Panduit Data Center Infrastructure Topologies for Cisco Enterprise-class Platforms

At-A-Glance

Technology Impact on the Data Center

An optimized data center design must address the interdependencies between the logical network and physical layer infrastructure. This at-a-glance provides an overview of the key design considerations.

Cisco® and Panduit have collaborated to create enterprise data center topologies that provide guidelines for high-performance, flexible, scalable, and reliable data center design. These topologies incorporate:

- Network design best practices
- Physical layer infrastructure best practices
- Power, cooling, and space considerations
- Data center standards

Data Center Design Overview

Data center design requires a layered approach:

- Logical network design determines overall data center capacity.
- Logical network design and topology determine active hardware and physical layer requirements.
- Integration of active and physical layer components determine facility requirements for floor space, power, and cooling.

Future capacity, new technologies, and industry standards must be planned for and taken into account throughout the design process.

Network Considerations

A logical network architecture design requires consideration of the following capacity measurements:

- Port density
- Uplink bandwidth
- Server capacity
- Oversubscription

If these considerations are not carefully addressed, network bottlenecks can occur, limiting data center performance.

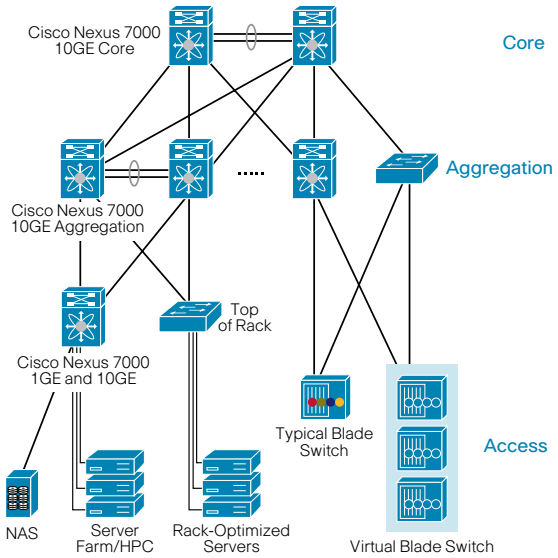
Panduit® Net-Access™ Switch Cabinet

Figure 1. Production Data Center

Cisco Network Logical Topology

Figure 2 shows a network topology for deployment of the Cisco Nexus 7000 Series switch in an data center environment.

Figure 2. Places in the Network



Cisco-Panduit topologies incorporate Cisco network design best practices to maximize capacity in the data center's network.

Network Equipment Architectures

Cisco-Panduit have partnered to create enterprise infrastructure topologies for three logical data center access layer network equipment architectures:

- End of row: Approach with a modular chassis supporting one or more racks or cabinets of servers
- Top of rack: Consists of a 1- or 2-RU switch supporting server equipment within the same rack.
- Integrated switching: Addresses blade chassis server environments with integrated switches.

Cisco-Panduit pod topologies provide the flexibility to interchange architectures without substantial impact to the overall data center infrastructure (Figure 3).

Infrastructure Considerations

Active Hardware

A network and infrastructure topology design determines active hardware requirements, which include:

- Number of routers and switches
  - Number of ports on each network layer (core, aggregation, and access)
  - Bandwidth per router or switch
- Number of servers
  - Number of ports per server
  - Bandwidth per server
- Number of storage components

Physical Layer Hardware

Active hardware requirements determine physical layer (or connectivity) infrastructure requirements to host and interconnect active components. The physical layer infrastructure includes:

Cabinets Racks Cabling Cable Management

Panduit works closely with Cisco to provide comprehensive connectivity solutions that integrate server, storage, and Cisco networking components. This helps ensure efficient installation and long-term interoperability.

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The Panduit® Net-Access™ Switch Cabinet provides the security and aesthetics of a cabinet with accessibility and thermal performance comparable to an open rack. Features include:

- Thermal ducting to provide hot/cold aisle deployments for side-to-side airflow switches.
- Thermal and cable management to provide capacity for two Cisco Catalyst® 6509, MDS 9513, or Nexus 7010 switches.
- Copper/fiber cable management to ensure optimal bend radius and access to vertical pathways.
- Fully integrated electrically bonded structure to ensure protection for active equipment.

Figure 3. Modular Pod Topology

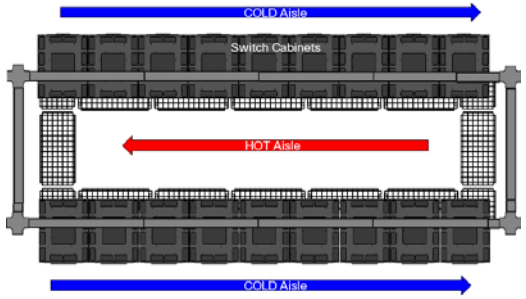


Figure 4. Vertical Patching

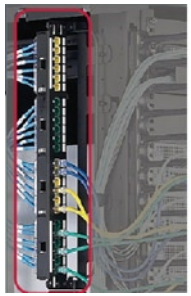
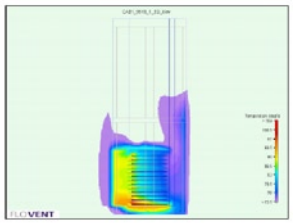


Figure 5. Hot Spot Analysis



Populated cabinets and racks can be consolidated into a pod topology. Figure 3 shows an example of a modular pod topology.

Pod Topologies and Facilities

Pod topologies provide a modular and scalable solution for the buildout of a data center. Key considerations for a data center pod topology include:

Power Cooling Space Cabling

Figure 6. Data Center Facility

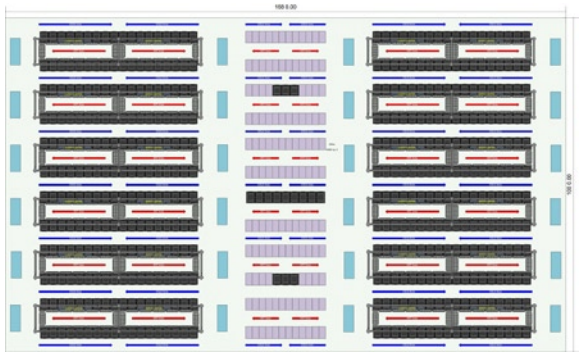
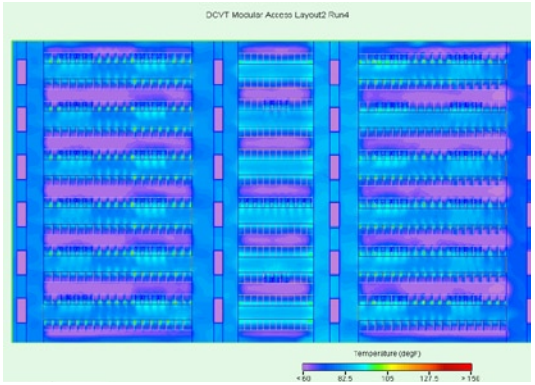


Figure 7. Flovent Model



Using Panduit connectivity solutions within a combined Cisco-Panduit infrastructure pod topology helps ensure:

- Proper scaling of power requirements.
- Proper cabinet and data center thermal management.
- Efficient use of data center footprint.
- Scalability for future growth.
- Flexibility to interchange use of network architectures with limited impact to the data center infrastructure.

A pod topology must be able to flexibly scale within the limitations of a data center's facilities. As shown in Figures 4-7, Cisco-Panduit topologies address the considerations at all levels (cabinet, pod, and data center).

Computational fluid dynamics (CFD) testing was performed to ensure that each Cisco and Panduit infrastructure topology scales within the bounds of a typical data center's facility limitations (Figure 5 and 6).

Data Center Standards

Industry standards must be taken into consideration throughout the entire design process. Data center standards to consider include:

- TIA-942: Telecommunications Infrastructure Standard for Data Centers
- ASHRAE: Thermal Guidelines
- IEEE 1100: Power and Grounding Standards
- OSHA: Safety Standards

Cisco and Panduit topologies include these network, thermal, power, and safety standards to help take the guesswork out of compliance.

Summary

Cisco-Panduit data center infrastructure topologies provide enterprise customers with a series of templates to quickly deploy robust, flexible, and scalable data center architectures to maximize return on technology investment.

For more information, see:

- www.cisco.com/go/datacenter
- www.panduit.com/datacenter

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