



Liaison Communication

March 15, 2007

From: IEEE 802.3 Ethernet Working Group

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Subject: Trade-off between channel length and connection insertion loss in response to
ISO/IEC JTC1/SC 25/WG 3 N 822

Action: Information/Advice

Dear Colleagues:

Thank you for your letter of March 6, 2007.

Firstly, we should explain what powers we have to address your request within our rules. Without a letter ballot or other formal procedure, which is slow, it is difficult to do more than re-state what IEEE Std 802.3 [2] says. However, we have tried to give pointers to further information below.

An ad hoc committee has reviewed your document [1], in particular Table C.1 showing a trade-off between channel length and connection insertion loss. IEEE Std 802.3 [2] does not support such a trade-off beyond what is allowed by text such as this quoted from IEEE Std 802.3, 52.14.2.1: "Connections with different loss characteristics may be used provided the requirements of Table 52-24 are met". In our brief review we found technical problems with Table C.1.

It should be noted that optical loss at connections in multimode fiber must be contained to avoid modal noise for laser based fiber optic transmission [4,5].

- To limit modal noise the Gigabit Ethernet standard was based on a maximum loss due to connectors of 1.5 dB.
- The practice of exchanging "margin" for additional connector loss is not supported for the laser based PMDs in the 802.3 Ethernet standard.
- Such tradeoffs are therefore made at the risk of the user.
- Unallocated margin is not available for any purpose other than what is stated within the standard.
- Table 52-10 allows up to 1 dB of additional insertion loss, depending on PMD and fiber type.

For completeness, a table such as Table C.1 should include 10GBASE-LRM, which has been an approved standard since September 2006.

We also note that some entries in the table are beyond the supported operating range.

In case this information is helpful to you, note that:

The parameter values in the spreadsheet used for development of 802.3ae [6] do not always coincide with the final published limits. Also, note the trade-off limits in Table 52–8.

References 4 and 5 estimate that 3 dB loss due to connections is capable of contributing approximately 1 dB of modal noise penalty. Some consider 1 dB of modal noise to be large, as it can contribute to an error floor, in conjunction with other noise sources. Some consider that a large loss from a single connection is particularly of concern, and that a large allowance for total loss of connections can let several good connections mask a bad one.

References 3, 6 and 7 may provide useful background information.

We remind you that the 802.3 standard is revised every few years, and changes may be requested via our maintenance process (see, <http://www.ieee802.org/3/maint>).

We are advised that there is similar material, which raises the same issues, in reference 8.

We appreciate your communication and look forward to receiving news of your next steps.

Regards,

Robert M. Grow
Chair, IEEE 802.3 Ethernet Working Group

References

- 1 ISO/IEC JTC1/SC 25/WG 3 N 822
- 2 IEEE Std 802.3 - 2005 (see <http://standards.ieee.org/getieee802/>)
- 3 Cunningham and Lane, "Gigabit Ethernet Networking", Macmillan Technical Publishing, ISBN 1-57870-062-0
- 4 P Pepeljugoski, D Kuchta and A Risteski, "Modal Noise BER Calculations in 10-Gb/s Multimode Fiber LAN Links", IEEE Photonics Technology Letters, 17, NO. 12, pp 2586-8, Dec. 2005
- 5 P Pepeljugoski, D Kuchta and A Risteski, "Improvements to Modal Noise Penalty Calculations", http://ieee802.org/3/aq/public/nov04/pepeljugoski_1_1104.pdf
- 6 http://ieee802.org/3/ae/public/adhoc/serial_pmd/documents/10GEPBud3_1_16a.xls
- 7 MC Nowell, DG Cunningham, DC Hanson and LG Kazovsky, "Evaluation of Gb/s laser based fibre LAN links: Review of the Gigabit Ethernet model", Optical and Quantum Electronics, 32, pp 169-192, 2000
- 8 CENELEC TC215 EN 50173-5 data center standard, in draft