

400GBASE-DR4 link budget discussion

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400GBASE-DR4 Receiver sensitivity calculation

- TIA input referred noise (total RMS) of 3 μ A (15 pA/rt-Hz, 40 GHz noise bandwidth), Q of 3.5 for KP4 FEC, and 0.9 A/W p/d responsivity, gets to an ideal noise limited inner eye sensitivity of -16 dBm. This might be the sensitivity achievable with a single channel 'gold box' receiver with very good coupling.
- For a high volume/low cost implementation we would add:
 - 1 dB for receiver chain implementation penalty (non-ideal frequency response and electrical reflections)
 - 3.5 dB for a silicon photonics based grating coupler
 - 1 dB for crosstalk penalty (which may be optimistic, since PAM4 is 3x more sensitive to crosstalk effects than NRZ)
 - 3 dB of manufacturing margin (the high yield, low cost, rule of thumb)
- This would give a manufacturable spec for equivalent inner eye sensitivity of -7.5 dBm.
- The current 802.3bs draft 2.0 spec is equivalent to -9.2 dBm inner eye sensitivity, 1.7 dB below what we think is a manufacturable spec, ie in our estimation the current draft has just 1.3 dB of manufacturing margin.

Proposal

- In the DR4 link budget, shift Tx OMA specs up by 0.5 dB (and other dependent specs)
- Shift Rx stressed sensitivity up by 0.5 dB (and other dependent specs)
- Discuss...

