Cl **150** *SC* **150.8.5** *P* **61** *L* **15** # r01-1

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Comment Type **TR** *Comment Status* **D**

SMF TDECQ is defined with minimum and maximum dispersion so that the signal after any allowed dispersion is acceptable. MMF TDECQ is defined with maximum dispersion only. We thought that was the worst case but it isn't always.

As explained in D3.0 comment 30, some unusual signals have a higher penalty with a short fibre than in the low-bandwidth MMF TDECQ test, hence could be effectively weaker than the budget, and could exceed the TDECQ limit.

Possible remedies include:
(a) With the low bandwidth, ensure there is at least one precursor (tap 2 or 3 is the largest), or
(b) With the low bandwidth, add ~0.4 dB to TDECQ if tap 1 is the largest, or
(c) Define MMF TDECQ with higher and lower bandwidths, in the same spirit as SMF with high and low dispersion. A measurement with the higher bandwidth can be processed in software to give TDECQ as in the lower bandwidth, so there is still only one measurement. But now, the scope bandwidth is the standard one for SMF TDECQ, and can be used for Clause 138 by the same software method, reducing test equipment cost. Typically, measurement accuracy will be improved too, because the extra filtering for the lower bandwidth and the equalisation to recover from net each other off, accurately, in software.

No extra cost: an implementer who doesn't like option c, can comply by following a or b, or noting that if tap 2 or 3 is the largest with the low bandwidth, it can be assumed that TDECQ(fast) < TDECQ(slow). In practice, it seems that TDECQ uses at least one precursor at the lower bandwidth for reasonable MMF transmitters, so there is no extra cost to a competent / responsible transmitter implementer, but the receiver needs protection from inferior transmitters that could appear in the future.

SuggestedRemedy

To ensure that the transmitter is good enough for the intended range of channel bandwidths, change the paragraph at line 15 to:
TDECQ is defined for two conditions. In the higher bandwidth case, the combination of the O/E converter and the oscilloscope used to measure the optical waveform is as in 121.8.5.1. In the lower bandwidth case, it has a 3 dB bandwidth of 8.96 GHz with a fourth-order Bessel-Thomson response to at least 1.5 x 17.92 GHz; in this case, at frequencies above 1.5 x 17.92 GHz the response should not exceed -24 dB. Compensation may be made for any deviation from an ideal fourth-order Bessel-Thomson response. The lower bandwidth TDECQ may be obtained by processing the data from the higher bandwidth measurement. TDECQ is the greater of the results from the two bandwidth cases.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment is similar to comments #48 against D1.0, #14 against D1.1, #9 against D1.2, #14 against D2.0, #5 against D2.1 and #i-30 against D3.0, which were rejected.
Insufficient evidence has been provided to justify a change.
Furthermore, it is highly desirable that the TDECQ measurement methodology be common to all Clause 138 and Clause 150 PMDs. The suggested remedy effectively introduces a back-to-back TDECQ test of the transmitter. However, there is no equivalent back-to-back requirement specified by in-force MMF PMD clauses, such as Clause 52 (10GBASE-SR), Clause 95 (100GBASE-SR4), Clause 112 (25GBASE-SR), Clause 123 (400GBASE-SR16) or Clause 138 (50GBASE-SR, 100GBASE-SR2 and 200GBASE-SR4). As for Clause 150, these PMDs are based on VCSEL-based transmitters and in many implementations use pre-emphasis, but a back-to-back test was not found to be necessary.