

# CDAUI-8 SIMULATION RESULTS AND TRANSMITTER SPECIFICATION PROPOSAL



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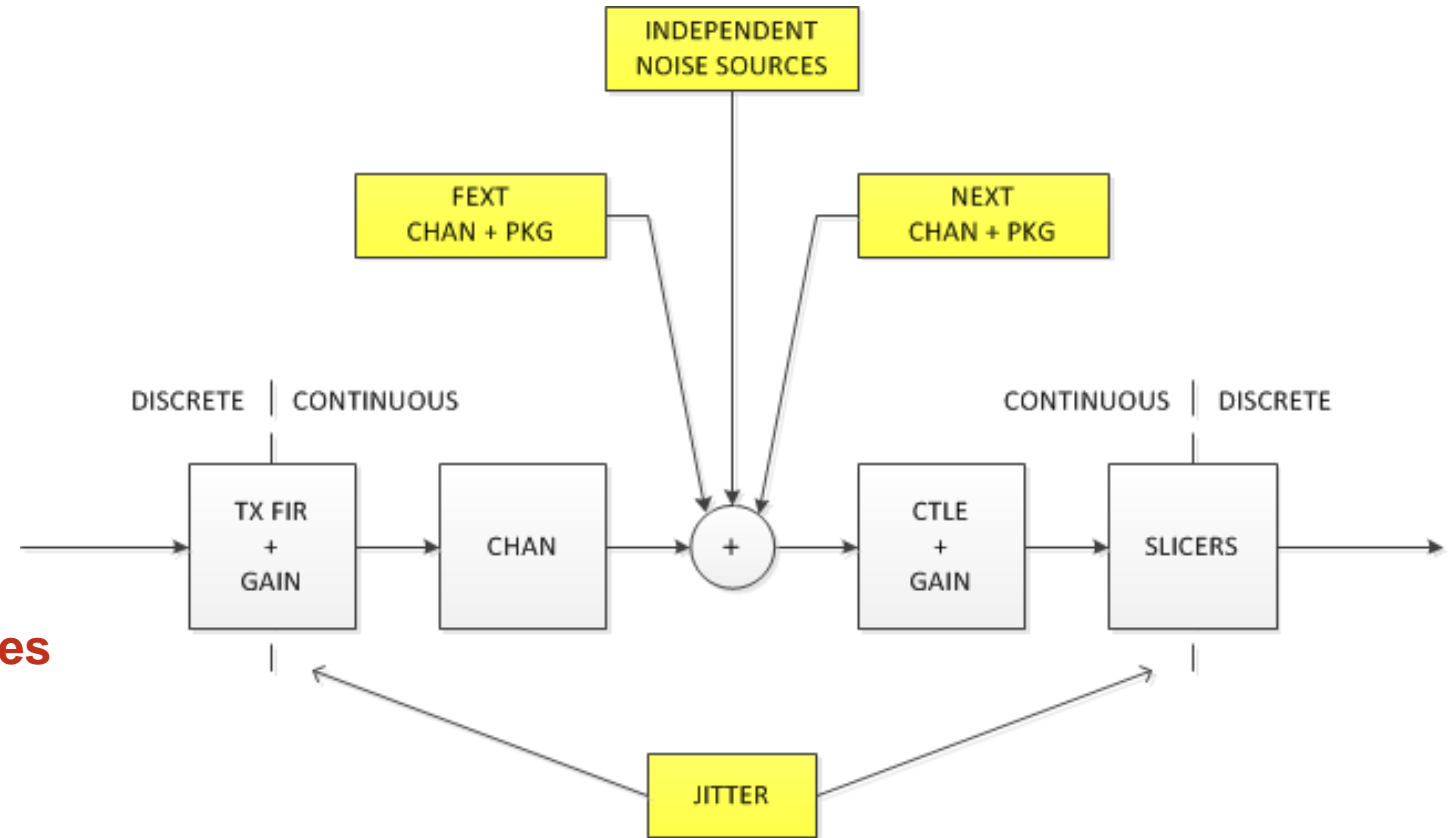
## SUPPORTERS

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- Pirooz Tooyserkani, Cisco
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- Vasu Parthasarathy, Broadcom
- Will Bliss, Broadcom

- **Channels**
  - Chip-to-Chip channels
- **Simulation setup**
  - Data rate: 50Gbps, Signaling: PAM4 @ 26.5625GBd
  - BER calculated from statistical analysis
- **Architecture**
  - DFE less - No Error-Propagation and related MTTFFPA Concerns
  - Lower Power, Simpler implementation
- **Results & Conclusions**

- [http://www.ieee802.org/3/bs/public/14\\_07/mellitz\\_3bs\\_01\\_0714.pdf](http://www.ieee802.org/3/bs/public/14_07/mellitz_3bs_01_0714.pdf) (11-July-14)
  - Rich Mellitz, Intel
  - Chip-to-Chip (w/ mezzanine) channels
  - Channels 1 to 7
  - IL: 7, 9, 11, 15, 17, 2 x19dB @13.28GHz
  - XT: 4FEXT, 3NEXT
  
- [http://ieee802.org/3/bs/public/channel/TEC/shanbhag\\_02\\_0914.pdf](http://ieee802.org/3/bs/public/channel/TEC/shanbhag_02_0914.pdf) (30-Sep-14)
  - Megha Shanbhag, Nathan Tracy, TE Connectivity
  - Medium reach/Chip-to-chip channel using a single connector (Armor)
  - IL: 19.1dB @13.28GHz
  - XT: 7FEXT, 0 NEXT

- **Signaling: PAM4**
- **Signaling rate: 26.5625 GBd**
- **Target BER:**
  - 5.2e-4 Pre-FEC
  - 1e-15 Post FEC, RS(544,514)
- **CTLE**
  - Adaptive with 2 real zeros, 2 real poles
- **TXFIR**
  - 4 taps with 1 pre, 2 post
  - Pre, main, and 1<sup>st</sup> post same as CAUI-4
  - 2<sup>nd</sup> post cursor [0, 0.1]





- Analog models based on existing 28nm, 25G NRZ Serdes IP
- ISI and Channel crosstalk driven by statistical worst-case sequences
- Package models based on large ASIC (60mmx60mm)
  - Insertion loss of  $\sim 1.6\text{dB}$  on each side of the link
- Max End-to-end insertion loss:  $\sim 22\text{dB}$  (pkg+channel+pkg)
- Rx input referred AWGN:  $1.6\text{mV rms}$  ( $-155\text{dBm/Hz}$ )
- Jitter: TX - 35mUI DCD, 0.1UI BUJ, 0.26UI Total at  $1\text{E}-15$ , RX - 0.01UI RJ, 0.02UI DDJ
- Slicer offsets:  $\pm 2\%$

Channel info	Insertion loss (dB)	TX-FIR Coefficients				SNR margin (dB)	BER
		c(-1)	c(0)	c(1)	c(2)		
Mellitz 1	18.9	-0.1	0.6	-0.2	0.1	2.13	1.7e-5
Mellitz 2	14.5	-0.15	0.65	-0.15	0.05	3.36	9.3e-7
Mellitz 3	7.1	-0.1	0.75	-0.1	0.05	4.74	1.3e-8
Mellitz 4	19	-0.1	0.6	-0.2	0.1	1.85	2.8e-5
Mellitz 5	17.6	-0.1	0.6	-0.2	0.1	3.7	3.6e-7
Mellitz 6	11.1	-0.1	0.7	-0.1	0.1	4.65	1.8e-8
Mellitz 7	9.2	-0.1	0.75	-0.05	0.1	4.74	1.3e-8
TEC-MR	18.6	-0.1	0.6	-0.2	0.1	4.66	1.7e-8

- **Positive SNR margin on all channels**

- Additional TX-FIR tap allows lower-power DFE-less operation on CDAUI-8 Channel suite
- CAUI-4 optional TX eq. feedback mechanism can be employed to tune TX-FIR taps.
- DFE-less solution:
  - allows lower pre-FEC BER (no error propagation and MTTFPA concerns)
  - Simpler implementation
  - Lower power