



PIERGIORGIO BERUTO
GIAN MARCO BO

IEEE802.3cg TF
Proposal for PSD mask adoption
November 7th, 2017

- Adoption of PMA electrical specifications
- Adoption of PSD mask

Channel Characteristics

- Channel defined as in

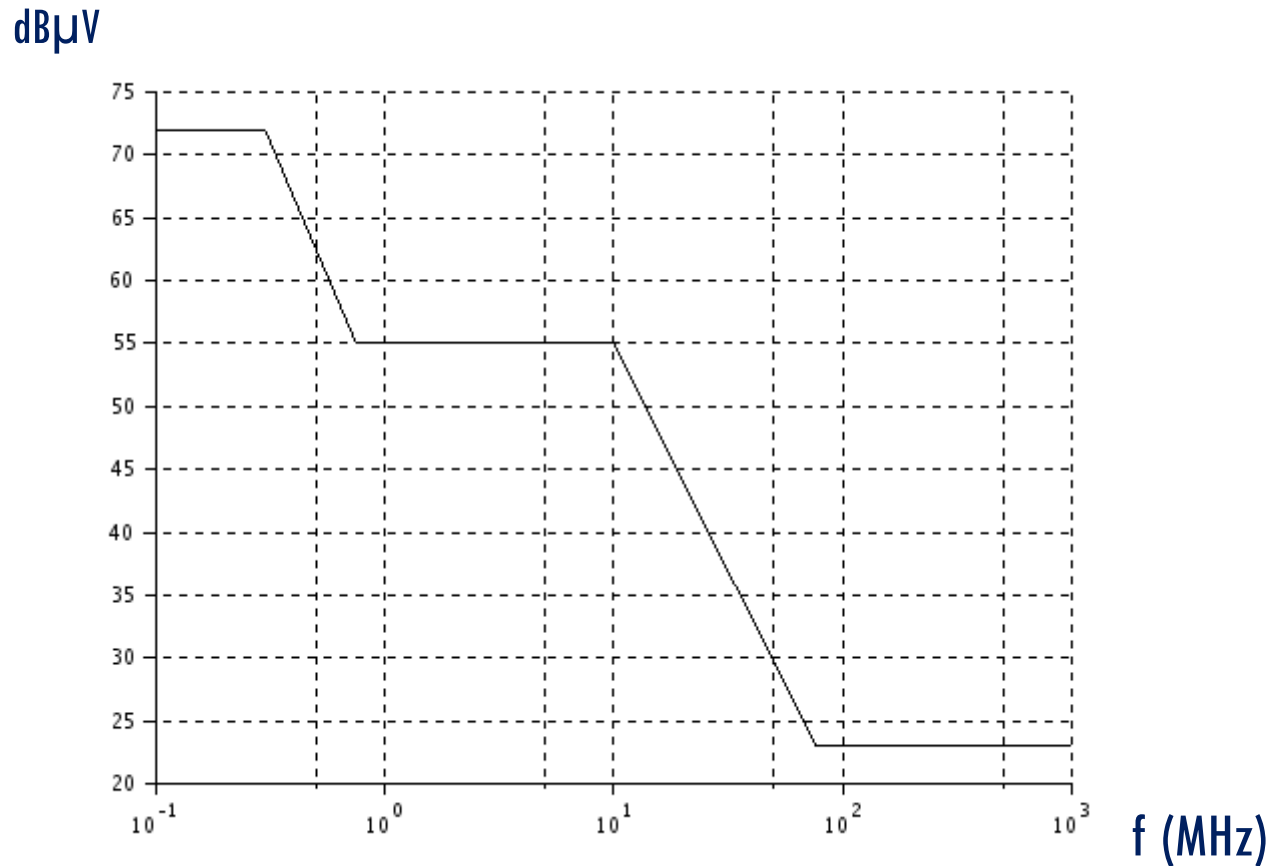
http://www.ieee802.org/3/cg/public/Sept2017/DiBiasoBergner_01c_0917.pdf slide #18

Return Loss (f) > 14 dB for f (0.3MHz -> 10MHz)
> 14 - 10*log₁₀(f/10) dB for f (10MHz -> 40MHz)

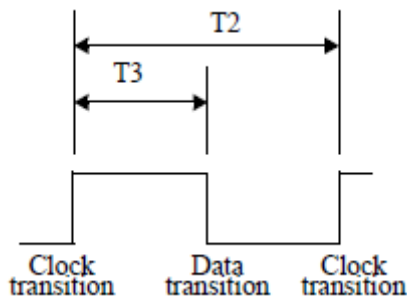
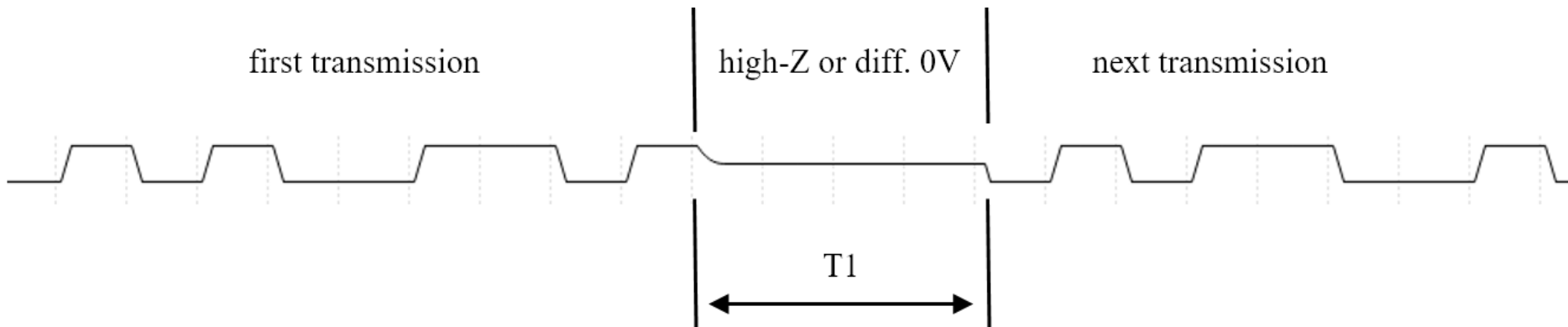
Insertion Loss (f) < 1.0 + 1.6*(f-1)/9 dB for f (0.3MHz -> 10MHz)
< 2.6 + 2.3*(f-10)/23 dB for f (10MHz -> 33MHz)
< 4.9 + 2.3*(f-33)/33 dB for f (33MHz -> 40MHz)

Mode Conversion Loss (f) > 30 dB for f (0.3MHz -> 20MHz)
> 30-20*log₁₀(f/20) dB for f (20MHz -> 200MHz)

- Same as 100base-T1



Line Coding



- **4B/5B coding + DME**
 - defined in TIS proposed text clause 147.4.2
- **Voltage levels: 1 V \pm 30% peak-to-peak**
 - defined in TIS proposed text clause 147.5.4.1

	Parameters	Min	Typ	Max	Units
T1	Delay between transmissions	200			ns
T2	Clock transition to clock transition		80		ns
T3	Clock transition to data transition (data = 1)		40		ns

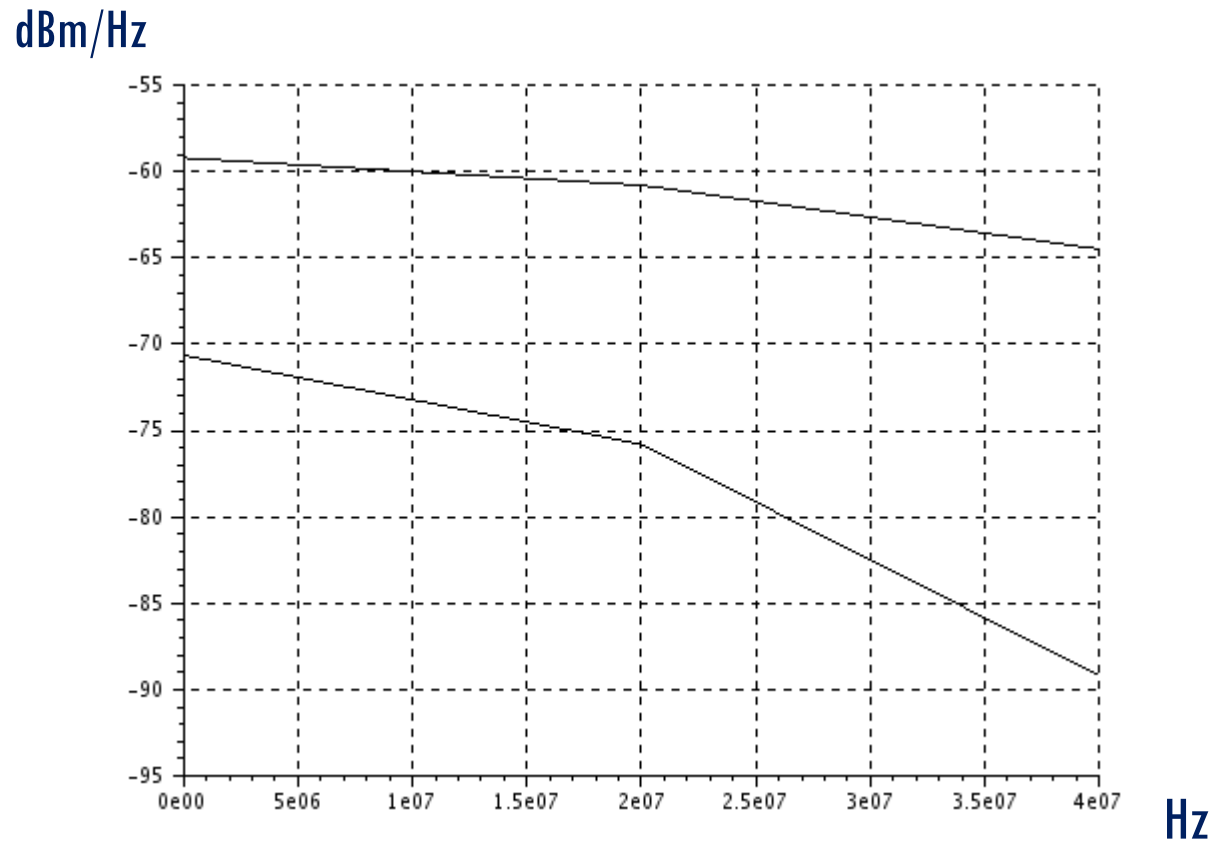
Proposal for PSD mask

$$\text{Upper PSD}(f) = \begin{cases} -59.3 - 1.5 * \frac{f - 1}{19} & 300\text{KHz} < f < 20 \text{ MHz} \\ -60.8 - 3.7 * \frac{f - 20}{20} & 20 \text{ MHz} < f < 40 \text{ MHz} \\ -64.5 - 8.0 * \frac{f - 40}{17} & f > 40 \text{ MHz} \end{cases}$$

$$\text{Lower PSD}(f) = \begin{cases} -70.9 - 4.9 * \frac{f - 1}{19} & 300\text{KHz} < f < 20 \text{ MHz} \\ -75.8 - 13.4 * \frac{f - 20}{20} & f > 20 \text{ MHz} \end{cases}$$

Proposed text in 147.5.4.4 - Transmitter power spectral density (PSD)

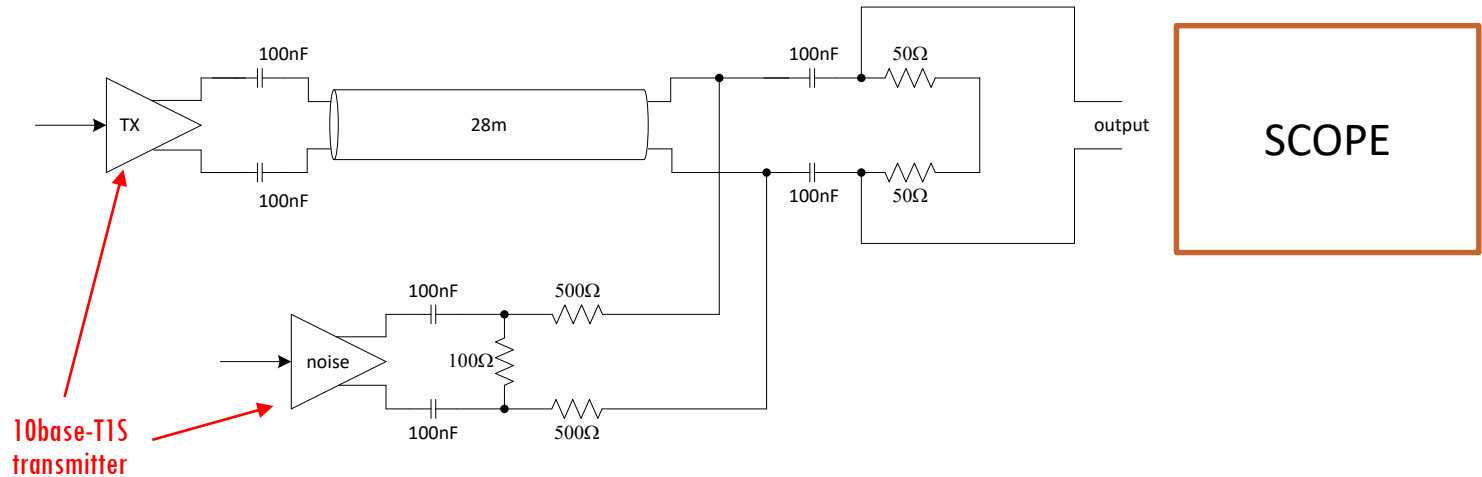
Proposal for PSD mask



Proposed text in 147.5.4.4 - Transmitter power spectral density (PSD)

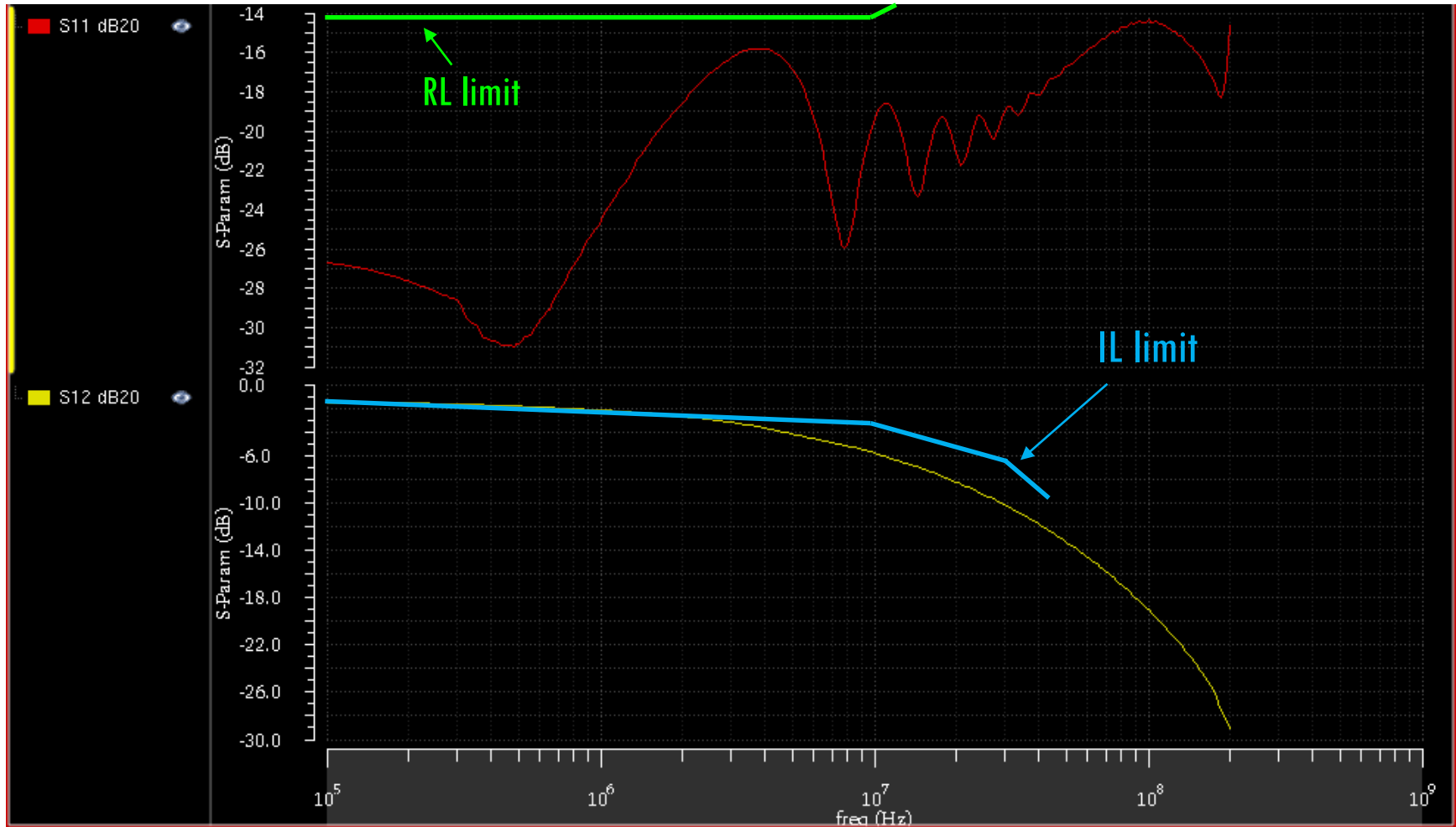
POINT TO POINT simulations

Simulations: P2P link segment Test Bench

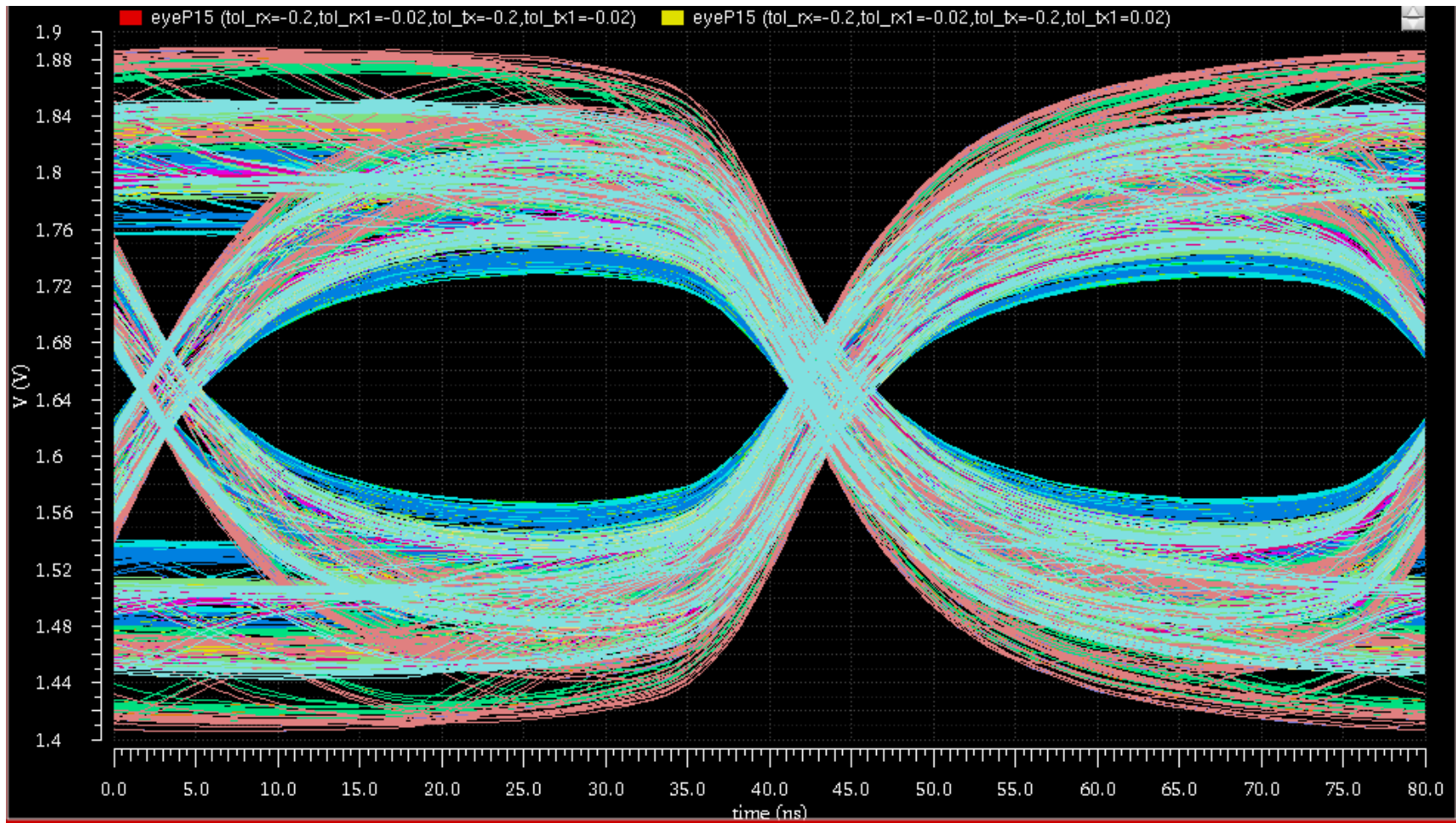


- 100Ω TX termination resistance with 20% of tolerance, $\pm 2\%$ mismatch
- 100Ω RX termination resistance with 20% of tolerance, $\pm 2\%$ mismatch
- Alien Crosstalk Noise ($\sim 100\text{mV}$ P-P)

Simulations: P2P link segment RL, IL



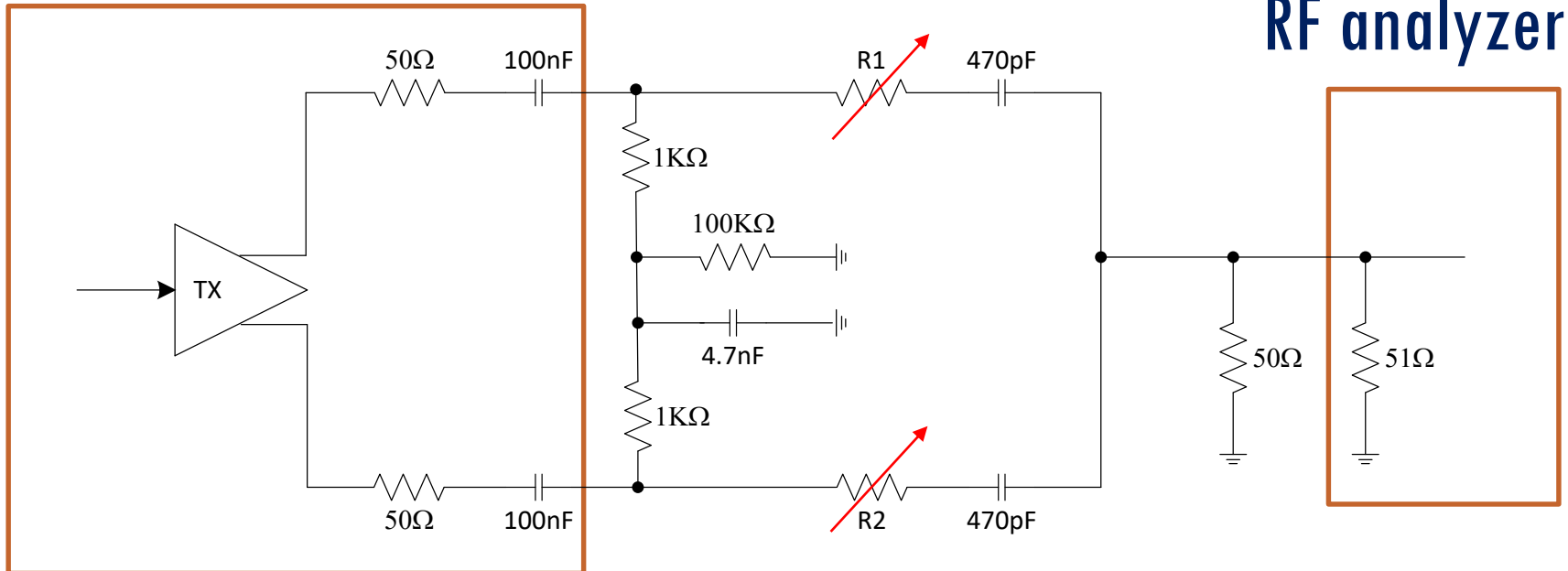
Simulations: P2P link segment eye diagram



Eye diagram at max impedance mismatch (20%) and alien noise crosstalk

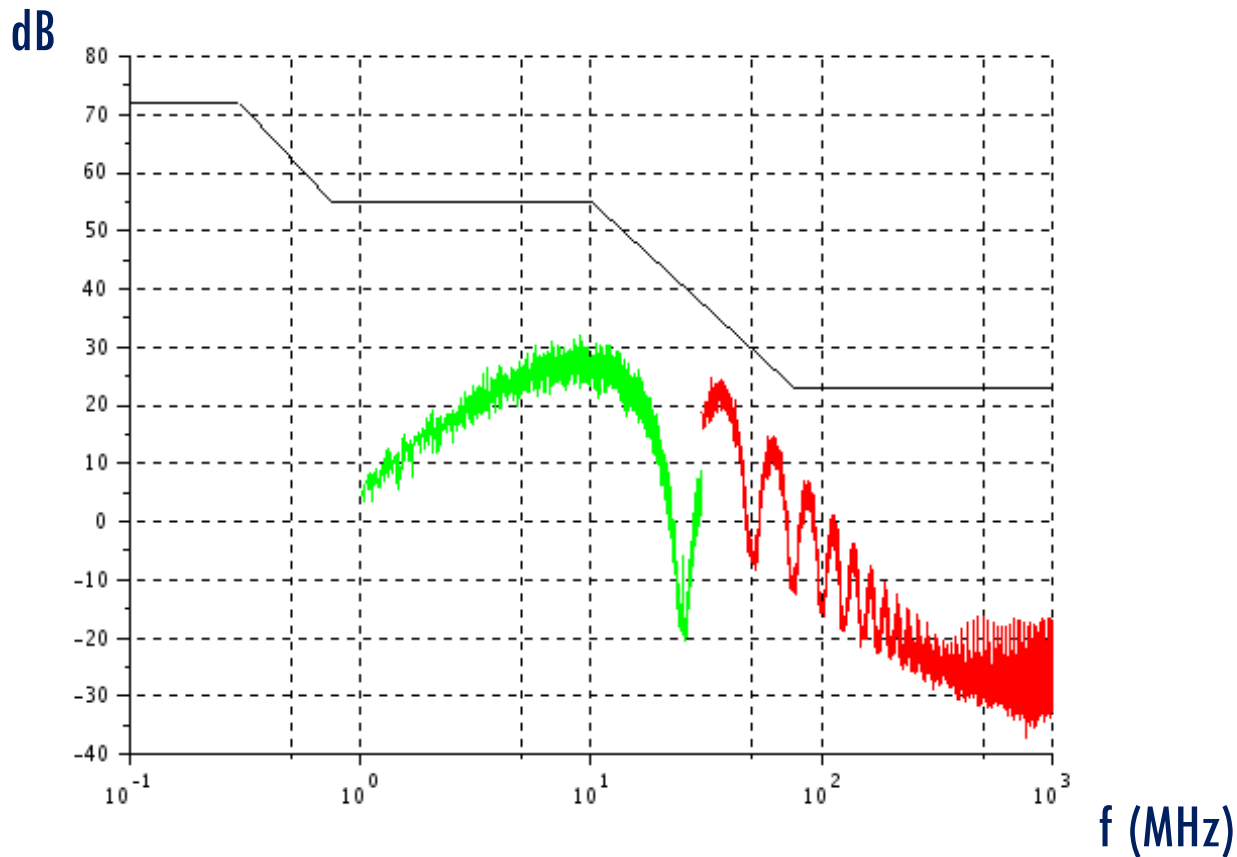
150 Ohm Emission Test

DUT



- Direct Power Injection (DPI) and 150 Ohm emission tests for noise immunity and emission may be used to establish a baseline for PHY EMC performance

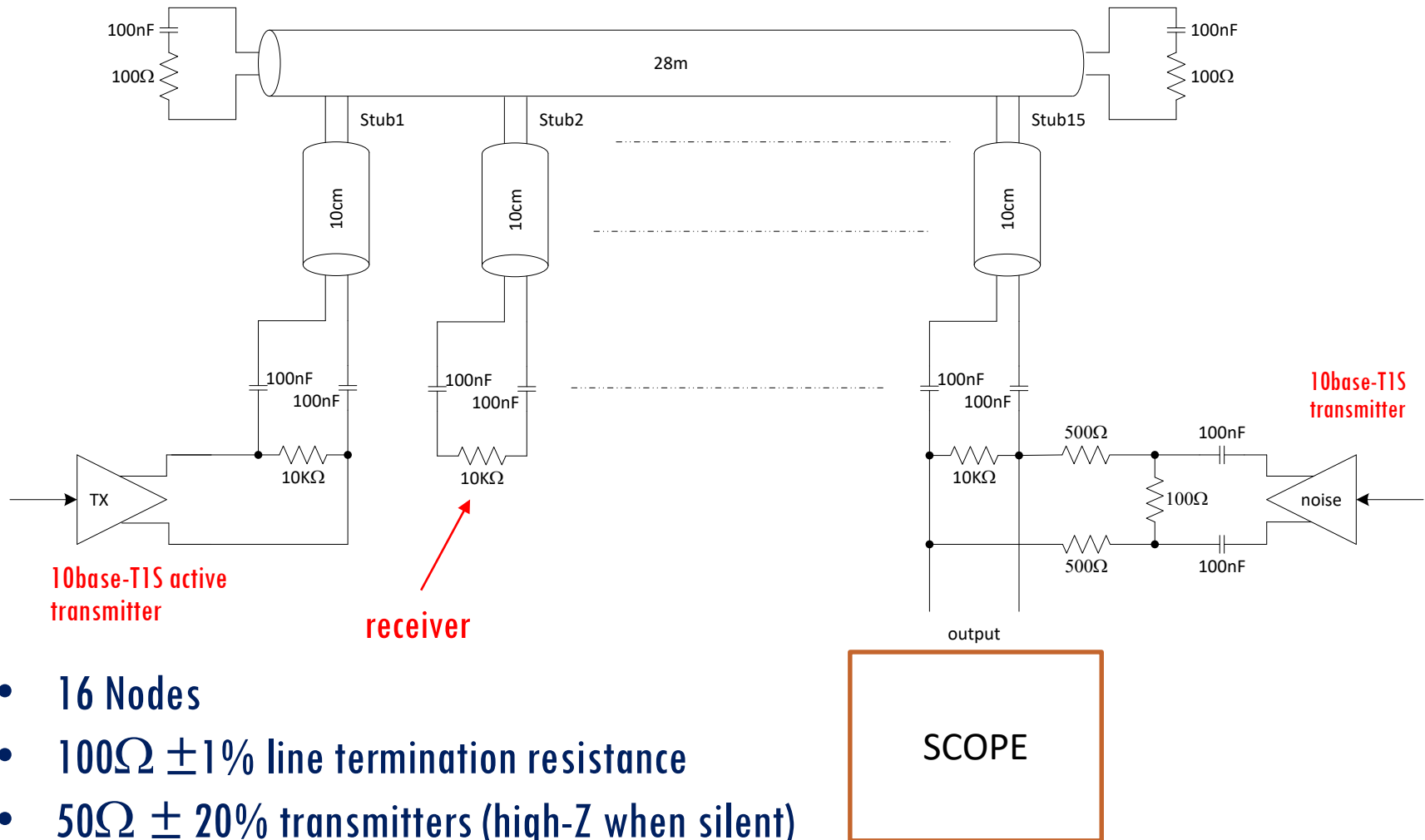
Simulations: P2P Link EMC performance



**EMC performance at max PSD and R1/R2 unbalance of
+/- 2.5%**

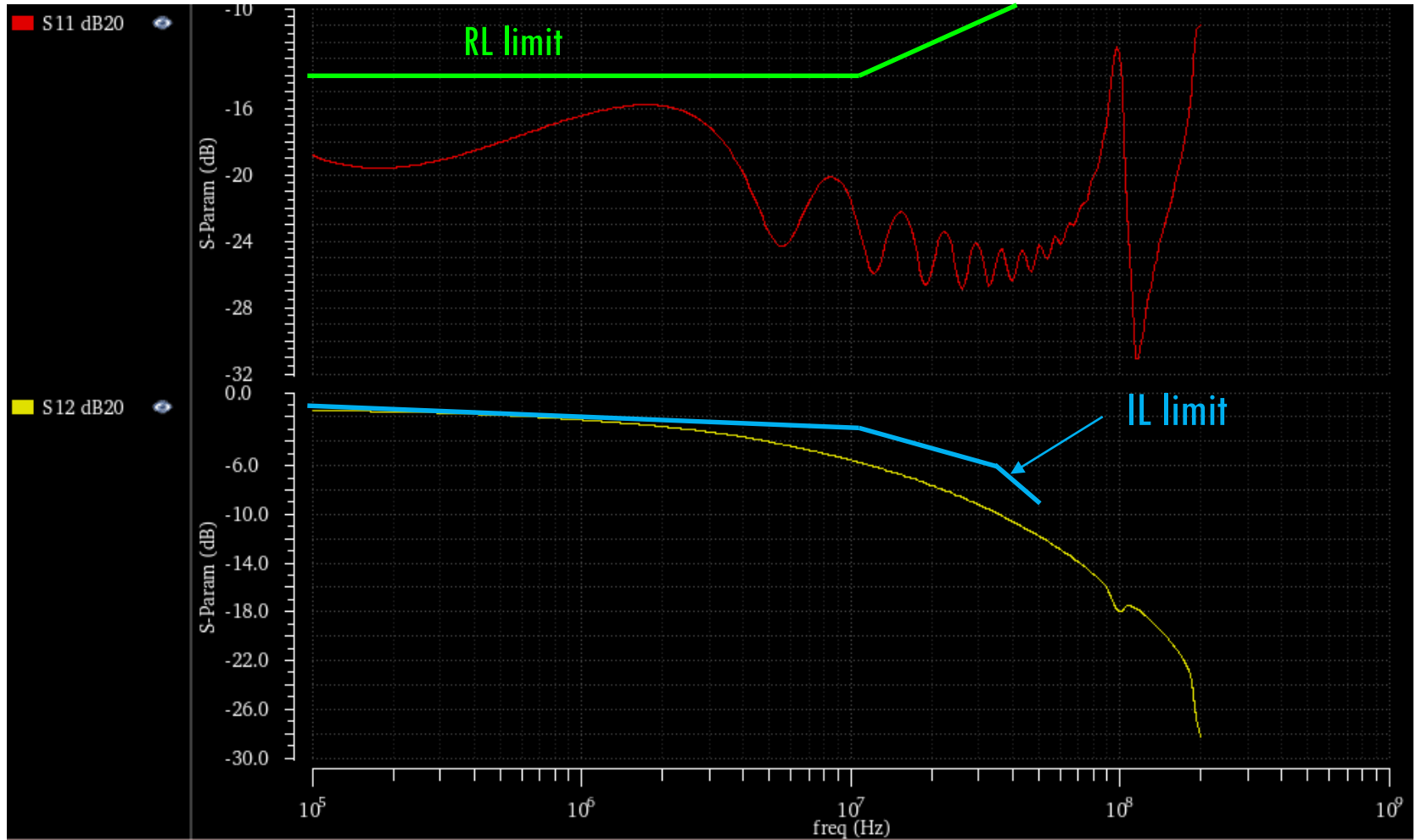
MULTIDROP simulations

Simulations: Multidrop link segment Test Bench

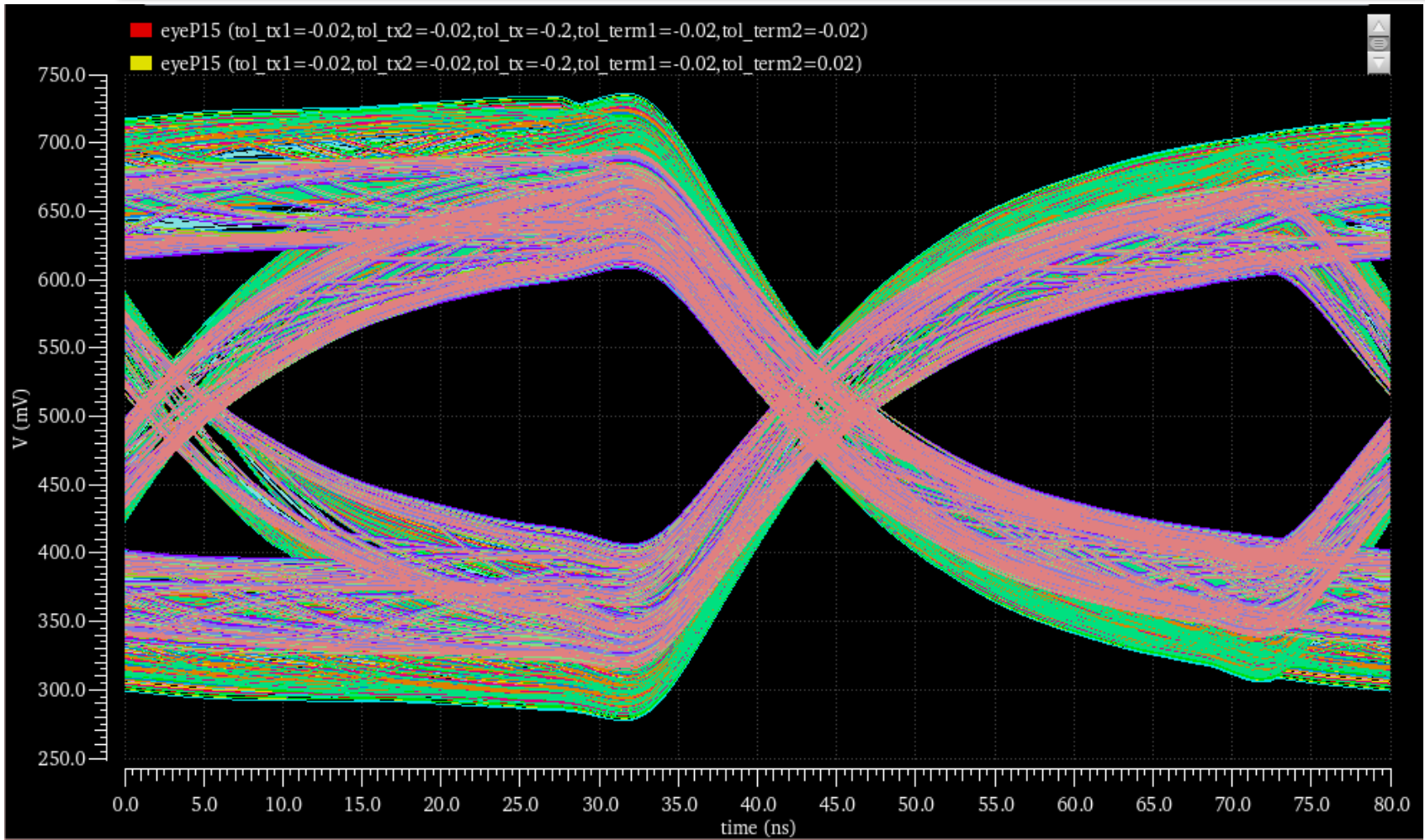


- 16 Nodes
- $100\Omega \pm 1\%$ line termination resistance
- $50\Omega \pm 20\%$ transmitters (high-Z when silent)
- Alien Crosstalk Noise ($\sim 100\text{mV P-P}$)

Simulations: Multidrop link segment RL, IL



Simulations: Multidrop link segment eye diagram



Eye diagram at max impedance mismatch (20%) and alien noise crosstalk

Thank You !