

# Networking Connectivity for AI Data Centers

## - Breaking Connectivity and Power Walls

**Hong Hou**
President & CEO
Semtech Corporation

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# Semtech: Long History with Renewed Vision



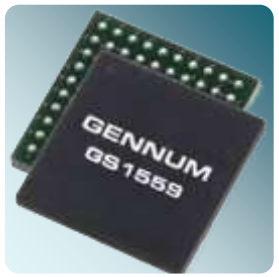
**1960s –1990s**

Founding and defense roots



**Mid 1990s – 2000s**

Pivot to analog / mixed-signal




**2012**

Gennum and Cycleo acquisitions




**2023**

Sierra Wireless / IoT systems detour




**2024-Present**

Refocus and AI-era transformation

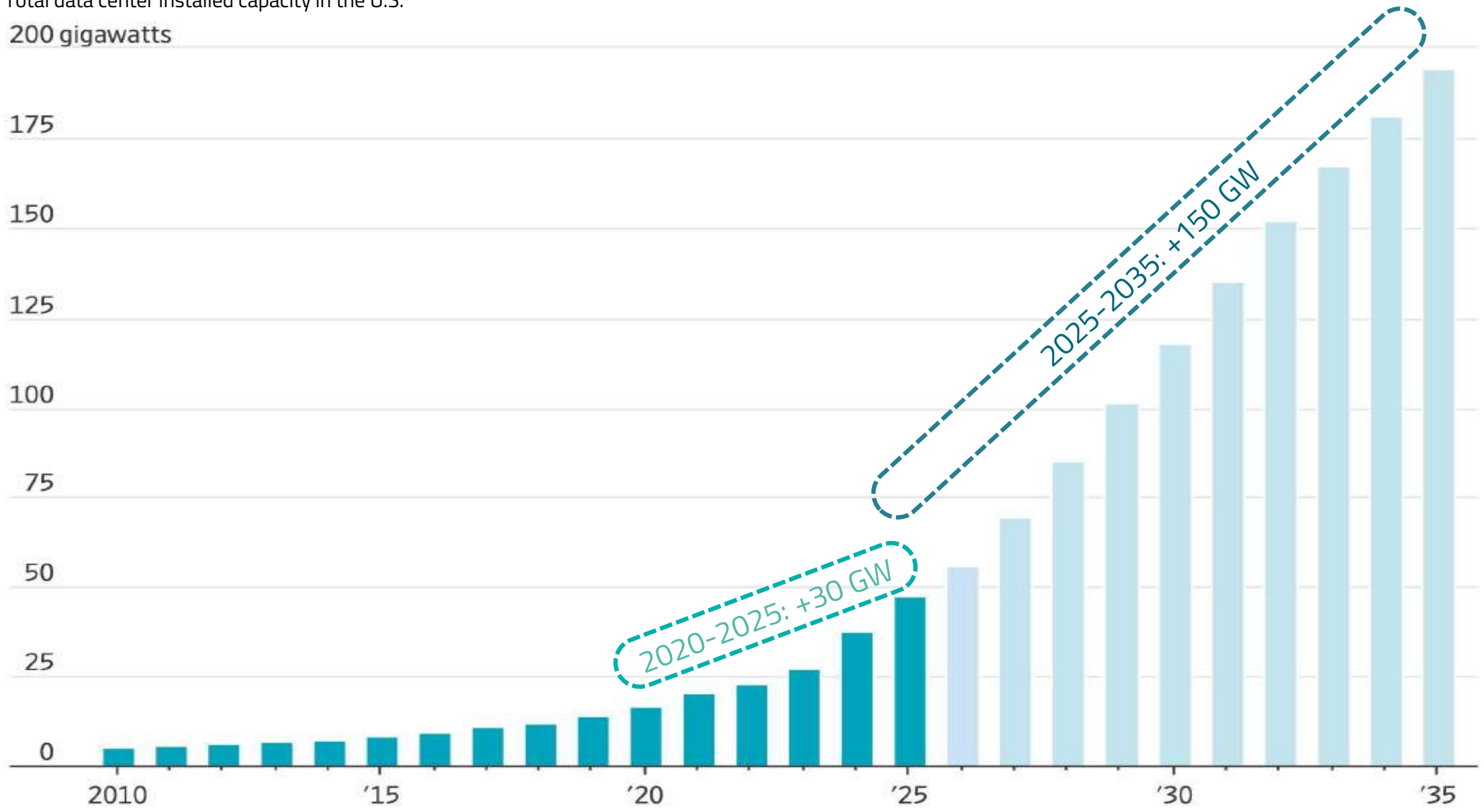
*A fundamentally different company*

**RENEWED STRATEGY AND VISION**

Be the **leading connectivity company of the AI era**, focused on moving **more data** with **less energy** from the heart of the data center to the edge of the physical world.

# Projected US AI Data Center Building Boom

Total data center installed capacity in the U.S.




Source: Bloomberg NEF with 2026-2035 as projections

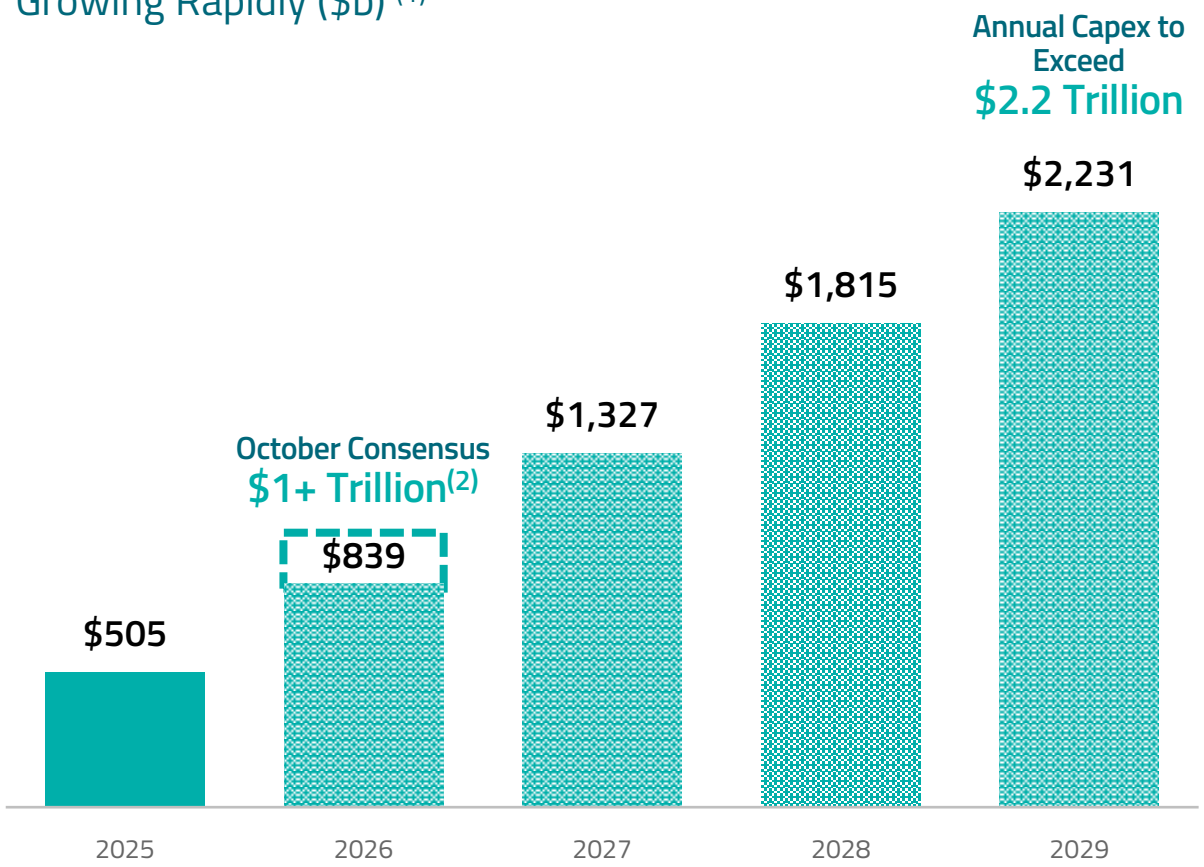


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# Generational AI Data Center Growth Opportunity

## The Opportunity

Global Data Center Capex Spend is Growing Rapidly ($b) (1)




(1) Based on Bank of America Equity Research (September 2026), other than Latest Consensus for 2026
(2) Management estimates based on market research reports (October 2026)

### KEY GROWTH DRIVERS

**Expanding AI Workloads**
Agentic AI, inference, and enterprise adoption are materially increasing compute and connectivity requirements

**Persistent Capacity Constraints**
Limited compute, power, and data center capacity continue to support incremental investment

**Improving Demand Visibility**
Multi-year cloud commitments and growing backlog provide greater confidence in sustained infrastructure spend



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# Power Saved in Networking Allows More Revenue

## The Power Constrained Datacenter

ARISTA

Example: NVIDIA NVL72 GB200 Rack with 648 1600G port backplane = 1+ Pbps

| PHY | PHY Pwr / Port [W] | PHY Pwr / Rack [W] | Total Rack Power [W] | Relative Power [%] |
|---|---|---|---|---|
| Copper | 0 | 0 | 120,000 | 100% |
| LPO | 10 | 6,480 | 126,480 | 105.4% |
| LRO | 20 | 12,960 | 132,960 | 110.8% |
| DSP | 30 | 19,440 | 139,440 | 116.2% |

DSP Optics would have displaced 12 GB200 chips
Copper is by far the lowest cost and power solution



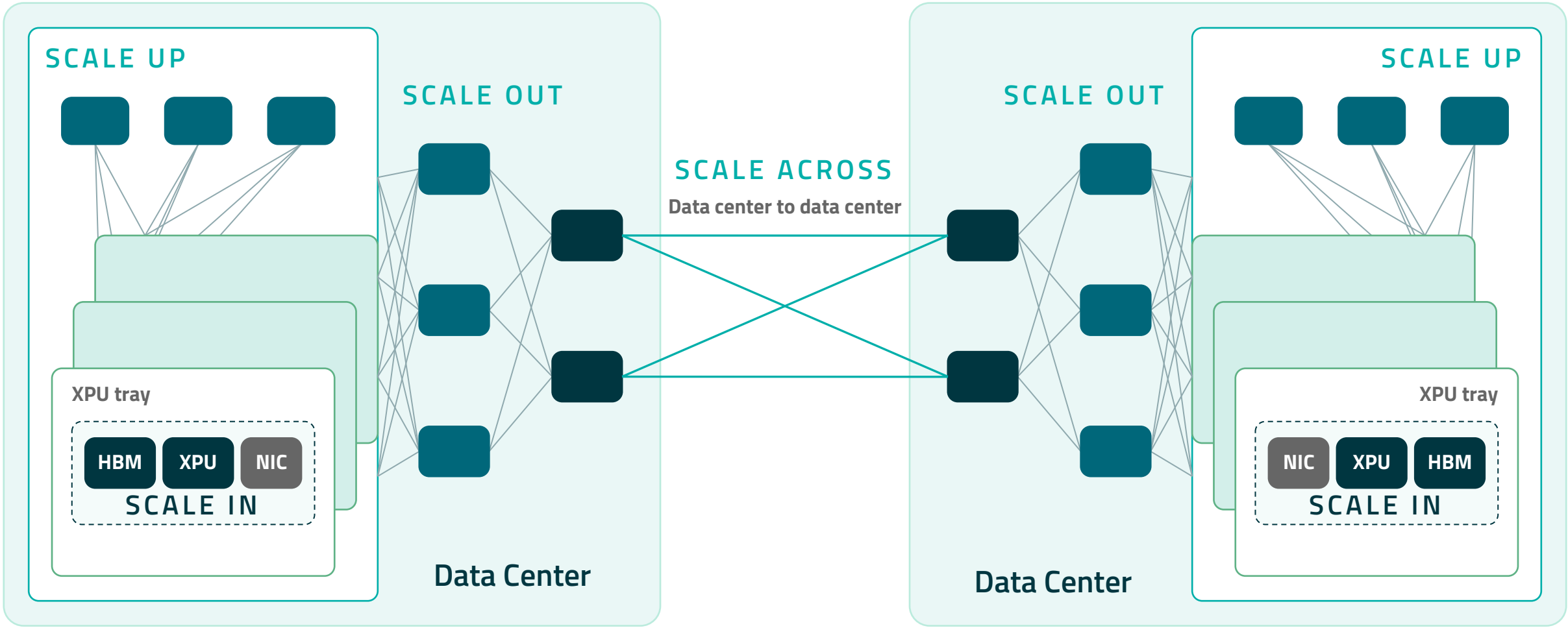
Courtesy of Andy Bechtolsheim

- Datacenters are becoming power limited
- Revenue directly proportional to GPU density
- Interconnect power efficiency now a critical constraint

**Power Saved = More GPUs = More Revenue**

# XPU Interconnect Topology for Hyperscale AI Systems

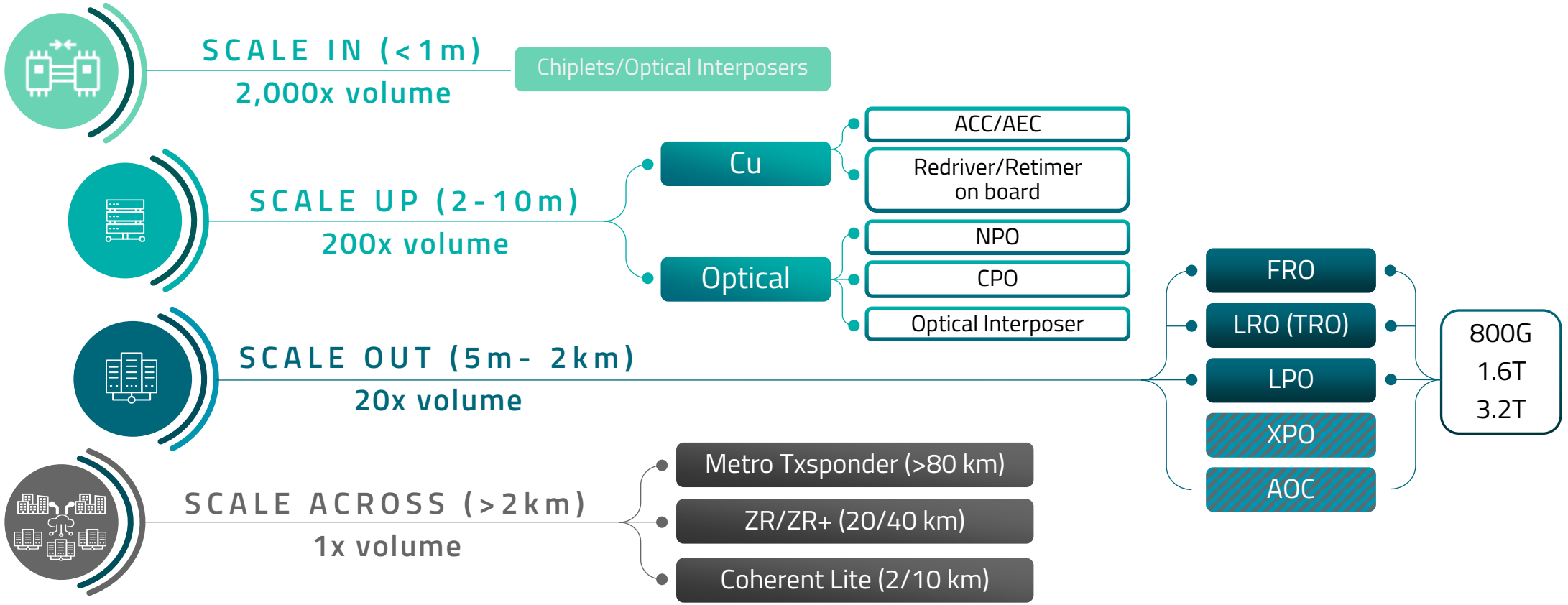
**Four connectivity domains, from inside the package to across data centers**






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# Various Connectivity Solutions Across AI Data Center Network

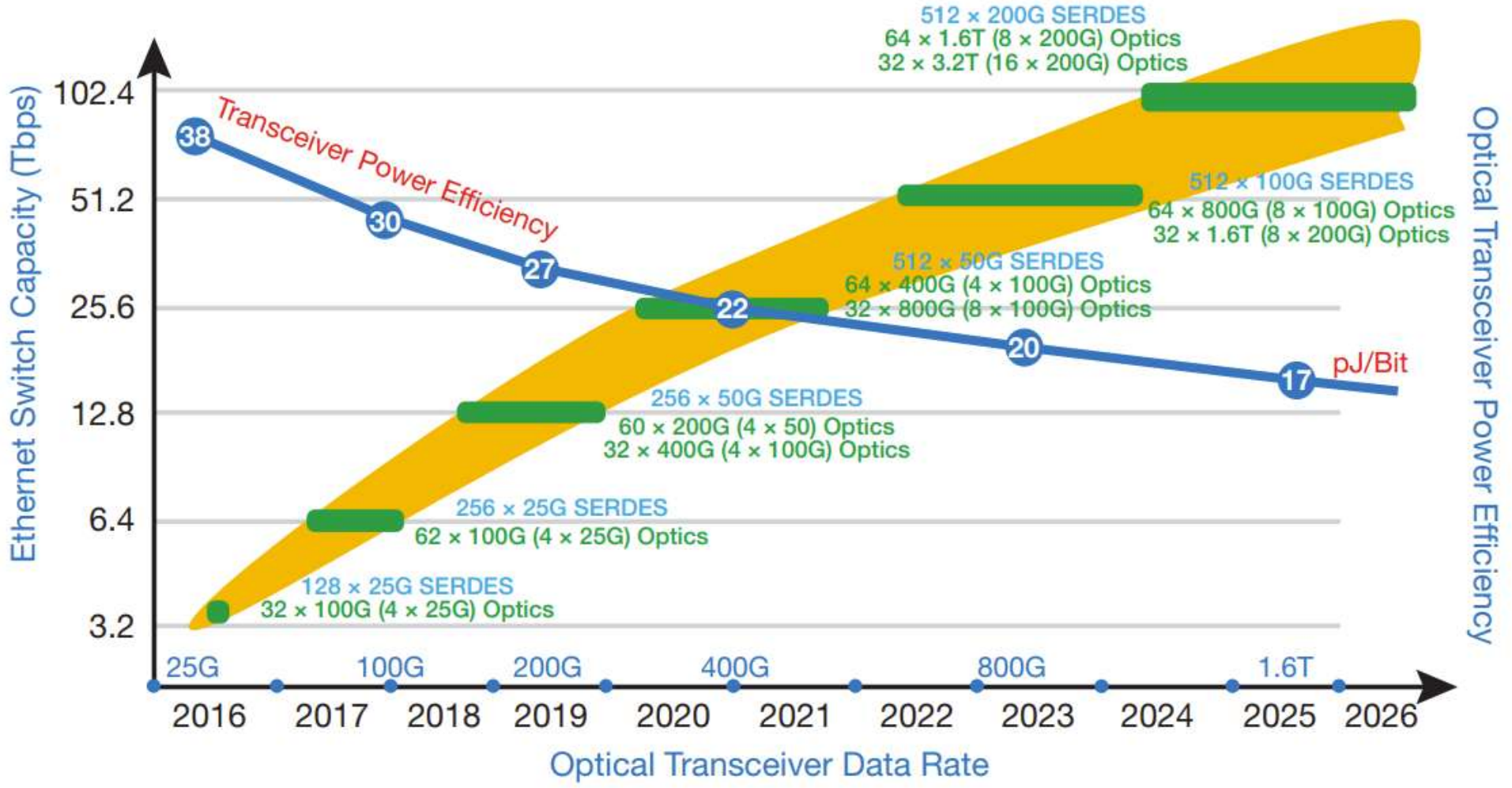



**High speed connectivity solutions to deliver high bandwidth, low power consumption, high bandwidth density, and low latency**



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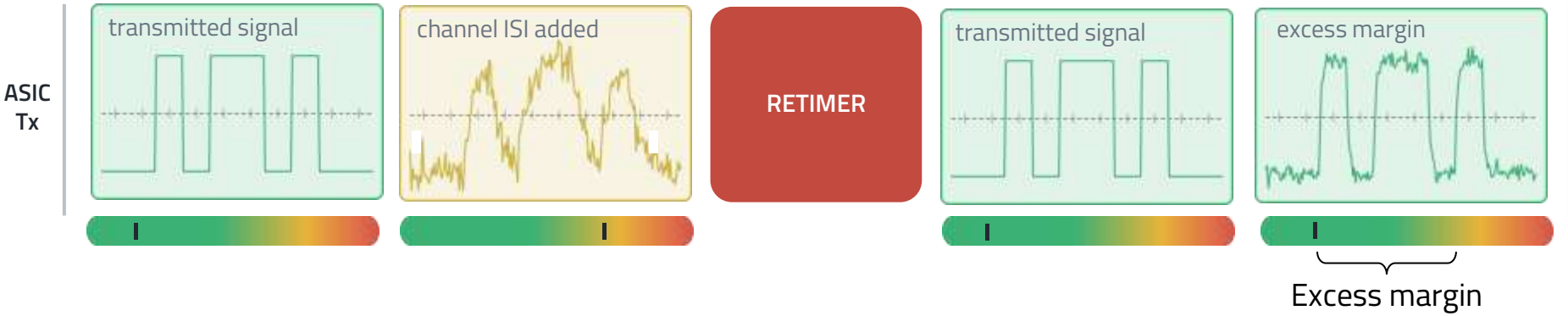
# Scaling Trends in Ethernet Switch Capacity and Optical Interconnects




Source: Sunil Priyadarshi, Arista Networks

# Linear Analog: Solution to Maintain Signal Integrity and Reduce Power

## Retimed




- Longer reach
- Better interoperability
- Digital diagnostics

## Semtech Analog ICs




- Fraction of the power
- Effectively zero latency
- Smaller footprint
- Cost advantage

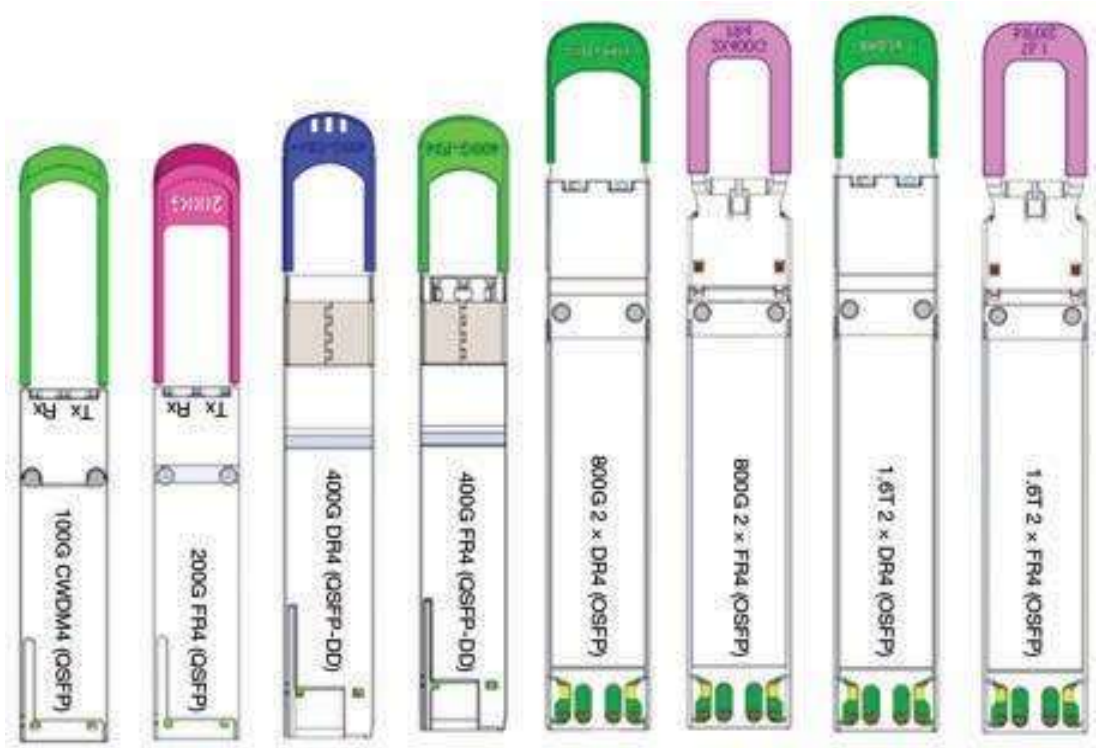
**"Linear when you can and retimed when you must"**

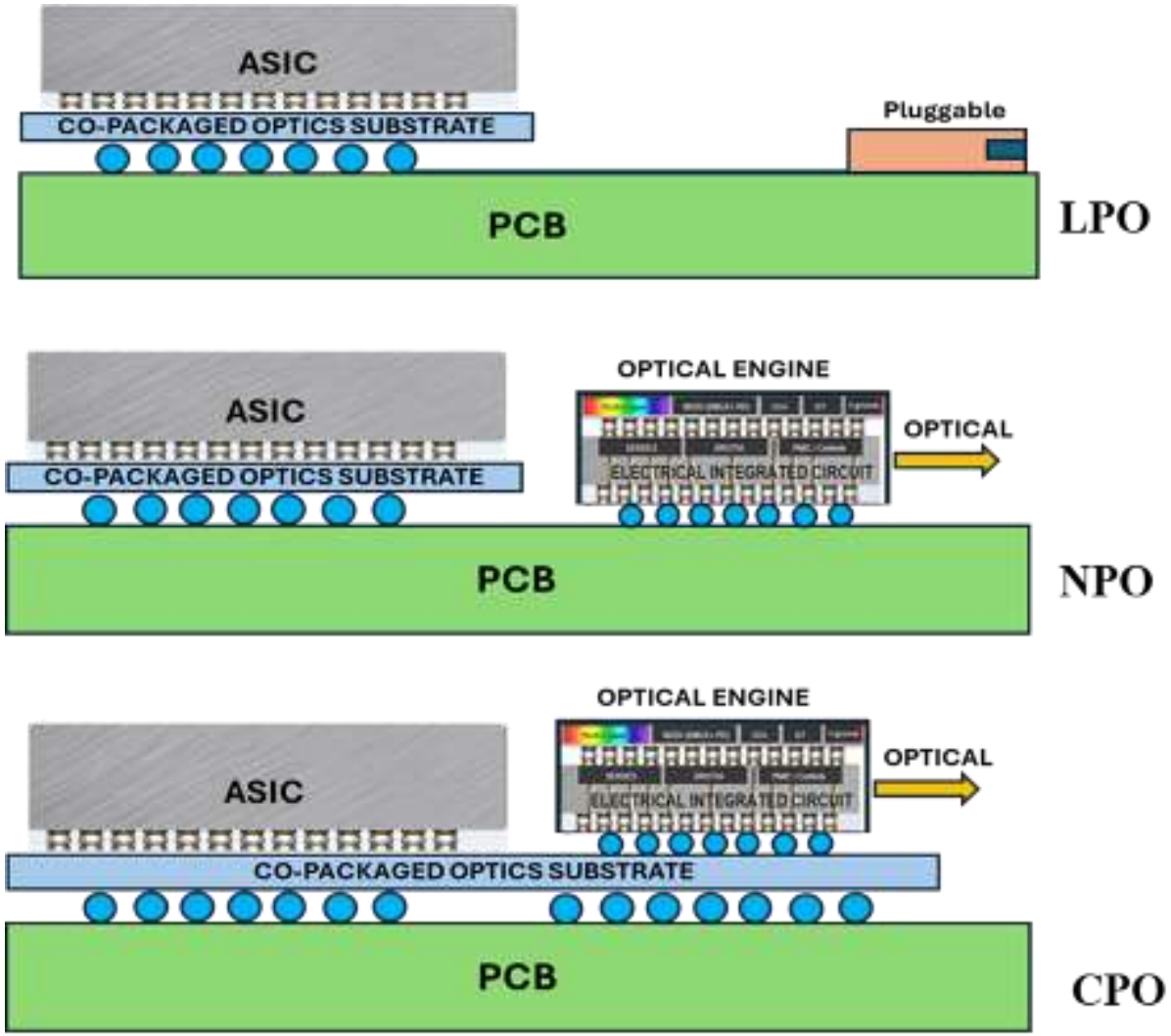


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# Pluggable Transceiver Modules & Advanced Packaged Optical Interconnects

Various pluggable optical module solutions

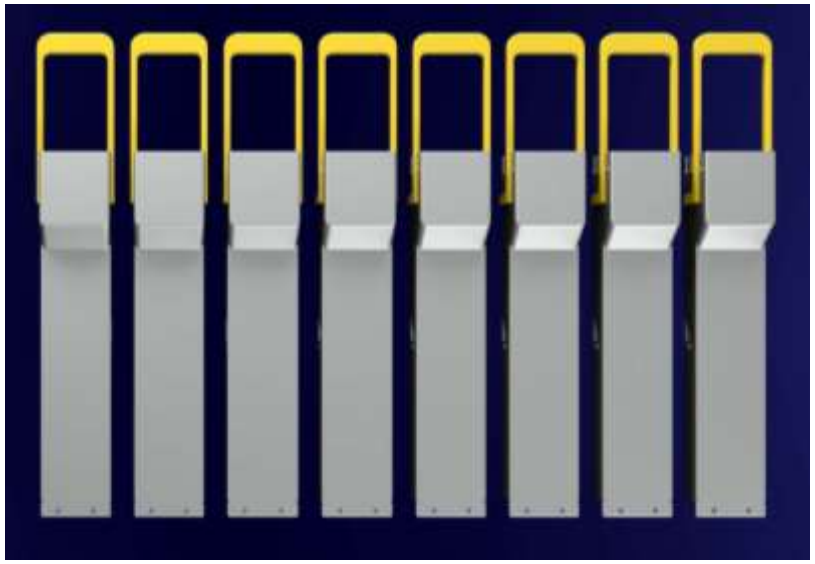


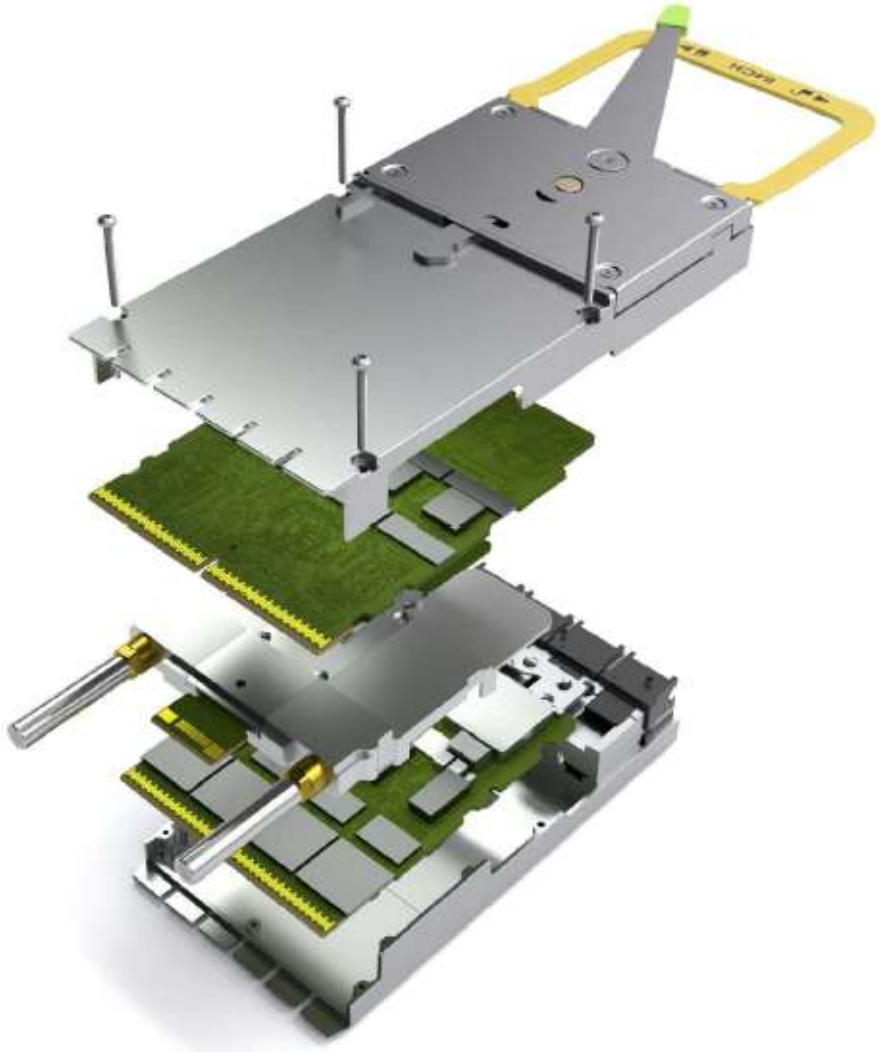



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# One 12.8T XPO Module to Replace Eight 1.6T OSFP Modules



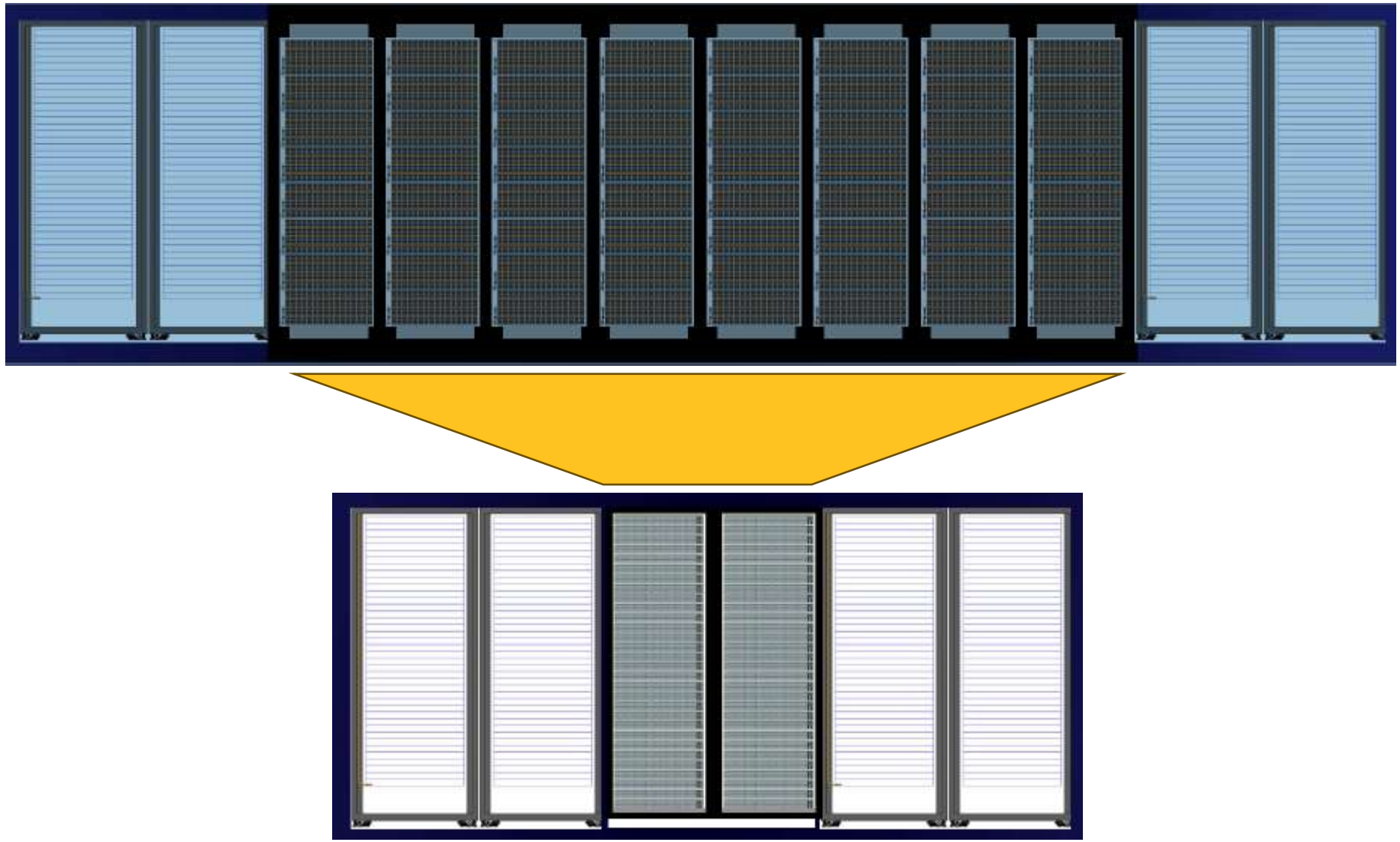






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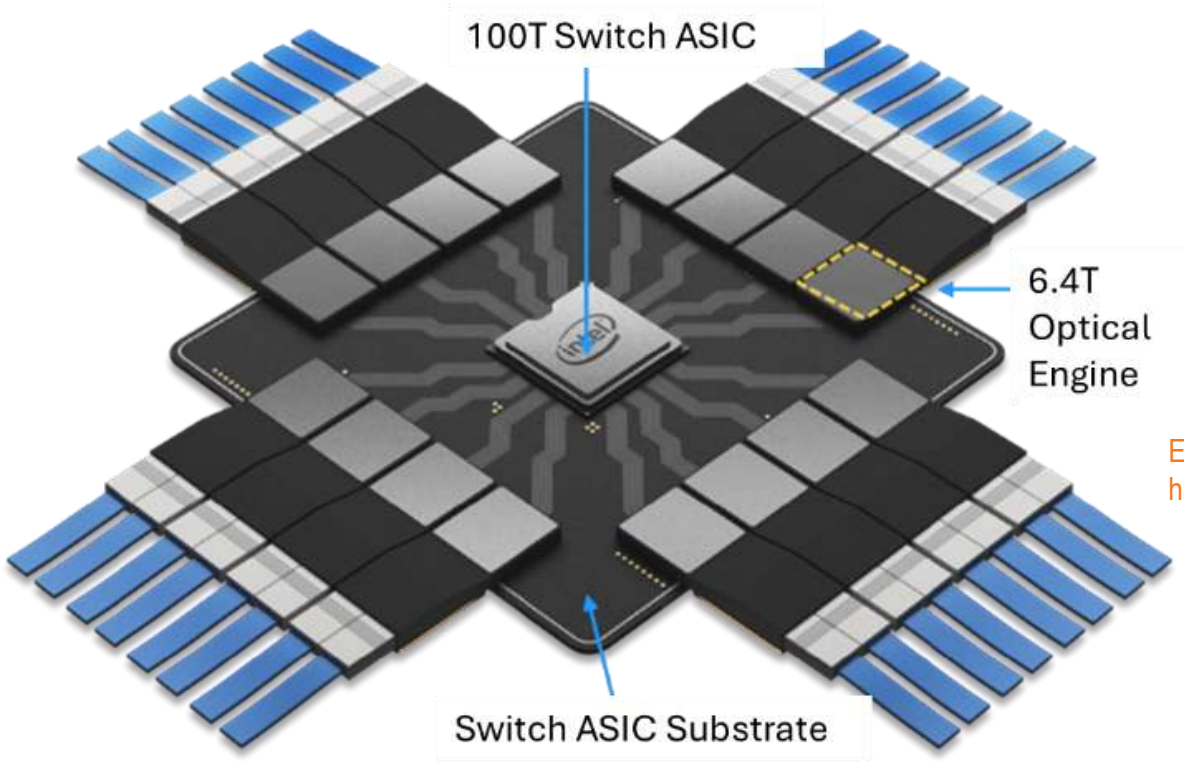
# XPO Allows 4x Footprint Reduction for Switch Racks: 8 to 2!

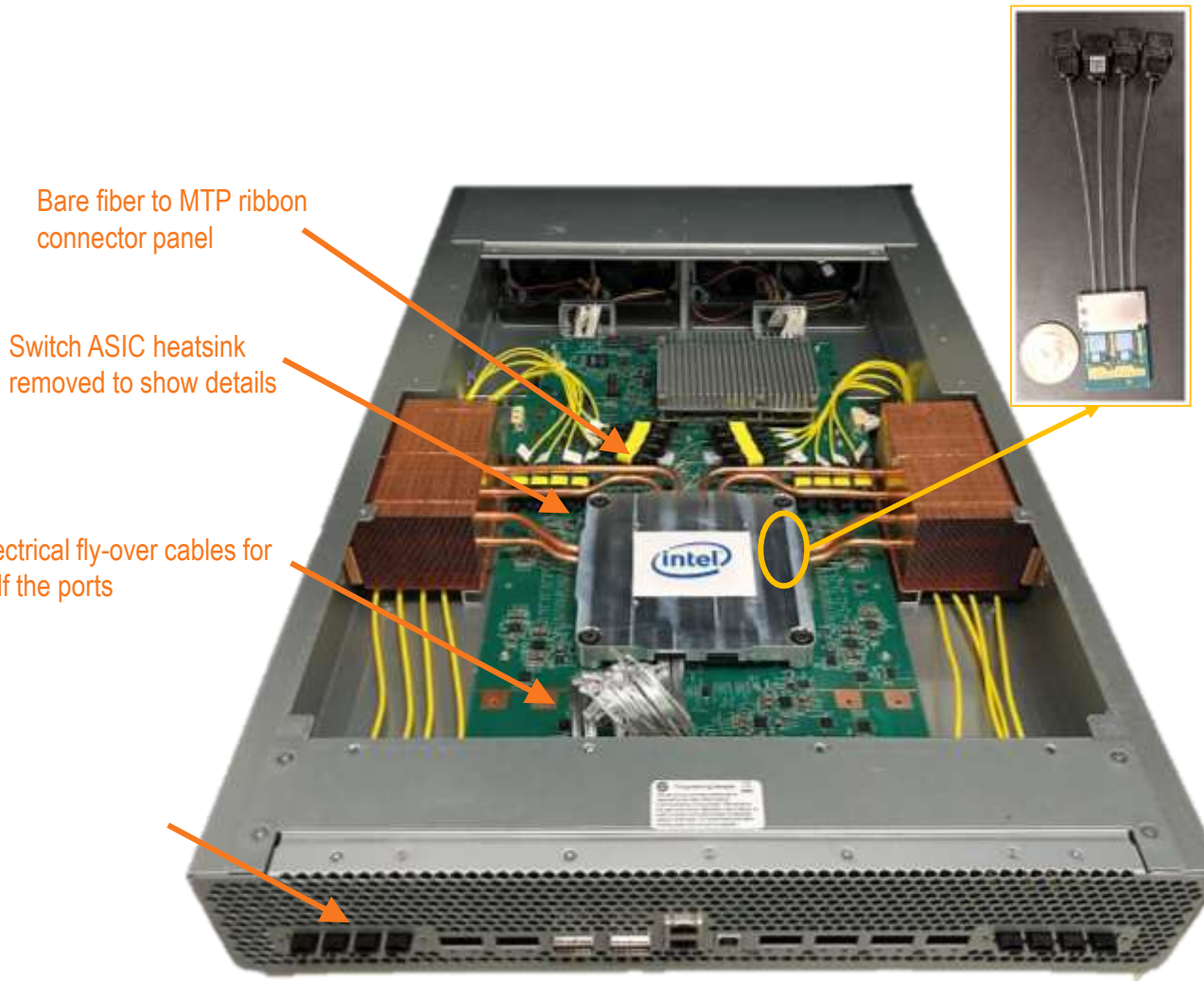




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# Demonstration of Industry-First CPO Ethernet Switch for Scale Out



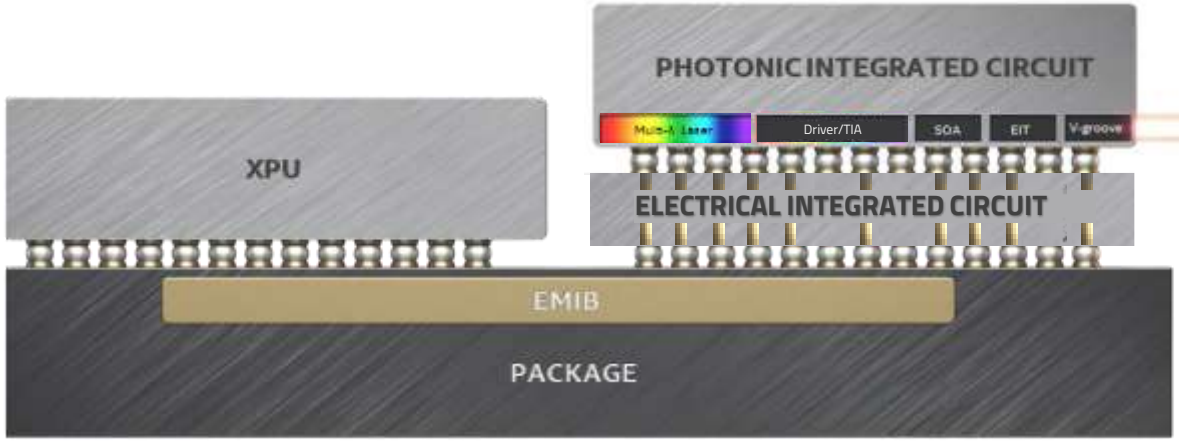



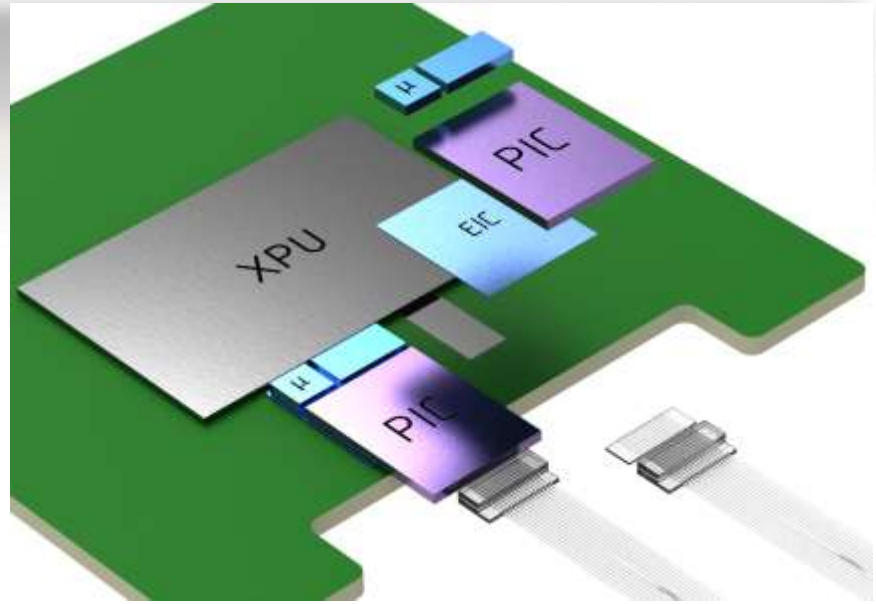

Source: Intel, 2020



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# CPO with DWDM OCI Lasers for Scale up




**Ultra-high bandwidth**
~1Tbps per fiber

## Reach
>100m, orders of magnitude better than electrical I/O

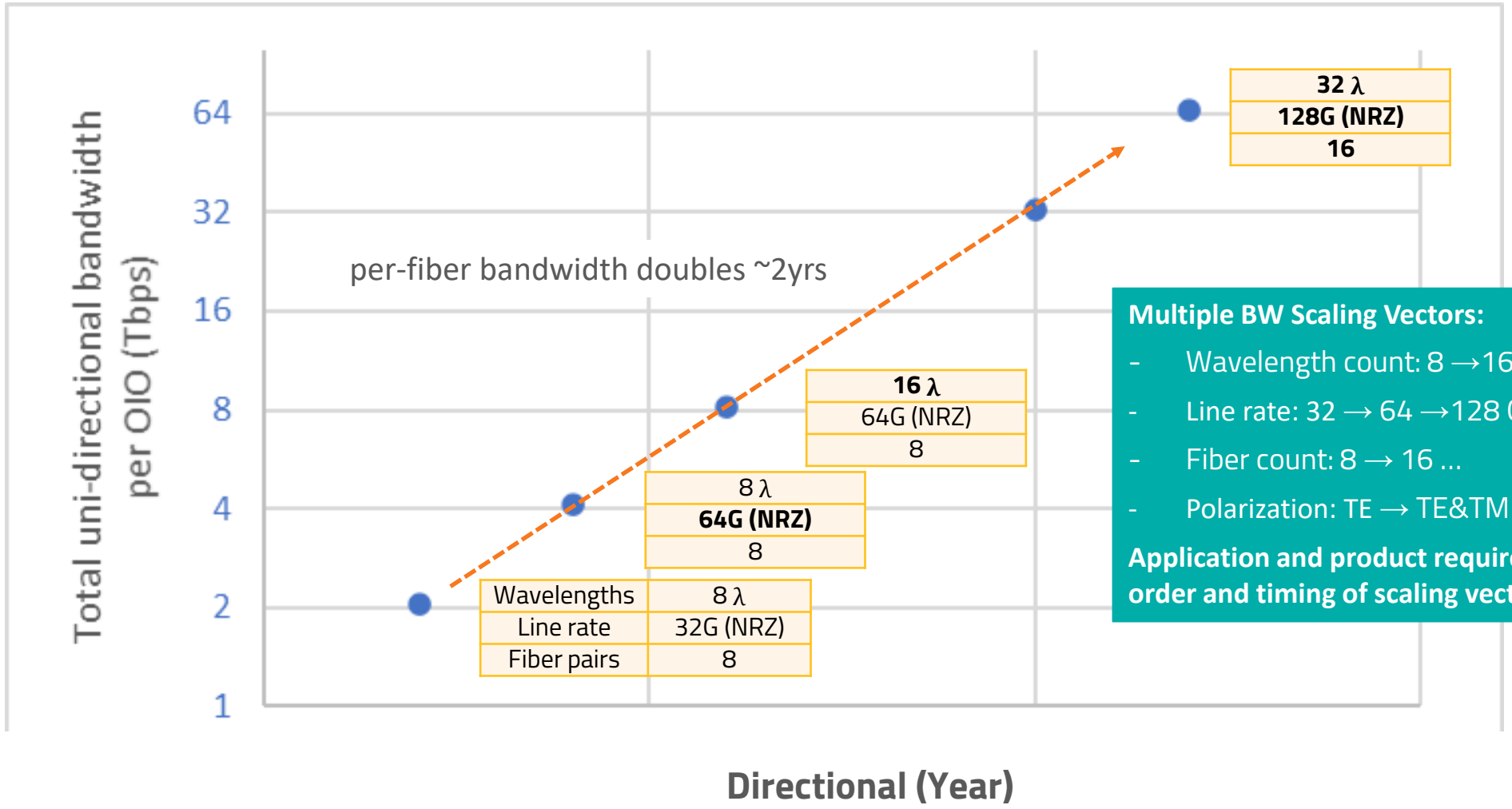
**Shoreline Density**
>4x improvement over PCIe6

**Energy Efficiency**
Trending to 3pJ/b (65% of PCIe6)

**Latency**
<10ns + TOF, comparable to electrical I/O

Source: Intel, 2020

# CPO Bandwidth Scaling Trajectory




**Multiple BW Scaling Vectors:**

- Wavelength count: 8 →16 →32 …
- Line rate: 32 → 64 →128 Gbps …
- Fiber count: 8 → 16 …
- Polarization: TE → TE&TM

**Application and product requirements will drive order and timing of scaling vectors**

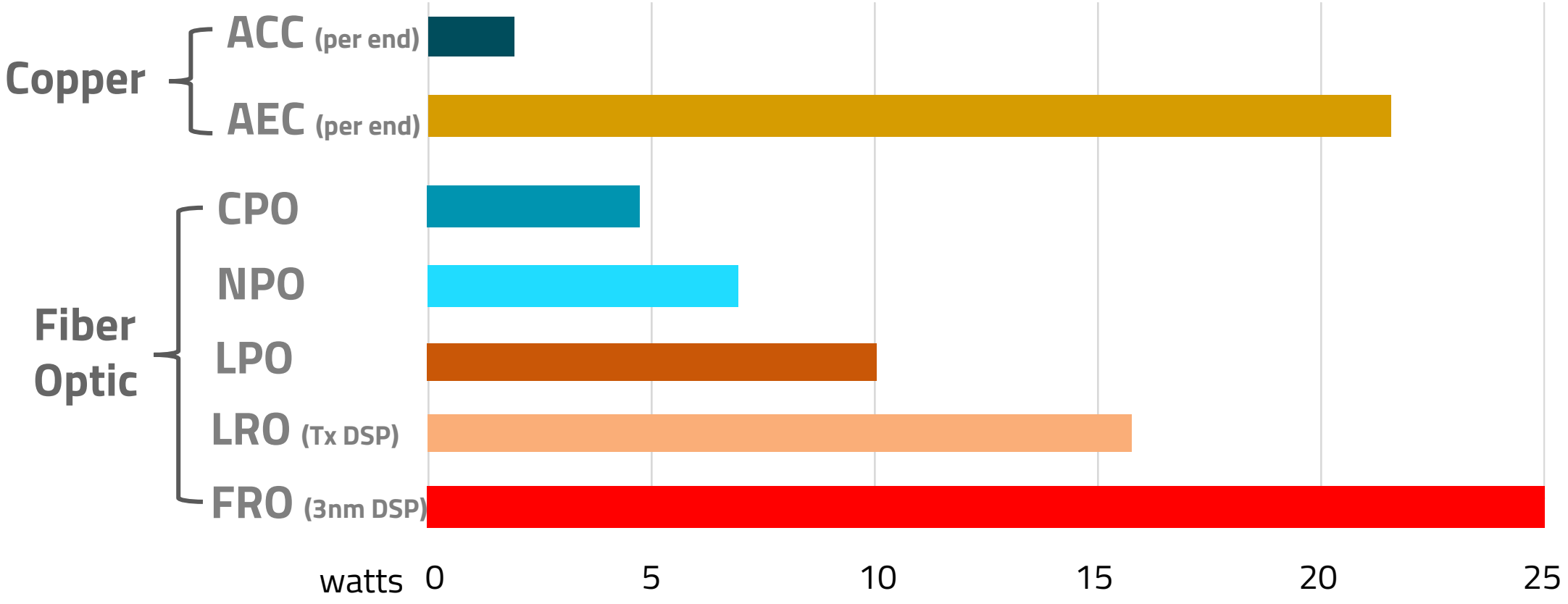
Source: Intel, 2020



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# Comparison of Interconnect Solutions

## Approximate Power Consumption at 1.6T (estimates based on various sources)

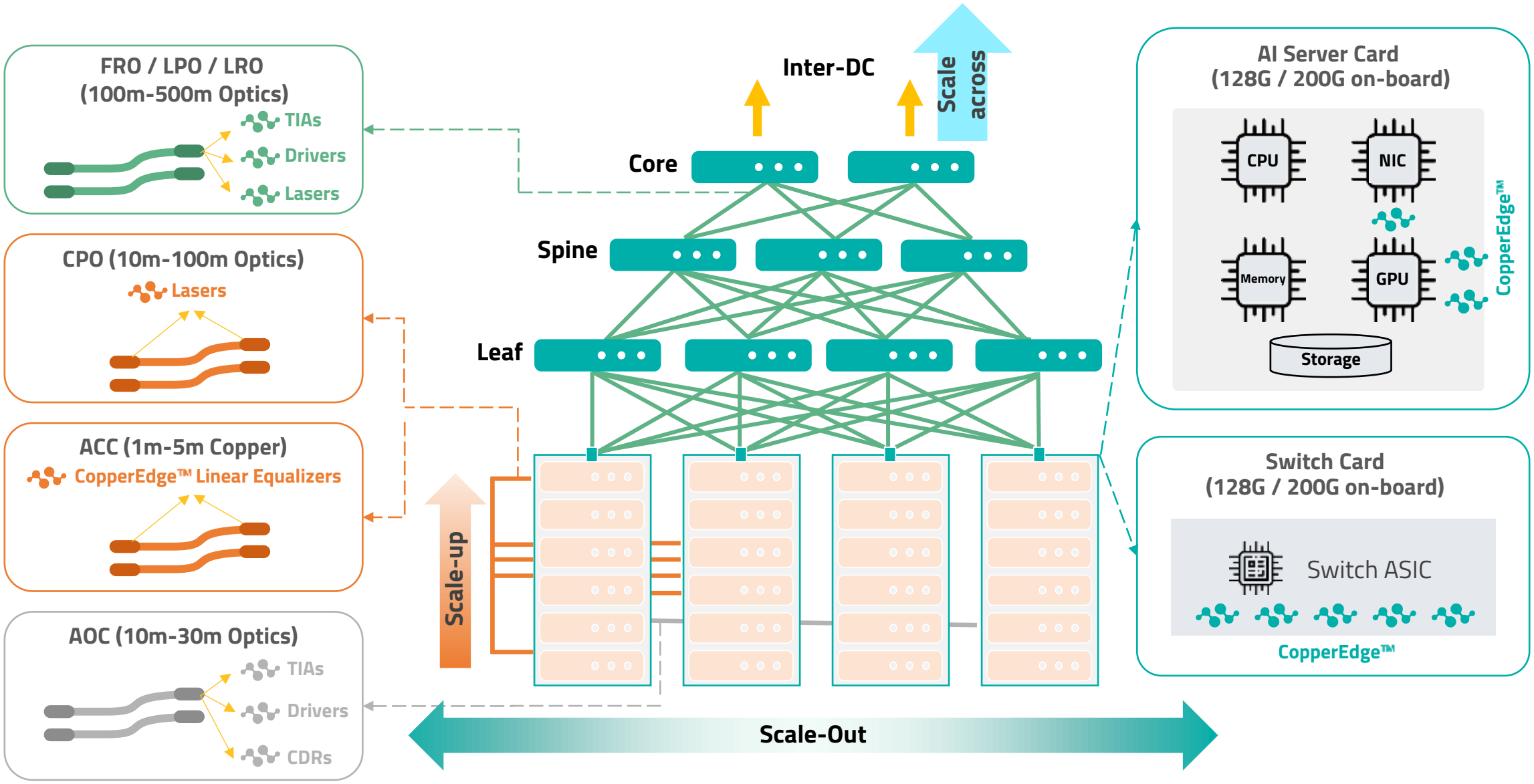



**Analog Interconnects Save 60-90% Power vs DSP Retimed**



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# Semtech's Products Have Broad Presence in AI Data Centers






Indicates Semtech content

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# Key Takeaways

Massive opportunities for AI data center network connectivity

Linearized analog design provides high bandwidth, low power, and low latency connectivity solutions

Innovative solutions help break the power and connectivity walls

For high-performance connectivity:
"Use copper when you can, use optics when you must" AND
"Use analog when you can, and use DSP when you must"