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400G is here, is your DC ready?

Priyesh Sankaran

Field Application Engineering – DC & AIM

Data Center Market Segments & Trends

Hyperscale continued expansion

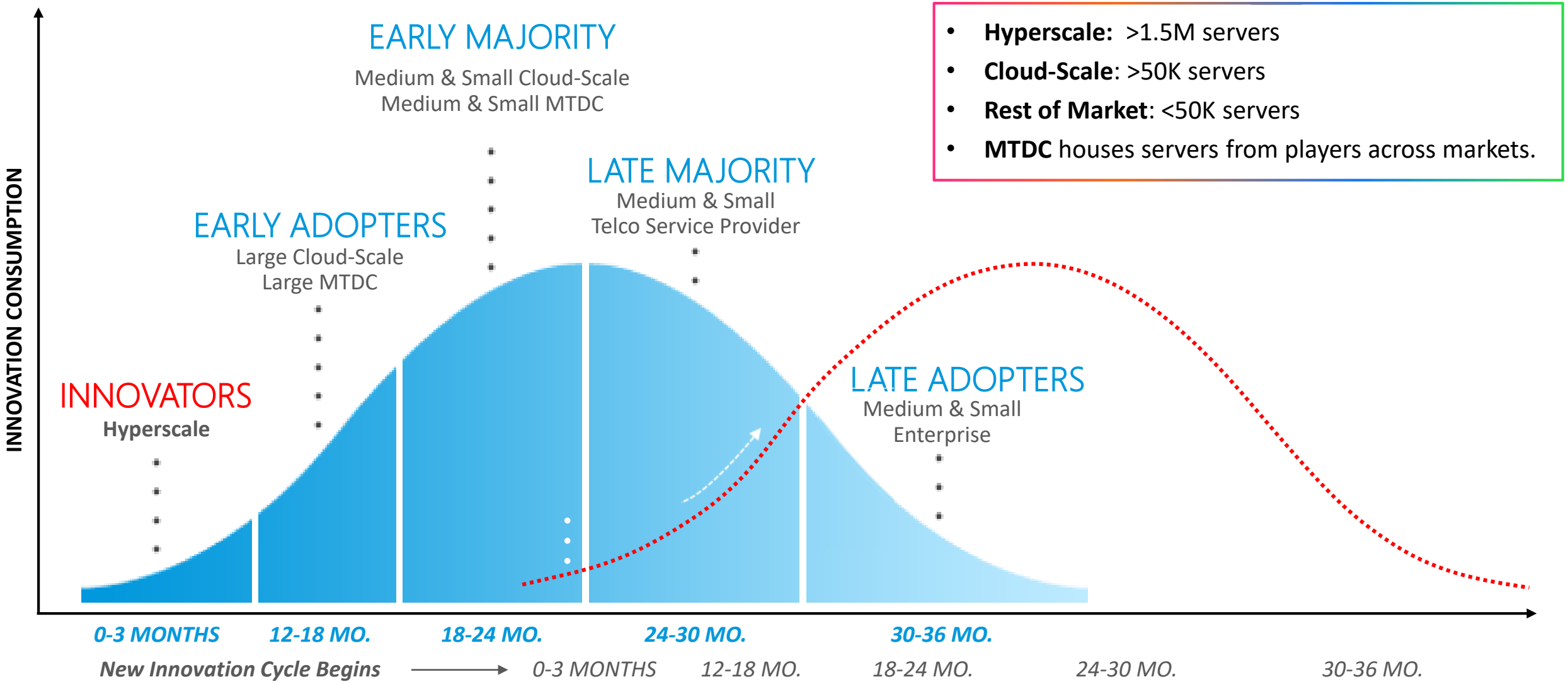
Proliferation of **Cloud-Scale**

MTDC Retail/Wholesale

Impact			
	Hyperscale sets the pace and direction of DC Optic systems development	Across Large Enterprises and Service Providers	MTDCs serve all DC segments Multi Tenant Data Center

Data Center Technology Adoption Cycle

The Hyperscale segment leads the way for technology adoption across the market.



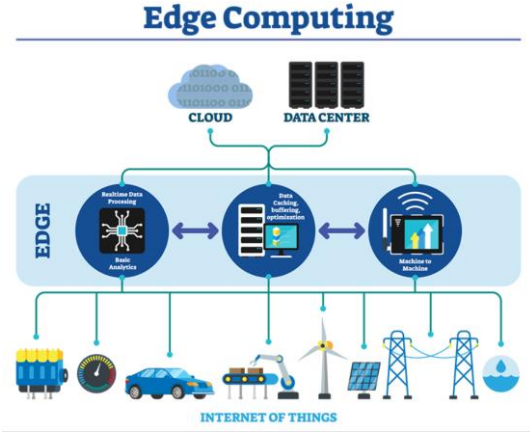
- **Hyperscale:** >1.5M servers
- **Cloud-Scale**: >50K servers
- **Rest of Market**: <50K servers
- **MTDC** houses servers from players across markets.

What Happens Inside a Data Center?

Human to Machine Applications

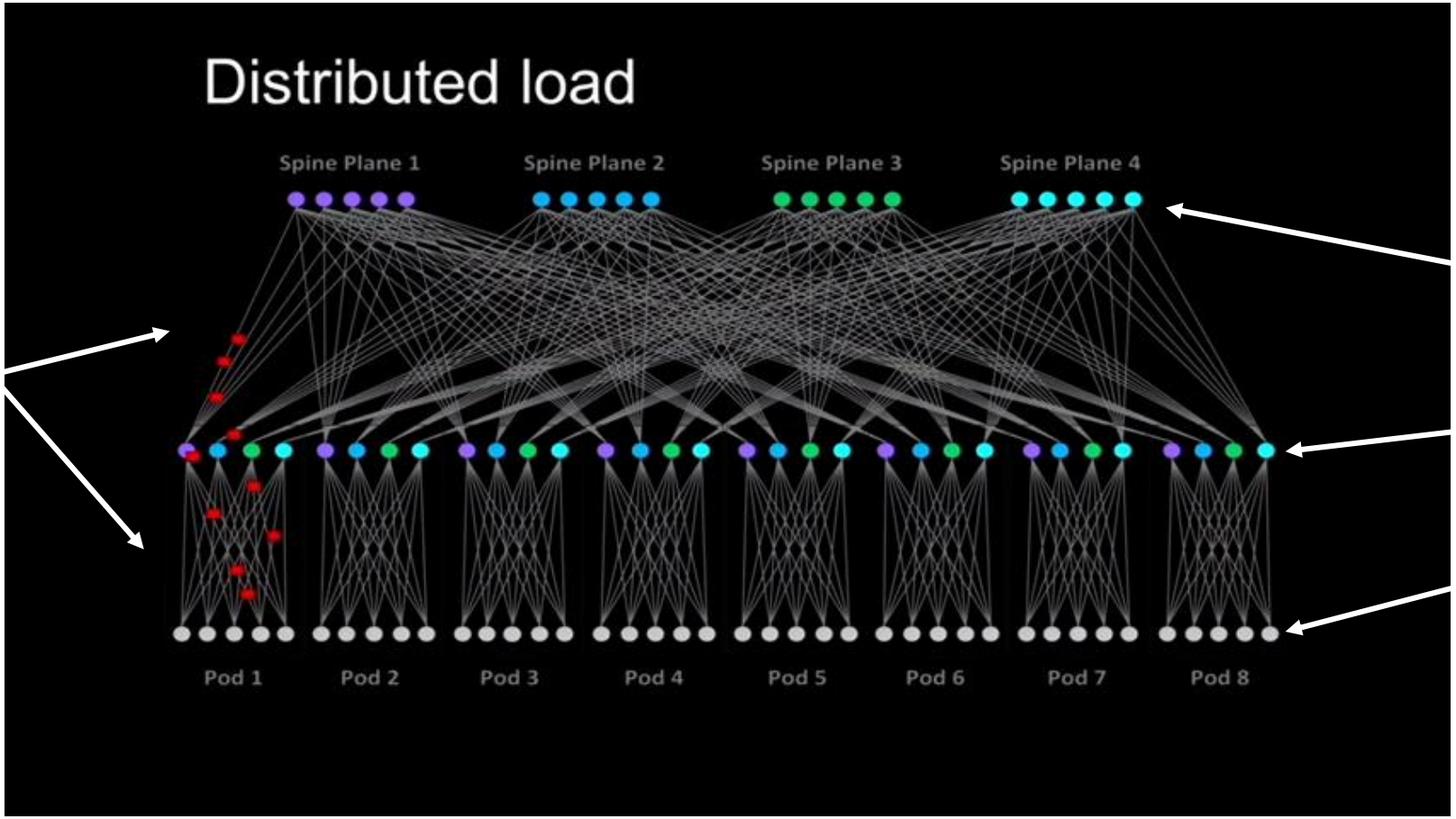
5%

95%



Machine to Machine Applications

Example Spine and Leaf in Action



Fabric of cables to be managed

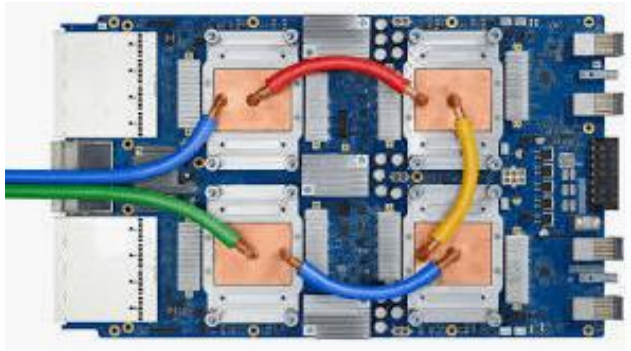
Super Spine Switches

Spine Switches

Leaf Switches

- The fabrics have equal performance.
- Redundancy – A single component failure doesn't matter, alternative/equal performance paths are always available

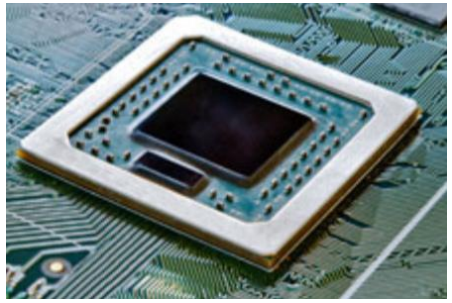
Google TPU

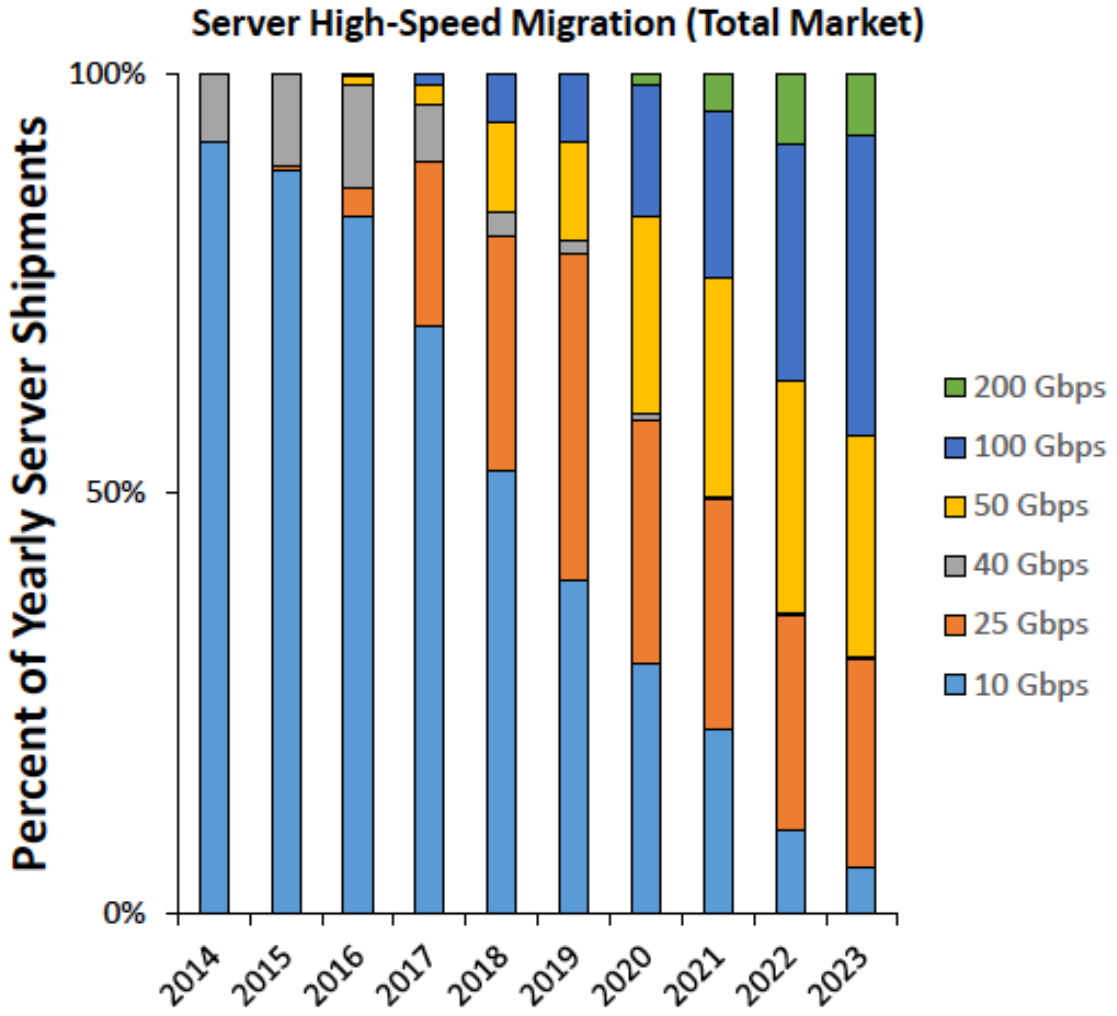


FPGA

CPU

GPU





Servers With AI Accelerators Deliver Deep Learning

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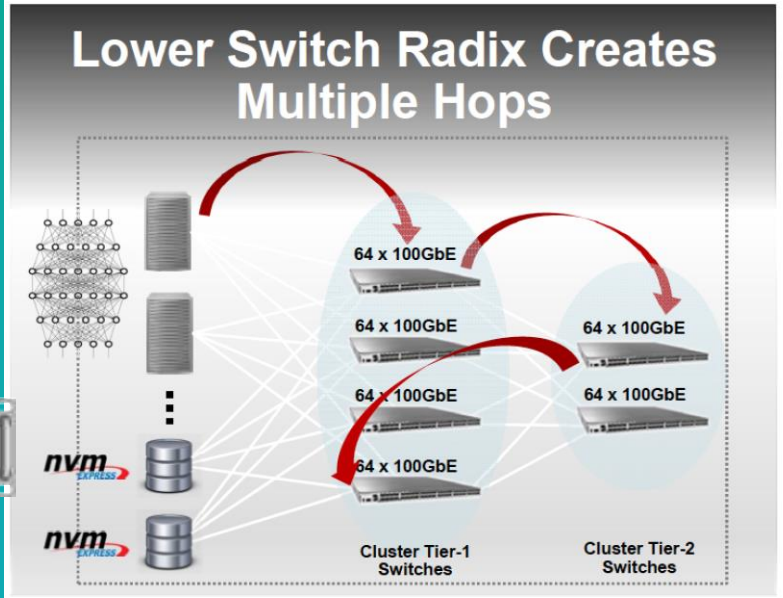
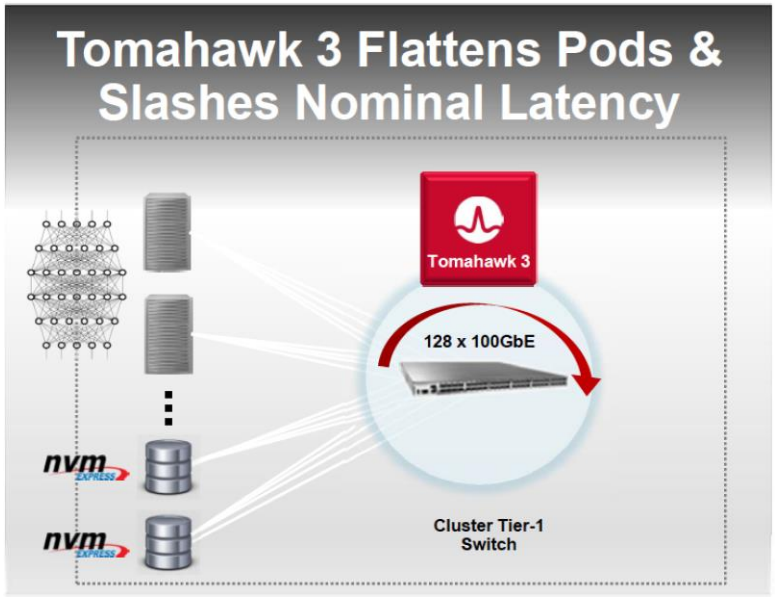
Single Chip switches

- 2020 -> 12.8 Terabits/Sec Implemented On A Single Chip.
- Reducing Cost-per-port By **75** Percent And Power-per-port By **40** Percent Compared To Existing Solutions.
- 2021 -> 25.6 Tb
- 2024 -> 51.2 Tb
- More to come….

Transceiver modules
32 QSFP–DD or OSFP per 1U switch

Increasing Radix decreases $$ and lowers latency





3 switch hops (>1 µs) vs single hop @ 400 ns – approximately 67% decrease

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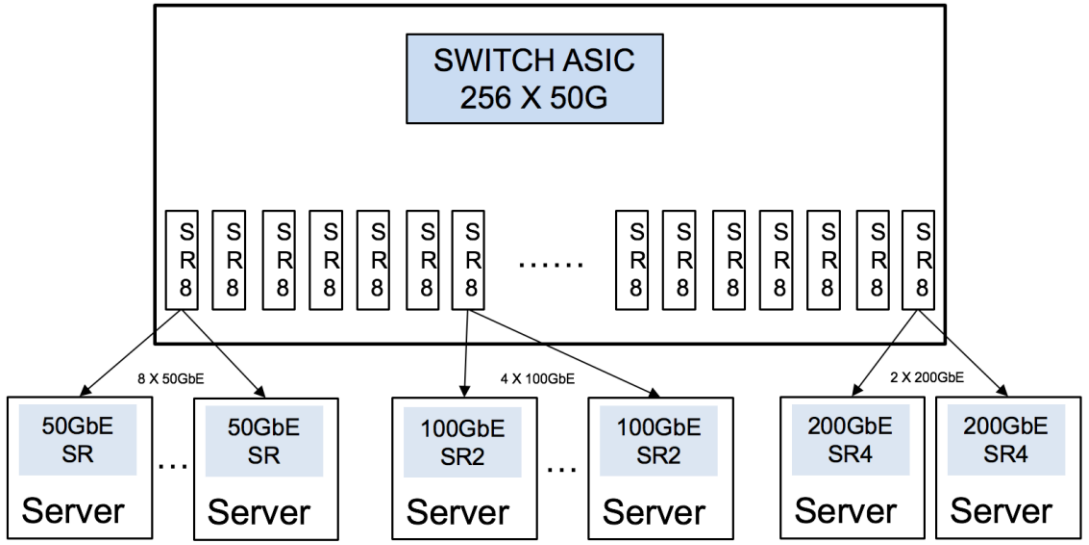
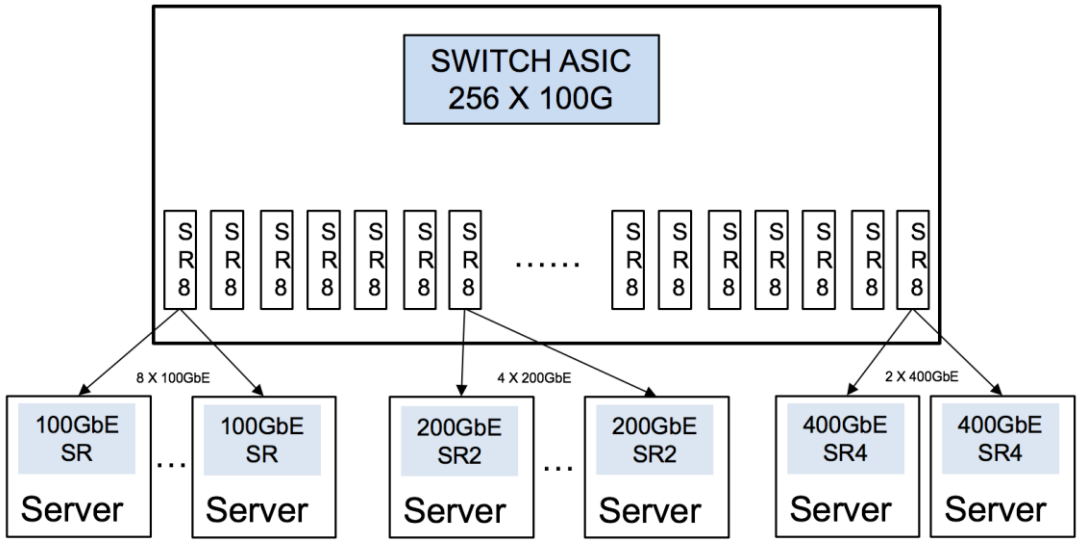
Optimize Servers for AI and ML

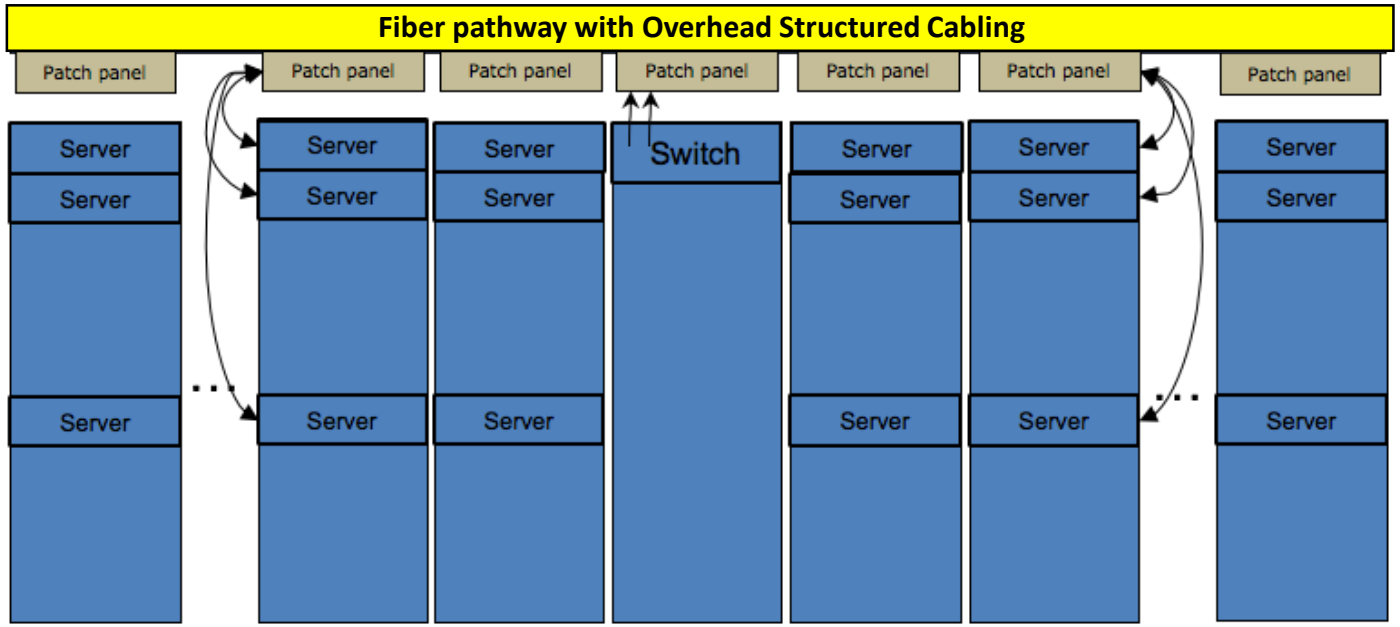
- Server attachment rates can be selected by grouping a number of SR8 ports together as required with structured cabling
- Reusable as lane rates increase

Transceiver modules
32 QSFP–DD or OSFP per 1U switch





http://grouper.ieee.org/groups/802/3/NGMMF/public/Jan18/shen_NGMMF_01_jan18.pdf



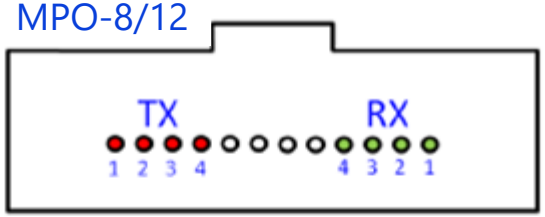
- Typical server row 8-10 cabinets
- Cabinets arrive on site with servers installed
- Overhead cable is pre-installed with pathway
- Simple patching from server to overhead patch panel

Supports server-row cabling objectives

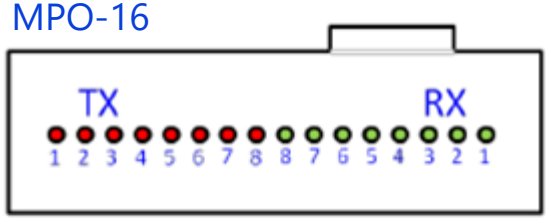
- Switches in the mid or end of row – they have 192 potential server connections
- Pre-cabled overhead supporting multiple generations (50G -> 100G and beyond)
  - Structured preterm fiber cabling systems
  - Installation time is decreased (pre-staged Racks)
- Breakouts in structured cabling support customized server connection speeds

Making the most of Server Networks

MPO-8/12

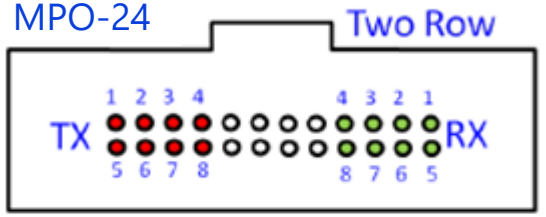


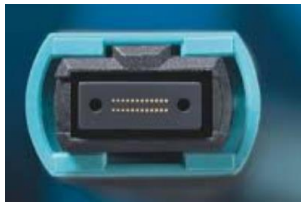
MPO-16



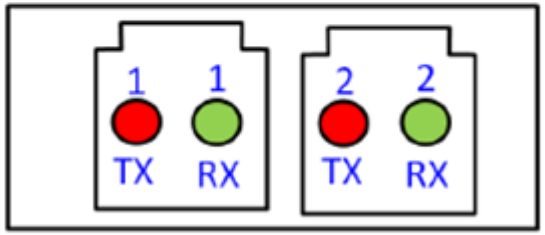
Multi-Fiber Connectors
MPO-8, MPO-12, MPO-16 & MPO-24

MPO-24 Two Row

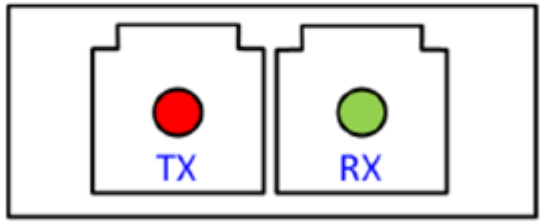




CS

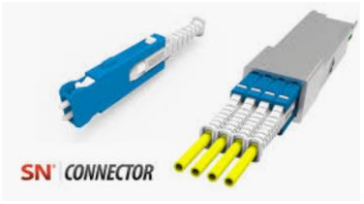


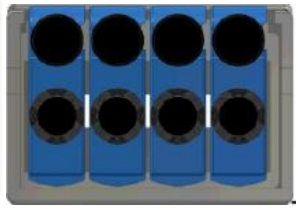
Dual LC



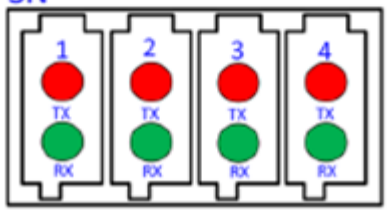
Single -Fiber Connectors

#1 connector in the DC today



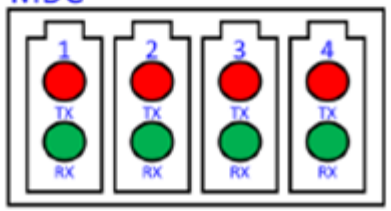


SN



SN, MDC in QSFP-DD, OSFP

MDC



VSFF - Very SMALL form factor

Data Center Fiber Connectors

Multi and Single Fiber

Data Center Technology Focus

Demand for increased capacity and density is fuelling innovation in the DC.

VSFF: Very Small Form Factor Connectors

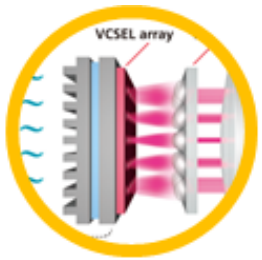
VSSF products provide an effective way to customize switch networks using structured cabling

Smaller diameter cables

Thinner cables to allow for increased density, reduced installation costs, and lower TCO.

Network Radix drives 16 Fiber Connectivity

Structured cabling (MPO) to efficiently connect servers



Higher Speed Multimode Optics

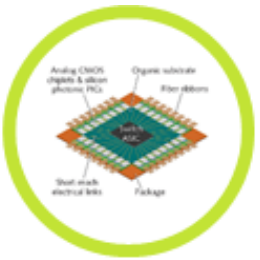
Increasing Line Rates from 50 to 100G can effectively increase the longevity of low cost multimode optics.

Improve Connectivity TCO

Lower cost DC connectivity with improved performance.

Rapid high fiber count cabling termination

Desire to reduce terminations time on high fiber count trunk cables



High Capacity Fiber Switching

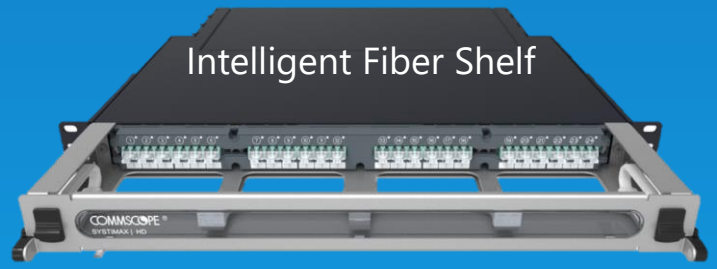
Higher speed networks call for optics on PCB Boards. Microsoft and Facebook are leading an effort on co-packaged optics (eg.)

2019 | **2020(E)** | **2021(E)**

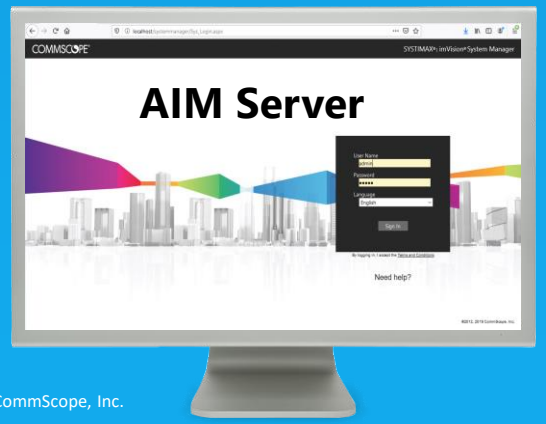
Automated Infrastructure Management (AIM)

ISO IEC TIA CENELEC Bicsi

Intelligent Fiber Shelf

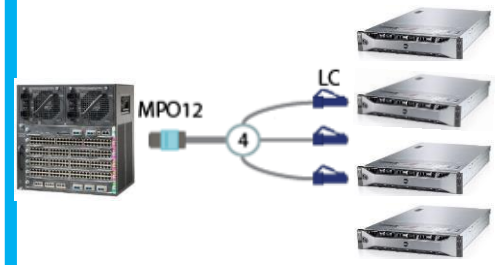


AIM Rack Controller



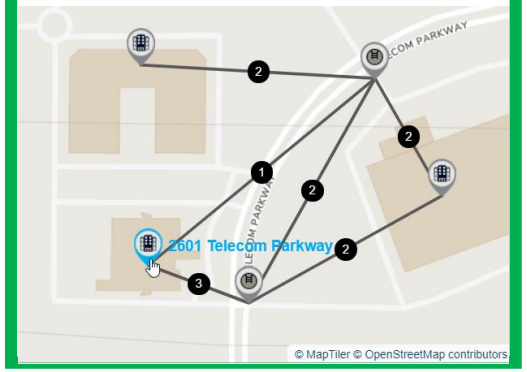
Managing/Documenting Fiber Array Connectivity with Intelligence

Fiber Array Connectivity: One-to-Many



Seamless Upgrade

Geo-maps/Campus



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Thank you!