Extending the OM3 Reach with EDC to 300 m

IEEE 802.3ba Call

May 2008

Ali Ghiasi

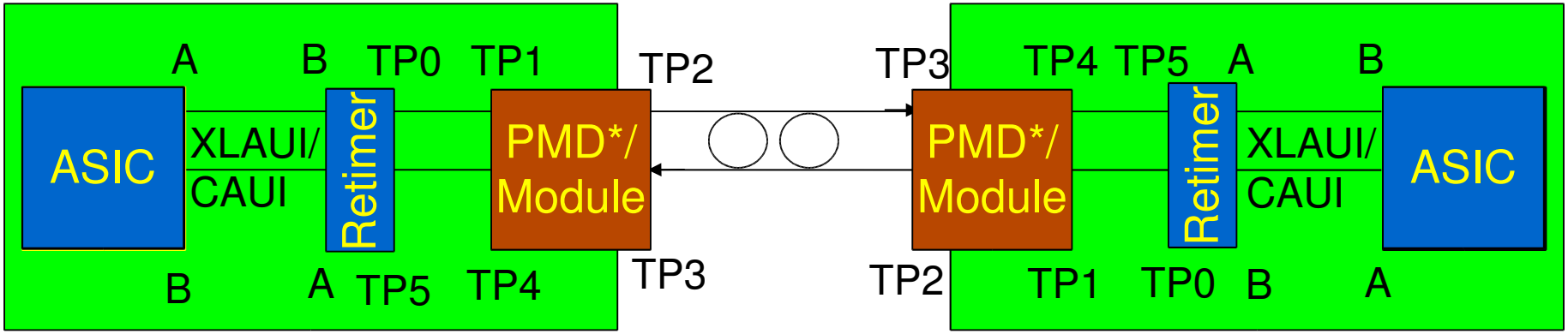
aghiasi@broadcom.com

Overview

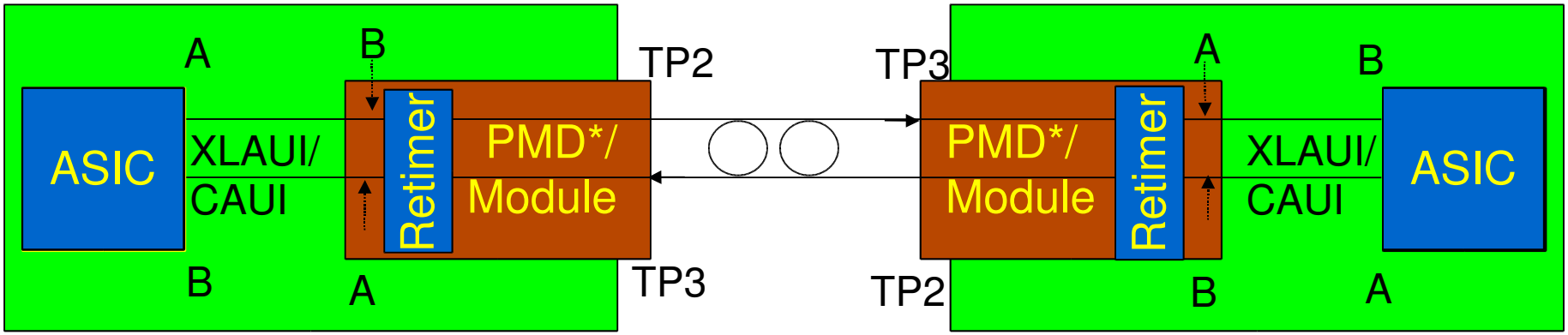
- A retimer is often will be used between the host ASIC interfacing XLAUI/CAUI to the PMD interface.
- Retimer/EDC “a.ka. KR” will be used for the copper cable.
- With availability of retimer/EDC to drive copper cable the current fibre reach on OM3 fibre can be extended from 100 m to >300 m with baseline transmitter.
  - It is more advantages to have one transmitter and just improve the receive chain.
- Linear interface can equalize multiple UI of fibre dispersion without pushing any limits.
- Use of CDR in the module one can gain 0.07 UI of DJ on TX and 0.05 for the RX.
  - But in QSFP application with CDR external there is no gain!

Application XLAUI/CAUI Extender for Front Ports

- **EDC will be part of the retimer and will be used for 10 m of Cu.**

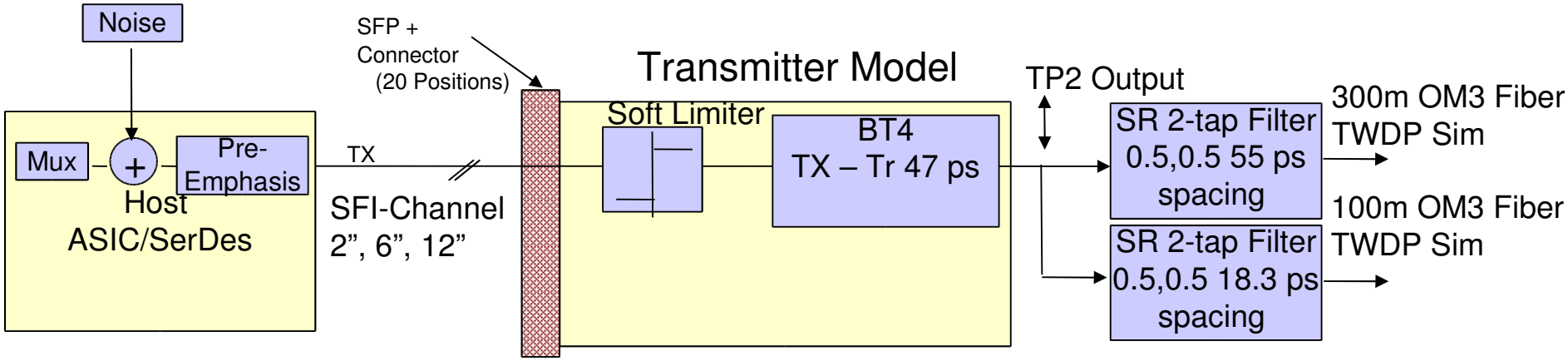


- **Application with Retimer in the module (QFP/CFP)**



SFI TP2 Simulation Set-up and TWDP Results

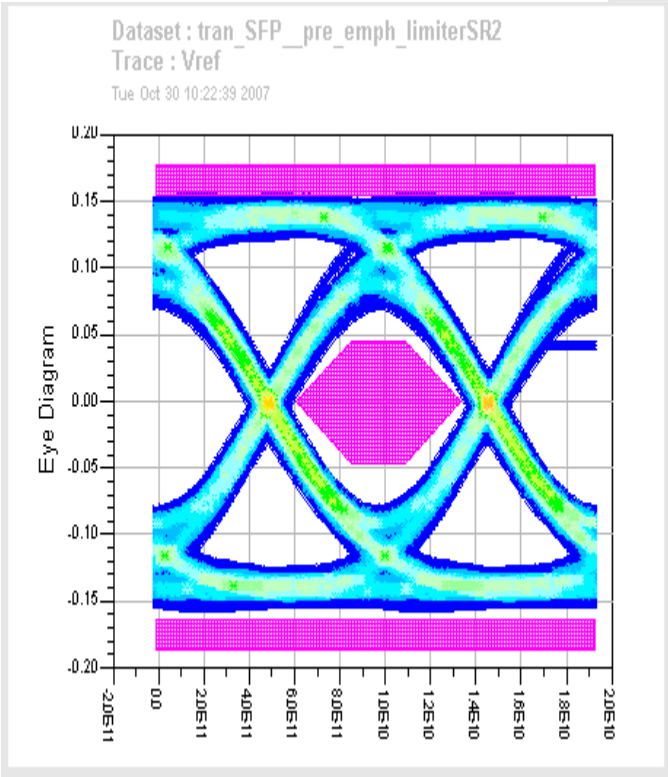
- **RIN penalty is not included**
- **Output rise time was calibrated with 2 inch stripline**
- **Noise source at the SerDes was adjusted for UJ of ~0.023 UI (RMS) at B.**
- **BT4 filter in the module was adjusted for Trise/fall of 47 ps 20-80%.**



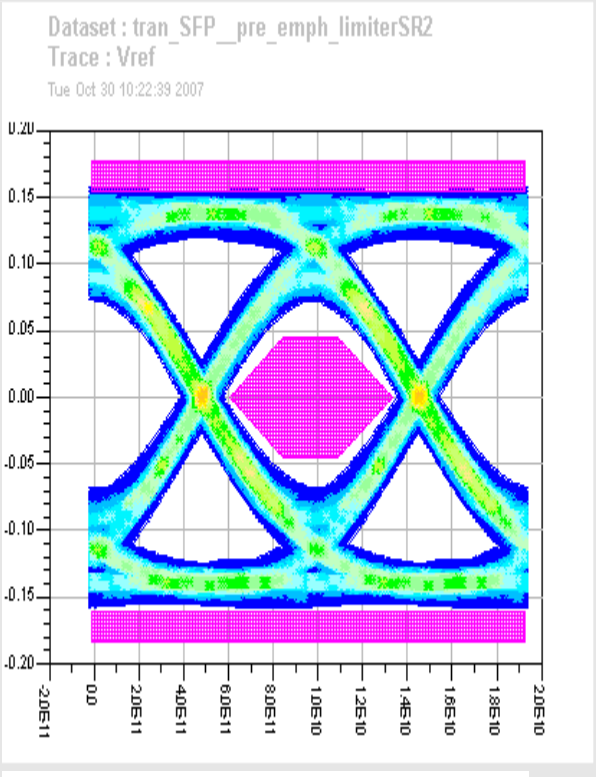
SFI Transmitter Output with Optimum Pre-emphasis

- **Pre-emphasis single T-Spaced post**
  - **Eye mask will get degraded further due to PCB and IC variations!**

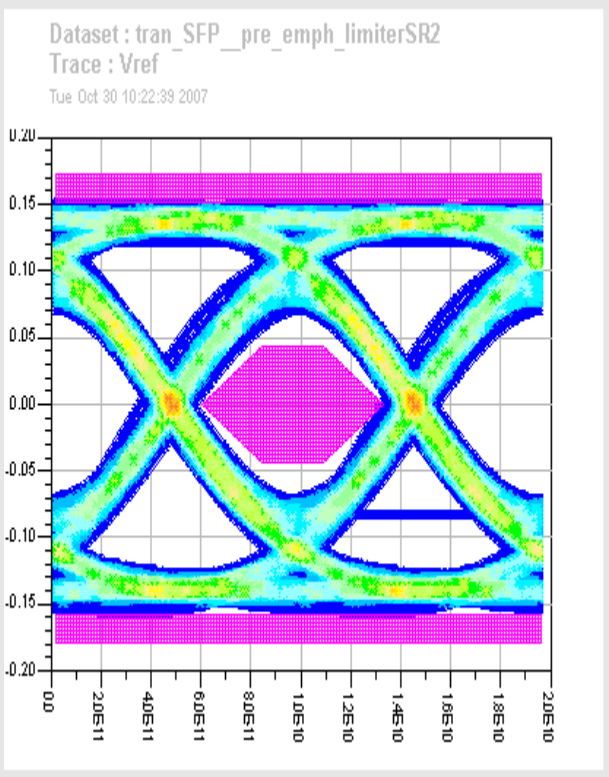
2” Fr4-13



6” Fr4-13

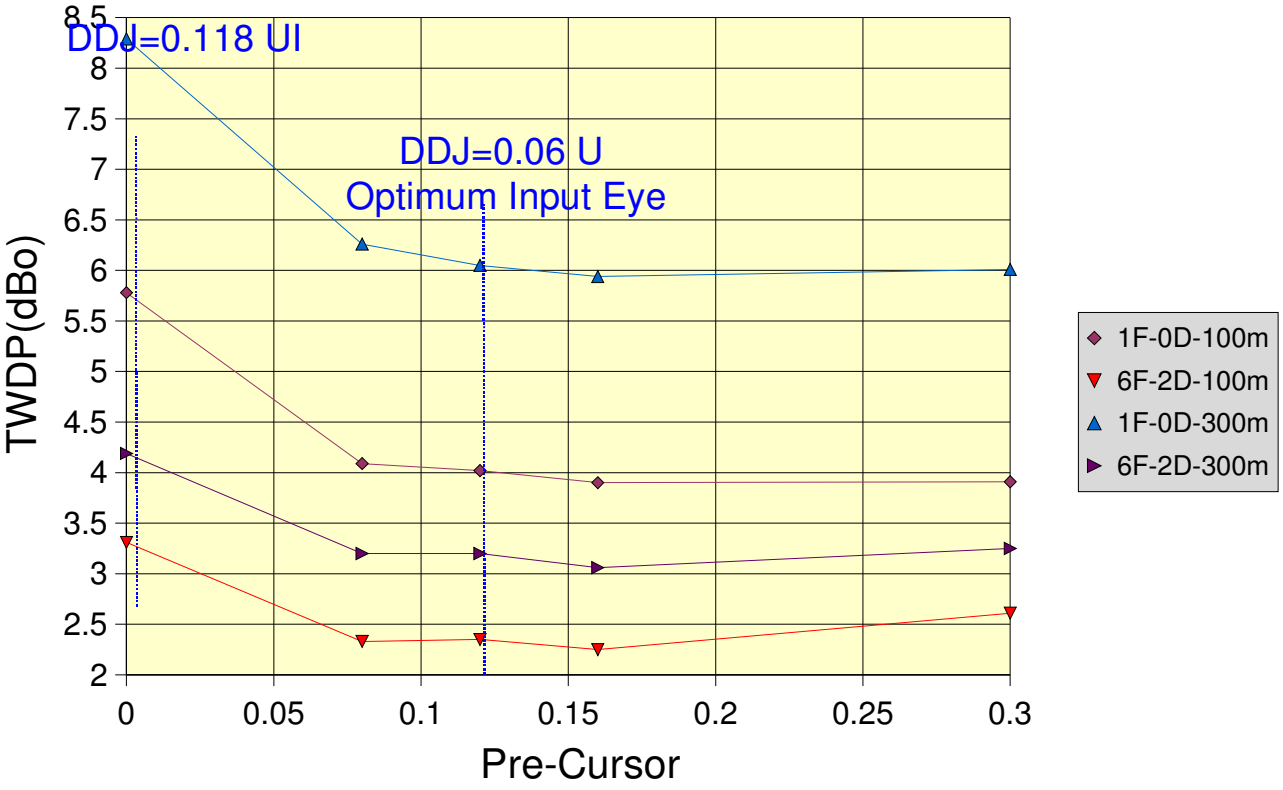


12” Fr4-13



TWDP as Function of Pre-emphasis

- **Pre-emphasis=0 results in an input DDJ of 0.118 UI <the amount on page 8**
  - **6" STL has TWDP of 5.8 dBo for 100m with 1FFE-0DFE but only 3.4 dBo with just 6T/2FFE+2TDFE!**
  - **Linear can do 300 m with about 1 dB less penalty than limiting can do 100 m!**



Conclusion

- This presentation shows a linear host (6T/2 FFE+2T DFE) can do 300 m with about 1 dB less penalty than a limiting host can do 100 m.
  - Next step is rerun this analysis with 2 T/2+5 T DFE to approximate common used KR EQ.
- Use of linear host with adaptive EDC can allow
  - Maintain common transmitter and SerDes
  - Not to increase optical transmitter cost
  - Linear can equalize module with both PMD and XLAUI/CAUI interface.
    - Since there is a reitmer on the host board no benefit will be gained for QSFP like application.
  - Commonality with copper interface.
  - Extend the reach to >300 m!