Contribution to IEEE 802.3ae Clause 52

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November, 2000

Replace the existing Clause 52.12.1 with the following material.

52.12.1 Optical fiber and cable

The fiber optic cable requirements are satisfied by the fibers specified in IEC 60793-2:1992 for fiber types A1a (50/125 µm multimode), A1b (62.5/125 µm multimode) and B1 (dispersion un-shifted singlemode) with the exceptions given in Table 52-17.

Table 52-17 – Optical fiber and cable characteristics

Description	62.5 µm MMF	50 µm MMF	Type B1 SMF		Unit
Nominal fiber specification wavelength	**850**	**850**	**1310**	**1550**	**nm**
Fiber cable attenuation (max)	3.5	3.5	0.4 or 0.5	N/A[b]	dB/km
Modal bandwidth (min; overfilled launch unless otherwise noted)	160 or 200	400 or 500 or 2000[a]	N/A		MHz·km
Zero dispersion wavelength (λ_0)	$1320 \le \lambda_0 \le 1365$	$1295 \le \lambda_0 \le 1320$	$1300 \le \lambda_0 \le 1324$		nm
Dispersion slope (max)	0.11 for $1320 \le \lambda_0 \le 1348$ and $0.001(1458 - \lambda_0)$ for $1348 \le \lambda_0 \le 1365$	0.11 for $1300 \le \lambda_0 \le 1320$ and $0.001(\lambda_0 - 1190)$ for $1295 \le \lambda_0 \le 1300$	0.093		$ps/nm^2 \cdot km$

a. Bandwidth measurement details being defined in TIA FO2.2 and IEC 86A.
b. See Table 52-14 for end-to-end link loss.

Summary of changes and rationale

New 50 um specs:
Presently there are blanks for all properties of the new 50 um fiber and a blank on the loss of SMF at 1550 nm. Representatives from Alcatel, Corning, and Plasma all agreed with the **assignment of the same dispersion and loss properties to the new 50 um as already exist for the old 50 um**. We also all agreed on **2000 MHz·km for the bandwidth with a note that says FO2.2 and IEC 86A are defining the test method.**

There are three loss values that need to be addressed. One is the missing value for 1550 nm on SMF. Another is the existing specification for SMF at 1310. The third is the loss of 62.5 cable at 850

62.5 um loss:
Presently the spec calls out 3.75 dB/km. This is a hold-over from the GbE spec (and other previous Ethernet specs). 3.75 was needed to harmonize with the specs of TIA 568A and support the installed base in the US. Since GbE three things have changed.

1. The B revision of the 568 spec now calls out 3.5 dB/km (in harmony with ISO 11801),
2. The distance coverage for 62.5 is in the range of 20 – 30 m, and so is limited to equipment room applications where installed base support is not a requirement (IEEE views that the cables are changed out with the equipment upgrade),
3. The 10GbE unallocated margin for 62.5 is large and the distances so short, even if 3.75 dB/km fiber was reused it would not be an issue.

Change the attenuation to 3.5 dB/km at 850 nm for 62.5 um in order to harmonize with the 568B and 11801 standards. Remove present note on this loss value.

SMF loss:
The loss of SMF is an issue for both 1310 and 1550 serial PMDs. The present value at 1310 is 0.5 dB/km. This comes from GbE and is supported by 568B. 568B calls out 0.5 dB at both wavelengths for SMF outside plant cable. The 0.5 dB value serves campus links well, as they are limited in scope within the cabling standards to 3 km. But the 10GbE objectives are for at least 10 km at 1310, and at least 40 km at 1550. These distances are far beyond campus range and the scope of the cabling standards. IEEE 802.3ae will benefit by specifying lower, more realistic numbers. Indeed lower numbers are the norm for high quality OSP cables. If we look to ITU-T G.652 for guidance, we see the recommended maximum values for fiber to support STM-64 (10G) rates are 0.4 at 1310 and 0.35 at 1550 nm.

Change attenuation to 0.4 dB/km at 1310 and insert 0.35 dB/km at 1550 for SMF.

References:
One more minor issue is the continued use of incorrect (but imbedded) terminology within the IEEE 802.3 for SMF. It is called 10um SMF. Not only is the core diameter incorrect, but it is also not a relevant parameter. Mode field diameter is more appropriate, but still misses the optimal description of the fiber. **Refer to the fiber as type B1 SMF in the table**. In the text, **use the additional descriptor "dispersion unshifted"**. This captures the appropriate and necessary descriptors.

Lastly, **update the reference to the fiber specification to the revised number IEC 60793-2:1992.** This is the same document with a new numbering scheme implemented recently by IEC.