Channel Metric Results for OM3 Fibers at 1300nm

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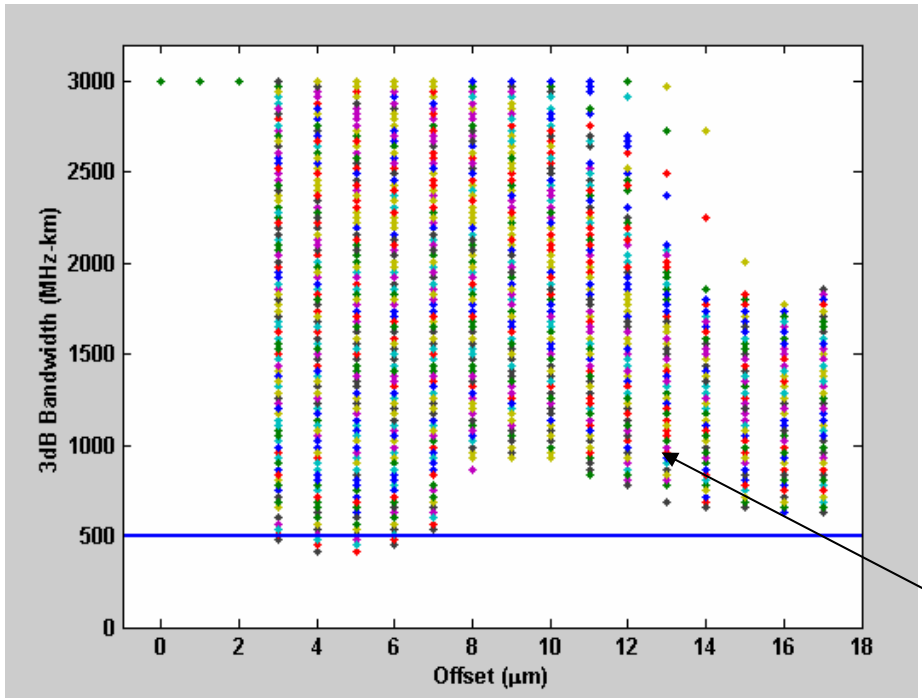
OM3 Simulation model

- 850nm TIA OM3 delay set converted to 1300nm by P. Pepeljugoski
  - 5000 fibers in the delay set
  - Subset of these fibers were used in simulations
  - Fibers in subset satisfy *both* criteria:
    - 500MHz·km at 1300nm
    - one of the six DMD mask sets at 850nm
- 10 mode-groups were used in calculations

- MPD's for 50μm fiber used in these simulations from John Abbott
- PIE-L & PIE-D
  - 47.1ps risetime Gaussian Tx filter
  - 7.5GHz, 4th-order Bessel-Thompson Rx filter

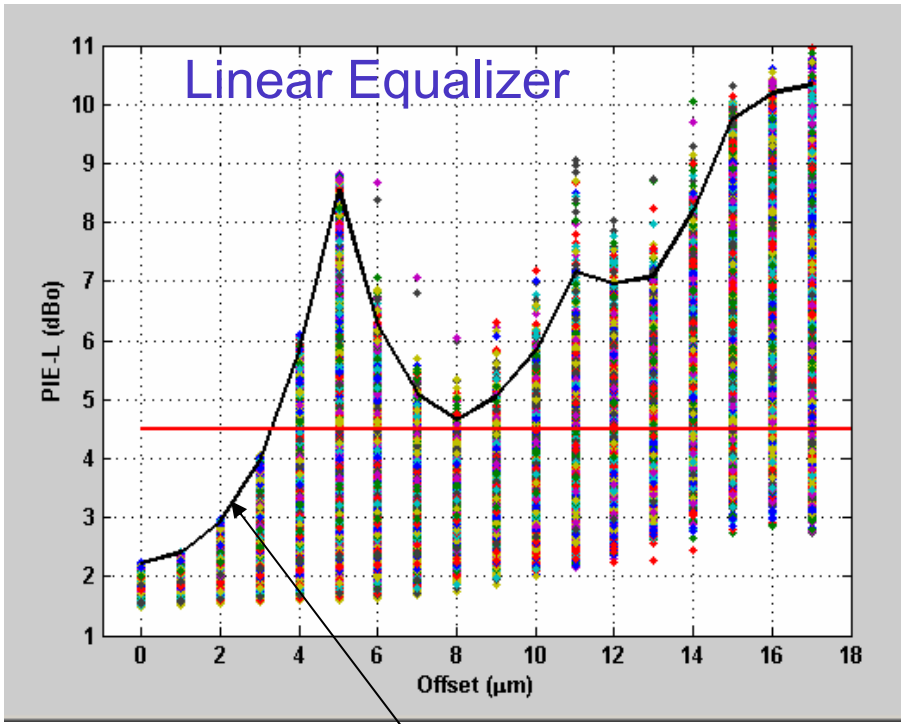
3dB Bandwidth vs. Launch offset

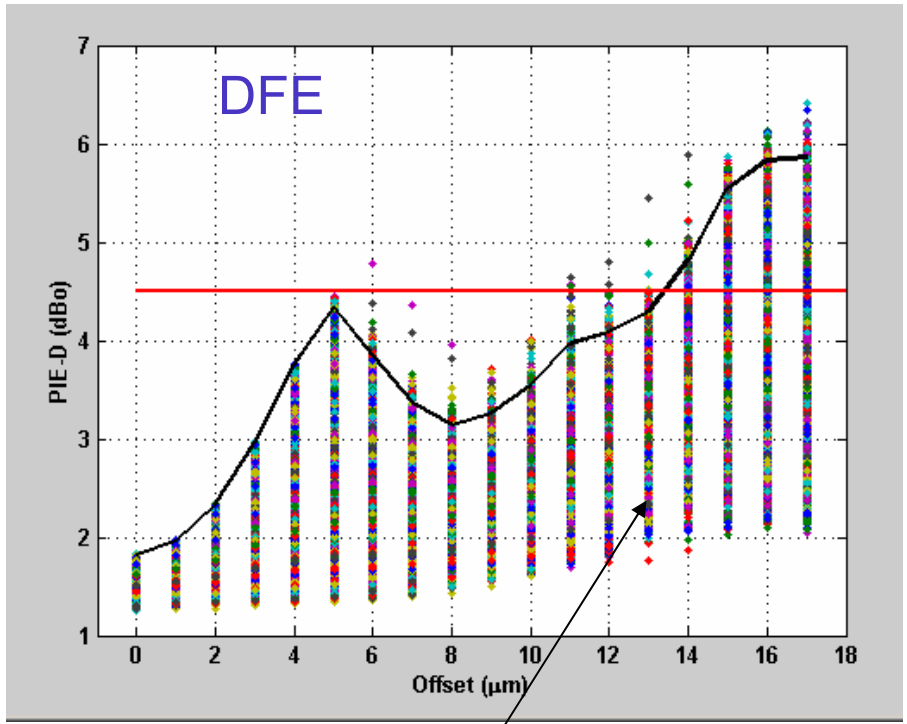


Individual fibers

- 802.3z MCP (13 +/- 3μm) results in min Bandwidth > 500MHz·km
- Recommend using PIE metrics instead of 3dB BW to set launch parameters
  - EDC dispersion penalty is poorly correlated to 3dB BW

PIE metrics for OM3 at 300m





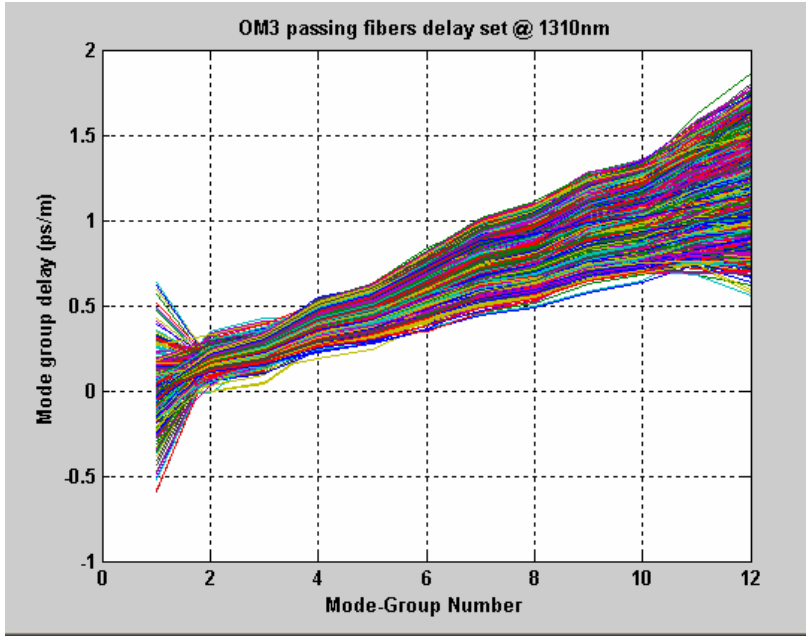
99th percentile at each offset

Individual fibers

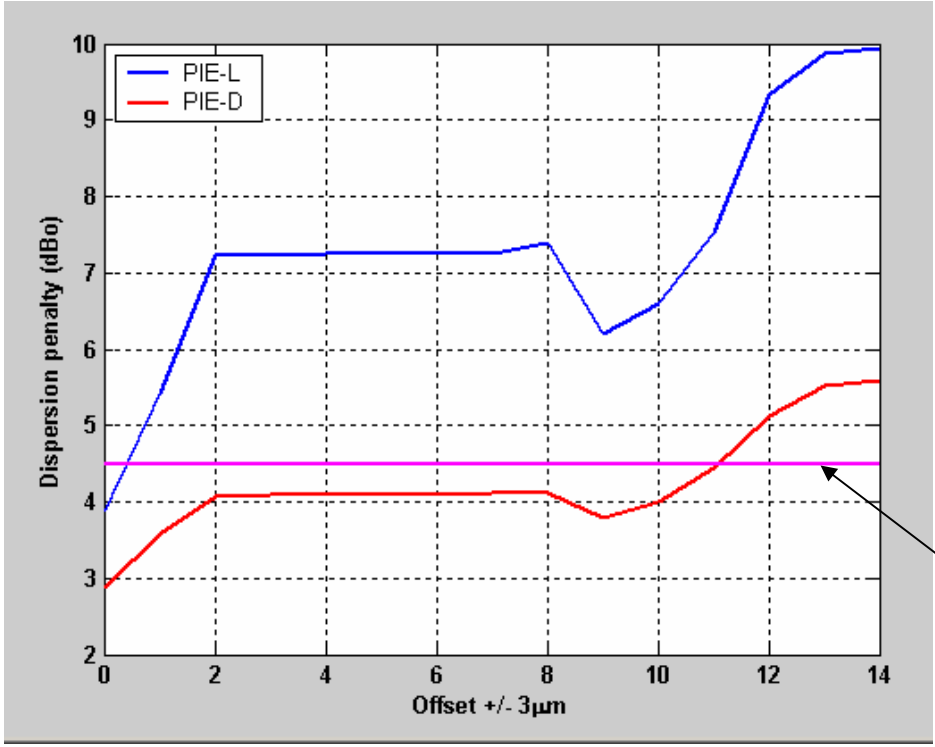
- 5um OSL tends to produces split pulses → very difficult for linear EQ
- Minimum penalty is at the center with local minimum at ~8μm
- Degrades monotonically for OSL greater than 8μm

Discussion

- OM3 fibers optimized for 850nm hence have systematic delay trend ~1.25ps/m @1300nm
- Exciting higher offset launches often results in wide pulses
  - Significant high frequency roll-off (monotonic)
  - 300m, 13μm OSL, 99% yield
    - PIE-L @ 7dB penalty
    - PIE-D @ 4.3dB penalty
- Exciting lower offsets often results in split pulses
  - Significant notches in frequency domain
  - 300m, 5μm OSL, 99% yield
    - PIE-L @ 8.5dB penalty
    - PIE-D @ 4.3dB penalty



Penalty for 300m (+/-3μm tolerance)

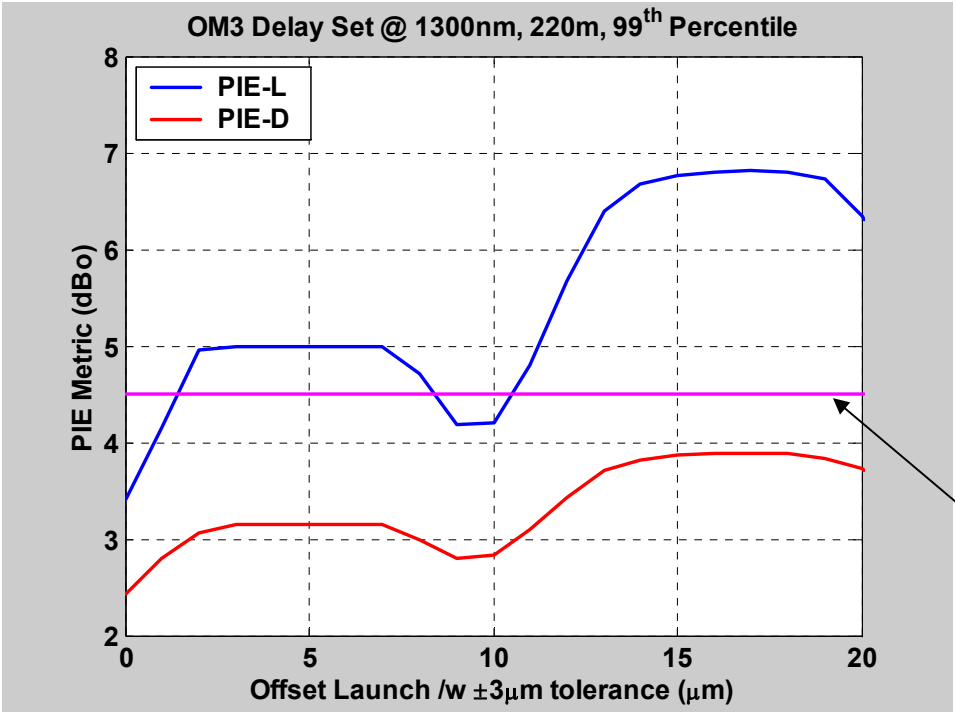


Dispersion budget

- 99% percentile in a 6μm launch window is computed
- PIE-D may support 300m on OM3 fiber
  - Any OSL in the range 0 – 11μm results in PIE-D below 4.5dBo
- PIE-L only supports 300m for center launch 0 +/- 3μm *(practical?)*

⇨ *Connectors need to be included before drawing final conclusions*

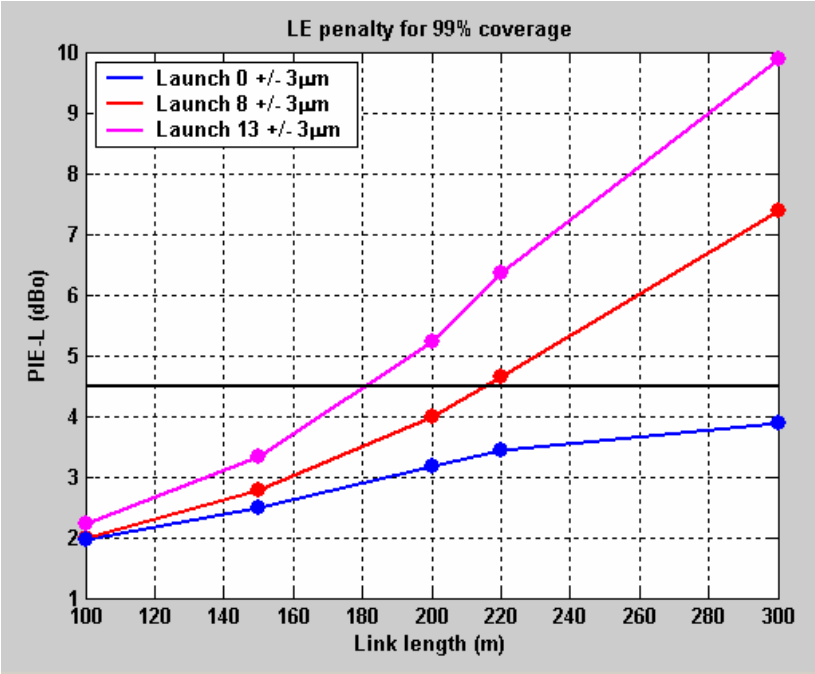
Penalty for 220m (+/-3μm tolerance)



Dispersion budget

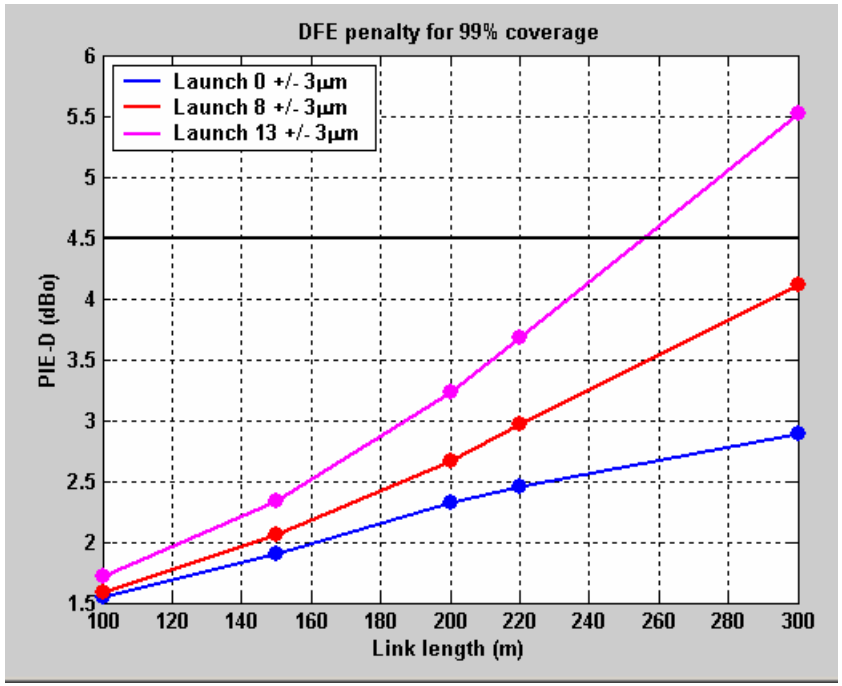
- 99% percentile in a 6μm launch window is computed
- PIE-D supports 220m on OM3 fiber
  - Any OSL results in PIE-D below 4.5dBo
- PIE-L only supports 220m for center launch 0 ± 3μm *(practical?)*

Ideal Linear Equalizer link lengths



- Ideal infinite length Linear Equalizer (4.5dBo dispersion budget)
  - 180m for 802.3z OSL (13 ± 3µm)
  - 220m for OSL (8 ± 3µm)
  - 300m for Center Launch (0 ± 3µm)

Ideal DFE link lengths



- Ideal infinite length Decision Feedback Equalizer (4.5dBo budget)
  - 260m distance for 802.3z OSL (13 ± 3μm)
  - >300m for Center Launch (0 ± 3μm) or OSL (8 ± 3μm)
- PIE-D on OM3 appears to meet the desired 300m yield target
  - Requires a different launch condition from 1GbE

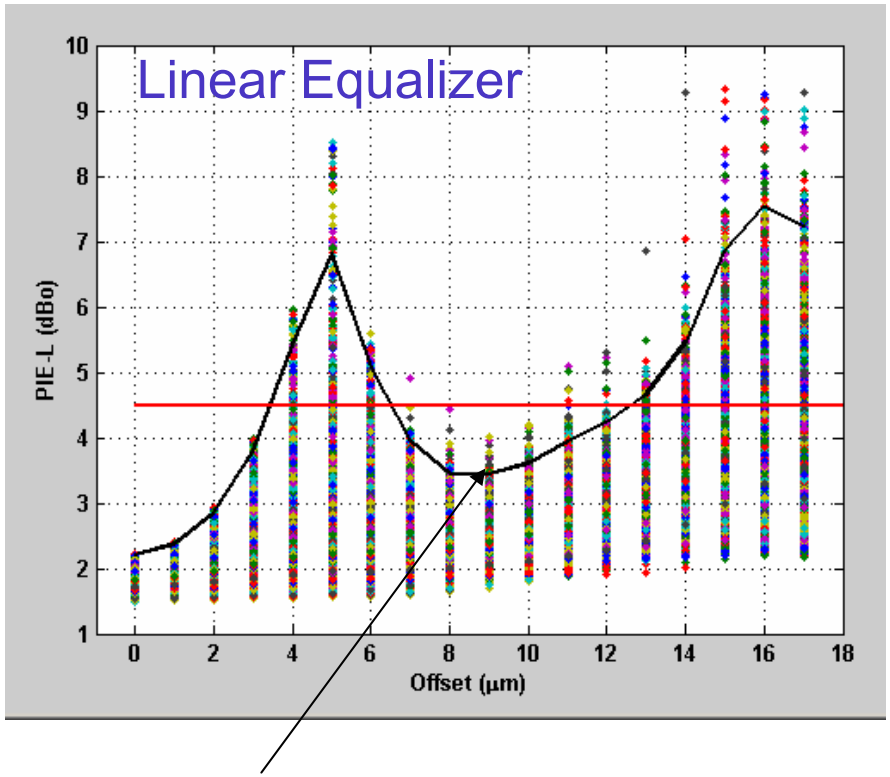
⇨ *Connectors need to be included before drawing final conclusions*

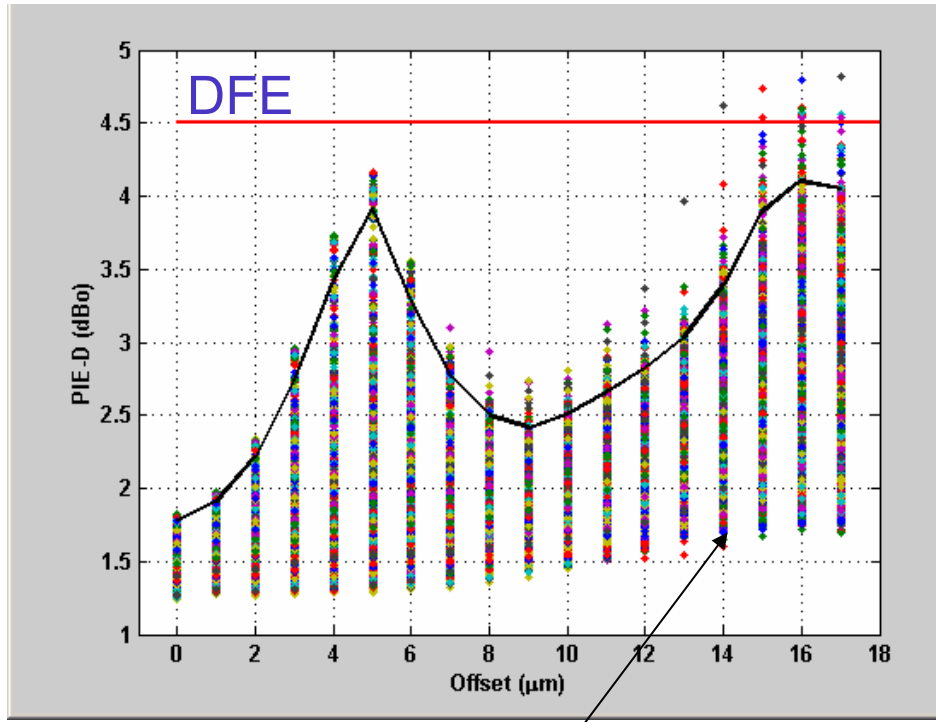
Summary

- OM3 models produce split pulses & broad pulses
  - PIE-L suffers from both types of pulses
  - PIE-D performs well under split pulses but suffers somewhat from broad pulses
- 802.3z 50μm OSL (13μm ± 3μm) is not optimized for OM3
  - Recommend deriving TP2 launch specifications from PIE metrics
- Launch conditions for OM3 require further work
  - Simulations do not include effect of connectors
  - Connectors will likely degrade the results
  - Adoption of a 50μm standard link model with connectors is required
  - 300m on OM3 will be difficult, but may not be impossible …
- Common launch for OM3 & OM2 is desirable
  - Will repeat simulations when OM2 fiber model is available

Backup

PIE metrics for OM3 at 220m





99th percentile at each offset

Individual fibers

- 5um produces split pulse