

# Optical Solutions and Components for the NPO/CPO & ELSFP Ecosystem

Wilfried Noell

Focuslight Technologies Inc.

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FOCUSLIGHT

- **Focuslight Company Introduction**
- Typical Products and Applications

# Focuslight Overview

- Founded in 2007 by Dr. Victor X. Liu, headquartered in Xi'an, China.
- A fast-growing company that develops and manufactures:
  - **Laser sources and materials** (Photon Generation)
  - **Optical components** (Photon Control)
  - **Photonics module and system solutions** (Application Solutions) focusing on **optical communication, consumer electronics, and pan-semiconductor applications.**
- A **global photonics foundry** offering process development and manufacturing services to the global photonics community.
- Publicly listed in the Shanghai Stock Exchange (Ticker Symbol: 688167).



# Key Facts & Figures



Employees

>1,000



Revenue Proportion Invested  
into R&D (2026 H1)

~20%



Yearly Revenue  
(2025)

880M RMB



Patents Valid  
Worldwide

>420



Facility Worldwide

>60,000m<sup>2</sup>

Clean Room Worldwide

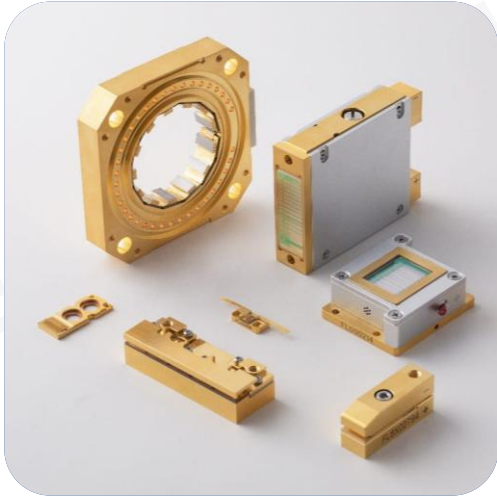
>19,000m<sup>2</sup>



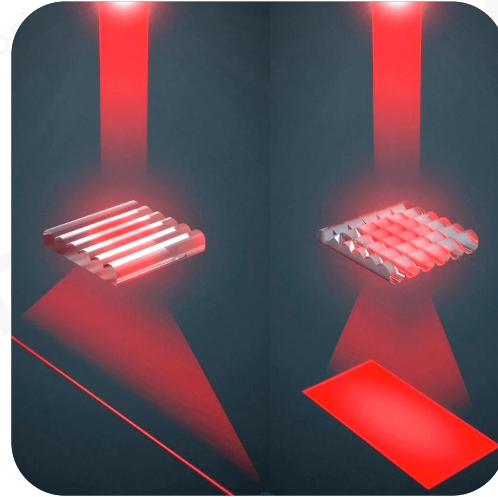
ISO 9001  
ISO 14001  
ISO 45001  
IATF 16949  
Certified

# Business and Branding

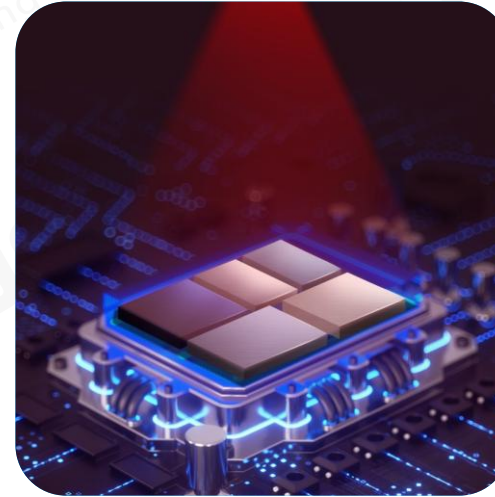
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Photon  
Generation



Photon  
Control



Photonics  
Application  
Solutions



Global  
Photonics  
Foundry

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 **HEPTAGON**

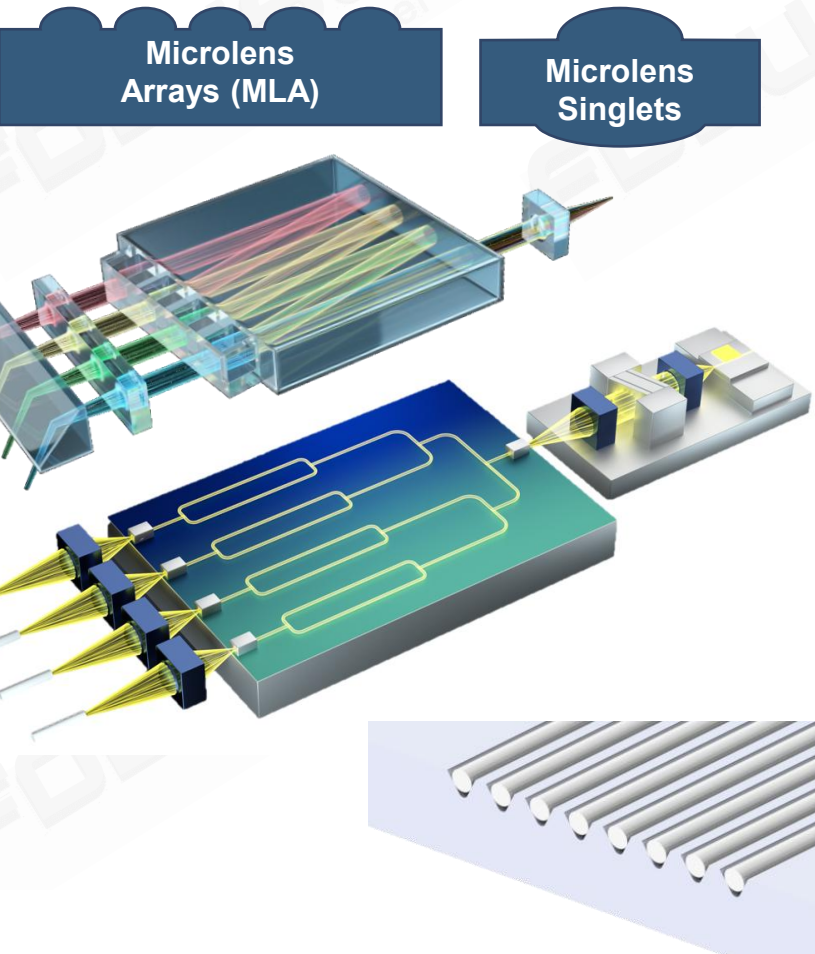
# CONTENTS

FOCUSLIGHT

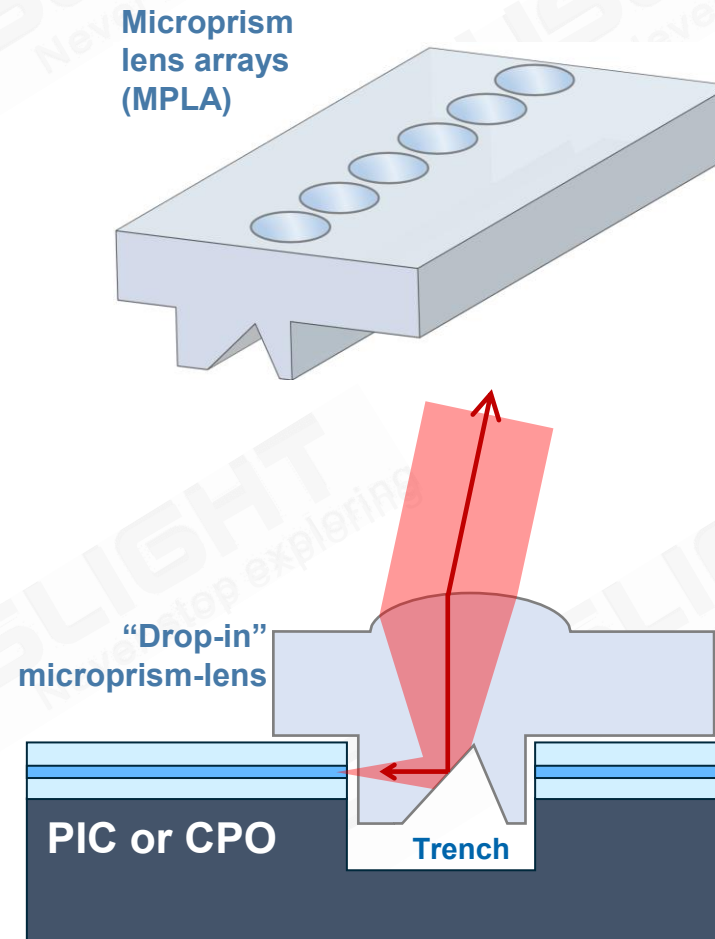
- Focuslight Company Introduction
- **Typical Products and Applications**

# Focuslight for Transceivers and NPO / CPO

- 1) For Pluggable Transceivers  
→ Microlenses for ELM & ELS

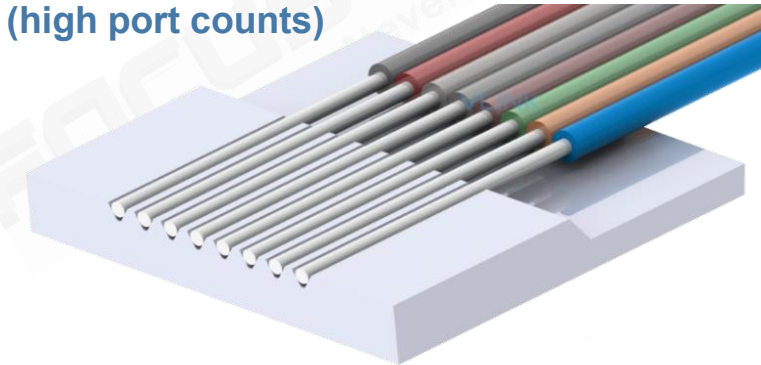


- 2) For CPO / NPO  
→ Microprism lanes arrays

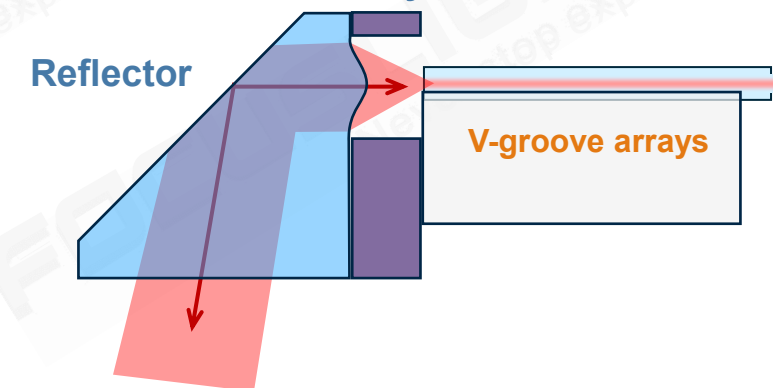


- 3) For XPO Detachable Optics  
→ For FAUs & PMLA

V-groove arrays  
(high port counts)

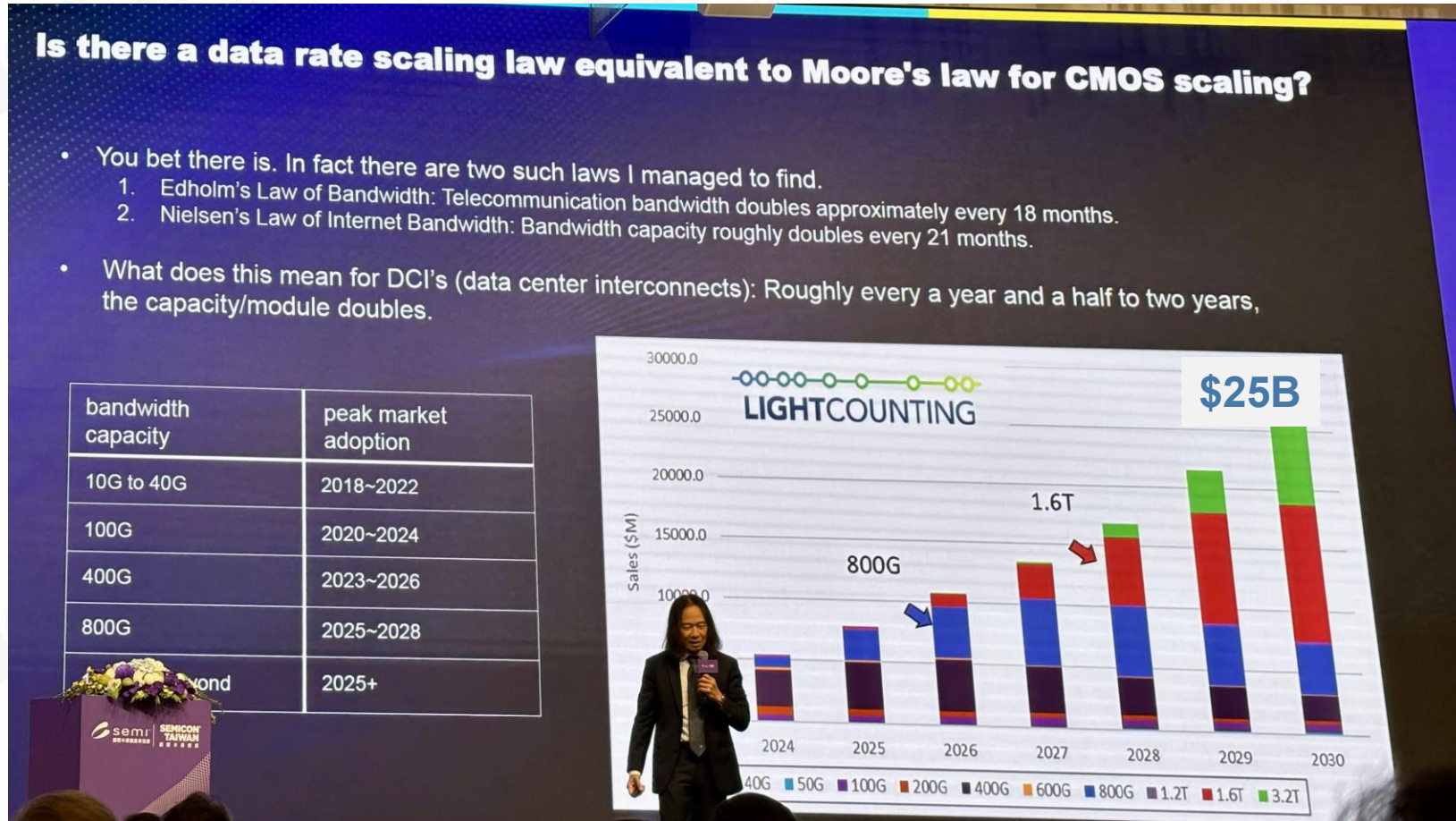
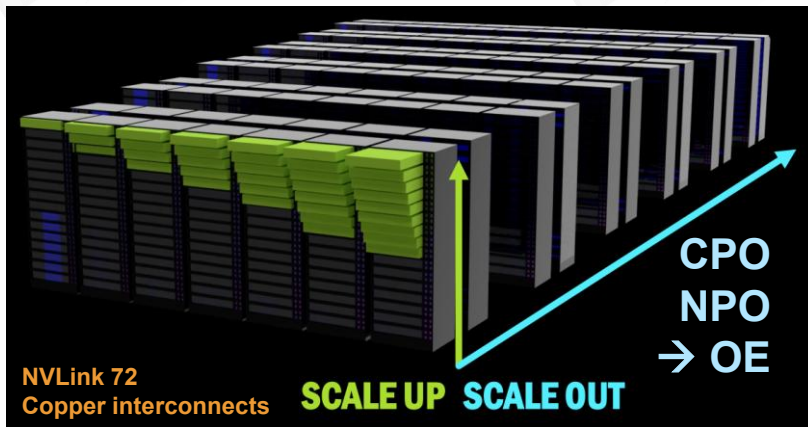


PMLA - Microprism with  
Microlens Array



# AI with “Pluggables”

- For the rack-to-rack connectors (scale-out): Highspeed transceivers (“pluggables” at 800G and 1.6T).
- Very high volumes of photonics components.
- Silicon Photonics will dominate now for 1.6T → EMLs will be replaced by PIC + CW-LD (DR4/8/16)



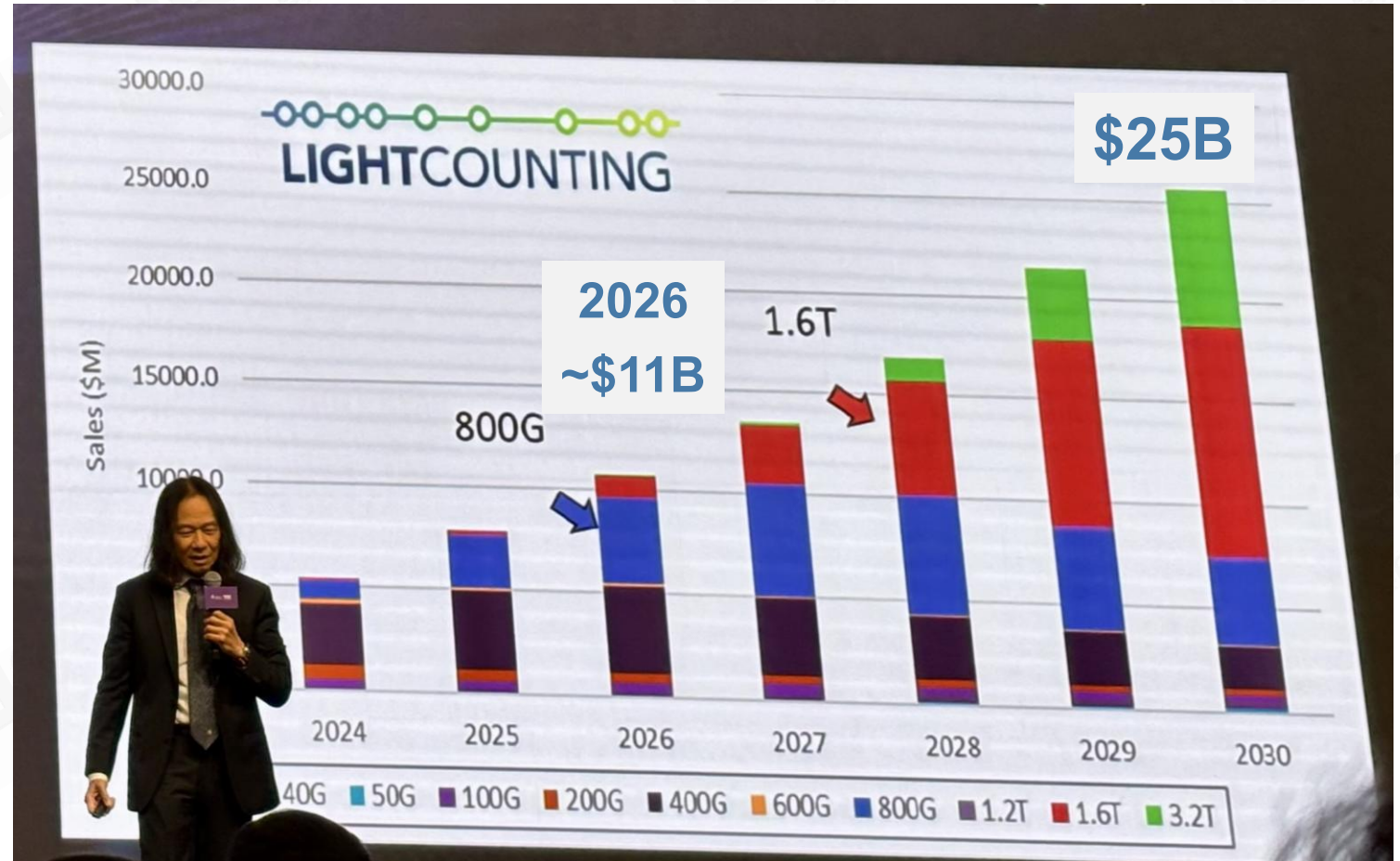
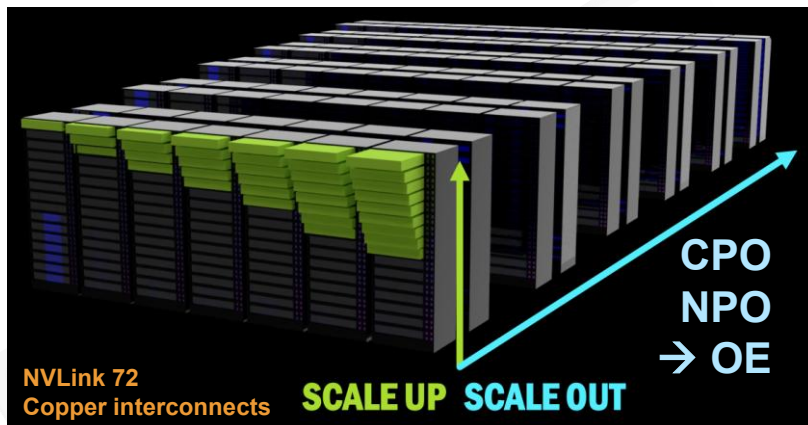
Source: Semicon Taiwan 2026 / UMC

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## Silicon Photonics

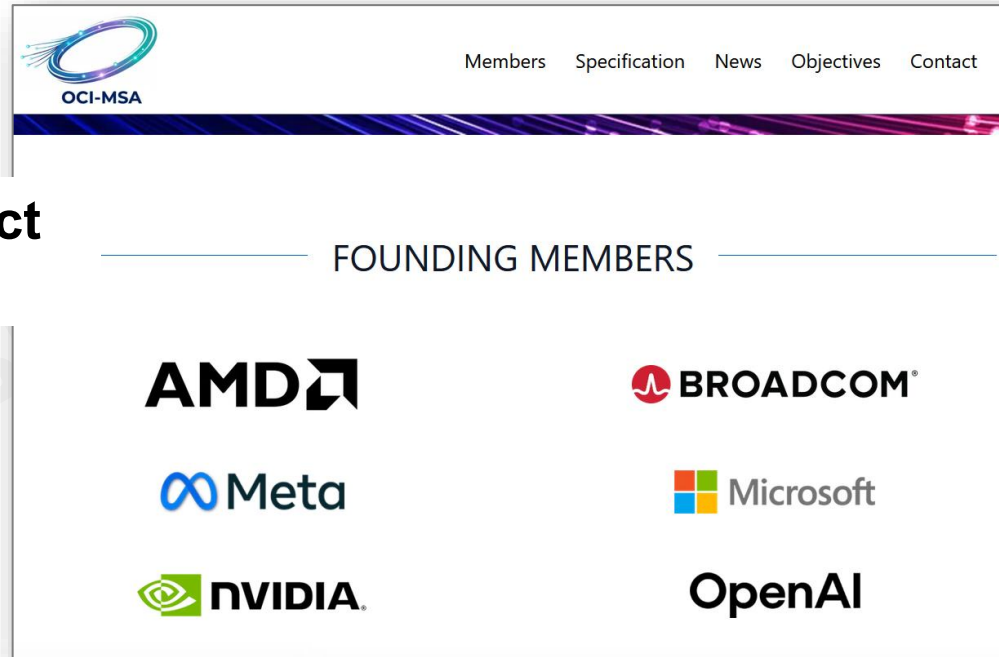
- DR 4/8
- Off-chip CW-Lasers (CD)
  - Special micro-optics
  - Sub-mounts
  - ... services



Source: Semicon Taiwan 2026 / UMC

# OCI & CPO Ecosystems

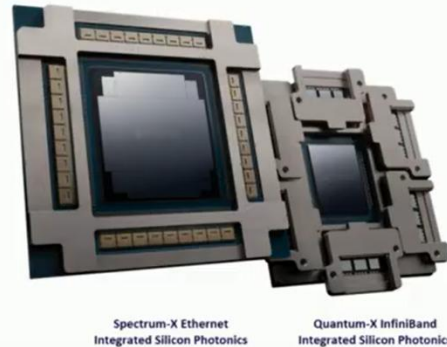
## OCI Optical Compute Interconnect MSA Multi-Source Agreement



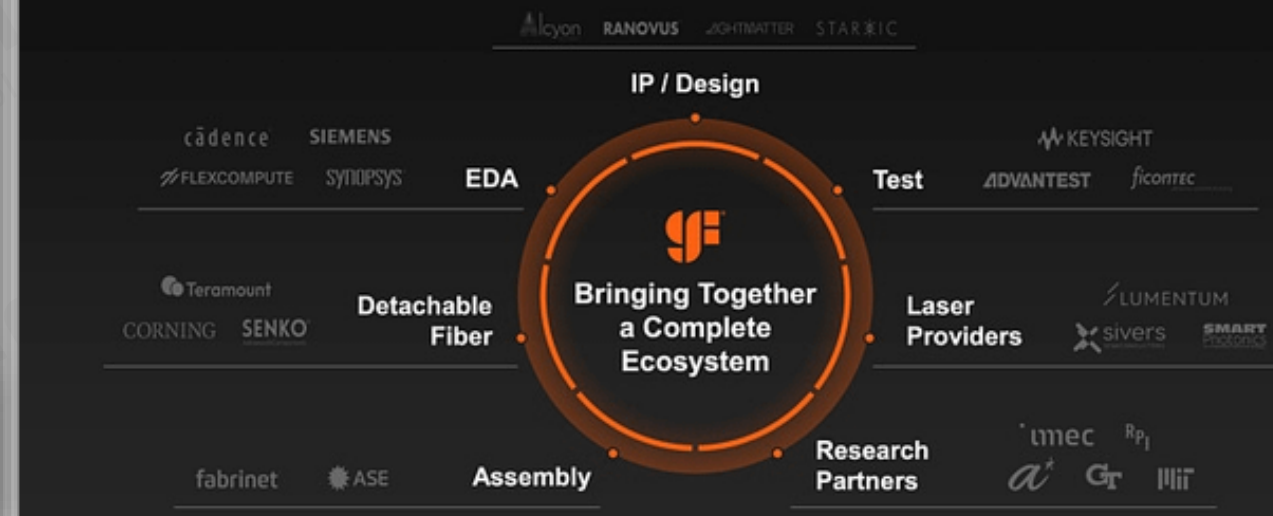
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### NVIDIA Photonics

- CPO co-invention with ecosystem partners
- 1<sup>st</sup> 1.6T Silicon Photonics CPO Chip - new Micro Ring Modulators (MRM)
- 1<sup>st</sup> 3D-Stacked Silicon Photonics Engine with TSMC process
- High-power, high-efficiency lasers
- Detachable fiber connectors
- 100's of patents, licensed to partners



### Scaling Designs With Trusted Partners



# From Pluggables to OCI: NPO / CPO / OIO

## NPO / OBO (currently for scale-out)

- OBO: On-Board Optics
- NPO: Near-Package Optics
- Optical engine on same *mainboard*
- Medium to high Electrical losses
- Less packaging complexity

## CPO (currently for scale-out)

- CPO: Co-Packaged Optics
- Optical engine on same *substrate*
- Low Electrical losses
- High packaging complexity

## OIO / OIO (Next-Gen CPO for scale-in)

- OIO: Optics On Interposer
- OIO: Optical I/O (input/output)
- Optical engine on same *interposer*
- Very low electrical losses
- Very high packaging complexity (“CoWoS”)

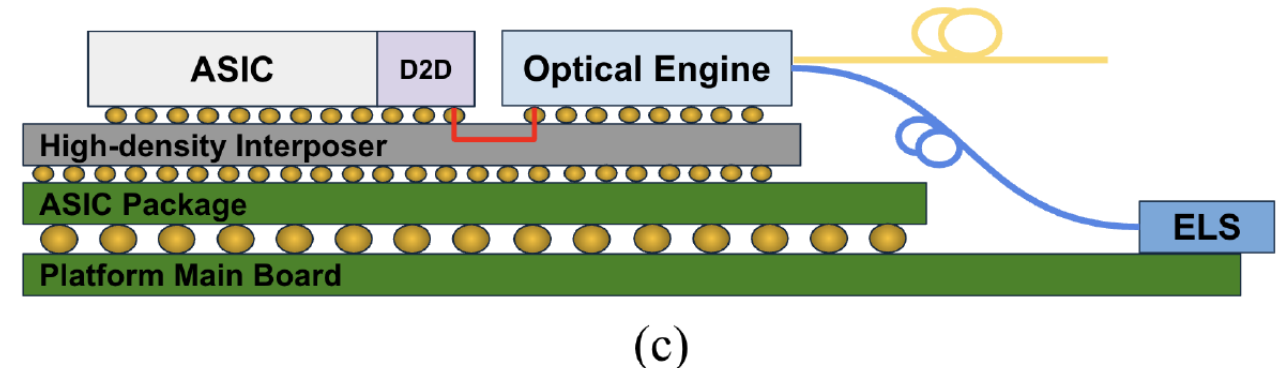
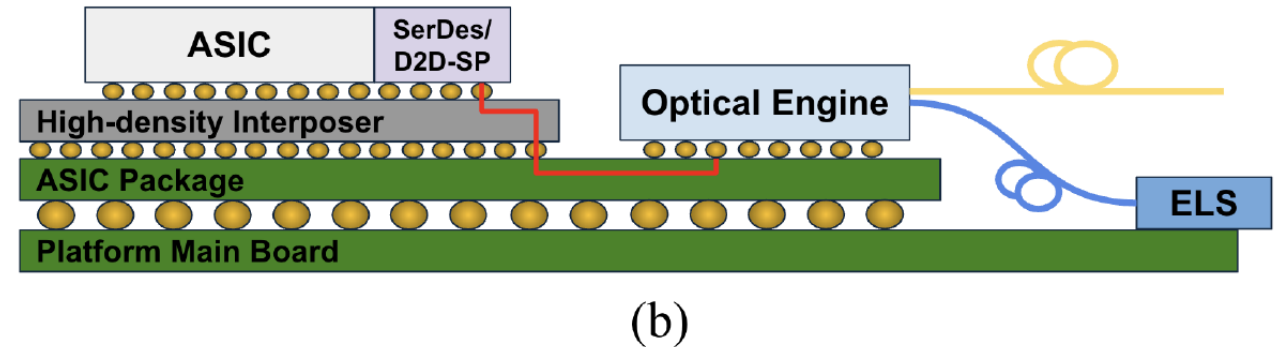
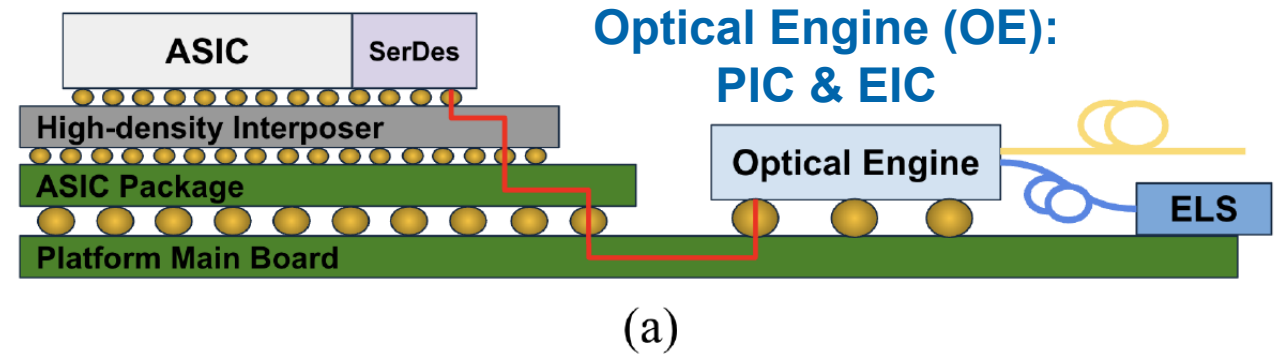
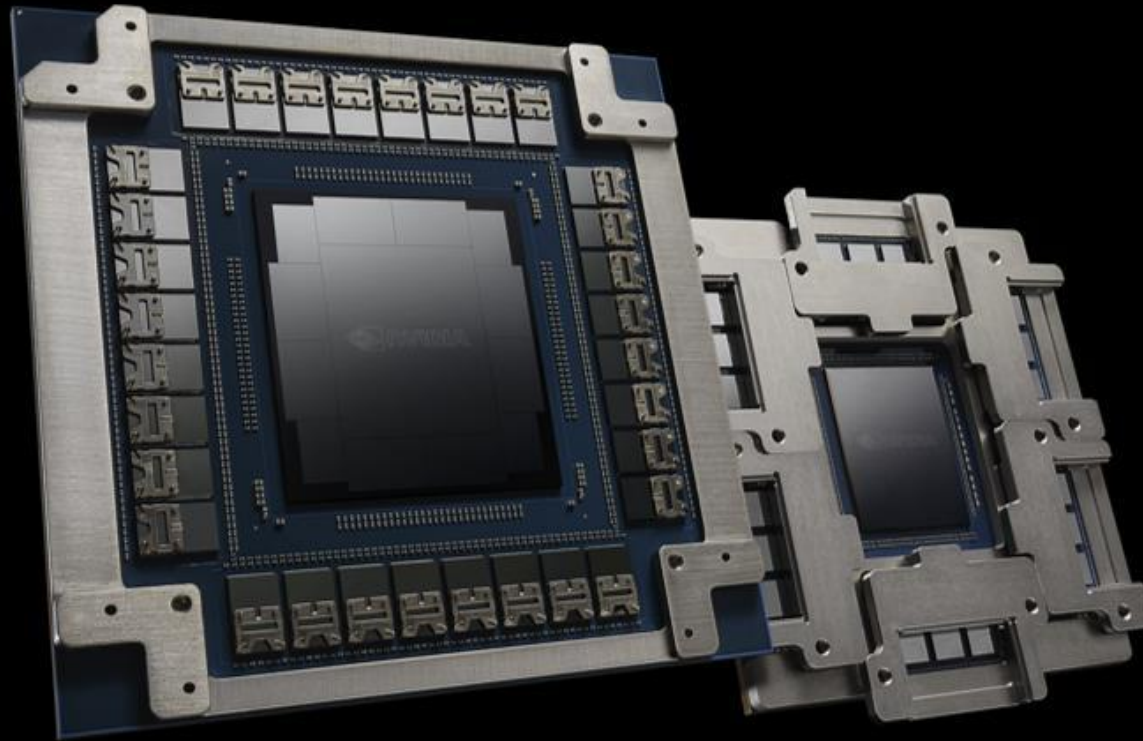


Figure 1. Illustration of three different physical OCI implementations highlighting the different levels of integration with (a) shows an On-Board Optics (OBO) implementation, (b) shows a package integration implementation and (c) shows an interposer integrated implementation.

# AI Needs Optics → NVIDIA's Spectrum X / CPO



Spectrum-X Ethernet  
Integrated Silicon Photonics

Quantum-X InfiniBand  
Integrated Silicon Photonics

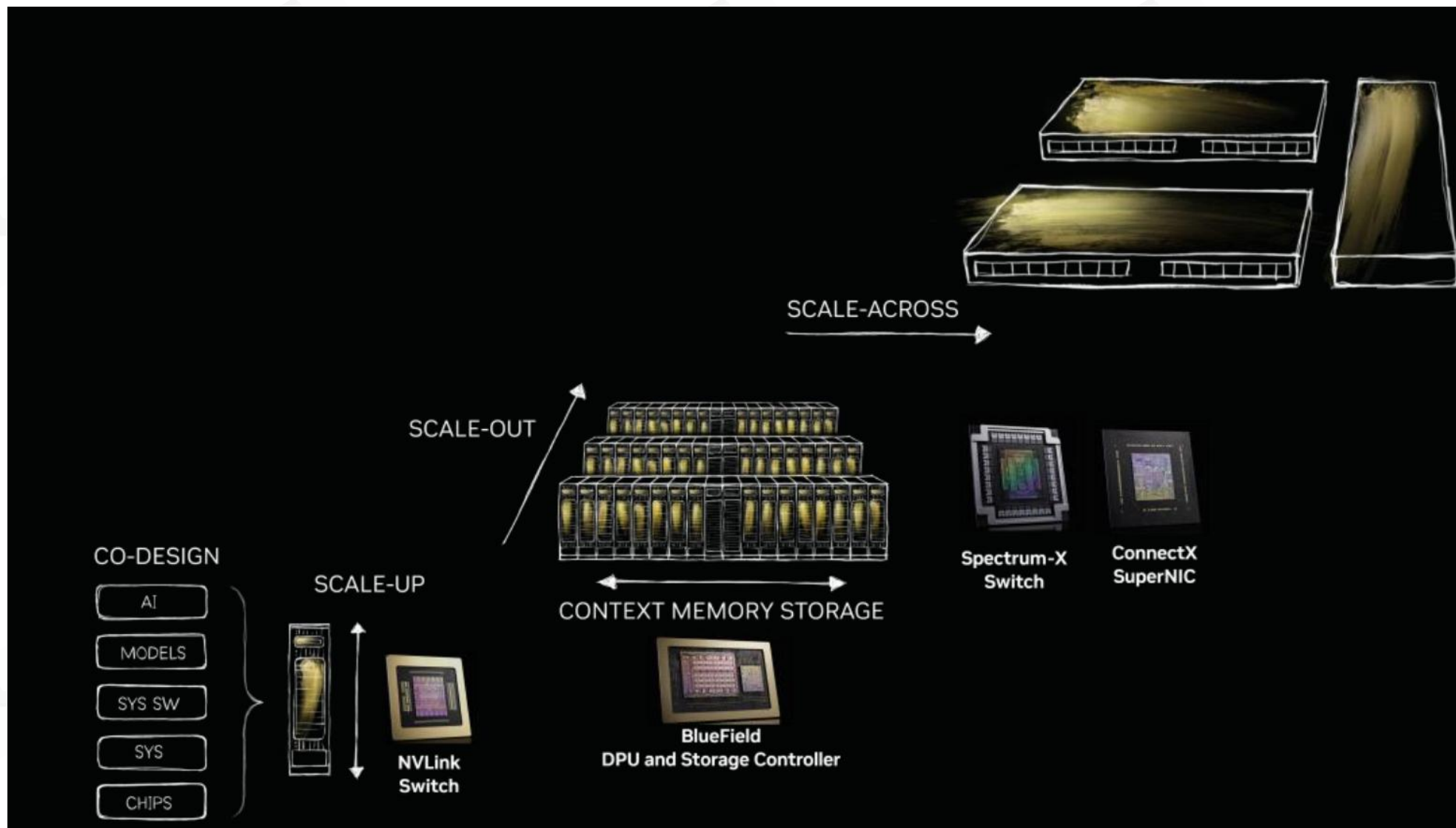
## CPO Co-Packaged Optics

### NVIDIA Photonics

CPO Co-Invention With Ecosystem Partners

- 1<sup>st</sup> 1.6T Silicon Photonics CPO Chip - New Micro Ring Modulators (MRM)
- 1<sup>st</sup> 3D-Stacked Silicon Photonics Engine with TSMC Process
- High-Power, High-Efficiency Lasers
- Detachable Fiber Connectors
- 100's of Patents, Licensed to Partners

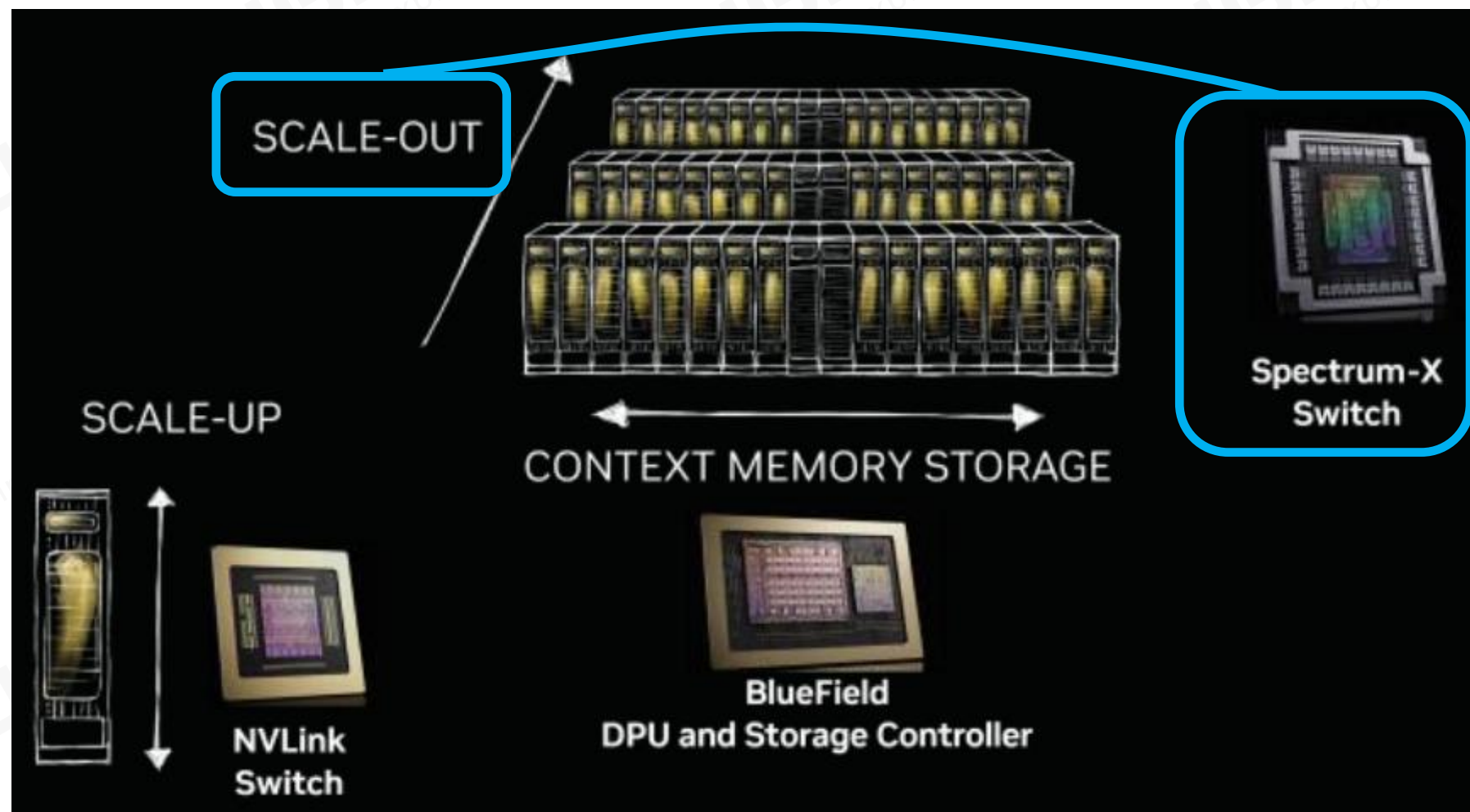
# NVIDIA's Spectrum X / CPO → Scale-Out



# NVIDIA's Spectrum X / CPO → Scale-Out

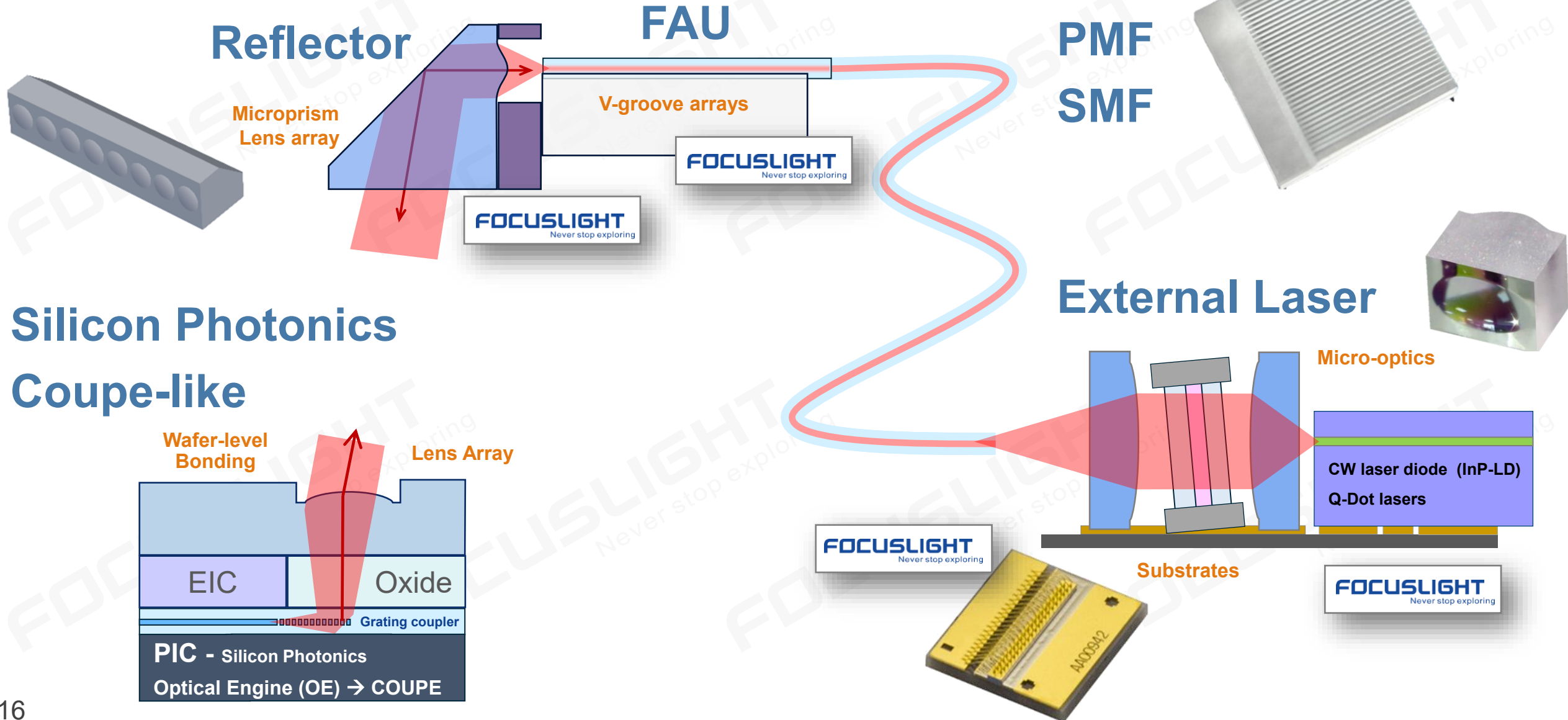
## Spectrum X / Spectrum 6

- For Scale-out
- Easier deployment?
- Lower risk?
- NVLink 72 / Scale up remains as-is?



# Focuslight's Products for COUPE-based CPO

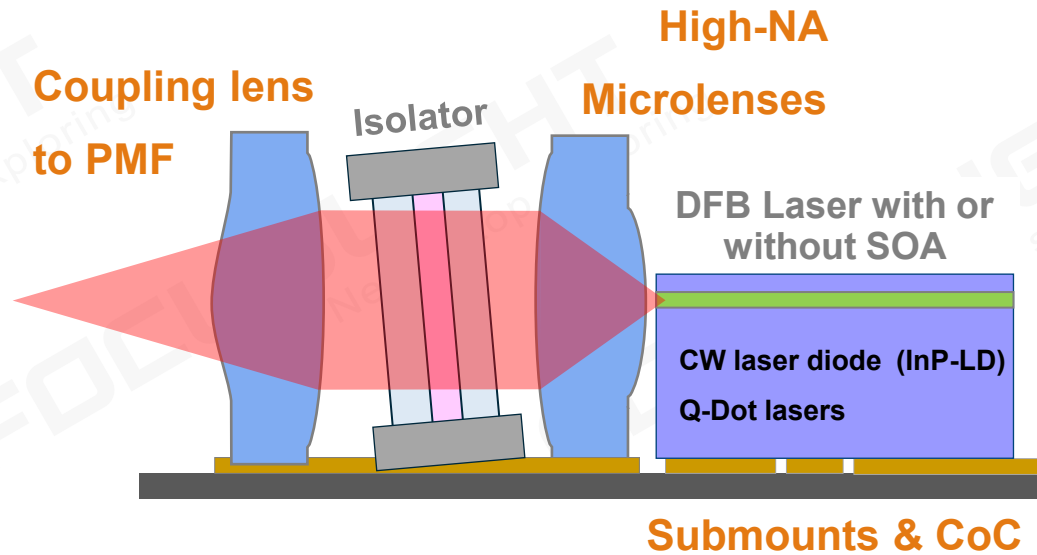
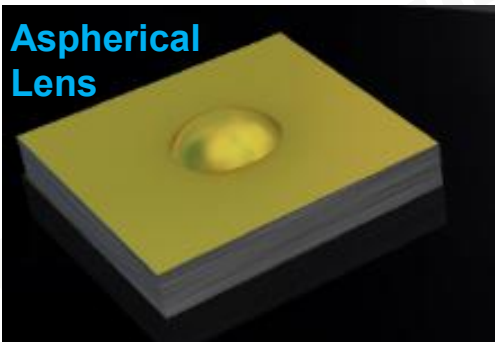
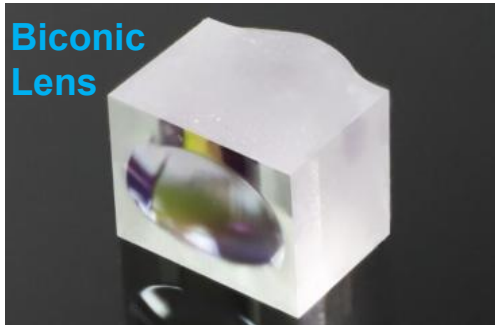
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# ELSFP – LD-to-Fiber Coupling Micro-optics, Substrates



## Laser-Fiber Coupling Solutions

- Precision molded biconic microlens
- Monolithic cross-cylinder & aspherical Lens

## Heat Dissipation AlN Substrates

- CW Laser
- Q-Dot Laser

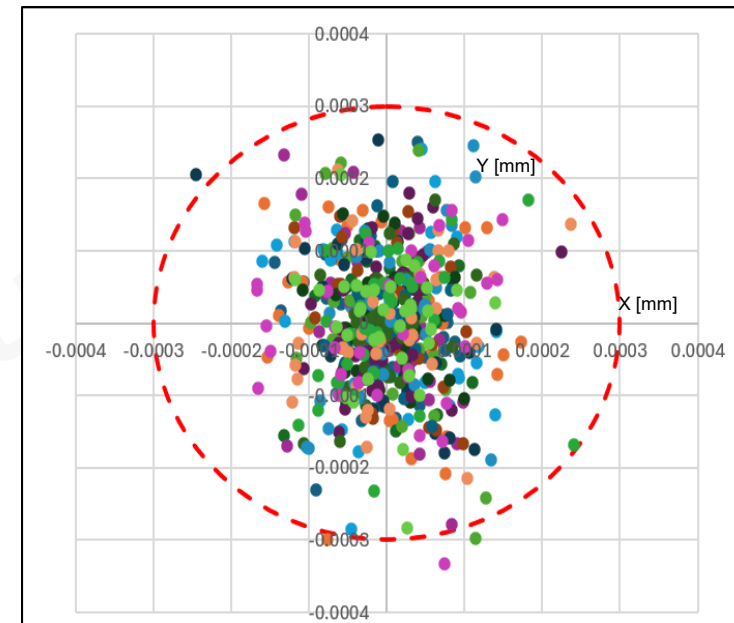
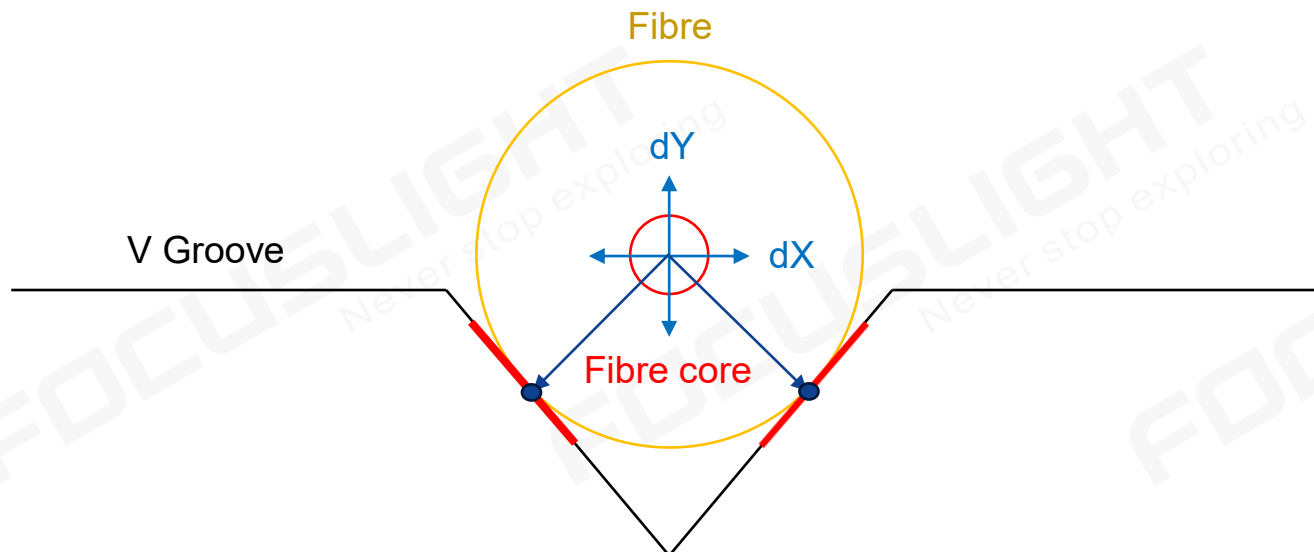
## Assembly Service & Assembly Tools

- Applying skills from industrial laser to datacom lasers

Ramping up or engaged with major players for product qualification

# V-Groove Arrays – Quality & Performance

- 36 channels, Pitch 127 $\mu$ m
- Pitch tolerance:  $\pm 0.35\mu$ m
- Dimension: 5x5x0.685mm
- Materials: B33, Silicon, Fused Silica



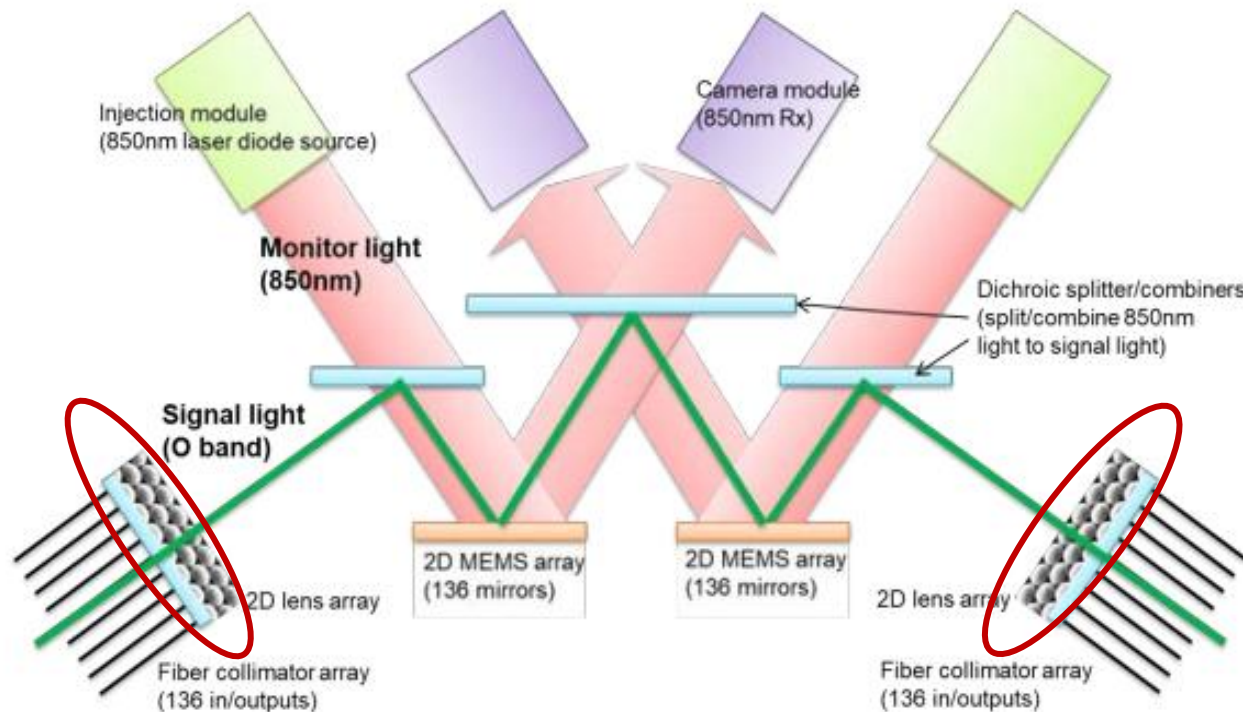
**Radial  
Position  
errors**

# Datacom & Optical Circuit Switches (OCS)

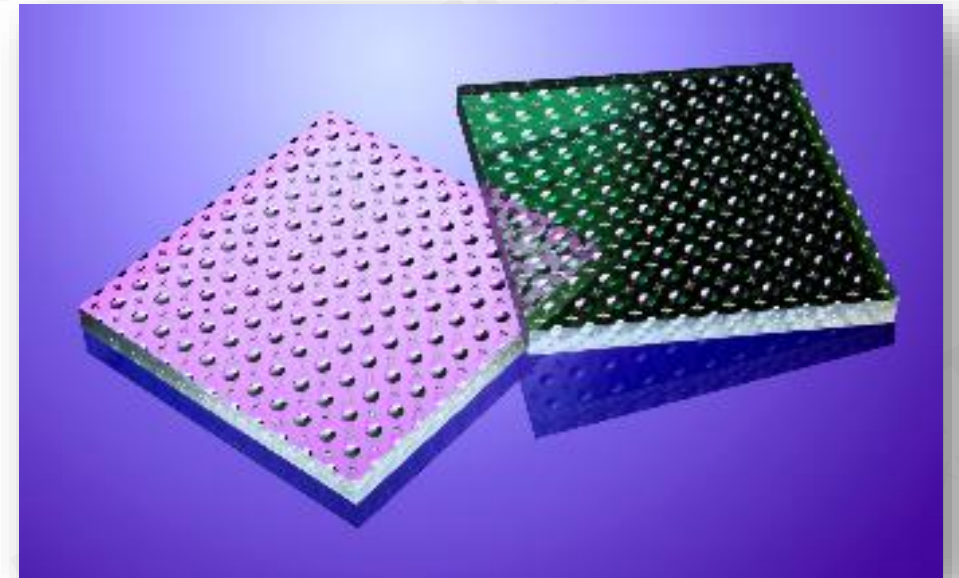
Datacom → Network Interoperability

Quickly growing heterogenous networks need Optical Cross Connects

## Optical Core of Palomar OCS



**Microtechnology and Micro-Optics  
are the enablers**

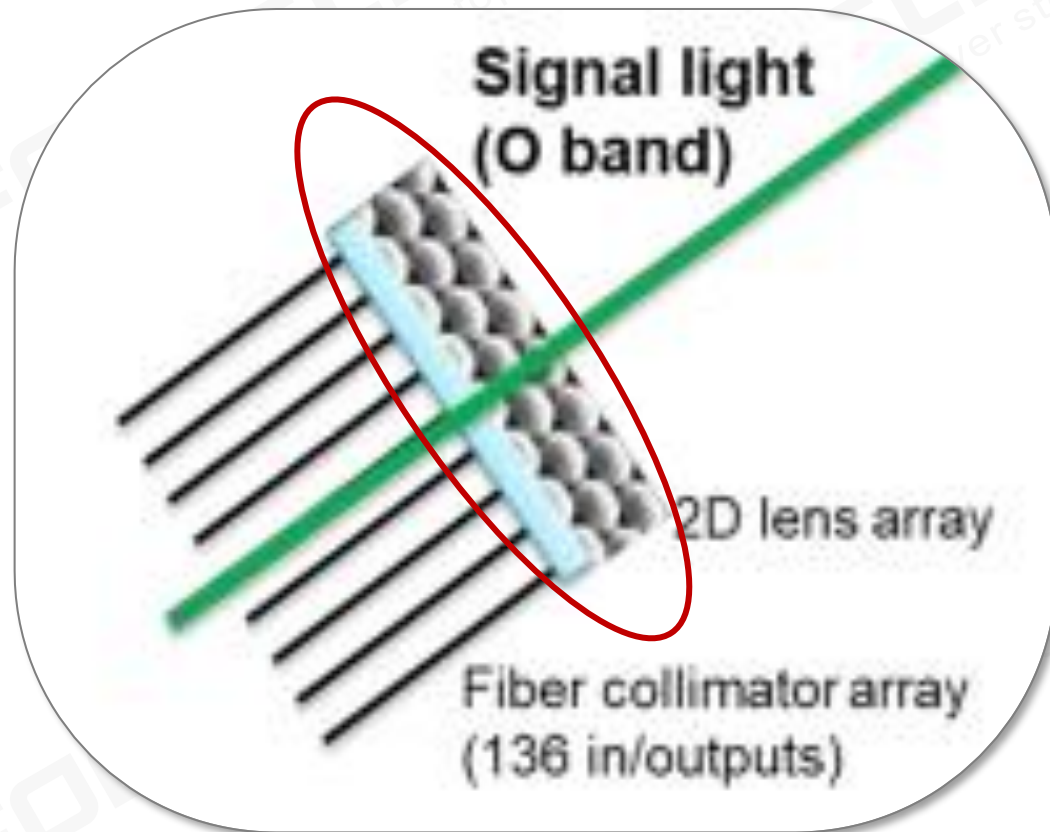


- MLA for MEMS based OCS in HVM
- Molded Lens with better ROC tolerance at  $\pm 0.5\%$  under development, prototyping in Q4, 2026

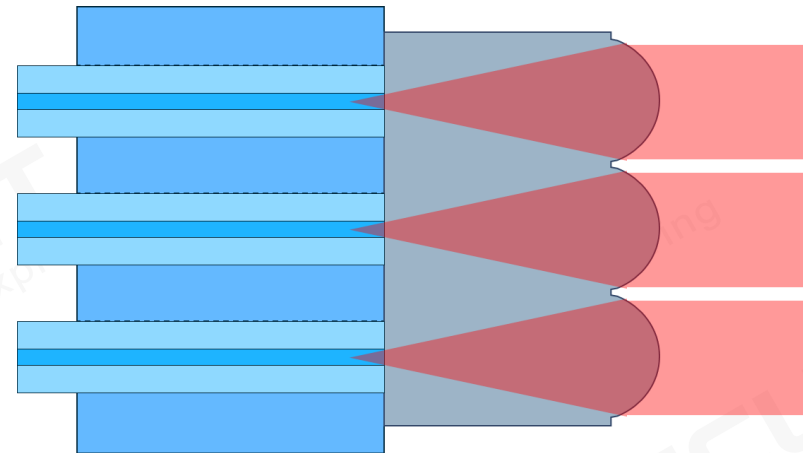
# Datacom & Optical Circuit Switches (OCS)

Datacom → Network Interoperability

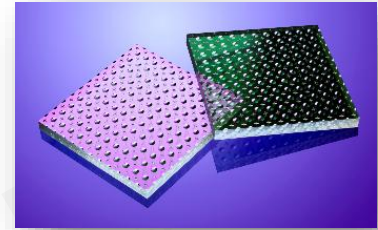
Quickly growing heterogenous networks need Optical Cross Connects



**Microtechnology and  
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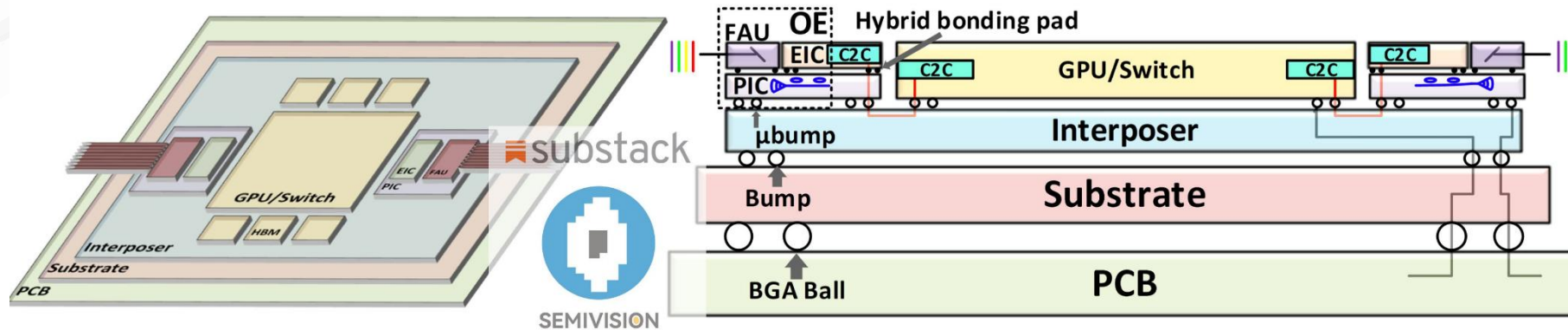
Application note of a 3<sup>rd</sup>-party hole plate  
with a Focuslight microlens array



# Co-Packaged Optics → What's next?

## CPO for compute (GPU) Scale-in

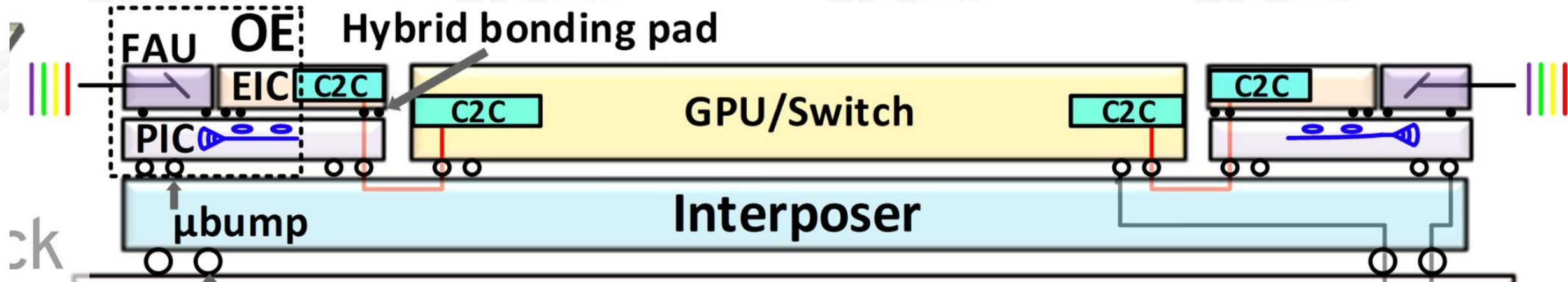
### Optics on Interposer



- Extend the reach of C2C-USR links with matching shoreline density and minimized latency
- 3D-stacked optical engine (**OE**, including FAU/EIC/PIC) on interposer, adjacent to host, minimizes distance with lower latency and maximizes bandwidth

# Co-Packaged Optics → What's next?

## CPO for compute (GPU) Scale-In



→ VCSEL-based solutions ... next slide

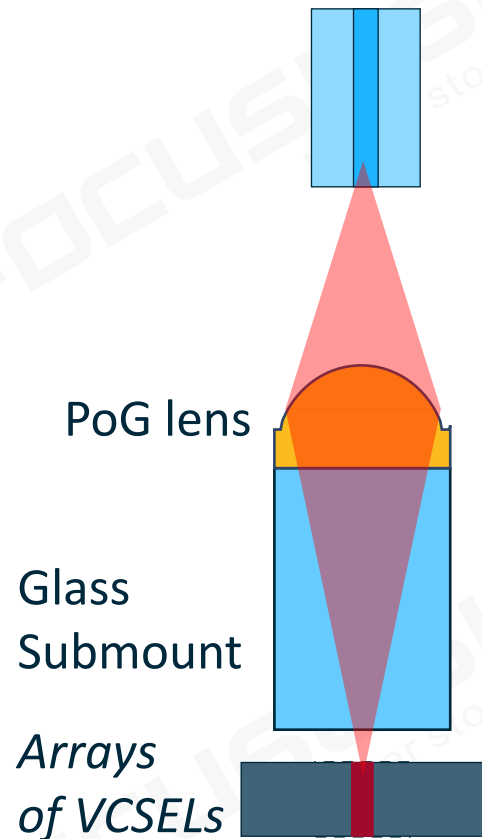
# Polymer-on-Glass Micro-Optics for 1060nm VCSEL

## Enable Cost-Effective Scaling

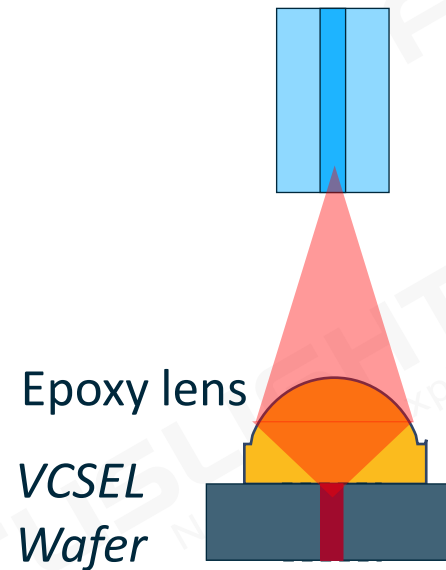
- Wafer-level manufacturing

## Optimized for 1060nm VCSEL

- Efficient beam shaping

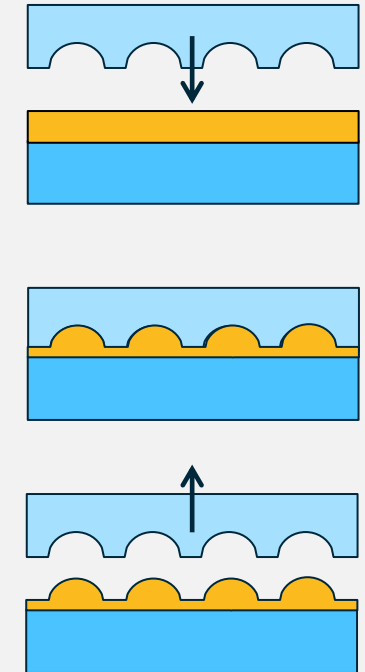


**Wafer-Level PoG  
Lens Array**



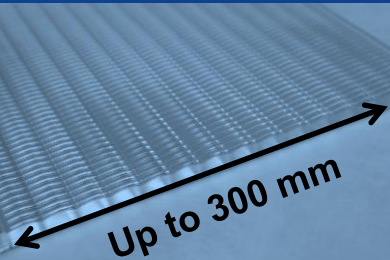
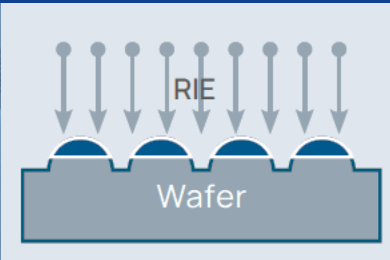
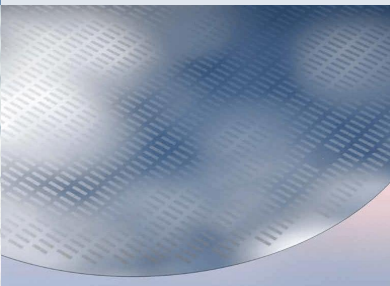
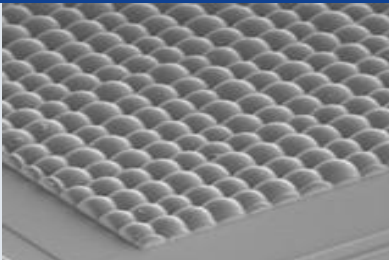
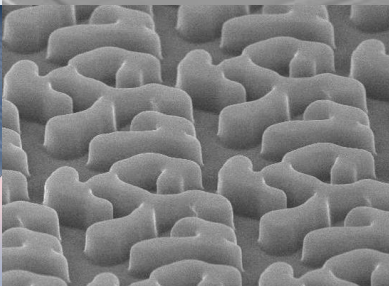
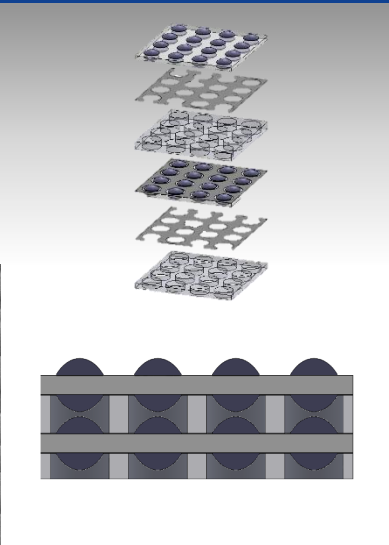
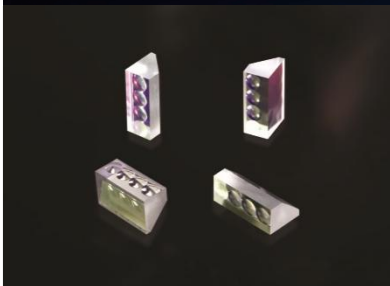
**Direct Imprinted  
on VCSEL Wafer**

UV imprint of a liquid polymer layer on a glass substrate



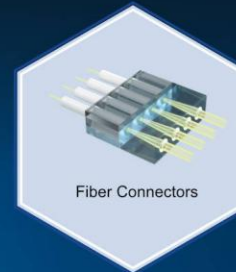
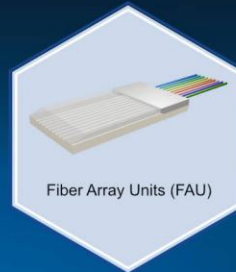
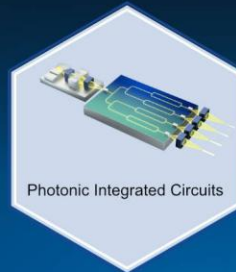
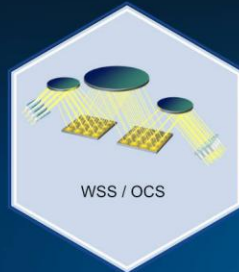
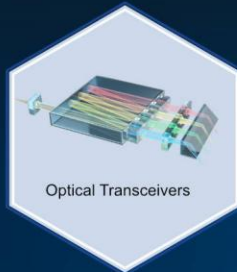
# Optics Manufacturing Technologies Overview

**Six different microtechnology options!**  
**Together with you, we pick the most suitable technology for you!**

| Wafer Level Simultaneous Structuring                                                                                                                                  | Wafer Level Photolithography-RIE (reactive ion etching)                                                                                                                 | Wafer-Level Optics (WLO) Precision Imprinting                                                                                                                             | Wafer-Level Stacking (WLS)                                                           | Precision Glass Molding                                                                                                                                                     | Optical Grinding and Polishing                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br> | <br> | <br> |  | <br> | <br> |
| With inorganic materials:<br>glass, fused silica, silicon, $\text{CaF}_2$                                                                                             |                                                                                                                                                                         | With polymer on glass                                                                                                                                                     |                                                                                      | With moldable glass                                                                                                                                                         | With inorganic materials                                                                                                                                                    |
| <b>High LIDT Optical Coating:</b> Anti-reflection, high-reflection, beam splitter, band filter, and various customization (UV, VIS, IR)                               |                                                                                                                                                                         |                                                                                                                                                                           |                                                                                      |                                                                                                                                                                             |                                                                                                                                                                             |

# ENGINEERED IN EUROPE, SCALED IN ASIA

*Accelerating Global Reach in* **High-Precision Micro-Optics**



# THANK YOU



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