

A CAUI-4 Chip-to-Chip Link Study: Presentation 2

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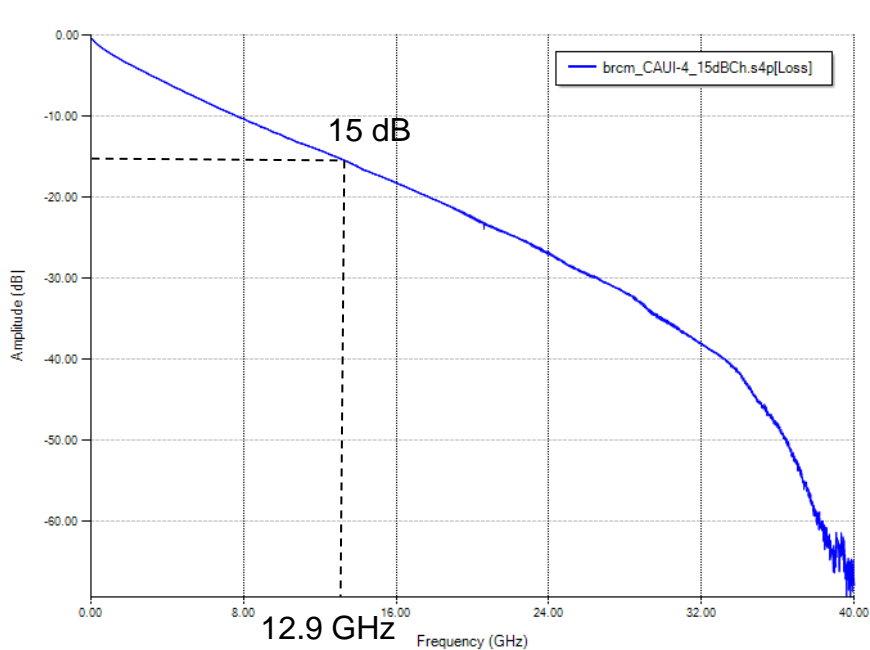
Purposes

- Explore the solution space for the CAUI-4 chip-to-chip link under the assumptions of
 - Tx FIR+Rx CTLE equalization
 - No FEC
 - Measured channels with IL, ILD, and xtalk

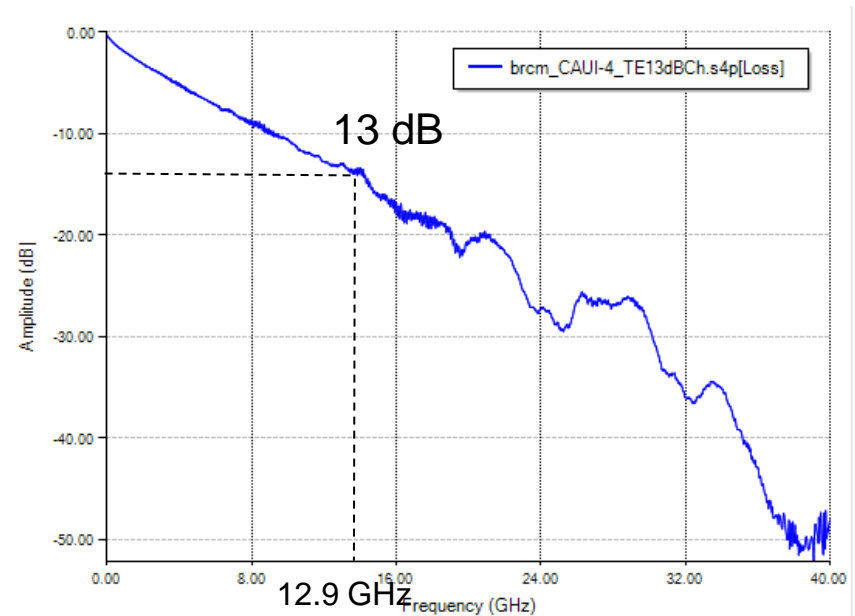
I. Channel Model Methodologies

Channel S-Parameters

- Use channel S-parameters from:
http://www.ieee802.org/3/bm/public/jan13/ghiasi_01a_0113_optx.pdf



Channel A



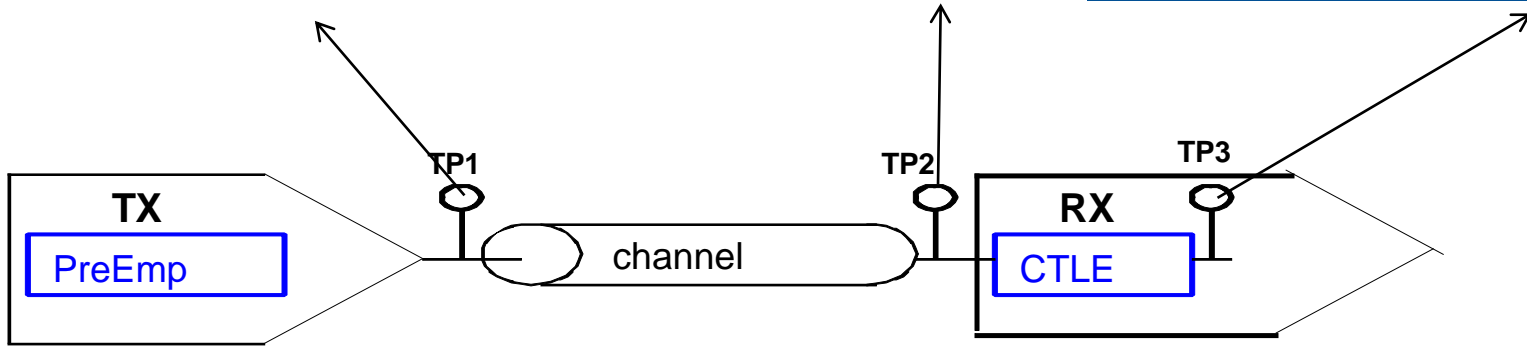
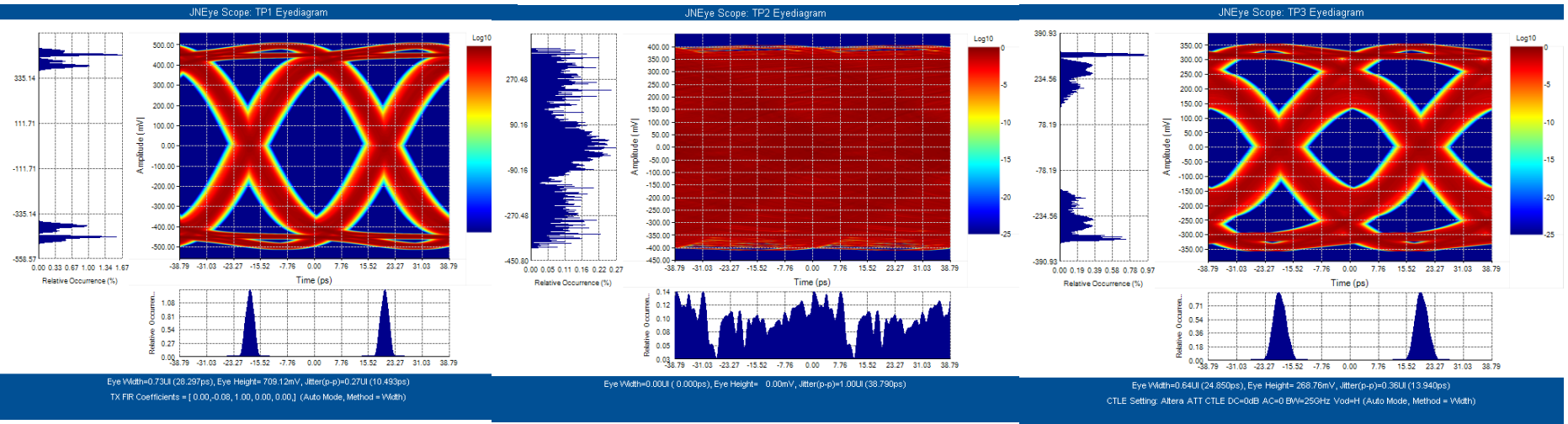
Channel B

II. Simulation and Solution Space Exploration

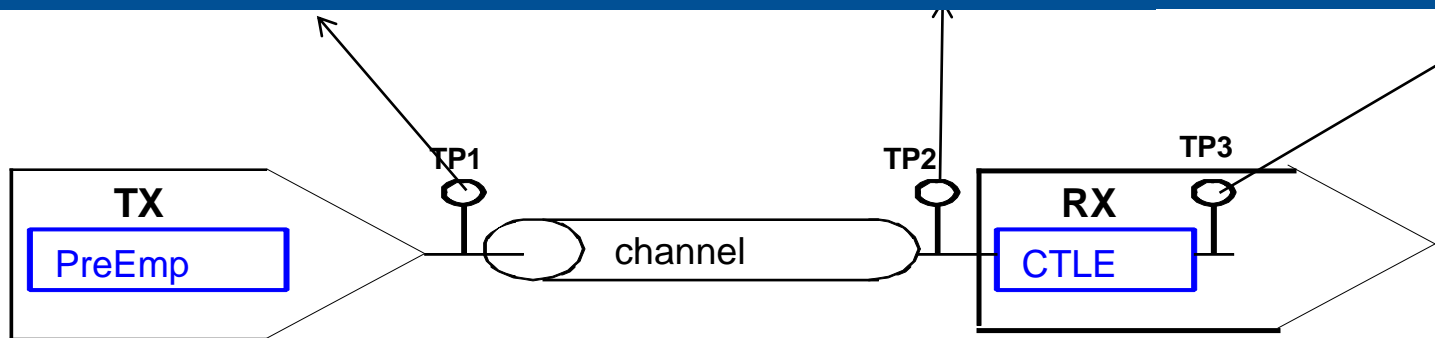
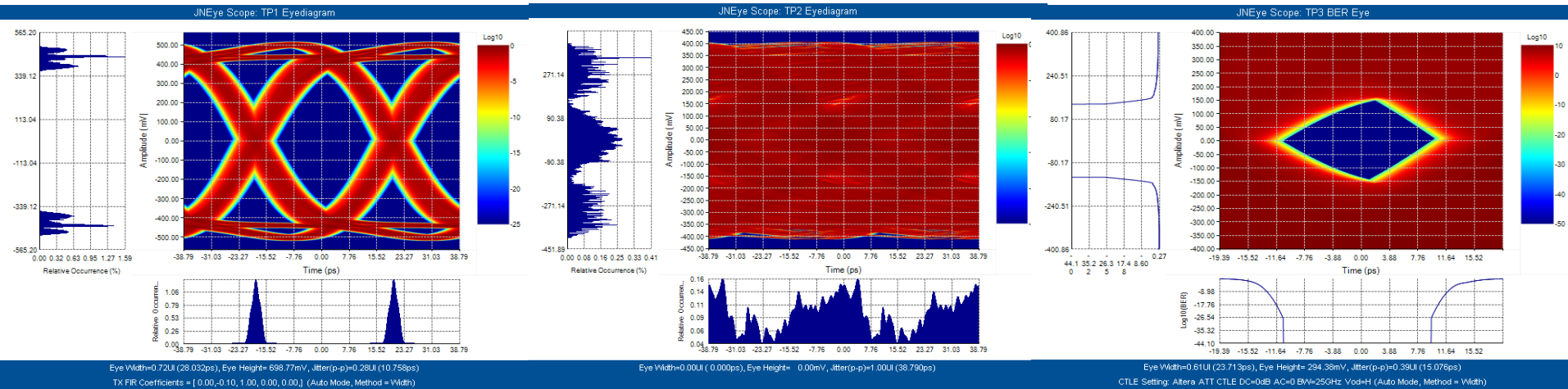
Simulation Setup

- Data rate
 - 25.78 Gbps
- Data Pattern
 - PRBS2¹⁰-1
- Tx
 - A 3-tap FIR (c-1, c0, c+1)
 - Vod = 1000 mV
 - Jitter
 - BUJ: 0.15 UI, DCD: 0.035 UI, RJ: 0.15 UI
 - Noise
 - RN: 1 mv rms
- Rx
 - CTLE
- Both Tx and Rx models have been correlated with actual device measurements
- Channel
 - S-parameters from:
(http://www.ieee802.org/3/bm/public/jan13/ghiasi_01a_0113_optx.pdf)

Simulation Results: Channel A



Simulation Results: Channel B



Summary for Simulation Results at CTLE Output

CH IL (dB)	EW (UI)	EH (mv)
15	0.64	268.76
13	0.61	294.38

III. Summary and Closing Remarks

Summary

- A link solution space exploration is carried out for CAUI-4 chip-to-chip at 25.78 Gbps, and for two measured channels studied previously
 - ILs are 13, 15dB at Nyquist (12.9 GHz)
 - Those channels have ILD and xtalk effects
- We have found that Tx FIR + Rx CTLE is sufficient to compensate those channels, and to achieve the link BER objective of $1e-12$ with margins (see table below)

CH IL (dB)	EW (UI)	EH (mv)
15	0.64	268.76
13	0.61	294.38

- In view of the two studies conducted ([1] and this study), we conclude that 20 dB channel objective for CAUI-4 chip-to-chip is achievable with confidence/margin, and the following benefits
 - Enable more applications (e.g., Interlaken)
 - Aligned with CEI -28G MR chip-to-chip
 - Enable wide acceptance

References

[1]: http://www.ieee802.org/3/bm/public/jan13/li_01_0113_optx.pdf

Acknowledgements

- The author would like to thank Ali Ghiasi for sharing his S-parameters that are used in this presentation.