

# 56Gbps Modulation

- NRZ Measurement Data in Support of C2M
- NRZ Measurement Data in Support of C2C
- NRZ Power Estimation

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Credo Semiconductor

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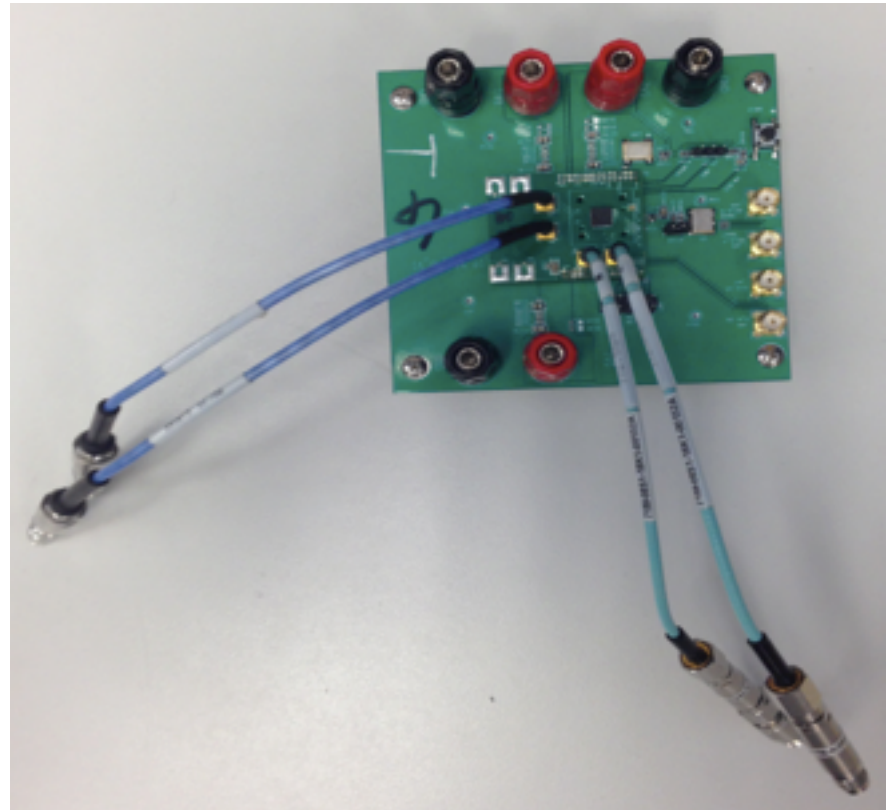
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IEEE 802.3bs 400G Task Force Meeting  
January 2015

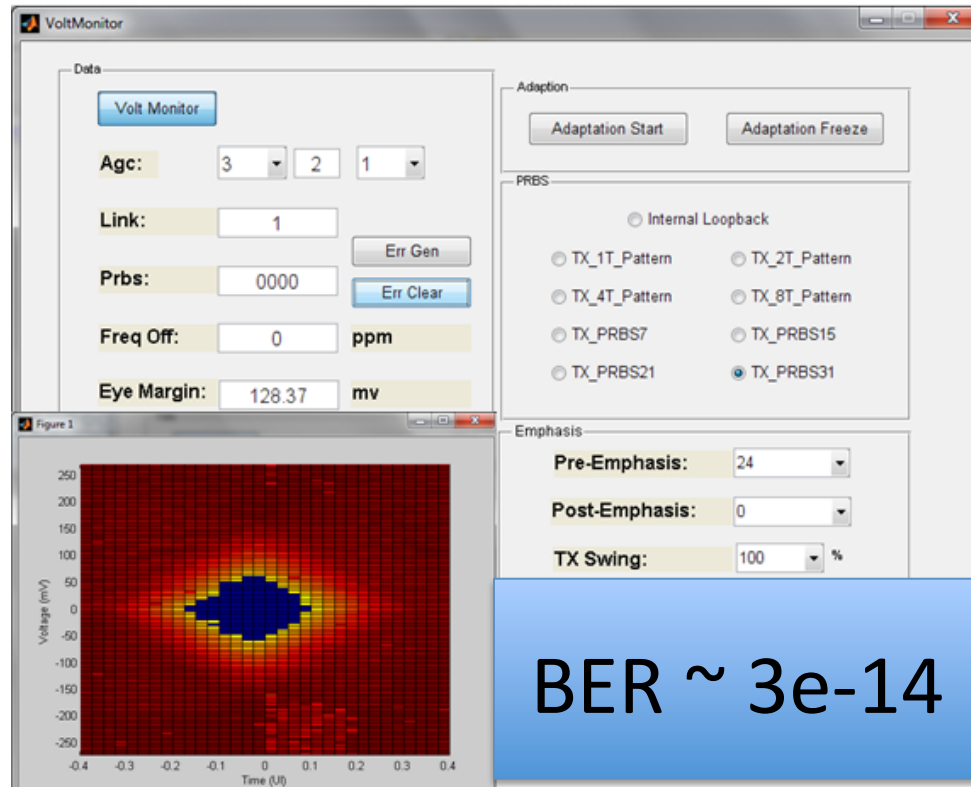
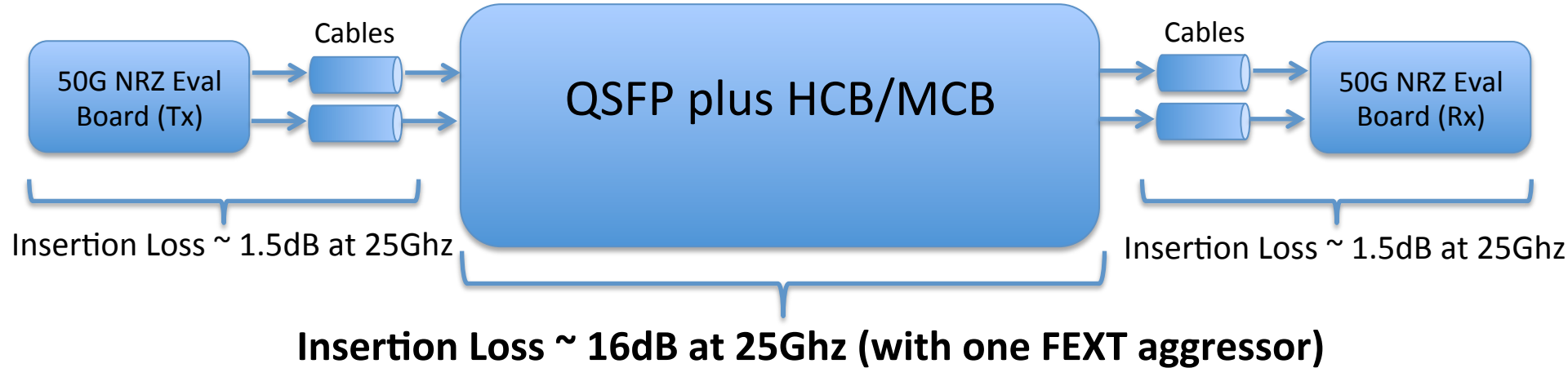
# Measured Results

## Credo 50G – 56Gbps Evaluation Board

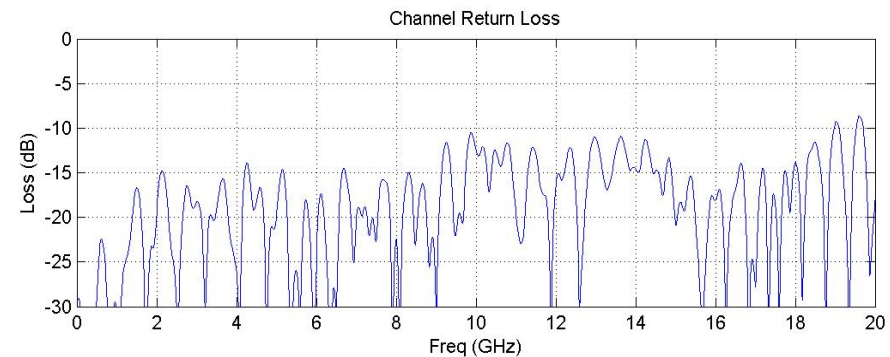
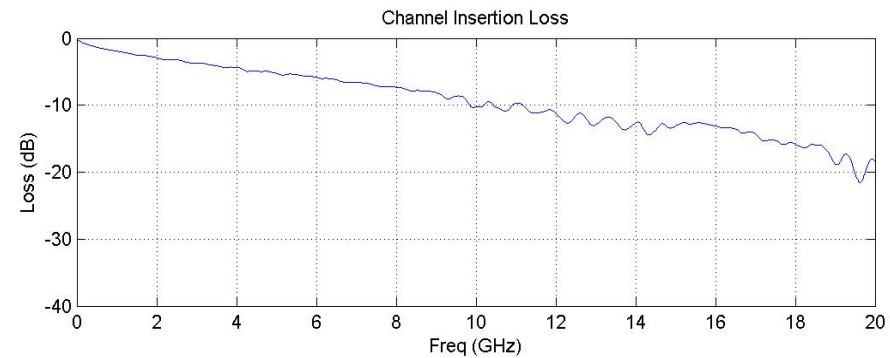
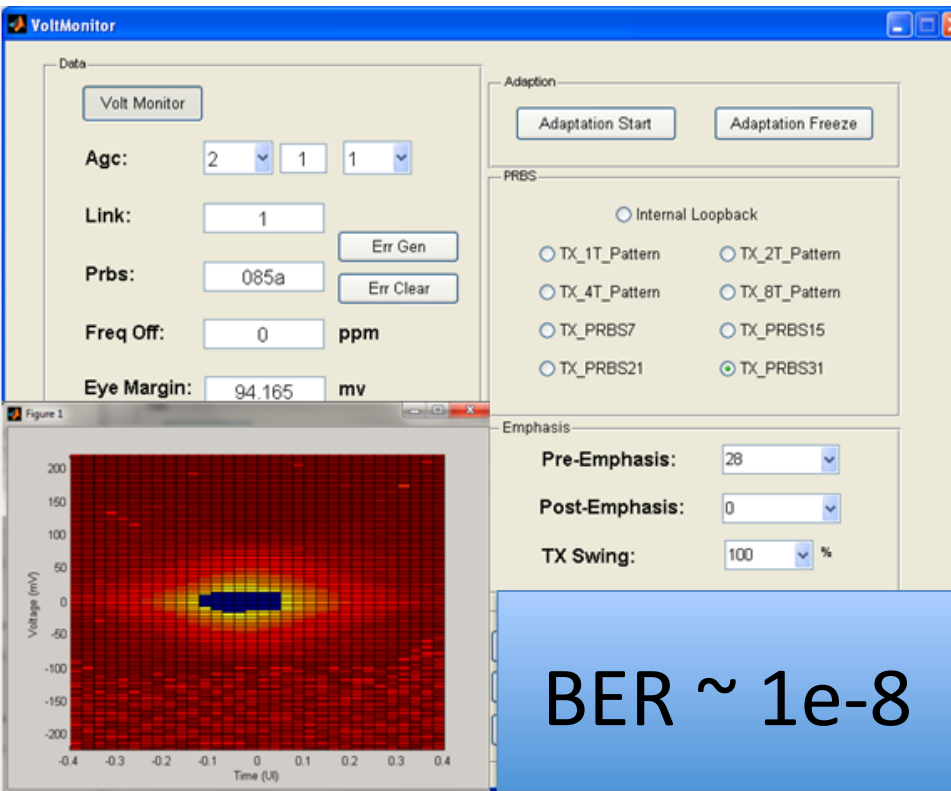
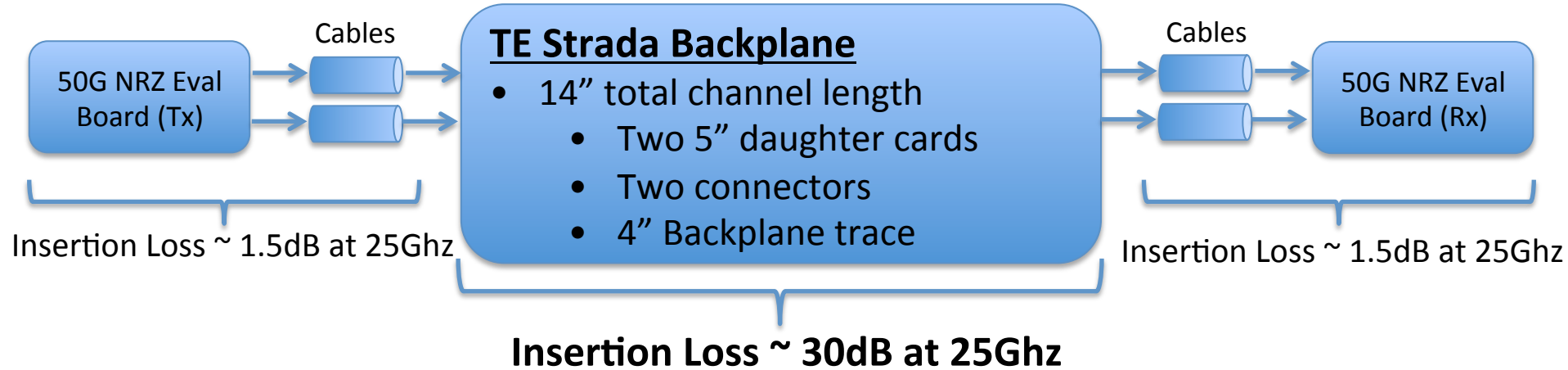
- 40nm
- No FEC
- Internal PRBS31
  - Generation and checking



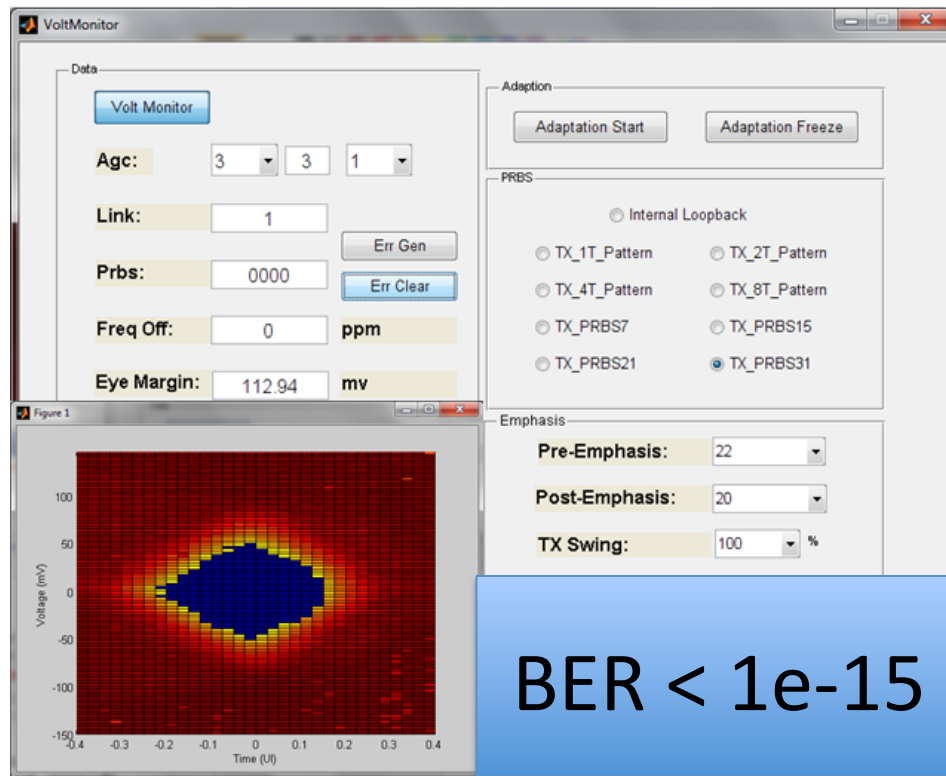
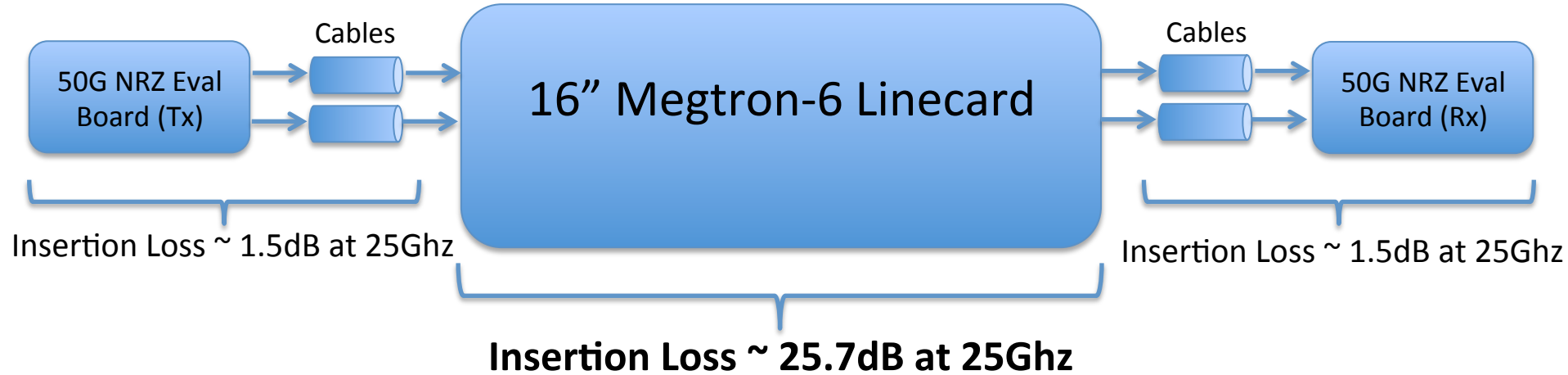
# #1: HCB/MCB Measured Data in Support of C2M



# #2: Backplane Measured Data in Support of C2C



# #3: Linecard Measured Data in Support of C2C



**BER < 1e-15**

# 56G NRZ Power Estimation

- 16nm Process Node
- Chip to Module (C2M)
  - 100mW
  - 1.8pJ/bit
- Chip to Chip (C2C)
  - 175mW
  - 3.125pJ/bit

# Summary

- C2M and C2C links using 56G NRZ are feasible
  - Demonstrated via measured data
    - Examples from this presentation and:
      - [http://www.ieee802.org/3/bs/public/14\\_11/qian\\_3bs\\_01d\\_1114.pdf](http://www.ieee802.org/3/bs/public/14_11/qian_3bs_01d_1114.pdf)
- 56G NRZ power consumption looks promising
  - On par or better than PAM-4 projections
- NRZ testing infrastructure preserved
  - Decades of knowledge accumulation