

Advancing AI Performance with 3D Photonic Interconnects

Nikhil Kumar, Senior Director Photonics

Lightmatter

Yole Group Market Briefing | OFC 2026



LM

\$850M RAISED

Fidelity
Google Ventures
Sequoia
Spark Capital

Viking
T. Rowe Price
Matrix Partners
SIP Capital

MIT
Stanford



Mountain View (HQ)



Boston



Hsinchu



Toronto

310

EMPLOYEES



Nicholas Harris, PhD
Founder, CEO



Simona Jankowski
CFO



Sujatha Wagle
VP, Supply Chain Ops



Boon Tan
VP, Product Engineering



Praveen Kukkamalla
VP, Sales



Darius Bunandar, PhD
Founder, Chief Scientist



Ritesh Jain
SVP, Engineering & Ops



Beth Keil
SVP, People



Colin Sturt
General Counsel



Kurt von Hausen
VP, Cloud Services Sales



Thomas Graham
Founder, Head of ML



Bob Turner
SVP, Sales & Solution Arch



Steve Klinger
VP, Product



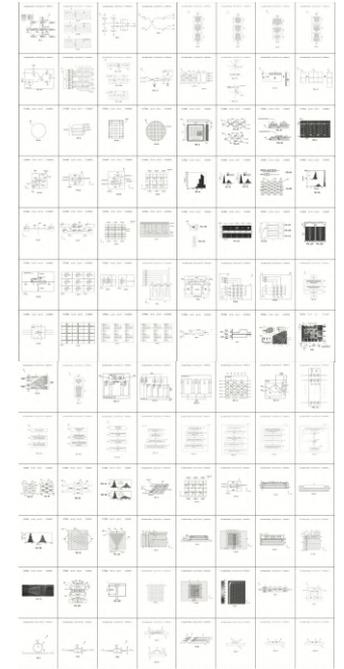
Kaushik Patel, PhD
VP, Photonics & Si Eng



Israel Kandarian
Head of Creative Marketing

370

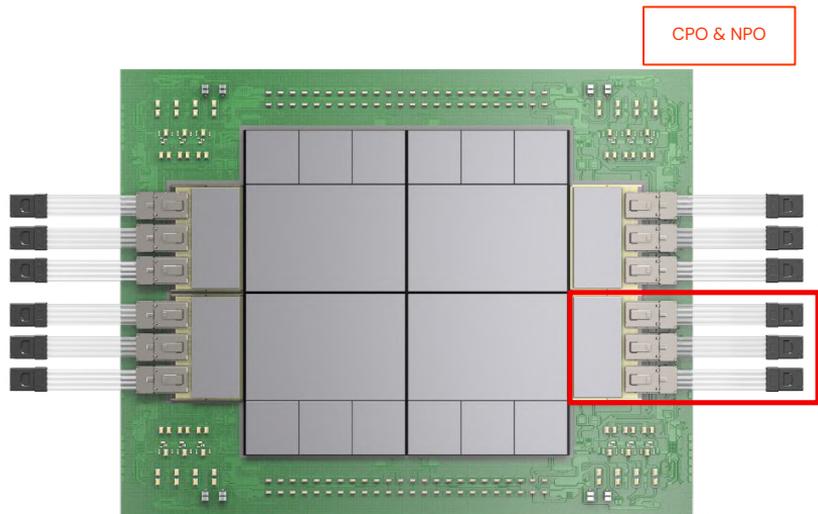
PATENTS



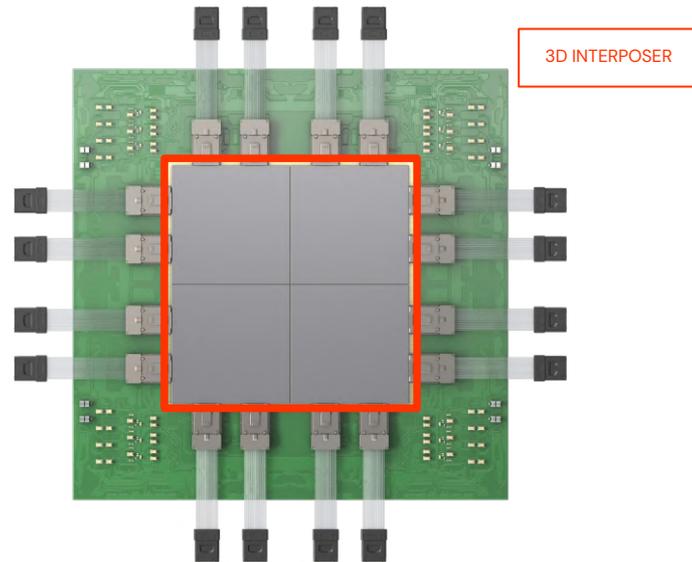
Granted & Pending

PASSAGE™

PHOTONIC CHIPS FOR AI



L-SERIES

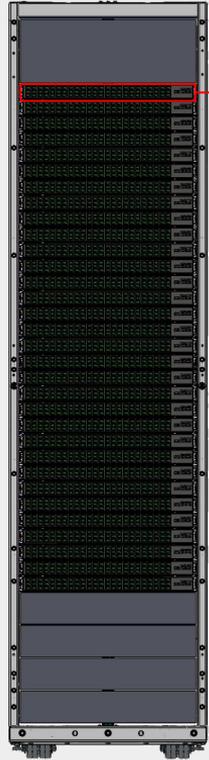


M-SERIES

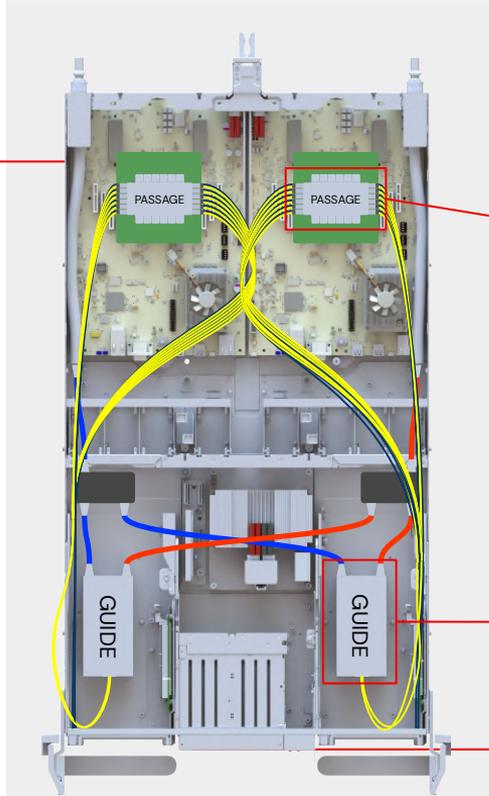
RACK-LEVEL TEST AND VALIDATION SYSTEMS

APPLICATIONS

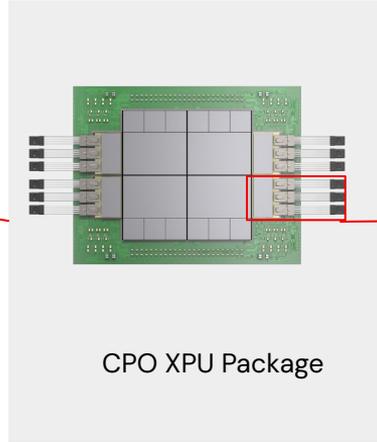
LM PRODUCTS



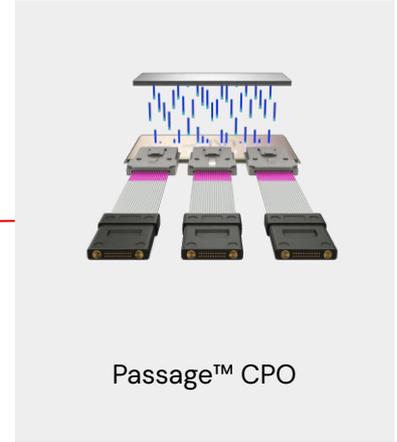
Rack



System



CPO XPU Package



Passage™ CPO



Guide® VLSP™ Light Engine

Lightmatter 3D Photonics Ecosystem

HYPERSCALE VOLUME-READY

Passage™ CPO

Custom ASIC
Partners



Passage™ SerDes
and EIC Partners



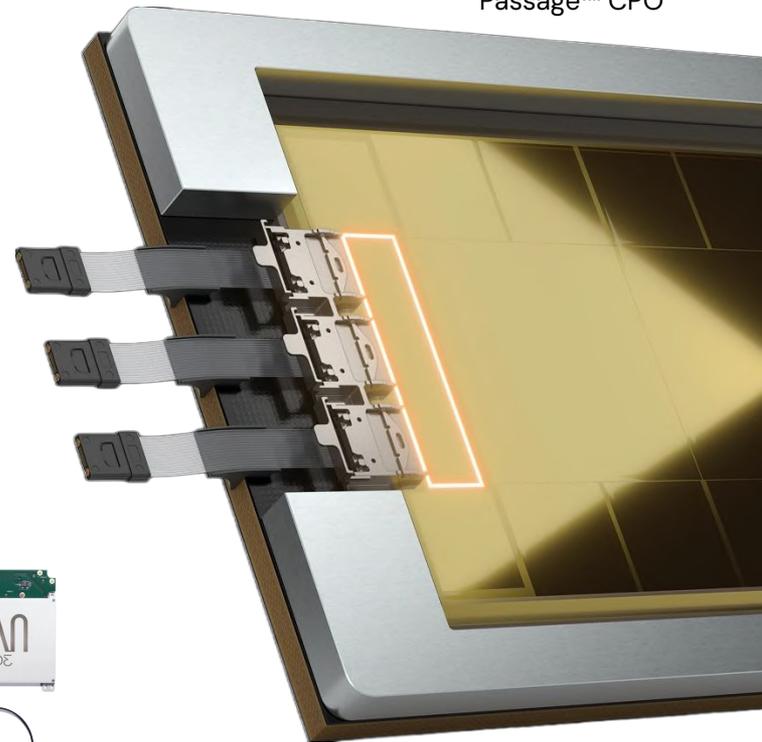
LIGHTMATTER
Passage™ PIC



Detachable
Fiber Array Unit

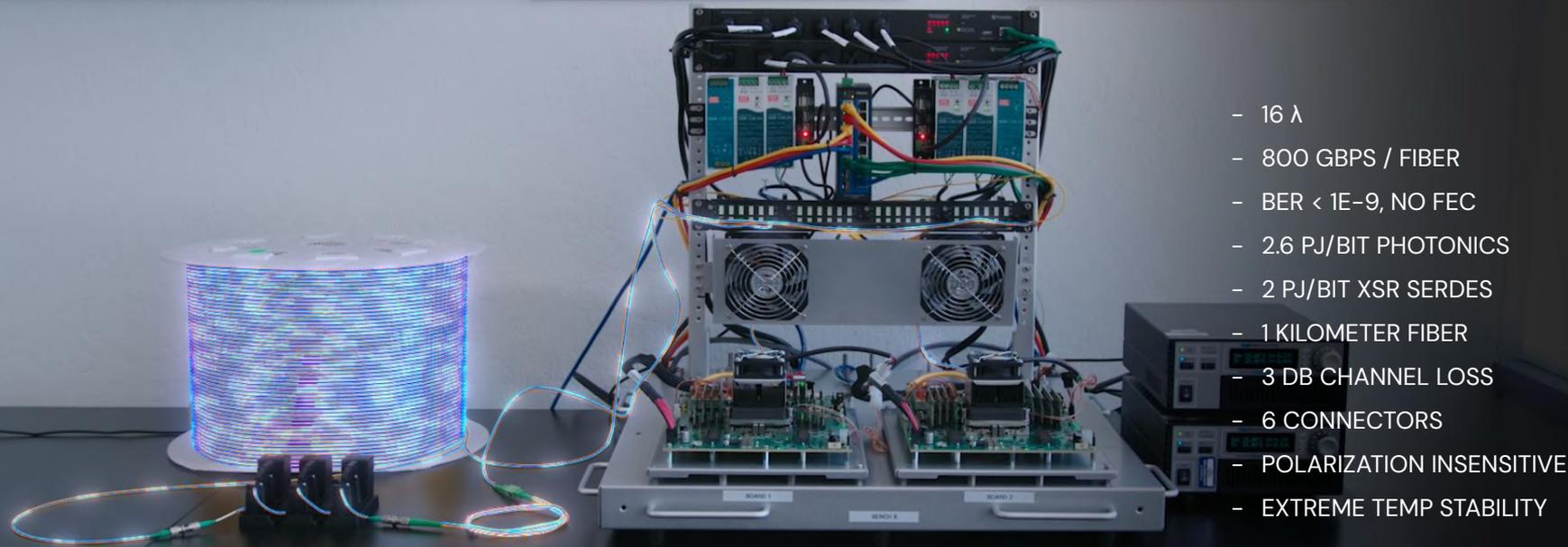


Guide® VLSP™
Light Engine



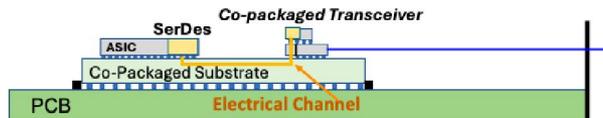
PHOTONIC CHIPS FOR AI

Passage™ EVK50: First 16-wavelength bidirectional link.

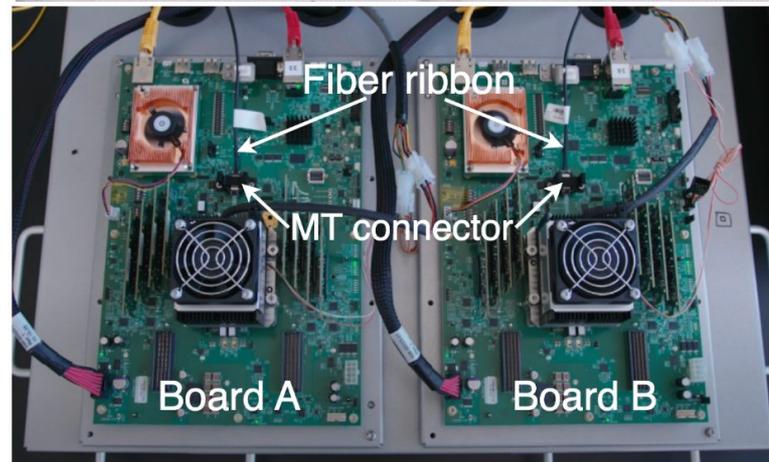
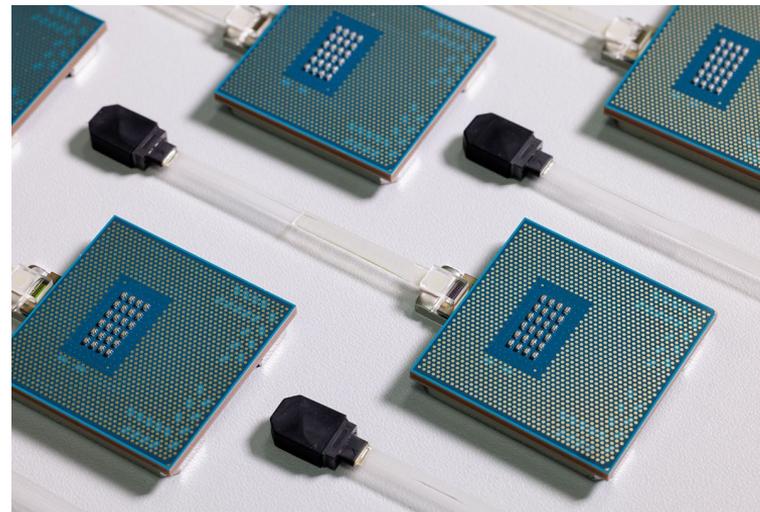
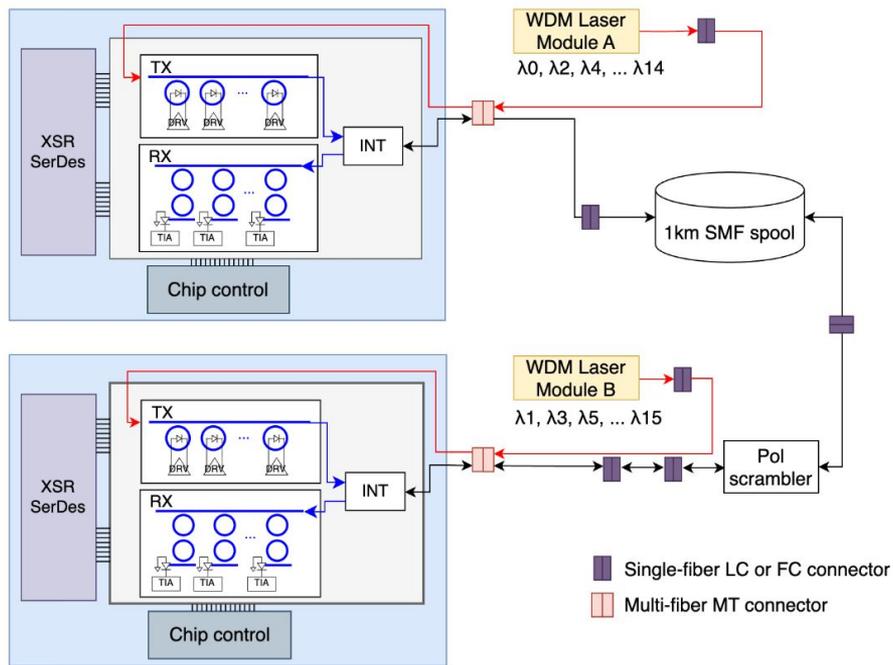


- 16 λ
- 800 GBPS / FIBER
- BER < 1E-9, NO FEC
- 2.6 PJ/BIT PHOTONICS
- 2 PJ/BIT XSR SERDES
- 1 KILOMETER FIBER
- 3 DB CHANNEL LOSS
- 6 CONNECTORS
- POLARIZATION INSENSITIVE
- EXTREME TEMP STABILITY

Passage EVK50 System

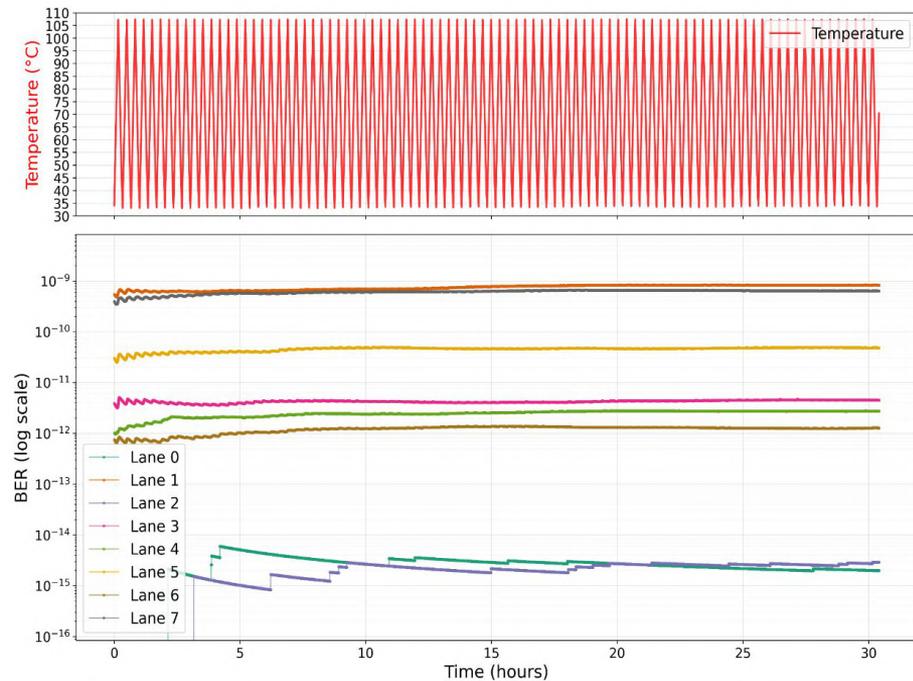


Reference CPO: OIF "Compute Optics Interface (COI): Energy Efficient Photonic Interconnects for AI Compute Scale-up"

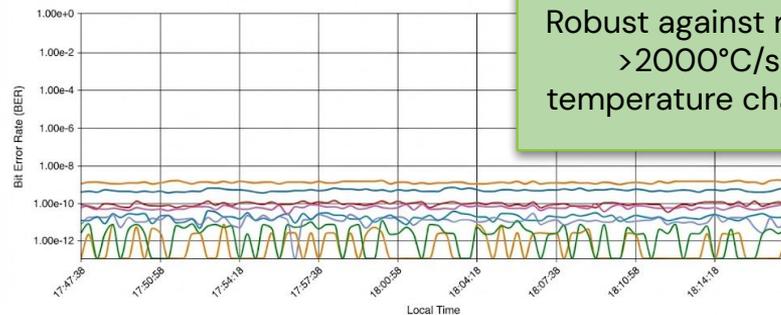
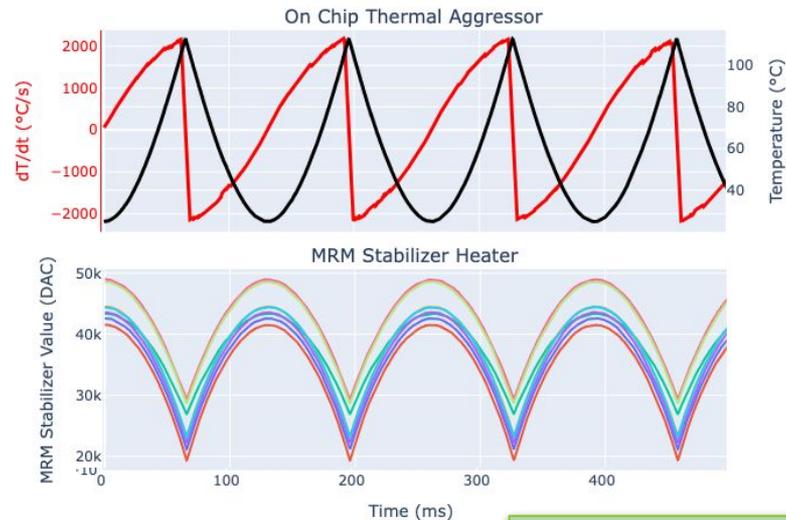


MRRMs in extreme thermal excursions

Using Lightmatter MRM control technology



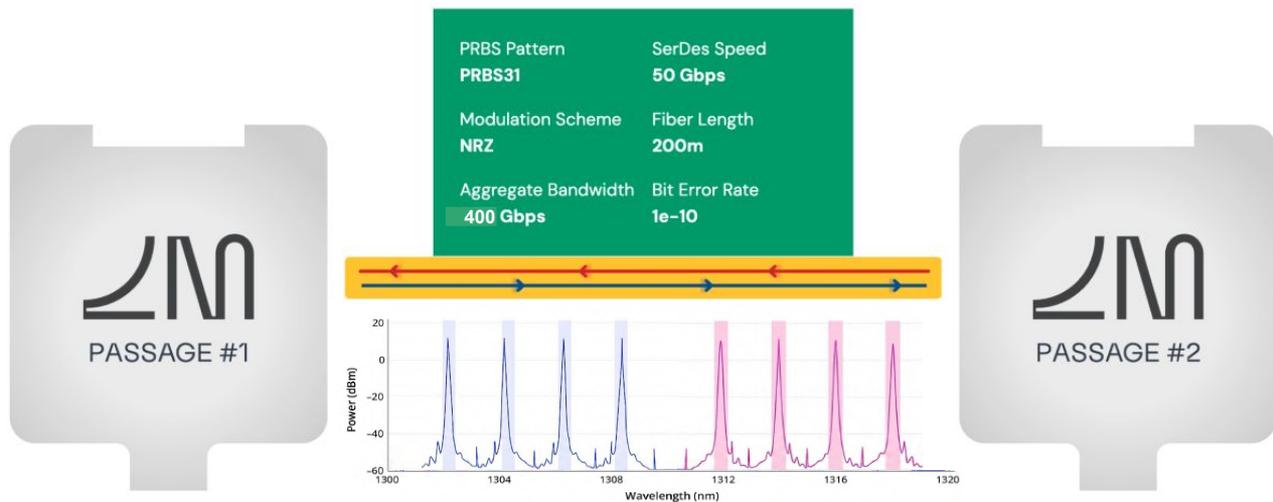
Measured robustness against repeated temperature cycling



Robust against rapid >2000°C/s temperature change

Passage™ EVK50

Live at OFC: 4+4 Band Interleaved Bi-Directional Link on SM Fiber



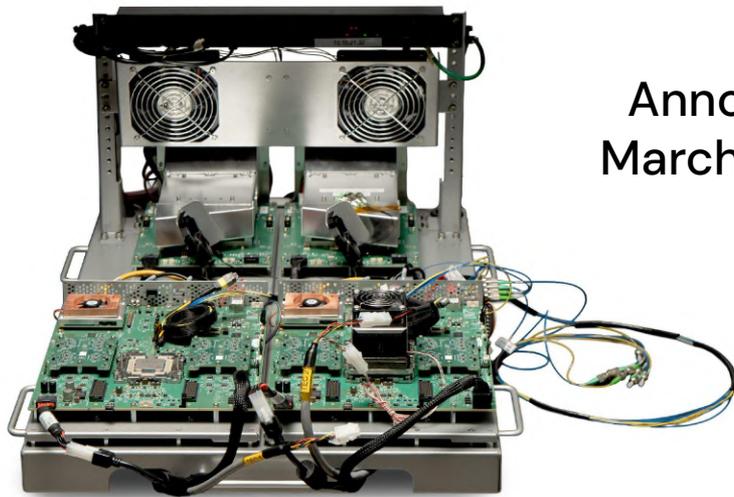
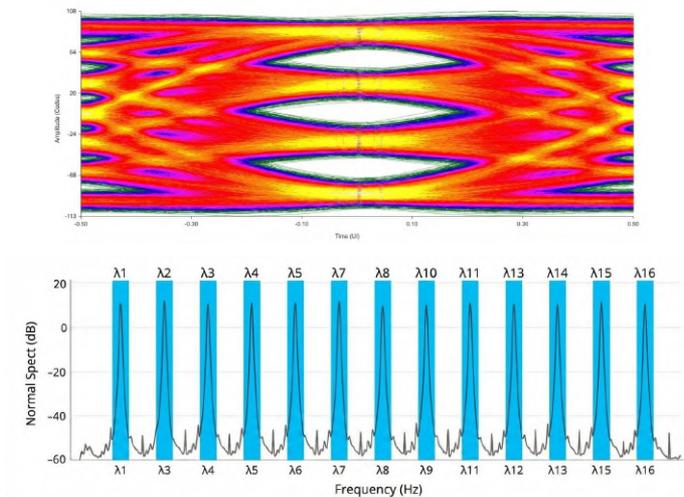
- Chassis-to-chassis connectivity
- Guide 1 Light Engine: DWDM
- 200m SM fiber spool
- 8λ/fiber, 50 Gbps/λ; 2 Ports
- 400 Gbps BiDi (200 Gbps Tx, 200 Gbps Rx) per fiber

- ~2 pJ/bit energy efficiency
- Pre-FEC bit error rate (BER) 1e-9 or better
- MRM thermal stability >1500°C/sec
- Temperature sweep: 25°C - 105°C

Passage™ EVK100

Industry First 1.6T/Fiber: DWDM 16 λ , 112G PAM4

Announced:
March 11, 2026



- **Lightmatter** Passage L-Series Photonic Engine | **Qualcomm** Advanced 112G PAM4 optical SerDes chiplet
- Guide 1 Light Engine: 16 λ DWDM with 200 GHz Spacing
- 200m SM fiber spool
- 16 λ /fiber, 112 Gbps PAM4/ λ
- 1.6Tbps UniDi per fiber; Intra-board loopback connectivity
- Pre-FEC bit error rate (BER) 1e-6 or better



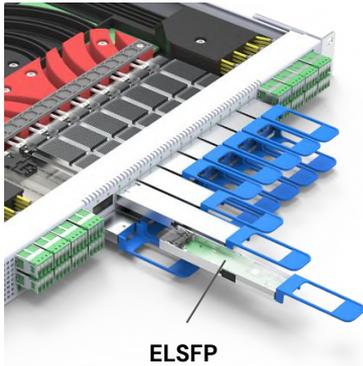
Introducing Guide[®] VLSP[™] Light Engine

Industry's First Tunable, Semiconductor-Grade Laser

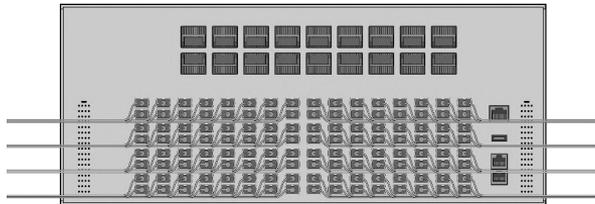


CONVENTIONAL LASER TECHNOLOGY

Yield, wavelength accuracy, scalability, reliability challenges



ELSFP



18 x ELSFP
100T in 4RU

SUCCESSOR TO DISCRETE LASER SOLUTIONS

Guide® VLSP™ Light Engine
(Very Large Scale Photonics)

Massively scalable optical power

Semiconductor-grade integration

Fine grained control, wavelength tuning



4 x GUIDE
100T in 1RU

Guide[®] VLSP[™] Light Engine Overview

51.2 Tbps

per Module

16 λ

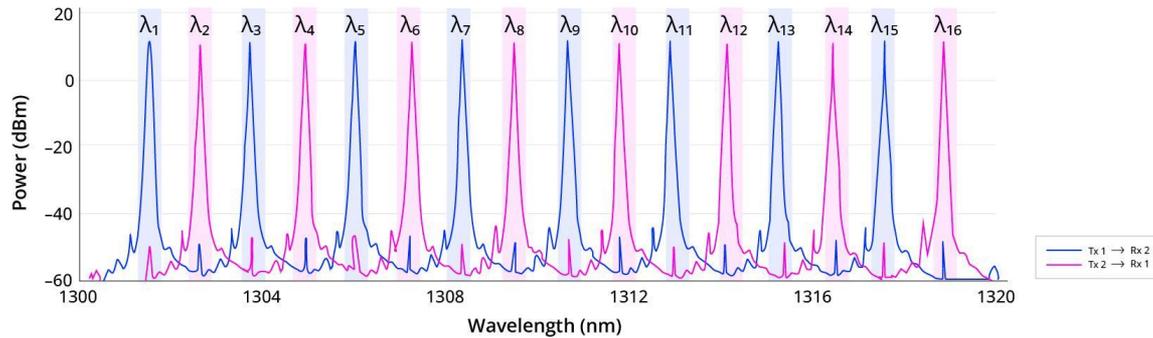
per Module

± 20 GHz

200 GHz Grid Spacing

100 mW+

per Fiber

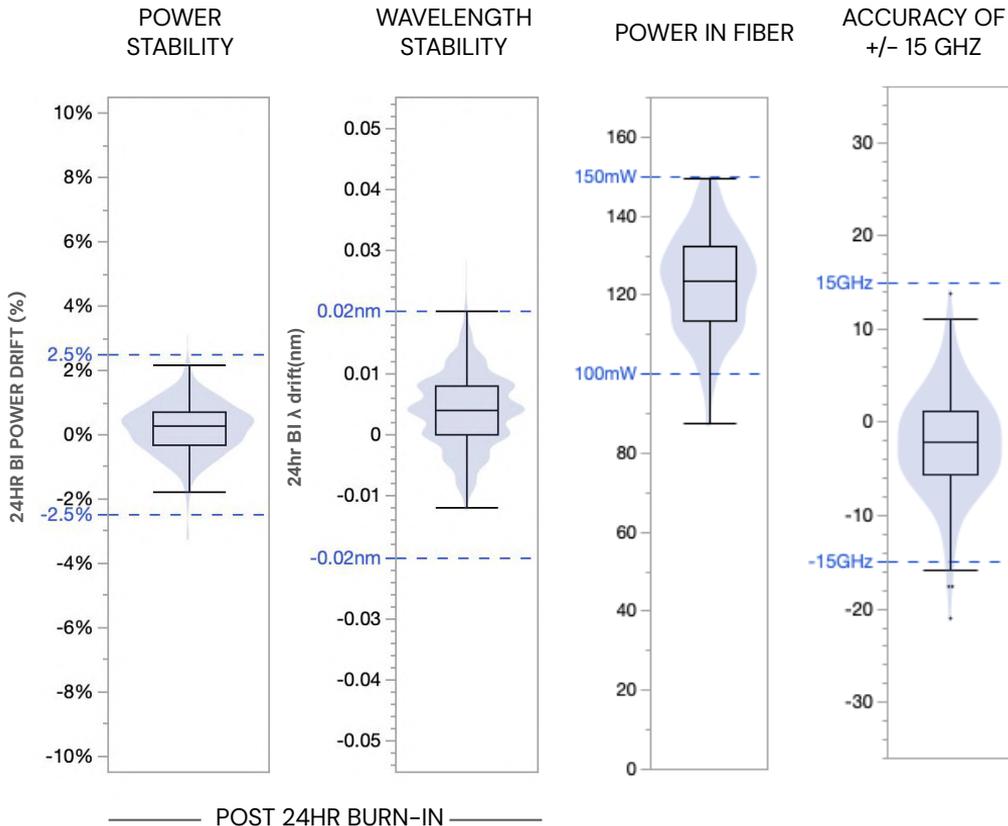


- Up to 16 wavelengths per fiber, 200 GHz grid (± 20 GHz).
- 32 fiber output with > 100 mW each.
- Optimized for microring modulator Tx architectures.

Guide[®] VLSP[™] Industry-Leading Performance

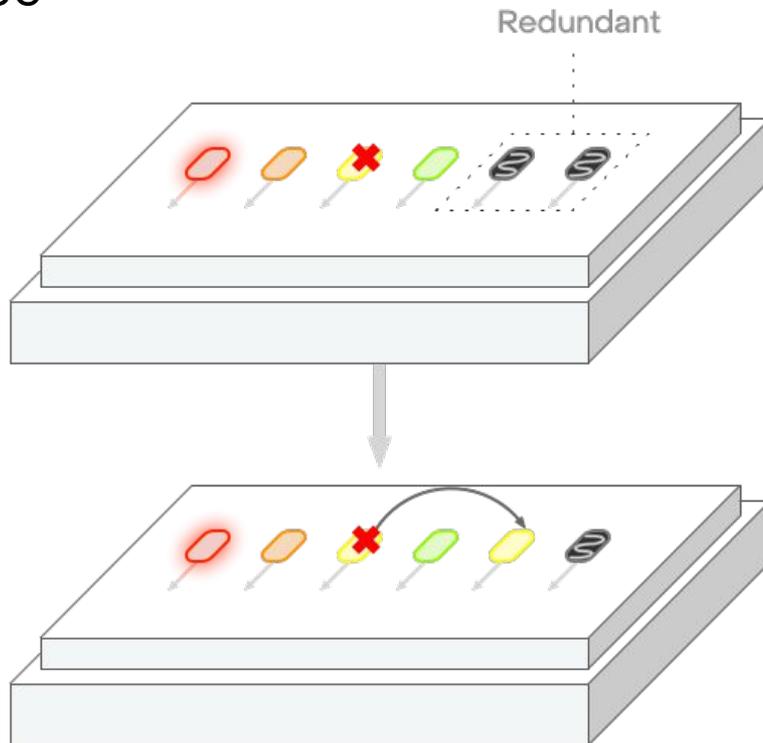


PHOTONIC CHIPS FOR AI



Resilience

- t0 Yield
- Burn-in Mortality
- Field Failure



VLSP SELF-HEALING AND REDUNDANCY

- Tunability N+M redundancy
- Backup laser auto-tuned exact λ
- Then swapped it in.

Program Repair

Guide[®] Evaluation System

Includes

- Evaluation board
- 2-tile Guide module sample
- 16 wavelength support

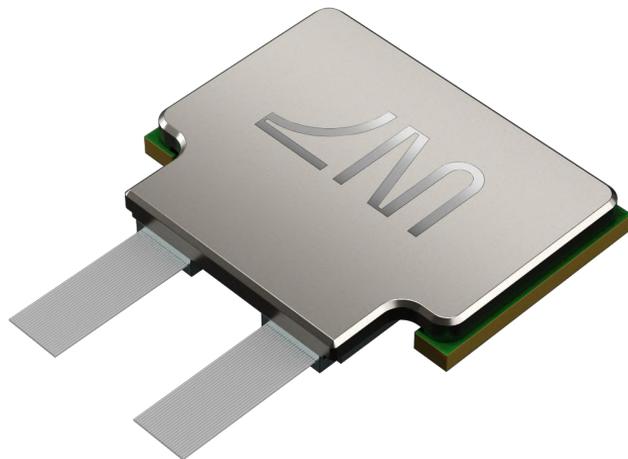
Software Utilities and GUI

User Guide and Datasheet



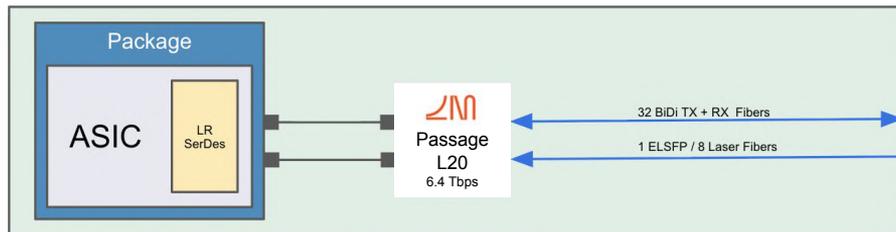
Introducing Passage™ L20 Optical Engine

Industry-First 6.4T BiDi Near Package Optics (NPO)

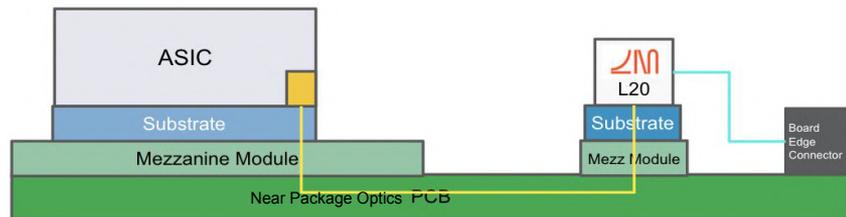


L20 Deployment Options for Multi-Rack Scale-up

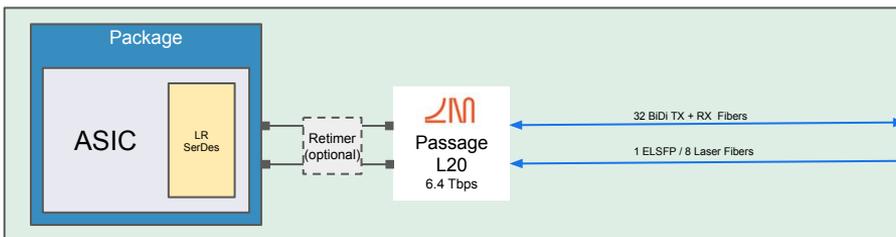
Near-Package Optics (NPO):



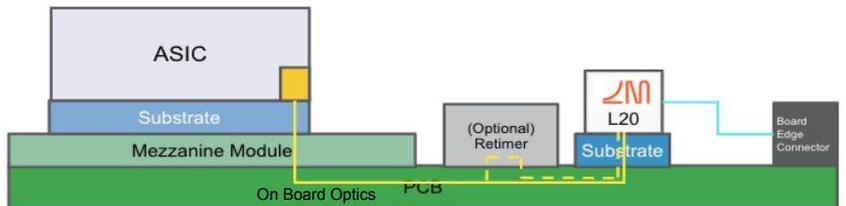
Near-Packaged Optics



On-Board Optics (OBO):



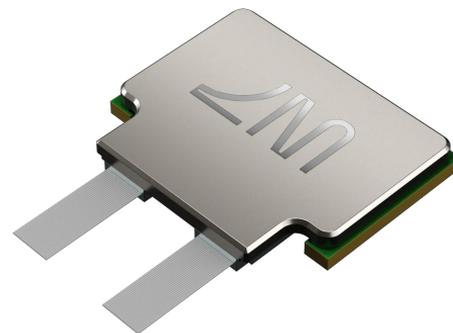
On-Board Optics



L20 NPO/OBO delivers 2x BW in a compact footprint with 1/2 the Fibers vs Pluggable Optics

Passage L20 Optical Engine: No-Compromise NPO

- **6.4T** (each direction) **BiDi** NPO Solution
- **Integration:** As module or on board via OIF-CEI 224G electrical interface standard
- **Link Architecture:**
 - **BiDi DR** (1+1) λ
 - **212G PAM4** per port (32 ports)
- **Applications (total bandwidth per direction):**
 - **Switch:** Up to 115.2 Tbps (18 x L20)
 - **XPU:** 38 Tbps (6 x L20)



Passage L20

Notes:

- Bandwidths above reflect speed in each direction (UniDi), i.e., Tx or Rx.
- First 200G BiDi Optical Engine cutting interconnect power by 70% while doubling fiber efficiency

Passage L20 NPO Summary

Metric	Pluggable Optics	L20 (NPO/OBO)	Advantages
Power Efficiency	17–20 pJ/bit	5 pJ/bit	Up to 75% Power Savings
Fiber Density	UniDi	BiDi	50% Fiber Count Reduction
Optical Ports	8 ports @ 200G	32 ports @ 200G	4X scalability to high radix
Form Factor (L x W x H)	108.8 x 22.93 x 15.5mm	37.5 x 27.6 x 4.55mm	~88% Smaller Form Factor (by Vol)

Lightmatter Joins XPO MSA as Founding Member

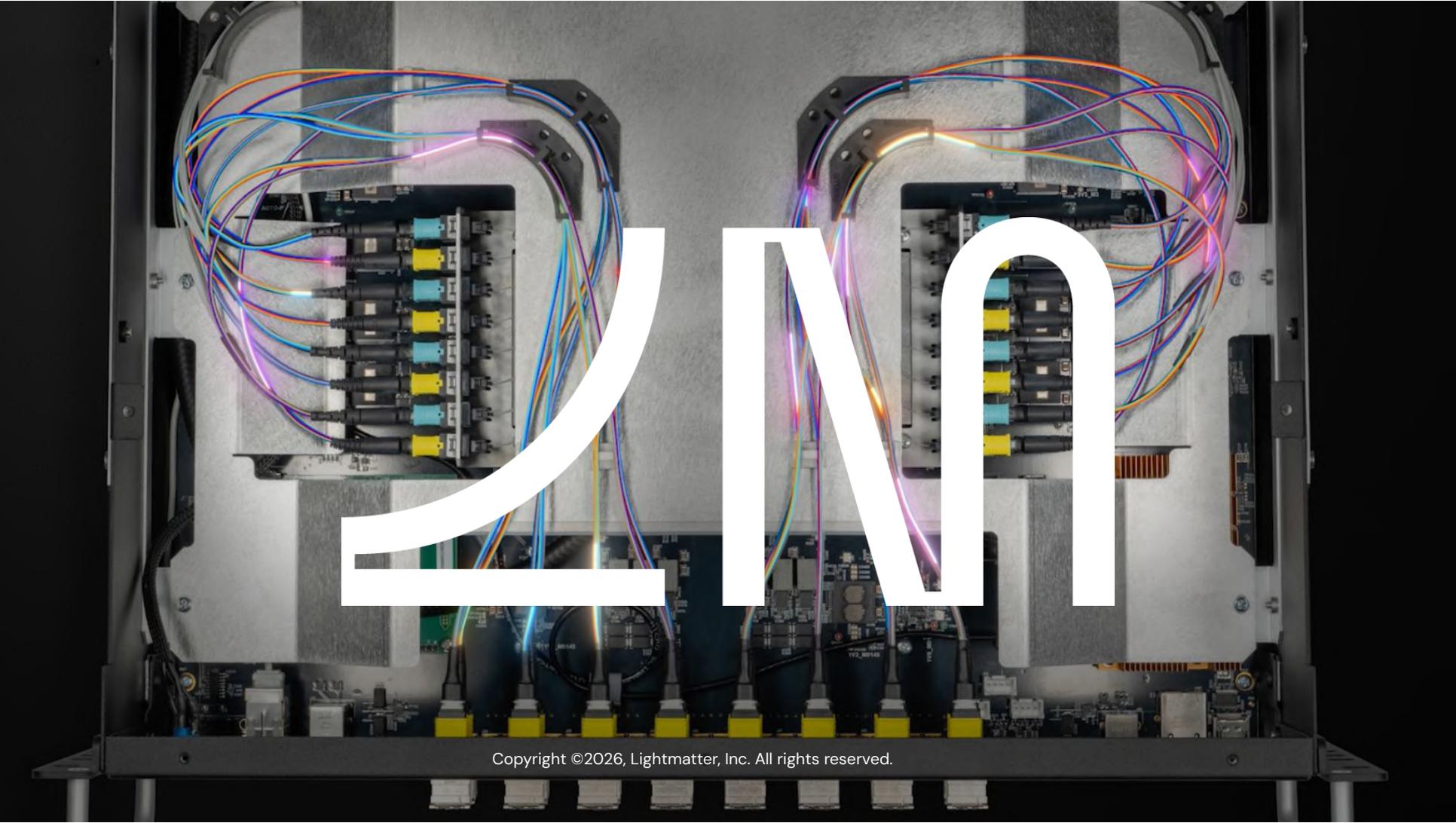
The logo for Lightmatter, featuring a stylized orange symbol resembling a right-angle corner or a 'Z' shape followed by the word "LIGHTMATTER" in orange, uppercase, sans-serif font.

**Accelerating High-Density Optical
Interconnects for AI Data Centers**

In collaboration with

The logo for Arista, featuring the word "ARISTA" in a bold, blue, uppercase, sans-serif font.

- **Higher Bandwidth Density:** With Lightmatter's industry-leading BiDi link architecture
- **Integrated Liquid Cooling:** Integrated cold plate for next-gen liquid-cooled AI data centers
- **Enhanced Reliability:** By reducing component counts and operating at lower temperatures
- **Architectural Flexibility:** Supports Data Center Reach, Fabric Reach & Long Reach standards



LM

Copyright ©2026, Lightmatter, Inc. All rights reserved.