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

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Gaussian filter (rise time Tr) 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
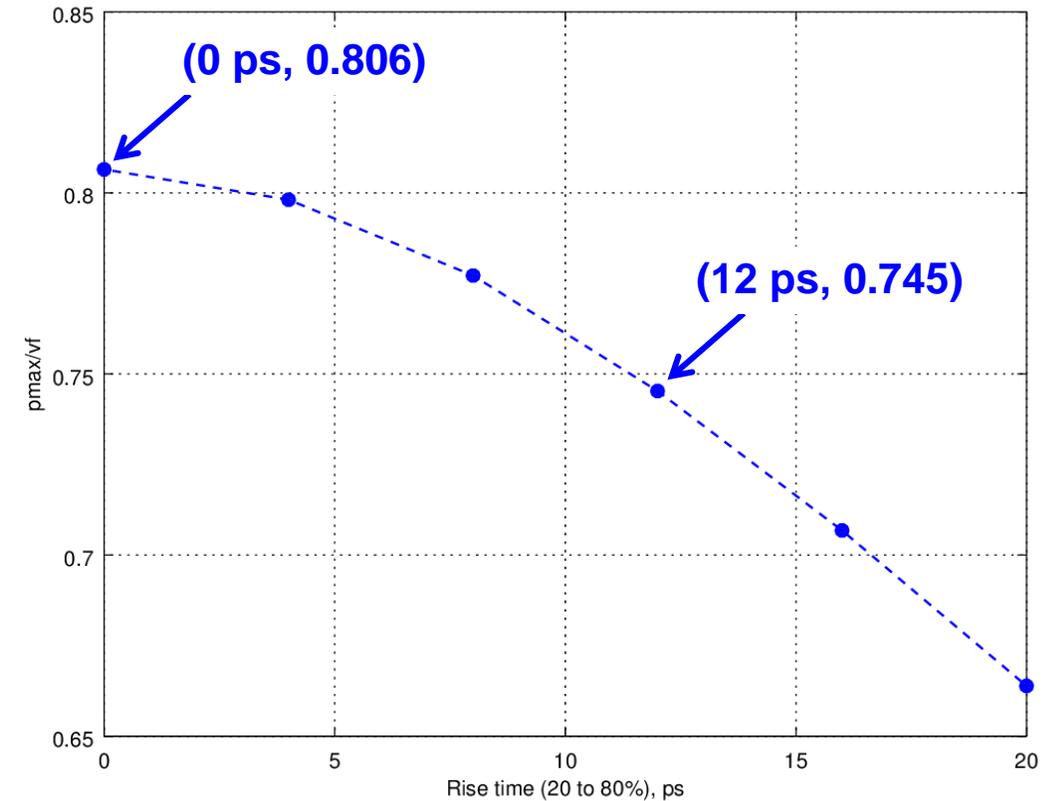
Gaussian filter (rise time Tr) impact on COM

Tr, ps	1	2	3	4	5	6	7	8	9	10
0	**2.97**	**3.64**	**3.60**	**2.78**	**2.53**	**3.68**	**3.52**	**4.63**	**1.59**	**3.09**
4	2.94	3.58	3.57	2.72	2.47	3.65	3.50	4.58	1.56	3.02
8	2.79	3.46	3.52	2.76	2.34	3.55	3.42	4.41	1.57	2.87
12	2.70	3.27	3.41	2.49	2.24	3.36	3.28	4.09	1.43	2.66
16	2.22	3.15	3.23	2.20	1.94	3.09	3.07	3.65	1.18	2.38
20	1.88	2.81	2.97	1.79	1.51	2.87	2.75	3.07	0.70	1.86

- 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

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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 other adjustments to COM parameters

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