

TDECQ Improvements with New MMSE Optimization Points

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Rev A

These results are preliminary and undergoing further validation.

Addresses Comment: R2-194

Can TDECQ Optimization Be Improved?

- Some commenters have expressed concern that the changes introduced in TDECQ may substantially change results because a global optimization is no longer required
- This study investigated other convergence criteria to investigate improvements achievable
- Optimization criteria investigated included minimizing MSE where the SER is estimated
- Waveforms were simulated and included the following effects
 - Bandwidth limitation in the electrical domain
 - MZM modulation including nonlinear E-to-O conversion
 - Imbalance in the MZM arms
 - Different modulation depths and extinction ratios to explore eye compression
- Thus far, with 36 waveforms run, TDECQ measured did not improve by more than .13 dB
 - Average improvement was .035 dB

Preliminary Results

Run #	Elec Tx BW (GHz)	Mod Depth	ER Target (dB)	ER Meas (dB)	OMA Square Wv (mW)	OMA Outer (mW)	OMA TDECQ (mW)	TDECQ Standard (dB)	TDECQ New Algo (dB)	TDECQ Delta (dB)
1	45	0.5	3.00	3.00	0.33	0.33	0.20	2.62	2.61	0.01
2	45	0.5	4.55	4.55	0.48	0.48	0.29	2.62	2.61	0.01
3	45	0.5	6.10	6.11	0.61	0.61	0.37	2.62	2.61	0.01
4	45	0.5	7.66	7.66	0.71	0.71	0.43	2.62	2.61	0.01
5	45	0.75	3.00	3.00	0.33	0.33	0.22	3.29	3.28	0.02
6	45	0.75	6.68	6.68	0.65	0.65	0.42	3.29	3.28	0.02
7	45	0.75	10.35	10.35	0.83	0.83	0.55	3.29	3.28	0.02
8	45	0.75	14.03	14.04	0.92	0.92	0.61	3.29	3.28	0.02
9	45	0.9	3.00	3.00	0.33	0.33	0.25	4.84	4.77	0.07
10	45	0.9	9.36	9.36	0.79	0.79	0.60	4.84	4.77	0.07
11	45	0.9	15.72	15.73	0.95	0.95	0.72	4.84	4.77	0.07
12	45	0.9	22.08	22.11	0.99	0.99	0.75	4.84	4.77	0.07
13	53.1	0.5	3.00	3.00	0.33	0.33	0.22	2.21	2.20	0.01
14	53.1	0.5	4.55	4.55	0.48	0.48	0.32	2.21	2.20	0.01
15	53.1	0.5	6.10	6.10	0.61	0.61	0.41	2.21	2.20	0.01
16	53.1	0.5	7.66	7.66	0.71	0.71	0.47	2.21	2.20	0.01
17	53.1	0.75	3.00	3.00	0.33	0.33	0.23	2.74	2.73	0.01
18	53.1	0.75	6.68	6.68	0.65	0.65	0.46	2.74	2.73	0.01
19	53.1	0.75	10.35	10.35	0.83	0.83	0.59	2.74	2.73	0.01
20	53.1	0.75	14.03	14.03	0.92	0.92	0.65	2.74	2.73	0.01
21	53.1	0.9	3.00	3.00	0.33	0.33	0.26	3.65	3.60	0.05
22	53.1	0.9	9.36	9.36	0.79	0.79	0.61	3.65	3.60	0.05
23	53.1	0.9	15.72	15.72	0.95	0.95	0.73	3.65	3.60	0.05
24	53.1	0.9	22.08	22.09	0.99	0.99	0.76	3.65	3.60	0.05
25	60	0.5	3.00	3.00	0.33	0.33	0.24	2.00	1.99	0.01
26	60	0.5	4.55	4.55	0.48	0.48	0.35	2.00	1.99	0.01
27	60	0.5	6.10	6.10	0.61	0.61	0.44	2.00	1.99	0.01
28	60	0.5	7.66	7.65	0.71	0.71	0.51	2.00	1.99	0.01
29	60	0.75	3.00	3.00	0.33	0.33	0.25	2.57	2.54	0.03
30	60	0.75	6.68	6.68	0.65	0.65	0.48	2.57	2.54	0.03
31	60	0.75	10.35	10.35	0.83	0.83	0.62	2.57	2.54	0.03
32	60	0.75	14.03	14.03	0.92	0.92	0.69	2.57	2.54	0.03
33	60	0.9	3.00	3.00	0.33	0.33	0.26	3.50	3.37	0.13
34	60	0.9	9.36	9.36	0.79	0.79	0.63	3.50	3.37	0.13
35	60	0.9	15.72	15.72	0.95	0.95	0.75	3.50	3.37	0.13
36	60	0.9	22.08	22.08	0.99	0.99	0.78	3.50	3.37	0.13

Conclusions

- Minimal improvement resulted from generalizing optimization criterion
 - Average improvement: .035dB
 - Maximum improvement: .13 dB
- Methods can be investigated to improve TDECQ optimization
- However, the methods should be explicit such that anyone can replicate
 - The measurement should not depend on the algorithmic skill of the person performing the measurement
- There has been no evidence presented that MMSE is not a good criterion to use

Thank you