

# TDECQ related changes for existing 200 Gb/s and 400 Gb/s PMDs

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# Introduction

The P802.3cn PAR scope includes:

Make TDECQ (Transmitter and dispersion eye closure for PAM4) related changes to existing 200 Gb/s and 400 Gb/s physical medium dependent sublayers over single-mode fiber.

This contribution gives the details of a set of proposed changes to the:

200GBASE-DR4, 200GBASE-FR4, 200GBASE-LR4

400GBASE-DR4, 400GBASE-FR8, 400GBASE-LR8

PMDs to implement the equivalent to the TDECQ related changes that were made for the:

50GBASE-SR, 50GBASE-FR, 50GBASE-LR

100GBASE-SR2, 100GBASE-DR

200GBASE-SR4

PMDs in the P802.3cd project.

# List of changes part 1

- Add a requirement that  $P_{th1}$ ,  $P_{th2}$ , and  $P_{th3}$  are varied from their nominal values by up to  $\pm 1\%$  of  $OMA_{outer}$  in order to optimize TDECQ.
- For all PMDs except 400GBASE-DR4, reduce TDECQ (max) by 0.2 dB.
- Add a specification for the maximum value of TDECQ –  $10\log_{10}(C_{eq})$  with a limit equal to TDECQ (max) for each PMD.
- Add a specification for the maximum transmitter transition time with a limit of 17 ps for 400GBASE-DR4 and 34 ps for the other PMDs.
- For all PMDs except 400GBASE-DR4, reduce the target SECQ and the stressed receiver sensitivity (max) by 0.2 dB.
- Add a specification for the maximum value of SECQ –  $10\log_{10}(C_{eq})$  with a limit equal to the target SECQ for each PMD.
- For all PMDs except 400GBASE-DR4, reduce the allocation for penalties (for max TDECQ) by 0.2 dB

## List of changes part 2

- Add a constraint that the largest magnitude tap coefficient for the TDECQ reference equalizer is greater than 0.8.
- For all PMDs except 400GBASE-DR4, change the filter definition for TDECQ, SECQ and transition time measurements to be a 3 dB bandwidth of approximately 13.28125 GHz with a fourth-order Bessel-Thomson response to at least  $1.5 \times 26.5625$  GHz and at frequencies above  $1.5 \times 26.5625$  GHz the response should not exceed  $-24$  dB.
- For 400GBASE-DR4, change the filter definition for TDECQ, SECQ and transition time measurements to be a 3 dB bandwidth of approximately 26.5625 GHz with a fourth-order Bessel-Thomson response to at least  $1.3 \times 53.125$  GHz and at frequencies above  $1.3 \times 53.125$  GHz the response should not exceed  $-20$  dB.
- Add a requirement that with the Gaussian noise generator on and the sinusoidal jitter and sinusoidal interferer turned off, the RIN<sub>x</sub>.xOMA of the SRS test source should be no greater than the RIN<sub>x</sub>.xOMA limit for the transmitter.

# List of changes part 3

- Add a requirement that the transition time of the stressed receiver conformance test signal is no greater than the transition time limit for the transmitter.
- Remove the restriction that the combination of the low-pass filter and the E/O converter should have a frequency response that results in at least half of the dB value of the stressed eye closure (SECQ) before the sinusoidal and Gaussian noise terms are added.

# Consequential changes

- As the requirement that  $P_{th1}$ ,  $P_{th2}$ , and  $P_{th3}$  are varied from their nominal values by up to  $\pm 1\%$  of  $OMA_{outer}$  in order to optimize TDECQ is being added to Clause 120, remove this as an exception in Clause 138, Clause 139, and Clause 140.
- As the restriction that the combination of the low-pass filter and the E/O converter should have a frequency response that results in at least half of the dB value of the stressed eye closure (SECQ) before the sinusoidal and Gaussian noise terms are added is being removed from Clause 120, remove the exception that this does not apply from Clause 138, Clause 139, and Clause 140.

Thanks!