the data terminal equipment (DTE) within a data station. Note that the AUI carries encoded signals and provides for duplex data transmission. (See IEEE 802.3, Clause 7 and Clause 8.)

Auto-Negotiation: The algorithm that allows two devices at either end of a link segment to negotiate common data service functions. (See IEEE 802.3, Clause 28.)

balanced cable: A cable consisting of one or more metallic symmetrical cable elements (twisted pairs or quads). (From ISO/IEC 11801.)

Bandplan: The set of parameters that control the lowest and highest frequencies and power at which 10PASS-TS and 2BASE-TL may operate.

baseband coaxial system: A system whereby information is directly encoded and impressed upon the transmission medium. At any point on the medium only one information signal at a time can be present without disruption.

Base Link Codeword: The first 16-bit message exchanged during IEEE 802.3 Auto-Negotiation. (See IEEE 802.3, 28.2.1.2.)

Base Page: *See:* **Base Link Codeword**.

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baud (Bd): A unit of signaling speed, expressed as the number of times per second the signal can change the electrical state of the transmission line or other medium.

NOTE — Depending on the encoding strategies, a signal event may represent a single bit, more, or less that one bit. *Contrast with:* **bit rate; bits per second**. (From IEEE Std 610.7-1995 [B38].)

Binary Phase Shift Keying (Binary PSK or BPSK): A form of modulation in which binary data are transmitted by changing the carrier phase by 180 degrees. (See IEEE 802.3, Clause 11.)

bit cell: The time interval used for the transmission of a single data (CD0 or CD1) or control (CVH or CVL) symbol.

bit error ratio (BER): The ratio of the number of bits received in error to the total number of bits received.

bit interleaved parity N (BIP-N): A method of error monitoring using even (or odd) parity, such that an N-bit codeword is generated over a specified portion of an input data stream in such a manner that the i-th bit of the codeword provides even (or odd) parity over the i-th bit of all N-bit sequences in the covered portion of the data stream. This definition is derived from ANSI T1.416-1999 and ANSI T1.105-1995, which take precedence.

bit rate (BR): The total number of bits per second transferred to or from the Media Access Control (MAC). For example, 100BASE-T has a bit rate of one hundred million bits per second (10^8 b/s).

bit rate (BR)/2: One-half of the BR in hertz.

bit time (BT): The duration of one bit as transferred to and from the Media Access Control (MAC). The bit time is the reciprocal of the bit rate. For example, for 100BASE-T the bit rate is 10^{-8} s or 10 ns.

BR/2: *See:* **bit rate (BR)/2**.

branch cable: In 10BROAD36, the Attachment Unit Interface (AUI) cable interconnecting the data terminal equipment and Medium Attachment Unit (MAU) system components.

bridge: A layer 2 interconnection device that does not form part of a CSMA/CD collision domain but conforms to the ISO/IEC 15802-3: 1998 [ANSI/IEEE 802.1D, 1998 Edition]. A bridge does not form part of a CSMA/CD collision domain but, rather appears as a Media Access Control (MAC) to the collision domain. (See also IEEE 100.)

broadband local area network (LAN): A local area network in which information is transmitted on modulated carriers, allowing coexistence of multiple simultaneous services on a single physical medium by frequency division multiplexing. (See IEEE 802.3, Clause 11.)

bundle: A group of signals that have a common set of characteristics and differ only in their information content.

carrier extension: The addition of non-data symbols to the end of frames that are less than slotTime bits in length so that the resulting transmission is at least one slotTime in duration.

carrier sense: In a local area network, an ongoing activity of a data station to detect whether another station is transmitting.

NOTE — The carrier sense signal indicates that one or more DTEs are currently transmitting.

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Category 3 balanced cabling: Balanced 100 Ω and 120 Ω cables and associated connecting hardware whose transmission characteristics are specified up to 16 MHz (i.e., performance meets the requirements of a Class C link as per ISO/IEC 11801: 1995). Commonly used by IEEE 802.3 10BASE-T installations. In addition to the requirements outlined in ISO/IEC 11801: 1995, IEEE 802.3 Clause 14, Clause 23, and Clause 32 specify additional requirements for cabling when used with 10BASE-T, 100BASE-TX, and 1000BASE-T.

Category 4 balanced cabling: Balanced 100 Ω and 120 Ω cables and associated connecting hardware whose transmission characteristics are specified up to 20 MHz as per ISO/IEC 11801: 1995. In addition to the requirements outlined in ISO/IEC 11801: 1995, IEEE 802.3 Clause 14, Clause 23, and Clause 32 specify additional requirements for this cabling when used with 10BASE-T, 100BASE-T4, and 100BASE-T2, respectively.

Category 5 balanced cabling: Balanced 100 Ω and 120 Ω cables and associated connecting hardware whose transmission characteristics are specified up to 100 MHz (i.e., cabling components meet the performance specified in ISO/IEC 11801:1995). In addition to the requirements outlined in ISO/IEC 11801: 1995, IEEE 802.3 Clause 14, Clause 23, Clause 25, and Clause 40 specify additional requirements for this cabling when used with 10BASE-T and 100BASE-T.

CATV-type broadband medium: *See:* **Community Antenna Television (CATV)-type broadband medium.**

center wavelength: The average of two optical wavelengths at which the spectral radiant intensity is 50% of the maximum value. (See IEEE 802.3, Clause 11.)

channel: A band of frequencies dedicated to a certain service transmitted on the broadband medium. (See IEEE 802.3, Clause 11.)

channel insertion loss: As used in IEEE 802.3 Clause 38 for fiber optic links, the static loss of a link between a transmitter and receiver. It includes the loss of the fiber, connectors, and splices.

circuit: The physical medium on which signals are carried across the Attachment Unit Interface (AUI) for 10BASE-T or Media Independent Interface (MII) for 100BASE-T. For 10BASE-T, the data and control circuits consist of an A circuit and a B circuit forming a balanced transmission system so that the signal carrier on the B circuit is the inverse of the signal carried on the A circuit.

Class I repeater: A type of 100BASE-T repeater set with internal delay such that only one repeater set may exist between any two DTEs within a single collision domain when two maximum length copper cable segments are used. (See IEEE 802.3, Clause 27.)

Class II repeater: A type of IEEE 802.3 100BASE-T repeater set with internal delay such that only two or fewer such repeater sets may exist between any two DTEs within a single collision domain when two maximum length copper cable segments are used. (See IEEE 802.3, Clause 27.)

Clocked Data One (CD1): A Manchester-encoded data 1. A CD1 is encoded as a LO for the first half of the bit-cell and a HI for the second half of the bit-cell. (See IEEE 802.3, Clause 12.)

Clocked Data Zero (CD0): A Manchester-encoded data 0. A CD0 is encoded as a HI for the first half of the bit-cell and a LO for the second half of the bit-cell. (See IEEE 802.3, Clause 12.)

Clocked Violation HI (CVH): A symbol that deliberately violates Manchester-encoding rules, used as a part of the Collision Presence signal. A CVH is encoded as a transition from LO to HI at the beginning of

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the bit cell, HI for the entire bit cell, and a transition from HI to LO at the end of the bit cell. (See IEEE 802.3, Clause 12.)

Clocked Violation LO (CVL): A symbol that deliberately violates Manchester-encoding rules, used as a part of the Collision Presence signal. A CVL is encoded as a transition from HI to LO at the beginning of the bit cell, LO for the entire bit cell, and a transition from LO to HI at the end of the bit cell. (See IEEE 802.3, Clause 12.)

coaxial cable: A two-conductor (center conductor, shield system), concentric, constant impedance transmission line used as the trunk medium in the baseband system.

coaxial cable interface: The electrical and mechanical interface to the shared coaxial cable medium either contained within or connected to the Medium Attachment Unit (MAU). Also known as the Medium Dependent Interface (MDI).

coaxial cable section: A single length of coaxial cable, terminated at each end with a male BNC connector. Cable sections are joined to other cable sections via BNC plug/receptacle barrel or Type T adapters.

coaxial cable segment: A length of coaxial cable made up from one or more coaxial cable sections and coaxial connectors, and terminated at each end in its characteristic impedance.

code-bit: Within IEEE 802.3, in 100BASE-T, the unit of data passed across the Physical Medium Attachment (PMA) service interface, and the smallest signaling element used for transmission on the medium. A group of five code-bits constitutes a code-group in the 100BASE-X Physical Coding Sublayer (PCS). (See IEEE 802.3, Clause 24.)

code-group: For IEEE 802.3, a set of encoded symbols representing encoded data or control information. For 100BASE-T4, a set of six ternary symbols that, when representing data, conveys an octet. For 100BASE-TX and 100BASE-FX, a set of five code-bits that, when representing data, conveys a nibble. For 100BASE-T2, a pair of PAM5×5 symbols that, when representing data, conveys a nibble. For 1000BASE-X, a set of ten bits that, when representing data, conveys an octet. For 1000BASE-T, a vector of four 8B1Q4 coded quinary symbols that, when representing data, conveys an octet. (See IEEE 802.3, Clause 23, Clause 24, Clause 32, Clause 36, and Clause 40.)

code-group alignment: In 1000BASE-X, the receiver action that resets the existing code-group boundary to that of the comma or K28.5 character currently being received. (See IEEE 802.3, Clause 36.)

code-group slipping: In 1000BASE-X, the receiver action to align the correct receive clock and code-group containing a comma. (See IEEE 802.3, Clause 36.)

Code Rule Violation (CRV): An analog waveform that is not the result of the valid Manchesterencoded output of a single optical transmitter. The collision of two or more 10BASE-FB optical transmissions will cause multiple CRVs. The preamble encoding of a single 10BASE-FP optical transmission contains a single CRV. (See IEEE 802.3, 16.3.1.1.)

collision: A condition that results from concurrent transmissions from multiple data terminal equipment (DTE) sources within a single collision domain.

collision domain: A single, half duplex mode CSMA/CD network. If two or more Media Access Control (MAC) sublayers are within the same collision domain and both transmit at the same time, a collision will occur. MAC sublayers separated by a repeater are in the same collision domain. MAC sublayers separated by a bridge are within different collision domains. (See IEEE 802.3.)

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collision presence: A signal generated within the Physical Layer by an end station or hub to indicate that multiple stations are contending for access to the transmission medium. (See IEEE 802.3, Clause 8 and Clause 12.)

comma: In 1000BASE-X, the seven-bit sequence that is part of an 8B/10B code-group that is used for the purpose of code-group alignment. (See IEEE 802.3, Clause 36.)

comma-: In 1000BASE-X, the seven-bit sequence (1100000) of an encoded data stream. (See IEEE 802.3, Clause 36.)

comma+: In 1000BASE-X, the seven-bit sequence (0011111) of an encoded data stream. (See IEEE 802.3, Clause 36.)

common-mode voltage: The instantaneous algebraic average of two signals applied to a balanced circuit, with both signals referenced to a common reference. Also called *longitudinal voltage* in the telephone industry.

Community Antenna Television (CATV)-type broadband medium: A broadband system comprising coaxial cables, taps, splitters, amplifiers, and connectors the same as those used in CATV or cable television installations. (See IEEE 802.3, Clause 11.)

compatibility interfaces: Several hardware points of attachment have been defined by this standard to allow connection of independently designed and manufactured components to the transmission medium. (See IEEE 802.3, 1.1.2.2.)

container: An SDH term that is equivalent to the payload capacity of a synchronous payload envelope. This definition is derived from ANSI T1.416-1999 and ANSI T1.105-1995, which take precedence.

continuous wave (CW): A carrier that is not modulated or switched.

Control mode: In 1000BASE-T, the period of operation in which the PHY is transmitting codegroups that represent control information. The end of a frame is accompanied by a transition to the Control mode, which immediately follows the Data mode and precedes the Idle mode. This occurs when the GMII signal TX_EN is set FALSE. During this time, several control fields are transmitted as code-groups to complete a stream. These include two convolutional encoder reset code-groups, two End-of-Stream delimiter (ESD) code-groups and, possibly, carrier extend code-groups. (See IEEE 802.3, Clause 40.)

Control Signal One (CS1): An encoded control signal used on the Control In and Control Out circuits. A CS1 is encoded as a signal at half the bit rate (BR)/2). (See IEEE 802.3, Clause 7.)

Control Signal Zero (CS0): An encoded control signal used on the Control In and Control Out circuits. A CS0 is encoded as a signal at the bit rate (BR). (See IEEE 802.3, Clause 7.)

conversation: A set of MAC frames transmitted from one end station to another, where all of the MAC frames form an ordered sequence, and where the communicating end stations require the ordering to be maintained among the set of MAC frames exchanged. (See IEEE 802.3, Clause 43.)

Coupled Power Ratio (CPR): The ratio (in dB) of the total power coupled into a multimode fiber to the optical power that can be coupled into a single-mode fiber.

cross connect: A group of connection points, often wall- or rack-mounted in a wiring closet, used to mechanically terminate and interconnect twisted-pair building wiring.

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