

802.3aj™

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**

Amendment: Maintenance 7

IEEE Computer Society

Sponsored by the
LAN/MAN Standards Committee



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**LAN/MAN Standards Committee
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IEEE Computer Society**

Approved 29 December 2003
American National Standards Institute

Approved 13 June 2002
IEEE-SA Standards Board

Abstract: This amendment to IEEE Std 802.3-2002, as amended by IEEE Std 802.3ae-2002 10Gb/s Ethernet and IEEE Std 802.3af-2003 DTE Power via MDI, contains a set of maintenance requests approved for ballot at the November 2002 IEEE 802.3 closing plenary as part of project IEEE P802.3aj Maintenance 7.

Keywords: 802.3aj, 1000BASE-T, Auto-Negotiation, Maintenance 7, Next Page

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Introduction to IEEE Std 802.3aj-2003

(This introduction is not part of IEEE Std 802.3aj-2003, IEEE Standard for Information technology— Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements CSMA/CD Access Method and Physical Layer Specifications Amendment: Maintenance 7.)

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 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 802.3ad specified link aggregation. These major additions are all now included in IEEE Std 802.3-2002 and are not available as separate documents.

Recent additions such as IEEE Std 802.3ae (also called 10 Gigabit Ethernet) and IEEE Std 802.3af (also called Power over Ethernet) are currently published as separate documents. These recent amendments are part of IEEE Std 802.3 and they are dependent on and reference information published in IEEE Std 802.3-2002.

At the date of IEEE Std 802.3aj publication, IEEE Std 802.3 is comprised of the following documents:

IEEE Std 802.3-2002

Section One—Includes Clause 1 through Clause 20 and Annexes A through H. 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 32 and Annexes 22A through 32A. Section Two includes the specifications for 100 Mb/s operation and management attributes for multiple protocols and operational speeds.

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

IEEE Std 802.3ae-2002

Includes changes to IEEE Std 802.3-2002, and adds Clauses 44 through 53 and Annexes 44A through 50A. This amendment includes specifications for 10 Gb/s operation.

IEEE Std 802.3af-2003

Includes changes to IEEE Std 802.3-2002, and adds Clause 33 and Annexes 33A through 33E. This amendment includes specifications for the provision of power over 10BASE-T, 100BASE-TX and 1000BASE-T cabling.

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IEEE Std 802.3aj-2003

Includes changes to IEEE Std 802.3-2002 and IEEE Std 802.3ae-2002.

IEEE 802.3 will continue to evolve. Revisions are anticipated to the above standards within the next few years to integrate approved changes into IEEE 802.3, to clarify existing material, to correct possible errors, and to incorporate new related material.

Conformance test methodology

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

IEEE Std 802.3aj-2003

IEEE Std 802.3aj-2003, Maintenance 7 is an amendment to IEEE Std 802.3. It includes corrections and clarifications to both IEEE Std 802.3-2002 and IEEE Std 802.3ae. In a few cases text published in IEEE Std 802.3-2002 is modified by IEEE Std 802.3ae-2002 and is subsequently modified by IEEE Std 802.3aj-2003. IEEE Std 802.3aj-2003 does not include any modifications to the text of IEEE Std 802.3af-2003.

Historical listing of IEEE Std 802.3 projects

Included in IEEE Std 802.3-2002

IEEE Std 802.3 document	Date approved by IEEE and ANSI	Officers at the time of working group ballot
802.3-1985, Original 10 Mb/s standard, MAC, PLS, AUI, 10BASE5	23 June 1983 (IEEE) 31 December 1984 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i>
802.3a-1988 (Clause 10), 10 Mb/s MAU 10BASE2	15 November 1985 (IEEE) 28 December 1987 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i> Alan Flatman , <i>Task Force Chair</i>
802.3b-1985 (Clause 11), 10 Mb/s Broadband MAU, 10BROAD36	19 September 1985 (IEEE) 28 February 1986 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i> Menachem Abraham , <i>Task Force Chair</i>
802.3c-1985 (9.1–9.8), 10 Mb/s Baseband Repeater	12 December 1985 (IEEE) 4 June 1986 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i> Geoffrey O. Thompson , <i>Task Force Chair</i>
802.3d-1987 (9.9), 10 Mb/s Fiber MAU, FOIRL	10 December 1987 (IEEE) 9 February 1989 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i> Steven Moustakas , <i>Task Force Chair</i>
802.3e-1987 (Clause 12), 1 Mb/s MAU and Hub 1BASE5	11 June 1987 (IEEE) 15 December 1987 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i> Robert Galin , <i>Task Force Chair</i>
802.3h-1990 (Clause 5), 10 Mb/s Layer Management, DTEs	28 September 1990 (IEEE) 11 March 1991 (ANSI)	Donald C. Loughry , <i>Working Group Chair</i> Andy J. Luque , <i>Task Force Chair</i>
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 , <i>Working Group Chair</i> Patricia Thaler , <i>Task Force Chair (initial)</i> Richard Anderson , <i>Task Force Chair (final)</i>
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 , <i>Working Group Chair</i> Keith Amundsen , <i>Task Force Chair (initial)</i> Frederick Scholl , <i>Task Force Chair (final)</i> Michael E. Lee , <i>Technical Editor</i>
802.3k-1993 (Clause 19), 10 Mb/s Layer Management, Repeaters	17 September 1992 (IEEE) 8 March 1993 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Joseph S. Skorupa , <i>Task Force Chair</i> Geoffrey O. Thompson , <i>Vice Chair and Editor</i>

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802.3l-1992 (14.10), 10 Mb/s PICS Proforma 10BASE-T MAU	17 September 1992 (IEEE) 23 February 1993 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Mike Armstrong , <i>Task Force Chair and Editor</i> Paul Nikolich , <i>Vice Chair</i> William Randle , <i>Editorial Coordinator</i>
802.3m-1995, Maintenance 2	21 September 1995 (IEEE) 16 July 1996 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Gary Robinson , <i>Maintenance Chair</i>
802.3n-1995, Maintenance 3	21 September 1995 (IEEE) 4 April 1996 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Gary Robinson , <i>Maintenance Chair</i>
802.3p-1993™ (Clause 20), Management, 10 Mb/s Integrated MAUs	17 June 1993 (IEEE) 4 January 1994 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Joseph S. Skorupa , <i>Task Force Chair</i> Geoffrey O. Thompson , <i>Vice Chair and Editor</i>
802.3q-1993™ (Clause 5), 10 Mb/s Layer Management, GDMO Format	17 June 1993 (IEEE) 4 January 1994 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Joseph S. Skorupa , <i>Task Force Chair</i> Geoffrey O. Thompson , <i>Vice Chair and Editor</i>
802.3r-1996 (8.8), Type 10BASE5 Medium Attachment Unit PICS proforma	29 July 1996 (IEEE) 6 January 1997 (ANSI)	Patricia Thaler , <i>Working Group Chair</i> Imre Juhász , <i>Task Force Chair</i> William Randle , <i>Task Force Editor</i>
802.3s-1995, Maintenance 4	21 September 1995 (IEEE) 8 April 1996 (ANSI)	Geoffrey O. Thompson , <i>Working Group Chair</i> Gary Robinson , <i>Maintenance Chair</i>
802.3t-1995, 120 Ω informative annex to 10BASE-T	14 June 1995 (IEEE) 12 January 1996 (ANSI)	Geoffrey O. Thompson , <i>Working Group Chair</i> Jacques Christ , <i>Task Force Chair</i>
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 , <i>Working Group Chair</i> Peter Tarrant , <i>Task Force Chair (Phase 1)</i> Howard Frazier , <i>Task Force Chair (Phase 2)</i> Paul Sherer , <i>Editor-in-Chief (Phase 1)</i> Howard Johnson , <i>Editor-in-Chief (Phase 2)</i> Colin Mick , <i>Comment Editor</i>
802.3v-1995, 150 Ω informative annex to 10BASE-T	12 December 1995 (IEEE) 16 July 1996 (ANSI)	Geoffrey O. Thompson , <i>Working Group Chair</i> Larry Nicholson , <i>Task Force Chair</i>
802.3x-1997 and 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 , <i>Working Group Chair</i> David J. Law , <i>Working Group Vice Chair</i> Rich Seifert , <i>Task Force Chair and Editor</i> (802.3x) J. Scott Carter , <i>Task Force Chair (802.3y)</i> Colin Mick , <i>Task Force Editor (802.3y)</i>
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 , <i>Working Group Chair</i> David J. Law , <i>Working Group Vice Chair</i> Howard M. Frazier, Jr. , <i>Task Force Chair and Editor</i> Howard W. Johnson , <i>Task Force Editor</i>
802.3aa-1998, Maintenance 5	25 June 1998 (IEEE)	Geoffrey O. Thompson , <i>Working Group Chair</i> Colin Mick , <i>Task Force Editor (100BASE-T Maintenance)</i>
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 , <i>Working Group Chair</i> David J. Law , <i>Working Group Vice Chair</i> Robert M. Grow , <i>Working Group Secretary</i> George Eisler , <i>Task Force Chair</i> Colin Mick , <i>Task Force Editor</i>

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802.3ac-1998, Frame Extensions for Virtual Bridged Local Area Network (VLAN) Tagging on 802.3 Networks	16 September 1998 (IEEE)	Geoffrey O. Thompson , <i>Working Group Chair</i> David J. Law , <i>Working Group Vice Chair</i> Andy J. Luque , <i>Working Group Secretary</i> Ian Crayford , <i>Task Force Chair</i> Rich Seifert , <i>Task Force Editor</i>
802.3ad-2000 (Clause 43), Aggregation of Multiple Link Segments	30 March 2000 (IEEE)	Geoffrey O. Thompson , <i>Working Group Chair</i> David J. Law , <i>Working Group Vice Chair</i> Robert M. Grow , <i>Working Group Secretary</i> Steven Haddock , <i>Task Force Chair</i> Tony Jeffree , <i>Co-Editor</i> Rich Seifert , <i>CoEditor</i>
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 , <i>Working Group Chair</i> David J. Law , <i>Working Group Vice Chair</i> Robert M. Grow , <i>Working Group Secretary</i>

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IEEE Std 802.3 document	Date approved by IEEE and ANSI	Officers at the time of working group ballot
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 , <i>Working Group Chair</i> David J. Law , <i>Working Group Vice Chair</i> Robert M. Grow , <i>Working Group Secretary</i> R. Jonathan Thatcher , <i>Task Force Chair</i> Stephen Haddock , <i>Task Force Vice Chair</i> Bradley J. Booth , <i>Task Force Editor</i> Lacreshia Laningham , <i>Task Force Assistant Editor</i> Benjamin Brown , <i>Logic Track Chair</i> Walter Thirion , <i>Optical Track Chair</i>
802.3af-2003, (Clause 33) Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI)	12 June 2003 (IEEE)	Geoffrey O. Thompson , <i>Working Group Chair—Phase 1</i> Robert M. Grow , <i>Working Group Chair—Phase 2</i> David J. Law , <i>Working Group Vice Chair</i> Robert M. Grow , <i>Secretary—Phase 1</i> Steven B. Carlson , <i>Secretary—Phase 2</i> Steven B. Carlson , <i>Task Force Chair</i> Michael S. McCormack , <i>Editor—Phase 1</i> John J. Jetzt , <i>Editor—Phase 2</i> Chad M. Jones , <i>Comment Editor</i>
802.3aj-2003, Maintenance 7	11 September 2003 (IEEE)	Robert M. Grow , <i>Working Group Chair</i> David J. Law , <i>Working Group Vice Chair, Task Force Chair</i> Steven B. Carlson , <i>Working Group Secretary</i> Catherine K. N. Berger , <i>Task Force Editor</i>

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Satish K. Aggarwal, *NRC Representative*

Michelle D. Turner
IEEE Standards Project Editor

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List of special symbols

For the benefit of those who have received this document by electronic means, what follows is a list of special symbols and operators. If any of these symbols or operators fail to display or print out correctly, the editors hope that this table will aid in interpreting any funny blobs and strokes appearing in the body of the document.

Special symbols and operators

Printed Character	Meaning	Font
*	Boolean AND	Symbol
+	Boolean OR, Arithmetic addition	Symbol
^	Boolean XOR	Times
!	Boolean NOT	Symbol
<	Less than	Symbol
≤	Less than or equal to	Symbol
=	Equal to	Symbol
≠	Not equal to	Symbol
≥	Greater than or equal to	Symbol
>	Greater than	Symbol
←	Assignment operator	Symbol
∈	Indicates membership	Symbol
∉	Indicates nonmembership	Symbol
±	Plus or minus (a tolerance)	Symbol
°	Degrees (as in degrees Celsius)	Symbol
∑	Summation	Symbol
—	Big dash (Em dash)	Times
–	Little dash (En dash)	Times
†	Dagger	Times
‡	Double dagger	Times

SUPERSEDED

SUPERSEDED

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

Amendment: Maintenance 7

[These changes are part of IEEE Std 802.3™-2002.]

EDITORIAL NOTE—This amendment is based on the current edition of IEEE Std 802.3-2002 as amended by IEEE Std 802.3ae-2002 and IEEE Std 802.3af-2003. The editing instructions define how to merge the material contained here into this base document set to form the new comprehensive standard as created by the addition of IEEE Std 802.3aj-2003. (This standard does not modify any text of IEEE Std 802.3af-2003.)

Editing instructions are shown in ***bold italic***. Four editing instructions are used: change, delete, insert, and replace. ***Change*** is used to make small corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed either by using ~~striketrough~~ (to remove old material) or underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. Editorial notes will not be carried over into future editions. ***Replace*** is used to make large changes in existing text, subclauses, tables, or figures by removing existing material and replacing it with new material. Editorial notes will not be carried over into future editions because the changes will be incorporated into the base standard.

1. Introduction

1.3 Normative references

Delete the following reference from 1.3:

ANSI X3.237-1995, Rev 2.1 (1 January 1995), FDDI Low-Cost Fibre Physical Layer—Medium Dependent (LCF-PMD) (ISO/IEC CD 9314-9).

Change the references in 1.3 and associated footnotes as follows (entries should be placed in subclause in alphabetical order):

ANSI/TIA/EIA-568-B:2001, Commercial Building Telecommunications Cabling Standard.

IEEE Std 802.1Q-1998, P802.1Q/D11TM (July 30, 1998), Draft IEEE Standard for Local and Metropolitan Area Networks: Virtual Bridged Local Area Networks.¹

IEEE Std 802aTM-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. McClohrrie, May 1990.¹

ISO/IEC 11801:1995, Information technology—Generic cabling for customer premises.²

ISO/IEC 11801:2002, Information technology—Generic cabling for customer premises.

1.4 Definitions

Change definition 1.4.120 as follows:

1.4.120 Fiber Optic Inter-Repeater Link (FOIRL) bit error rate ratio (BER): For 10BASE-F, the mean bit error rate ratio of the FOIRL. (See IEEE 802.3 Clause 9.)

¹IEEE IETF RFCs are available from the Internet Engineering Task Force website at <http://www.ietf.org/rfc.html>.

²Previous editions of ISO/IEC standards are available from Deutsches Institut für Normung, Burggrafenstrasse 6, 10787 Berlin, Germany (www.din.de).

3. Media access control frame structure

3.2.6 Length/Type field

Insert the following note to the end of 3.2.6:

NOTE—Clause 12 of IEEE Std 802a-2003 (an amendment to IEEE Std 802) defines a set of Type values and associated mechanisms for use in prototype and vendor-specific protocol development.

4. Media Access Control

4.4.2 Allowable implementations

Delete 4.4.2.1 through 4.4.2.4 (as modified by IEEE Std 802.3ae-2002).

5. Layer Management

5.2.4.1 Common constants and types

Change 5.2.4.1 as follows:

The following are the common constants and types required for the Layer Management procedures:

const

```
maxUntaggedFrameSize = ...; {in octets, implementation-dependent, see 4.4}
maxDeferTime = ...; {2 × (maxUntaggedFrameSize × 8), for operating speeds of 100 Mb/s and
                     below, and 2 × (burstLimit + maxUntaggedFrameSize × 8 + headerSize) for
                     operating speeds greater than 100 Mb/s, in bits, error timer limit for
                     maxDeferTime}

maxLarge = 4294967295; {maximum value (232 – 1) of wraparound 32-bit counter}
max64 = 18446744073709551615; {maximum value (264 – 1) of wraparound 64-bit counter}
oneBitTime = 1; {the period it takes to transmit one bit}
```

type

```
CounterLarge = 0..maxLarge; —Ssee footnote3;
```

³The CounterLarge declaration is an example of how to declare a counter. This particular example produces a 32 bit counter.

7. Physical Signaling (PLS) and Attachment Unit Interface (AUI) specifications

7.2.4.6 Carrier Sense function

Change the footnote associated with the first paragraph of 7.2.4.6 as follows:

The PLS sublayer Carrier Sense function performs the task of sending carrierSense and sqeTestError to the MAC sublayer. The state diagram of Figure 7–8 depicts the Carrier Sense function operation.⁴

⁴Formerly, this function utilized the variable output_in_progressprocess generated by the PLS output function described in Figure 7–5. For the sake of consistency with common implementation practice, the variable transmitting (see 4.3.3) is utilized directly by the PLS Carrier Sense function in recent editions of the standard.

The mapping between variable output_in_progressprocess and the variable transmitting is as follows. When output_in_progressprocess is true, transmitting is true; when output_in_progressprocess is false, transmitting is false.

8. Medium Attachment Unit and baseband medium specifications, type 10BASE5

Change the note the prefaces Clause 8 as follows:

NOTE—This MAU is not recommended for new installations. No maintenance changes will be considered for this clause.

8.1.3.1 Object

Change item c) of 8.1.3.1 as follows:

- c) Provide a communication channel capable of high bandwidth and low bit error-rate ratio performance. The resultant mean bit error-~~rate~~ ratio, at the physical layer service interface should be less than one part in 10^8 (on the order of one part in 10^9 at the link level).

8.6.1 Transmission system model

Change item c) of 8.6.1 as follows:

- c) The repeater unit specified in Clause 9 provides the means for connecting 10 Mb/s baseband segments into a CSMA/CD network. The proper operation of a CSMA/CD network requires network size to be limited to control round-trip propagation delay to meet the requirements of 4.2.3.2.3 and 4.4.2.4.4.2.1, and the number of repeaters between any two DTEs to be limited in order to limit the shrinkage of interpacket gap as it travels through the network. Configuration rules, which ensure that these limits are not exceeded, are given in Clause 13.

9. Repeater unit for 10 Mb/s baseband networks

9.1 Overview

Change the third paragraph of 9.1 as follows:

Repeater sets are used to extend the network length and topology beyond what could be achieved by a single mixing segment. Mixing segments may be connected directly by a repeater set (Figure 9–1) or by several repeater units that are, in turn, connected by link segments. Repeater sets are also used as the hub in a star topology network in which DTEs attach directly to link segments (e.g., 10BASE-T, Clause 14). Allowable topologies shall contain only one operative signal path between any two points on the network. The proper operation of a CSMA/CD network requires network size to be limited to control round-trip propagation delay to meet the requirements of 4.2.3.2.3 and ~~4.4.24.4.2.4~~, and the number of repeaters between any two DTEs to be limited in order to limit the shrinkage of interpacket gap as it travels through the network. The method for validating networks with respect to these requirements is specified in Clause 13.

9.9.1.2 Application perspective: FOMAU and medium objectives

Change item c) of 9.9.1.2 as follows:

- c) Provide a communication channel capable of high bandwidth and low bit error ~~rate~~ ratio performance. The resultant BER of the FOIRL should be less than one part in 10^{10} .

10. Medium attachment unit and baseband medium specifications, type 10BASE2

10.1.3.1 Object

Change item c) of 10.1.3.1 as follows:

- c) Provide a communication channel capable of high bandwidth and low bit error-~~rate~~ratio performance. The resultant mean bit error-~~rate~~ratio, at the Physical Layer service interface, should be less than one part in 10^7 (on the order of one part in 10^8 at the link level).

10.7.1 Transmission system model

Change item c) of 10.7.1 as follows:

- c) The repeater unit specified in Clause 9 provides the means for connecting 10 Mb/s baseband segments into a CSMA/CD network. The proper operation of a CSMA/CD network requires network size to be limited to control round-trip propagation delay to meet the requirements of 4.2.3.2.3 and 4.4.24.4.2.1, and the number of repeaters between any two DTEs to be limited in order to limit the shrinkage of the interpacket gap as it travels through the network. Configuration rules, which ensure that these limits are not exceeded, are given in Clause 13.

11. Broadband medium attachment unit and broadband medium specifications, type 10BROAD36

Change the note that prefaces Clause 11 as follows:

NOTE—This MAU is not recommended for new installations. No maintenance changes will be considered for this clause.

11.1.3 MAU and medium objectives

Change item j) of 11.1.3 as follows:

- j) Provide a communication channel capable of high bandwidth and low bit error ~~rate~~ ratio performance. The resultant mean bit error ~~rate~~ ratio at the physical layer service interface should be less than one part in 10^8 (on the order of one part in 10^9 at the link level) in a worst-case signal-to-noise ratio of 26 dB.

11.3.4.8 Bit error rate

Change 11.3.4.8 as follows:

11.3.4.8 Bit error ~~rate~~ ratio

The MAU shall have a Bit Error ~~Rate~~ Ratio (BER) as measured at the AUI lower than one error in 10^8 in a “zero-length coax” test environment (that is, a coaxial cable connection sufficiently short to have negligible delay and transmission impairments). It shall have this BER for receive signal levels in the range specified in 11.3.1.1.3 and in the presence of -28.3 dBmV rms/14 MHz white Gaussian noise. This represents a 24.3 dB signal-to-noise ratio for the specified minimum signal level, -4 dBmV rms. For the same BER in a “system” environment (as opposed to zero-length coax), a 26 dB signal-to-noise ratio is required.

12. Physical signaling, medium attachment, and baseband medium specifications, type 1BASE5

Change the note that prefaces Clause 12 as follows:

NOTE—This MAU is not recommended for new installations. No maintenance changes will be considered for this clause.

12.1.6 Objectives of type 1BASE5 specification

Change item f) of 12.1.6 as follows:

- f) Provide a communication channel with a resultant mean bit error ~~rate~~ ratio, at the physical layer service interface, of less than one part in 10^8 (on the order of one part in 10^9 at the link level)

12.2.3.1 Silence

Change 12.2.3.1 as follows:

The <silence> delimiter provides an observation window for an unspecified period of time during which no transitions occur. The minimum duration of <etd> followed by <silence> is the interFrameGap defined in 4.4.24.4.2.2.

12.5.3.2.6 Noise immunity

Change 12.5.3.2.6 as follows:

Receivers shall meet the following limits on average error ~~rates~~ ratios when the noise described in 12.7.4 is added to the signals described in 12.5.3.2.1 and 12.5.3.2.2:

- a) When nonidle, the receiver error ~~rate~~ ratio shall not exceed one error in 10^8 bits.
- b) When idle, a receiver used in a DTE shall not falsely detect carrier more than one in 100 s.
- c) When idle, a receiver used in a hub shall not falsely detect carrier more than once in 1500 s.

12.6.1 Line interface connector

Change 12.6.1 as follows:

Eight-pin connectors meeting the requirements of Clause 3 and Figure 1 through Figure 5 of ~~ISO/IEC 8877: 1992~~ IEC 60603-7 shall be used as the compatibility interface between the PMA and the medium. The use of other types of connectors, if any, within a PMA or within the medium, although not explicitly prohibited, is outside the scope of this standard.

12.9.5 Hub timing

Change fifth paragraph of 12.9.5 as follows:

Hub Delay Stretch/Shrink is the increase or decrease in a hub's transit delay due to the effects of differing clock rates. The clock rate tolerance of 0.01% specified in 12.3.2.4.1 and the maximum frame size of 1518 octets specified in ~~4.4.24.4.2.2~~ yield a maximum stretch or shrink of $(56 + 8 + 1518 \times 8) \times 0.01\% \times 2 < 3$ BT, both at any given hub and through an entire network.