Preliminary COM results for two reference receiver models

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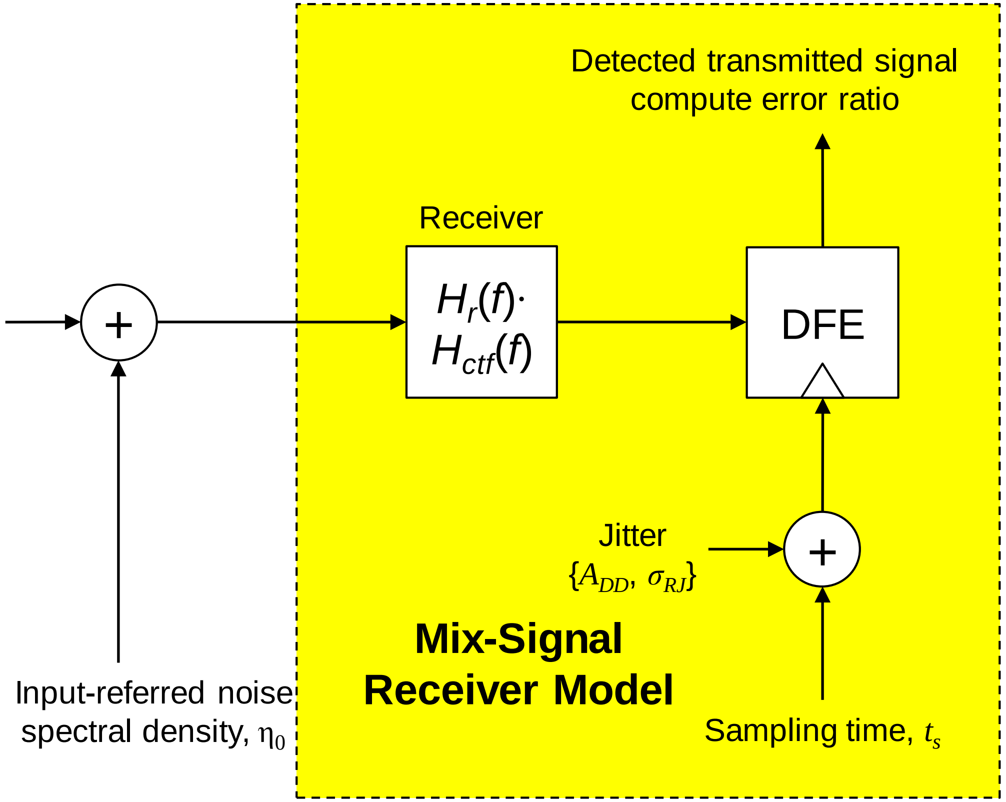
  - Difference in behaviors of these two types of reference receivers
  - 34 channels with different “IL and ICN” combinations are explored.
- Summary

Mix-signal receiver model and ADC-DSP receiver model

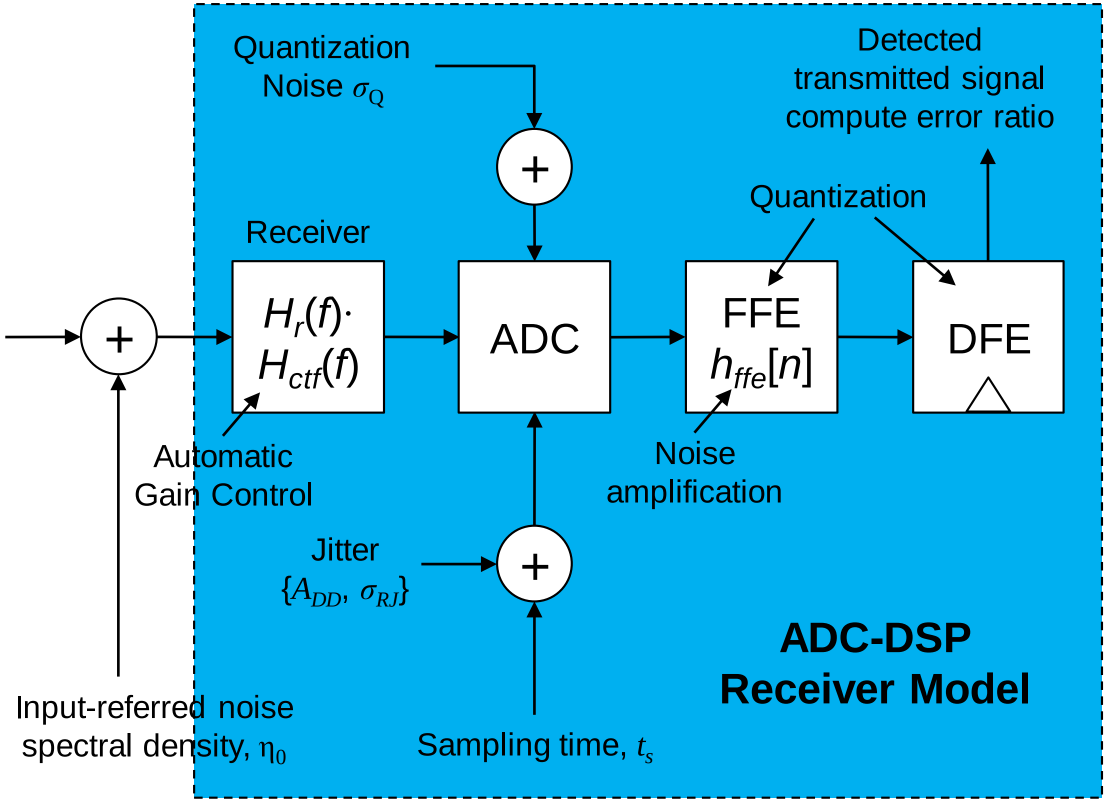
Long DFE taps, FFE-free.



Reference: IEEE Std 802.3-2015, Annex 93A

TX FFE taps deal with pre-cursors, DFE taps deal with the post cursors without noise amplification.
Pros: High tolerance to noisy channels.
Cons: Low tolerance to high loss channels.

Long FFE taps, short DFE taps (usually 1 tap).



Reference: lu_3ck_adhoc_01_082918, lu_3ck_01_0918.

RX FFE taps can deal with both pre- and post cursors, but RX FFE will amplify the noise.
Pros: High tolerance to high loss channels.
Cons: Low tolerance to noisy channels.

Comparison of COM for two types of reference receivers

Channel	ID	IL fitted(dB)	ICN (mV)	FOM_ILD (dB)	COM (dB)				COM Delta (MS vs. DSP)	COM Delta (ADC quant.)	COM Delta (FFE&DFE Quant.)
					MS	Full DSP	DSP ADC QUAT.	DSP no QUAT.			
lim_3ck_01_0718	1	-10.24	2.41	0.13	4.61	4.46	4.51	4.81	0.15	0.30	0.05
	2	-12.27	2.15	0.13	4.66	4.34	4.44	4.76	0.32	0.32	0.10
	3	-14.13	1.97	0.13	4.97	4.45	4.56	4.85	0.52	0.29	0.11
	4	-16.03	1.83	0.13	4.91	4.40	4.53	4.85	0.51	0.32	0.13
mellitz_100GEL_adhoc_02_010318	5	-15.88	2.63	1.24	2.35	1.48	1.48	1.67	0.87	0.19	0.00
lim_100GEL_02_0318	6	-10.24	2.41	0.13	4.61	4.46	4.51	4.81	0.15	0.30	0.05
	7	-12.27	2.15	0.13	4.66	4.34	4.44	4.76	0.32	0.32	0.10
	8	-14.13	1.97	0.13	4.97	4.45	4.56	4.85	0.52	0.29	0.11
mellitz_3ck_01_0518_C2M	9	-9.03	1.70	0.10	5.90	4.91	5.06	5.34	0.99	0.28	0.15
	10	-9.30	3.38	0.48	3.09	2.36	2.41	2.58	0.73	0.17	0.05
	11	-11.12	1.44	0.09	6.19	5.35	5.46	5.77	0.84	0.31	0.11
	12	-11.17	2.97	0.46	3.31	2.89	2.98	3.19	0.42	0.21	0.09
	13	-13.21	1.25	0.09	6.16	5.46	5.56	5.87	0.70	0.31	0.10
	14	-12.96	2.38	0.47	3.57	3.21	3.30	3.51	0.36	0.21	0.09
tracy_100GEL_02_0118	15	-15.73	0.67	0.37	5.08	4.71	4.85	5.18	0.37	0.33	0.14
	16	-16.03	0.68	0.28	4.11	3.85	3.94	4.24	0.26	0.30	0.09
tracy_100GEL_06_0118	17	-14.31	0.62	0.21	4.94	4.34	4.40	4.69	0.60	0.29	0.06
	18	-14.29	0.70	0.23	5.38	4.93	5.01	5.34	0.45	0.33	0.08
mellitz_100GEL_adhoc_04_010318	19	-30.34	1.97	1.61	-1.80	-2.06	-2.39	-2.37	0.26	0.02	-0.33
mellitz_100GEL_adhoc_03_010318	20	-25.55	2.00	1.48	0.47	0.35	0.30	0.39	0.12	0.09	-0.05
mellitz_100GEL_adhoc_02_021218	21	-25.15	1.46	0.55	1.24	1.03	1.09	1.26	0.21	0.17	0.06
	22	-27.84	1.42	0.57	0.07	0.24	0.22	0.40	-0.17	0.18	-0.02
heck_100GEL_85ohm_nom_01_011718	23	-29.74	1.52	2.29	-0.73	-0.09	-0.07	0.08	-0.64	0.15	0.02
heck_100GEL_85ohm_1h1_01_011718	24	-29.85	1.53	2.23	-0.75	0.21	0.08	0.23	-0.96	0.15	-0.13
heck_100GEL_85ohm_h1h_01_011718	25	-29.62	1.52	2.37	-0.87	-0.06	-0.09	0.07	-0.81	0.16	-0.03
mellitz_3ck_adhoc_02_081518 Opt1	26	-23.79	0.56	0.23	3.95	4.62	4.74	5.13	-0.67	0.39	0.12
	27	-27.59	0.42	0.26	2.26	3.49	3.66	4.06	-1.23	0.40	0.17
	28	-31.36	0.33	0.29	0.15	1.88	2.03	2.41	-1.73	0.38	0.15
mellitz_3ck_adhoc_02_081518 Opt2	29	-22.98	0.66	0.46	3.97	4.56	4.73	5.08	-0.59	0.35	0.17
	30	-26.72	0.49	0.51	2.54	3.62	3.86	4.23	-1.08	0.37	0.24
	31	-30.42	0.37	0.58	0.59	2.28	2.40	2.75	-1.69	0.35	0.12
tracy_100GEL_04_0118	32	-22.94	0.36	1.28	3.94	4.67	4.87	5.22	-0.73	0.35	0.20
tracy_100GEL_05_0118	33	-23.90	0.54	1.50	3.26	3.88	4.01	4.35	-0.62	0.34	0.13
zambell_100GEL_02_0318	34	-27.40	0.29	0.27	2.76	3.83	3.93	4.29	-1.07	0.36	0.10

DSP fail, MS pass. (IDs 10, 12)

DSP pass, MS fail. (IDs 27, 30, 34)

Use parameters modified from COM2.50.
Cd=130fF, Cp = 110fF.
N_b = 24 (mix-signal, 24 taps DFE),
N_b = 1, N_post_ffe = 24
(DSP, 24 post taps, 3-pre taps).
Noise amplification of FFE is considered.

(1) Low loss, high crosstalk.

(2) Low loss, low crosstalk.

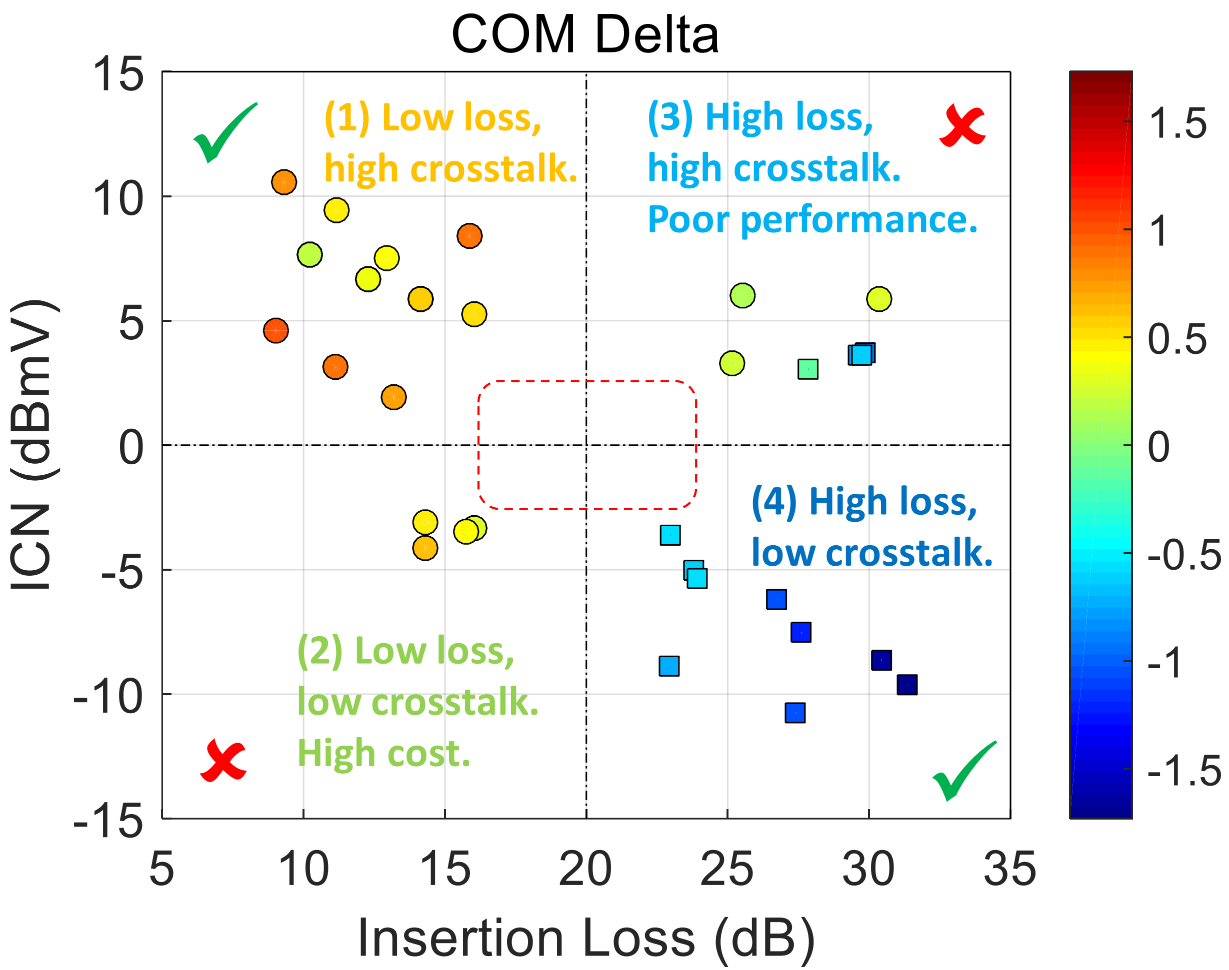
Mix-Signal receiver model gives better COM

(3) High loss, high crosstalk.

(4) High loss, low crosstalk.

DSP receiver model gives better COM

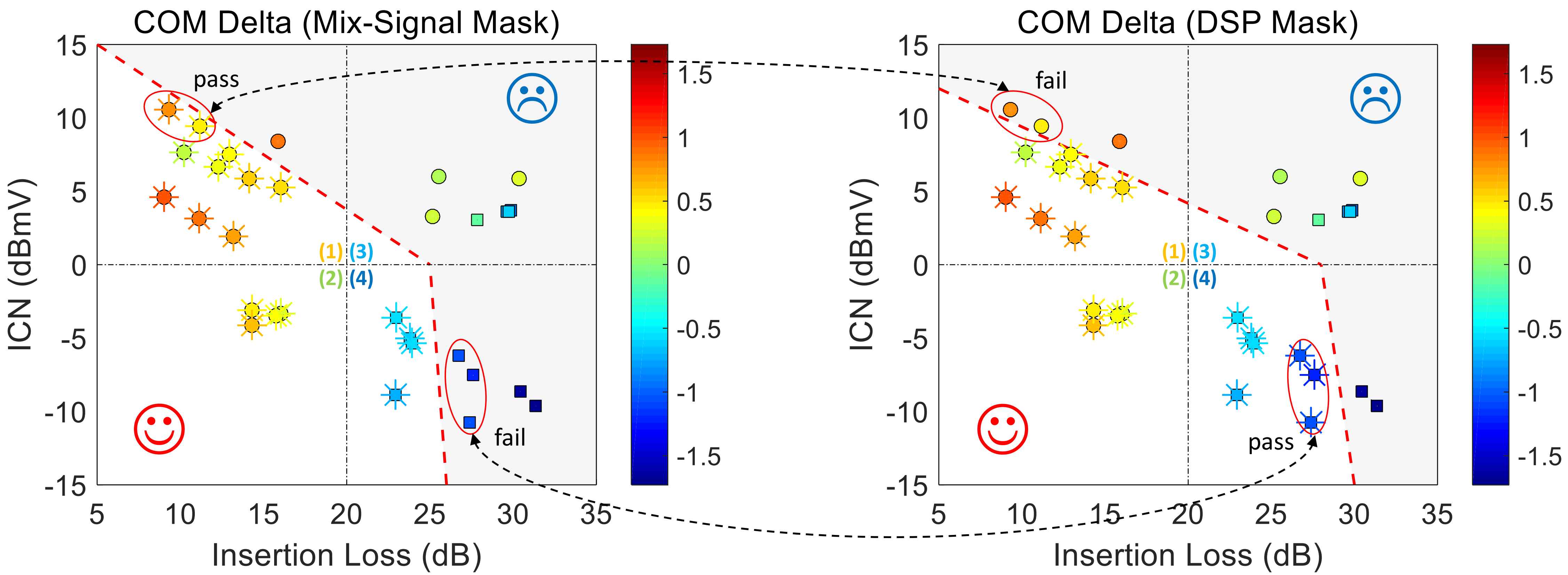
Comparison of COM for two types of reference receivers



- 'Circle': Mix-signal receiver model gives better COM.
- 'Square': DSP receiver model gives better COM.
- Mix-signal and DSP receiver models show different behaviors in different "IL and ICN" combinations.
- The COM delta deviation is approaching 3dB margin.
  - Cannot replace DSP model by mix-signal model.
  - Cannot attribute receiver difference to COM margin.

Note: COM Delta is the difference in COM between mix-signal and DSP receiver models.

Comparison of COM for two types of reference receivers



- The “ICN vs. IL” mask for mix-signal receiver and DSP receiver are different.
  - Mix-signal receiver model gives better COM in low loss and high crosstalk channels.
  - DSP receiver model gives better COM in high loss and low crosstalk channels.
- For the same channel, mix-signal and DSP receiver model may yield a ‘pass’ or a ‘fail’.

Summary

- The mix-signal (MS) and DSP receivers behave differently for different “IL and ICN” combinations.
  - MS receiver model gives better COM for low loss and high cross talk channels.
  - DSP receiver give better COM for high loss and low cross talk channels.
  - The COM difference is not negligible, the deviation is approaching 3dB COM margin.
- MS receiver model cannot replace DSP receiver model due to their divergent behavior.
  - For the same channel, mix-signal and DSP receiver model may yield a ‘pass’ or a ‘fail’.
- MS receivers (DFE only) may not satisfy the 28dB ball-to-ball target, and give pessimistic COM results for high loss channels (backplane and twin-axial copper cable cases).

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