Optical Interconnect – Pathways to an Open Infrastructure for AI
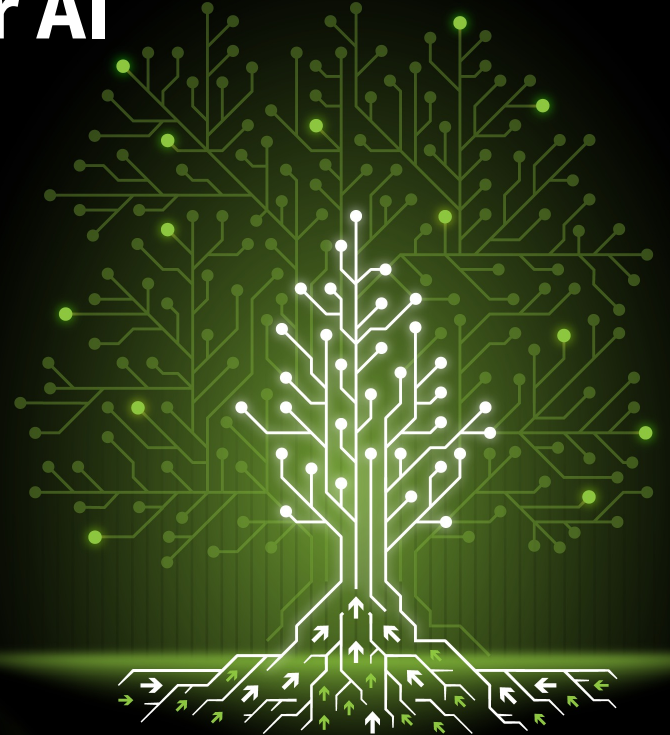
Presented by Matthew Williams, CTO, Cerio

Scaling Innovation Through Collaboration
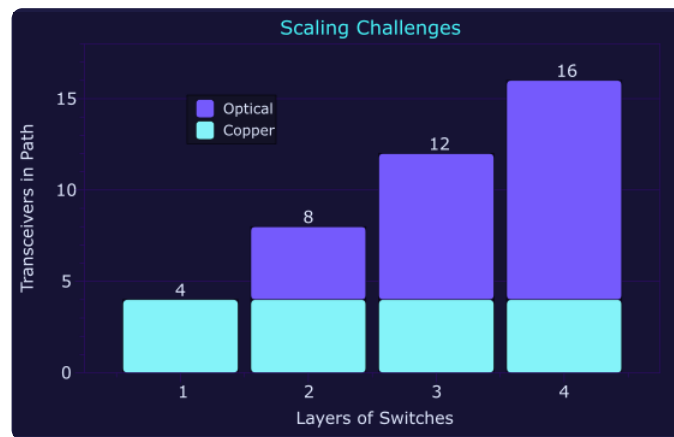
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Centralized Switching Challenges

Price/Performance Challenges

Price / Performance vs Speed:
- 100 Gbps: 1x
- 200 Gbps: 1.07x
- 400 Gbps: 1.26x
- 800 Gbps: 2.78x

Scaling Challenges

Transceivers in Path vs Layers of Switches (Optical / Copper):
- 1 layer: 4
- 2 layers: 8
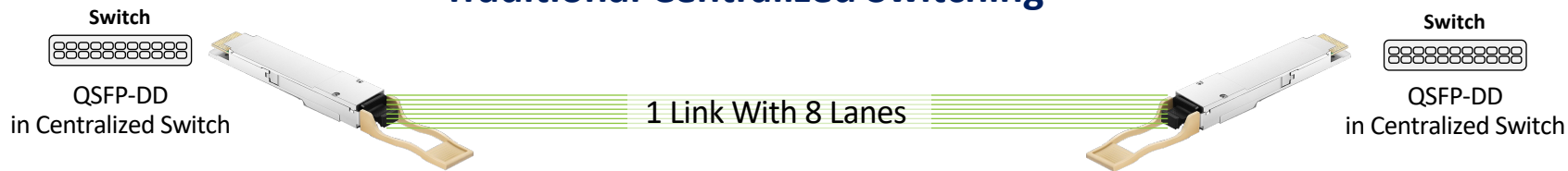- 3 layers: 12
- 4 layers: 16

- Increasing price/performance as speed grows
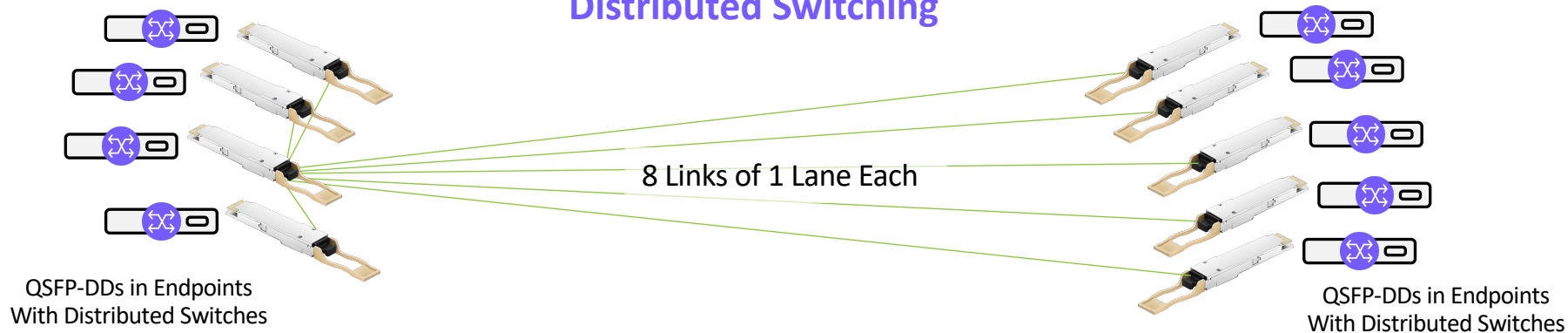- Cost of optics growing as a percentage of total system

- Large number of transceivers in each path
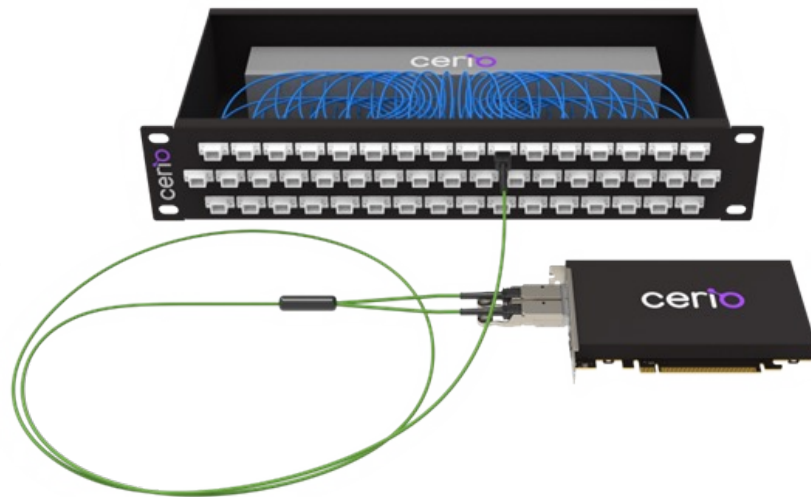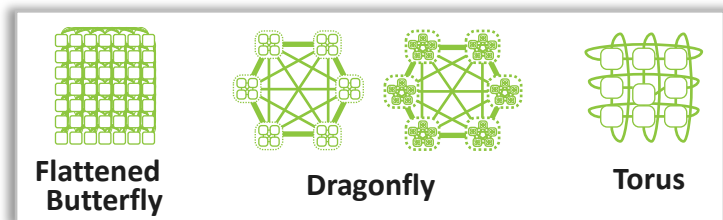- Non-linear transceiver cost and power at scale

Commodity MSA Optical Module Deployment
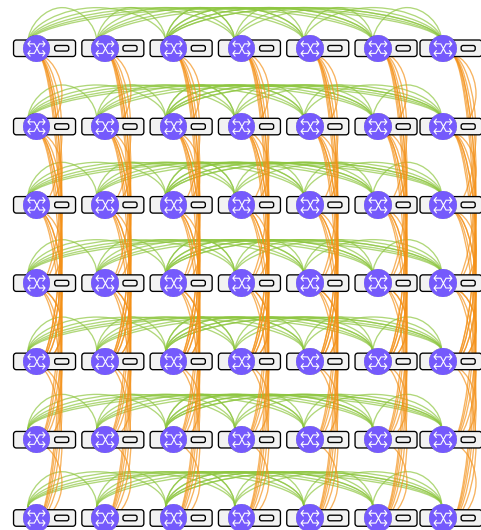
SHFL - Passive Optical Interconnect

- Direct interconnectivity between endpoints
  12, 16, 24, 32 links per node

- Zero power, pre-wired patch panel

- Eliminates complexity from typical cabling

- Uses commodity MPO passive optical cables

- Tremendous flexibility and scalability

Example Topologies

Flattened Butterfly   **Dragonfly**   **Torus**
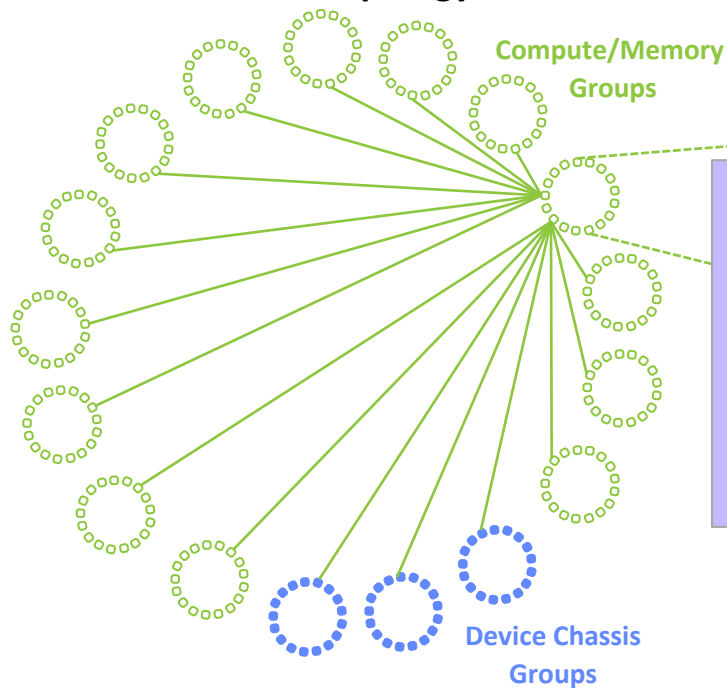
2D Flattened Butterfly

- Low-latency diameter 2 network

- Full-mesh of nodes in each dimension
  - Full mesh in each row
  - Full mesh in each column
  - Optical pass-throughs for sparse topologies

2D Flattened Butterfly SHFL

Composability and CXL Memory Pool Example

Global Topology

Compute/Memory Groups

Device Chassis Groups

Local Group (17 nodes)

Compute Nodes (13 per group)

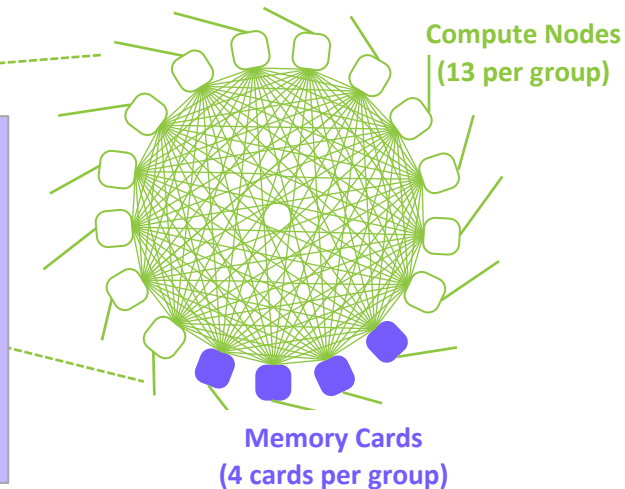Memory Cards (4 cards per group)

Dragonfly Topology

Type 3 Memory Cards strategically distributed to ensure direct connections

PCIe device chassis placed in other groups for broad sharing

Example Use Cases and Topologies

Use Case	Topologies	Max Scale Ranges	Diameter	
Combined Composable Infrastructure and CXL Memory Pools	Dragonflies	104 to 205 nodes	Memory Pools	1
			PCIe	3
Composable Infrastructure	Flattened Butterflies and Dragonflies	49 to 8600 nodes	Flattened Butterfly	2
			Dragonfly	3
High Performance Ethernet	Dragonflies	333 to 60,100 nodes	Dragonfly A	3
			Dragonfly B	5

Learn more about the
Cerio open systems platform

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