

Considerations for the CDAUI-8 chip-to-chip p_{\max}/v_f limit

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Problem statement (comment #32)

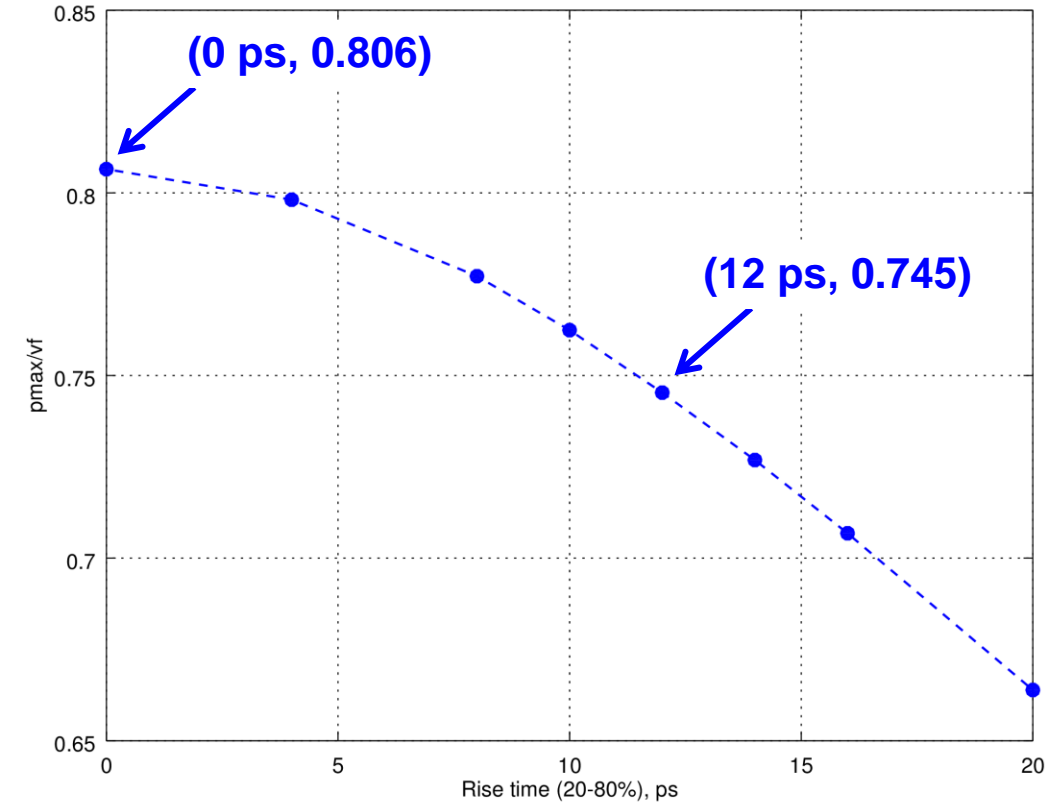
- The transmitter modeled by COM implies the p_{\max}/v_f ratio limit should be 0.8
 - Rise time that drives the device termination and package model = 0 ps
 - There is optimism in the calculation that may not be realized with practical transmitters [1]
- IEEE P802.3by (D3.2) amends Annex 93A to (optionally) include a Gaussian transmitter filter
 - Rise time that drives the device termination and package model > 0 ps
 - Used to reconcile COM transmitter model with a more practical p_{\max}/v_f ratio limit
- Similar considerations should be made for CDAUI-8 chip-to-chip

[1] http://www.ieee802.org/3/by/public/adhoc/architecture/ran_021716_25GE_adhoc.pdf

Gaussian filter (rise time T_r) impact on p_{\max}/V_f

- Table 120D–7 parameter values, $z_p = 30$ mm
- TP0-TP0a model is 38 mm of host PCB trace
- Include a Gaussian filter and calculate p_{\max}/V_f at TP0a versus its 20 to 80% rise time

T_r , ps	p_{\max}/V_f
0	0.806
4	0.798
8	0.777
10	0.762
12	0.745
14	0.727
16	0.707
20	0.664



Gaussian filter (rise time T_r) impact on COM

T_r , ps	1	2	3	4	5	6	7	8	9	10
0	3.06	3.67	3.62	2.83	2.59	3.70	3.54	4.73	1.67	3.14
4	3.00	3.62	3.59	2.77	2.53	3.68	3.51	4.69	1.71	3.08
8	2.89	3.51	3.54	2.80	2.40	3.58	3.43	4.52	1.64	2.95
10	2.89	3.43	3.48	2.72	2.42	3.47	3.37	4.36	1.55	2.85
12	2.78	3.32	3.43	2.51	2.29	3.38	3.29	4.18	1.50	2.70
14	2.65	3.33	3.34	2.38	2.18	3.26	3.19	4.01	1.39	2.58
16	2.47	3.21	3.25	2.25	1.99	3.11	3.08	3.75	1.22	2.41
20	1.96	2.84	2.99	1.82	1.57	2.90	2.76	3.16	0.76	1.91

- Table 120D–7 parameter values, $z_p = 30$ mm
- Test cases 1 through 7 are from [mellitz_3bs_01_0714.pdf](#)
- Test case 8 is from [shanbhag_02_0914.pdf](#)
- Test cases 9 and 10 are from [mellitz_3bs_01_0315.pdf](#)

Summary

- In the context of 25GBASE-KR, it has been observed a p_{\max}/v_f limit of 0.8 will be difficult to achieve
- If true, one can assume such a limit will be difficult to meet for CDAUI-8 as well
- Inclusion of a Gaussian filter in the COM calculation enables the relaxation of the limit while maintaining a closed budget
- E.g., a 12 ps rise time yields a 0.2 to 0.5 dB penalty for channels that pass COM
- Some margin could be recovered via adjustments to other COM parameters