224G – CR/KR Channel Analysis with COM 4.6 beta 2

Jun 2024

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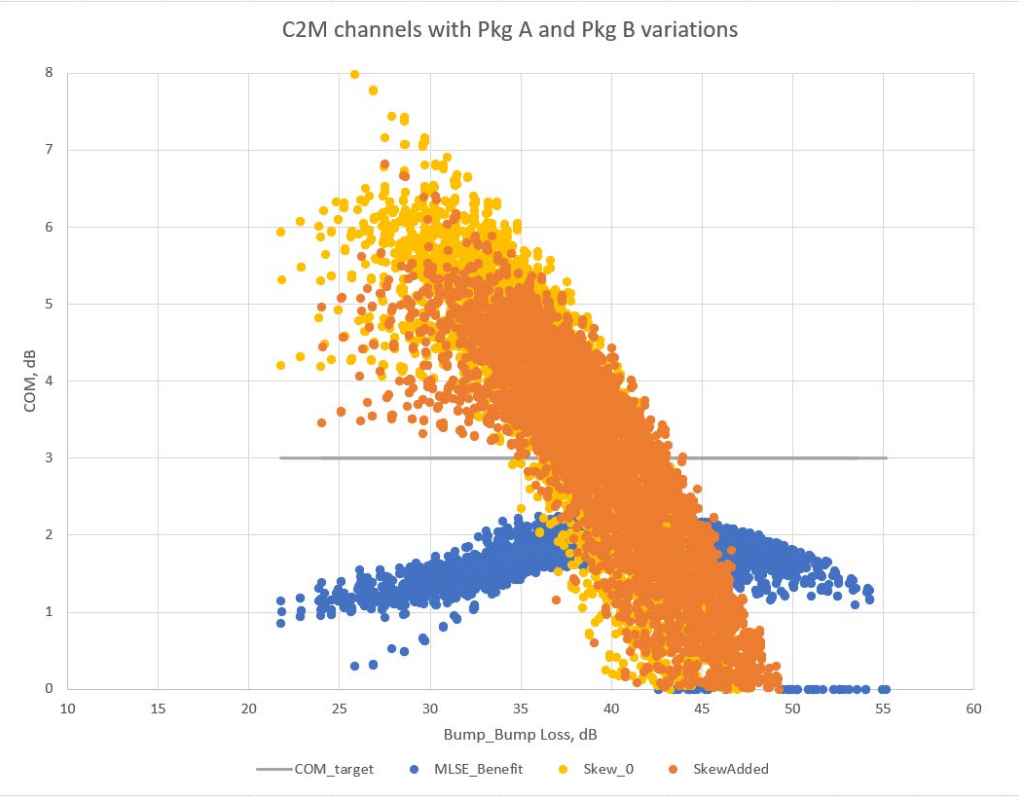
CR/KR Channel Analysis - Setup

- COM tool version: 4.6 Beta 2.
- All channels that were contributed to 802.3dj project for CR/KR interfaces.
  - Includes PCB-host and Cabled-host channels
  - Most CR channels are PCB host channels
  - Most KR channels are Cabled Host channels
  - Except Megha Shanbhag contributed channels have all combinations
- Base configuration for simulation and test Configs Include:
  - Both types of packages (Type A and Type B)
    - But presenting here only with Package B
  - Mixing of Package types for Package variations
    - Transmitter package trace lengths – 8 mm to 45 mm
    - Receiver package trace lengths – 8 mm to 45 mm
    - Presenting only Package B length variations – 36 combinations
  - Cover all CR/KR channels contributed to IEEE C2M interface
    - ***Added skew variations by max tolerable skew for all channels (Identifying basic skew profiles in freq. domain slide 13 of kareti_3dj_02_2401.pdf – actual step by step procedure is not shared)***
    - Impedance variations
    - Temperature variations
  - Receiver
    - Num of RX FFE pre-cursors : 6
    - Num of RX FFE fixed post cursors : 200; 8 to 16
    - Number of banks of floating up to 60 UI -100 UI: 1 to 3
    - Input Reference Noise (ETA_0) levels (V^2/GHz) : 1e-8
  - NEXT Voltage levels
    - A_Ne = A_V

Reference Receiver Options

CR/KR Channel Analysis – Ethernet data rate -212.5 Gbps



Total#cases	11190	9308	1882	1712	9478
Cases <40 dB	6837	Cabled Host	PCB Host	CR	KR

Config: 1 - Intended for finding High side book-end Ref. Receiver solution

Receiver

- Num of RX FFE pre-cursors : 6
- Num of RX FFE fixed post cursors : 200

**Max Tolerable Skew cases included but separated the stats.*

1 tap DFE (No MLSE)

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644

<=24	0	**24-32**	0	**32-40**	968
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	431	537

>40	3883
Skew_Added	Skew_0
2427	1456

MLSE - No Limit Placed

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644

<=24	0	**24-32**	0	**32-40**	24
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	3	21

>40	1614
Skew_Added	Skew_0
942	672

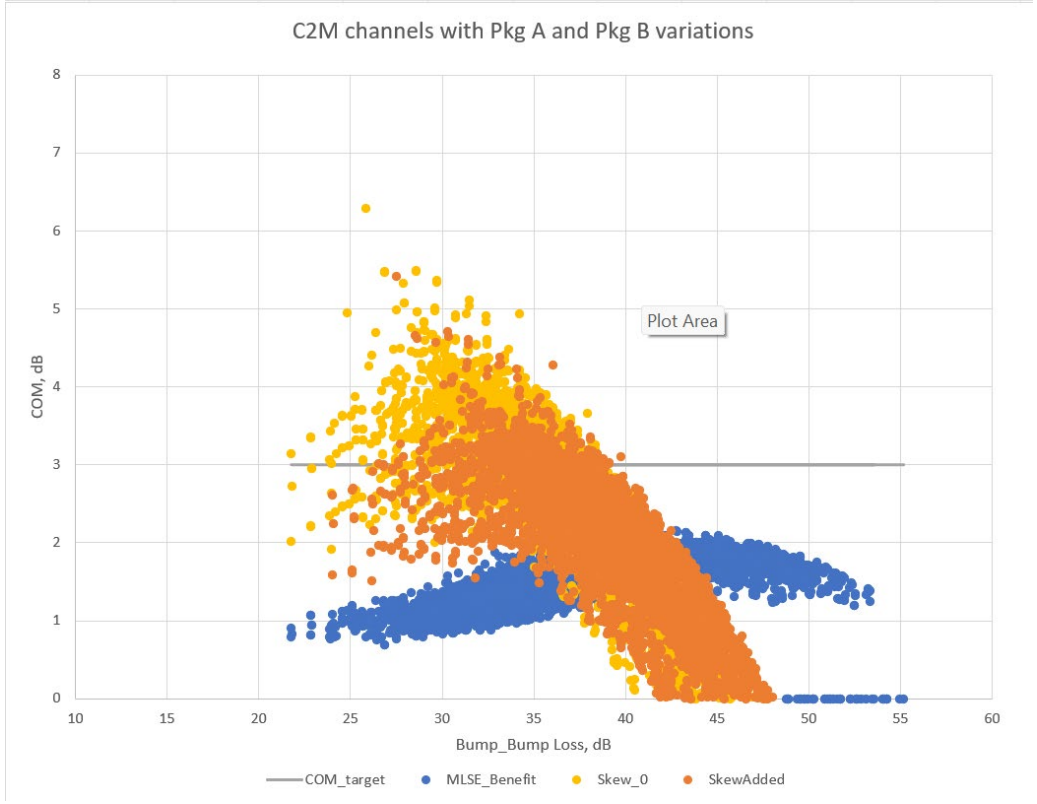
MLSE with max benefit limted to 1 dB

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644

<=24	0	**24-32**	0	**32-40**	146
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	55	91

>40	2685
Skew_Added	Skew_0
1652	1033

CR/KR Channel Analysis – Ethernet data rate -212.5 Gbps



Total#cases	11094	9222	1872	1656	9438
Cases <40 dB	6926	Cabled Host	PCB Host	CR	KR

Config: 2
Receiver

- Num of RX FFE pre-cursors : 6
- Num of RX FFE fixed post cursors : 16
- Number of banks of floating up to 60 UI: 1

**Max Tolerable Skew cases included but separated the stats.*

1 tap DFE (No MLSE)

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644							
<=24	10	**24-32**	359	**32-40**	4185	**>40**	4168
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
1	9	187	172	2166	2019	2617	1551

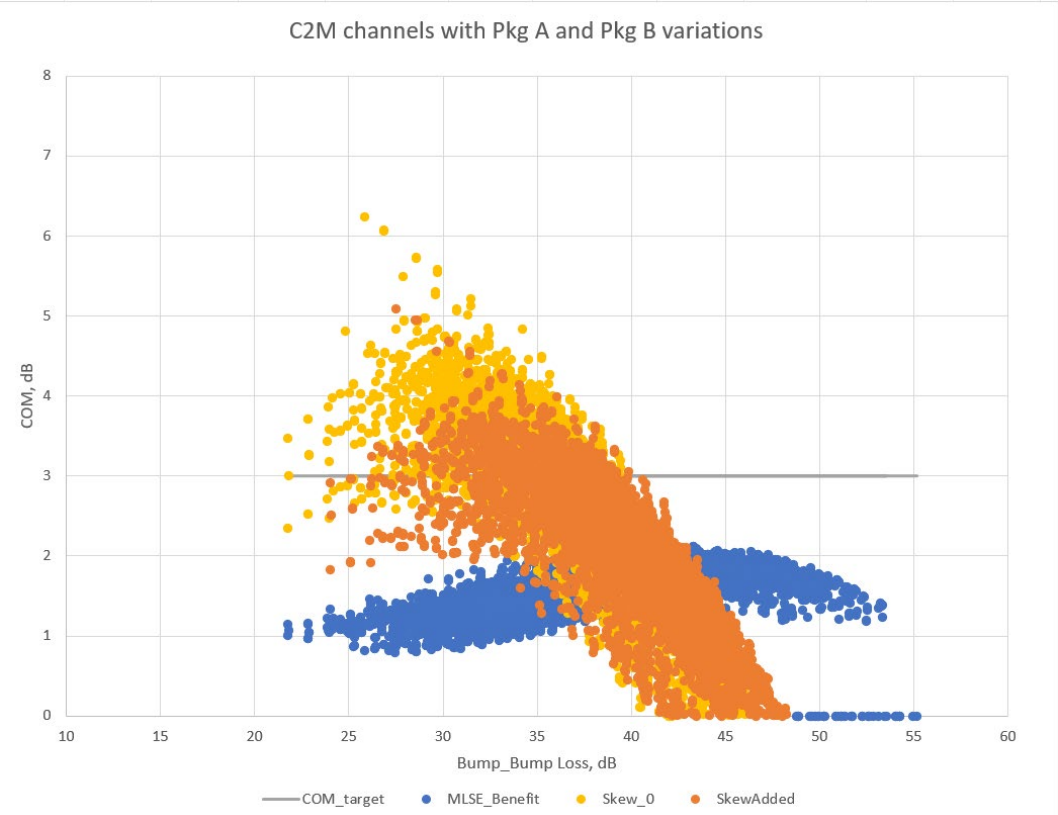
MLSE - No Limit Placed

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644							
<=24	3	**24-32**	7	**32-40**	150	**>40**	2546
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
1	2	7	0	74	76	1537	1009

MLSE with max benefit limited to 1 dB

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644							
<=24	3	**24-32**	29	**32-40**	944	**>40**	3821
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
1	2	29	0	506	438	2377	1444

CR/KR Channel Analysis – Ethernet data rate -212.5 Gbps



Total#cases	10926	9054	1872	1656	9270
Cases <40 dB	6859	Cabled Host	PCB Host	CR	KR

Config: 3
Receiver

- Num of RX FFE pre-cursors : 6
- Num of RX FFE fixed post cursors : 8
- Number of banks of floating up to 80 UI: 2

**Max Tolerable Skew cases included but separated the stats.*

1 tap DFE (No MLSE)

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644						**>40**	4067
<=24	7	**24-32**	230	**32-40**	3738	Skew_Added	Skew_0
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	2552	1515
1	6	138	92	1991	1747		

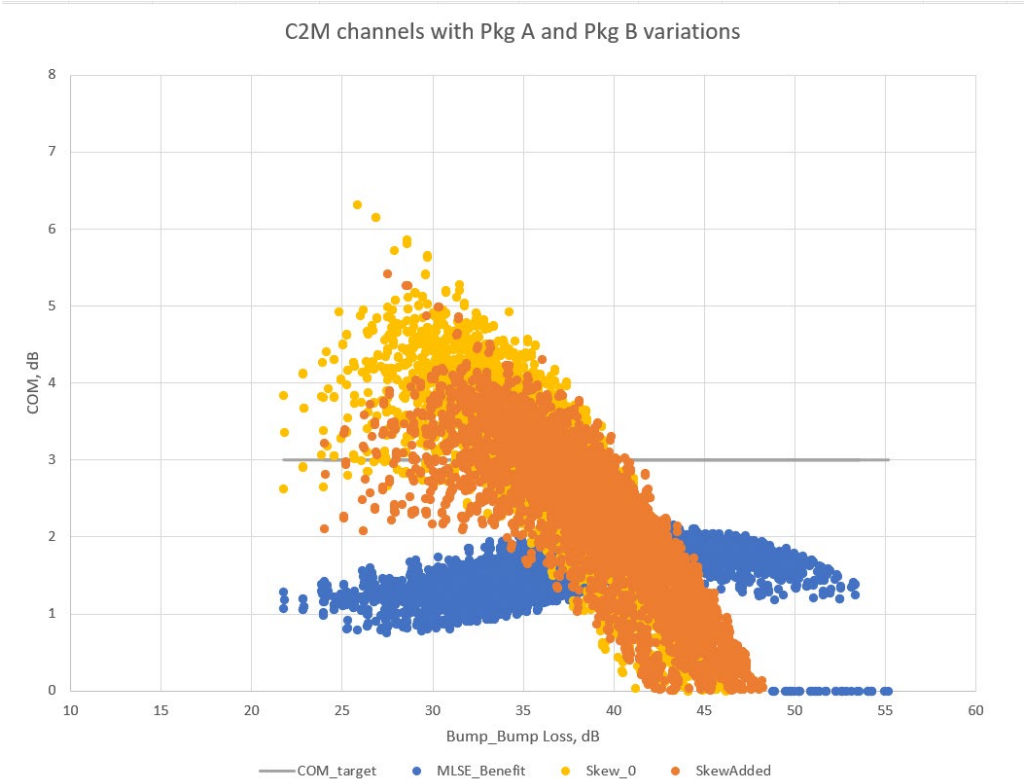
MLSE - No Limit Placed

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644						**>40**	2315
<=24	0	**24-32**	0	**32-40**	127	Skew_Added	Skew_0
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	1396	919
0	0	0	0	74	53		

MLSE with max benefit limited to 1 dB

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644						**>40**	3628
<=24	1	**24-32**	5	**32-40**	790	Skew_Added	Skew_0
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	2254	1374
1	0	5	0	434	356		

CR/KR Channel Analysis – Ethernet data rate -212.5 Gbps



Total#cases	10926	9054	1872	1656	9270
Cases <40 dB	6859	Cabled Host	PCB Host	CR	KR

Config: 4
Receiver

- Num of RX FFE pre-cursors : 6
- Num of RX FFE fixed post cursors : 8
- Number of banks of floating up to 80 UI: 3

**Max Tolerable Skew cases included but separated the stats.*

1 tap DFE (No MLSE)

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644					
<=24	5	**24-32**	153	**32-40**	3215
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
1	4	105	48	1677	1538

>40	4065
Skew_Added	Skew_0
2550	1515

MLSE - No Limit Placed

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644					
<=24	0	**24-32**	0	**32-40**	76
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	37	39

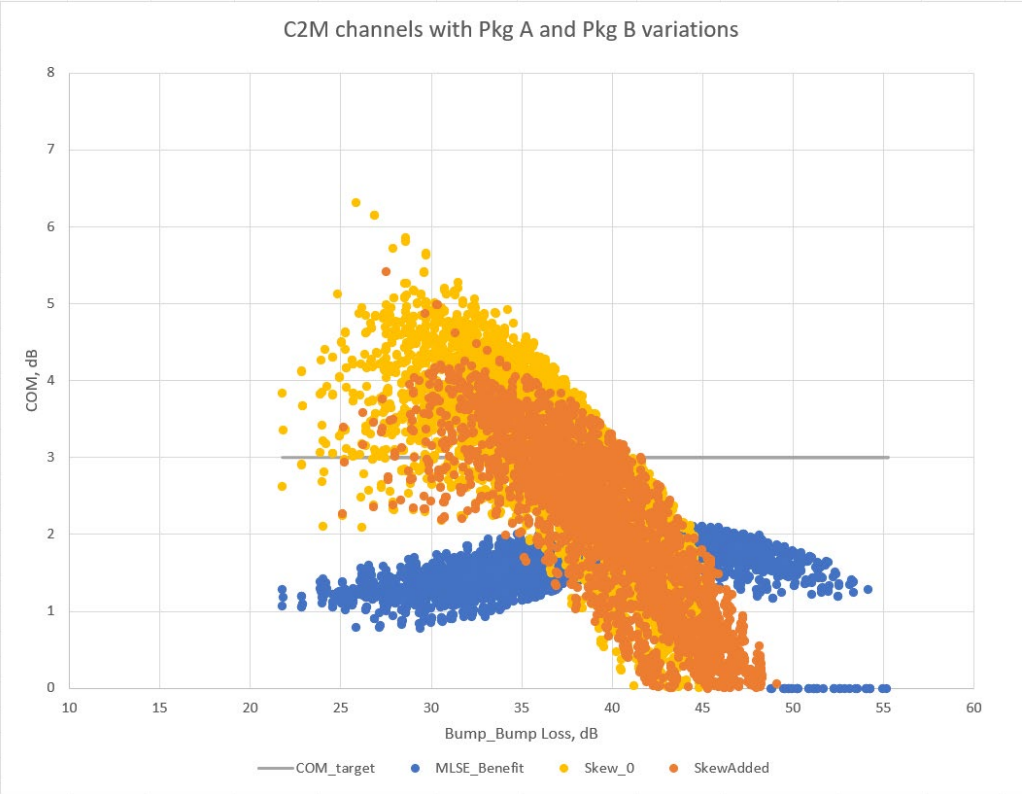
>40	2211
Skew_Added	Skew_0
1323	888

MLSE with max benefit limited to 1 dB

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644					
<=24	0	**24-32**	0	**32-40**	587
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	296	291

>40	3522
Skew_Added	Skew_0
2174	1348

CR/KR Channel Analysis – Ethernet data rate -212.5 Gbps



Total#cases	10678	8832	1846	1630	9048
Cases <40 dB	6735	Cabled Host	PCB Host	CR	KR

Config: 5
Receiver

- Num of RX FFE pre-cursors : 6
- Num of RX FFE fixed post cursors : 8
- Number of banks of floating up to 100 UI: 3

**Max Tolerable Skew cases included but separated the stats.*

1 tap DFE (No MLSE)

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644					
<=24	5	**24-32**	116	**32-40**	2707
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
1	4	94	22	1459	1248

>40	3910
Skew_Added	Skew_0
2454	1456

MLSE - No Limit Placed

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644					
<=24	0	**24-32**	0	**32-40**	63
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	31	32

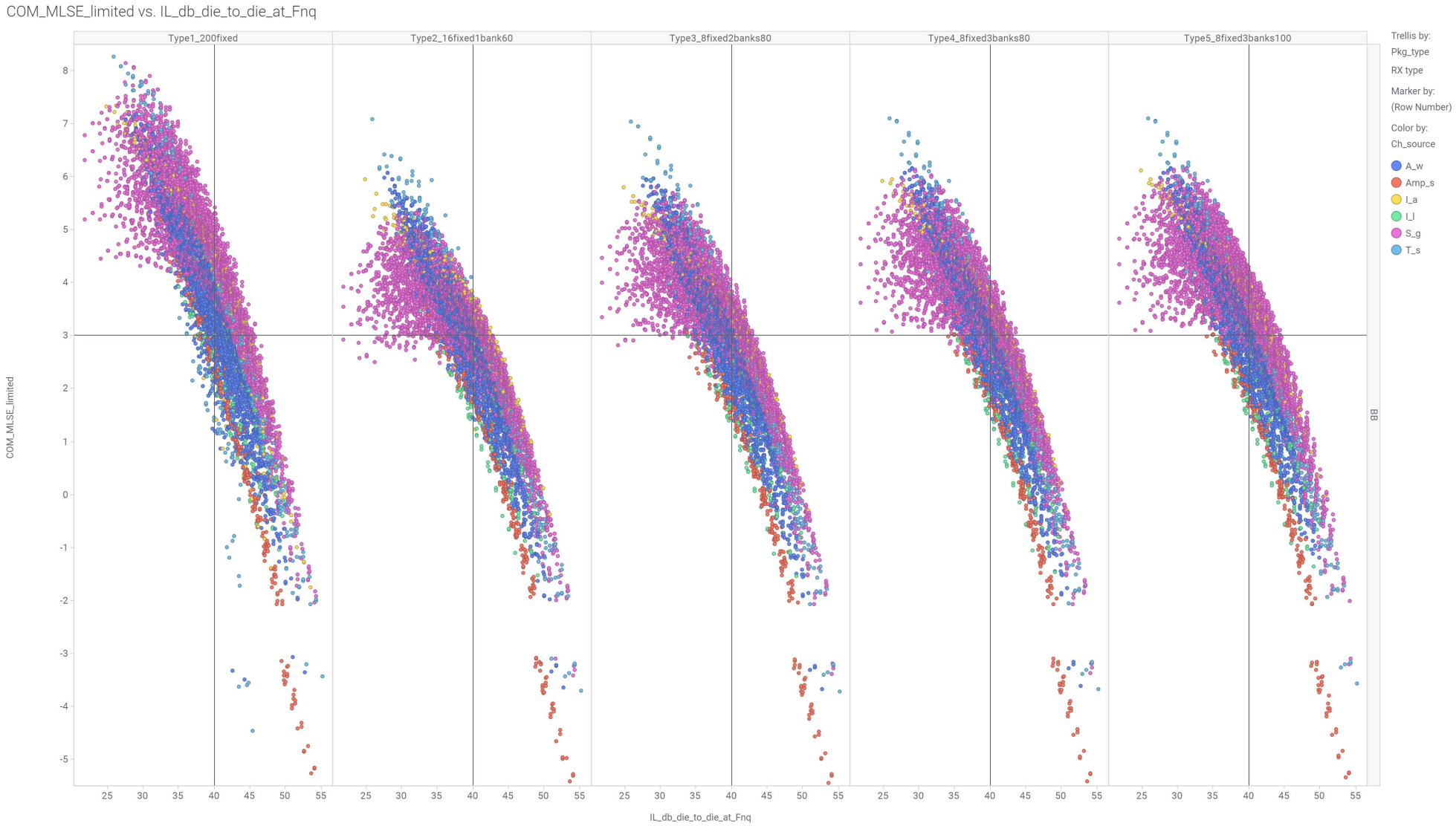
>40	1886
Skew_Added	Skew_0
1126	760

MLSE with max benefit limited to 1 dB

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644					
<=24	0	**24-32**	0	**32-40**	440
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	229	211

>40	3164
Skew_Added	Skew_0
1946	1218

Ref.RX comparison with Max MLSE Benefit limited to 1 B



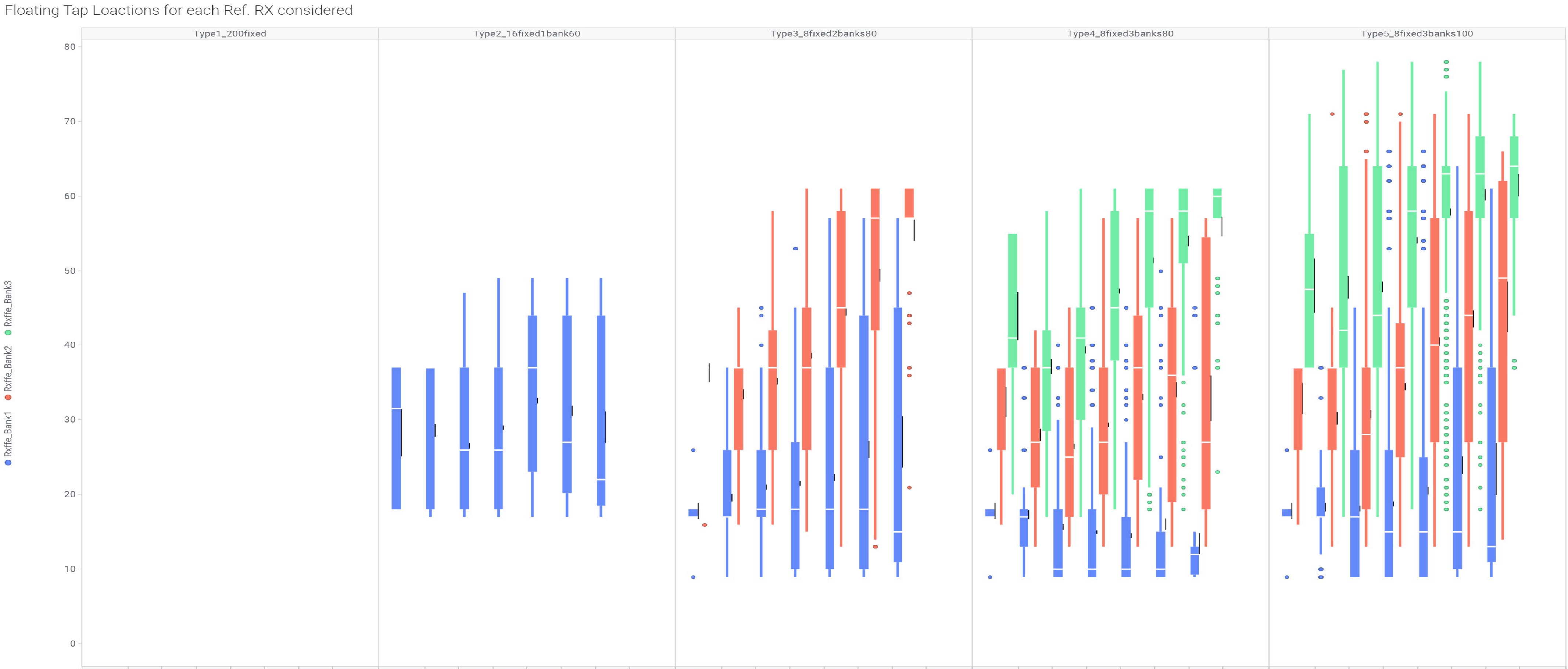
Filter Settings
- Pkg_type: (BB)

Reference Receiver Options Summary

- Config1 is only used for to high side book-end solution for Ref. Receiver
- Config 5 seems to a solution for consideration
- Observations:
  - Present COM code is reporting floating point location(s) are misaligned with positions in tap values filed
    - When 1 bank is used 8 taps misalignment is observed
    - When 2 or 3 banks are used 16 taps misalignment is observed
    - E.g., when 100 UI span is used in Config 5 with 3 floating banks, floating taps are only up to max 84 UI (farthest 3rd bank was in positions 78-81 UI.

Floating Tap locations and Max values

Floating tap Locations for each Ref, RX Type



Type1_200fixed

	20.00 ≤...			25.0...			30.0...			35.0...			40.0...			45.0...			50.0...			55.00 ≤...		
	Rx...	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	Rx...
Count	31	3	3	4	4	4	2	2	2	4	4	4	3	3	3	1	1	1	1	1	1	1	1	1
Median	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Outliers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Type2_16fixed1bank60

	20.00 ≤...			25.0...			30.0...			35.0...			40.0...			45.0...			50.0...			55.00 ≤...		
	Rx...	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	Rx...
Count	32	3	3	4	4	4	2	2	2	4	4	4	3	3	3	9	9	9	1	1	1	1	1	1
Median	31...	0	0	3	0	0	2	0	0	2	0	0	3	0	0	2	0	0	2	0	0	1	0	0
Outliers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Type3_8fixed2banks80

	20.00 ≤...			25.0...			30.0...			35.0...			40.0...			45.0...			50.0...			55.00 ≤...		
	Rx...	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	Rx...
Count	32	3	3	4	4	4	2	2	2	4	4	4	3	3	3	9	9	9	1	1	1	1	1	1
Median	17	3	0	1	3	0	1	3	0	1	3	0	1	4	0	1	5	0	1	5	0	1	6	0
Outliers	4	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	7	0	0	2	0	0	0	0

Type4_8fixed3banks80

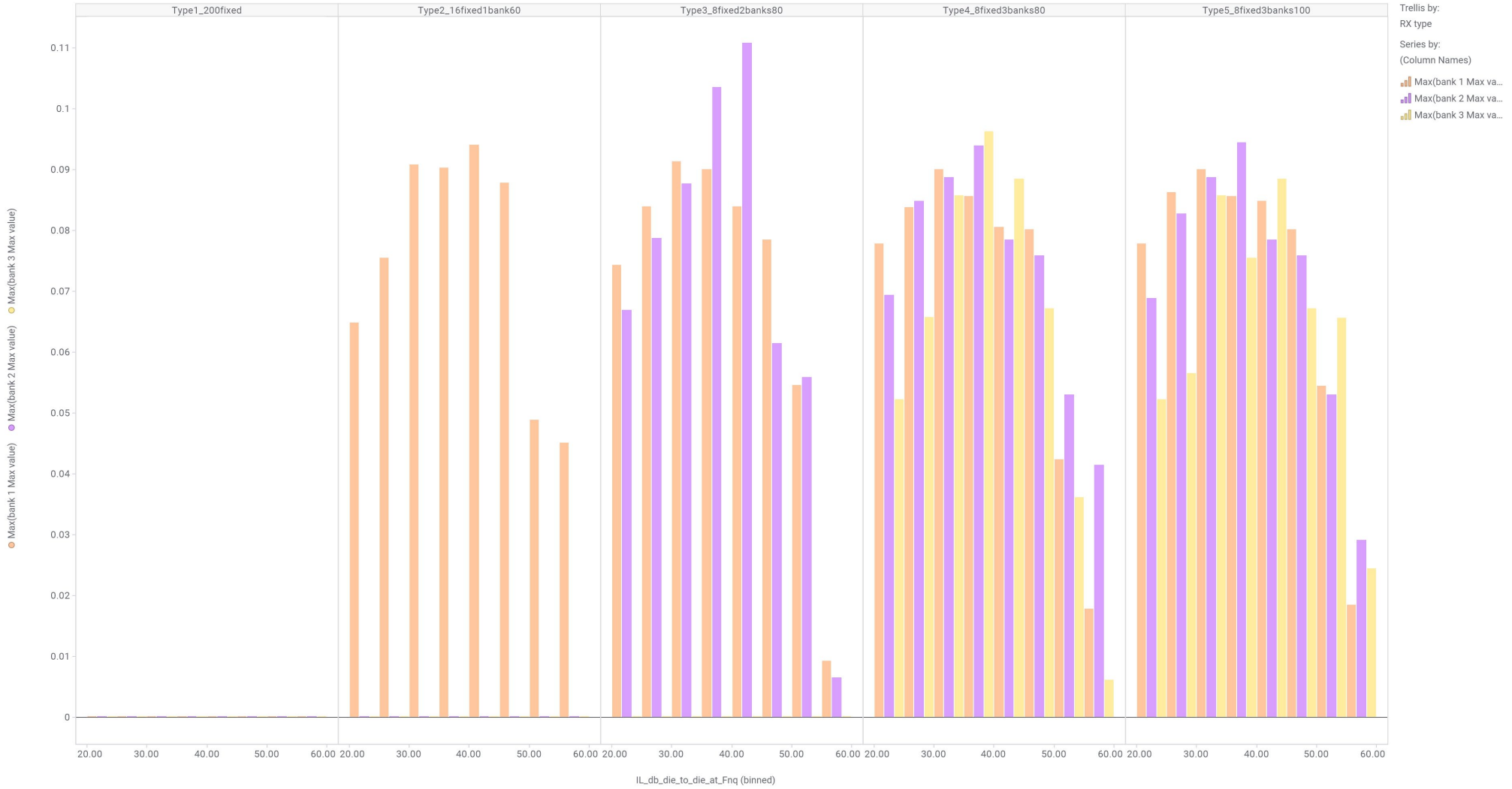
	20.00 ≤...			25.0...			30.0...			35.0...			40.0...			45.0...			50.0...			55.00 ≤...		
	Rx...	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	Rx...
Count	32	3	3	4	4	4	2	2	2	4	4	4	3	3	3	9	9	9	1	1	1	1	1	1
Median	17	3	4	1	2	3	1	2	4	1	2	4	1	3	5	1	3	5	1	2	6	1	1	61
Outliers	4	0	0	9	0	0	1	0	0	4	0	0	2	0	5	1	0	6	8	0	2	0	0	0

Type5_8fixed3banks100

	20.00 ≤...			25.0...			30.0...			35.0...			40.0...			45.0...			50.0...			55.00 ≤...		
	Rx...	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	Rx...
Count	32	3	3	4	4	4	2	2	2	4	4	4	2	2	2	8	8	8	1	1	1	1	1	1
Median	17	3	4	1	3	4	1	2	4	1	3	5	1	4	6	1	4	6	1	4	6	1	1	63
Outliers	4	0	0	9	2	0	0	3	0	4	6	0	1	0	7	0	0	7	0	0	6	0	0	0

Bank Max Value

bank 1 Max value, bank 2 Max value, bank 3 Max value per IL_db_die_to_die_at_Fnq



Bank Location - Max Value table

Floating tap starting location

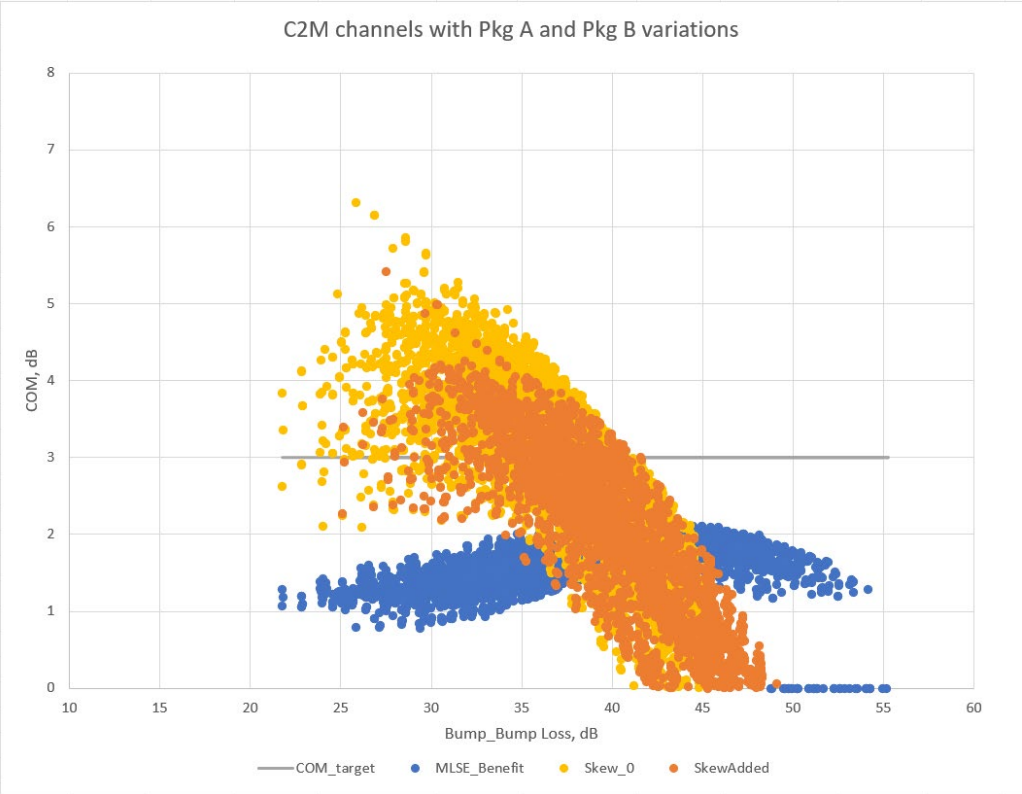
Column	(Subsets)	Avg	Max	Median	Count
Rxffe_Bank1	Current filtering	17.22	66	15.00	54814
Rxffe_Bank2	Current filtering	21.10	71	20.00	54814
Rxffe_Bank3	Current filtering	19.92	78	0.00	54814

Max Floating tap Value

Column	(Subsets)	Avg	Min	Max	Median	Count
bank 1 Max v...	Current filtering	0.02	0.00	0.09	0.02	54814
bank 2 Max v...	Current filtering	0.02	0.00	0.11	0.01	54814
bank 3 Max v...	Current filtering	0.01	0.00	0.10	0.00	54814

Package Combinations - Class A and Class B

CR/KR Channel Analysis – Ethernet data rate -212.5 Gbps



Total#cases	10678	8832	1846	1630	9048
Cases <40 dB	6735	Cabled Host	PCB Host	CR	KR

Package Combination: **BB**

Config: 5
Receiver

- Num of RX FFE pre-cursors : 6
- Num of RX FFE fixed post cursors : 8
- Number of banks of floating up to 100 UI: 3

**Max Tolerable Skew cases included but separated the stats.*

1 tap DFE (No MLSE)

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644					
<=24	5	**24-32**	116	**32-40**	2707
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
1	4	94	22	1459	1248

>40	3910
Skew_Added	Skew_0
2454	1456

MLSE - No Limit Placed

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644					
<=24	0	**24-32**	0	**32-40**	63
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	31	32

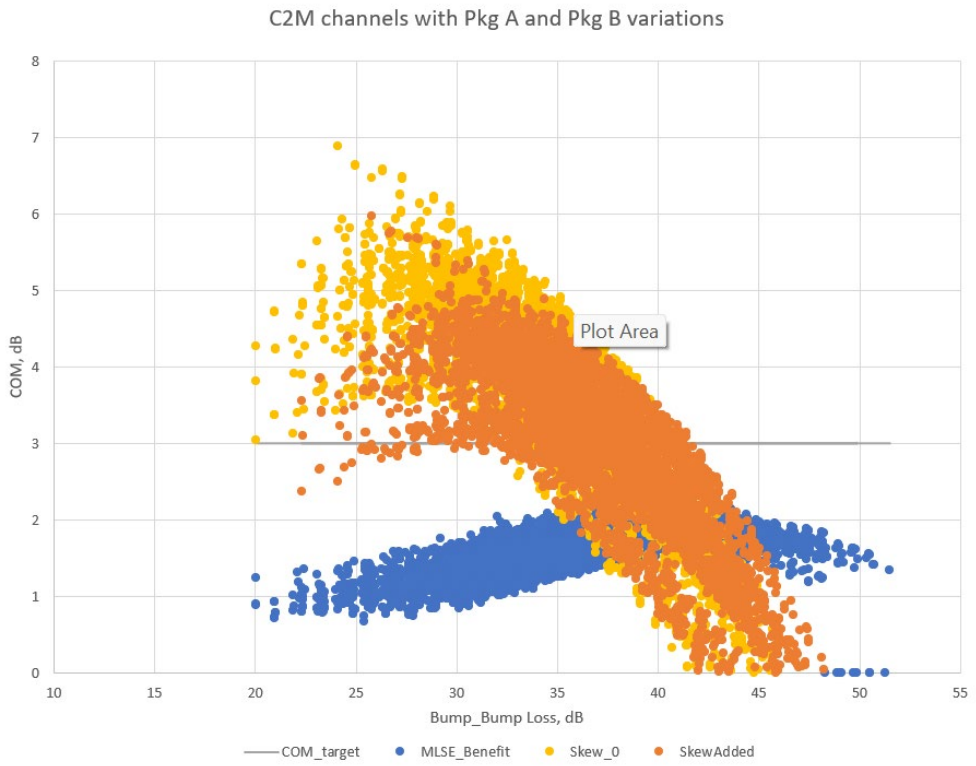
>40	1886
Skew_Added	Skew_0
1126	760

MLSE with max benefit limited to 1 dB

Loss Range /number of COM failures -- Loss Range: 21.7672 : 55.1644					
<=24	0	**24-32**	0	**32-40**	440
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	229	211

>40	3164
Skew_Added	Skew_0
1946	1218

CR/KR Channel Analysis – Ethernet data rate -212.5 Gbps



Total#cases	10745	8888	1857	1641	9104
Cases <40 dB	8842	Cabled Host	PCB Host	CR	KR

Package Combination: **AA**

Config: 5
Receiver
- Num of RX FFE pre-cursors : 6
- Num of RX FFE fixed post cursors : 8
- Number of banks of floating up to 100 UI: 3

**Max Tolerable Skew cases included but separated the stats.*

1 tap DFE (No MLSE)

Loss Range /number of COM failures -- Loss Range: 20.0305 : 51.4992							
<=24	3	**24-32**	33	**32-40**	1980	**>40**	1854
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
3	0	33	0	1139	841	1272	582

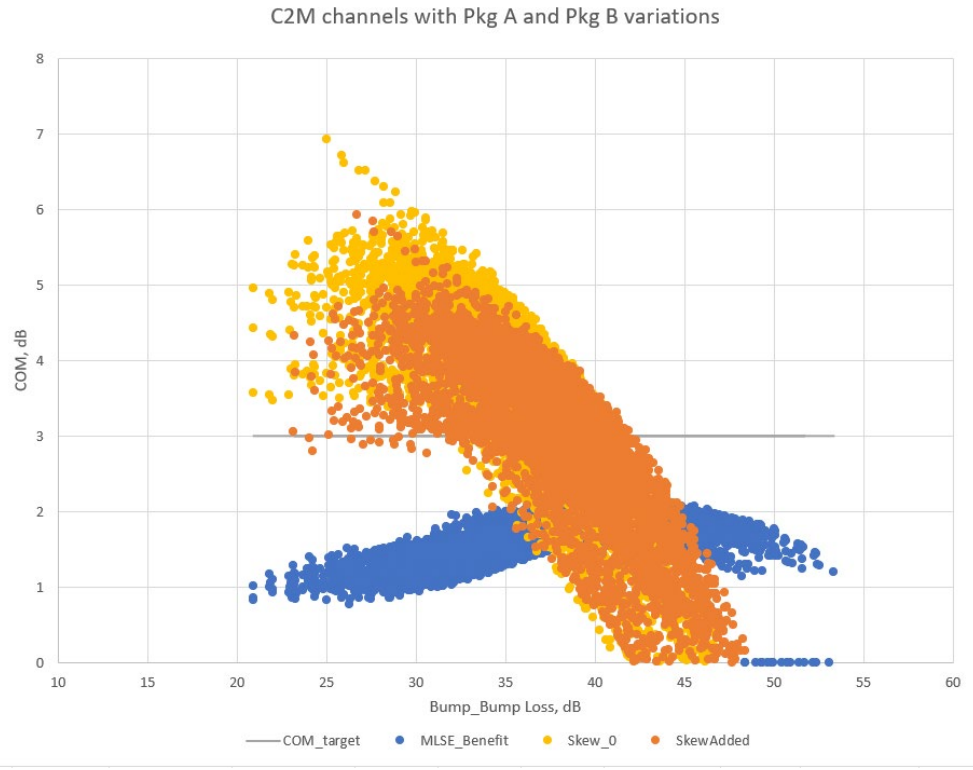
MLSE - No Limit Placed

Loss Range /number of COM failures -- Loss Range: 20.0305 : 51.4992							
<=24	0	**24-32**	0	**32-40**	39	**>40**	738
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	13	26	456	282

MLSE with max benefit limited to 1 dB

Loss Range /number of COM failures -- Loss Range: 20.0305 : 51.4992							
<=24	0	**24-32**	0	**32-40**	295	**>40**	1330
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	147	148	879	451

CR/KR Channel Analysis – Ethernet data rate -212.5 Gbps



Package Combination: **AB**

Config: 5
Receiver
- Num of RX FFE pre-cursors : 6
- Num of RX FFE fixed post cursors : 8
- Number of banks of floating up to 100 UI: 3

**Max Tolerable Skew cases included but separated the stats.*

1 tap DFE (No MLSE)

Loss Range /number of COM failures -- Loss Range: 20.8977 : 53.3318								
<=24	1	**24-32**	48	**32-40**	2024	**>40**	2851	
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	
1	0	48	0	1179	845	1860	991	

MLSE - No Limit Placed

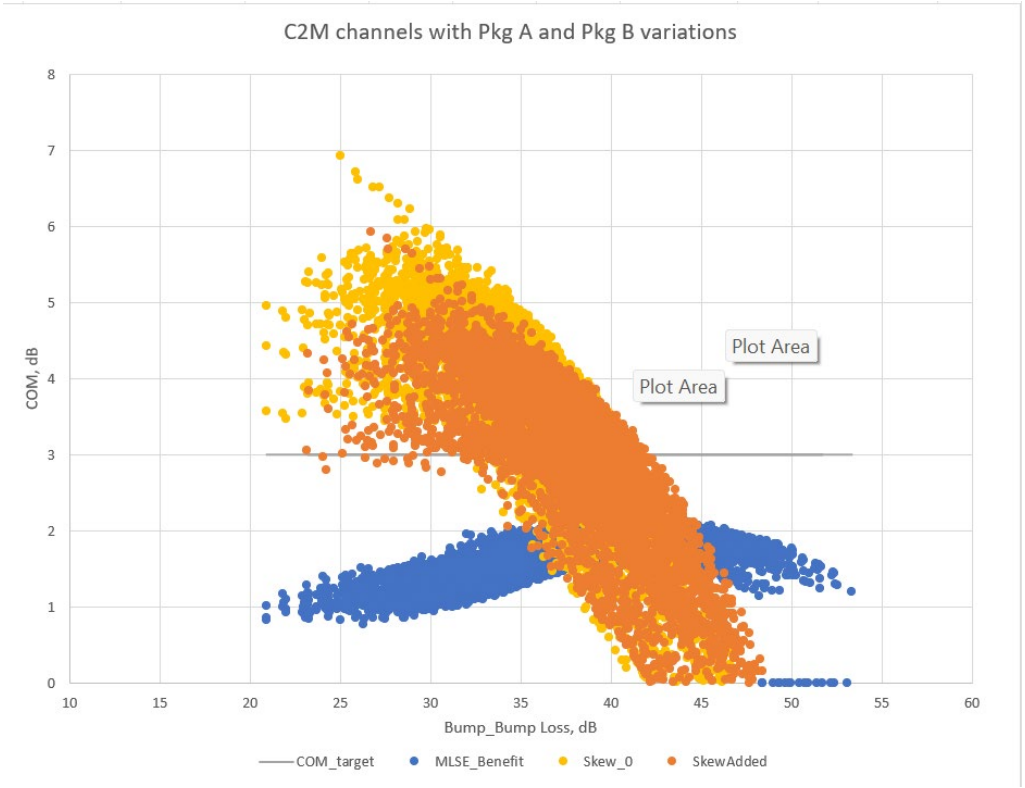
Loss Range /number of COM failures -- Loss Range: 20.8977 : 53.3318								
<=24	0	**24-32**	0	**32-40**	43	**>40**	1128	
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	
0	0	0	0	19	24	694	434	

MLSE with max benefit limited to 1 dB

Loss Range /number of COM failures -- Loss Range: 20.8977 : 53.3318								
<=24	0	**24-32**	0	**32-40**	288	**>40**	2063	
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0	
0	0	0	0	151	137	1318	745	

Total#cases	10736	8880	1856	1640	9096
Cases <40 dB	7789	Cabled Host	PCB Host	CR	KR

CR/KR Channel Analysis – Ethernet data rate -212.5 Gbps



Total#cases	10736	8880	1856	1640	9096
Cases <40 dB	7789	Cabled Host	PCB Host	CR	KR

Package Combination: **BA**

Config: 5
Receiver
- Num of RX FFE pre-cursors : 6
- Num of RX FFE fixed post cursors : 8
- Number of banks of floating up to 100 UI: 3

**Max Tolerable Skew cases included but separated the stats.*

1 tap DFE (No MLSE)

Loss Range /number of COM failures -- Loss Range: 20.9001 : 53.3318					
<=24	0	**24-32**	13	**32-40**	1931
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	13	0	1030	901

>40	2819
Skew_Added	Skew_0
1827	992

MLSE - No Limit Placed

Loss Range /number of COM failures -- Loss Range: 20.9001 : 53.3318					
<=24	0	**24-32**	0	**32-40**	50
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	24	26

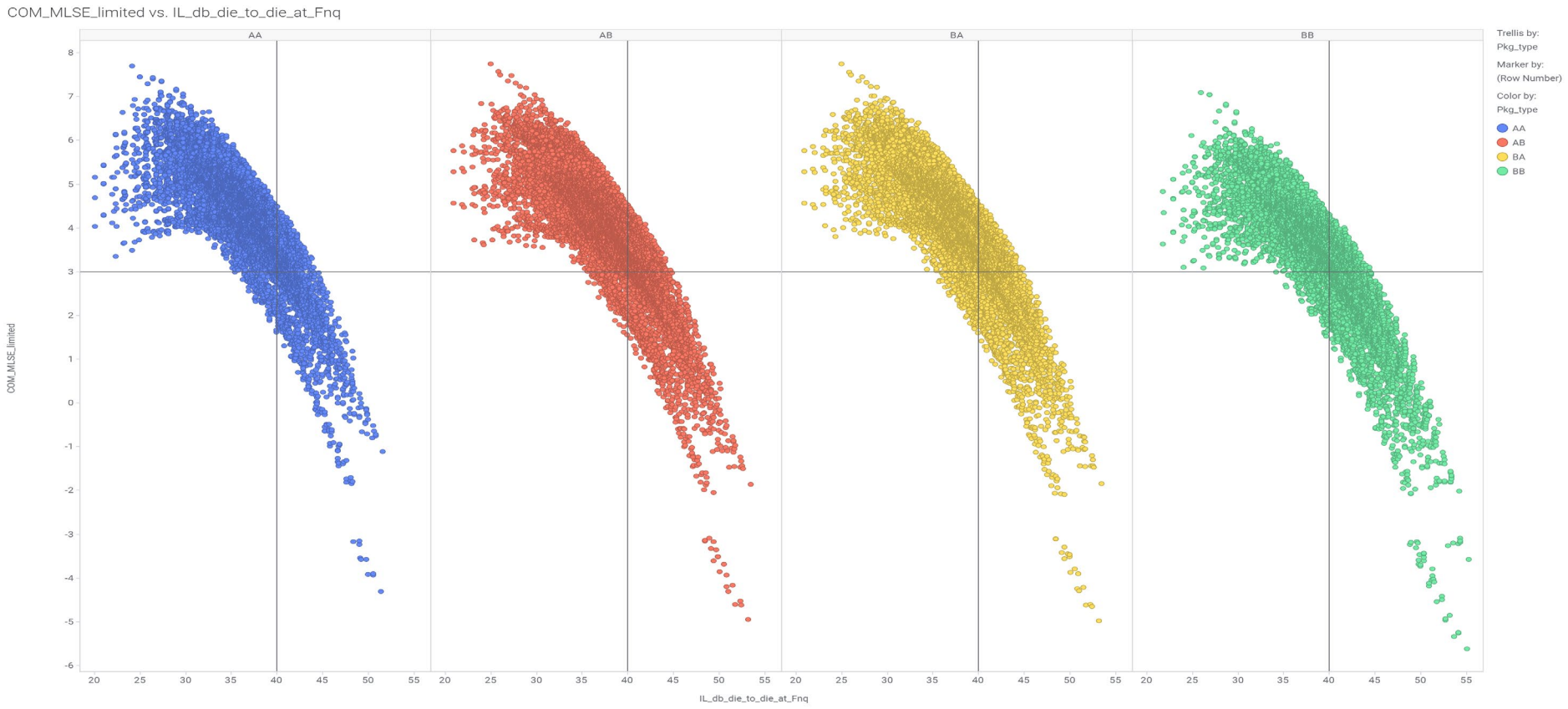
>40	1108
Skew_Added	Skew_0
680	428

MLSE with max benefit limited to 1 dB

Loss Range /number of COM failures -- Loss Range: 20.9001 : 53.3318					
<=24	0	**24-32**	0	**32-40**	318
Skew_Added	Skew_0	Skew_Added	Skew_0	Skew_Added	Skew_0
0	0	0	0	166	152

>40	2005
Skew_Added	Skew_0
1263	742

Package class combination comparison for Ref. RX with Config 5 with MLSE benefit limited to max 1 dB



Filter Settings
- RX type: (Type5_8fixed3banks100)

Package Combinations Summary - Class A and Class B

- Package Combinations of Class B with Class B (TX -> RX) seems to create most stress cases when multiple package trace lengths are considered
- Going forward we may be able to limit our focus to ClassB with Class B Package combination.

Next steps

- Consider updates from Comment resolution
  - RDr and RDt
  - SNDR
- Update(s) to COM code (expect minimal impact)
  - Floating tap location fix
  - NEXT package Fix
- MLSE implementation Penalty approach
  - Limit Max MLSE Benefit
  - Or MLSE.Q (Update to COM code required)
- What else?

Backup

Sample COM Configuration Table

Table 93A-1 parameters			
Parameter	**Setting**	**Units**	**Information**
f_b	106.25	GBd	
f_min	0.05	GHz	
Delta_f	0.01	GHz	
C_d	[0.4e-4 0.9e-4 1.1e-4 ;0.4e-4 0.9e-4 1.1e-4]	nF	[TX RX]
L_s	[0.13 0.15 0.14; 0.13 0.15 0.14]	nH	[TX RX]
C_b	[0.3e-4 0.3e-4]	nF	[TX RX]
R_0	5.00E+01	Ohm	
R_d	[50 50]	Ohm	[TX RX]
PKG_NAME	**PKG_HiR_CLASSB PKG_HiR_CLASSB**		TX RX
A_v	0.413	V	
A_fe	0.413	V	
A_ne	0.608	V	
z_p select	[1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36]		
L	4		
M	32		
filter and Eq			
f_r	0.58	*fb	
c(0)	0.55		min
c(-1)	0		[min:step:max]
c(-2)	0		[min:step:max]
c(-3)	0		[min:step:max]
c(-4)	0		[min:step:max]
c(1)	0		[min:step:max]
N_b	1	UI	
b_max(1)	1		As/dffe1
b_max(2..N_b)	0.3		As/dfe2..N_b
b_min(1)	0		As/dffe1
b_min(2..N_b)	-0.15	S	As/dfe2..N_b
g_DC	[0]	dB	[min:step:max]
f_z	42.50	GHz	
f_p1	42.50	GHz	
f_p2	106.25	GHz	
g_DC_HP	[-10:1:0]		[min:step:max]
f_HP_PZ	1.328125	GHz	
Butterworth	1	logical	include in fr

I/O control		
DIAGNOSTICS	1	logical
DISPLAY_WINDOW	1	logical
CSV_REPORT	1	logical
RESULT_DIR	.\results\CRKR_BB_{date}\	
SAVE_FIGURES	0	logical
Port Order	[1 3 2 4]	
RUNTAG	CRKR_BB_eval_	
COM_CONTRIBUTION	1	logical

TDR and ERL options		
TDR	1	logical
ERL	1	logical
ERL_ONLY	0	ns
TR_TDR	0.01	
N	4000	logical
TDR_Butterworth	1	
beta_x	0	
rho_x	0.618	
TDR_W_TXPKG	0	UI
N_bx	20	
fixture delay time	[0 0]	
Tukey_Window	1	
Noise, jitter		UI
sigma_RJ	0.01	UI
A_DD	0.02	V^2/GHz
eta_0	1.00E-08	dB
SNR_TX	33	
R_LM	0.95	

Batch control options		
BATCH_RUN	1	logical
CHANNEL_DIR	..\Channels\IEEE channels\All_KRCR_skew4s tds_channels\	

baseline

Table 93A–3 parameters			
Parameter	**Setting**	**Units**	Information
package_tl_gamma0_a1_a2	[5e-4 0.00065 0.0003]		
package_tl_tau	0.006141	ns/mm	
package_Z_c	[92 92 ; 70 70; 80 80; 100 100]	Ohm	
z_p (TX)	[8 24 30 45 ; 1 1 1 1; 1 1 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases to run]
z_p (NEXT)	[8 24 30 45 ; 1 1 1 1; 1 1 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases]
z_p (FEXT)	[8 24 30 45 ; 1 1 1 1; 1 1 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases]
z_p (RX)	[8 24 30 45 ; 1 1 1 1; 1 1 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases]
C_p	[0.4e-4 0.4e-4]	nF	[test cases]
Operational			
ERL Pass threshold	10	dB	
COM Pass threshold	3	db	
DER_0	2.00E-04		
T_r	0.00400	ns	
FORCE_TR	1	logical	
PMD_type	C2C		
EW	1		
MLSE	3	logical	
ts_anchor	1		
sample_adjustment	[-32 32]		
Local Search	0		
Filter: Rx FFE			
ffe_pre_tap_len	**6**	UI	
ffe_post_tap_len	8	UI	
ffe_pre_tap1_max	1	(normalized)	
ffe_post_tap1_max	1	(normalized)	
ffe_tapn_max	1	(normalized)	
FFE_OPT_METHOD	MMSE		FV-LMS or MMSE
num_ui_RXFF_noise	1024		
RXFFE FLOAT CTL	FOM		FOM o ISI
Floating Tap Control			
N_bg	**3**	0 1 2 or 3 groups	
N_bf	4	taps per group	
N_f	100	UI span for floating taps	
bmaxg	0.2	max DFE value for floating taps	
B_float_RSS_MAX	1	rss tail tap limit	
N_tail_start	25	(UI) start of tail taps limit	

SAVE_CONFIG2MAT	0	
Receiver testing		
RX_CALIBRATION	0	logical
Sigma BBN step	5.00E-03	V
ICN parameters		
f_v	0.278	Fb
f_f	0.278	Fb
f_n	0.278	Fb
f_2	61.625	GHz
A_ft	0.450	V
A_nt	0.450	V

Parameter	**Setting**	
board_tl_gamma0_a1_a2	*[0 6.44084e-4 3.6036e-05]*	1.4 db/in @ 53.125G
board_tl_tau	*5.790E-03*	ns/mm
board_Z_c	100	Ohm
z_bp (TX)	*32*	mm
z_bp (NEXT)	*32*	mm
z_bp (FEXT)	*32*	mm
z_bp (RX)	*32*	mm
C_0	[0.2e-4 0]	nF
C_1	[0.2e-4 0]	nF
Include PCB	**0**	**logical**
Seletions (rectangle, gaussian,dual_rayleigh,triangle		
Histogram_Window_Weight	gaussian	selection
Qr	*0.02*	UI

COM tool version: 4.6 Beta 2

Host Package Test Cases

.START	PKG_LowR_CLASSA	[2.44 5.7] db	
Table 93A–3 parameters			
Parameter	**Setting**	**Units**	Information
package_tl_gamma0_a1_a2	[0.0005 0.00089 0.0002]		
package_tl_tau	0.006141	ns/mm	
package_Z_c	[87.5 87.5 ; 95 95 ; 100 100; 100 100]	Ohm	
R_d	[50 50]	Ohm	[TX RX]
z_p (TX)	[8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45;1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8;0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]	mm	[test cases]
z_p (NEXT)	[8 8 8 8 8 8 15 15 15 15 15 15 24 24 24 24 24 24 30 30 30 30 30 30 40 40 40 40 40 40 45 45 45 45 45 45;1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8;0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]	mm	[test cases]
z_p (FEXT)	[8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45;1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8;0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]	mm	[test cases]
z_p (RX)	[8 8 8 8 8 8 15 15 15 15 15 15 24 24 24 24 24 24 30 30 30 30 30 30 40 40 40 40 40 40 45 45 45 45 45 45;1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8;0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]	mm	[test cases]
C_p	[0.4e-4 0.4e-4]	nF	[TX RX]
A_v	[0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192]	V	Vf=0.400
A_fe	[0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192]	V	Vf=0.399
A_ne	[0.4049 0.4049 0.4049 0.4049 0.4049 0.4049 0.4065 0.4065 0.4065 0.4065 0.4065 0.4065 0.4114 0.4114 0.4114 0.4114 0.4114 0.4114 0.4132 0.4132 0.4132 0.4132 0.4132 0.4132 0.4173 0.4173 0.4173 0.4173 0.4173 0.4173 0.4192 0.4192 0.4192 0.4192 0.4192 0.4192]	V	Vf=0.400
.END			

.START	PKG_HiR_CLASSB	[2.8 5.6 6.7 9.4] db	
Table 93A–3 parameters			
Parameter	**Setting**	**Units**	Information
package_tl_gamma0_a1_a2	[0.0005 0.00065 0.000293]		
package_tl_tau	0.006141	ns/mm	
package_Z_c	[87.5 87.5 ; 95 95 ; 100 100; 78 78]	Ohm	
R_d	[50 50]	Ohm	[TX RX]
z_p (TX)	[8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45;2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2;1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3;1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5]	mm	[test cases]
z_p (NEXT)	[8 8 8 8 8 8 15 15 15 15 15 15 24 24 24 24 24 24 30 30 30 30 30 30 40 40 40 40 40 40 45 45 45 45 45 45;2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2;1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3;1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5]	mm	[test cases]
z_p (FEXT)	[8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45 8 15 24 30 40 45;2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2;1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3;1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5]	mm	[test cases]
z_p (RX)	[8 8 8 8 8 8 15 15 15 15 15 15 24 24 24 24 24 24 30 30 30 30 30 30 40 40 40 40 40 40 45 45 45 45 45 45;2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2;1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3;1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5]	mm	[test cases]
C_p	[0.4e-4 0.4e-4]	nF	[TX RX]
A_v	[0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192]	V	Vf=0.400
A_fe	[0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192 0.4049 0.4065 0.4114 0.4132 0.4173 0.4192]	V	Vf=0.399
A_ne	[0.4049 0.4049 0.4049 0.4049 0.4049 0.4049 0.4065 0.4065 0.4065 0.4065 0.4065 0.4065 0.4114 0.4114 0.4114 0.4114 0.4114 0.4114 0.4132 0.4132 0.4132 0.4132 0.4132 0.4132 0.4173 0.4173 0.4173 0.4173 0.4173 0.4173 0.4192 0.4192 0.4192 0.4192 0.4192 0.4192]	V	Vf=0.400
.END			