

CA COM parameters SNR_TX and eta_0 Baseline Proposal

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Thanks and Acknowledgements to Liav Ben Artsi, Marvell
for 3-D Modeling Contributions

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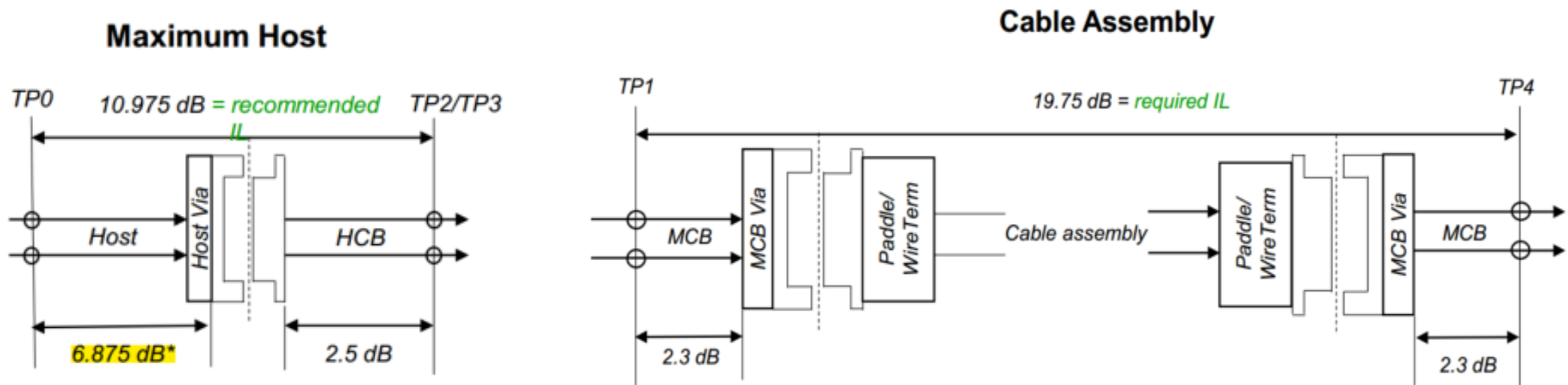
IEEE 802.3 100 Gb/s, 200 Gb/s, and 400 Gb/s Electrical Interfaces Task Force Interim Meeting
Indianapolis, IN, USA

Agenda

- ❑ CA so far and computation circuit review
- ❑ SNR_Tx experiment and recommendation
- ❑ Process to to determine SNR_Tx and eta_0
- ❑ CA COM spreadsheet template
- ❑ Channel Key
- ❑ Results
- ❑ Recommendation

Models use will match this proposal

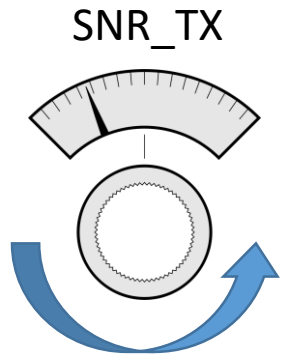
- ❑ The maximum host loss is used to determine the PCB added for the CA COM computation



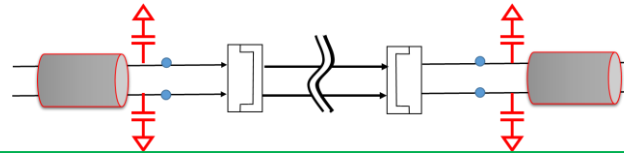
Note: The 6.875 dB includes via allowances for BGA and connector footprint

Method overview

Adjust SNR_TX and eta_0 match to a reference COM which has via crosstalk

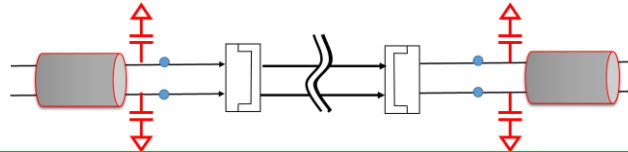


Via thru Tx victim model

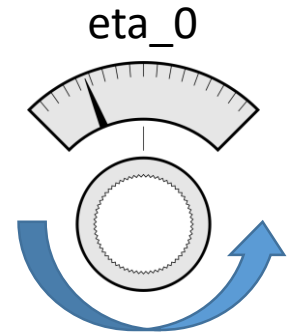


Via thru Rx victim model

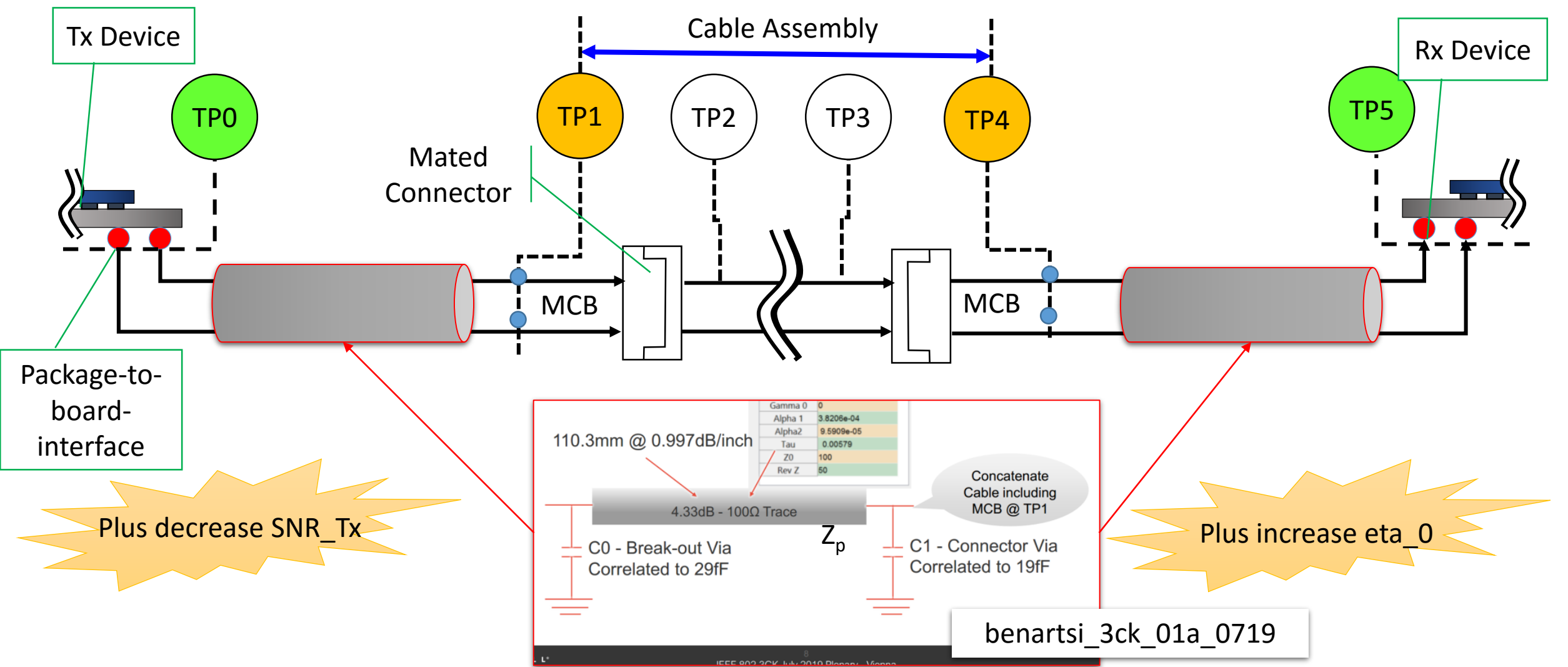
Via thru Tx victim model



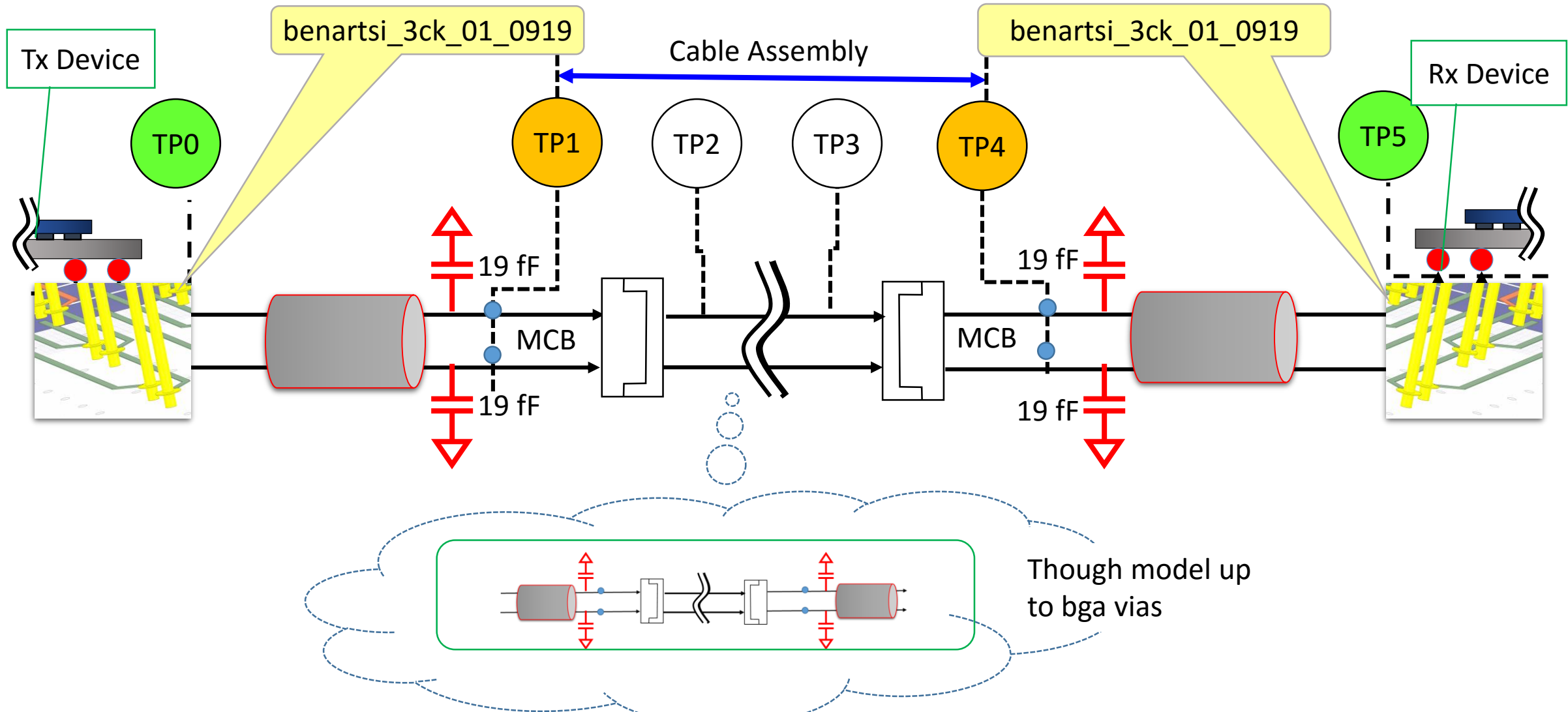
Via thru Rx victim model



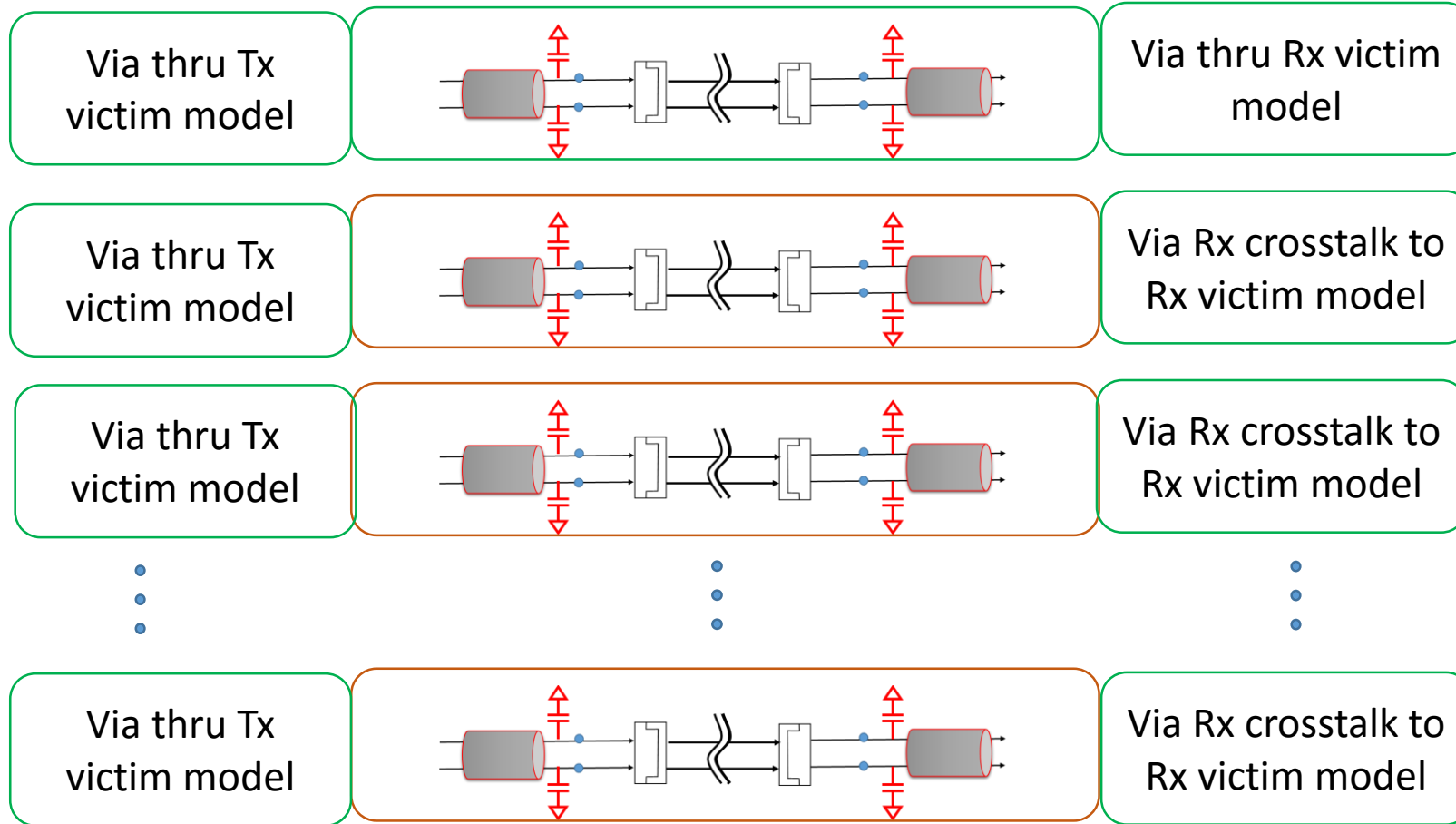
Review of COM for CA Proposal



Models used are from a CA, added boards, and vias



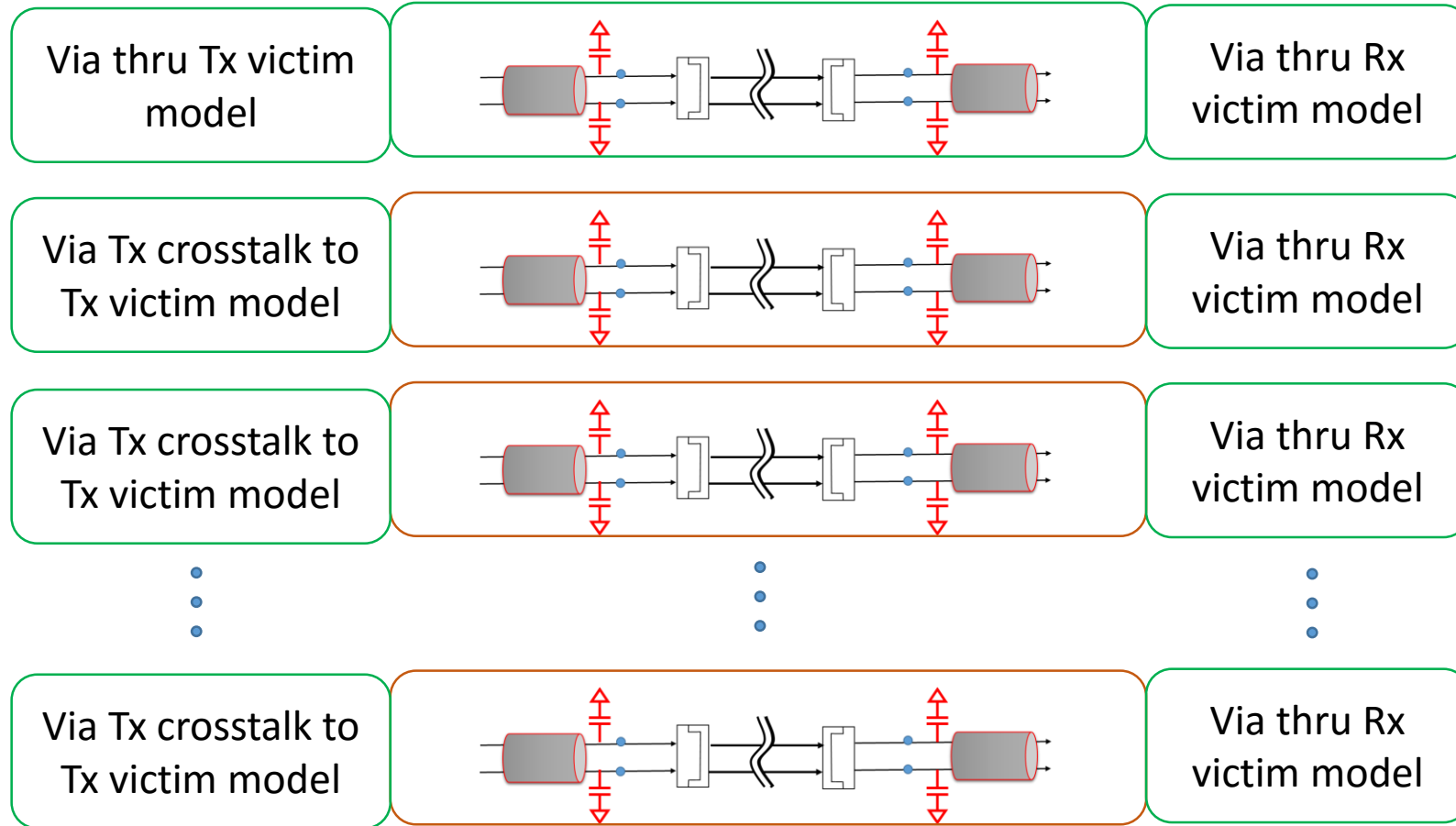
Process to finding η_{0} equivalent to via crosstalk



Tp0-Tp5 with crosstalk

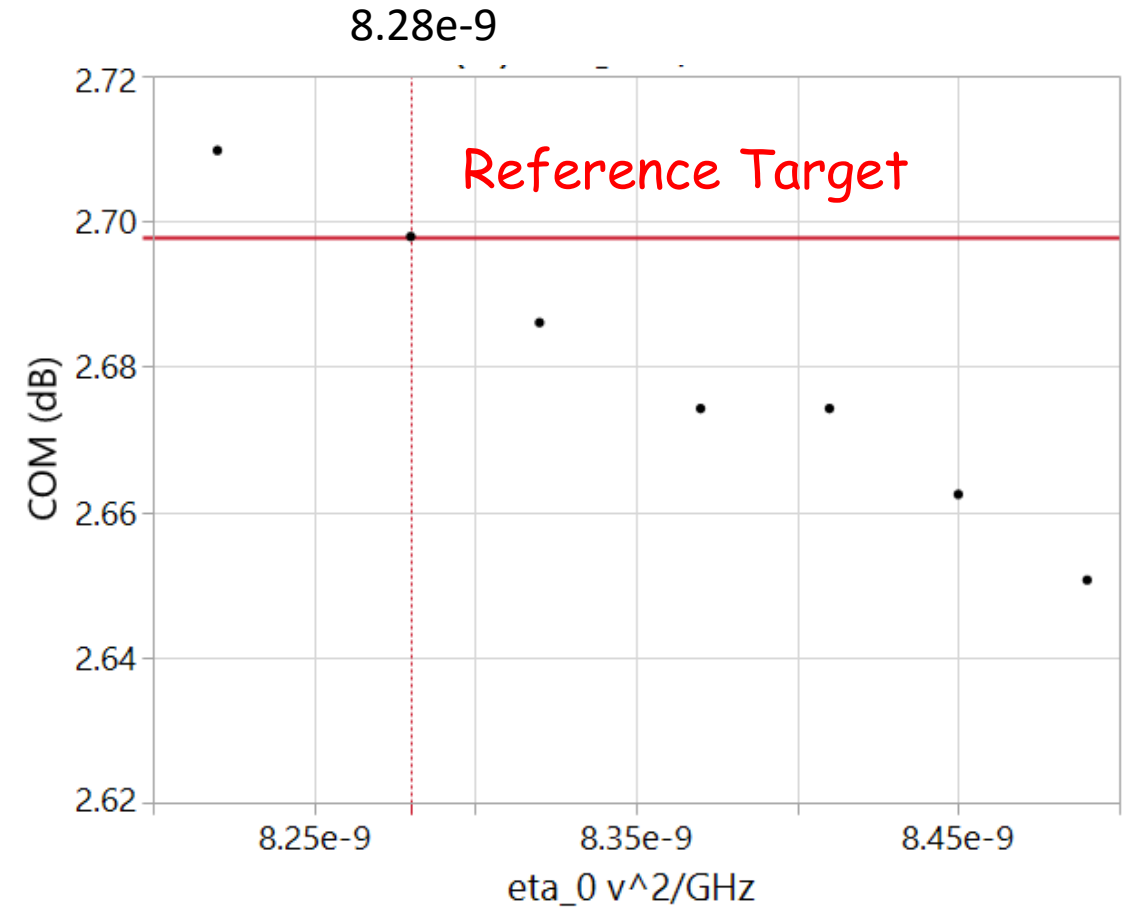
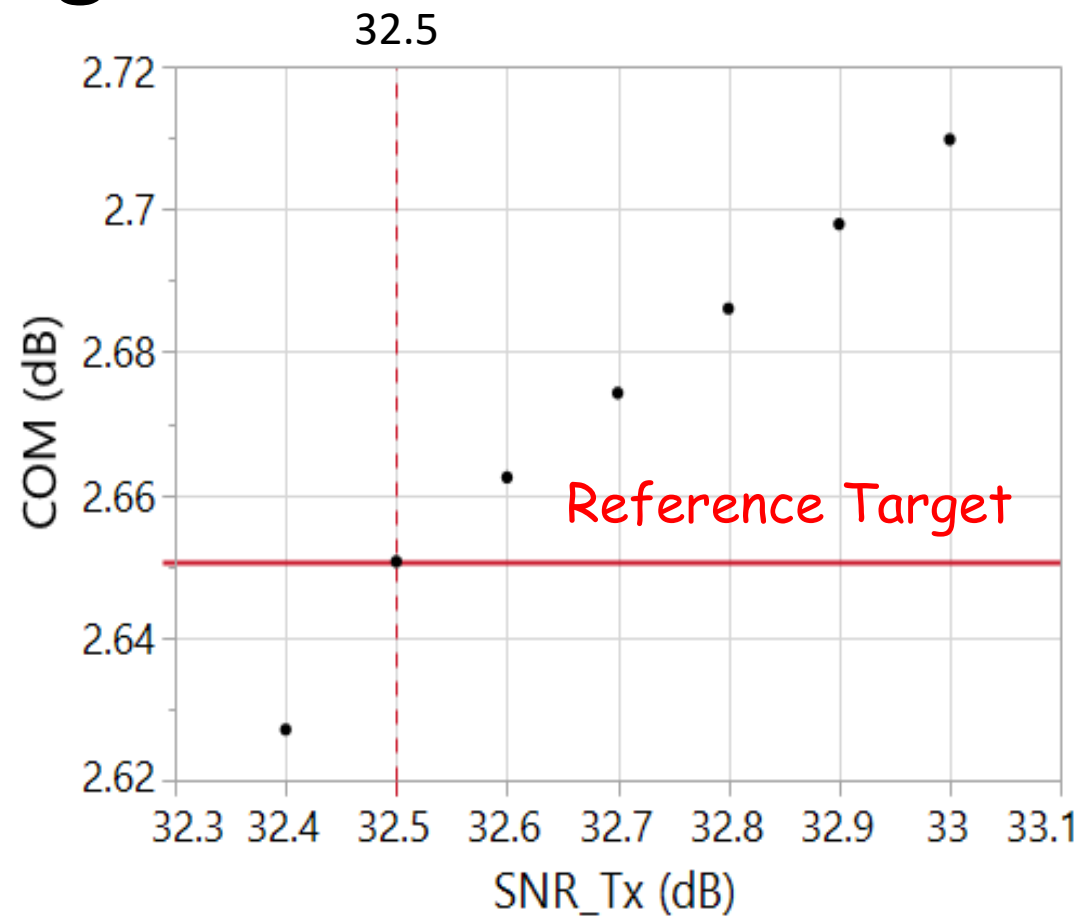
- ☐ Build Tp0-Tp5 with and without Rx via crosstalk
 - Only use through files for CA, Tx vias. and Rx vias
- ☐ Baseline target is COM with Rx via crosstalk
 - KR spreadsheet in backup slides was used
- ☐ For the no crosstalk channel determine the value of η_{0} where COM matches the target

Process to finding SNR_TX equivalent to via crosstalk



- ❑ Build Tp0-Tp5 with and without Tx via crosstalk
 - Only use through files for CA, Tx vias. and Rx vias
- ❑ Baseline target is COM with Tx via crosstalk
 - KR spreadsheet in backup slides was used
- ❑ For the no crosstalk channel determine the value of SNR_TX where COM matches the target

Results are found my matching to reference target



COM CA Host Noise Parameter Baseline Recommendation

- ❑ $\text{SNR}_{\text{TX}} = 32.5 \text{ dB}$
- ❑ $\eta_0 = 8.28\text{E-}09 \text{ v}^2/\text{GHz}$

Backup

KR COM configuration example

Table 93A-1 parameters			
Parameter	Setting	Units	Information
f_b	53.125	GBd	
f_min	0.05	GHz	
Delta_f	0.01	GHz	
C_d	[1.2e-4 1.2e-4]	nF	[TX RX]
L_s	[0.12, 0.12]	nH	[TX RX]
C_b	[0.3e-4 0.3e-4]	nF	[TX RX]
z_p select	[1 2]		[test cases to run]
z_p (TX)	[12 31; 1.8 1.8]	mm	[test cases]
z_p (NEXT)	[12 29; 1.8 1.8]	mm	[test cases]
z_p (FEXT)	[12 31; 1.8 1.8]	mm	[test cases]
z_p (RX)	[12 29; 1.8 1.8]	mm	[test cases]
C_p	[0.87e-4 0.87e-4]	nF	[TX RX]
R_0	50	Ohm	
R_d	[50 50]	Ohm	[TX RX]
A_v	0.415	V	vp/vf=.694
A_fe	0.415	V	vp/vf=.694
A_ne	0.608	V	
L	4		
M	32		
filter and Eq			
f_r	0.75	*fb	
c(0)	0.54		min
c(-1)	[-0.34:0.02:0]		[min:step:max]
c(-2)	[0:0.02:0.12]		[min:step:max]
c(-3)	[-0.06:0.02: 0]		[min:step:max]
c(1)	[-0.2:0.05:0]		[min:step:max]
N_b	12	UI	
b_max(1)	0.85		
b_max(2..N_b)	0.2		
g_DC	[-20:1:0]	dB	[min:step:max]
f_z	21.25	GHz	
f_p1	21.25	GHz	
f_p2	53.125	GHz	
g_DC_HP	[-6:1:0]		[min:step:max]

I/O control		
DIAGNOSTICS	1	logical
DISPLAY_WINDOW	1	logical
CSV_REPORT	1	logical
RESULT_DIR	.\results\100GEL_CR_{date}\	
SAVE_FIGURES	0	logical
Port Order	[1 3 2 4]	
RUNTAG	CR_eval_	
COM_CONTRIBUTION	0	logical
Operational		
COM Pass threshold	3	dB
ERL Pass threshold	10	dB
DER_0	1.00E-04	
T_r	6.16E-03	ns
FORCE_TR	1	logical

TDR and ERL options		
TDR	1	logical
ERL	1	logical
ERL_ONLY	0	logical
TR_TDR	0.01	ns
N	3000	
beta_x	2.3407E+09	
rho_x	0.16	
fixture delay time	[0 0]	[port1 port2]
TDR_W_TXPKG	0	
N_bx	12	UI
Receiver testing		
RX_CALIBRATION	0	logical
Sigma BBN step	5.00E-03	V
Noise, jitter		
sigma_RJ	0.01	UI
A_DD	0.02	UI
eta_0	8.2E-09	V^2/GHz
SNR_TX	33	dB
R_LM	0.95	

Table 93A-3 parameters		
Parameter	Setting	Units
package_tl_gamma0_a1_a2	[0 0.0009909 0.0002772]	
package_tl_tau	6.141E-03	ns/mm
package_Z_c	[87.5 87.5 ; 92.5 92.5]	Ohm
benartsi_3ck_01_0119 & mellitz_3ck_01_0119		
Table 92-12 parameters		
Parameter	Setting	
board_tl_gamma0_a1_a2	[0 3.8206e-04 9.5909e-05]	
board_tl_tau	5.790E-03	ns/mm
board_Z_c	100	Ohm
z_bp (TX)	110.3	mm
z_bp (NEXT)	110.3	mm
z_bp (FEXT)	110.3	mm
z_bp (RX)	110.3	mm
C_0	[0.29e-4]	nF
C_1	[0.19e-4]	nF
Include PCB	0	logical

Floating Tap Control		
N_bg	3	0 1 2 or 3 groups
N_bf	3	taps per group
N_f	40	UI span for floating taps
bmaxg	0.2	max DFE value for floating taps

cable assemblies require this for each HCB

ICN parameters (v2.73)		
f_f	12.919	
f_n	12.919	
f_2	39.844	
A_ft	0.600	
A_nt	0.600	
heck_3ck_03b_0319	Adopted Mar 2019	
walker_3ck_01a_0719	Adopted July 2019	
result of R_d=50		
benartsi_3ck_01a_0719	no used for KR	
mellitz_3ck_03_0919		

CR/CA COM configuration example

Table 93A-1 parameters			
Parameter	Setting	Units	Information
f_b	53.125	GBd	
f_min	0.05	GHz	
Delta_f	0.01	GHz	
C_d	[1.2e-4 1.2e-4]	nF	[TX RX]
L_s	[0.12, 0.12]	nH	[TX RX]
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heck_3ck_03b_0319	Adopted Mar 2019	
walker_3ck_01a_0719	Adopted July 2019	
result of R_d=50		
benartsi_3ck_01a_0719	require COM 2.72 or later	
mellitz_3ck_03_0919		
mellitz_3ck_02_0919		