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Telecommunications and exchange between information technology systems — Requirements for local and metropolitan area networks —

Part 3: Standard for Ethernet

AMENDMENT 10: Maintenance #14: Isolation

Télécommunications et échange entre systèmes informatiques — Exigences pour les réseaux locaux et métropolitains —

Partie 3: Norme pour Ethernet

AMENDEMENT 10: Maintenance n° 14 : Isolation

Reference number
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IEEE Std 802.3cr™-2021
(Amendment to IEEE Std 802.3™-2018
as amended by IEEE Std 802.3cb™-2018,
IEEE Std 802.3bt™-2018,
IEEE Std 802.3cd™-2018,
IEEE Std 802.3cn™-2019,
IEEE Std 802.3cg™-2019,
IEEE Std 802.3cq™-2020,
IEEE Std 802.3cm™-2020,
IEEE Std 802.3ch™-2020,
and IEEE Std 802.3ca™-2020)

IEEE Standard for Ethernet

Amendment 10: Maintenance #14: Isolation

Developed by the

LAN/MAN Standards Committee
of the
IEEE Computer Society

Approved 9 February 2021

IEEE SA Standards Board

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Abstract: This amendment to IEEE Std 802.3-2018 replaces references to the IEC 60950 series of standards with appropriate references to the IEC 62368 series and makes appropriate changes to the standard corresponding to the new references.

Keywords: Ethernet, IEC 60950, IEC 62368, IEEE 802.3™, IEEE 802.3cr™, isolation, safety

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Introduction

This introduction is not part of IEEE Std 802.3cr-2021, IEEE Standard for Ethernet. Amendment 10: Maintenance #14: Isolation.

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 Std 802.3ba™-2010).

The half duplex Media Access Control (MAC) protocol specified in IEEE Std 802.3-1985 is Carrier Sense Multiple Access with Collision Detection (CSMA/CD). This MAC protocol was key to the experimental Ethernet developed at Xerox Palo Alto Research Center, which had a 2.94 Mb/s data rate. Ethernet at 10 Mb/s was jointly released as a public specification by Digital Equipment Corporation (DEC), Intel and Xerox in 1980. Ethernet at 10 Mb/s was approved as an IEEE standard by the IEEE Standards Board in 1983 and subsequently published in 1985 as IEEE Std 802.3-1985. Since 1985, new media options, new speeds of operation, and new capabilities have been added to IEEE Std 802.3. A full duplex MAC protocol was added in 1997.

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 802.3z added 1000 Mb/s operation (also called Gigabit Ethernet), IEEE Std 802.3ae added 10 Gb/s operation (also called 10 Gigabit Ethernet), IEEE Std 802.3ah™ specified access network Ethernet (also called Ethernet in the First Mile) and IEEE Std 802.3ba added 40 Gb/s operation (also called 40 Gigabit Ethernet) and 100 Gb/s operation (also called 100 Gigabit Ethernet). These major additions are all now included in and are superseded by IEEE Std 802.3-2018 and are not maintained as separate documents.

At the date of IEEE Std 802.3cr-2021 publication, IEEE Std 802.3 was composed of the following documents:

IEEE Std 802.3-2018

Section One—Includes Clause 1 through Clause 20 and Annex A through Annex H and Annex 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 management attributes for multiple protocols and speed of operation as well as specifications for providing power over twisted pair cabling for multiple operational speeds. It also includes general information on 100 Mb/s operation as well as most of the 100 Mb/s Physical Layer specifications.

Section Three—Includes Clause 34 through Clause 43 and Annex 36A through Annex 43C. Section Three includes general information on 1000 Mb/s operation as well as most of the 1000 Mb/s Physical Layer specifications.

Section Four—Includes Clause 44 through Clause 55 and Annex 44A through Annex 55B. Section Four includes general information on 10 Gb/s operation as well as most of the 10 Gb/s Physical Layer specifications.

Section Five—Includes Clause 56 through Clause 77 and Annex 57A through Annex 76A. Clause 56 through Clause 67 and Clause 75 through Clause 77, as well as associated annexes, specify subscriber access and other Physical Layers and sublayers for operation from 512 kb/s to 10 Gb/s, and defines

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services and protocol elements that enable the exchange of IEEE Std 802.3 format frames between stations in a subscriber access network. Clause 68 specifies a 10 Gb/s Physical Layer specification. Clause 69 through Clause 74 and associated annexes specify Ethernet operation over electrical backplanes at speeds of 1000 Mb/s and 10 Gb/s.

Section Six—Includes Clause 78 through Clause 95 and Annex 83A through Annex 93C. Clause 78 specifies Energy-Efficient Ethernet. Clause 79 specifies IEEE 802.3 Organizationally Specific Link Layer Discovery Protocol (LLDP) type, length, and value (TLV) information elements. Clause 80 through Clause 95 and associated annexes include general information on 40 Gb/s and 100 Gb/s operation as well the 40 Gb/s and 100 Gb/s Physical Layer specifications. Clause 90 specifies Ethernet support for time synchronization protocols.

Section Seven—Includes Clause 96 through Clause 115 and Annex 97A through Annex 115A. Clause 96 through Clause 98, Clause 104, and associated annexes, specify Physical Layers and optional features for 100 Mb/s and 1000 Mb/s operation over a single twisted pair. Clause 100 through Clause 103, as well as associated annexes, specify Physical Layers for the operation of the EPON protocol over coaxial distribution networks. Clause 105 through Clause 114 and associated annexes include general information on 25 Gb/s operation as well as 25 Gb/s Physical Layer specifications. Clause 99 specifies a MAC merge sublayer for the interspersing of express traffic. Clause 115 and its associated annex specify a Physical Layer for 1000 Mb/s operation over plastic optical fiber.

Section Eight—Includes Clause 116 through Clause 126 and Annex 119A through Annex 120E. Clause 116 through Clause 124 and associated annexes include general information on 200 Gb/s and 400 Gb/s operation as well the 200 Gb/s and 400 Gb/s Physical Layer specifications. Clause 125 and Clause 126 include general information on 2.5 Gb/s and 5 Gb/s operation as well as 2.5 Gb/s and 5 Gb/s Physical Layer specifications.

IEEE Std 802.3cb™-2018

Amendment 1—This amendment includes changes to IEEE Std 802.3-2018 and its amendments, and adds Clause 127 through Clause 130, Annex 127A, Annex 128A, Annex 128B, and Annex 130A. This amendment adds new Physical Layers for operation at 2.5 Gb/s and 5 Gb/s over electrical backplanes.

IEEE Std 802.3bt™-2018

Amendment 2—This amendment includes changes to IEEE Std 802.3-2018 and adds Clause 145, Annex 145A, Annex 145B, and Annex 145C. This amendment adds power delivery using all four pairs in the structured wiring plant, resulting in greater power being available to end devices. This amendment also allows for lower standby power consumption in end devices and adds a mechanism to better manage the available power budget.

IEEE Std 802.3cd™-2018

Amendment 3—This amendment includes changes to IEEE Std 802.3-2018 and adds Clause 131 through Clause 140 and Annex 135A through Annex 136D. This amendment adds MAC parameters, Physical Layers, and management parameters for the transfer of IEEE 802.3 format frames at 50 Gb/s, 100 Gb/s, and 200 Gb/s.

IEEE Std 802.3cn™-2019

Amendment 4—This amendment includes changes to IEEE Std 802.3-2018 and adds 50 Gb/s, 200 Gb/s, and 400 Gb/s Physical Layer specifications and management parameters for operation over single-mode fiber with reaches of at least 40 km.

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IEEE Std 802.3cg™-2019

Amendment 5—This amendment includes changes to IEEE Std 802.3-2018 and its amendments and adds Clause 146 through Clause 148 and Annex 146A and Annex 146B. This amendment adds 10 Mb/s Physical Layer specifications and management parameters for operation on a single balanced pair of conductors.

IEEE Std 802.3cq™-2020

Amendment 6—This amendment includes editorial and technical corrections, refinements, and clarifications to Clause 33 and related portions of the standard.

IEEE Std 802.3cm™-2020

Amendment 7—This amendment includes changes to IEEE Std 802.3-2018 and adds Clause 150. This amendment adds Physical Layer (PHY) specifications and management parameters for 400 Gb/s operation on four pairs (400GBASE-SR4.2) and eight pairs (400GBASE-SR8) of multimode fiber, over reaches of at least 100 m.

IEEE Std 802.3ch™-2020

Amendment 8—This amendment includes changes to IEEE Std 802.3-2018 and adds Clause 149, Annex 149A, Annex 149B, and Annex 149C. This amendment adds physical layer specifications and management parameters for operation at 2.5 Gb/s, 5 Gb/s, and 10 Gb/s over a single balanced pair of conductors.

IEEE Std 802.3ca™-2020

Amendment 9—This amendment to IEEE Std 802.3-2018 extends the operation of Ethernet passive optical networks (EPONs) to multiple channels of 25 Gb/s providing both symmetric and asymmetric operation for the following data rates (downstream/upstream): 25/10 Gb/s, 25/25 Gb/s, 50/10 Gb/s, 50/25 Gb/s, and 50/50 Gb/s. This amendment specifies the 25 Gb/s EPON Multi-Channel Reconciliation Sublayer (MCRS), Nx25G-EPON Physical Coding Sublayers (PCSs), Physical Media Attachment (PMA) sublayers, and Physical Medium Dependent (PMD) sublayers that support both symmetric and asymmetric data rates while maintaining backward compatibility with already deployed 10 Gb/s EPON equipment. The EPON operation is defined for distances of at least 20 km, and for a split ratio of at least 1:32.

IEEE Std 802.3cr™-2021

Amendment 10—This amendment includes changes to IEEE Std 802.3-2018 and adds Annex J. This amendment replaces references to the IEC 60950 series of standards (including IEC 60950-1 “Information technology equipment—Safety—Part 1: General requirements”) with appropriate references to the IEC 62368 “Audio/video, information and communication technology equipment” series and makes appropriate changes to the standard corresponding to the new references.

Two companion documents exist, IEEE Std 802.3.1 and IEEE Std 802.3.2. IEEE Std 802.3.1 describes Ethernet management information base (MIB) modules for use with the Simple Network Management Protocol (SNMP). IEEE Std 802.3.2 describes YANG data models for Ethernet. IEEE Std 802.3.1 and IEEE Std 802.3.2 are updated to add management capability for enhancements to IEEE Std 802.3 after approval of those enhancements.

IEEE Std 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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IEEE Standard for Ethernet

Amendment 10:
Maintenance #14: Isolation

(This amendment is based on IEEE Std 802.3™-2018 as amended by IEEE Std 802.3cb™-2018, IEEE Std 802.3bt™-2018, IEEE Std 802.3cd™-2018, IEEE Std 802.3cn™-2019, IEEE Std 802.3cg™-2019, IEEE Std 802.3cq™-2020, IEEE Std 802.3cm™-2020, IEEE Std 802.3ch™-2020, and IEEE Std 802.3ca™-2020.)

NOTE—The editing instructions contained in this amendment define how to merge the material contained therein into the existing base standard and its amendments to form the comprehensive standard.

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

Cross references that refer to clauses, tables, equations, or figures not covered by this amendment are highlighted in green.[1]

[1] 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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1. Introduction

1.3 Normative references

Change the reference for IEC 62368-1 (as inserted by IEEE Std 802.3cg-2019) as follows:

IEC 62368-1:2018~~4~~, Audio/video, information and communication technology equipment—Part 1: Safety requirements.[2]

Insert the following new reference in alphanumeric order:

ITU-T Recommendation K.44, 2019—Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents—Basic Recommendation.[3]

[2]IEC publications are available from the International Electrotechnical Commission (https://www.iec.ch/) and the American National Standards Institute (https://www.ansi.org).

[3]ITU-T publications are available from the International Telecommunications Union (https://www.itu.int/).

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

8.3 MAU–medium electrical characteristics

8.3.2 MAU electrical characteristics

8.3.2.1 Electrical isolation

Change 8.3.2.1 as follows:

The MAU provides isolation between the AUI cable and the coaxial trunk cable. This isolation shall meet the isolation requirements as specified in J.1.

~~The MAU must provide isolation between the AUI cable and the coaxial trunk cable. This isolation shall withstand at least one of the following electrical strength tests:~~

~~a) 1500 V rms at 50 Hz to 60 Hz for 60 s, applied as specified in 5.3.2 of IEC 60950: 1991.~~
~~b) 2250 Vdc for 60 s, applied as specified in 5.3.2 of IEC 60950: 1991.~~
~~c) A sequence of ten 2400 V impulses of alternating polarity, applied at intervals of not less than 1 s. The shape of the impulses shall be 1.2/50 μs (1.2 μs virtual front time, 50 μs virtual time of half value), as defined in IEC 60060.~~

~~There shall be no isolation breakdown, as defined in 5.3.2 of IEC 60950: 1991, during the test. The resistance after the test shall be at least 2 MΩ, measured at 500 Vdc. In addition, the isolation impedance between the DTE and the coaxial cable shield shall be less than 15 Ω between 3 MHz and 30 MHz.~~

CAUTION

The current electrical isolation requirement is a change that was incorporated into IEEE Std 802.3-1996. Older editions of IEEE Std 802.3 had a significantly lower isolation requirement.

8.7 Environmental specifications

8.7.1 General safety requirements

Change 8.7.1 as follows:

~~All stations~~All Physical Layer MDIs meeting this standard shall conform to ~~IEC 60950: 1991~~the general safety requirements as specified in J.2.

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8.8 Protocol implementation conformance statement (PICS) proforma for Clause 8, Medium Attachment Unit and baseband medium specifications, type 10BASE5[4]

8.8.6 PICS proforma tables for MAU

8.8.6.8 MAU electrical characteristics

Change the table in 8.8.6.8 as follows:

Item	Parameter	Reference	Status	Support	Value/Comment
1	Isolation ~~impedance~~ between MDI and AUI cable (each conductor, including shields)	8.3.2.1	M	Yes [ ] No [ ]	~~> 250 kΩ at 60 Hz, < 15 Ω for 3 MHz to 30 MHz~~ Conforms to J.1
~~2~~	~~Breakdown voltage~~	~~8.3.2.1~~	~~M~~	~~Yes [ ] No [ ]~~	~~≥ 1.5 kV ac, rms~~
~~3~~ 2	Current drawn from AUI sources	8.3.2.2	M	Yes [ ] No [ ]	≤ 0.5 A
~~4~~ 3	Operation over VP voltage range	8.3.2.2	M	Yes [ ] No [ ]	11.28–15.75 V, any permissible AUI cable
~~5~~ 4	Low VP circuit behavior	8.3.2.2	M	Yes [ ] No [ ]	No disruption of media
~~6~~ 5	MAU current labeling	8.3.2.2	M	Yes [ ] No [ ]	Current consumption shall be labeled externally
~~7~~ 6	Reliability	8.3.2.3	M	Yes [ ] No [ ]	MTBF ≥ 1 million hours of continuous operation

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8.8.6.11 Safety requirements

Change the row for item 2 in the table in 8.8.6.11 as follows (unchanged rows not shown):

Item	Parameter	Reference	Status	Support	Value/Comment
…					
2	General safety	8.7.1	M	Yes [ ] No [ ]	~~Conforms to IEC 60950: 1991~~ Conforms to J.2
…					

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9. Repeater unit for 10 Mb/s baseband networks

9.9 Medium attachment unit and baseband medium specification for a vendor-independent FOIRL

9.9.3 FOMAU electrical characteristics

9.9.3.1 Electrical isolation

Insert a new note at the beginning of 9.9.3.1 as follows:

NOTE—Since February 2021, electrical isolation requirements are in J.1.

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

10.8 Environmental specifications

10.8.3 Regulatory requirements

Change 10.8.3 as follows:

NOTE—Since September 2011, maintenance changes are no longer being considered for this clause. Since February 2021, electrical isolation requirements are in J.1.

The MAU and medium should consider IEC 60950 in addition to local and national regulations. See IEC 60950 and MIL-C-17F-1983 [B51].

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

12.10 Safety

12.10.1 Isolation

Insert a new note at the beginning of 12.10.1 as follows:

NOTE—Since September 2003, maintenance changes are no longer being considered for this clause. Since February 2021, electrical isolation requirements are in J.1.

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14. Twisted-pair medium attachment unit (MAU) and baseband medium, type 10BASE-T including type 10BASE-Te

14.3 MAU electrical specifications

14.3.1 MAU-to-MDI interface characteristics

Change the title and text of 14.3.1.1 (as modified by IEEE Std 802.3bt-2018) as follows:

14.3.1.1 ~~Isolation requirement~~Electrical isolation

A MAU with a MDI that is a PI (see 33.1.3) shall meet the isolation requirements defined in 33.4.1 or 145.4.1.

A MAU with a MDI that is not a PI shall provide isolation between the DTE Physical Layer circuits including frame ground and all MDI leads including those not used by 10BASE-T.

This electrical isolation shall meet the isolation requirements as specified in J.1.~~withstand at least one of the following electrical strength tests.~~

~~a) 1500 V rms at 50 Hz to 60 Hz for 60 s, applied as specified in subclause 5.2.2 of IEC 60950-1:2001.~~
~~b) 2250 V dc for 60 s, applied as specified in subclause 5.2.2 of IEC 60950-1:2001.~~
~~c) A sequence of ten 2400 V impulses of alternating polarity, applied at intervals of not less than 1 s. The shape of the impulses shall be 1.2/50 µs (1.2 µs virtual front time, 50 µs virtual time of half value), as defined in IEC 60950-1:2001 Annex N.~~

~~There shall be no insulation breakdown, as defined in subclause 5.2.2 of IEC 60950-1:2001, during the test. The resistance after the test shall be at least 2 MΩ, measured at 500 V dc.~~

14.7 Environmental specifications

14.7.1 General safety

Change 14.7.1 as follows:

An MAU meeting this standard shall conform to the general safety requirements as specified in J.2.~~All equipment meeting this standard shall conform to IEC 60950-1.~~

14.10 Protocol implementation conformance statement (PICS) proforma for Clause 14, Twisted-pair medium attachment unit (MAU) and baseband medium, type 10BASE-T and type 10BASE-Te[5]

14.10.4 PICS proforma for 10BASE-T

14.10.4.5 PICS proforma tables for MAU

Change the title of 14.10.4.5.11 as follows:

14.10.4.5.11 ~~Isolation requirements~~Electrical isolation

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Change the table in 14.10.4.5.11 as follows:

	Parameter	Subclause	Req	Imp	Value/Comment
IR1 ~~IR1a~~	~~Isolation, MDI leads to DTE Physical Layer circuits~~ Electrical isolation	14.3.1.1	C		~~Any one of three tests listed in 14.3.1.1 Function provided by MAUs that do not encompass the PI of a PD within their MDI.~~ Conforms to J.1
~~IR1b~~	~~Isolation, MDI leads to all external conductors~~	~~14.3.1.1~~	~~C~~		~~Any of the three tests listed in 14.3.1.1. Function provided by MAUs that encompass the PI of a PD within their MDI.~~
~~IR2~~	~~Resistance after breakdown test~~	~~14.3.1.1~~	~~M~~		~~≥ 2 MΩ at 500 Vdc~~

14.10.4.5.15 Safety requirements

Change item SR3 in the table in 14.10.4.5.15 as follows (unchanged rows not shown):

	Parameter	Subclause	Req	Imp	Value/Comment
…					
SR3	General safety	14.7.1	M		~~Conforms to IEC 60950:1991~~ Conforms to J.2
…					

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15. Fiber optic medium and common elements of medium attachment units and star, type 10BASE-F

15.3 Characteristics of the fiber optic medium

15.3.4 Electrical isolation

Change 15.3.4 as follows:

Electrical isolation shall be provided between MDIs attached to the fiber optic cable. There shall be no conducting path between the optical medium connector plug and any conducting element within the fiber optic cable. This isolation shall meet the isolation requirements as specified in J.1.~~withstand at least one of the following electrical strength tests:~~

~~a) 1500 V rms at 50 Hz to 60 Hz for 60 s, applied as specified in 5.3.2 of IEC 60950:1991.~~
~~b) 2250 Vdc for 60 s, applied as specified in 5.3.2 of IEC 60950:1991.~~
~~c) A sequence of ten 2400 V impulses of alternating polarity, applied at intervals of not less than 1 s. The shape of the impulses shall be 1.2/50 µs (1.2 µs virtual front time, 50 µs virtual time of half value) as defined in IEC 60060.~~

~~There shall be no isolation breakdown, as defined in 5.3.2 of IEC 60950:1991, during the test. The resistance after the test shall be at least 2 MΩ measured at 500 Vdc.~~

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15.8 Protocol implementation conformance statement (PICS) proforma for Clause 15, Fiber optic medium and common elements of medium attachment units and star, type 10BASE-F[6]

15.8.6 PICS Proforma for the fiber optic medium

15.8.6.4 Electrical isolation requirements

Change the table in 15.8.6.4 as follows:

Item	Feature	Subclause	Value/Comment	Status	Support
IR1	Electrical isolation, optical connector plug to any electrically conducting element in cable	15.3.4	~~Any one of three tests listed in 15.3.4~~ Conforms to J.1	M	Yes [ ]
~~IR2~~	~~Resistance after breakdown test~~	~~15.3.4~~	~~> 2 MΩ measured at 500 Vdc~~	~~M~~	~~Yes [ ]~~

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23. Physical Coding Sublayer (PCS), Physical Medium Attachment (PMA) sublayer and baseband medium, type 100BASE-T4

23.5 PMA electrical specifications

23.5.1 PMA-to-MDI interface characteristics

23.5.1.1 Isolation requirement

Insert a new note at the beginning of 23.5.1.1 as follows:

NOTE—Since September 2003, maintenance changes are no longer being considered for this clause. Since February 2021, electrical isolation requirements are in J.1.

23.9 Environmental specifications

23.9.1 General safety

Change 23.9.1 as follows:

NOTE—Since September 2003, maintenance changes are no longer being considered for this clause. Since February 2021, safety information is in J.2.

All equipment meeting this standard shall conform to IEC 60950: 1991.

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25. Physical Medium Dependent (PMD) sublayer and baseband medium, type 100BASE-TX

25.4 Specific requirements and exceptions

25.4.6 Replacement of 8.4.1, “UTP isolation requirements”

Change 25.4.6 (as modified by IEEE Std 802.3bt-2018) as follows:

A PMD with a MDI that is a PI (see 33.1.3 and 145.1.3) shall meet the isolation requirements defined in 33.4.1 and 145.4.1.

A PMD with a MDI that is not a PI shall provide isolation between frame ground and all MDI leads including those not used by the 100BASE-TX PMD.

This electrical isolation shall meet the isolation requirements as specified in J.1.~~withstand at least one of the following electrical strength tests.~~

~~a) 1500 V rms at 50 Hz to 60 Hz for 60 s, applied as specified in subclause 5.2.2 of IEC 60950-1:2001.~~
~~b) 2250 V dc for 60 s, applied as specified in subclause 5.2.2 of IEC 60950-1:2001.~~
~~c) A sequence of ten 2400 V impulses of alternating polarity, applied at intervals of not less than 1 s. The shape of the impulses shall be 1.2/50 µs (1.2 µs virtual front time, 50 µs virtual time of half value), as defined in IEC 60950-1:2001 Annex N.~~

~~There shall be no insulation breakdown, as defined in subclause 5.2.2 of IEC 60950-1:2001, during the test. The resistance after the test shall be at least 2 MΩ, measured at 500 V dc.~~

NOTE—In the case of a PMD with a MDI that is not a PI, these requirements are equivalent to those found in TP-PMD.

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25.6 Protocol implementation conformance statement (PICS) proforma for Clause 25, Physical Medium Dependent (PMD) sublayer and baseband medium, type 100BASE-TX[7]

25.6.4 PICS proforma tables for the Physical Medium Dependent (PMD) sublayer and baseband medium, type 100BASE-TX

25.6.4.2 PMD compliance

Change item PD7 in the table in 25.6.4.2 as follows (unchanged rows not shown):

Item	Feature	Subclause	Status	Support	Value/Comment
…					
PD7	Isolation requirements	25.4.6	M		Conforms to J.1

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27. Repeater for 100 Mb/s baseband networks

27.5 Environmental specifications

27.5.1 General safety

Insert a new note at the beginning of 27.5.1 as follows:

NOTE—Since September 2011, maintenance changes are no longer being considered for this clause. Since February 2021, safety information is in J.2.

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