802.3 Isolation Ad Hoc: Moving Forward

22 May 2018

Pittsburgh, PA USA

Jon Lewis – Dell EMC

Ad Hoc Chair

Moving Forward

- In an effort to progress this ad-hoc I have prepared the following information on the known changes as proposed during the Isolation ad-hoc meetings.

Remove Clause 8 & 10

Remove Clause 8 (10BASE5) and Clause 10 (10BASE2)

1. Leave the entries in the TOC and add a note that the clauses are deprecated and have been removed

2. Examine all links to and from Clauses 8 and 10 in IEEE 802.3cj and make a recommendation for each as to how the missing reference is to be handled. (NOTE: This cross-reference issue is of concern to the IEEE 802.3 Vice Chair/Maintenance Chair and may be a significant effort)

From: 1117_carlson%20_1_iso_ad_hoc.pdf

Clause 8 references

- 1.4.43 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 Std 802.3-2018, Clause 8.)

- 13.1: Table 13–1 summarizes the delays for the various network media segments. In addition, Clause 14 summarizes the delays for the 10BASE-T MAU (Table 14–2); IEEE Std 802.3-2018, Clause 8, the delays for the 10BASE5 MAU; IEEE Std 802.3-2018, Clause 10, the delays for the 10BASE2 MAU;

Clause 8, Page 2

- 30.5.1.1.2:

- 10BASE5 Thick coax MAU as specified in IEEE Std 802.3-2018, Clause 8

Clause 10 references

- **1.4.42 10BASE2:** IEEE 802.3 Physical Layer specification for a 10 Mb/s CSMA/CD local area network over RG 58 coaxial cable. (See IEEE Std 802.3-2018, Clause 10.)

- 9.4.1:

10BASE5 and 10BASE2 MAUs associated with the repeater unit shall be as specified in IEEE Std 802.3-2018, Clause 8 for type 10BASE5 and IEEE Std 802.3-2018, Clause 10 for type 10BASE2 with the following restrictions:

a) The MAU shall implement receive mode collision detect as defined in IEEE Std 802.3-2018, 8.3.1.5 or IEEE Std 802.3-2018, 10.4.1.5.

b) The MAU shall not implement the *signal_quality_error* Message Test function as defined in 8.2.1.1

and IEEE Std 802.3-2018, 10.3.1.1. The MAU shall not activate its Jabber function when operated under the worst-case Jabber Lockup Protection condition as specified in 9.6.5.

c) The MAU shall operate only in the normal mode as defined in IEEE Std 802.3-2018, 8.1.3.4, not in the monitor mode.

Clause 10, Page 2

- 13.1: Table 13–1 summarizes the delays for the various network media segments. In addition, Clause 14 summarizes the delays for the 10BASE-T MAU (Table 14–2); IEEE Std 802.3-2018, Clause 8, the delays for the 10BASE5 MAU; IEEE Std 802.3-2018, Clause 10, the delays for the 10BASE2 MAU;

- D.3: Clause 7 and IEEE Std 802.3-2018, Clause 10 of the standard provide detailed specifications…

Clause 10, Page 3

- 30.5.1.1.2:

- 10BASE2 Thin coax MAU as specified in IEEE Std 802.3-2018, Clause 10

Recommendations to Maintenance TF

1. Identify by clause number all instances in IEEE 802.3cj that refer to "isolation" and "safety"
2. Identify by clause number all instances in IEEE 802.3cj that refer to "IEC 60950" and IEC 60950-1"
3. Move all references to IEEE Std 802.3 isolation requirements to a single place in the document
   1. This might be the introduction or an annex
4. Create language for isolation requirements and testing that reference the appropriate clause(s) in IEC 62368-1
5. Insure that all language that references "safety" is a pointer to an external safety standard, not a requirement mandated by IEEE 802.3cj.
6. Locate and remove all language that directly mandates compliance with IEC 60950-1 as this is frequently misconstrued

From: 1117_carlson%20_1_iso_ad_hoc.pdf

60950, 60950-1 Where Used

Normative References: 2 references (60950:1991, 60950-1)

Isolation Requirements - 14 references (Each references the spec more than 1x)

- **8.3.2, 9.9.3.1, 12.10.1**, 14.3.1.1, 15.3.4, **23.5.1.1, 23.12.4.12 (PICS**), 25.4.6, **32.6.1.1, 32.13.5.8 (PICS), 33.4.1**, 40.6.1.1, 40.12.7 (PICS), 55.5.1, 113.5.1, 126.5.1

General Safety - 63 references

- **8.7.1, 8.8.6.11 (PICS**), 14.7.123.12.4.16, 14.10.4.5.15 (PICS), **23.9.1, 23.12.4.12 (PICS), 23.12.4.16 (PICS), 27.5.1, 27.7.4.11 (PICS), 32.10.1, 32.13.5.11 (PICS), 33.4.1, 33.7.1, 33.8.3.9 (PICS)**, 38.7.1, 38.12.4.5 (PICS), 40.9.1, 40.12.10 (PICS), 41.4.1, 41.6.4.11 (PICS), 52.10.1, 52.15.3.11 (PICS), 53.10.1, 53.15.4.5 (PICS), 55.9.1, 55.12.9 (PICS), 58.8.1, 58.10.3.6 (PICS), 59.8.1, 59.10.3.6 (PICS), 60.10.1, 60.12.4.12 (PICS), 68.10.3.5 (PICS), 70.9.1, 70.10.4.5 (PICS), 71.9.1, 71.10.4.6 (PICS), 72.9.1, 72.10.4.7 (PICS), 75.8.1, 75.10.4.19 (PICS), 84.10.1, 84.11.4.5 (PICS), 86.9.1, 86.11.4.5 (PICS), 87.9.1, 87.13.4.6 (PICS), 88.9.1, 88.12.4.6 (PICS), 89.8.1, 89.11.4.5 (PICS), 93.10.1, 93.11.4.5 (PICS), 94.5.1, 94.6.4.6 (PICS), 95.9.1, 95.12.4.5 (PICS), 96.9.1, 96.11.4.9 (PICS), 97.9.1, 97.11.13 (PICS), 100.5.1, 100.7.3.3 (PICS), 112.8.1, 112.11.4.5 (PICS), 113.9.1, 113.12.10 (PICS), 126.9.1, 126.12.9 (PICS), 83A.6.1, 83A.7.7 (PICS), 83B.3.1, 83B.4.6 (PICS), 86A.7.1, 86A.8.4.4 (PICS)

Regulatory requirements

- 10.8.3

Red Text indicates clauses that are to be removed in this proposal

Example of change: Isolation

40.6.1.1 Isolation requirement

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

A PHY with a MDI that is not a PI shall provide electrical isolation between the port device circuits,

including frame ground (if any) and all MDI leads. This electrical 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 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 M☐, measured at 500 V dc.

TO:

40.6.1.1 Isolation requirement

Refer to [Section/Location TBD] for Isolation requirements.

New Isolation Text

- Section/Location TBD

This electrical 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 following the test procedure in IEC 60950-1:2001, subclause 5.2.2.

   b) 2250 V dc for 60 s following the test procedure in IEC 60950-1:2001, subclause 5.2.2.

   c) A sequence of ten 2400 V, 1.2/50 impulses of alternating polarity, applied at intervals of not less than 1 s following the test procedures from IEC 61180:2016, subclause 6.3.

   > NOTE: IEC defines the 1.2/50 impulses in IEC 60060-1 and defines the waveform in TC 42 IEC 61180:2016, clause 6.2.

- The requirements of the test are satisfied if no disruptive discharge (sparkover, flashover or puncture) occurs during the test.

   - Include references to sparkover, flashover or puncture from Mick's presentation

      sparkover: electrical breakdown in a gaseous or liquid medium
      IEC 60664-1, ed. 2.0 (2007-04)
      (clearance breakdown)

      flashover: electrical breakdown along a surface of solid insulation located in a gaseous or liquid medium
      IEC 60664-2-1, ed. 2.0 (2011-01)
      (creepage breakdown)

      puncture: electrical breakdown through solid insulation
      IEC 60664-1, ed. 2.0 (2007-04)
      (solid insulation breakdown)

      partial discharge: discharge that does not completely bridge the insulation between electrodes
      Note 1 to entry: The term corona is preferably reserved for partial discharge in air around a conductor, but not within the bushing assembly.
      IEC/IEEE 65700-19-03, ed. 1.0 (2014-07)

Example of change: General Safety

40.9.1 General safety

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

TO:

40.9.1 General safety

Refer to [Section/Location TBD] for Isolation requirements.

New General Safety Text

- ## General Safety
  - All equipment meeting this standard shall conform to with applicable local and national codes.

Example of change: Regulatory

N/A since Clause 10 will be removed.

How to Change the PICS

- Remove the existing PICs that apply to safety and write a generic PICs section in the new section/clause (TBD).
  – In each section we would remove the existing PICs calling out each specific test and instead add a PICS that points to the new section

Item	Feature	Subclause	Value/Comment	Status	Support
ES1	General safety	84.10.1	Complies with applicable section of IEC 60950-1	M	Yes [ ]

  – Change Value/Comment to "Complies with [section TBD].

Network Safety – in Scope?

- 8.7.2, 14.7.2, 23.9.2, 27.5.2, 32.10.2, 33.7.2, 40.9.2, 41.4.2, 55.9.2, 70.9.2, 71.9.2, 72.9.2, 84.10.2, 93.10.2, 94.5.2, 83A.6.2, 83B.3.2, 96.9.2, 97.9.2, 104.8.2, 113.9.2, 126.9.2 (22 Instances)

40.9.2 Network safety

This subclause sets forth a number of recommendations and guidelines related to safety concerns; the list is neither complete nor does it address all possible safety issues. The designer is urged to consult the relevant local, national, and international safety regulations to ensure compliance with the appropriate requirements.

LAN cabling systems described in this subclause are subject to at least four direct electrical safety hazards during their installation and use. These hazards are as follows:

a) Direct contact between LAN components and power, lighting, or communications circuits.
b) Static charge buildup on LAN cabling and components.
c) High-energy transients coupled onto the LAN cabling system.
d) Voltage potential differences between safety grounds to which various LAN components are connected.

Such electrical safety hazards must be avoided or appropriately protected against for proper network installation and performance. In addition to provisions for proper handling of these conditions in an operational system, special measures must be taken to ensure that the intended safety features are not negated during installation of a new network or during modification or maintenance of an existing network.

Laser Safety

- 38.7.2 (and footnote), 38.9, 52.10.2, 53.10.2, 58.8.2, 59.8.2, 60.10.2, 75.8.2, 86.9.2, 87.9.2, 88.9.2, 89.8.2, 95.9.2, 112.8.2, 112.12.5 (optical safety), 115.12.5, 121.9.2, 122.9.2, 123.9.2, 124.9.2

122.9.2 Laser safety

200GBASE-FR4, 200GBASE-LR4, 400GBASE-FR8, and 400GBASE-LR8 optical transceivers shall conform to Hazard Level 1 laser requirements as defined in IEC 60825-1 and IEC 60825-2, under any condition of operation. This includes single fault conditions whether coupled into a fiber or out of an open bore.

Conformance to additional laser safety standards may be required for operation within specific geographic regions.

Laser safety standards and regulations require that the manufacturer of a laser product provide information about the product's laser, safety features, labeling, use, maintenance, and service. This documentation explicitly defines requirements and usage restrictions on the host system necessary to meet these safety certifications.[7]

Environmental Safety

- 96.9.2.1, 97.9.2.1, 115.12.3,

115.12.3 Environmental safety

All equipment in automotive applications integrating a PHY subject to this clause shall conform to the potential environmental stresses with respect to their mounting location, as defined in the following specifications:

a) General loads: ISO 16750-1

b) Electrical loads: ISO 16750-2, ISO 7637-2:2008, and ISO 8820-1

c) Mechanical loads: ISO 16750-3, ASTM D4728, and ISO 12103-1

d) Climatic loads: ISO 16750-4 and IEC 60068-2-1/27/30/38/52/64/78

e) Chemical loads: ISO 16750-5 and ISO 20653