

# Initial evaluation of CER TDECQ

Addressing comments #179, #180, #181 and #182 against IEEE 802.3dj D2.1

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# DCA test setup


A big thank you to Ahmad El-Chayeb, Keysight, for providing an evaluation version of FlexDCA for lab testing and for his guidance on setting up the test.

## Reference Receiver Setup

(F3) Reference Receiver Setup ? Close

Select Equalizers TDECQ Measurement Display Setup

Preset  
Custom ▼ + Recalculate



CTLE  
None ▼

Linear Equalizer  
TDECQ Equalizer ▼  
Taps per UI: 1  
Number of Taps: 15  
Tap Values:  
-0.009135, 0.039726,  
-0.095937, 0.957921, 0.125184,  
-0.014841, -0.017655,  
0.009792, 0.001765, -0.007761,  
0.007389, 0.004952, 0.000446,  
Setup...

Non-Linear Equalizer  
DFE ▼  
Number of Taps: 1  
Tap Values:  
0.231223  
Setup...

☐ Use Pulse Response Optimization ☐ Show Intermediate Functions

Specify Pattern Symbol Sequence

## CER TDECQ Configuration

PAM-N Analysis Setup ? Close

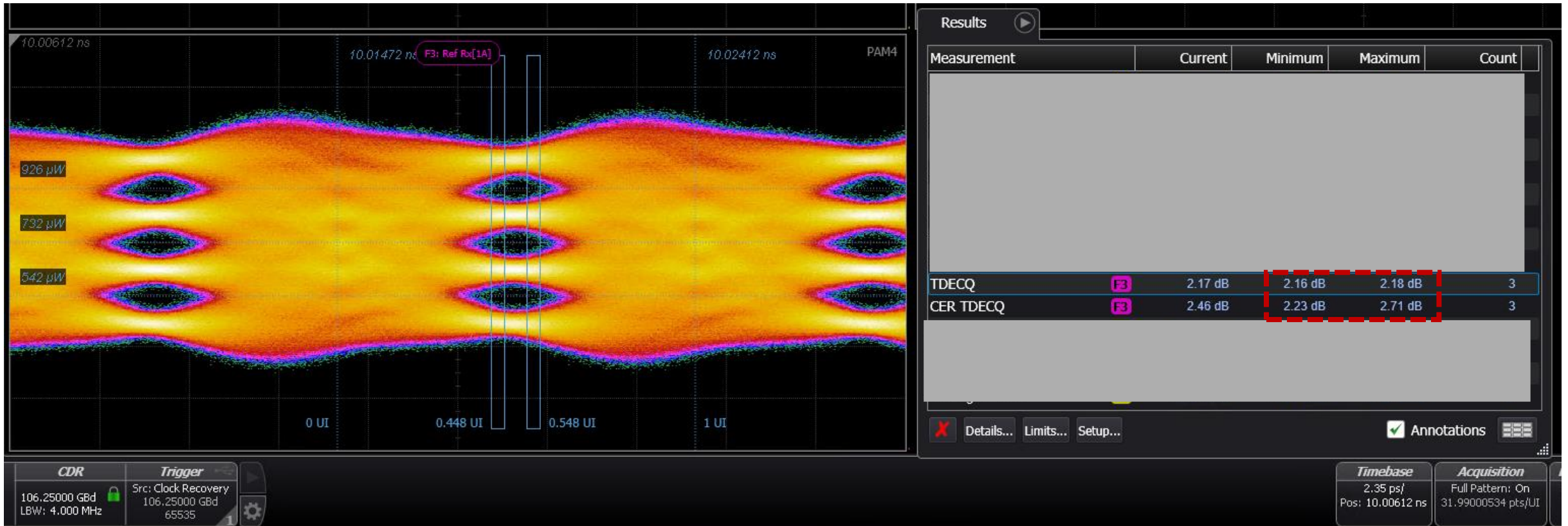
CER TDECQ Configuration TDECQ Configuration

Preset  
Outer FEC (Check CER) ▼ +

Codeword Definition  
Codeword Length: 544 ▼ ▲  
Signal Symbols Per Codeword Symbol: 5 ▼ ▲  
Interleaving Count: 2 ▼ ▲  
Correctable Symbol Errors: 15 ▼ ▲

Target Error Rate  
Target CER: 8.16E-13 ▼ ▲  
☒ Track CER  
Target SER: 4.80E-4 ▼ ▲

# Measurement Setup

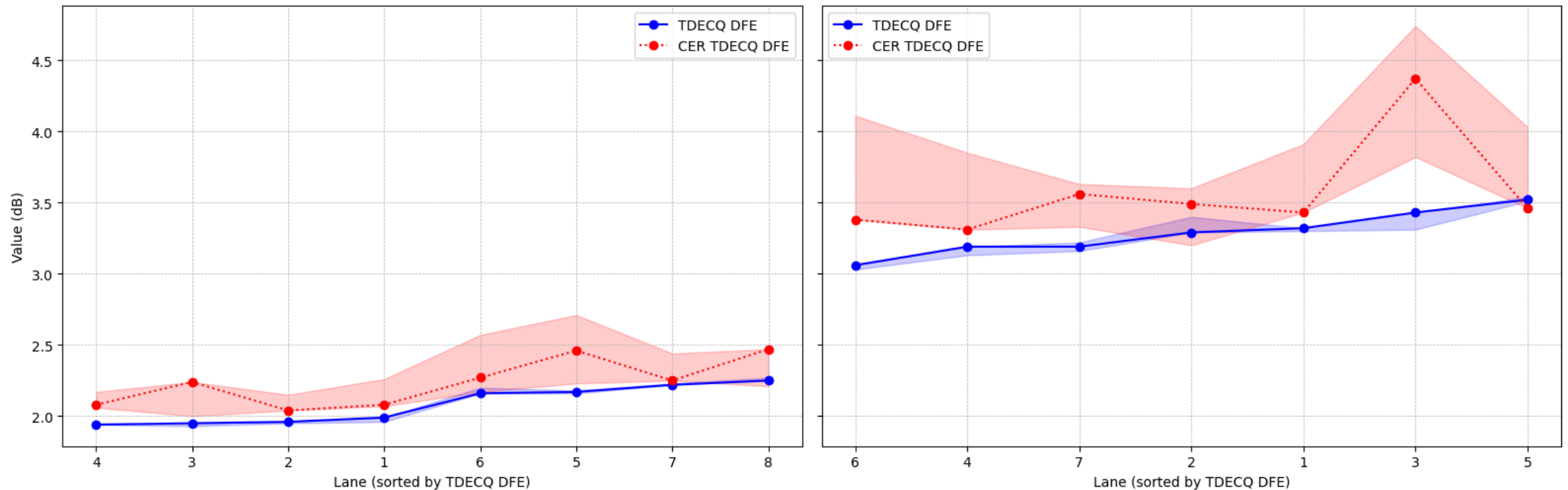


- Measuring simultaneously TDECQ and CER TDECQ.
- CER TDECQ changes significantly between counts

# Measurement Results

Testing the methodology with a short patchcord fiber (TECQ) over multiple Tx lanes from different modules

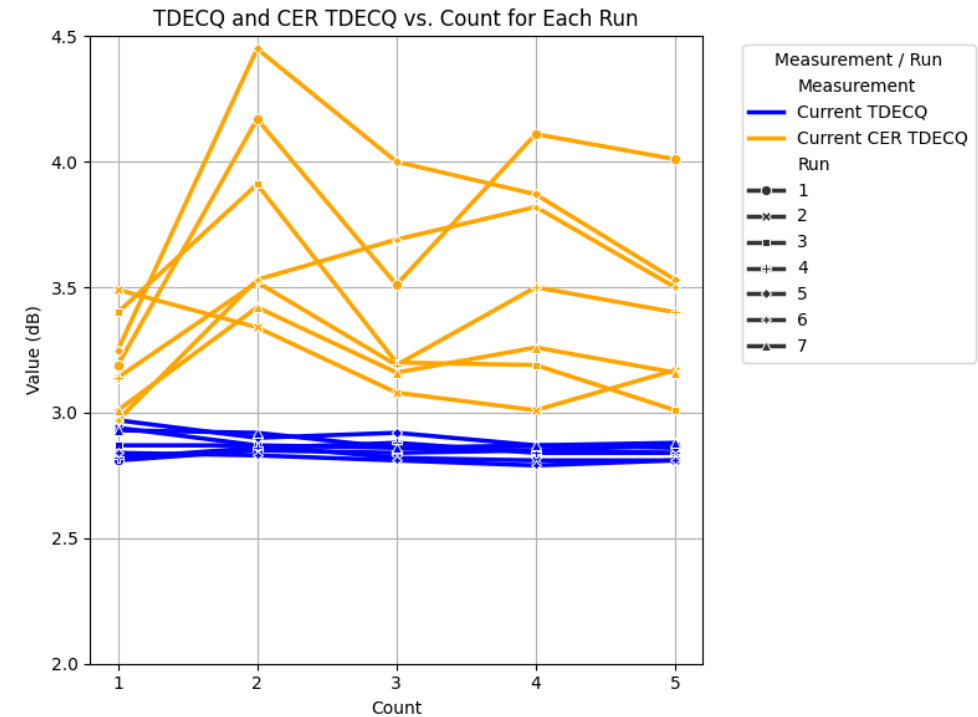
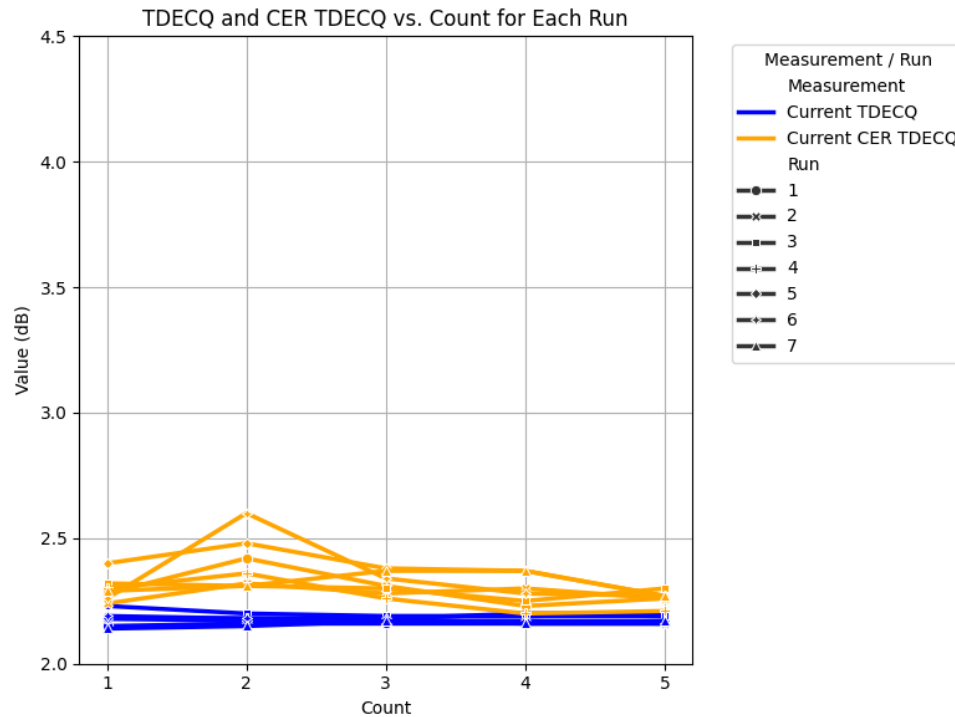
TDECQ and CER TDECQ vs Lane



- CER TDECQ gives around 0.2dB higher in average, however, it shows significantly variability
- CER TECQ could even go below TECQ in some cases.

# Test Repeatability

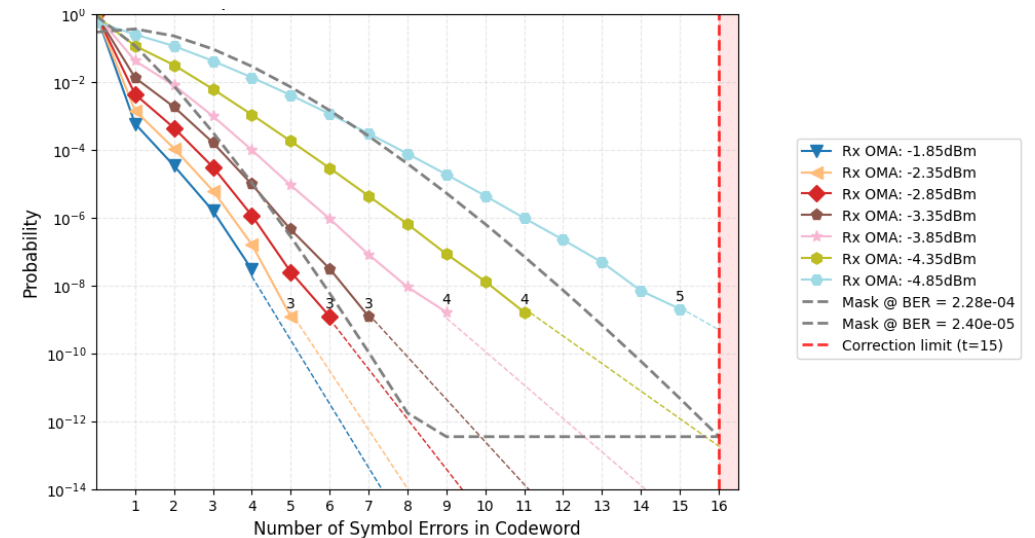
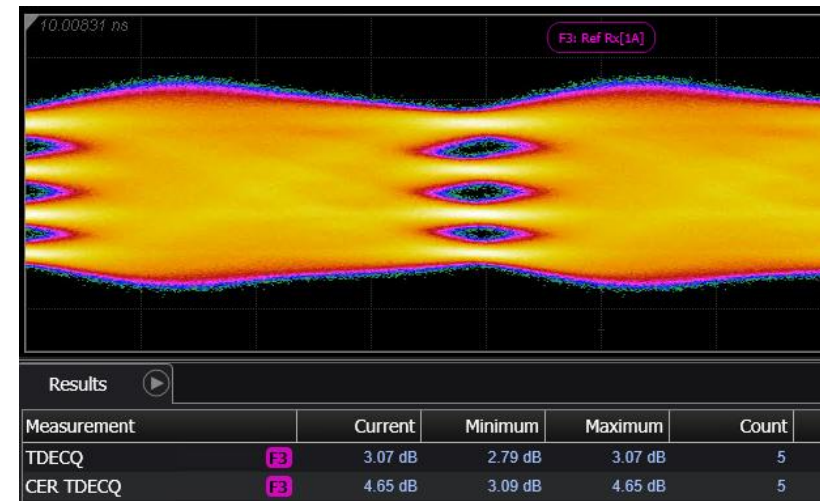
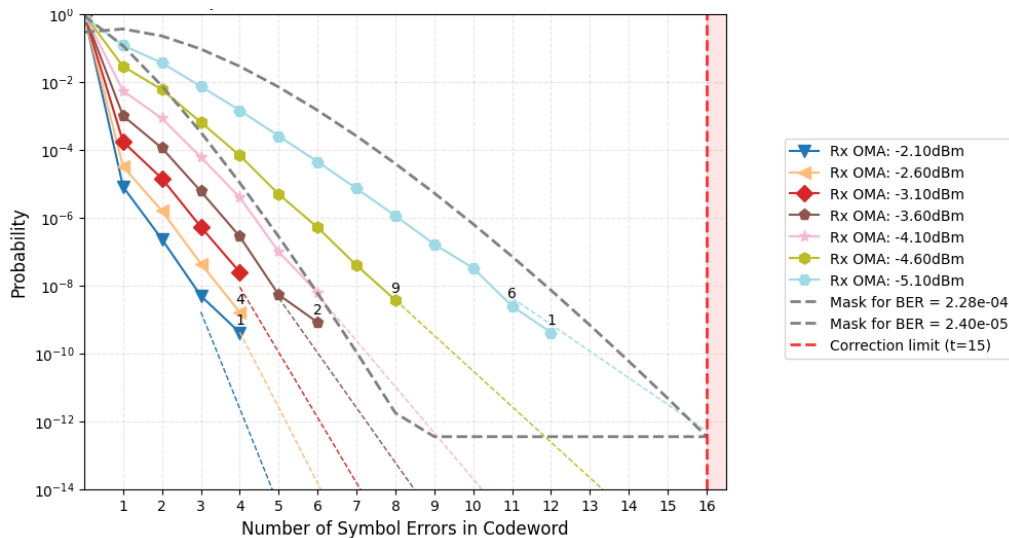
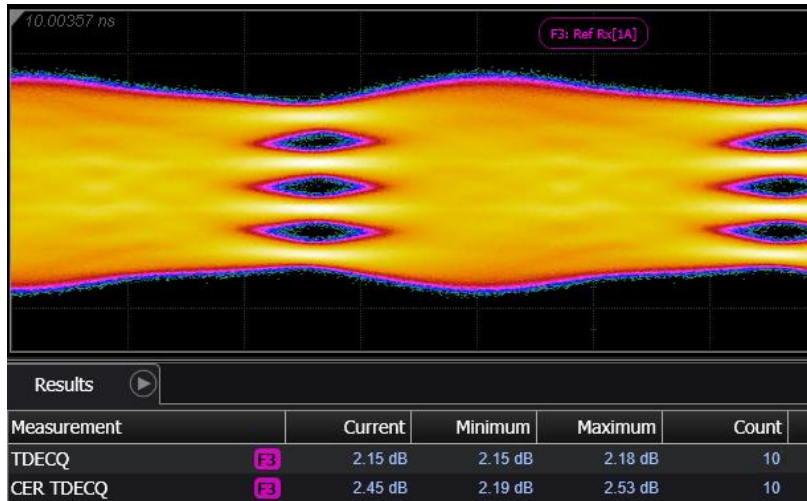
- Record TDECQ and CER TDECQ for every count accumulation up to 5
- repeating the test 7 times (runs)
- On a higher TECQ Tx and a lower TECQ Tx



CER TECQ can vary and does not seem to converge when collecting more data (up to 5 counts)  
The variation is higher for high TECQ Tx

# Link Performance of the Txs

- Link performance of the same two Txs in previous slide into the same Receiver
- Link performance difference does not show a significant degradation (besides  $\sim 0.8\text{dB}$  penalty) that would justify a  $>2\text{dB}$  penalty in CER TECQ



# Conclusion

- Thank you to Ahmad and Keysight for developing this new test. While it serves a valuable purpose, further refinement and evaluation are needed before it can be adopted.