Baseline Proposal for 50 Gb/s Ethernet 40 km SMF 50GBASE-ER in 802.3cn

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Introduction

- This presentation contains a baseline proposal to meet the cn objective “Provide a physical layer specification which supports 50 Gb/s operation over at least 40 km of SMF”
- The specification is compatible with logic layer and KP4 FEC from 802.3cd.
- This would imply a 50GBASE-ER specification to be added to cd clause 139.

Background Discussion

- Jan.2018: Investigation of the technical feasibility for 200G/400G beyond 10km optical PHYs using high-power TOSA and APD-ROSA showed a -18dBm B-to-B receiver sensitivity at 2.4E-4 operating BER with 0.5dB dispersion penalty at worst case, according to this presentation, the OMA margin is 3.2dB for 200G 40km transmission. http://www.ieee802.org/3/B10K/public/18_01/yamamoto_b10k_01a_0118.pdf

- Mar. 2018: Technical Feasibility to Support 200GbE 40km Objective, presented receiver sensitivities of -17.1dBm at SECQ = 1.7dB and -16.6dBm at SECQ = 2.0dB; http://www.ieee802.org/3/B10K/public/18_03/yu_b10k_01c_0318.pdf

Background Discussion

- Sep. 2018: Single and Quad channel APD receiver performance at 25Gbaud, provided a sensitivity of -19dBm at 26.6Gbaud PAM4, with the Transmitter SECQ ranging from 1.4 to 1.7dB and extinction ratio from 6.4 to 6.9dB.

  http://www.ieee802.org/3/B10K/public/18_09/huang_b10k_01a_0918.pdf

- Sep. 2018: 200G EML Fiber Propagation Result, showed a measured B-to-B sensitivity around -17dBm with a suggestion that > 2dBm for Transmitter “minimum launch power (OMAouter) minus TDECQ” is possible.

  http://www.ieee802.org/3/B10K/public/18_09/jackson_b10k_01_0918.pdf

Transmitter Characteristics 50GBASE-ER

Description	Proposal	Unit
Signaling rate	26.5625	GBd
Modulation format	PAM4	-
Wavelengths (range)	1304.5 to 1317.5	nm
Side-mode suppression ration (SMSR), (min)	30	dB
Average launch power (max)	6.63	dBm
Average launch power (min)	0.4	dBm
OMA_{outer} (max)	7.4	dBm
OMA_{outer} (min)	3.4	dBm
Launch power in OMA_{outer} – TDECQ (min)	2	dBm
TDECQ (max)	3.2	dB
TDECQ – $10log_{10}(C_{eq})$ (max)	3.2	dB
Average launch power of Off transmitter, each lane (max)	-15	dBm
Extinction ratio (ER) (min)	6	dB
Transmitter transition time (max)	34	ps
RIN OMA (max)	TBD	dB
Optical return loss tolerance (max)	TBD	dB
Transmitter reflectance (max)	–26	dB

Receiver Characteristics 50GBASE-ER

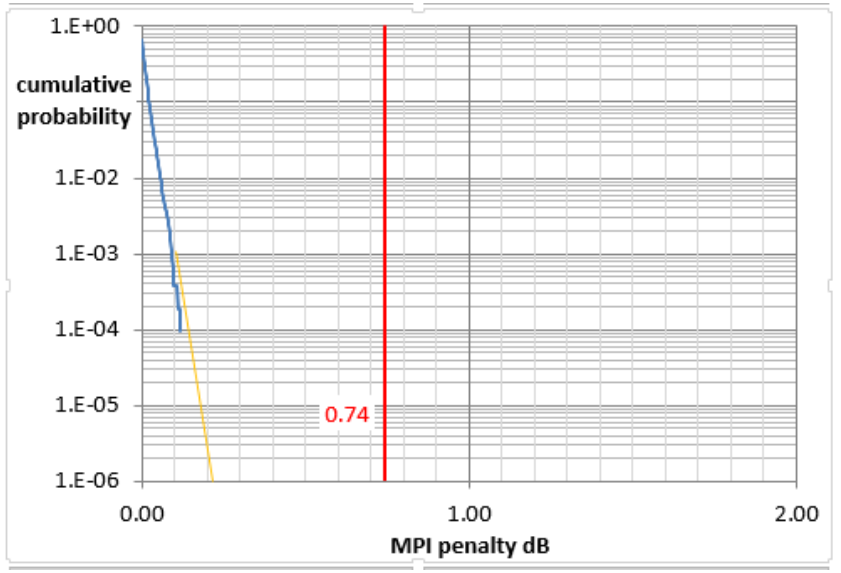
Description	Proposal	Unit
Signaling rate	26.5625	GBd
Wavelengths (range)	1304.5 to 1317.5	nm
Damage threshold	-2.37	dBm
Average receive power (max)	-3.37	dBm
Average receive power (min)	−17.6	dBm
Receive power (OMA_{outer}) (max)	-2.6	dBm
Receiver reflectance (max)	−26	dB
Receiver sensitivity (OMA_{outer}) (max)	max(−15.1, SECQ − 16.5)	dBm
Stressed receiver sensitivity (OMA_{outer}) (max)	−13.3	dBm
Conditions of stressed receiver sensitivity test		
Stressed eye closure for PAM4 (SECQ)	3.2	dB
SECQ – $10\log_{10}(C_{eq})$ (max)	3.2	dB

Illustrative Link Power Budget 50GBASE-ER

Description	Proposal	Unit
Power budget (for maximum TDECQ)	21.7	dB
Operating distance	40	km
Channel insertion loss (max)	18	dB
Channel insertion loss (min)	10	dB
Maximum discrete reflectance	TBD	dB
Allocation for penalties (for maximum TDECQ)	3.7	dB
Additional insertion loss allowed	0	dB

Suggested Penalty

- TDECQ 3.2dB
- MPI 0.3dB (by simulation @ 40km transmission)
- DGD 0.2dB (by simulation @ worst case)



BER:2.4E-4

Loss:18dB

ER:6dB

Connector: 6*-35dB

+4*-45dB

Recommendations

- Adopt the proposed baseline specification for 50GBASE-ER.
- The 50GBASE-ER will use the same FEC, PMA with 50GBASE-LR.
- All baseline parameters and specifications are open to further analysis and ae subject to change by the Task Force.


thank you
danke
謝謝
ngiyabonga
teşekkür ederim
gracias
merci
obrigado
go raibh maith agat
sukriya
kop khun krap
grazie
arigatō
dakujem
мерси
спасибо
dziękuję
bedankt
hvala
mochchakkeram
terima kasih
감사합니다
ありがとう
ευχαριστώ
tapadh leat
takk
taiku
dank je
рахмат
Баярлалаа
хвала
mersi
tack
blagodaram
chnorakaloutioun
sagolun
maururu
mesi
rahmet
tanemirt
dekuji
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gracies
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murakoze
najis tuke
kam sah hamnida
xiexie
rahmat
didi madloba
djiere dieuf
koszonom
bayarlalaa
grazie
nandri
sobodi