# 400Gb/s Ethernet Clause 121 review MMF ad hoc

18th December 2015

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# Aim

- Review what further work may be needed to complete Clause 121, especially in light of the differences between 95 and 121

# Recap of differences between Clause 121 and Clause 95

- Stronger FEC, RS(544,514) introduced for 400GBASE-SR16
    - 3% higher bit rate (26.5625 Gb/s per lane)
    - 5× higher target BER ($2.4\times10^{-4}$), than Clause 95.
  - The differences are relevant to TDEC, SEC, and allocations for penalties
- Frame loss ratio (FLR) after FEC correction is $6.2\times10^{-11}$ , including errors from electrical interfaces (a factor of 10 lower than Clause 95)

## Changes made so far to account for the different FEC and bit rate:

- 121.1.1 specifies the target BER is $2.4\times10^{-4}$, consistent with the target FLR and stronger FEC
- Optical Tx and Rx specs are the same as Clause 95, but an exception was added to modify the bit rate (to 26.5625 Gb/s per lane) and the BER to $2.4\times10^{-4}$.
- Test patterns: an exception which modifies the FEC encoding of the 'scrambled idle' test pattern has been added.
- TDEC (in 121.8.5) and SEC (in 121.8.8) definitions were modified to be consistent with the BER of $2.4\times10^{-4}$ given in 121.1.1.
- The stressed receiver eye mask hit ratio was modified to $2.4\times10^{-4}$.

# Items for review

TDEC and SEC spec values are unchanged from Clause 95 (4.3 dB)

- If the value changed there would be consequent changes to the Tx and Rx optical specs.

- *petrilla_01_0415_mmf* examined the impact of using KP4 FEC for 400GBASE-SR16. It showed that with the faster bitrate and higher target BER, TDEC should increase by ~0.2dB
  - keeping the 4.3 dB value makes TDEC slightly harder to meet, and the SEC slightly easier (by that ~0.2 dB).
- *petrilla_01_0415_mmf* concluded that the increased link ISI penalties due to the higher bit-rate are compensated for by the decreased noise penalties and better receiver sensitivity due to the higher target BER required, so the overall power budget didn't need to change. We discussed whether TDEC and SEC values should change from 4.3 dB, but there was no consensus to do so. Further contributions were invited, none received to date.

Any other items needing attention ?