Investigation of limiting solutions for 850nm 16GFC

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Feb 4 2009 09-030V0

Introduction

- At the last Fibre Channel meeting 14.025G with 64B/66B encoding was chosen for 16GFC.
- A limiting receiver without CDR's has been used for previous FC data rates.
- This investigation looks at what link lengths and specifications might be needed for such a system focused on OM3 fiber.

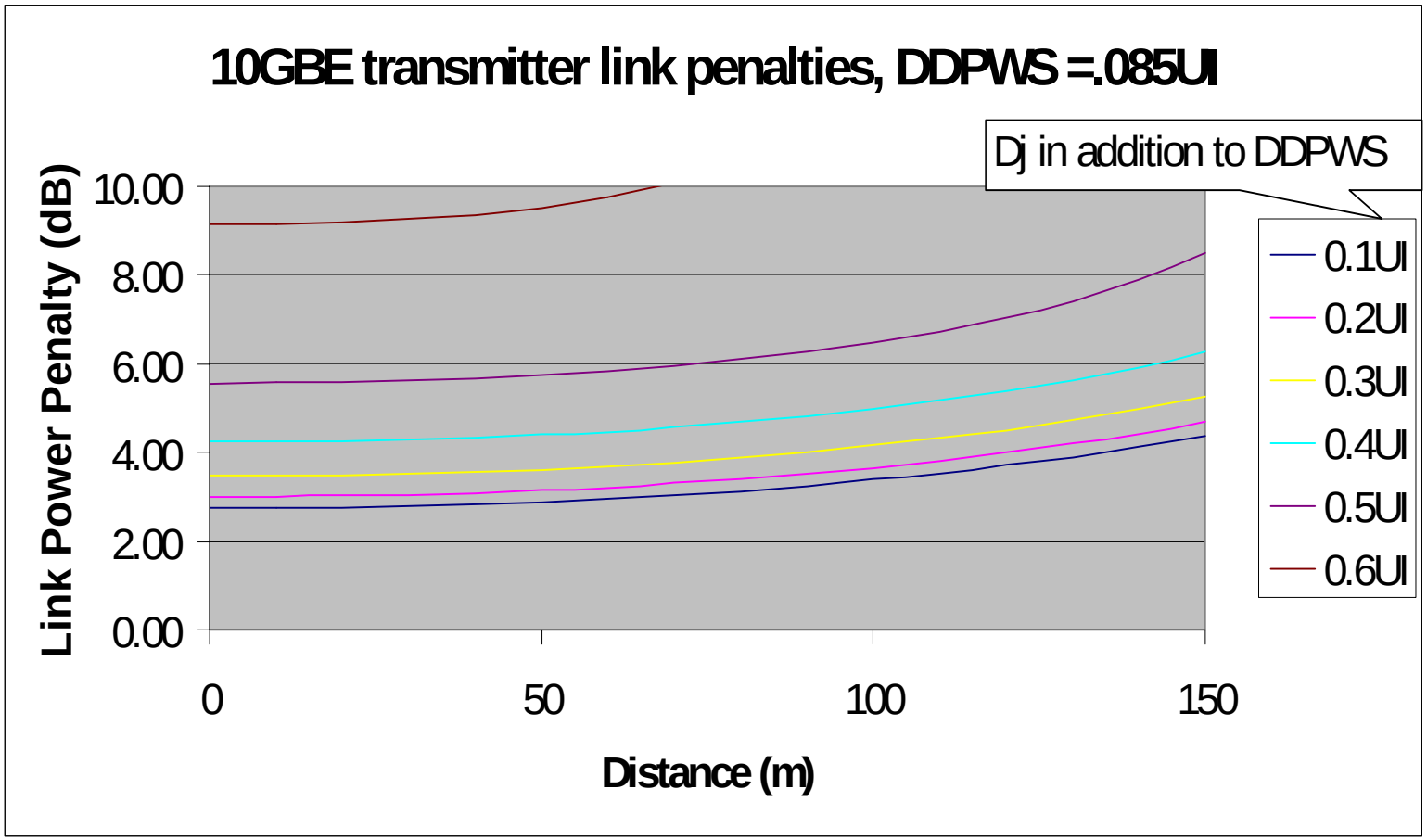
Methodology.

- The IEEE 10GBE spreadsheet was used for the study.
- The fiber chromatic dispersion was changed to the values appropriate for the latest OM3 fiber specs (U0=1316nm, S0=0.1028ps/nm^2*km)
- The receiver bandwidth was set to 0.75Xbit rate.
- The Tx used the 10GBE speadsheet values, except that the highest spectral width part of the triple trade off curve was used.
- The DCD cell which represents DDPWS was set to 0.085UI. The DJ cell (which represents 1-(required eye opening at Delta R) + Dual Dirac result of (jitter at TP1 + jitter in optical link) was varied.

Model values.

- Center Wavelength = 840nm
- Spectral Width = 0.45nm
- Rise/fall time =35ps
- RIN(OMA)=-130dB/Hz
- RIN Coef = 0.7
- MPN k(OMA)=0.3
- Modal Noise Penalty 0.3dB
- Fiber bandwidth 2000MHz.km
- Rx Bandwidth 10.5GHz

Resulting Link Power Penalties.



- There is little to be gained specifying shorter reach than 100m
- The link is likely to be jitter limited.

Dj discussion.

- **For 8G FC-PI4 has**
  - **Delta R Tj of 0.71UI ie 0.29UI required eye opening**
  - **Delta T Dj of 0.17UI**
- **Assuming these host values and allowing only 0.2UI for the optical link would put us at 0.575UI for the additional Dj (assuming linear addition of the Dj). This is too large.**

Conclusions.

- **The link is likely to be limited by jitter and for a limiting link without CDR's it will certainly not be possible to allocate more jitter (in UI) to the host than was allocated for 8GFC. In fact some tightening of these specifications appears necessary.**
- **The use of 10GBE transmitter technology is possible for 14.025GBaud if jitter can be controlled.**
- **There is little to be gained in specifying a distance significantly smaller than 100m.**

Additional sensitivity analysis.

- **Some additional test results were obtained to check the sensitivity of the link to various changes.**
  - **Increasing the spectral width to 0.65nm is approximately equivalent to reducing the link distance from 100m to 87m.**
  - **Decreasing the rise/fall times to 25ps (which is extremely aggressive) would only provide an extra 0.1UI in the jitter budget.**