CME Consulting
Experts in Advanced PHYsical Communications Technology

Clarifying use of 100m in 802.3 BASE-T and PoE clauses & Possible Liaison/comment text

G. ZIMMERMAN, CME CONSULTING

23 OCTOBER 2026

Supporters

Brett McClellan, Marvell

Use of 100m in 802.3 PoE clauses

A search of Clause 33 and Clause 145, the PoE clauses in 802.3 showed 100m at ONLY the following locations:

- 33.4.9 & 145.4.9 Midspan PSE device additional requirements
  - Refers to “the insertion loss of the resulting channel … for the same Class or category 100 m channel defined in ISO/IEC 11801 or ANSI/TIA-568-C.0”
  - Here the 100m is being used to identify the ISO/IEC or TIA spec. The specification in 802.3 is the insertion loss. HOWEVER, PICS PSEEL6 (in Cl 33, it is PSEEL7 in 145) on this states ‘does not increase the length to more than 100m as defined in ISO/IEC 11801.” This appears to be in error in the PICs as ISO/IEC do not define “length”.

Other than that, length of a PoE channel is only constrained by electrical specifications, mainly resistance and the resistance unbalance specifications

Use of 100m in 802.3 BASE-T PHY clauses. 10BASE-T/100BASE-TX

Clauses 14 (10BASE-T), 25 (100BASE-TX) are of interest. Other variants of 100BASE-T were ignored as 100BASE-TX is by far the most prevalent

- Both technologies use a signal wire pair for transmission and another for reception, so delay and delay-skew between pairs, which can be closely related to length, largely independent of gauge is not a concern for distance. Insertion loss is the dominant reach-dependent parameter.

Use of 100m in the text of both clauses appears only in descriptive text:

- Clause 14: 10BASE-T
  - 14.1.1.1: Provides for operating over 0 m to at least 100 m of twisted pair without the use of a repeater.
  - 14.1.1.3: The performance specifications are generally met by 100 m … A length of 100 m, the design objective, will be used when referring to the length of a twisted-pair link segment.
  - 14.4.2: These characteristics are generally met by 100 m of twisted-pair cable composed of 0.5 mm [24 AWG] twisted pairs.
- Clause 78: 10BASE-Te:
  - 78.1: The 10BASE-Te MAU is fully interoperable with 10BASE-T MAUs over 100 m of class D (Category 5) or better cabling as specified in ISO/IEC 11801:1995.
- Clause 25: 100BASE-TX
  - 25.4.9.2: The transmission parameters contained in this subclause are specified to ensure that a Category 5 link segment of up to 100 m, will provide a reliable medium.

Use of 100m in 802.3 BASE-T PHY clauses. 1000BASE-T

Clause 40: 1000BASE-T

- Using all 4 pairs with echo cancellation for simultaneous transmission, and reception makes delay and delay-skew between pairs, which can be closely related to length, largely independent of gauge is a concern for distance. Cancellation of NEXT involves an understanding of how loss varies with transmission delay. Insertion loss remains a significant reach-dependent parameter, but not the only one.

Use of 100m in the text of clause 40 appears only in descriptive text:

- 40.1.1: Support operation over 100 meters of copper balanced cabling as defined in 40.7
- 40.1.3.2: The PMA provides full duplex communications at 125 MBd over four pairs of balanced cabling up to 100 m in length
- 40.7.2: The transmission parameters contained in this subclause are specified to ensure that a Class D link segment of up to at least 100 m will provide a reliable medium
- 40.7.2: NOTE—The above equation approximates the insertion loss specification at discrete frequencies for Class D 100 m channels specified by ISO/IEC 11801:1995.
- 40.7.3: NOTE—The previous equation approximates the NEXT loss specification at discrete frequencies for Class D 100 m channels specified by ISO/IEC 11801:1995

Use of 100m in 802.3 BASE-T PHY clauses: 10GBASE-T

Clause 55: 10GBASE-T: Use of 100m appears only in descriptive text:

- 55.1.1: Define a single 10 Gb/s PHY that would support links of up to 100 m on 4-pair balanced copper cabling as specified in 55.7
- 55.1.3.2: The PMA provides full duplex communications at 800 MBd over four pairs of balanced cabling up to 100 m in length
- 55.5.4.4: (Alien crosstalk noise rejection test condition) through a 100 m link segment compliant with the specifications of 55.7
- 55.7.1: A link segment consisting of up to 100 m of Class E or up to 100 m of Class F that meets the transmission parameters of this subclause provides a reliable medium.
  - Table 55-17 lists supported cabling types and distances (and the table shows 100m in the supported distance for Class E / Category 5 screened, Class F, and Class F_A)
- 55.7.2.4.4 & 55.7.3.2: ELFEXT and PSAELFEXT specifications reference 100 m of coupling, but show scaling for coupling length
- 55.7.3.1.2: PSANEXT specifications reference links less than 100 m and a scaling based on IL(250 MHz)

Use of 100m in 802.3 BASE-T PHY clauses: 2.5G/5GBASE-T

Clause 126: 2.5G/5GBASE-T: Use of 100m appears only in descriptive text:

- 126.1.3.2: The PMA provides full duplex communications at 400 × S MBd over four pairs of balanced cabling up to 100 m in length.
- 126.5.4.4: (Alien crosstalk noise rejection test condition) through a 100 m link segment compliant with the specifications of 126.5.3
- 126.7.2: A link segment consisting of up to 100 m of Category 5e/Class D… that meets the transmission parameters of this subclause … provides a reliable medium.
  - Table 126-18 & 126-19 list supported cabling types and distances (and the table shows 100m in the supported distance for Class D / Category 5e and Class E / Category 6), with an additional requirement for alien crosstalk

Summary – possible liaison/comment text (pre meeting)

While it is commonly thought that 802.3 specifies only support to 100m, this is a misreading of the text.

The text of 802.3 clauses specifying 10BASE-T (and Te), 100BASE-TX, 1000BASE-T, and 2.5G, 5G, and 10GBASE-T PHYs specifies link segment electrical parameters and indicates that when 100 m of cabling according to specifications of TIA 568.2 and ISO/IEC 11801-1 will meet those specifications.

It would seem appropriate for a TIA TSB (or similar ISO TR) to advise reaches and guidelines for how length may relate to meeting 802.3 link segment parameters, and how cabling channels might be constructed to meet the IEEE 802.3 link segment requirements at other than 100 m of length.

Liaison letter body text (output of discussion)

CME Consulting
Experts in Advanced PHYsical Communications Technology

While it is commonly thought that IEEE Std 802.3 specifies only support to 100m, there is no normative requirement in IEEE Std 802.3 specifically limiting the length of the link segment to 100 meters. IEEE Std 802.3 has never precluded the specific engineering of link segments to achieve greater than 100 meters of length.

At this time there is no IEEE 802.3 project for extended reach BASE-T PHYs, nor is there any activity initiating such a project. The association of a simple 100 meter length with Ethernet performance has been a success factor for Ethernet adoption, and the IEEE 802.3 Working Group is concerned with weakening that association, whether or not it is normative in the IEEE Std 802.3 text.

The text of 802.3 clauses specifying 10BASE-T (and 10BASE-Te), 100BASE-TX, 1000BASE-T, and 2.5G, 5G, and 10GBASE-T PHYs specifies link segment electrical parameters and indicates that 100 m of cabling according to specifications of TIA 568.2 and ISO/IEC 11801-1 will meet those specifications.

It would seem appropriate for a TIA TSB (or similar ISO TR) to advise reaches and guidelines for how length may relate to meeting IEEE 802.3 link segment parameters, and how cabling channels might be constructed to meet the IEEE 802.3 link segment requirements at other than 100 m of length.

While devices built to IEEE Std 802.3 generally perform beyond these link segment parameters, this extra margin in the devices has been a major aspect of the success of Ethernet as a plug-and-play network. We are concerned if this margin is eroded in cabling standards or TSBs.

Straw Poll

I support the liaison body text on slide 9 of the (updated) deck, and the submission of the comments in Draft_comments_802d3_TSB5073.doc by the IEEE 802.3 Working Group.

Y: 14

N: 0

A: 0

(total on call: 16 (1 DNV is chair, the other, no response))