

In support of comment #39 to increase allocation for modal noise penalty

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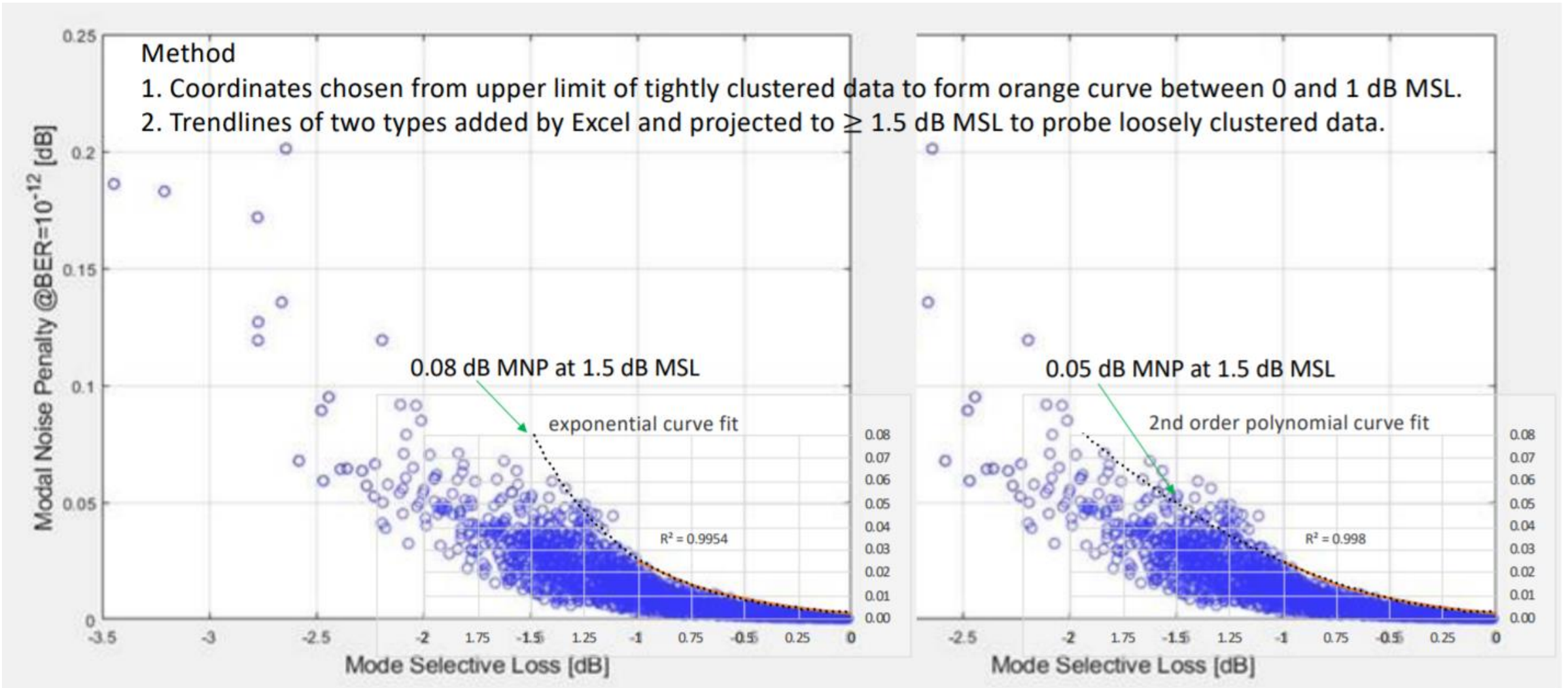
IEEE P802.3cm 400G over MMF Task Force

Salt Lake City Interim Meeting

Background

- Extensive modeling was conducted in the past when developing the original 10GBASE-SR and later standards that relied on 10G NRZ signaling: [pepeljugoski 01 0108.pdf](#)
- Recently, an approach was developed to translate those results to 25 Gbd PAM-4 signaling, [king 3cm 01 0319.pdf](#), where the predicted MN penalty for a 10 Gb/s 850nm 100m link with total MSL of loss 1.5 dB is multiplied by 3.8 to translate to a penalty with 25 Gbd PAM-4 and KP4 FEC.
- Further detail from the legacy results was recently made available to the Task Force: [lingle 3cm adhoc 01 042519.pdf](#)
- Curve fitting presented in the last Ad Hoc call gave useful guidance in using the additional detail from legacy modeling to estimate modal noise penalties expected for 400GBASE-SR8 and -SR4.2 for $k_{mpn}=0.1$: [kolesar 3cm adhoc 01 042519.pdf](#)

Recommend selecting the value 0.05 dB for 10G NRZ modal noise penalty (bottom right), and multiplying by 3.8 = 0.19 dB, as basis for evaluating MN penalty in IEEE P802.3cm PMDs

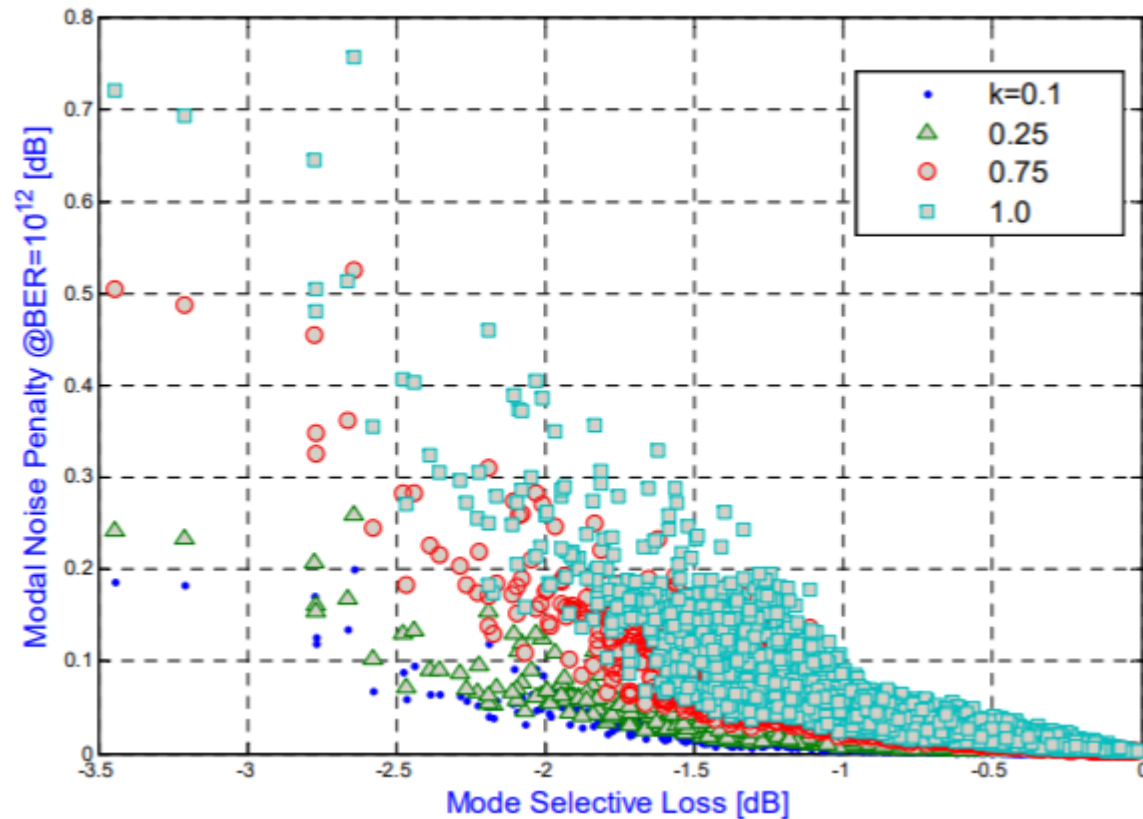


Conclusions

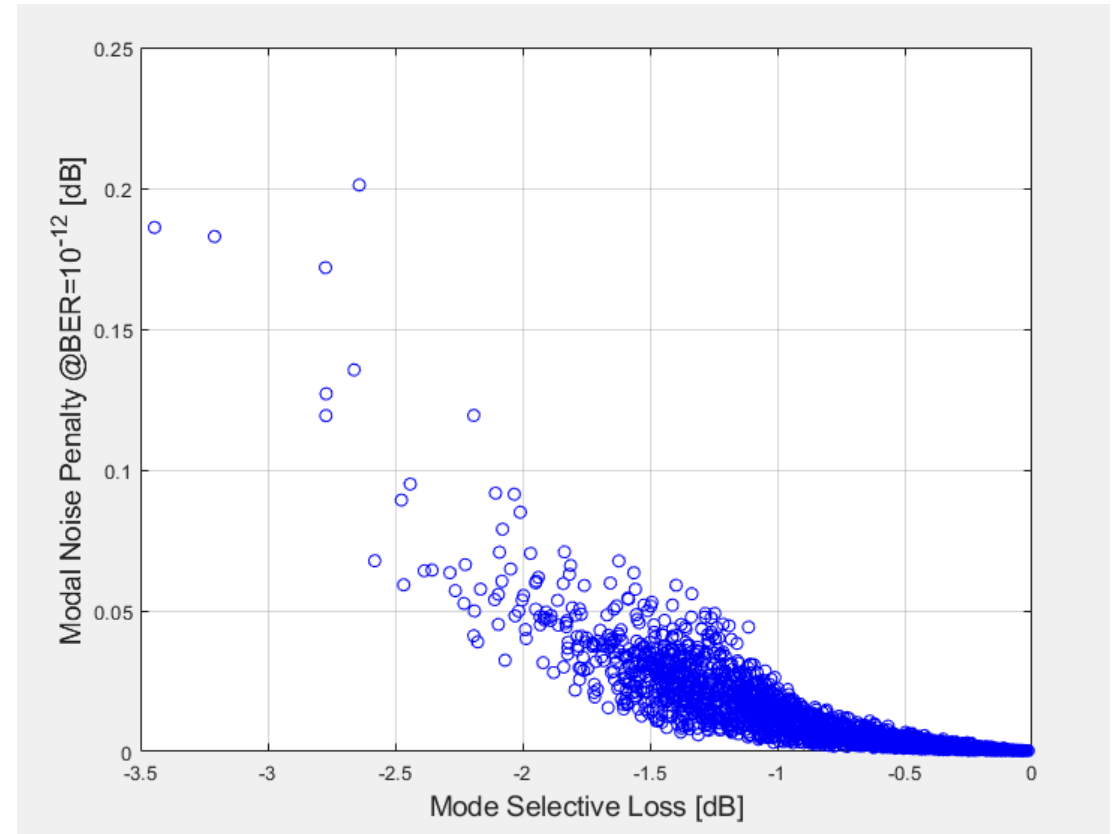
- D2.0 of IEEE P802.3cm currently includes a 0.1 dB penalty allocation including 0.05 dB MN + 0.05 dB MPN
- Measurements on 300 and 350m near-worst-case fibers, with 1.5 dB offset connector losses, with commercial 100G BiDi parts using same optics and signaling as 802.3cm, with equivalent CD*distance product equal to worst-case:
 - Have not seen ill-behaved, run-away penalties:
 - [sun 3cm 01a 0319.pdf](#)
 - Recent measurements with a modal noise generator have shown penalties not greater than 0.2 dB:
 - [sun 3cm 01 0519.pdf](#)
- Suggest increasing the allocation for MN & MPN by 0.2 dB
- Also supportive of adding an unallocated margin of 0.3 dB to provide margin for both this purpose as well as re-use of optics as suggested by comment #29. I consider it very unlikely that the maximum margin would be needed simultaneously for both purposes.

Back Up Slides

Figure on the right shows the previously obscured detail corresponding to the case $k=0.1$ on the original graph on the left - [linge 3cm adhoc 01 042519.pdf](#)



Bottom right figure from slide 13 of http://www.ieee802.org/3/ba/public/jan08/pepeljugoski_01_0108.pdf



Original data for $k=0.1$, isolated from figure to the left. Courtesy of Petar Pepeljugin, with permission.