Scaling Optical Interconnects for AI: Manufacturing Pathways to Massive CPO-Enabled Clusters

Rajiv Pancholy

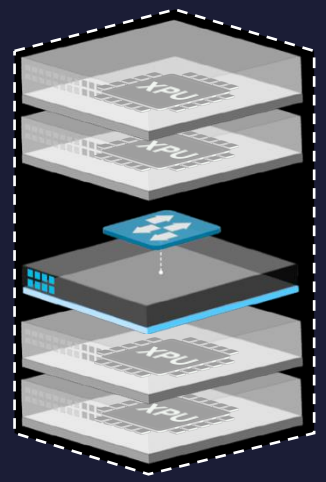
Director Hyperscale Strategy and Products Optical Systems Division

ECOC 2026 Special Symposium

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AI Interconnect

In Rack



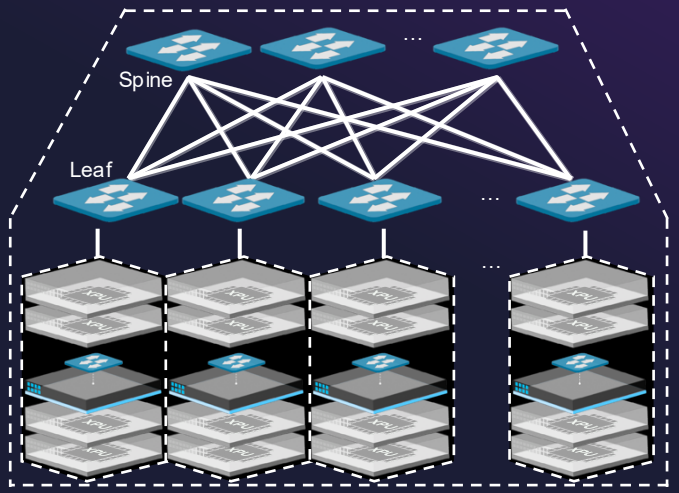
SCALE-UP

Latency and power at extreme density

SCALE-OUT

Cost, power, and reach at high radix

Across Racks

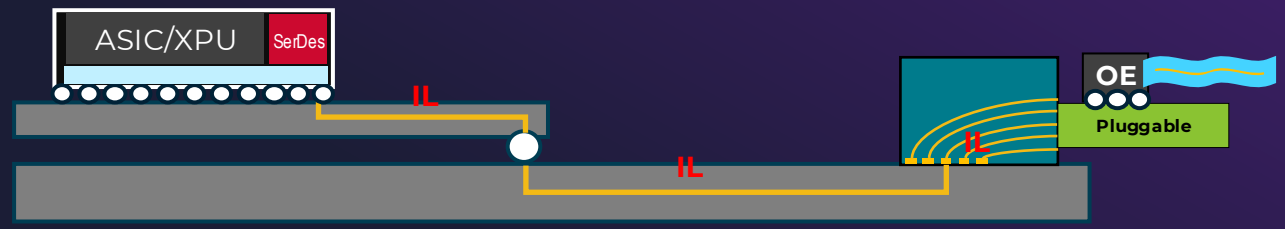


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Optical Interconnect Technology Options

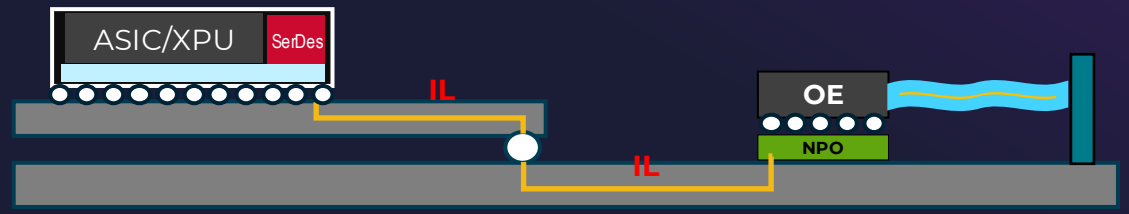
Pluggable flexibility but limited reach, power/performance

DSP/LRO/ LPO



Faceplate density & thermal Improvements

NPO/OBO



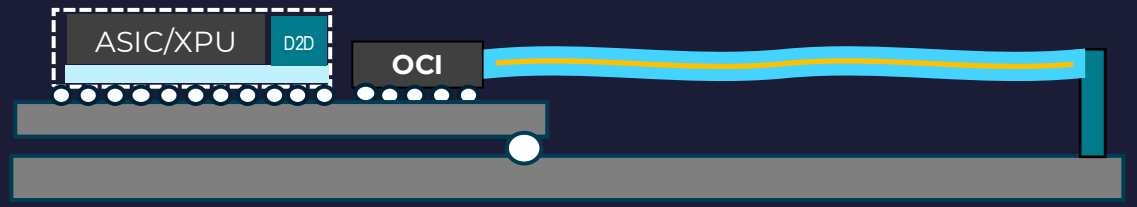
10x reliability improvement vs. pluggables

CPO



Lowest latency, power and cost -at par with copper reliability

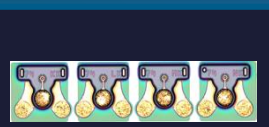
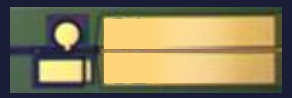
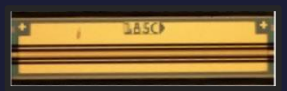
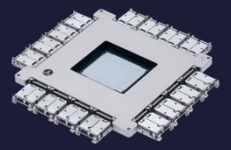
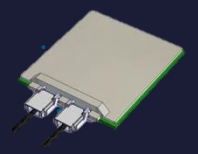
OCI



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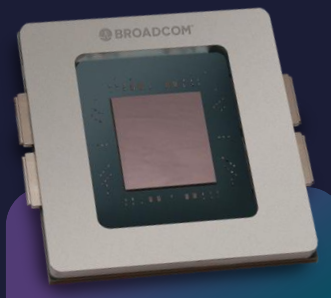
Broadcom’s Optical Interconnect Solutions



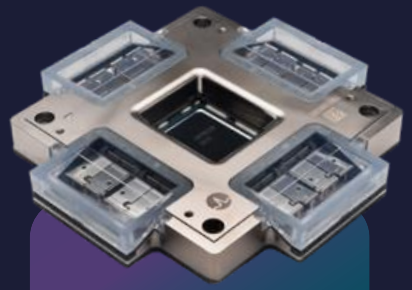
	**VCSEL**	Multi-mode, short reach
	**EML**	Single-mode, long reach
	**CWL**	Single-mode for Silicon Photonics and CPO
	**CPO**	Architecture, Reliability, and Power leadership, AI Scale-out
	**OCI**	Architecture, Reliability, Latency and Power leadership, AI Scale-up

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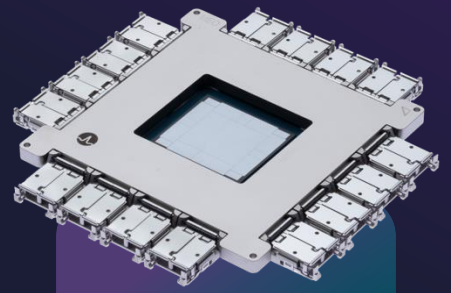
Leading the Future of Co-Packaged Optics



TH4 Humboldt
100G/lane



TH5 Bailly
100G/lane



TH6 Davisson
200G/lane



4th Generation CPO

2022	2024	2026	2028
25.6T	**51.2T**	**102.4T**	**Next Gen**

4th Generation CPO in development
> 1M device hours with 0 link flaps

Open and Scalable
Mature Partner Ecosystem

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CPO: Reduces Power, Improves Reliability

1M Hours of error free operation before link-flap

10X CPO Reliability improvement compared to pluggable optics

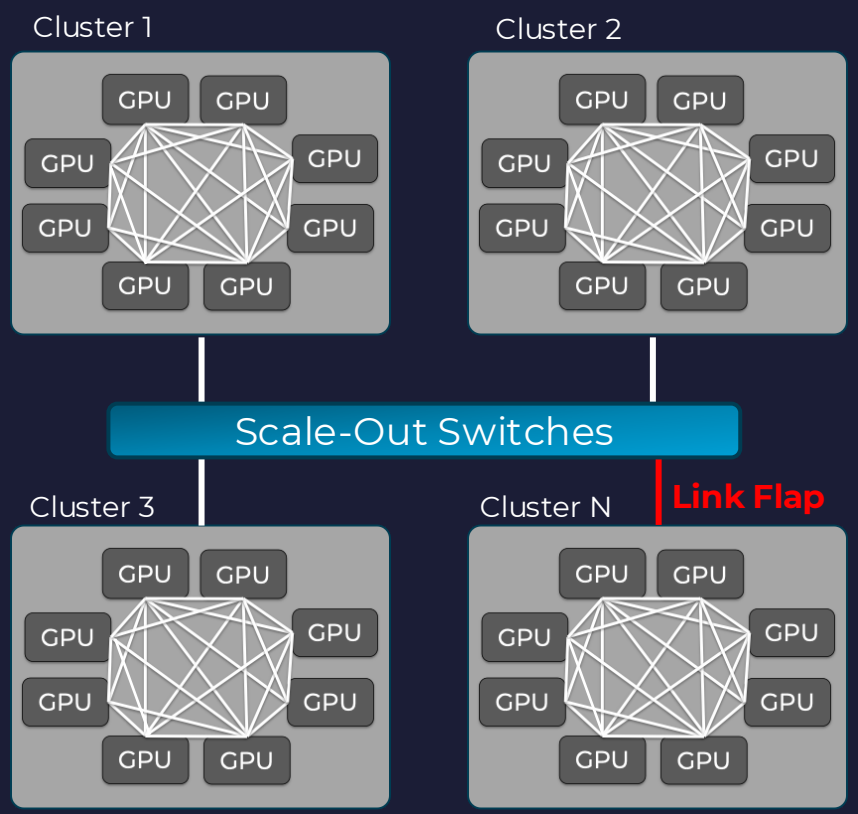
70% Power Reduction vs. Pluggable optics



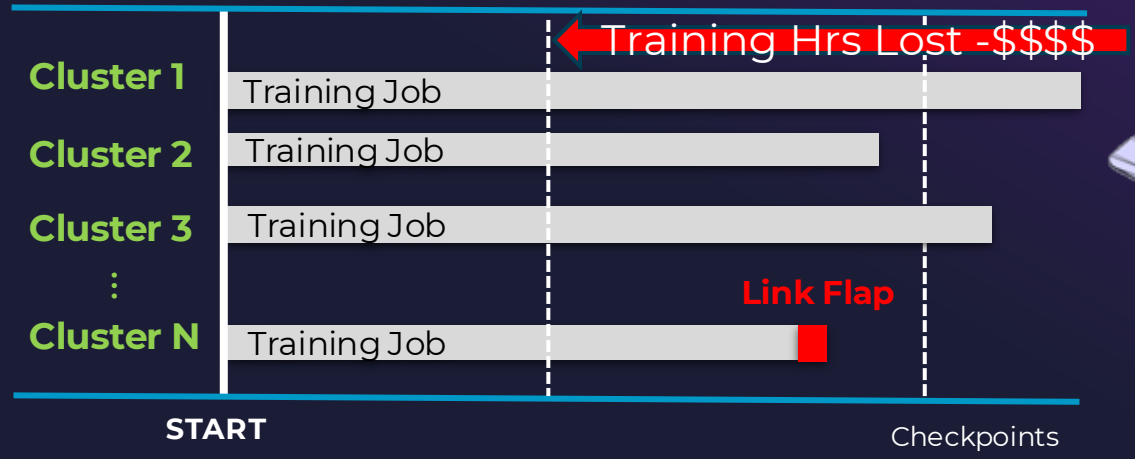
Tomahawk 6-Davisson:
Industry's First 100T CPO Ethernet Switch

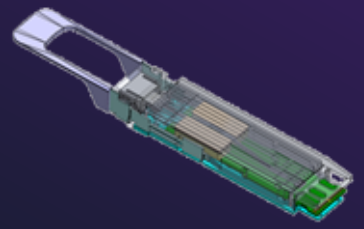
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CPO Technology: MTBF Advantage



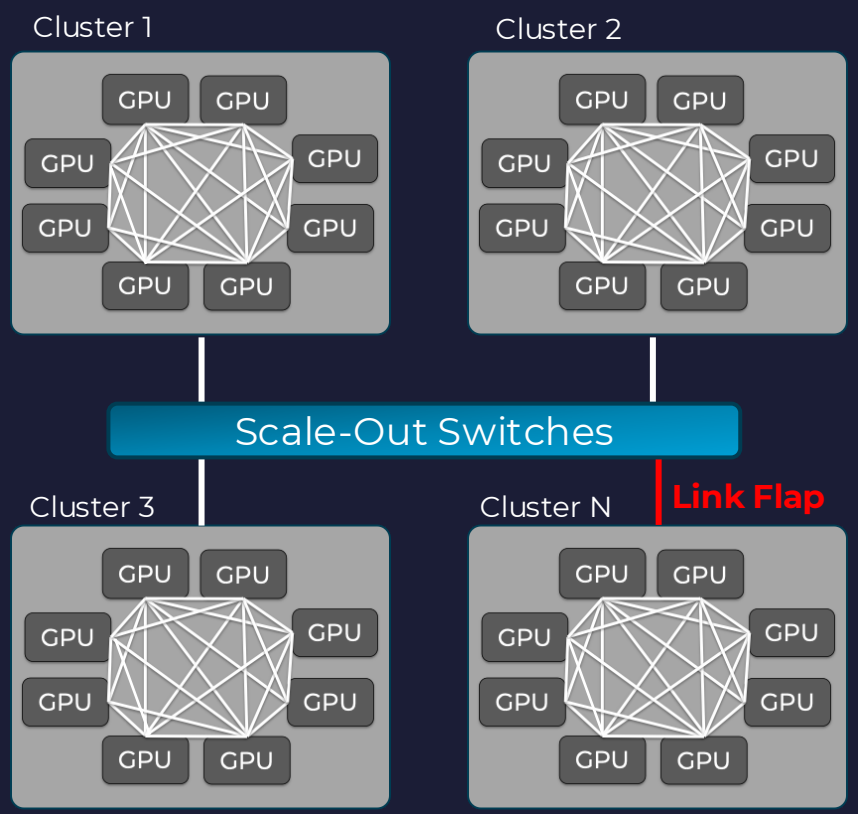
Scale-Out with Pluggable Optics



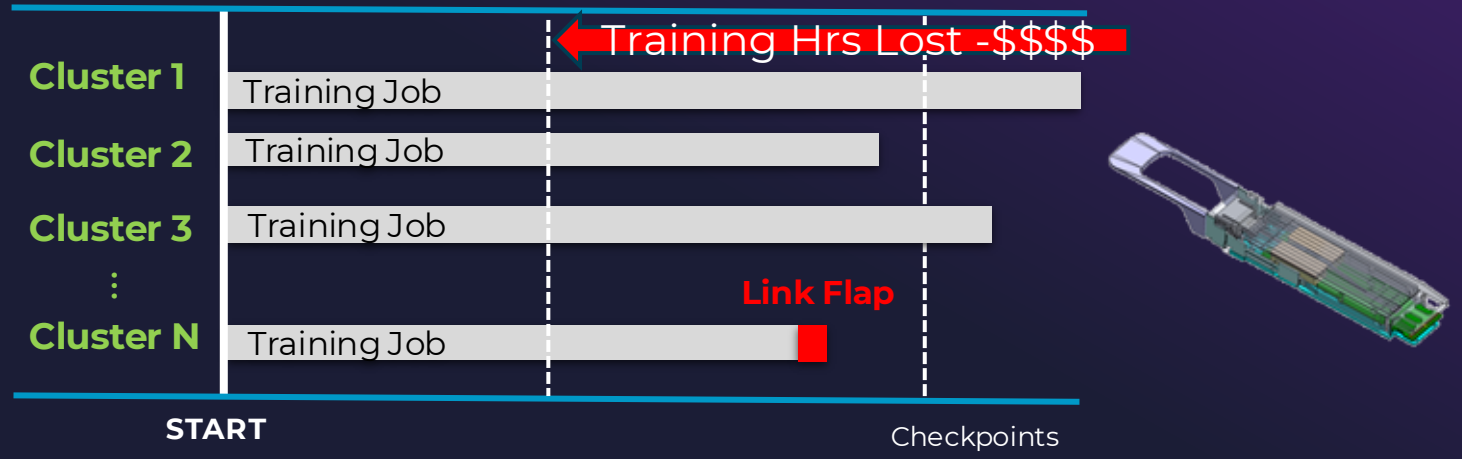


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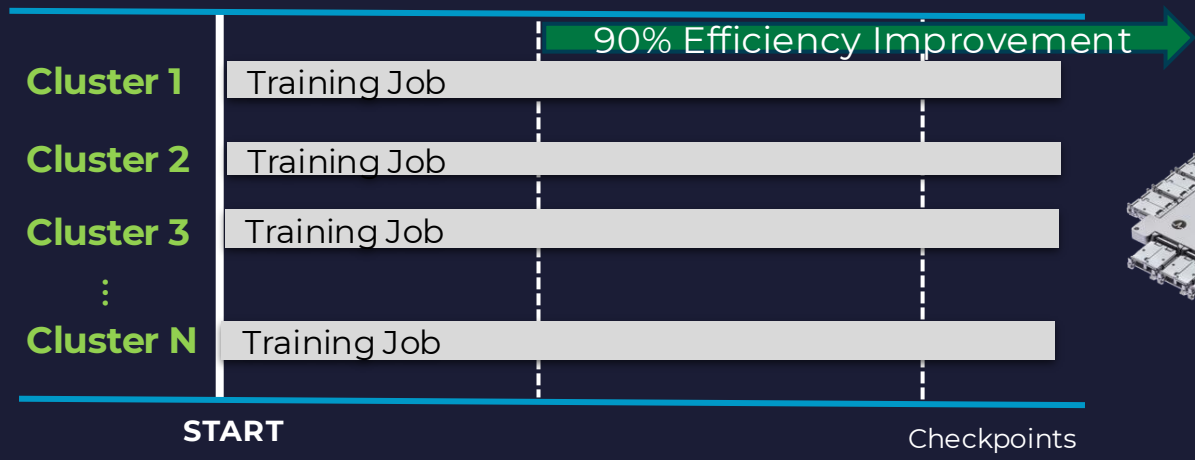
CPO Technology: MTBF Advantage

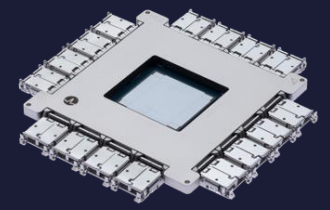


Scale-Out with Pluggable Optics



Scale-Out with CPO





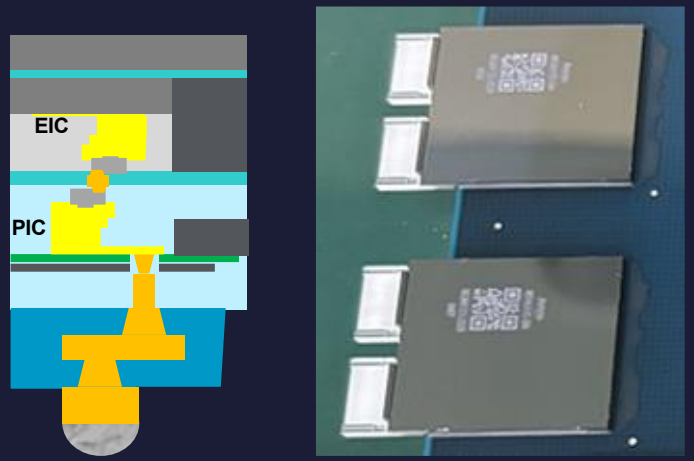
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Scaling Co-Packaged Optics: Challenges to Overcome

Advanced Packaging

- High-density and high-quality PIC to EIC attach required
- Must optimize signal integrity
- Enablement for 400G direct drive

EIC to PIC attach with COUPE



Optical Connectivity

- More than 1k fibers connecting to each chip package
- Detachable fiber connectivity to enable package reflow

Detachable fiber connector



Volume Manufacturing

- Must deliver industry leading yield and reliability through automation
- Enable system partners with automated assembly and test

Auto dispenser with loader and unloader

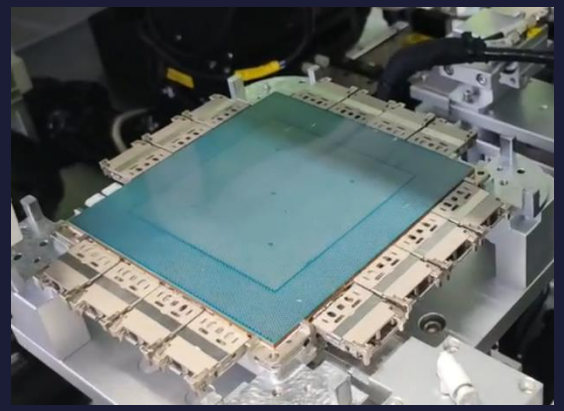


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Broadcom CPO Backend MFG Automation Line

Support Frame Attach
(Automation Example)







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Introducing Optical Compute Interconnect (OCI)

Founding Members

Industry alignment around an optical scale-up.

OCI-MSA

Est. March 2026

Future AI infrastructure built on open standards.



Optical Scale-Up

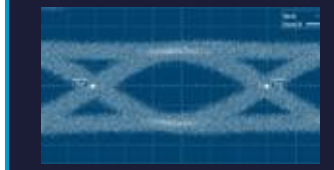
Architecture that delivers the efficiency required to scale AI infrastructure.

Move Scale-up from In-Rack to Multi-Rack & Multi-Row

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Why OCI-MSA?

OCI-MSA



NRZ

WDM

$\lambda_1..\lambda_4$ TX

RX $\lambda_5..\lambda_8$

Bi-Di

ELECTRICAL

200G PAM-4	400G PAM-4/6/8	800G ?	D2D-Wide & Parallel, any other

OPTICAL

200G PAM-4	400G PAM-4	800G ?	GEN1 200G	GEN2 400G	GEN3 800G

LINEAR

YES	MAYBE	UNLIKELY	NRZ provides the path to lowest latency

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Thank You

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