Data Centre Design & Implementation: An ROI Approach

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Agenda

1. About Panduit
2. Data Centre Market Trends
3. When Data Centres Go Wrong!
4. Data Centre Design Principals
5. Design & Deployment Steps
6. Summary
1. About Panduit
About Panduit

• Panduit is a world-class developer and provider of leading-edge solutions that help customers optimize the physical infrastructure and mitigate risk through simplification, increased agility and operational efficiency
• Independent leader since 1955
• Global presence, local focus and customization
• 4,000+ employees
• 112 countries of operation
• Solutions approach
  – Data centers
  – Connected buildings
  – Industrial automation
Unified Physical Infrastructure (UPI) Approach

- Flexible, end-to-end UPI-based solutions help meet business and technology challenges head on for a smarter, unified business foundation.

- **Mitigate Risk** – Efficient physical infrastructure management enables seamless integration to reduce risks which can occur throughout the network.

- **Lower Cost** – Panduit physical infrastructure solutions drive financial advantages to reduce energy and occupancy costs, and help secure competitive advantage.

- **Increase Agility** – A high level of integration within the physical infrastructure enables flexibility and improved business agility.

- **Enhance Sustainability** – UPI-based solution offerings enable organizations to meet sustainability goals by driving resource and energy efficiencies across the physical infrastructure.

The UPI approach enables organizations to connect, manage and automate critical systems and drive operational, financial and sustainability advantages, allowing your business to minimize risk, lower cost, and heighten agility and reliability.
Panduit’s Intelligent Data Center Solution Elements

**Professional Advisory Services**
Migration to next generation solutions, mitigating risks in consolidation and virtualization, and achieving greater energy and real-estate efficiency.

**Intelligent Software and Hardware**
Complete data center infrastructure management (DCIM) through monitoring of and management of critical physical layer resources.

**Energy Efficient Cabinets**
Cooling conservation for greater thermal management and energy efficiency.

**Pre-Configured Offerings**
Reduce implementation time and costs by delivering a pre-engineered, pre-tested and validated modular solutions optimized for high technology platforms.

**High Speed Data Transport (HSDT) Copper and Fiber Cabling Systems**
Ease of deployment and proven performance to ensure availability, reliability and scalability of mission critical systems.

**Physical Infrastructure Foundation**
Ensuring reliability, agility, and security to drive business advantages and overall success.
This is what we do with Cisco

Validated Infrastructures that Simplify & Accelerate Cisco Nexus 7009 Switch Deployments
Pre-configured Solutions

Pre-Engineered

Pre-Integrated

Pre-Deployed by Panduit

Validated by EMC and Cisco engineers
2. Data Centre Market Trends
Key Data Centre Call Outs

> 2.5 billion users on the Internet as of January 2013. 451 Research

> Mobile technology is becoming the preferred mode of business and personal life – 500 million new smart phones a year. 451 Research

> 15 million gigabytes of new data are created each day. 451 Research

> It is predicted that data will grow 800% in the next five years. Gartner

> The average age of data centers is nine-years-old. International Data Corporation

> Data centers older than seven years are obsolete. Gartner

> Running business in the cloud means cost savings. The rate SMB is moving to cloud is doubling every year. Biztech

> As of May 2013, 36 percent of large companies surveyed expect to exhaust IT capacity within the next 18 months. Uptime Institute
3. When Data Centres Go Wrong
Some Facts reported by facility managers

- 60% expect an incident or outage to happen over the next 6 months
- 80% of the incidents could have been prevented
- Average outage duration is reported 107 minutes
- 80% report a major upgrade over the next 4 years because of inefficiency reasons
- 90% do not have an online monitoring system
- Outages make headlines especially for cloud providers
Top of mind issues reported by DC managers

- Energy efficiency
- Performance Monitoring:
  - ASHARE TC 9.9 says that only real time energy measurements can support real energy saving efforts
- Capacity Planning or ... the missing discipline and the over-provisioning:
  - In a recent EMEA survey,
  - “reclaiming and/or repurposing hardware and software that is underutilized”
  - was cited as a top priority by
  - 57% of IT executives
- Deploying new architectures and technologies
- Rapid virtualised workload increase because of consolidation and virtualisation
Detection cost: Activities associated with the initial discovery and subsequent investigation of the outage.

Containment cost: Activities and associated costs that enable a company to reasonably prevent an outage from spreading, worsening or causing greater disruption.

Recovery cost: Activities and associated costs that relate to bringing the organization’s networks and core systems back to a state of readiness.

Ex-post response cost: All after-the-fact incidental costs associated with business disruption and recovery.

Equipment cost: The cost of new equipment purchases and repairs, including refurbishment.

IT productivity loss: The lost time and related expenses associated with IT personnel downtime.

User productivity loss: The lost time and related expenses associated with end-user downtime.

Third-party cost: The cost of contractors, consultants, auditors and other specialists engaged to help resolve unplanned outages.

Lost revenues: The total revenue loss from customers and potential customers because of their inability to access core systems during the outage period.

Business disruption (consequences): The total economic loss of the outage including reputational damages, lost business opportunities, etc.
Causes behind datacenter outages and downtime

**Increasing data center capacity.** As demand for IT applications grow and more servers and storage are added to the data center, the supporting IT infrastructure must grow as well. If the IT demand outgrows what the critical infrastructure can supply, downtime will occur. Downtime root cause correlation: UPS capacity exceeded and PDU/circuit breaker failure.

**Rising rack densities.** With the introduction of blade servers and other high-performance IT equipment, the typical server rack will contain well over 10 kWh of IT. High heat densities will require precision cooling closer to the server. However, depending on the cooling design, this also could bring water closer to the server. Downtime root cause correlation: Water incursion and heat-related/CRAC failure.

**Data center efficiency.** Data centers consume a lot of electricity and many managers are evaluating high-efficiency power and cooling technologies such as transformerless UPS or air economizers that provide cost reductions but may not provide the highest reliability or ideal operating environment. Efficiency should not come at the expense of availability, especially in critical data centers. Downtime root cause correlation: UPS failure, heat-related/CRAC failure and IT equipment failure.

**Need for infrastructure management and control.** The data center manager’s requirements of improving availability, increasing efficiency, maximizing density and planning for capacity all can be managed through infrastructure management. Monitoring the float charge of a battery, knowing optimal placement of a new server to even having a people-free facility with remote resolution all are aspects of successful infrastructure management.
The Datacenter stakeholders and Panduit’s role

1. The technical or facility dept
2. The IT dept
3. The external electromechanical consultant (by law)
4. The finance dept

Panduit speaks all different languages and makes the bridge by providing the methodology to have all stakeholders achieve common goals by:

1. Providing design & assessment services, solutions and products to meet standard requirements: TIA 942, EN directives, IEEE 1100, Uptime Intitute & ASRAHE guidelines, Telcordia, LEED etc
2. Defining optimization models (UPI) and support industry best practices
3. Working on reference architecture development together with partners like Cisco (NEXUS)
4. Ensuring a holistic approach at all design, assessment, deployment phases.
5. Providing optimization tools to effectively REMOVE THE WASTE, maximise ROI, meet SLA GOALS
6. Offering asset management, service management and energy management solutions
7. Mitigating risk and reducing operating costs by offering on line monitoring and management
8. Using a multiphase modular methodology.

In physics, your solution should convince a reasonable person. In math, you have to convince a person who's trying to make trouble. Ultimately, in physics, you're hoping to convince Nature. And I've found Nature to be pretty reasonable.

Frank Wilczek
4. Data Centre Design Principals
Mapping Logical to Physical Layers
Cisco architecture to TIA 942

Core Layer

Aggregation Layer

Access Layer

Network Switch Cabinet
Server Cabinet
Storage Cabinet

PoD

HOT AISLE
COLD AISLE

20 cabinet PoD with 16 server cabinets and 4 switch cabinets

June 2009
5. Design & Deployment Steps
Detailing the technical performance expectations and functional requirements of the physical infrastructure system design
Space-planning layout that illustrates a plan view of the data center space defining the locations of racks, cabinets, aisle ways, CRAC/CRAH units, PDUs, RPPs, and all building structure elements that have an impact on the physical infrastructure layout.
Schematic one-line diagrams for each cabling media type (such as single-mode optical fiber, multi-mode optical fiber, and copper) and the supplemental telecommunications bonding network.
## Cabling Considerations

<table>
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<th>PMD/Conn.</th>
<th>Cable Type</th>
<th>Power /Port</th>
<th>Latency/port</th>
<th>Reach</th>
<th>Standard</th>
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<td>10G SFP+(CX1) cable assembly</td>
<td>Twinax 2 pair</td>
<td>0.1 W</td>
<td>0.1 us</td>
<td>15m</td>
<td>SFF-8431</td>
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<td>Cat6A UTP</td>
<td>5.5 W</td>
<td>2.5 us</td>
<td>100m</td>
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**Standards**

- SFF-8431
- 802.3ak
- 802.3ae
- 802.3an
Datacenter Bonding & Grounding Implementation

Under Floor

Above the Rack
Phase 2 Deliverable – Pathway Design

Design of overhead and/or under floor pathways
Pathway Options for fibre optic cable distribution
Pathway and cable management options

Under Floor

Above the Rack
Phase 2 Deliverables - Elevations

Elevation views of cabinet rows illustrating the locations of cabinets, under-floor pathways, overhead pathways, relevant heights, and spacing
Top of Rack (ToR) design

Traditional

Fabric
Phase 2 Deliverables – Rack Details

Rack-level elevation details of server, switch, storage, and patching cabinets
Deployment Matters

Same equipment, one works... one fails.
Phase 2 Deliverables - Specification

A technical specification following the Construction Specification Institute's (CSI) format:

- Sets forth requirements for products, materials or performance while adhering to industry standards and best practices
- Provide detailed information for an unbiased comparison of materials and products

This in conjunction with our design drawings and Bill of Materials can be used as part of a bid documents package.
Phase 2 Deliverables – Cabling Schedules

- Detailed Cabling Schedules
- Simplified ordering with exact part numbers
- Reduce waste with customized cable lengths
- Speed implementation with to/from cable details
Pre-terminated copper and fiber, pre-tested connectivity

Minimising risk

Focusing on the design

Quick and easy deployment
### Phase 2 Deliverables - BOM

#### Detailed Bill of Materials
- Specifies all components in Design
- Reduces procurement time

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<th>Description</th>
<th>Qty.</th>
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<td>4 Post Rack - 4.5 RU, 30&quot; depth, threaded rails</td>
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<td>PC</td>
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<td>Wyn-Grid Bottom Waterfall</td>
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<td>PC</td>
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Phase 2: 3D modelling using ICE software
Phase 3: Predictive Thermal Assessment with CFD analysis: 6 Sigma platform

- Simulate the operation of the future datacenter
- Optimize data center cooling design to reduce CapEX & OpEx costs.
- Understand the future thermal behavior of the hardware and take corrective design decisions
- Identify airflow issues before the datacenter construction
- Evaluate individual cabinet thermal behavior
- Tiles selection & positioning or containment pressure etc
Air flow

Storage

Switch

Servers
Phase 4: Physical Infrastructure Management
On line asset tracking and management

The Physical Infrastructure Manager™ (PIM™) Software platforms for Data Centers and Enterprise track the allocation and utilization of critical IT assets and networking resources, as well as power consumption and environmentals within your data center and remote sites, from anywhere in the world.
Phase 5: 6 Zone Datacenter Management

Zone 1
- Water
- Power In
- Oil
- Gas

Zone 2
- Main MV / LV Distribution Board (A or B)
- Lighting
- Boilers
- Fire Security

Zone 3
- UPS
- Chillers
- CRAC
- Back up Generator

Zone 4
- Sub PDU
- Data Hall Environmental

Zone 5
- Data Rack or Free Standing Equipment

Zone 6
- Individual Payloads
- Power Monitoring
- Environmental Monitoring
Energy Management & Environmental Monitoring Solution

- 4x Outputs
- 12x Sensors
- LCD Status Display
- 2 x Keypad or 2 x Card Reader
Phase 6: On site assessment on the real datacenter

- DCIM can now provide real data
- CFD can perform analysis and support changes especially in a hosting environment
- Historical energy data, asset utilization information are now available to facilitate capacity planning
- Corrective actions with fully predicted effect
6. Summary
Verified Sustainable Value & Return on Investment

Panduit Capabilities

Customer Benefits

- **Up to 10%** more useable space
- **Up to 15%** reduction in power
- **Up to 40%** reduction in cooling costs
- **Up to 80%** reduction in change management time
- **Up to 75%** reduction in time to install

Availability/Uptime

Physical Security/Safety

Agility/Responsiveness

Energy/Sustainability

Space/Density
More exciting news to come in September 2013

You are welcome at our Customer Briefing Centers in Europe through the year
1. Marketing as % Sales
2. Lead Generation by Solution/Theatre
3. Campaign Effectiveness – MROI
4. Customer Satisfaction
5. Adherence to Budget

Key Marketing Metrics