



MEDIATEK

Discussion on Reference Receiver in COM

Pei-Rong Li, Mau-Lin Wu, Guo-Hau Gau, Yuan-Hao
Tung
MediaTek
IEEE 802.3ck Task Force



Outline

- Background & motivation
- Simulation platform & configurations
- COM value benchmark
- Summary

Background & Motivation

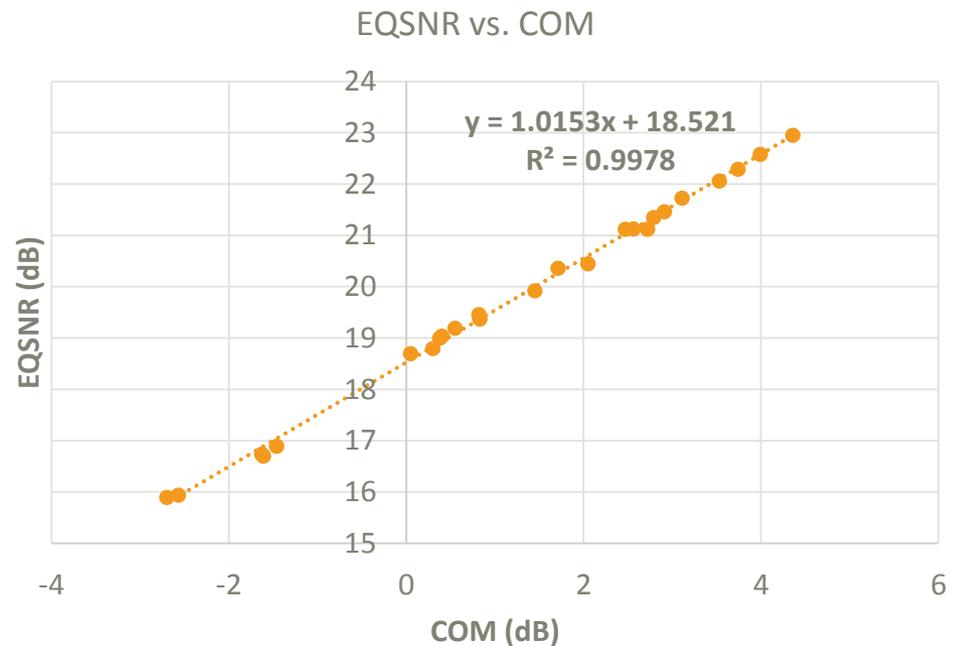
- For 112G KR & CR applications, one of the major Receiver architectures is ADC-based with digital Rx FFE & DFE
- Based on that, some contributions suggested to adopt “long Rx-FFE & 1-tap DFE” as reference Receiver in COM
 - But concerns of complexity raised by some
 - Intel proposed some simplified reference Receiver in COM (li_ck_02_1118.pdf)
- This contribution tries to explore the difference among “long Rx-FFE & 1-tap DFE” vs. simplified reference Receiver
 - By analysis of all IEEE KR + CR channels, the difference is smaller than 0.5 dB for 90% of the channels
 - Simplified reference Receiver seems to be feasible

Simulation MMSE Platform

- MediaTek proprietary MMSE platform
 - Adopt MMSE to calculate Rx FFE/DFE coefficients
 - Sampling point decided by Mueller-Muller TED
 - Clock jitters excluded
 - Output: EQSNR is transferred to COM by
 - $EQSNR = 1.0153 * COM + 18.521$
- Compare the following two configurations
 - Config0: Rx FFE(Pre:3, Post:n) + DFE(1)
 - Config2: Rx FFE(Pre:3, Post:0) + DFE(n)
 - Analysis for n = 12, 16, 20, 24
- Channels under simulation
 - All IEEE KR + CR channels
 - TX 30mm & Rx 30mm package

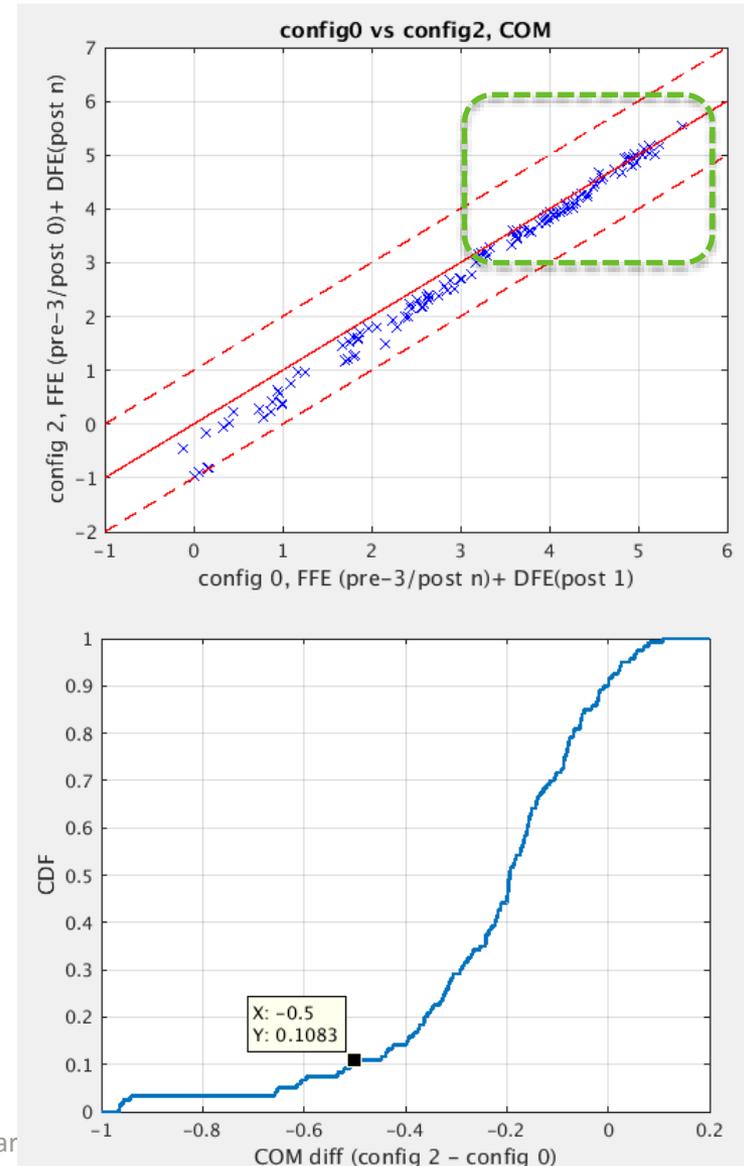
Relationship between EQSNR & COM

- Based on COM 2.40 – Long DFE-based Rx
- By all IEEE KR & CR channels
- EQSNR is strongly correlated to COM by linear equation
 - $\text{EQSNR} = 1.0153 * \text{COM} + 18.521$
- The following analysis bases the above equation to transfer MMSE SNR to COM values



Config2 vs Config0 – COM

- From COM perspective, difference among Config2 & Config0 are within 1dB
 - For COM wide range from 0 to 5.5 dB
 - The match is even better in the range of > 3dB
- From CDF, it shows that 90% of the channels are within 0.5 dB difference



Summary

- Compared the COM values of the following two configurations
 - Config0: Rx FFE(Pre:3, Post:n) + DFE(1)
 - Config2: Rx FFE(Pre:3, Post:0) + DFE(n)
- The differences between them are small
 - 90% of IEEE KR & CR channels: < 0.5 dB difference
- Config2 could be adopted as reference Rx in COM



everyday genius