Low Cost 100Gb/s Pluggable Optical Transceiver

Problem Statement

- Even as the demand for bandwidth continues to grow, the revenue-per-bit that service providers make continues to drop at an alarming rate
  - Fewer and fewer service providers will hit the return on investment (ROI) goals

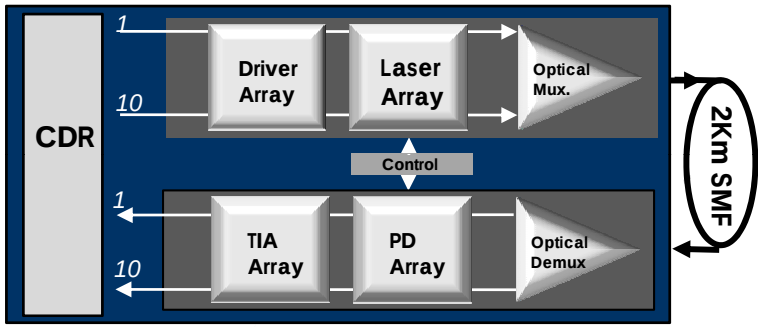
Can we leverage industry investment in 10G electronics and optics to deliver a low cost 100Gb/s solution now?

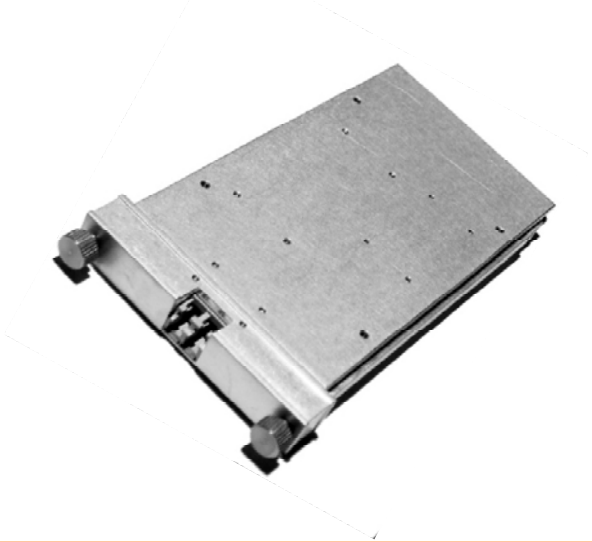
Low Cost 10G Technologies Delivers on Key 100G Metrics: Cost, Power

- Combine parallel 10G electronics with parallel 10G optics to deliver disruptive cost/G
  - Map 10G electrical lanes directly onto 10G wavelengths
    - Eliminate need for intermediate gear box
    - Utilize mature 10G optical and electrical technology for lower cost and power dissipation
  - Low risk system integration and accelerated roll-out
    - Compliant with IEEE 802.3ba CAUI, MLD, MAC structure
    - Compliant with CFP MSA specifications

Proposed Specifications

- 100Gb/s over 2Km SMF-28
  - Optional OTU4 rate
- DFBs centered at 1550
  - 8nm spacing
- CAUI Compliant electrical interface
- CFP Compliant form factor
  - Electrical
  - Mechanical
  - Firmware
- Target Max power: 14W

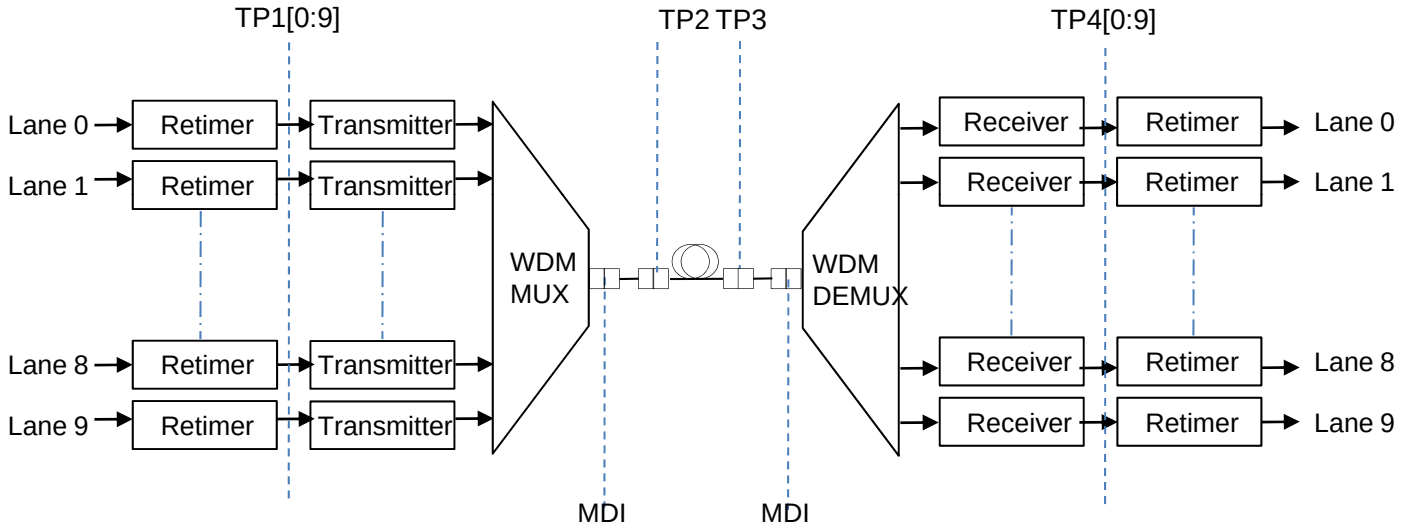




Scope of Agreement

- Interoperable source of pluggable fiber optic transceiver module in support of common product specifications such that the products are interchangeable and interoperable in these key aspects:
  - Optical – the main aspect of the specification
  - Electrical – According to referenced specifications
  - Mechanical, dimensions – compliant with module specification, e.g.,CFP MSA
  - Management interface – compliant with module specification, e.g., CFP MSA (MDIO)
- Internal design at discretion of members

Definition and Power budget



Description	Value	Unit
Power budget (for max TDP)	5.6	dB
Operating distance	2	km
Channel insertion loss	2.6	dB
Maximum discrete reflectance	-26	dB
Allocation for penalties (for max TDP)	3	dB
Additional insertion loss allowed	0	dB

2Km Power Budget

10x10 MSA Organization

- www.10x10msa.org will contain the latest drafts and information – under construction
- Weekly teleconferences on Fridays at 11 AM PST
- Face-to-face meeting planned in January to resolve comments
- 10x10 Officers
  - Chair – Scott Kipp, Brocade
  - Editor – David Lewis, JDSU
  - Secretary – Jim Tavacoli, Santur

MSA Membership

- 10X10 MSA is now established and open for membership
  - Membership benefits: Early Access to pre-release spec.

- <u>To become a New Participant:</u>
  - Request membership through one of the existing charter members or participants
  - Agree to MSA terms and sign the MSA agreement

Future MSA Directions

- Small Form factor
  - CFP module not meeting long term goal for high density 100G applications
  - CXP form factor preferred but thermal and signal integrity challenges remain
- Reach
  - 10Km
  - 40Km

Dual Track Kicked-off

- Exploring interest in establishing a parallel track for gathering requirements and developing next generation scope
- Scope
  - High port Density module form factor
  - Centered at 1550nm, 8nm spacing
  - Min 2Km reach