

TERAHOP

Refine the Tx/Rx OMA_{outer} for FR4 and FR4-500 (Comments #151-154)

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TeraHop

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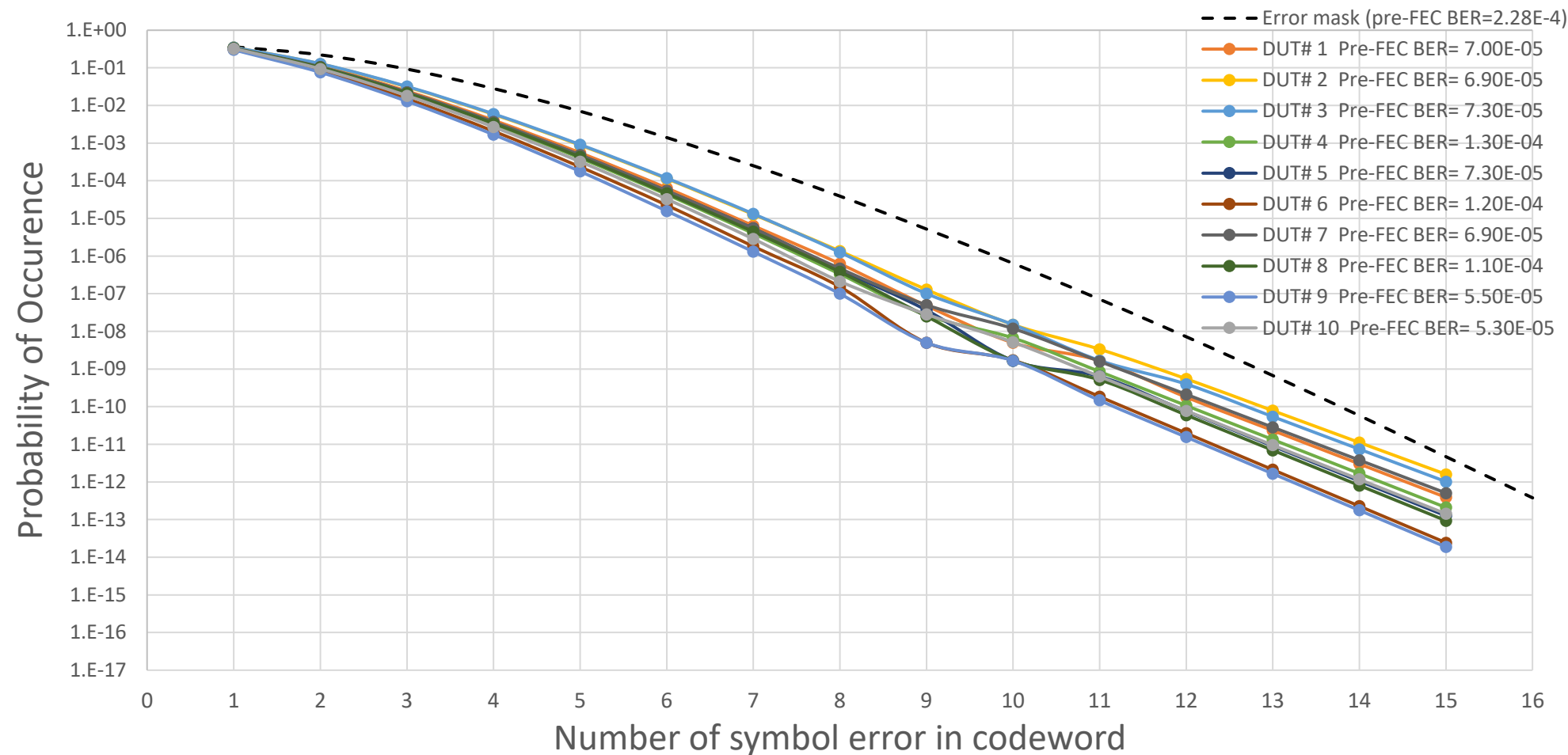


Background

- The 802.3dj PMD baseline for 800GBASE FR4 and 800GBASE FR4-500 was proposed by [welch_3dj_04_2309](#) and [welch_3dj_01a_2401](#) respectively
- Rx sens data was shown in [rodes_3dj_01a_2311](#), [welch_3dj_01a_2401](#) as supporting evidence before large number of product samples were built and tested.
- Industry now have cumulated significant amount of test data over large number of samples. Based on these newly available test data, we propose to adjust/refine Tx OMA_min and Rx OMA_max spec to optimize product with lower power dissipation and lower cost.

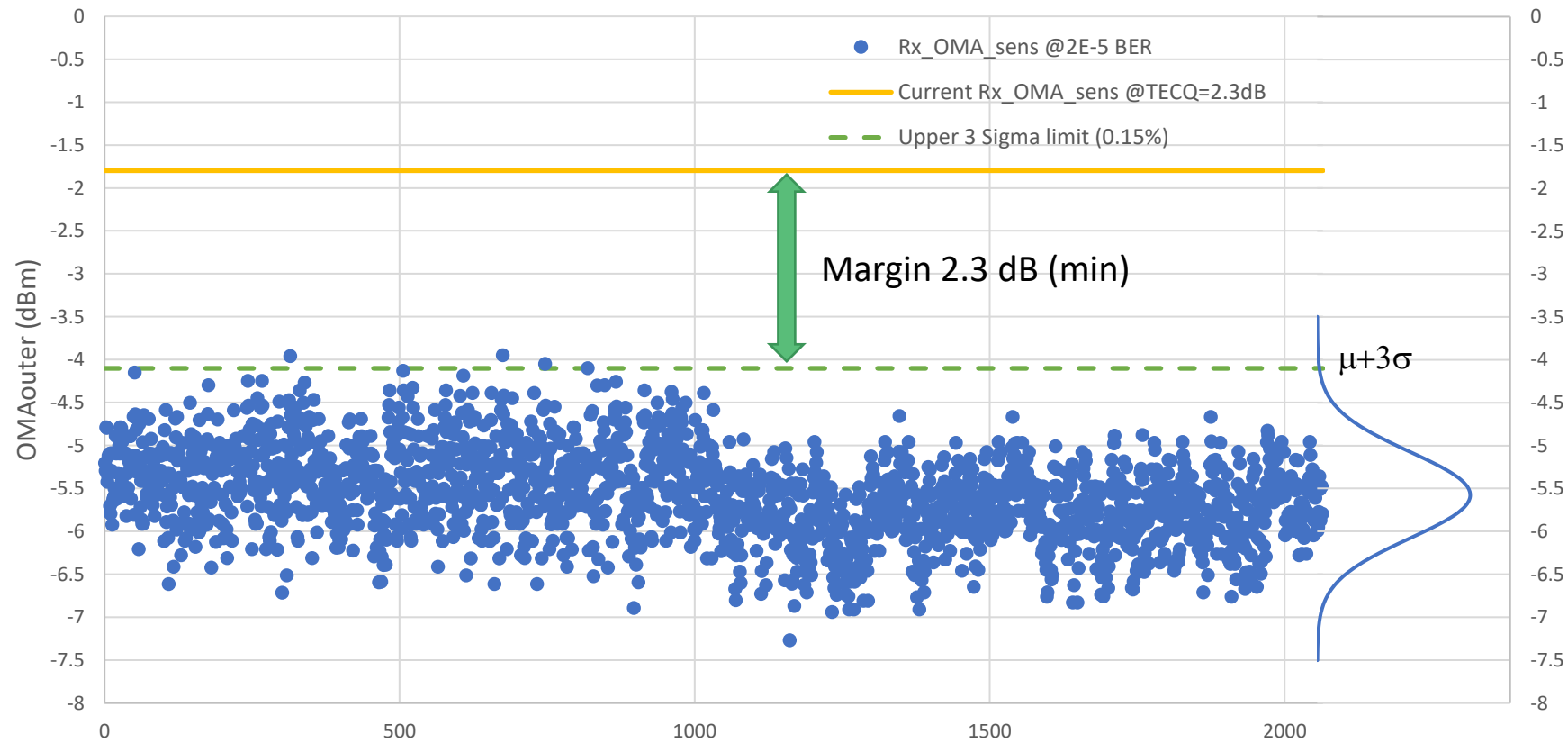
Correlation of Error Histogram Threshold and Pre-FEC BER

- The required pre-FEC BER for error histogram threshold is not a fixed level. Our results (after linear extrapolation) show it's in range of 5E-5 to 1.3E-4. To be simplified, we chose **2E-5 pre-FEC BER** as error histogram threshold replacement for Rx sensitivity.



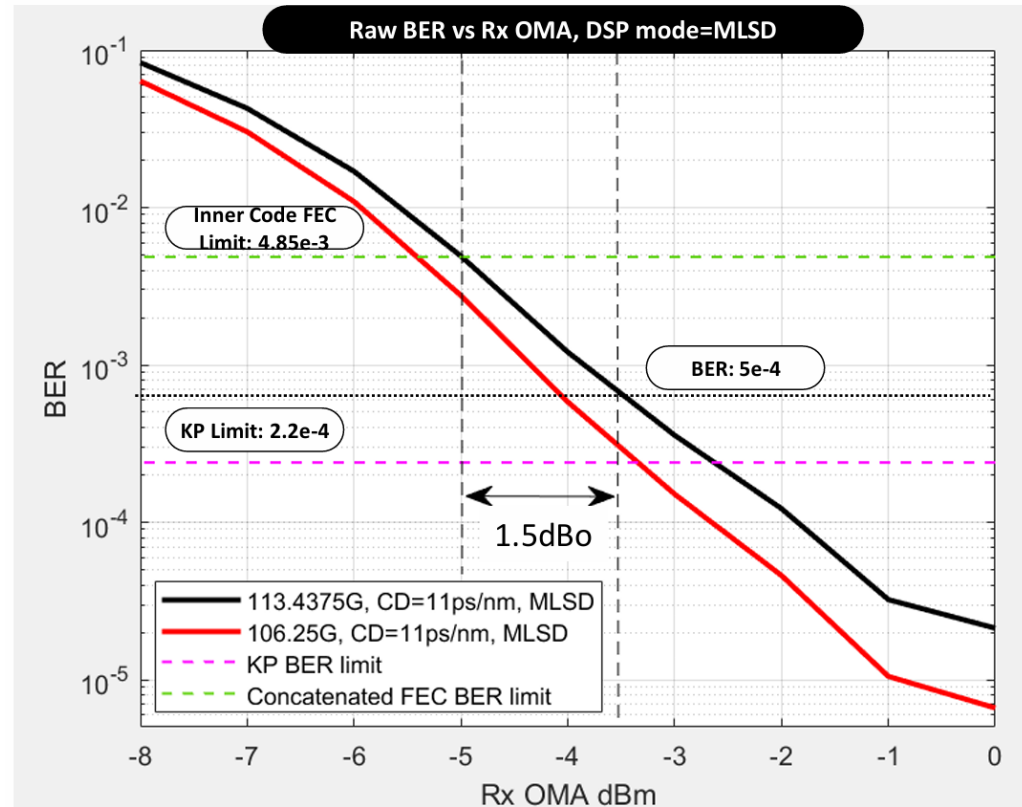
Rx OMAouter Sensitivities Distribution

- The Rx DUTs are Sipho based 1.6T 2xFR4-500, the TECQ of the test Tx is in range of **2.3-2.7 dB**
- Rx OMAouter sensitivities were tested **@ pre-FEC BER 2E-5**, which should be adequate for receiver error mask
- The distribution covers more than 2k data samples (86pcs x 8ch x 3-temp) and two main DSP suppliers. The upper 3 sigma limit of normal distribution fitting keeps **~2.3dB** margin from FR4-500 spec @TECQ=2.3dB



Additional margin w/ Inner FEC for FR4

- The simulation results in [parthasarathy_3dj_01_2303](#) show ~1.5dB coding gain with Inner FEC



Proposed updates for 802.3dj Optical PMD Tx/Rx OMAouter Specs

Current Specs	DRx	FR4-500	DRx-2	FR4	LR4	Unit
Tx OMAouter, each lane (min) for $\text{TECQ} \leq 0.9$ dB	-0.1	0.9	0.1	0.8	1.9	dBm
Rx sensitivity (OMAouter), each lane (max) for $\text{TECQ} \leq 0.9$ dB	-3.4	-3.2	-4.4	-3.7	-5.5	dBm



Proposed Specs	DRx	FR4-500	DRx-2	FR4	LR4	Unit
Tx OMAouter, each lane (min) for $\text{TECQ} \leq 0.9$ dB	-0.1	0.2	0.1	0.1	1.9	dBm
Rx sensitivity (OMAouter), each lane (max) for $\text{TECQ} \leq 0.9$ dB	-3.4	-3.9	-4.4	-4.4	-5.5	dBm



Summary

- We presented large number of product samples data showing Rx Sensitivity with good margin vs. baseline Rx_Sens specification
- For high-speed optical transceivers, majority of power dissipation and cost are from maintaining transmitter output power with acceptable quality. Shifting Rx_Sens_Max and Tx_OMA_min. to lower level will lower power dissipation and cost
- We propose to reduce **0.7dB** for Rx_sens_OMA_max for FR4-500 and FR4, and reduce Tx OMA_min spec by **0.7dB** accordingly to maintain same link loss budget

Note: the Tx and Rx optical power should be reduced for 0.7dB accordingly



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THANK YOU