Technology Exploration Forum

Susceptibility of 100G Signaling to Multi-Path Interference

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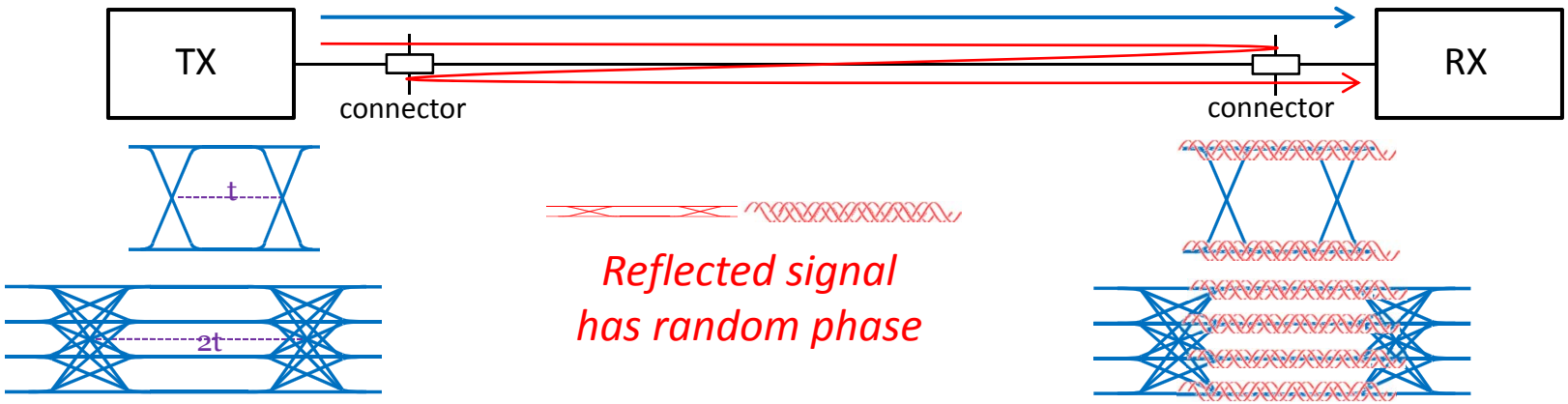
CISCO

Multi-Path Interference Concept

- Each pair of connectors in the link causes a reflection that combines with the intended signal. Rx receives the sum.

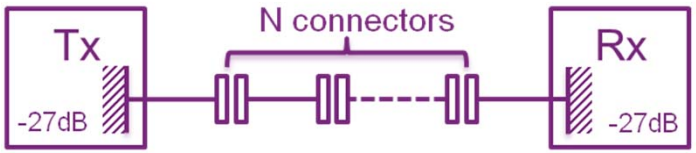


- In IEEE SA meeting, Bhatt_01 (*) showed three theoretical calculations for *four connector* case the Dual Trunk Model

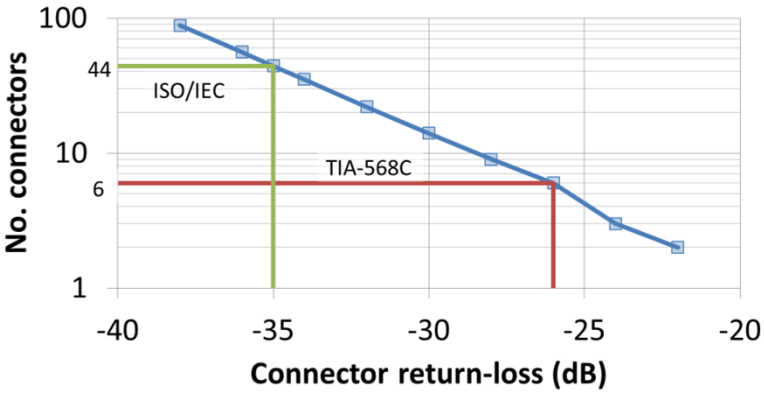
Frequency Domain Method			Time Domain Method			Upper Bound Method		
R (dB)	PAM-8	PAM-16	R (dB)	PAM-8	PAM-16	R (dB)	PAM-8	PAM-16
-30	< 0.3		-30	1.0	2.7	-30	3.57	High
-35	< 0.2		-35	0.3	0.7	-35	0.85	2.07
Matched polarization, all phases at worst case, for 10^-5 error rate.			Matched polarization, random data amplitudes, for 10^-5 error rate.			Matched polarization, pathological data pattern of m^(-cN) probability, for zero errors.		

(*) bhatt_01_0512_NG100GOPTX

Multi-Path Interference Experiment



"Connectors" were reflectometers and/or interferometers. Varying lengths between reflections investigated.



- We have experimentally verified how:
  - MPI Penalty scales with PAM levels
  - MPI Penalty scales with number of connectors

- We have experimentally verified that the theoretical models are overly pessimistic – *detailed analysis being submitted for publication*
  - PAM-8 has <1 dB MPI penalty with **N ≤ 6 connectors** of TIA-568C quality

- *Yet* – Improved connector return loss yields benefits for all future high speed signaling implementations