



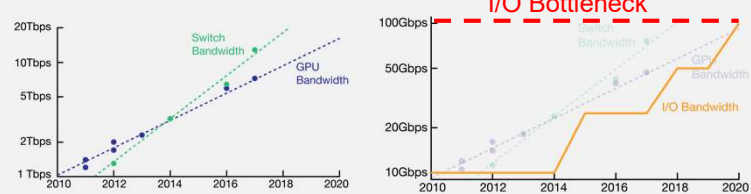
Integrated Photonics for Multi-Tbps I/O

Dr. Mark Wade, President & Chief Scientist
Ayar Labs, Inc. | Emeryville, CA

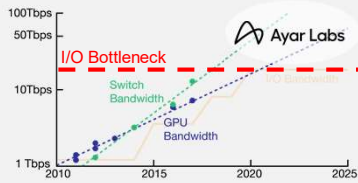
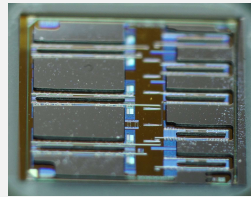


Driving Applications: A.I. & Machine Learning, Chip-to-Chip I/O, Rack-Scale Computing

Chip-to-chip I/O bottleneck

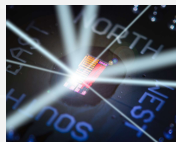
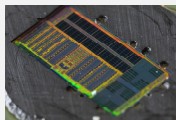
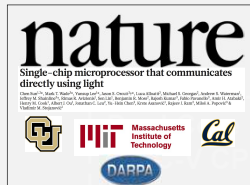
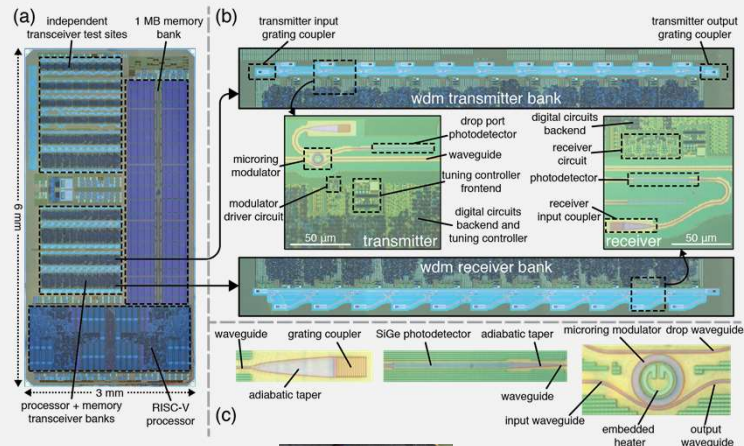


Solution: A new class of on-chip optical I/O



Background: DARPA POEM

World's first processor to communicate with light



2015 Ayar Labs

- Inventors formed company
- Secured exclusive rights to technology



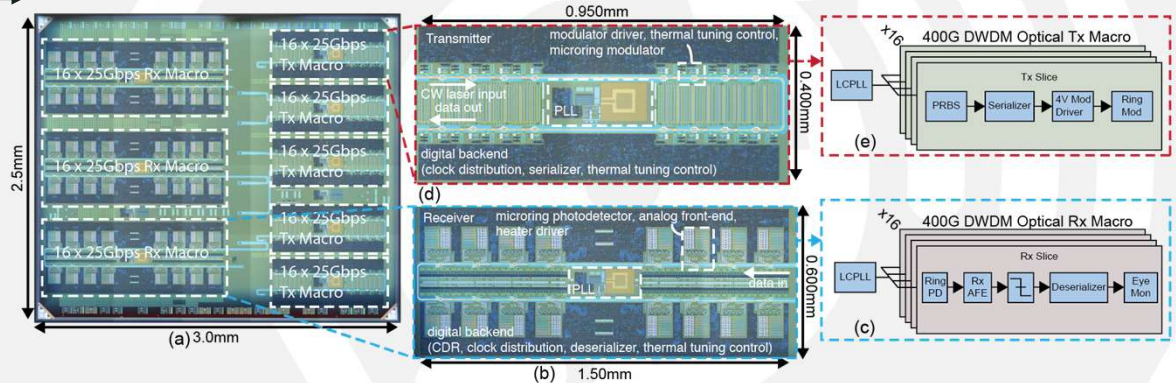
Ayar Labs is breaking the I/O Bottleneck with optical I/O systems

TeraPHY

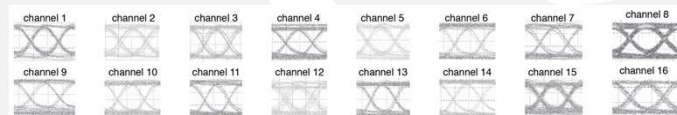
- 10x-100x higher bandwidth
- 10x lower latency
- 5x-20x lower energy use

SuperNova Laser

TeraPHY



400 Gbps per fiber (16 x 25 Gbps)



- 400G Tx
- ~1 Tbps/mm²
- 1 Tbps/mm
- 0.83 pJ/bit

- 400G Rx
- ~0.5 Tbps/mm²
- 0.6 Tbps/mm
- 2.5 pJ/bit

- Includes all electronics and photonics for optical I/O (except laser)
- Transmitter: 2.0 Tbps (5 x 400Gbps)
 - 16 x 25Gbps
 - Digital backend
 - SerDes
 - High-speed clocking, distribution
 - Closed-loop thermal control
 - Built-in self test (BERT, debug, etc.)
- Receiver: 1.2 Tbps (3 x 400Gbps)
 - 16 x 25Gbps
 - Digital backend
 - SerDes
 - PD, TIA, equalization, CDR, clocking



THE ELECTRONICS
RESURGENCE INITIATIVE