

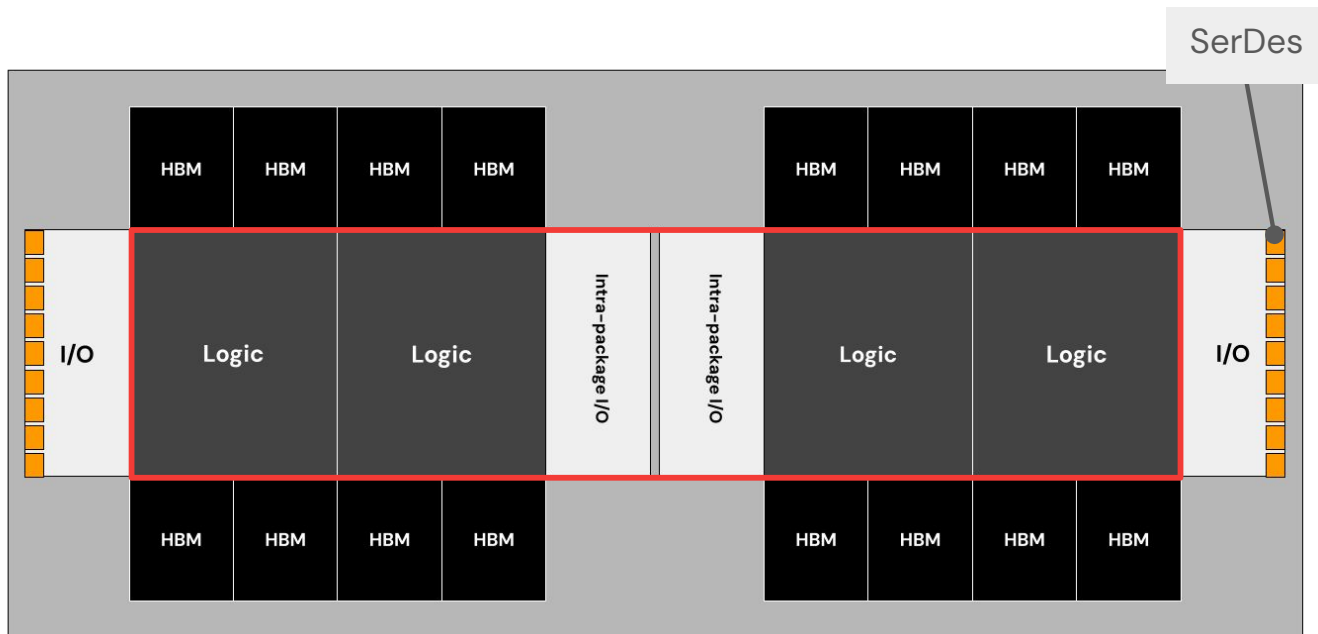


Scaling up AI networking with 3D photonics

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FOUNDER & CHIEF SCIENTIST



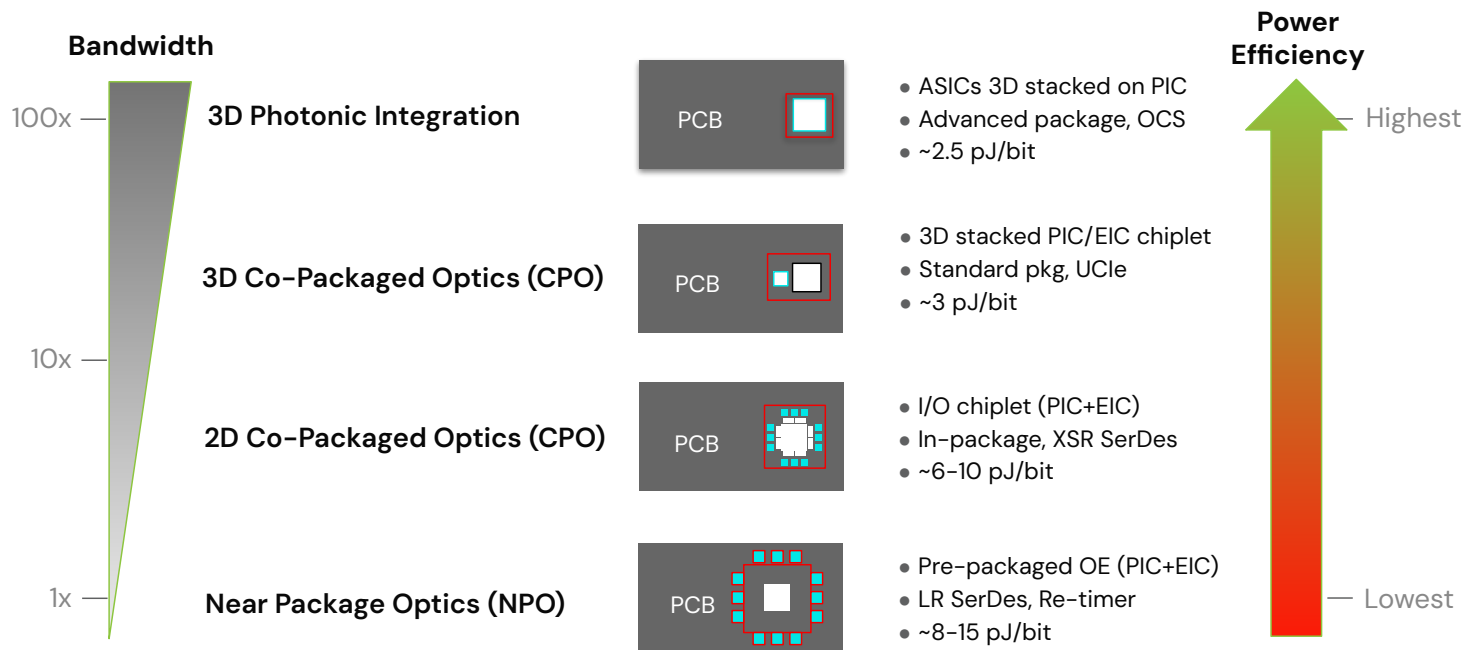
The interconnect bottleneck



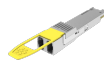
Communication happens on the chip perimeter

There is not enough shoreline, resulting in bandwidth constraints

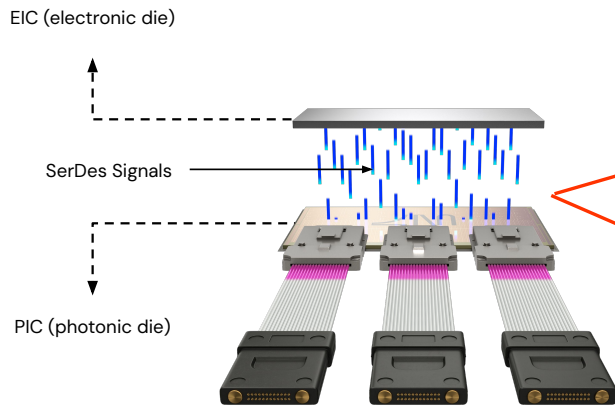
Evolving Interconnect



Copper, Pluggables

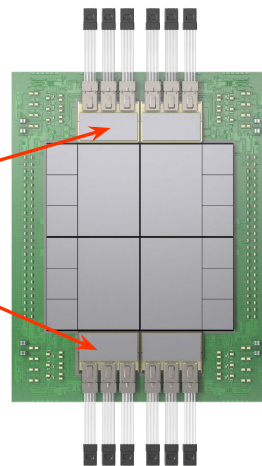


3D CPO

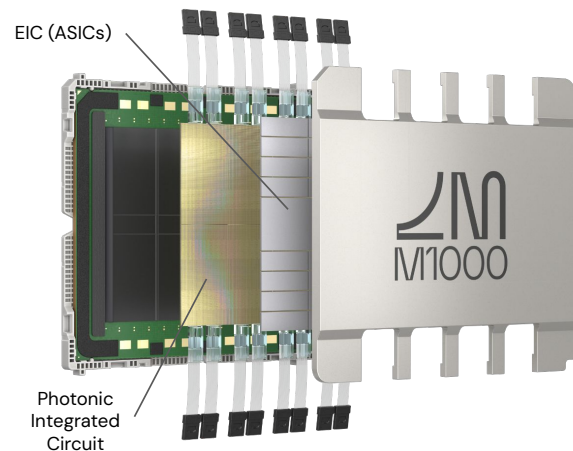


Passage™ L-Series

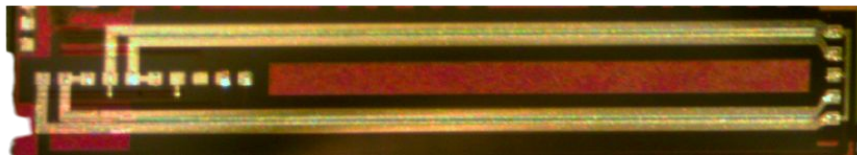
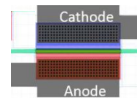
XPU application



3D Photonic Interposer



Passage™ M-Series

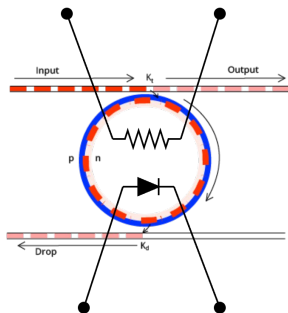
MZM~5000 μm **EAM**~50 μm **MRM**~10 μm

AT THE HEART OF PHOTONICS IS THE MODULATOR

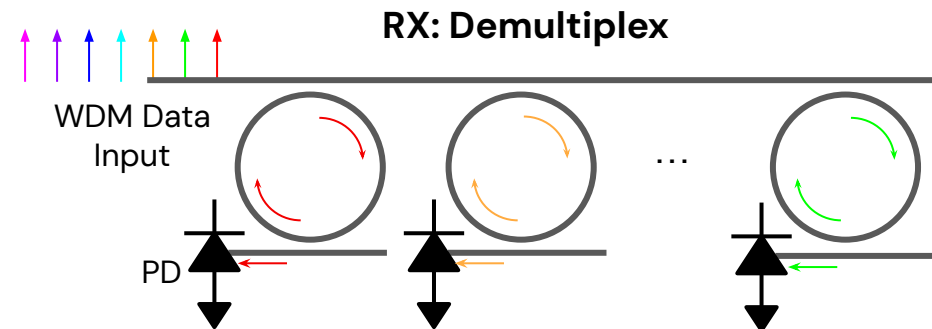
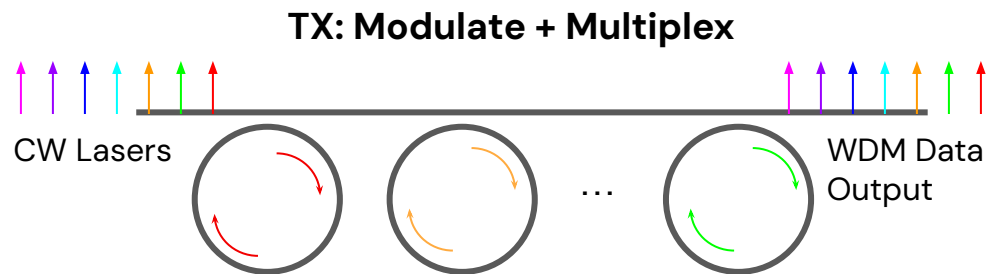
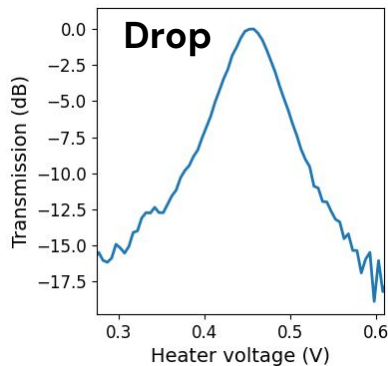
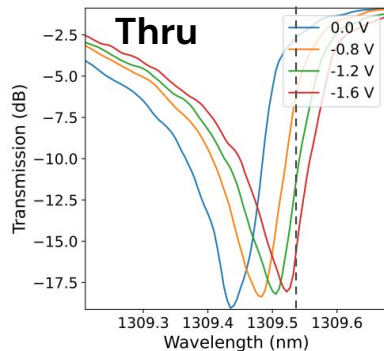
MRMs are extremely small.

The heart of the engine: silicon microrings

Ultra-compact, high-speed, WDM-friendly

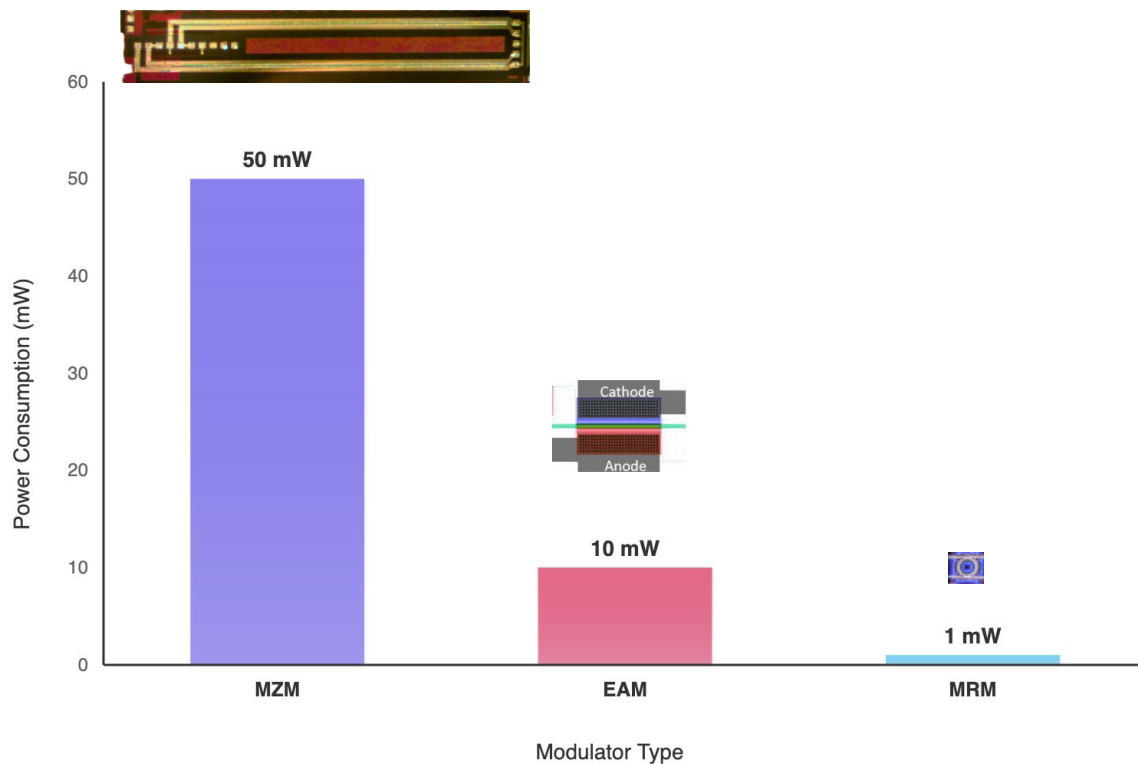


Resistive heater
for tuning
Depletion PN junction
for modulation

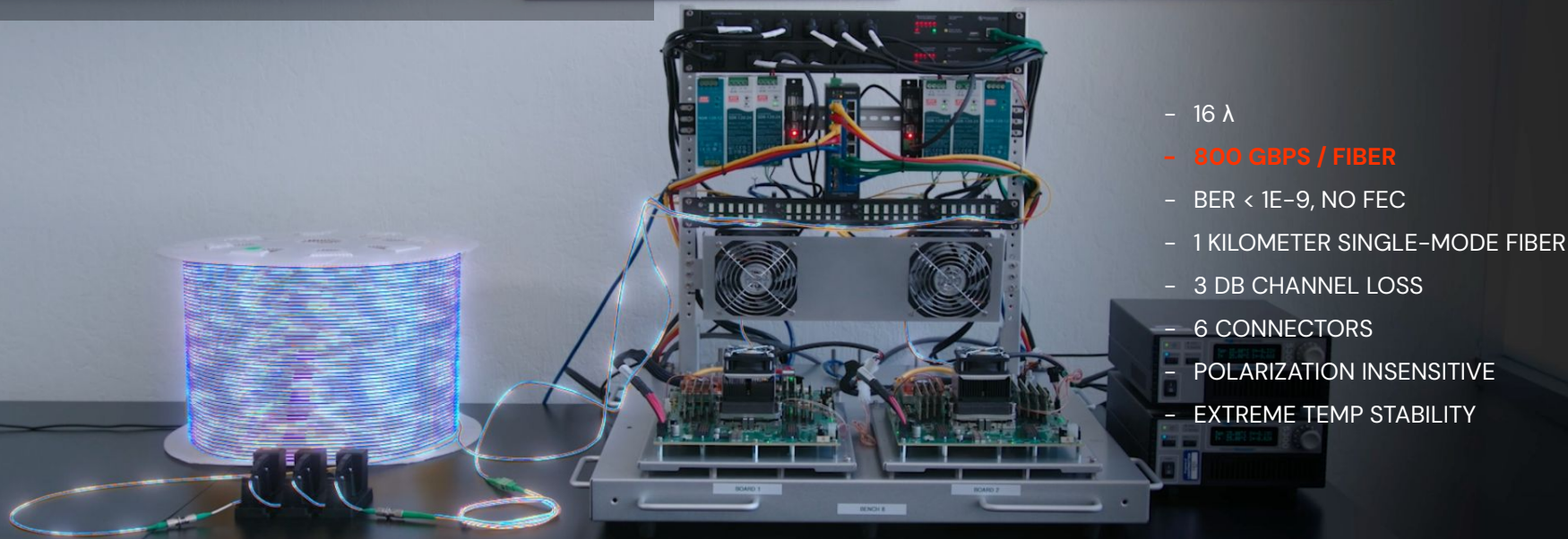


MINIMIZING ENERGY CONSUMPTION

Smaller and lower power



The first 16-wavelength bidirectional link.

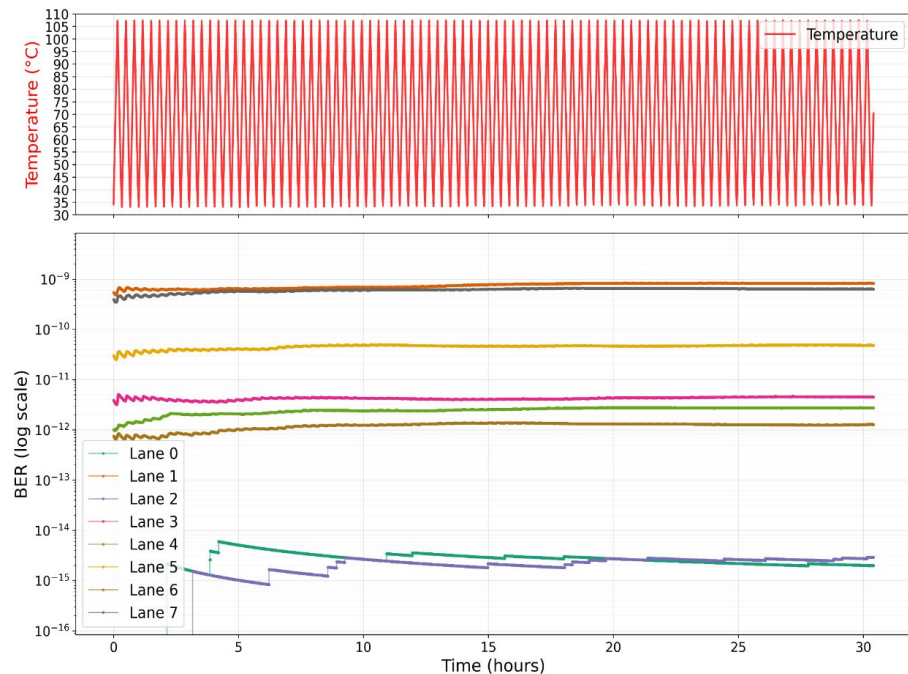


- 16 λ
- **800 GBPS / FIBER**
- BER < 1E-9, NO FEC
- 1 KILOMETER SINGLE-MODE FIBER
- 3 DB CHANNEL LOSS
- 6 CONNECTORS
- POLARIZATION INSENSITIVE
- EXTREME TEMP STABILITY

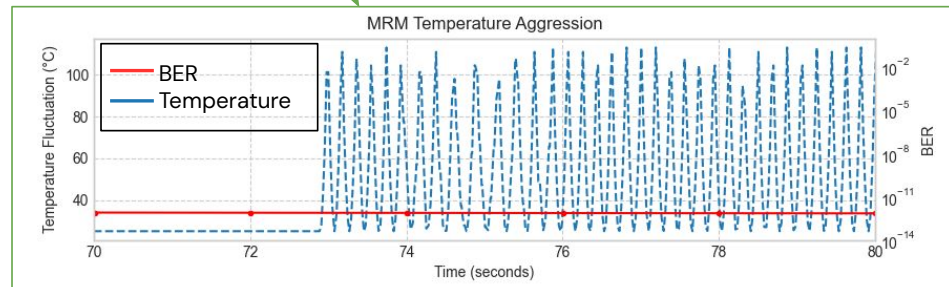
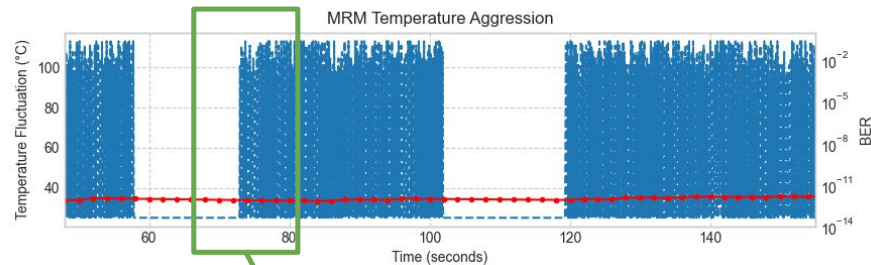
<5 pJ/bit DWDM technology today.
Partners are invited to visit our rack-scale validation lab.

Rock-solid MRMs in extreme thermals

Lightmatter MRM control technology



Measured robustness against 25 → 105 → 25°C
($\Delta T = 80^\circ\text{C}$) repeated temperature cycling



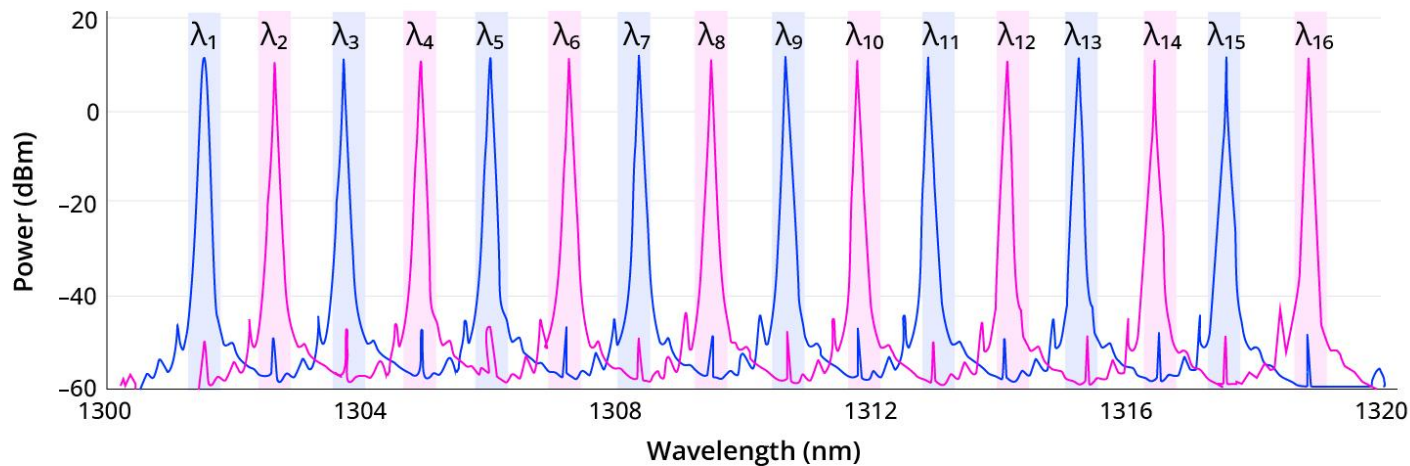
Also robust against rapid 800°C/s temperature change, using an on-die heater aggressor

Guide™: External WDM laser

Up to 16 wavelengths per fiber, 200 GHz grid

16 fiber output

Optimized for microring modulator Tx architectures



— Tx 1 → Rx 2
— Tx 2 → Rx 1

MULTIPLE ROADMAP GENERATIONS HERE TODAY

Enabling all link formats

STANDARDS COMPLIANT*

OR

CUSTOM ADVANCED

Bandwidth	Modulation	Number of Wavelengths	Transmission Type	WDM Type
56 Gbps	NRZ	16	Bi-directional	DWDM
56 Gbps	NRZ/PAM4	16	Uni-directional	DWDM
112 Gbps	PAM4	16	Uni-directional	DWDM
224 Gbps	PAM4	4	Bi-directional	CWDM
224 Gbps	PAM4	4	Uni-directional	CWDM*

Enabling bandwidth per XPU of 32T and above, up to 1 km
800 Gbps and 1600 Gbps per fiber already available. Leapfrog with Lightmatter.

WHAT'S THE UPSIDE?

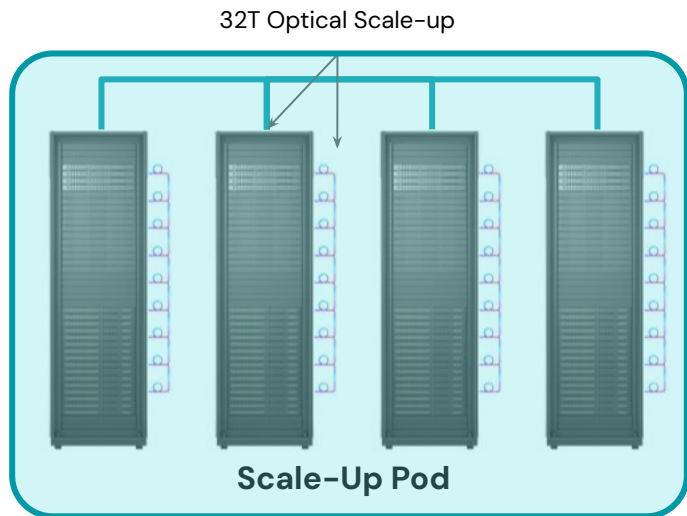
Faster Model Training



Impact of Pod Size + Bandwidth

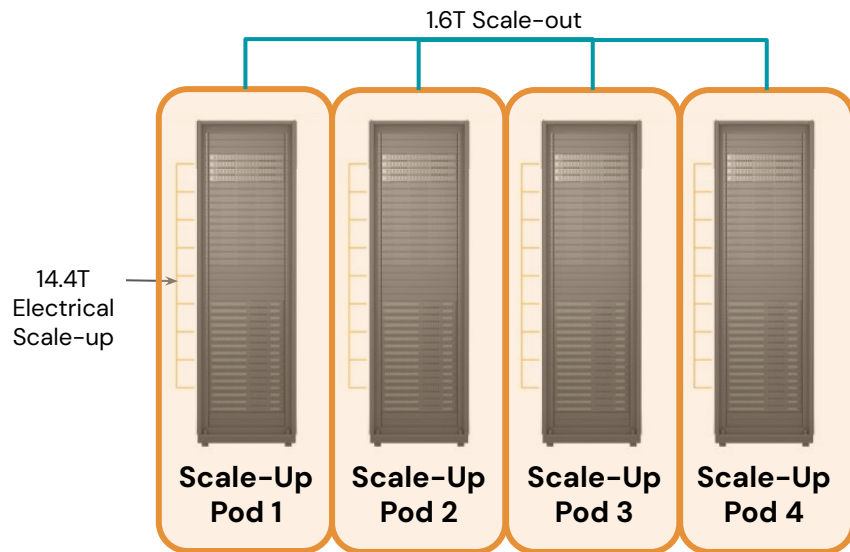
32T 3D-CPO SCALE-UP POD

Single Pod with Passage 3D CPO
512 active GPUs / Pod (2,048 dies)
Optical 32T per GPU
Scale-out 1.6T per GPU



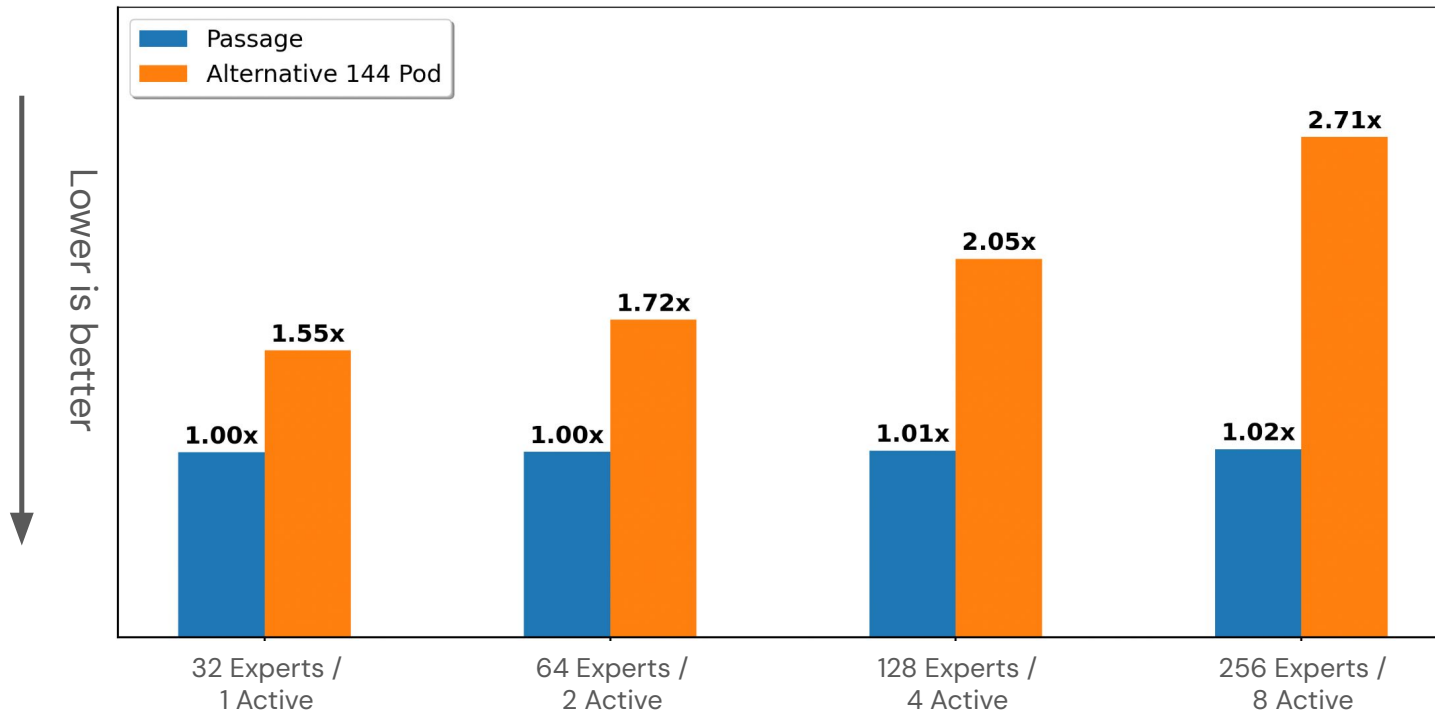
14.4T ELECTRICAL SCALE-UP+1.6T SCALE-OUT

4 Pods Electrical
512 active GPUs/ 4 Pods (2,048 dies)
Electrical 14.4T per GPU
Scale-out 1.6T per GPU



Passage Accelerates AI Model Training Time

Training Time Comparison





LTM