Adaptive Equalization of DMD Challenged Multimode Fiber at 1300 nm

Giorgio Giaretta, Thomas Lenosky

ggiaretta@finisar.com
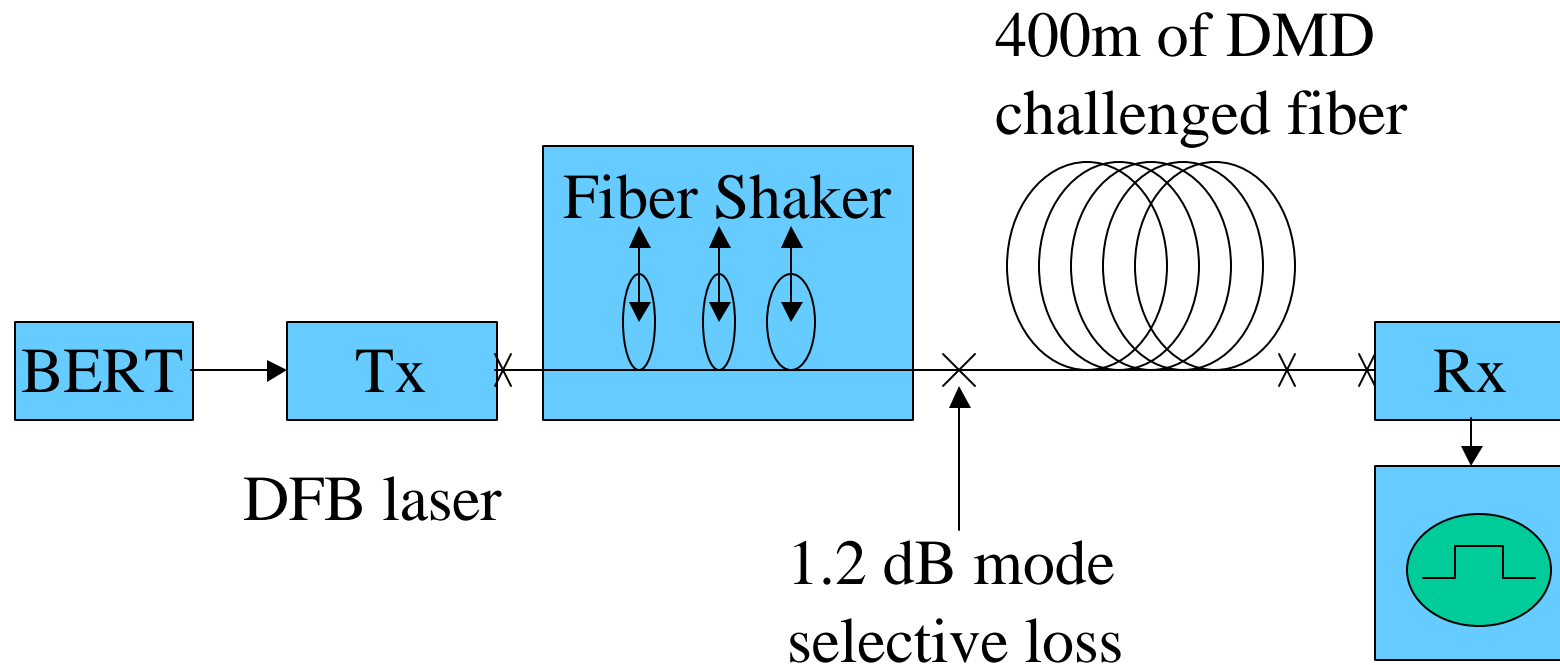
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IEEE P802.3ae Plenary

Objectives

- Show that a 10 Gb/s link at 1300 nm over 300m of worst case multimode fiber is possible using adaptive equalization
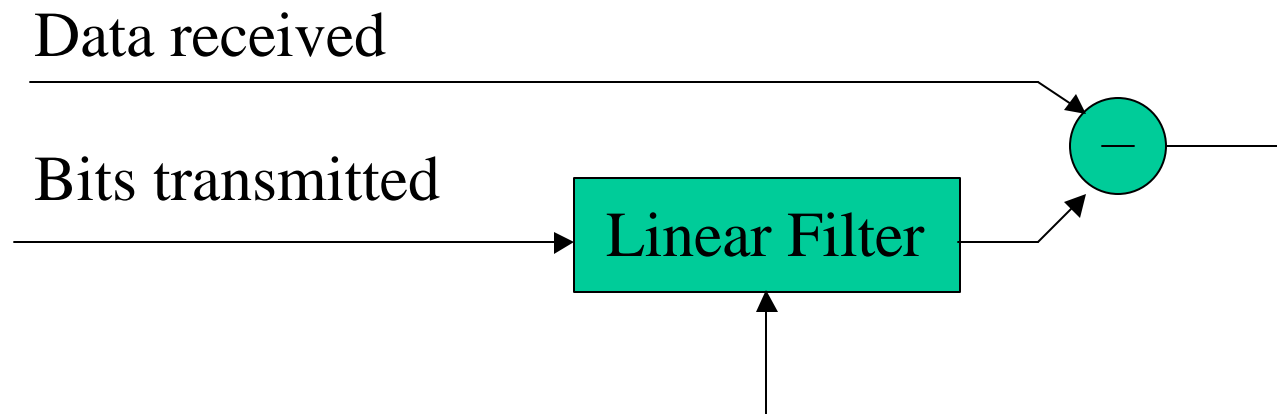- Show that the optical channel is slowly time variant

Experimental Setup

400m of DMD
challenged fiber

Fiber Shaker

BERT → Tx

DFB laser

1.2 dB mode
selective loss

Rx

- A 3 GHz, 10 GS/s, real time scope is used as A/D converter

Channel estimation

- A canceller is implemented to extract the pulse response of the channel

Data received
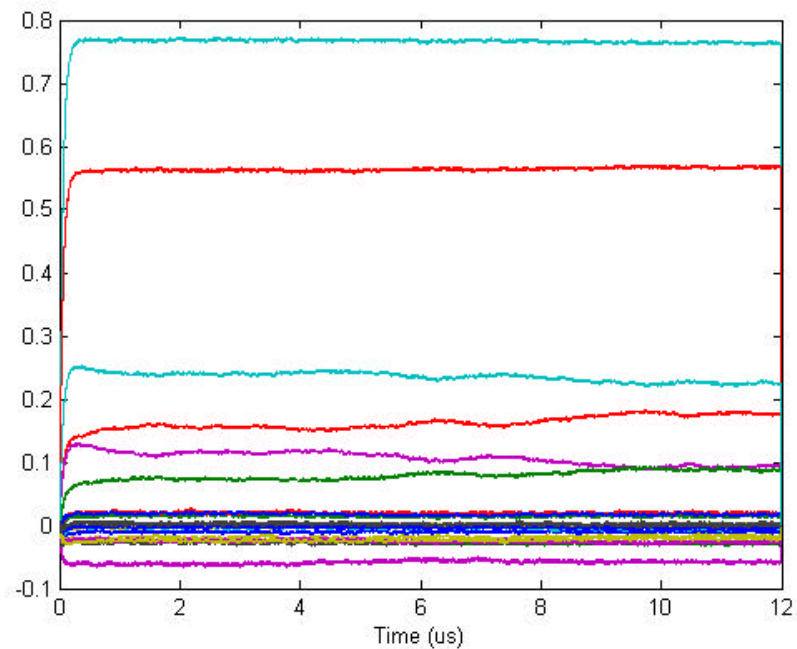
Bits transmitted

Linear Filter

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- The coefficients of the transversal filter are the pulse response of the channel

Channel pulse response
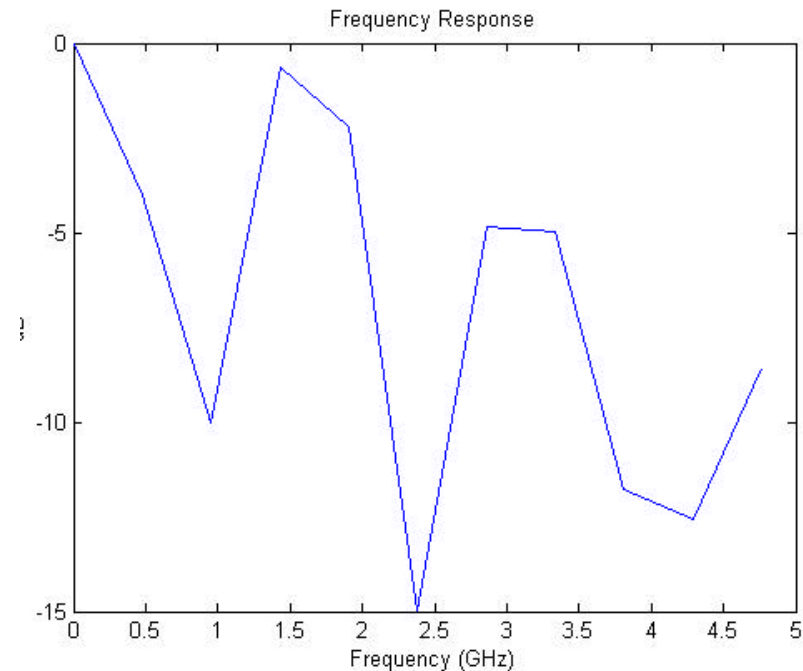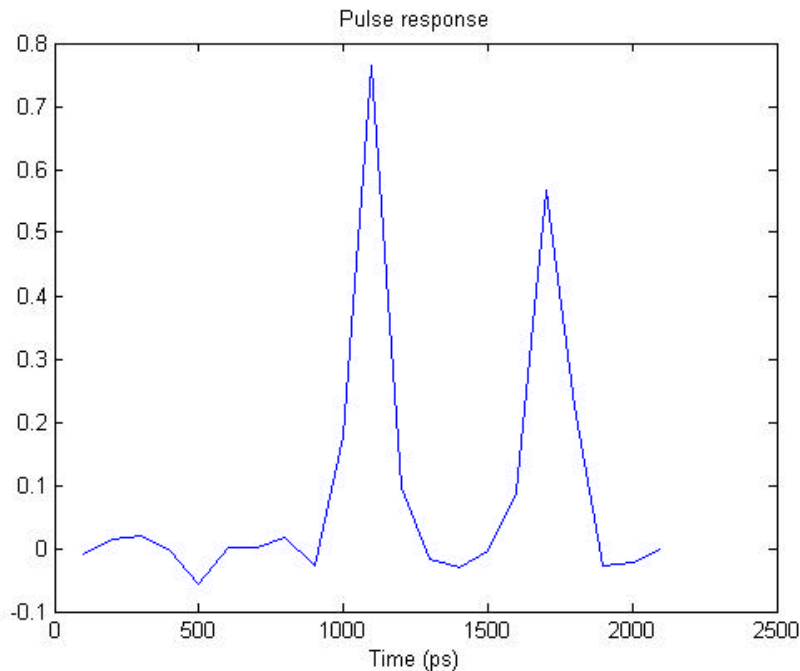
- The fiber shows pulse splitting with a bandwidth of < 400 MHz km

# Time variation of pulse response

- The coefficients of the transversal filter are slowly varying

Equalization algorithm

- A decision feedback equalizer is implemented to open the received eye
- The data sample distribution at the decision circuit is fitted using two gaussian distributions and the error rate is estimated
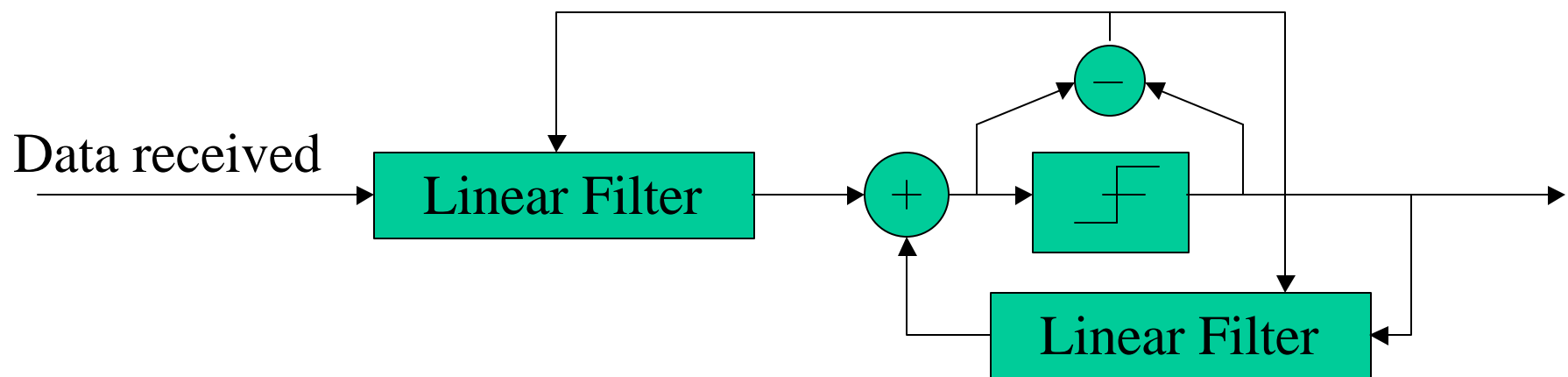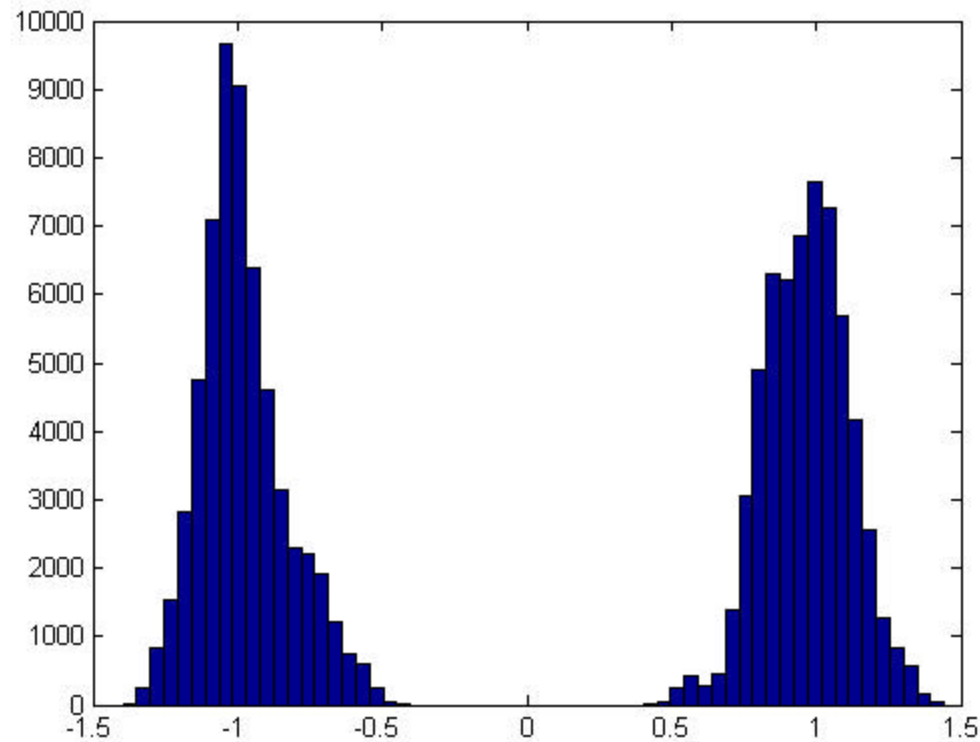
Samples distribution at input

Sampling time
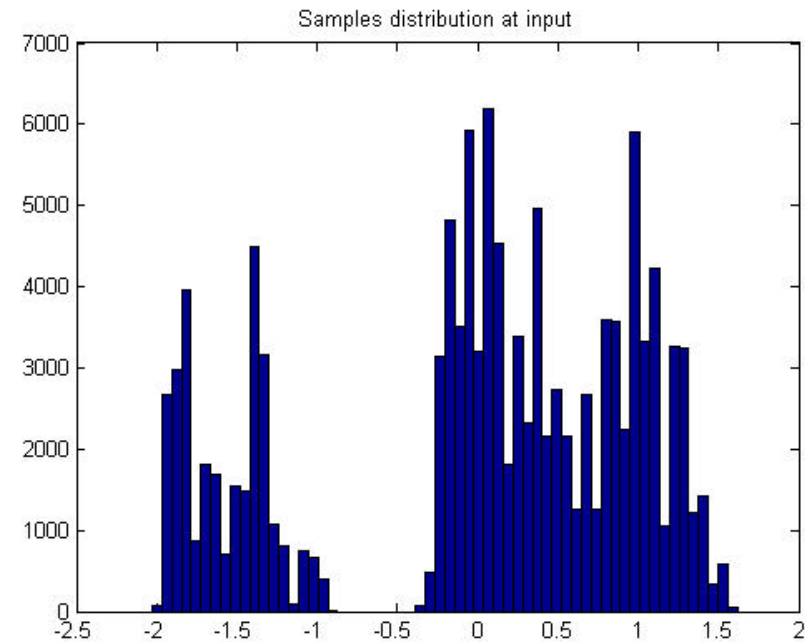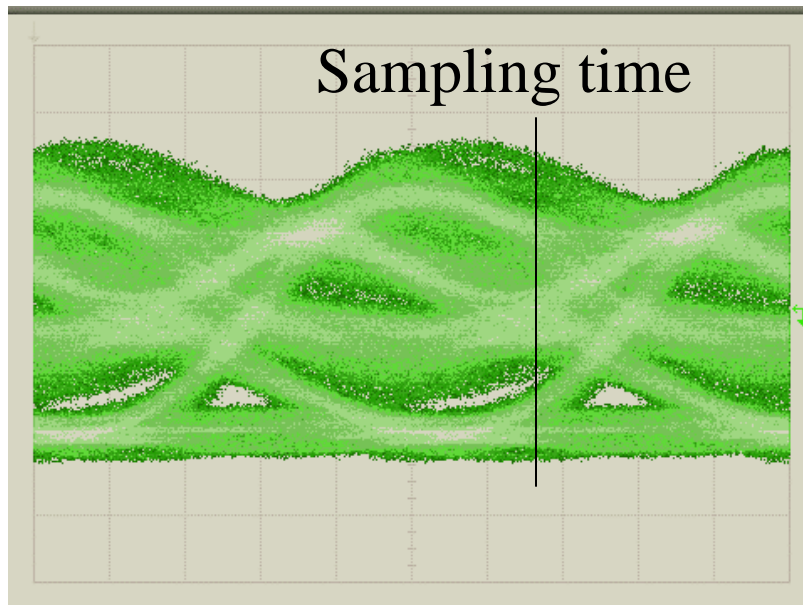
- The eye at the input of the equalizer is closed

Distribution of the samples at input of DFE

Samples distribution at the slicer

- No error were detected over 120000 bits
- Estimated ER ~ 10^{-12}

Summary

- We have transmitted error free 120000 bits at 10 Gb/s over 400 m of 400 MHz km MMF with pulse splitting

- The estimated error rate for the channel is 10^-12

- Equalization can follow the slow time variation of the optical channel