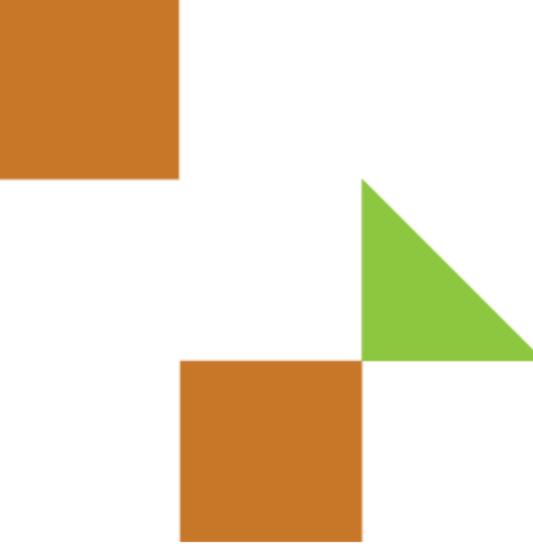




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# Unified Network Fabric

for Open Rack Vertical Expansion

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# Unified Network Fabric

## for Open Rack Vertical Expansion

### Abstract

The Unified Network Fabric addresses many challenge facing data centers on how to support the modularity and flexibility needed to promote business agility and maintain a company's competitive edge. Zollner Group supports the development for the concept of Unified Network Fabric architecture that allows the intermixing of different rack types and I/O requirements must also support a varied set of connectivity options including Gigabit Ethernet and 10 to 100 Gigabit Ethernet and Fibernet high speed data lines.

- Support for storage devices (Fiber Channel, Small Computer System Interface [SCSI] or NAS, FCoE, etc.)
- Support for convergence and unified fabric with growth factors incorporated
- Reliability, scalability, and redundancy
- High-capacity and high-density server access requirements
- Flexibility and expandability with easy access for moves, additions, and changes
- Migration from Gigabit Ethernet to 10 Gigabit Ethernet server connectivity with future support for 40 and 100 Gigabit Ethernet
- Cabling architecture balance with power, cooling, structural loading, management, and operations needs

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# Unified Network Fabric

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## Vertical System Integration Partner

- Established in 1965
- Incorporated company – 100% family-owned
- **Market Position** – among of the top 15 Electronic Manufacturing Service (EMS) providers worldwide
- **Corporate Strategy** – individual system solutions along the entire value-added chain and through all phases of delivery – no own-brand products
- **Continuous Organic Growth** – sustainable corporate development
- **Customer focus** – long-term partnerships as the key strategy
- **Locations** – altogether 18 locations in Germany, Hungary, Romania, China, Tunisia, the USA, Switzerland, Costa Rica and Hong Kong
- **Personnel** – more than 10,500 employees worldwide



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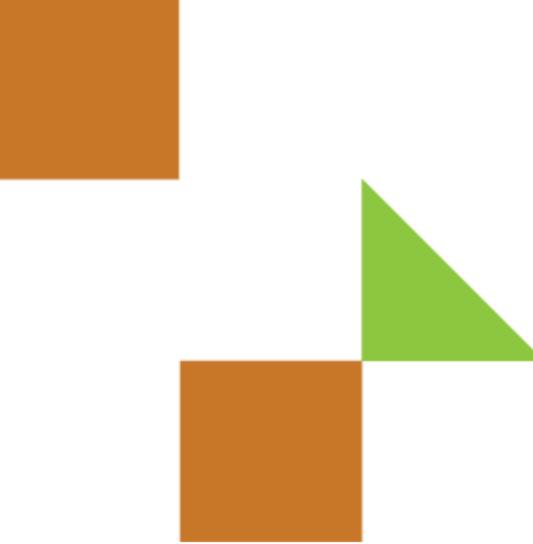
## Customer Reference Lists



Partial list of + 500 active customers

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# Zollner Value Propositions on Rack Fabric Innovation

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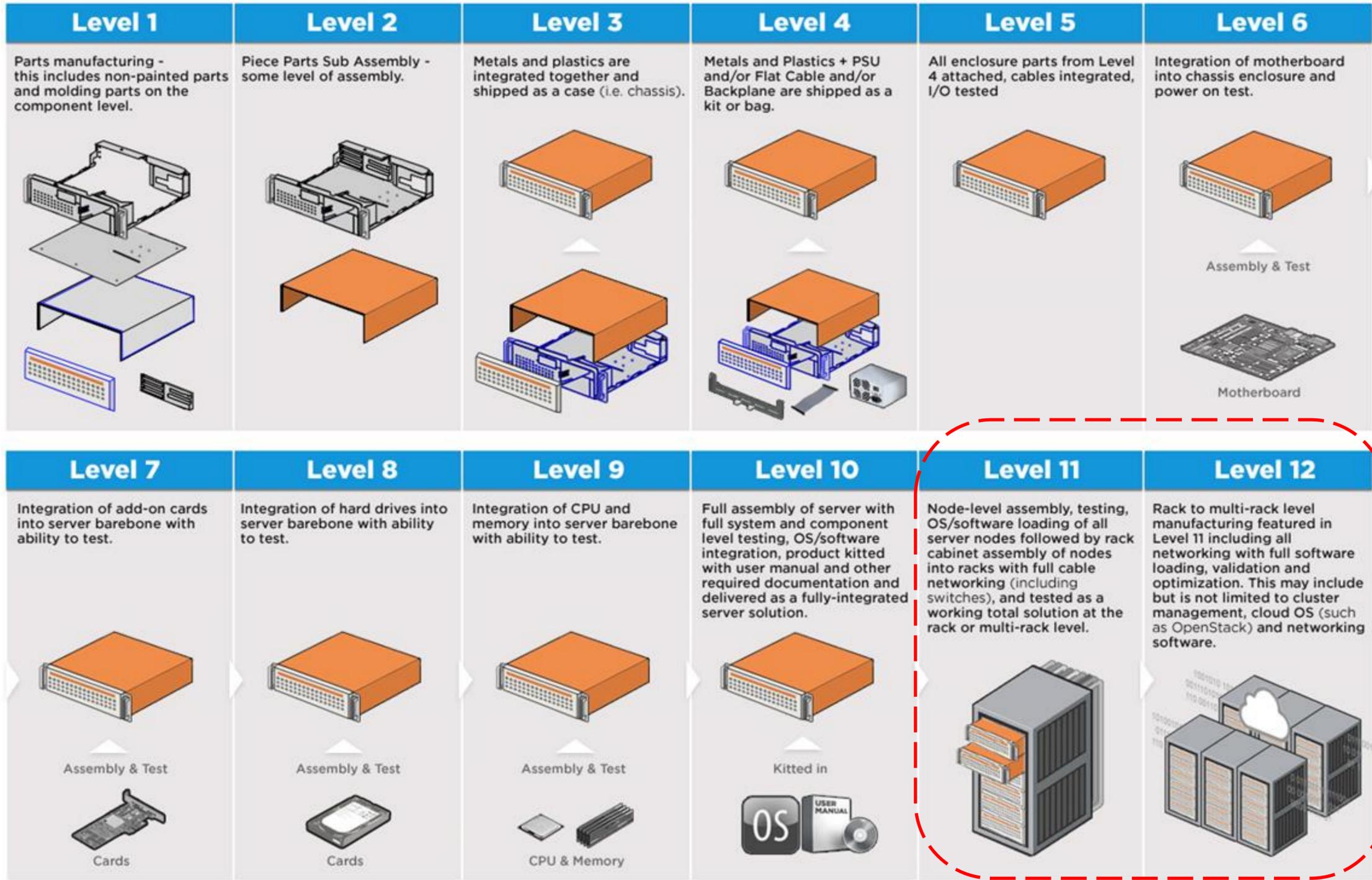
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# Zollner Value Proposition

## Unified Network Fabric for Open Rack Vertical Expansion

### Unified Network Fabric for Open Rack Vertical Expansion

- Support upgrade - to an “existing” legacy systems in the Data Center floors.
- Modular Refresh– Rapid deployment of 10 GbE and +40 GbE interconnect network fabric using minimal copper and optical fiber cabling.
- Minimize Cabling complexity minimized as all the servers are connected to the switch in the same rack and only a few cables go outside the rack

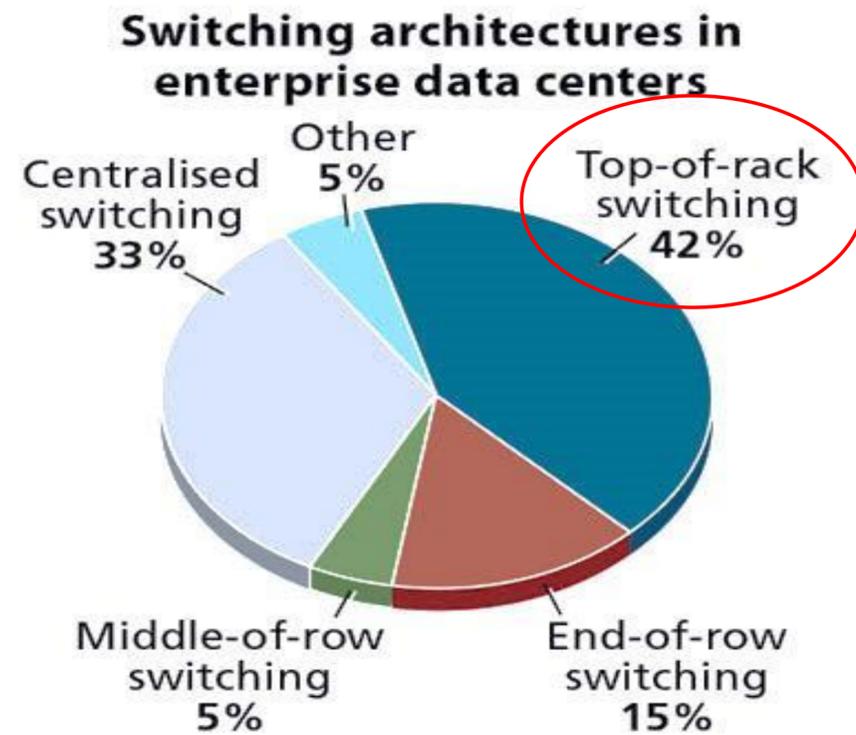


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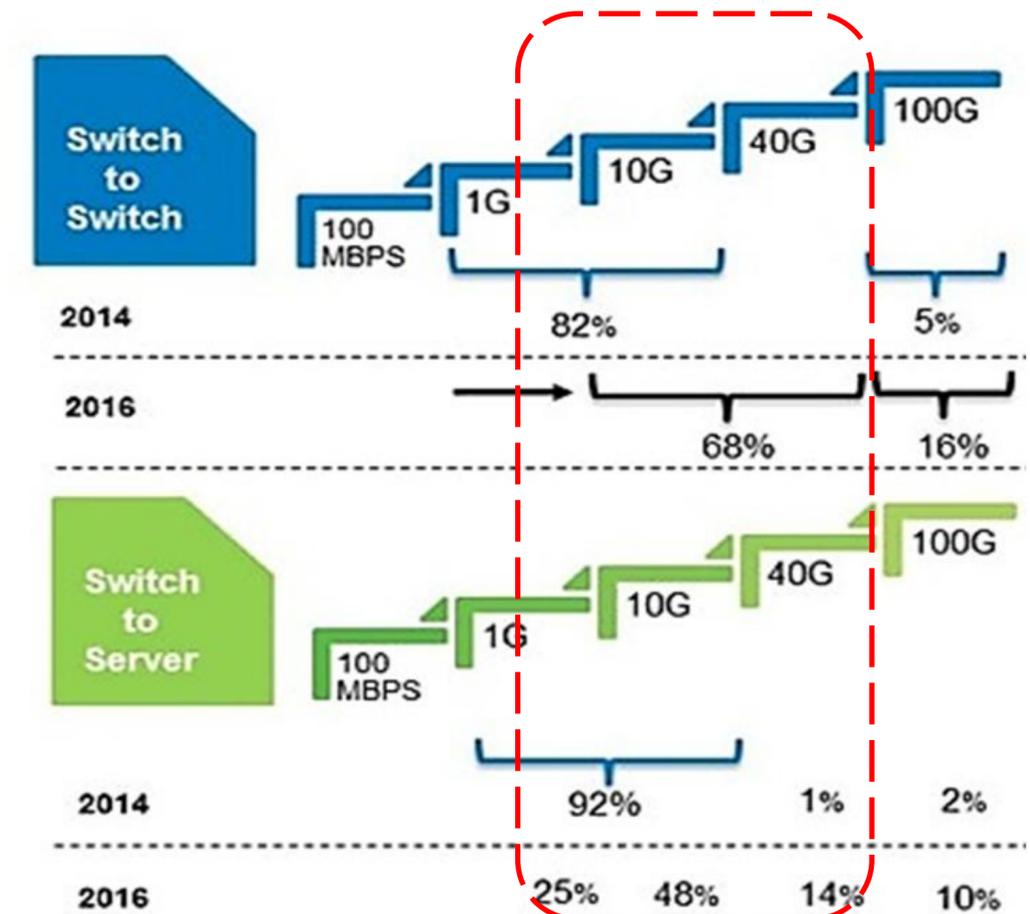
## The ToR relevance in the data centers



ToR switching is in place for 42 percent of enterprise data center connections, and point-to-point cabling is in use for 46 percent. This survey examine the point-to-point versus structured cabling specifically pertained to 10G links.

Source : BSRIA survey for enterprise data center operators

## Rack Scale Modular Refresh



In switch-to-server links, speeds up to 10G combined to account for 92 percent of connections within existing data centers and progression to 40G and 100G are in rapid adoption.

Source : BSRIA Data infrastructure Speeds switch to server

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## Zollner Unified Network Fabric Upgrade

- Laser-optimized multimode fiber (MMF) has become the dominant fiber choice. These 50-micron fibers are optimized for the 850-nanometer (nm) transmission of vertical-cavity surface-emitting laser (VCSEL)-based transceivers. The TIA-492AAAC OM3 and OM4 Standards.
- 10 GbE up to 40+ GbE (100GbE) interconnect with existing copper and Optical fiber infrastructure upgrade
- During Node-level assembly, testing OS/Software loading of all server nodes followed by rack cabinet assembly of nodes into racks with full cable networking (including switches)

Physical Network Topology (Level 11 : Node-Level Assembly, Cabling and Test)

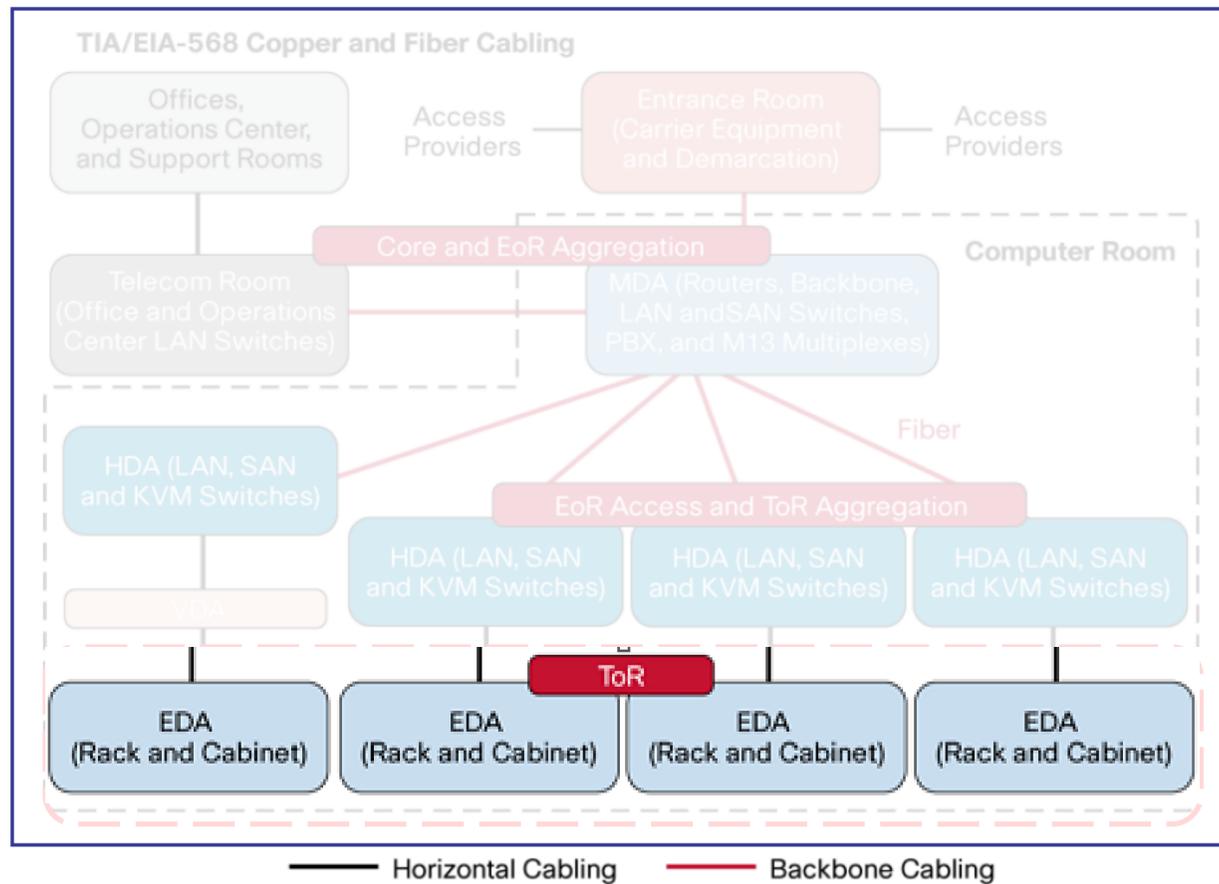


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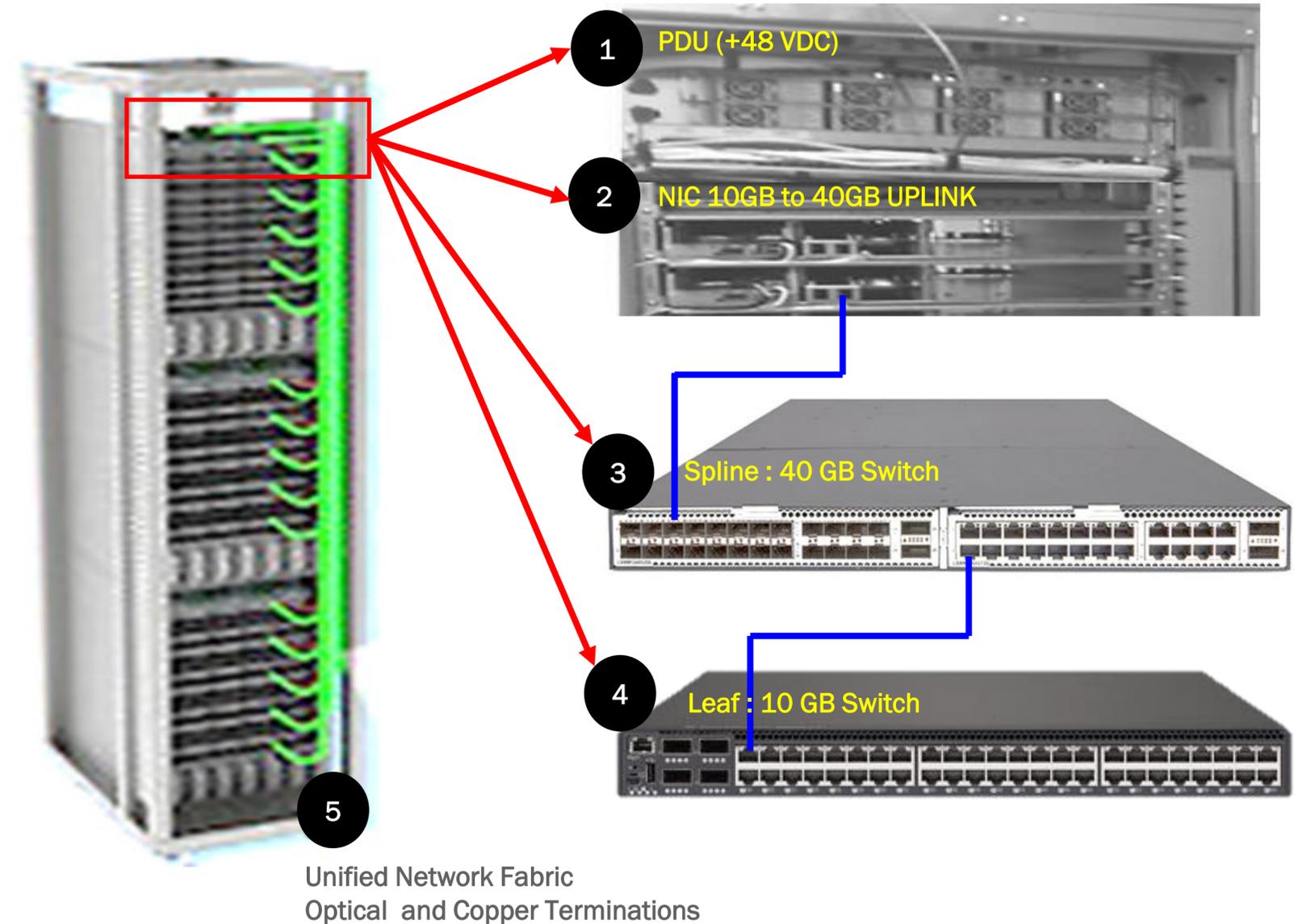


# Unified Network Fabric for Open Rack Vertical Expansion

## Modular Refresh ToR configurations



## PHY Layer of Unified Network Fabric



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## General Guidelines and Consideration

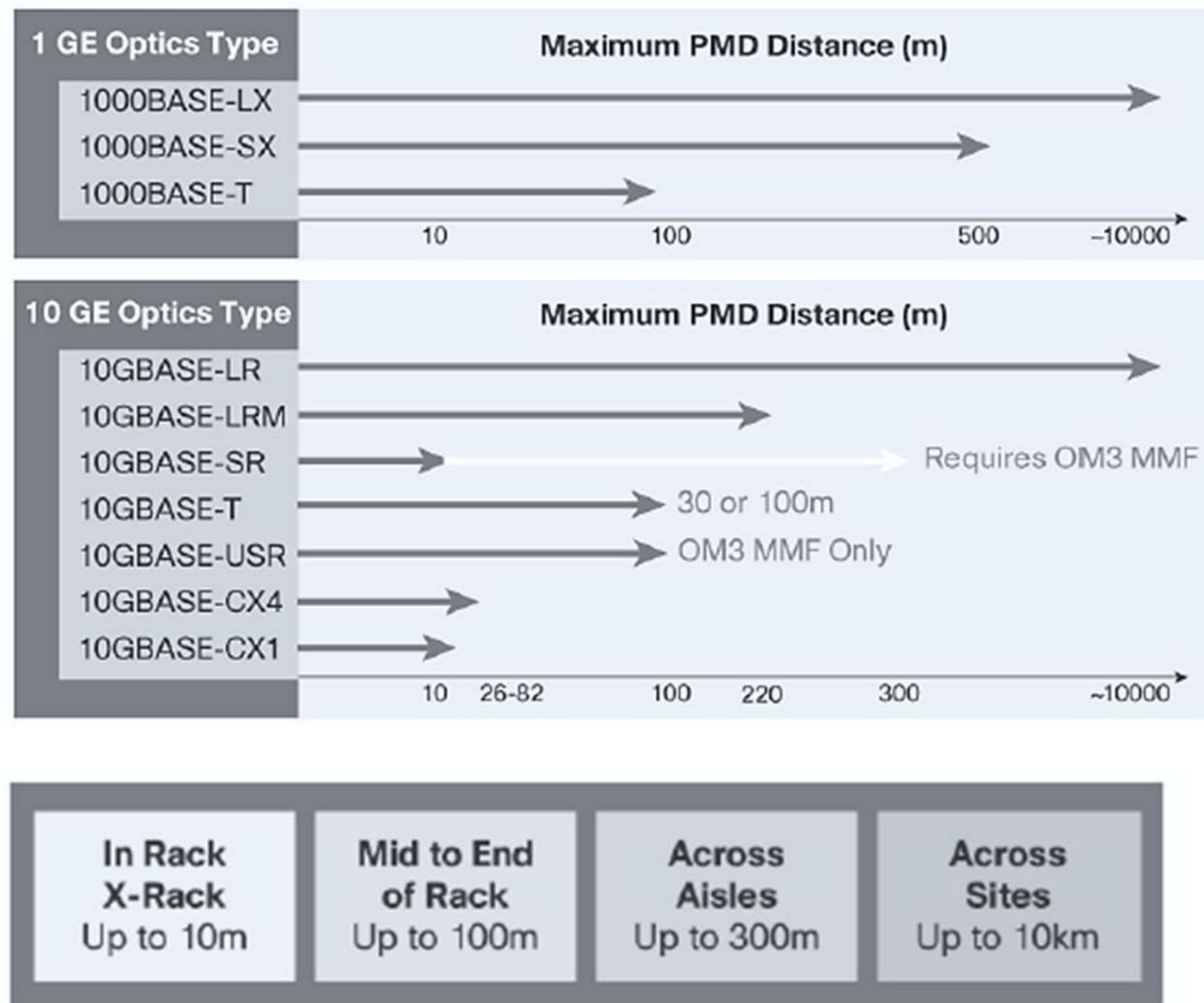
- The TIA/EIA-942 Telecommunications Infrastructure Standard for Data Centers provides guidelines for data center cabling infrastructure that customers can adopt as a guide in the data center cabling and planning process : for cabling specification , need for flexibility, scalability, reliability, and space management.
- Support for storage devices (Fibre Channel, Small Computer System Interface [SCSI] or NAS, FCoE, etc.)
- Support for convergence and unified fabric with growth factors incorporated
- Reliability, scalability, and redundancy
- High-capacity and high-density server access requirements
- Migration from Gigabit Ethernet to 10 Gigabit Ethernet server connectivity with future support for 40 and 100 Gigabit Ethernet

In the context of the TIA/EIA-942 simplified logical data center layout, the ToR architecture maps directly to the EDA and the horizontal distribution area (HDA).

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# Unified Network Fabric for Open Rack Vertical Expansion

## General Guidelines and Consideration



### Fiber and Copper Cabling Characteristics

A number of optics and media options are available for data center designs.

Choices depend on the physical facilities requirements and media characteristics (physical medium dependent [PMD] factors) of the data center.

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## Major Factors and Challenges

- **Modularity and flexibility is of paramount importance:** The need to rapidly deploy new applications and easily scale existing ones has caused server-at-a-time deployment to give way to a rack-at-a-time model. Ordering preconfigured racks of equipment with integrated cabling and switching and as many as +90 servers per rack. The time required to commission new racks and decommission old ones is now a matter of hours rather than days or weeks. Different racks have different I/O requirements, cabling strategies must support connectivity requirements at any rack position.
- **Bandwidth requirements are increasing:** Today's powerful multsocket, multicore servers, blade systems, and integrated server and rack systems, often running virtualization software, are running at higher utilization levels and impose higher bandwidth demands.
- **I/O connectivity options are evolving:** I/O connectivity options are evolving to accommodate the need for increasing bandwidth, and good data center switching and cabling strategies need to accommodate all connectivity requirements at any rack position with 10 Gigabit and +40 Gigabit Ethernet channels via unified network fabric with Fiber Channel over Ethernet (FCoE).

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## Key Takeaways

- Data centers architectures are changing for *maximized network efficiency* , *speed* and *flexibility* utilizing modular network pre-cabled to a ToR switch and then connected to aggregation-layer switches using fiber-optic cables.
- The transition from **10 GbE** to **+ 40GbE** network architecture will require the adoption of a unified fabric using **FCoE Fiber Channel over Ethernet (FCoE)**.
- To take advantage of the technology to achieve further efficiencies within the data center - ***cabling infrastructure must be considered*** to help ensure delivery of reliable high-bandwidth performance and application availability.
- Zollner's Unified Fabric Network architecture suits the ToR modular approach and enables immediate deployment for further modularity and flexibility at the rack level. The ToR network and cabling architecture model enables a graceful transition from Gigabit Ethernet to 10 Gigabit Ethernet attached servers and provides infrastructure readiness for future adoption of 40 and 100 Gigabit Ethernet server and switch-to-switch connectivity without the need to change the cabling plant.

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