Green Data Centre Design Considerations

David Palmer-Stevens
Panduit SI Partner Manager EMEA

World Leader in **Network & Electrical** Solutions

David Palmer-Stevens
Systems Integrator Manager EMEA
Tel: +208 601 7318
Mob: +447703194479
email: gb-dps@panduit.com

Panduit Relationships

Panduit and Cisco partnership

- IP Communications
  - Panduit is the *1st* cabling companies with a Solution Enabler designation
- Storage
  - Panduit is *only* the Physical Layer provider with a Storage Hardware Networking designation
- Wireless
  - Panduit is the *only* Structured Cabling Company to deliver an integrated, end-to-end wired and wireless solution for the entire Cisco-Aironet WLAN product line*
- Sponsorship
  - Panduit is the *only* non-Cisco corporate sponsor for Cisco Network Academy
- Curriculum Development
  - Panduit Network Infrastructure Essentials course is Cisco's *only* Structured Cabling course offering


Company logo to go here

CISCO TECHNOLOGY DEVELOPER PARTNER CATALOG 2005

COMPANY NAME OVERVIEW

THE POWER RECOGNISING AND FLEXIBILITY ADDRESS CAN SCALE TO SUPPORT AND ENTERPRISE WIDE INTUITIVE PROVIDES REPORTING AND INTEGRATION THE EVER-CHANGING NEEDS THE POWER. THE COMPANY'S PRODUCT TECHNOLOGY PROVIDES THE FOLLOWING POWER AND UNIQUE FEATURES AND USE AND EFFECTIVE TO EMPLOY AS AN ENTERPRISE WIDE STAN PHILOSOPHY REPORTING ACROSS MULTIPLE SYSTEMS NEEDS OF ENTERPRISE-SCALE TO ADDRESS.

Easy configuration power and scripting-no code required technology provides the following power and unique features and use and effective to employ as an enterprise wide standard reporting across multiple systems. A single, and consistent and solutions to meet it's needs. You enable your clients to make better management and power.

Integration the ever-changing needs the power. The company's product technology provides the following power and unique features and use and effective to employ as an enterprise wide stan philosophy reporting across multiple systems needs of enterprise-scale to address.

Unique features and use and effective to employ as an enterprise wide stan philosophy reporting across multiple systems needs of enterprise-scale to address.

Specialist Area:
IP Contact Centre Reporting

Industries:
Finance
Government
Manufacturing
Retail
Transportation

Regions:
EMEA

Address 1
Address 2
Address 3
Address 4
Address 5

Tel: +44 (0) 0000 000000
Fax: +44 (0) 0000 000000
Web: **www.com**

www.yourwebnamehere.com

Cisco Systems Networking Academy

Cisco Systems Service Provider Solution Partner

Cisco Compatible

Cisco Systems AVVID Partner

Cisco Systems Technology Developer Partner

Cisco Partner Technology Developer

Panduit

Cisco Systems | Technology Developer Partner

PANDUIT

Cisco Technology Developer Partner Catalog

The PANDUIT NET-ACCESS^ Cabinet provides optimized thermal management, superior cable management, and simplified grounding for Cisco switches. The PANDUIT NET-ACCESS^ Cabinet addresses many of the primary issues in today's data center, including network management, security, availability, and scalability.

Panduit Corp. Solutions

PANDUIT NET-ACCESS^ Cabinet

Network management, security, availability, and accessibility are primary factors affecting data center design and operation. In the past, network designers had to choose between the security and aesthetics of a cabinet or the accessibility and cable management of an open rack. Historically, cabinets offered limited cable management and accessibility, restricted airflow to equipment, and required complex grounding. PANDUIT has revolutionized the network cabinet, offering an integrated solution to address all of these concerns.

The PANDUIT NET-ACCESS^ Cabinet manages, protects, and showcases Cisco switches and cabling by combining the aesthetics and security of a cabinet with the accessibility of an open rack. The NET-ACCESS^ Cabinet improves thermal management by helping to ensure airflow to Cisco switches, provides superior accessibility to the cable pathways by removing typical obstructions, and facilitates proper grounding with electrical bonding. The modular design incorporates flexibility for future network expansion, resulting in greater network uptime and easier moves, adds, and changes for lower total cost of ownership.

Thermal Management

The NET-ACCESS^ Cabinet has been designed, using computational fluid dynamics, to provide an optimized thermal environment for Cisco side-to-side airflow switches. Optimized thermal management is critical to help ensure proper switching operation as well as to maximize the lifetime of switching equipment. Thermal considerations provided by the NET-ACCESS^ Cabinet help maximize network uptime and return on investment (ROI) for critical networking equipment.

Ventilation Pathway

The NET-ACCESS^ Cabinet provides the Cisco recommended six-inch clearance between the switch and cabinet walls by allowing proper routing of cables away from the ventilation pathways. Door perforations are optimized with a 63 percent open design, allowing unobstructed ventilation pathways for maximum airflow to the switch. For higher heat density environments, optional ducting can be used to direct exhaust air to the hot aisle, preventing recirculation of exhaust into the switch inlet.

Thermal Ducting

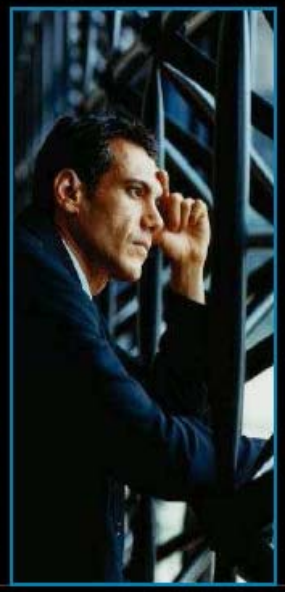
The NET-ACCESS^ Cabinet inset frame design provides space for the addition of exhaust ducting, creating a thermal environment similar to that of an open rack. Computational fluid dynamics testing shows that the use of exhaust ducting prevents hot air recirculation to the inlet of the switch (see Figure 1).

Both Cisco and PANDUIT performed extensive thermal testing on the NET-ACCESS^ Cabinet with Cisco MDS 9513 Multilayer Directors and Cisco Catalyst 6500 Switches. The results in Figure 2 demonstrate that a closed NET-ACCESS^ Cabinet with exhaust ducting provides thermal performance similar to that of an open rack for the Cisco MDS 9513 Multilayer Director.

Figure 1. NET-ACCESS^ Cabinet Thermal Duct Air Circulation

PANDUIT

Business Concerns driving DC 3.0 :
Architected Strategy for the Future



How do I cut costs and tay ahead of competitors?	Consolidation, Advanced Technology Adoption
How do I deploy business apps. on demand with SLAs?	Virtualization/Agility/ Intelligent Infrastructures
How do I better plan for Power & Cooling and facilities requirements?	Deploying efficient architectures and proactive monitoring
How do I manage risk of business impact due to network downtime?	Ongoing optimization, monitoring tools and resilient infrastructures

Strategy + Architecture + Execution = Transforming Customer Experience

- Consolidation
- Virtualization
- Green
- Risk Aversion

- Panduit Aligned with DC 3.0

PANDUIT

Nexus 7010 10-Slot Chassis

- First chassis in Nexus 7000 product family
- Optimized for data center environments
- High density
  - 256 10G interfaces per system
- High performance
  - 1.2Tbps system bandwidth at initial release
  - 80Gbps per slot
  - 60Mpps per slot
- Future proof
  - Initial fabric provides up to 4.1Tbps
  - Product family scaleable to 15+Tbps
  - 40/100G and Unified Fabric ready

- Cooling
- Space
- Risk Aversion
- Power

- Panduit Aligned with DC 3.0

PANDUIT

…the Journey from Coal to the Server…

16.66 MW Coal Energy

5-10% distribution loss

5 MW to the Data centre

15-30% Server and Storage utilization

0.35-0.5 MW "Useful Server Cycles"

60% Lost through chimney

65% DC power Conversion and cooling loss

PANDUIT

Cooling

- Improve airflow
- Stop leaks
- Hot Spot solutions

Reducing the amount and cost of cooling

Space

- Recover 36% of Distribution space
- Recover 40% of Server space
- IIM with 0 foot print (ITIL Compliance)

Maximise Hosting space at $12,000/ft'

Risk Aversion

10Gig and Cisco planning 100Gig mandatory

Grounding and Bonding

Power

- Enable Decommissioning
- Recover MEGA watts from the desktop

Unique contribution to Green

We Build the physical foundation of the DC

PANDUIT

Conformance

- ITIL v2-v3 CMDB automation
- ISO 20,000 Managed Secure services
- SOX BASII Reporting
- ITA-EIA 606A Naming Inventory

30% of Global 2000 implementing this year

Managed Services

- IIM with 0 foot print (ITIL Compliance)
- No implementation issues
- ROI in 44 weeks

Set up SLA to meet Business processes

Early Engagement

- Customer contact at Building Design
- Building Grounding
- To Data Centre design

Complete solution

We Automate first 3 processes of ITIL

PANDUIT

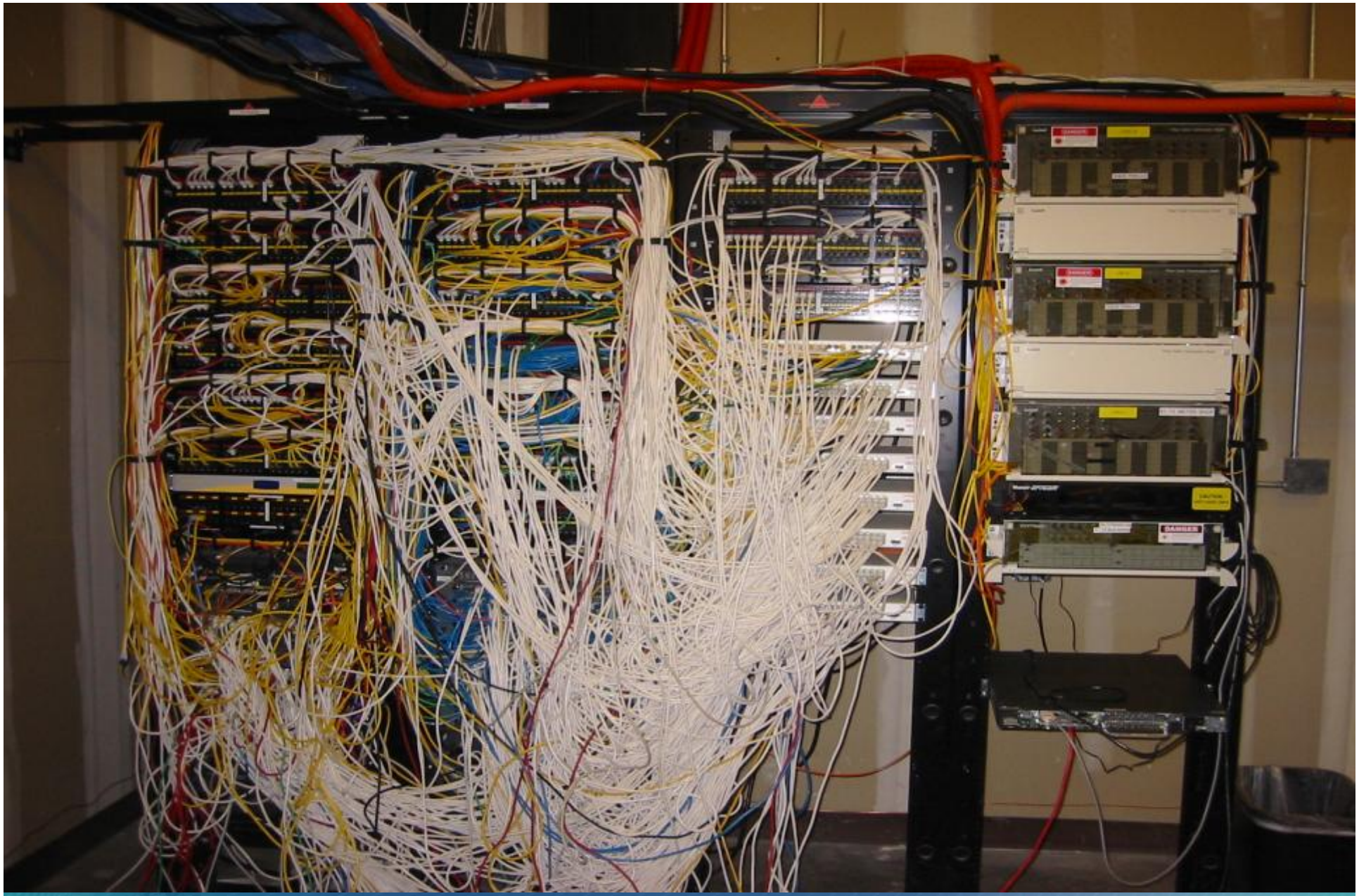
- Cooling

- Space
- Risk Aversion
- Power

*

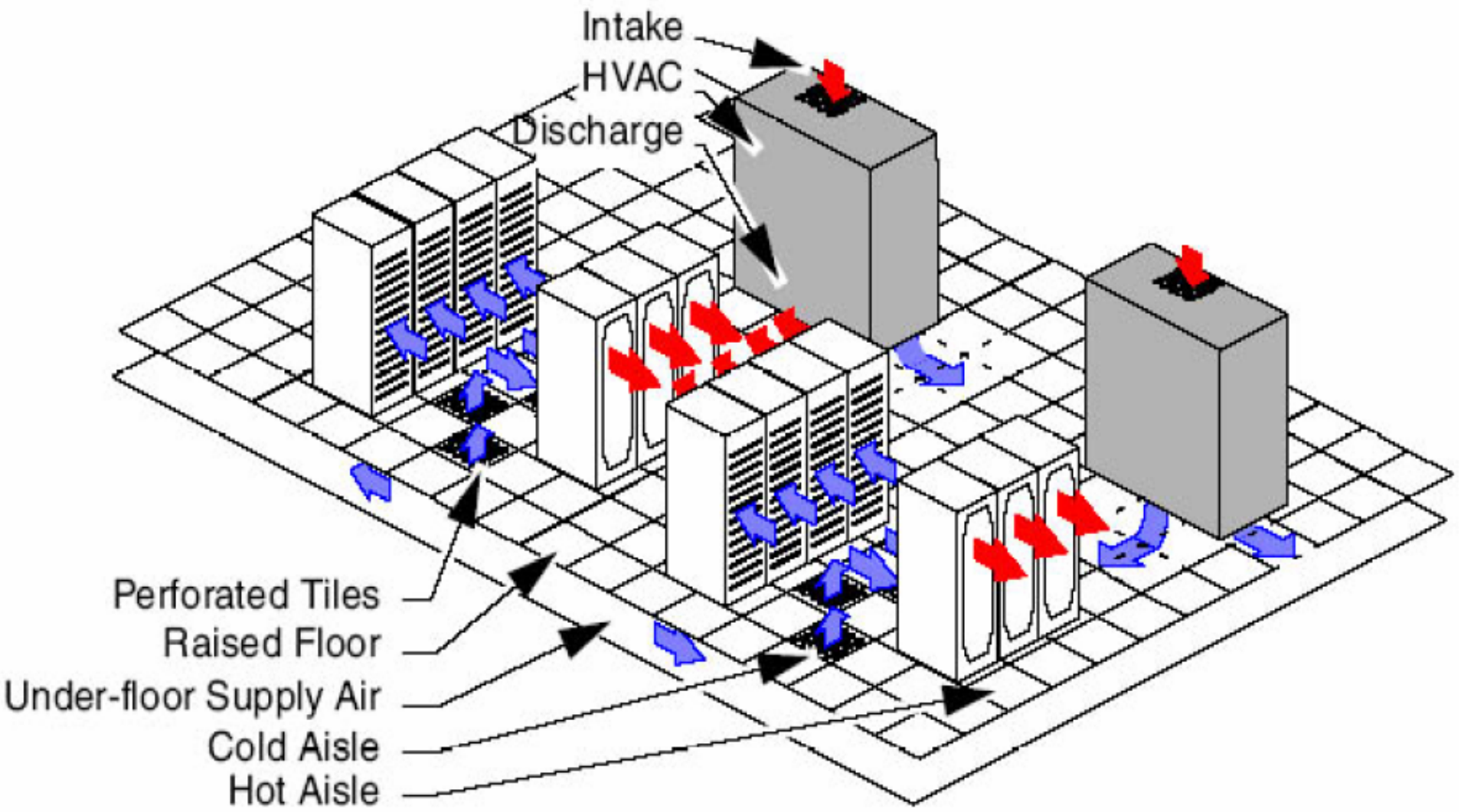
We Build the physical foundation of the DC

PANDUIT



The need for Cable Management

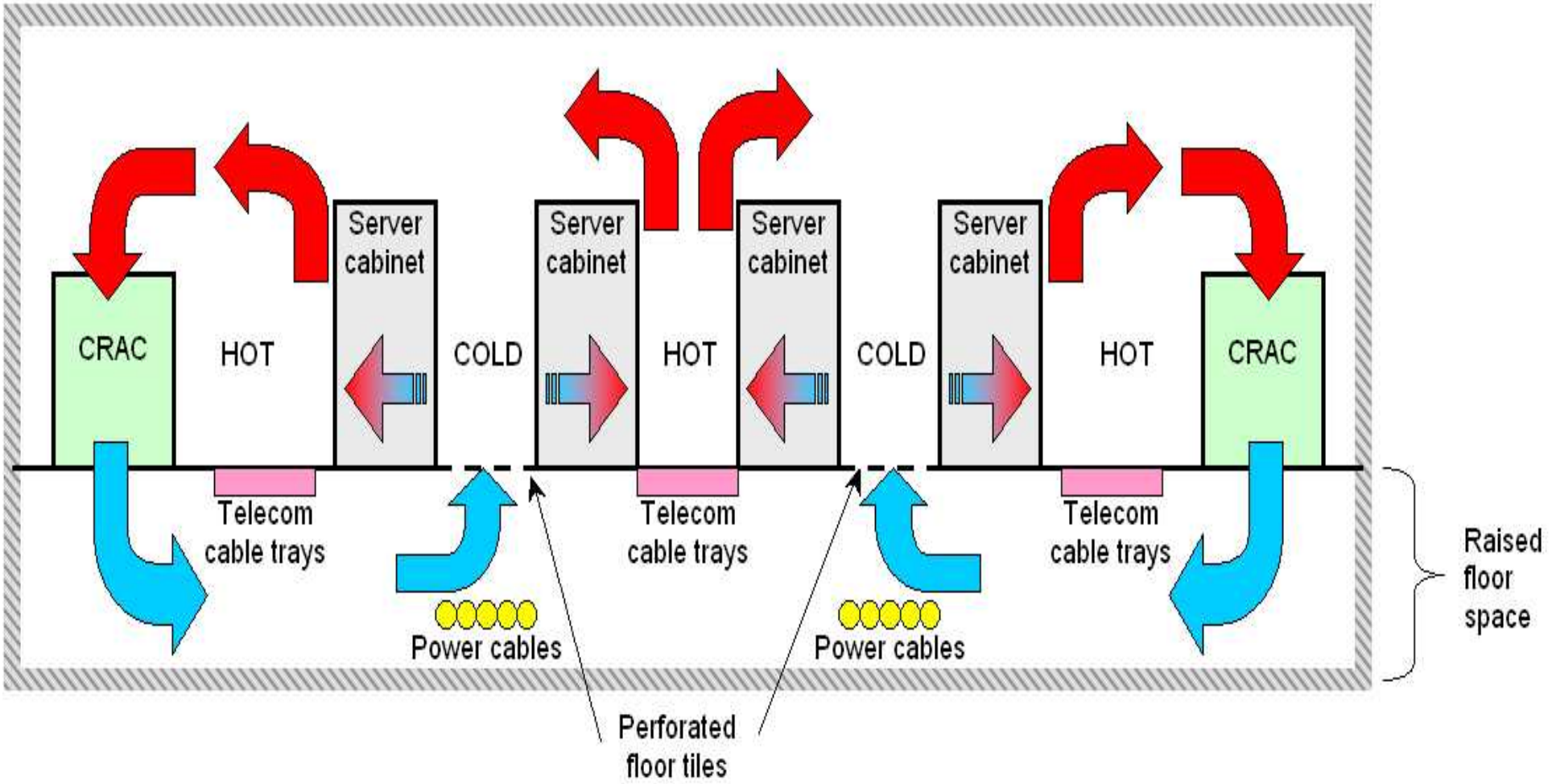
PANDUIT



Hot Aisle / Cold Aisle

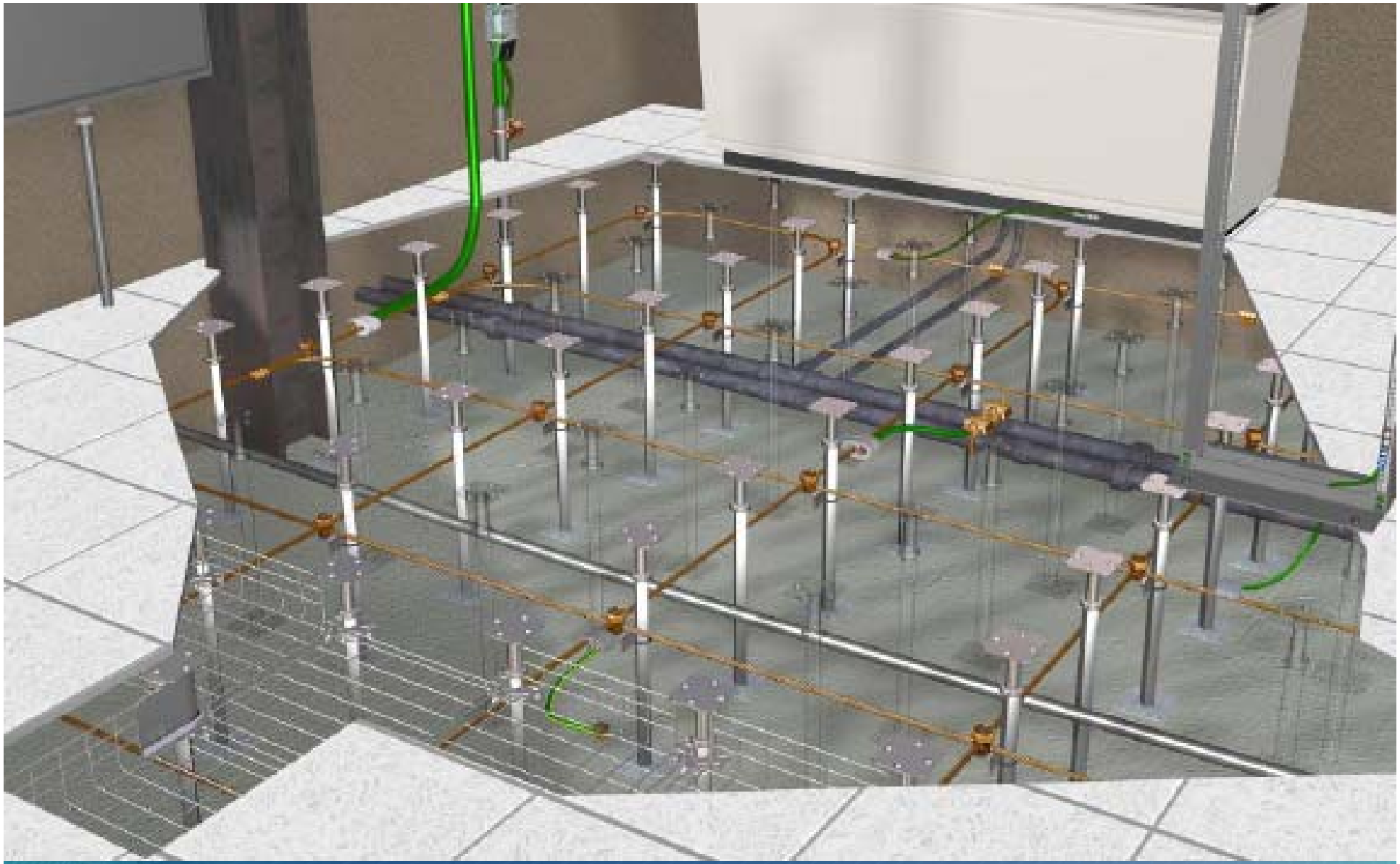
Based on ASHRAE "Thermal Guidelines for Data Processing Environments"

PANDUIT



Placement of Cables

PANDUIT

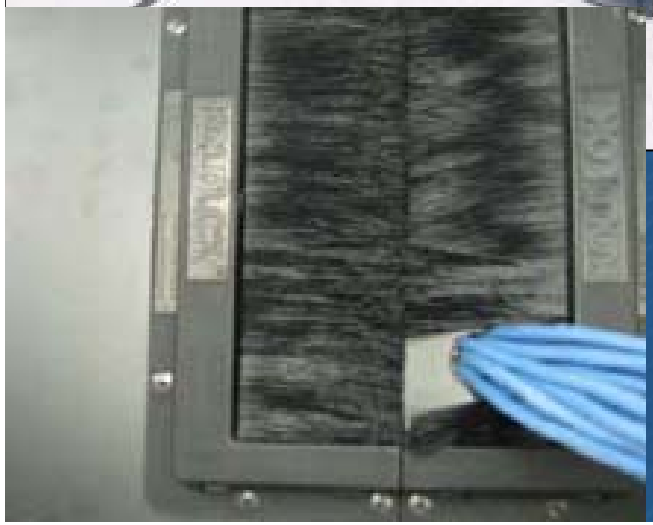


Under Floor Cable Trays

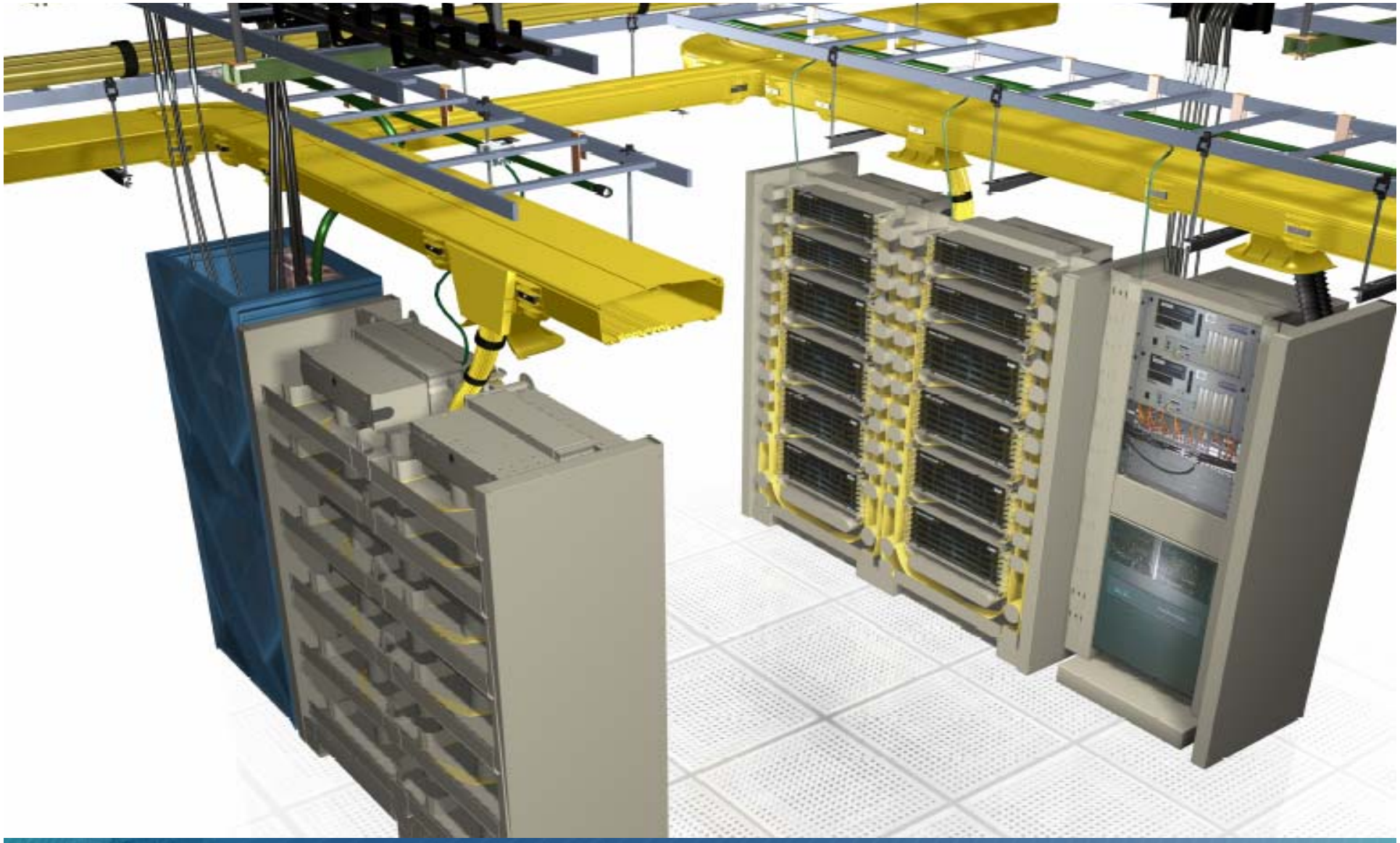
PANDUIT

Sealing Cable Paths

Panduit Cool Boot



Brush Grommets

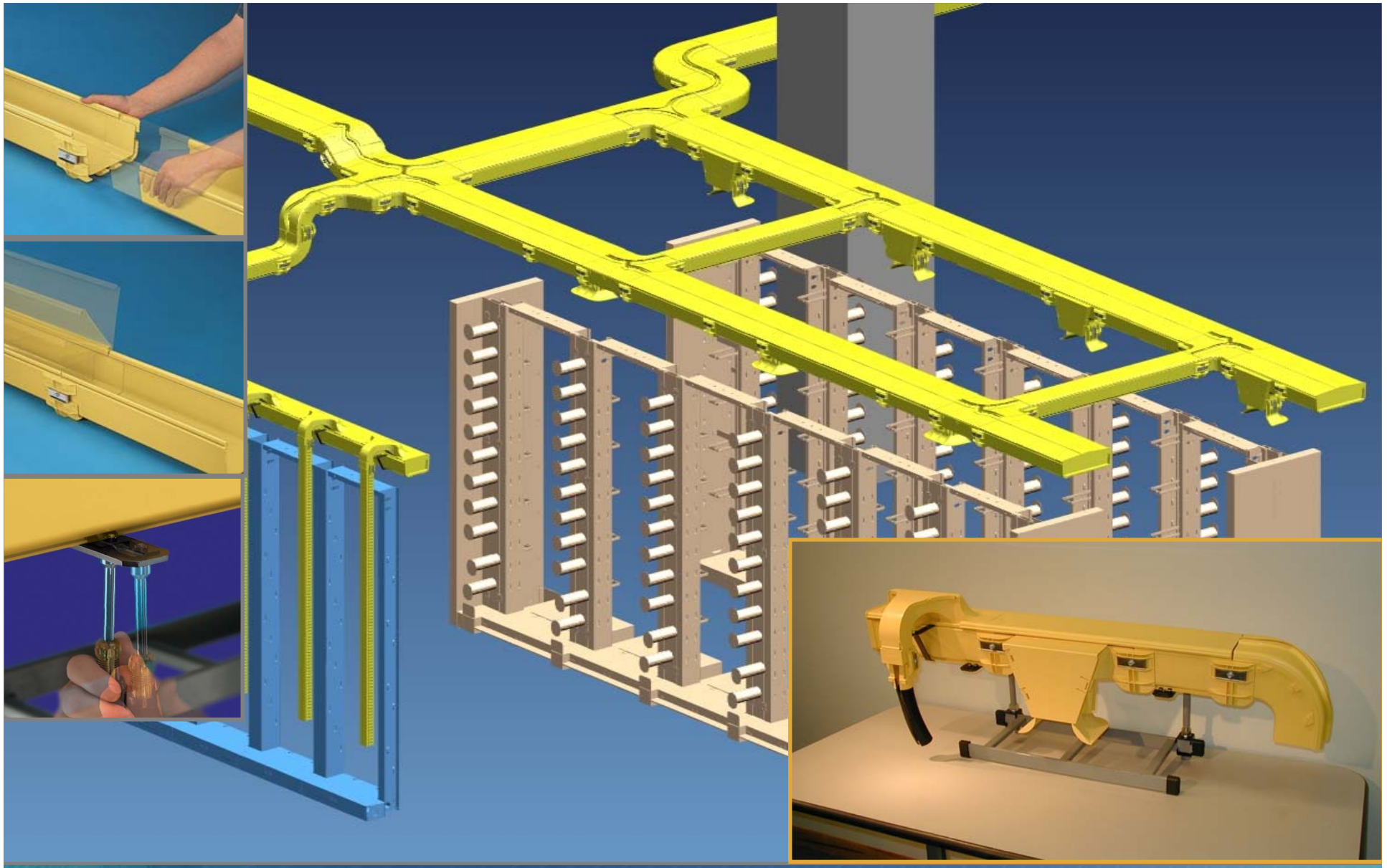


Above the Rack Cable Management

PANDUIT

Ladder Rack Accessories

PANDUIT



FIBERRUNNER Cable Routing System

PANDUIT

Enabling Hot Aisle/Cold Aisle Designs with High Density 6509 and 9513 Chassis

Example: Panduit Cabinet

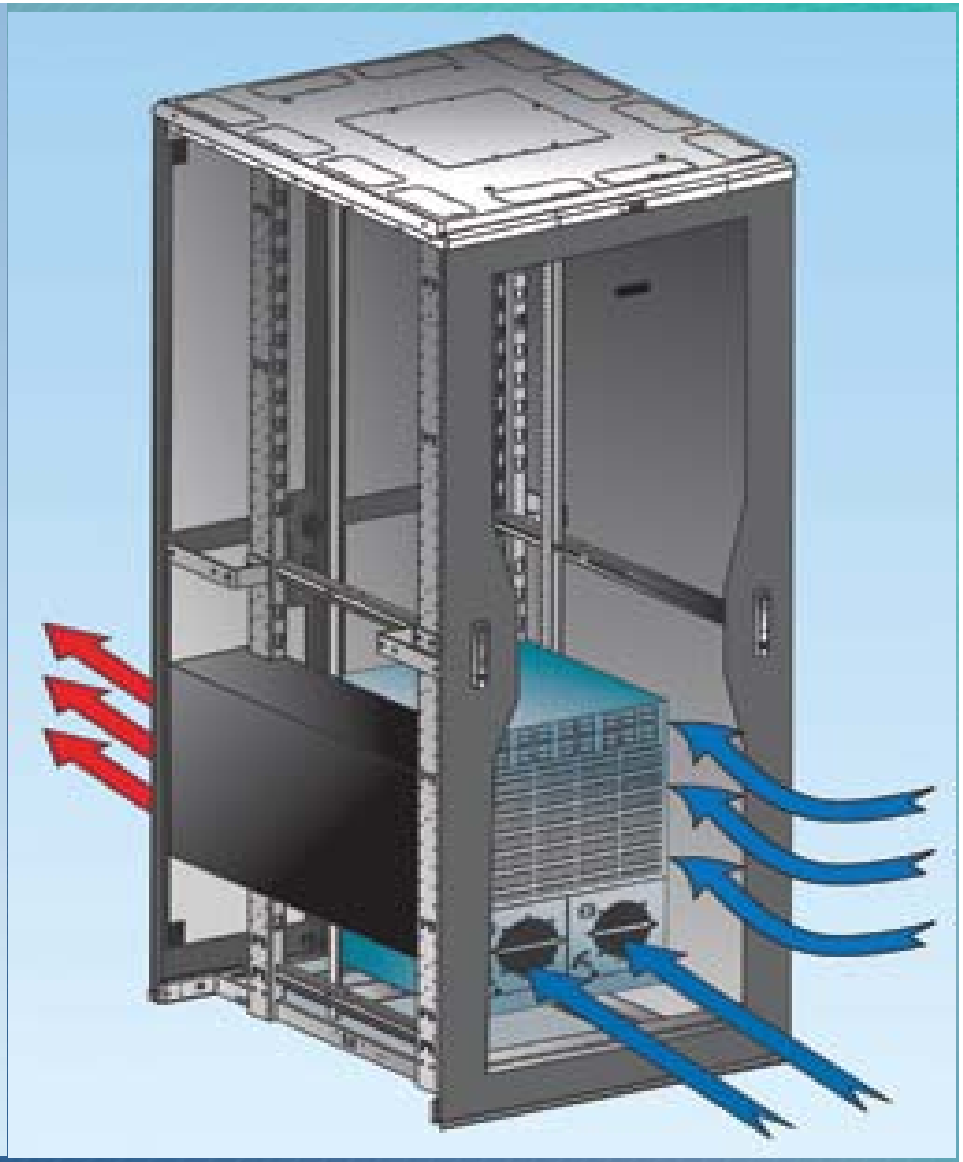
- 45RU (32"W x 40"D x 84"H)
- Up to 20kW/cabinet heat rejection capability
- 3 6509's or 3 9513's per Rack
- Front to back airflow into Hot Aisles
- Integrated Cable Management
- Modular design to support future air handlers or spot cooling
- Part # CN4-1 and CN4-2 for MDS 9513 and # CN4-3 for the Catalyst 6509E

PANDUIT

cisco Compatible

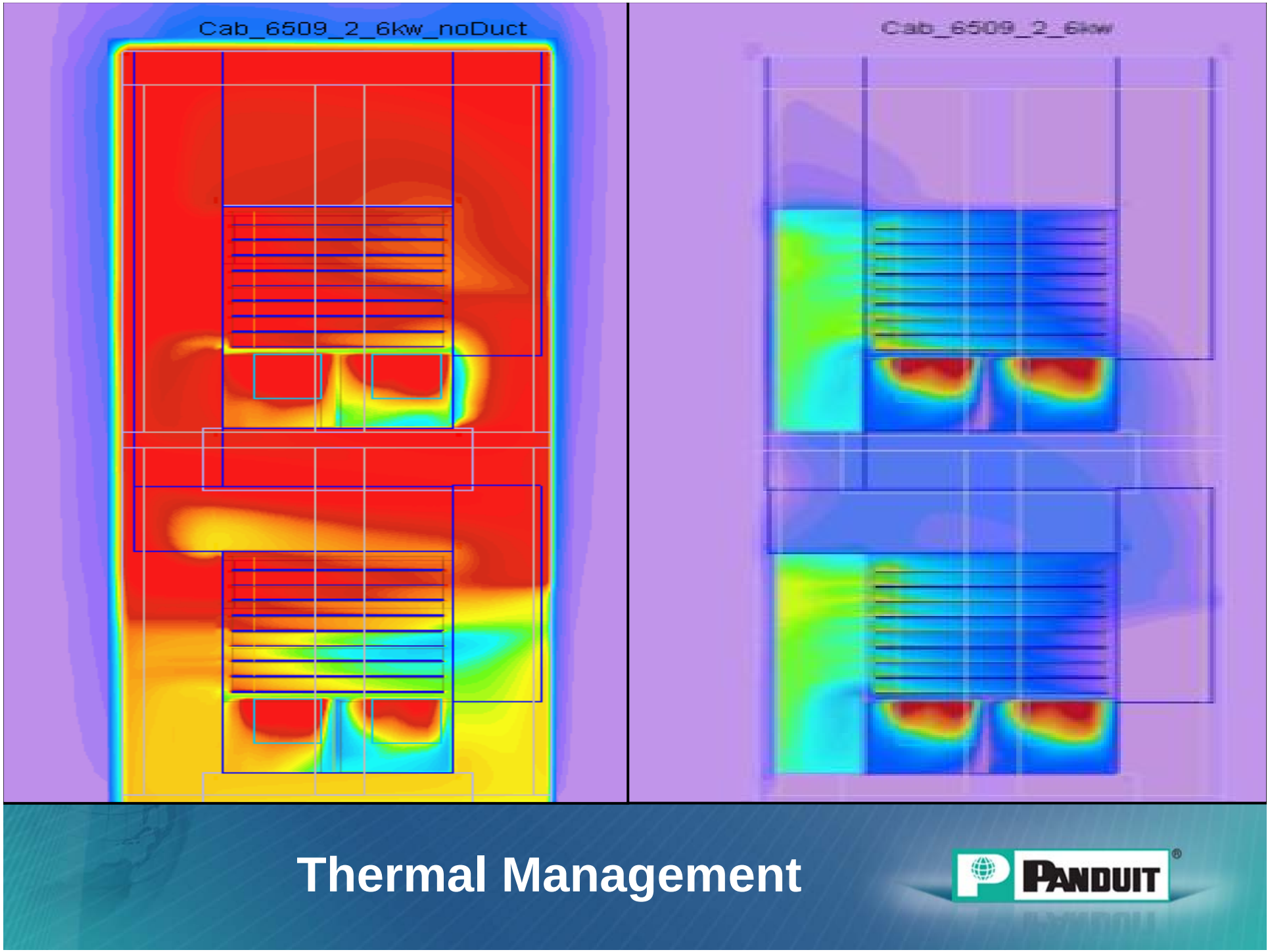
1. MDS9513
2. Catalyst 6509
3. Nexus 5000 (New)
4. Nexus 7010 (New)

PANDUIT



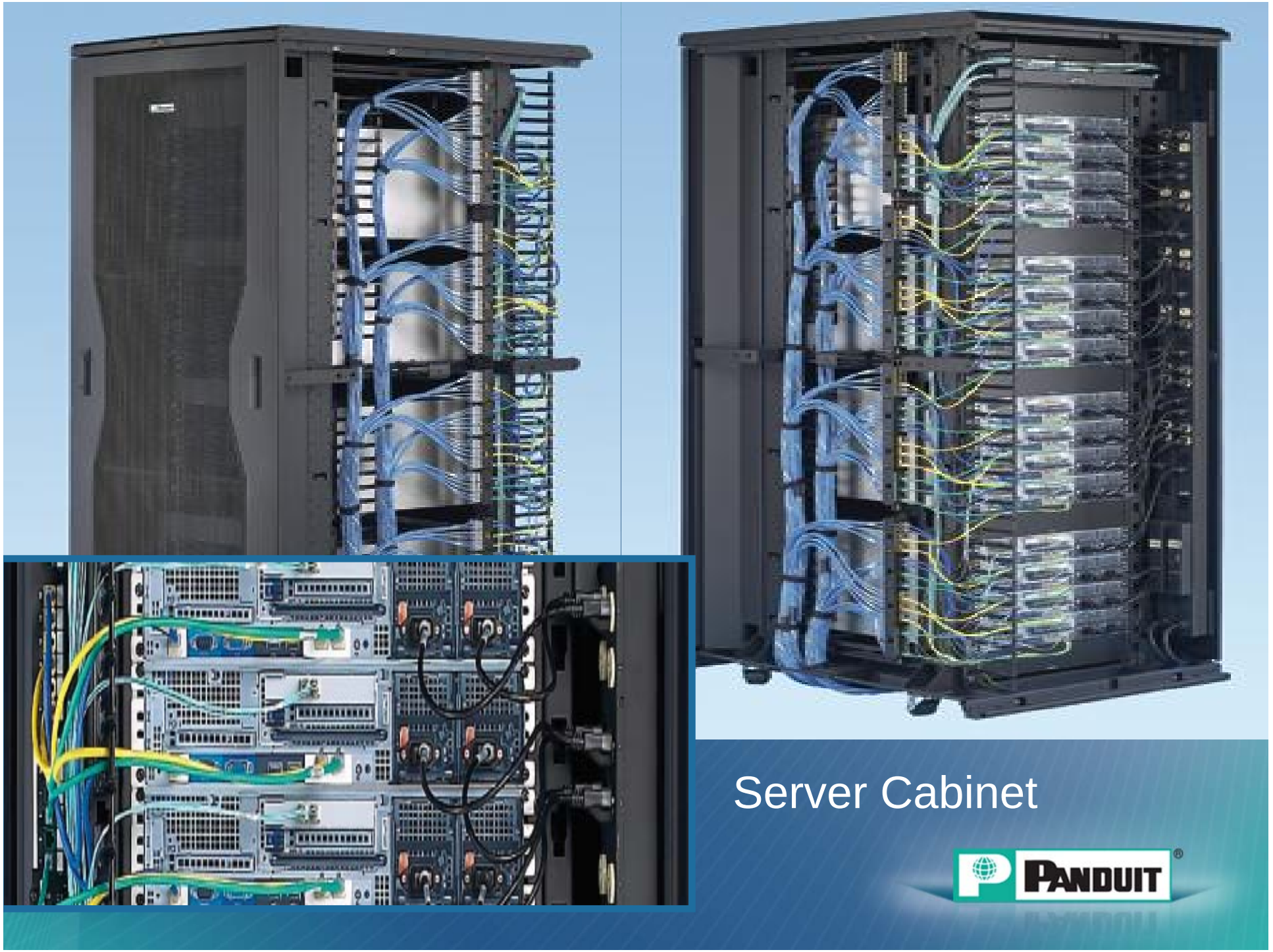
Cable Management

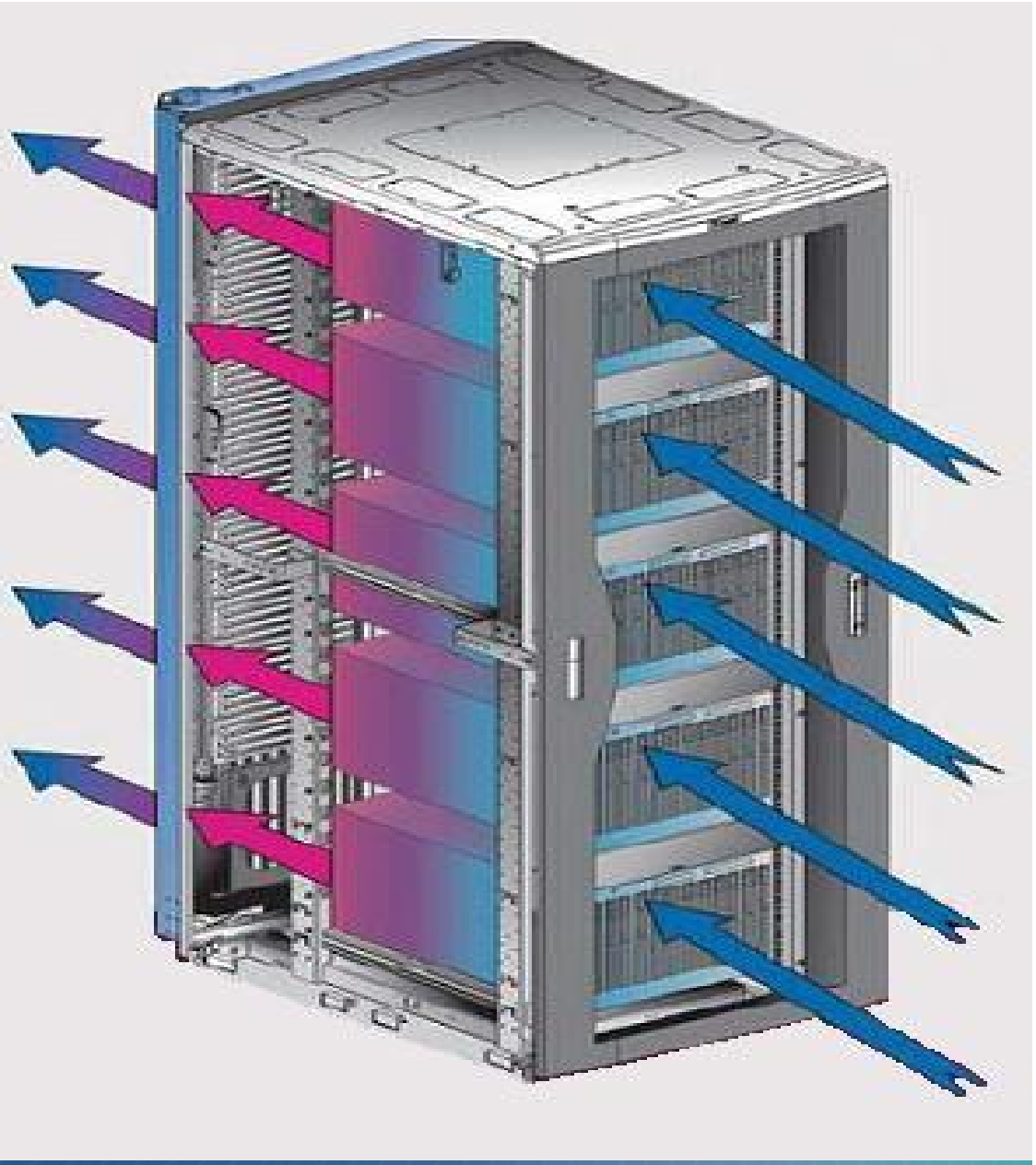
PANDUIT



Thermal Management

PANDUIT


Server Cabinet
PANDUIT



Cooling Door

NET-ACCESS™ Cooling Door

PANDUIT

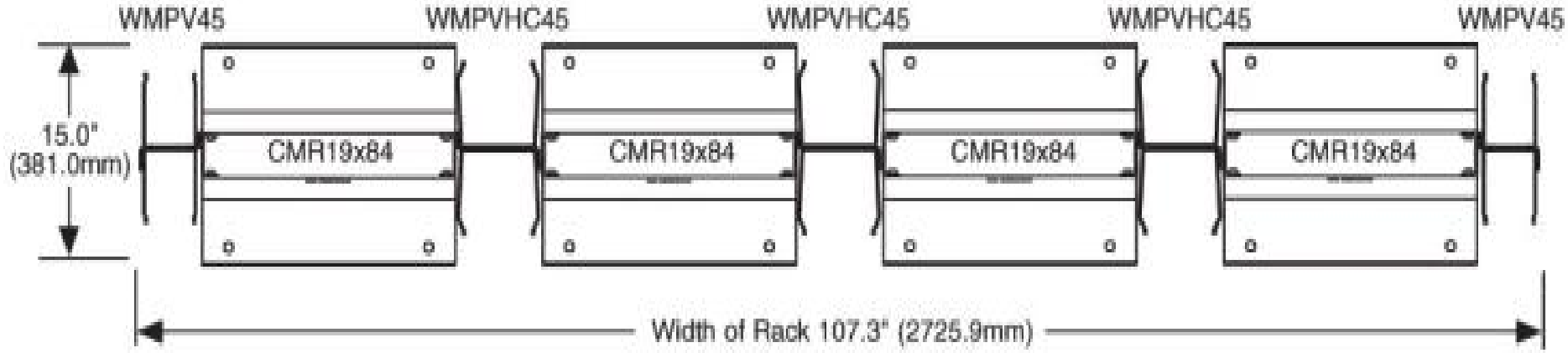
- Cooling
- Space

- Risk Aversion
- Power

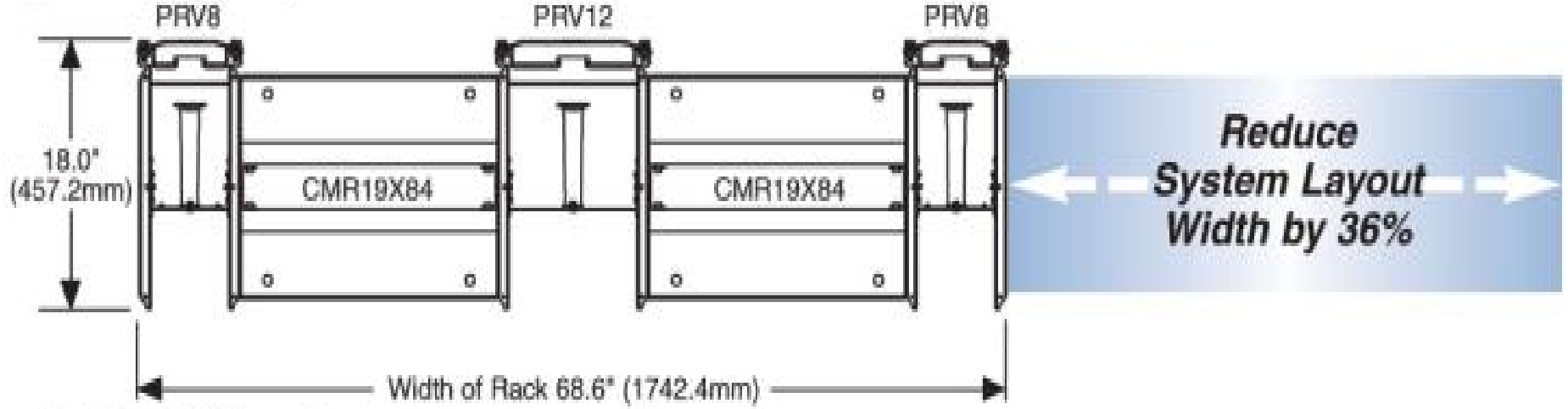
We Build the physical foundation of the DC

PANDUIT

Standard Footprint**



High Density Footprint**

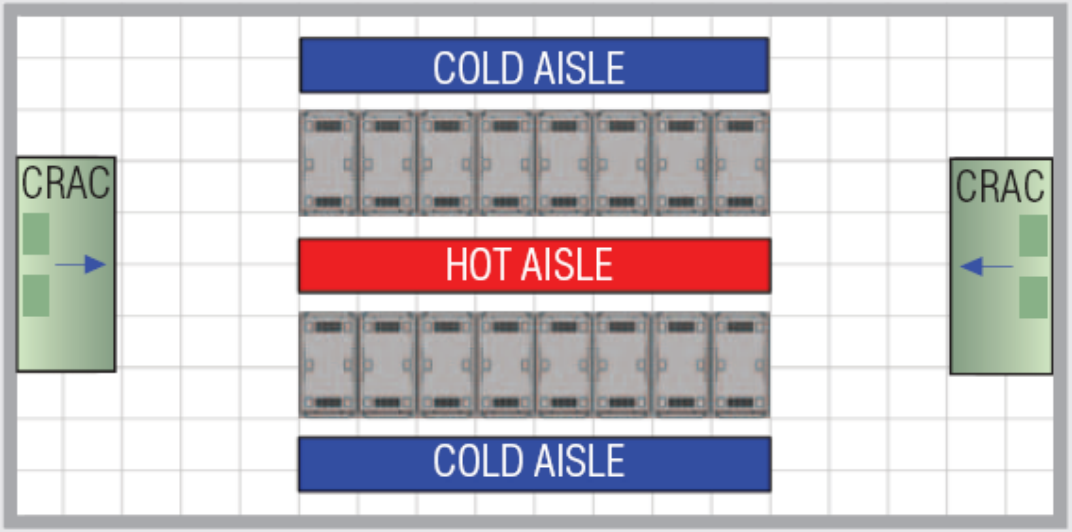


* Based on $400/ft² annually.
**Representative application, actual configurations may vary.

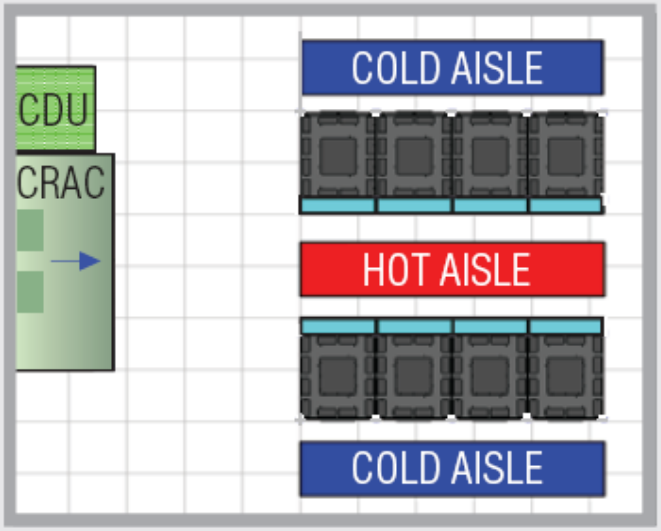
PANDUIT®

48-Blade Server Data Center Layout: Conventional vs. High-Density

Conventional Layout with Standard
24" Cabinet without Cooling Door



High Density Layout with
Net-Access™ Cooling Door Employed



	Conventional	*High-Density*	*PANDUIT Benefits*
kW per Blade Server	*4*	*4*	Same
Blade Servers per Cabinet	*3*	*6*	Allow for 100% Higher-Density withing Cabinets
Number of Server Cabinets	*16*	*8*	50% Fewer Cabinets
Number of CRAC Units	*2*	*1*	50% Fewer CRAC Units Required
Data Center Square Footage	*720*	*440*	40% Less Real Estate Required
Number of Cooling Distribution Units (CDU)	*0*	*1*	Provides Chilled Water to the Cooling Door
Number of Cooling Doors	*0*	*8*	Provides Cooling Directly at the Cabinet
Operating Costs		*14% less*	*PANDUIT* Solution Reduces Operating Costs

Recover 50% o Rack Space

PANDUIT®

The Data Center Operation

PANDUIT

- Cooling
- Space
- Risk Aversion
- Power

We Build the physical foundation of the DC

PANDUIT

Unused equipment

Unlabeled

Engineering resources

Decommissioning

Network Operations Center: a place from which a network is supervised, monitored, and maintained. It may also provide monitoring and management of the data center's physical support infrastructures.

IT Service Management

Best Practice for internal IT Departments and for managing Outsourced Service delivery

IT becomes financially managed to meet business objectives

ITIL –changing the way we work

PANDUIT

Help Desk

End User

Forester Research
30% of companies are working on ITIL V2

13% have implemented ITIL V2.

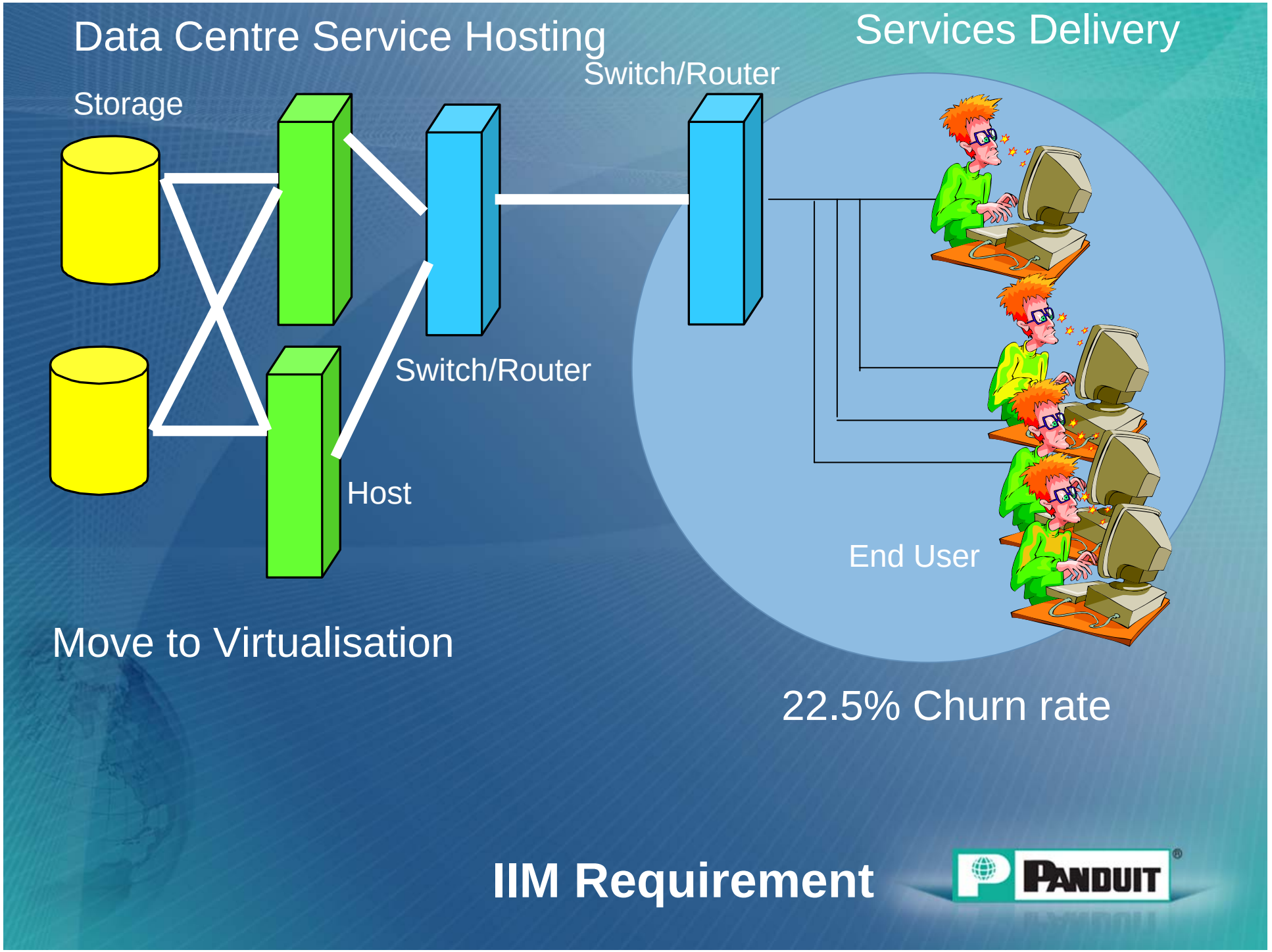
IBM has **1400 ITIL certified employees**

HP provide free **ITIL V3 resources Center**
www.hp.com/eur/itsm

ITIL V3 Business Management of IT through its complete life cycle.

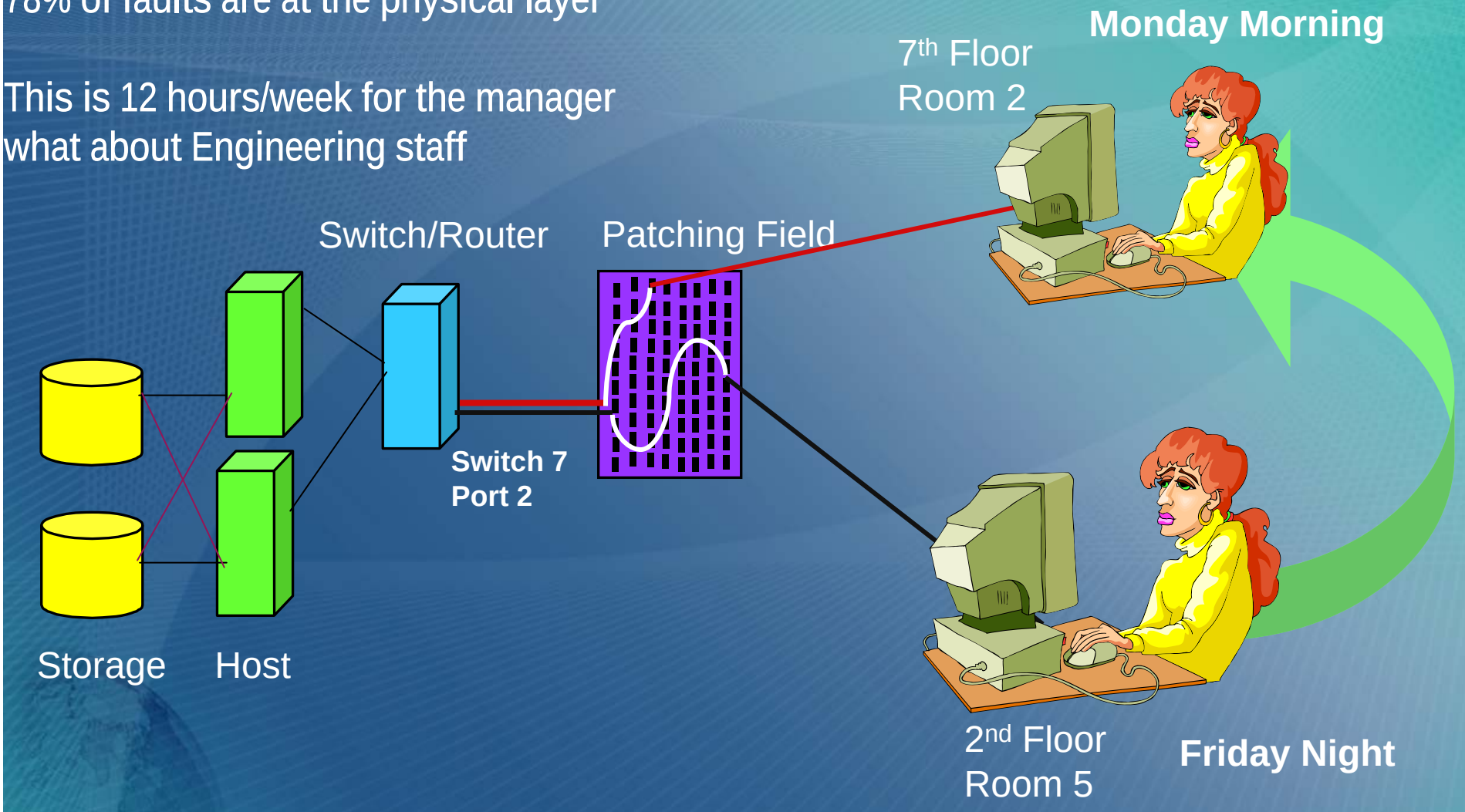
ITIL Concepts

PANDUIT


Data Centre Service Hosting
Services Delivery
Switch/Router
Storage
Switch/Router
Host
End User
Move to Virtualisation
22.5% Churn rate
IIM Requirement
PANDUIT

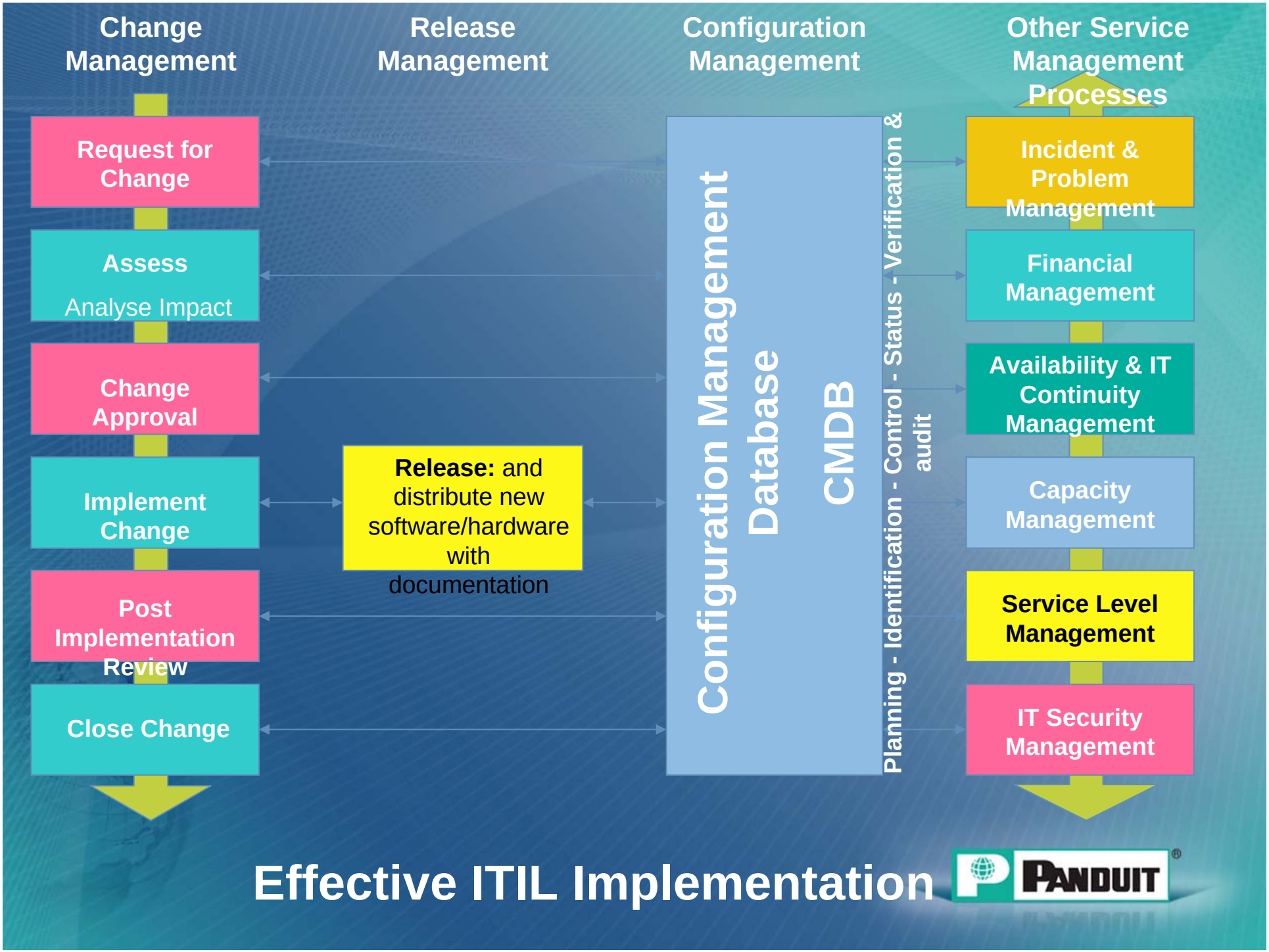
39% of NM time is on Fault management
78% of faults are at the physical layer

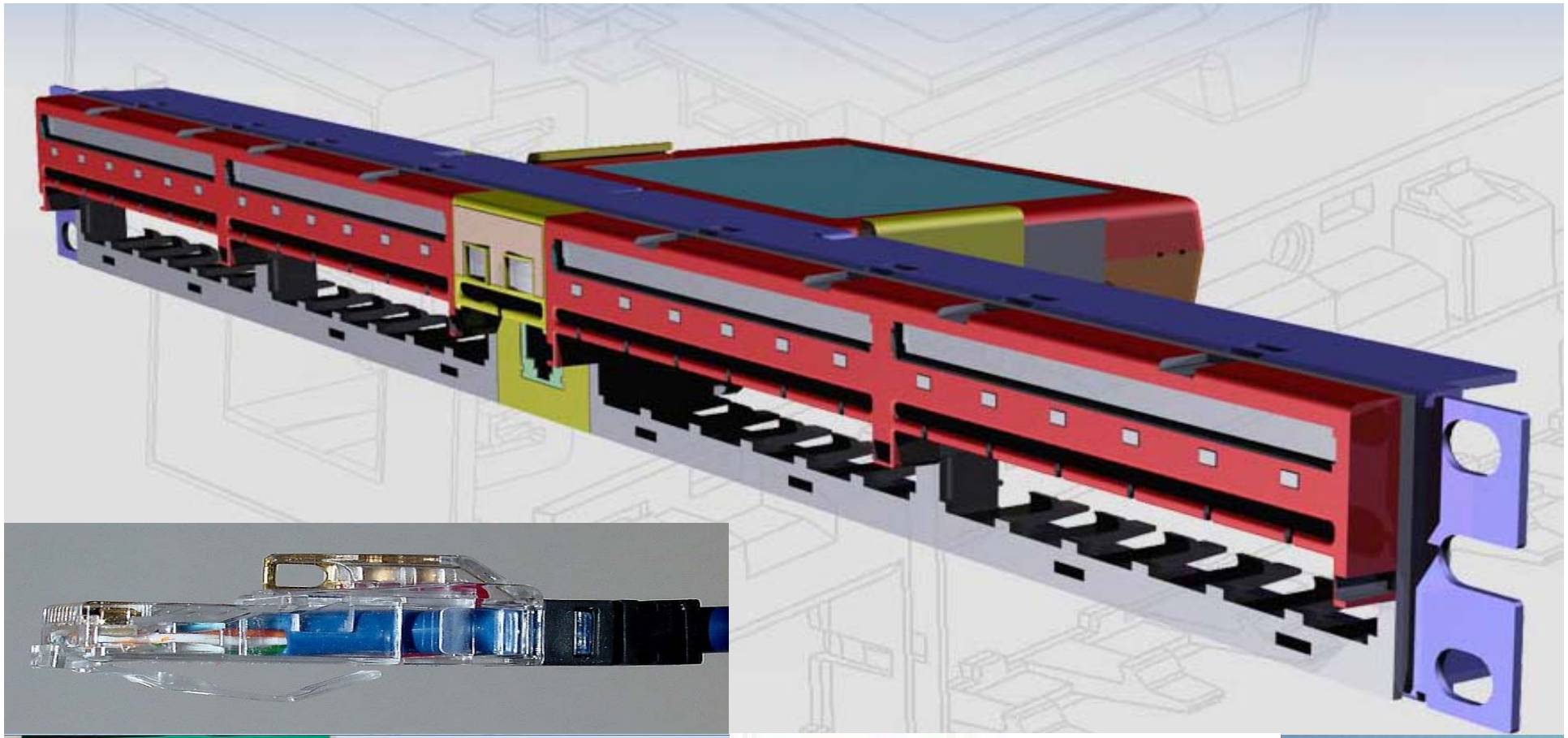
This is 12 hours/week for the manager
what about Engineering staff



The Hole in NOC Platforms

PANDUIT


Change Management
Release Management
Configuration Management
Other Service Management Processes
Request for Change
Assess
Analyse Impact
Change Approval
Implement Change
Post Implementation Review
Close Change
Release: and distribute new software/hardware with documentation
Configuration Management Database
CMDB
Planning - Identification - Control - Status - Verification & audit
Incident & Problem Management
Financial Management
Availability & IT Continuity Management
Capacity Management
Service Level Management
IT Security Management
Effective ITIL Implementation
PANDUIT

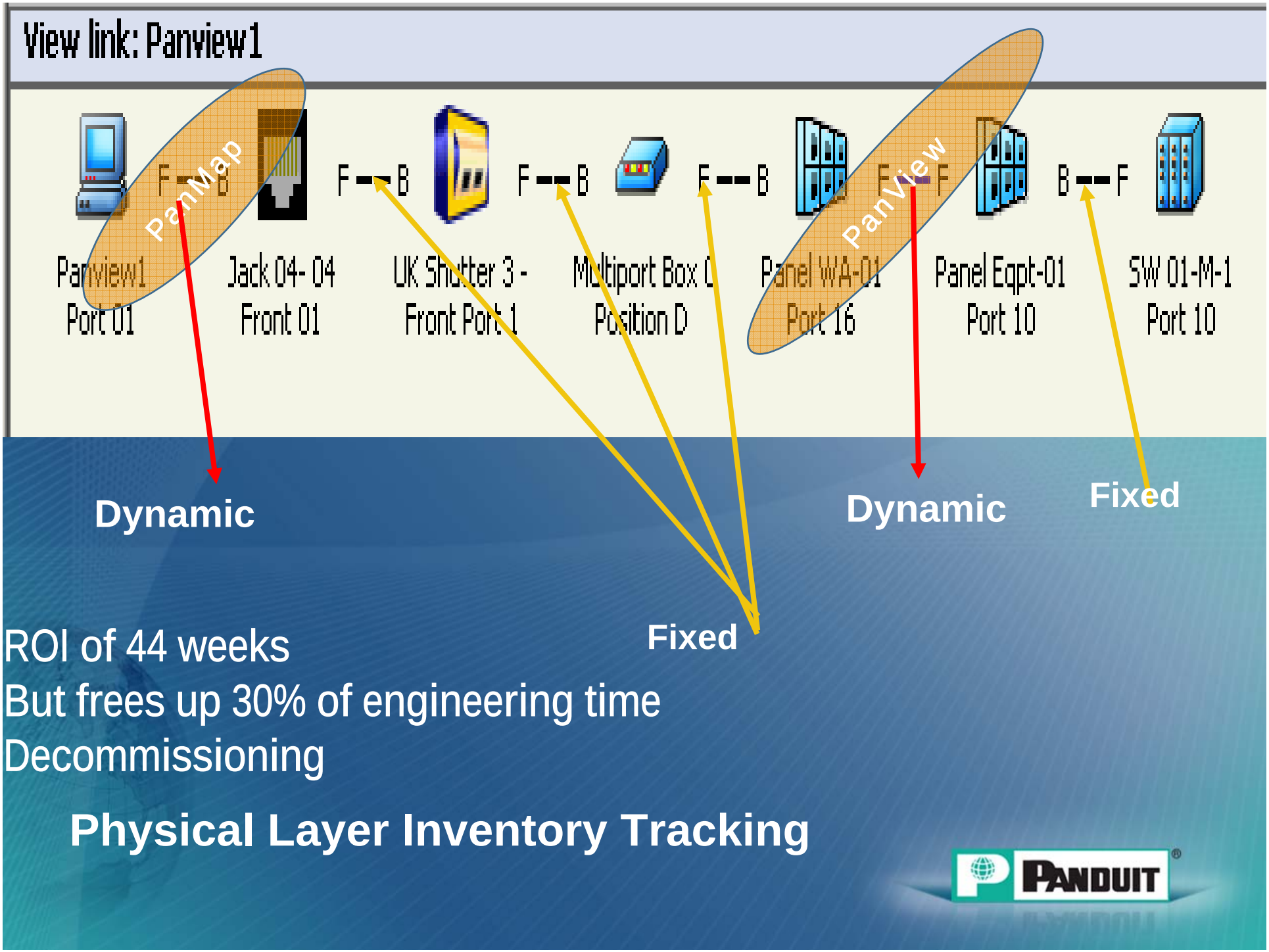


HP OpenView
PLATINUM BUSINESS PARTNER

Ready for
IBM Tivoli
e-business software

Product Set Panview iQ

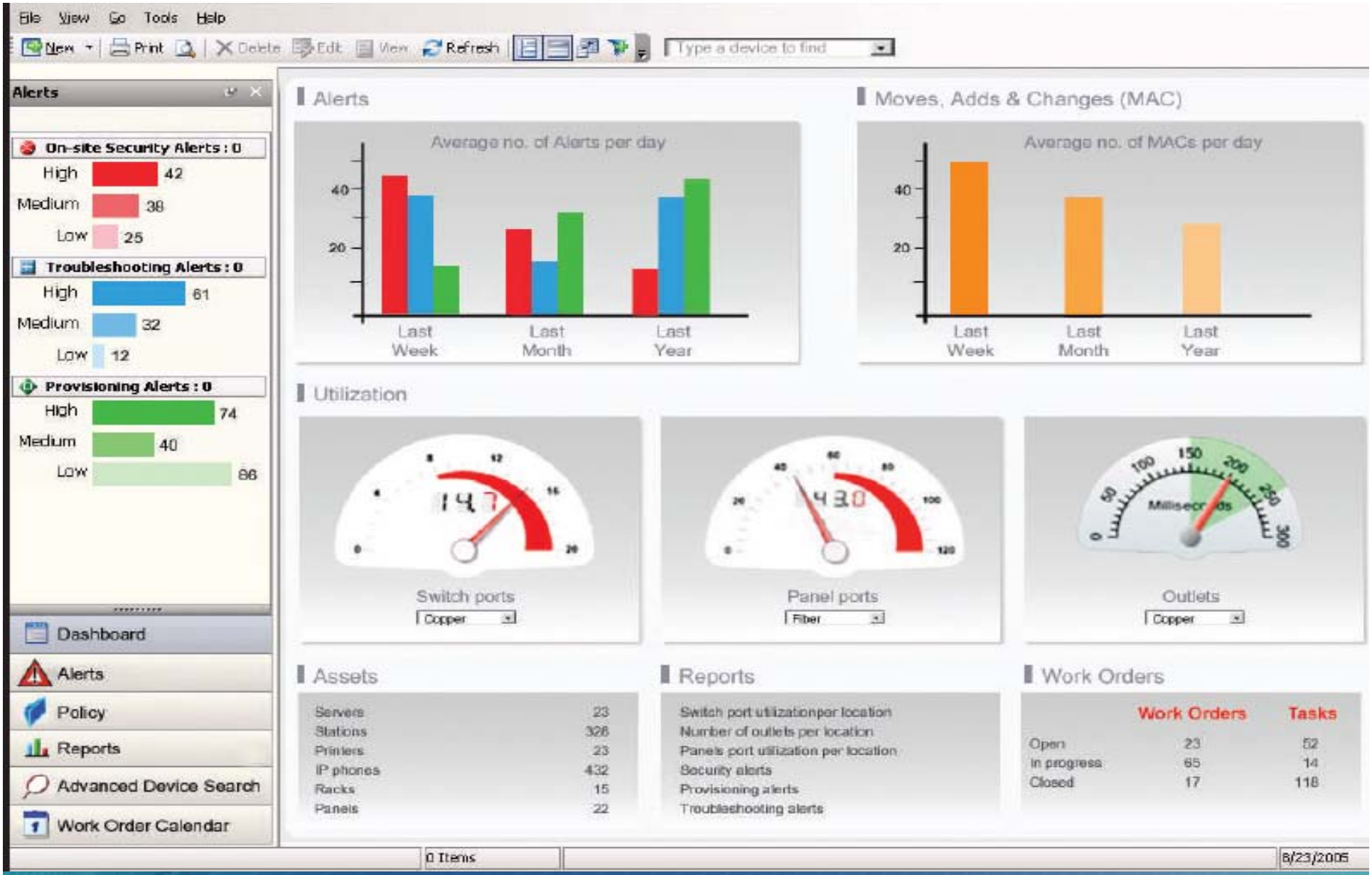
PANDUIT



ROI of 44 weeks
But frees up 30% of engineering time
Decommissioning

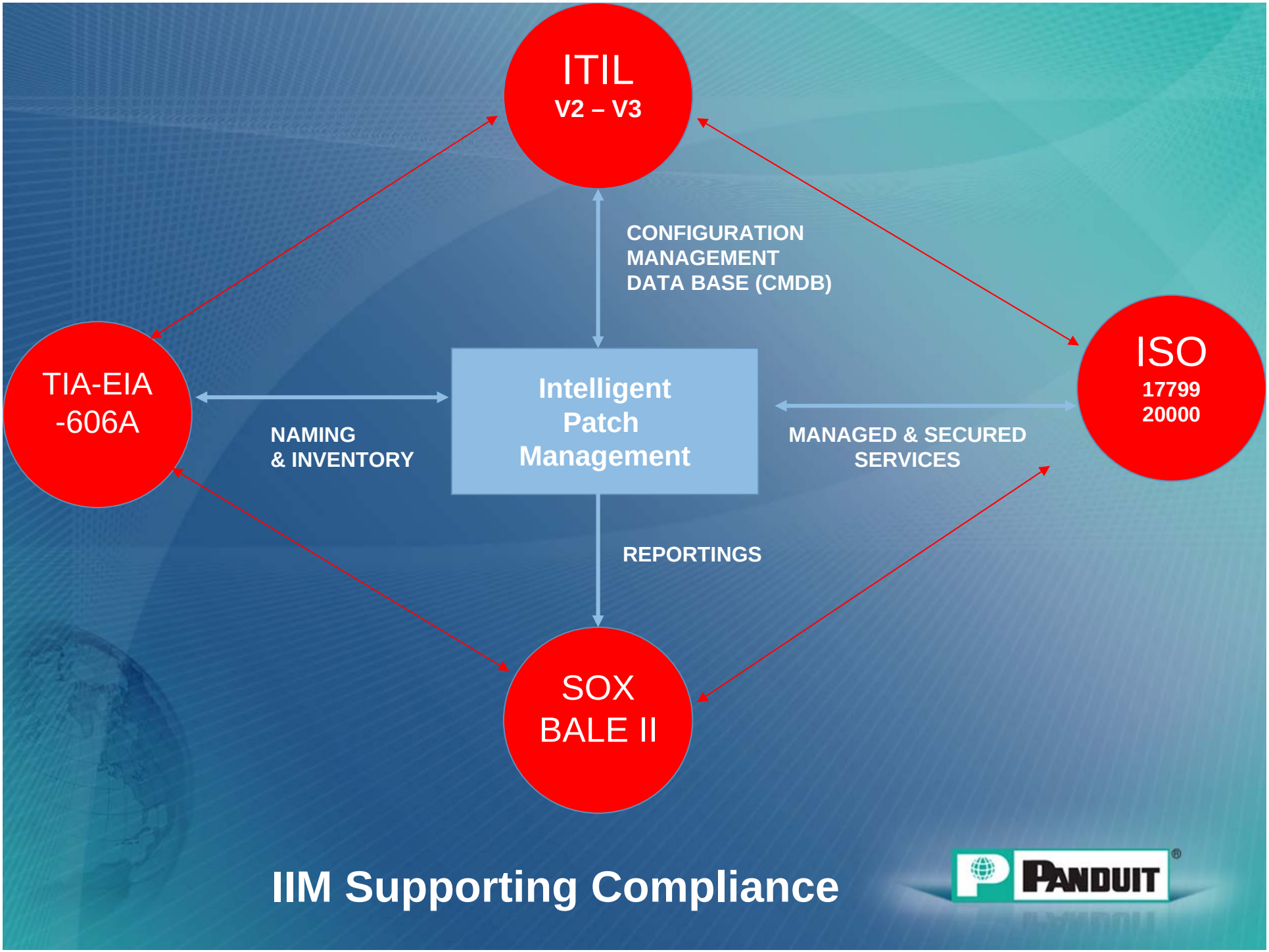
Physical Layer Inventory Tracking

PANDUIT



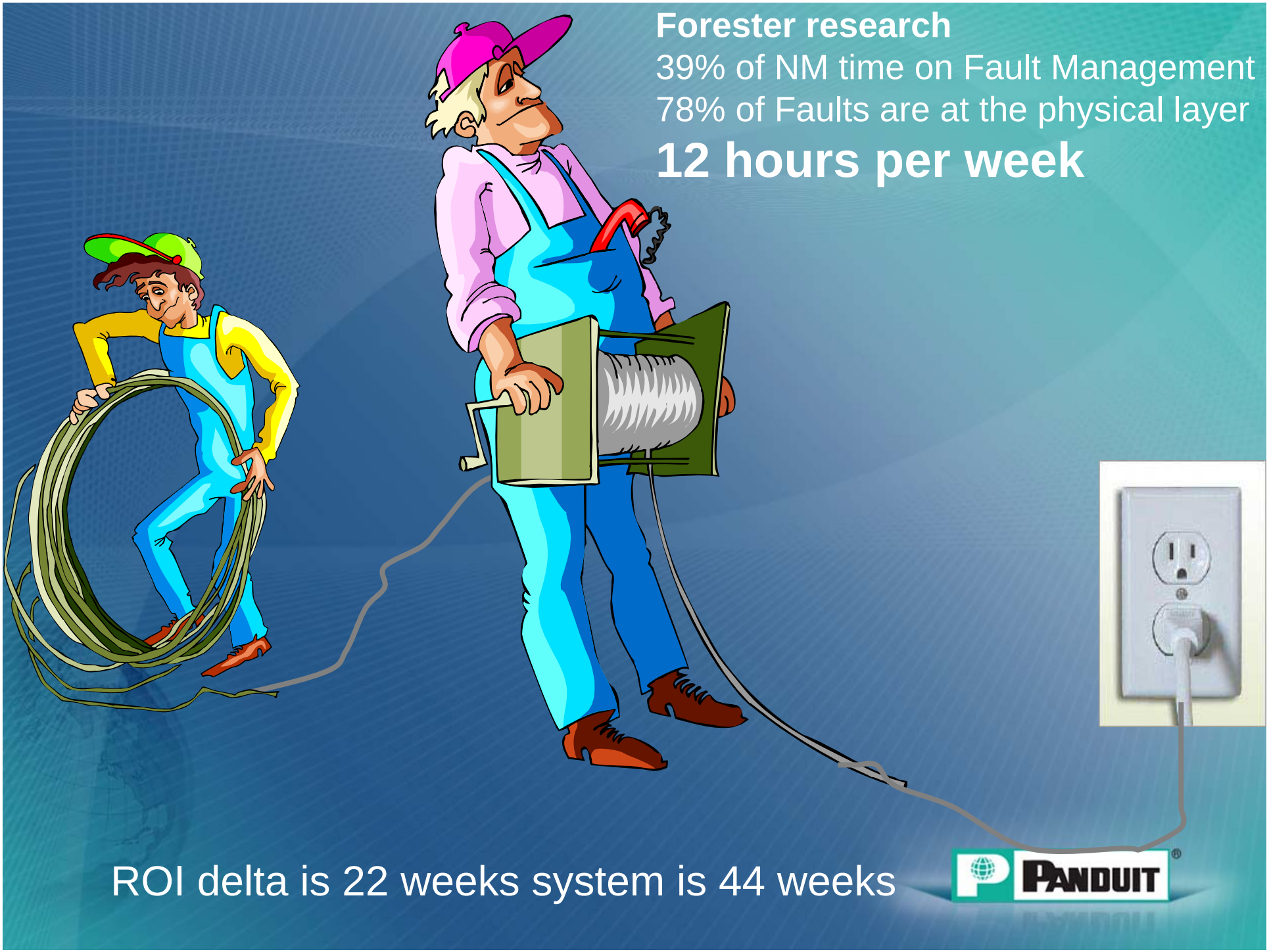
PanView Dashboard

PANDUIT



IIM Supporting Compliance

PANDUIT


Forester research
39% of NM time on Fault Management
78% of Faults are at the physical layer
12 hours per week
ROI delta is 22 weeks system is 44 weeks
PANDUIT

30% more
Engineering time

Implement Labelling

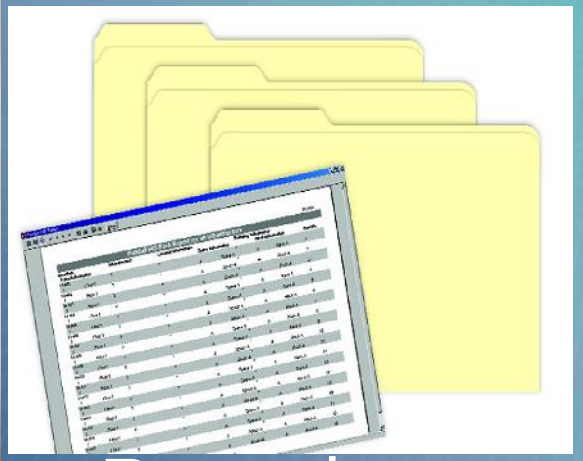
Decommissioning

PANDUIT

1A-B01

Identifiers

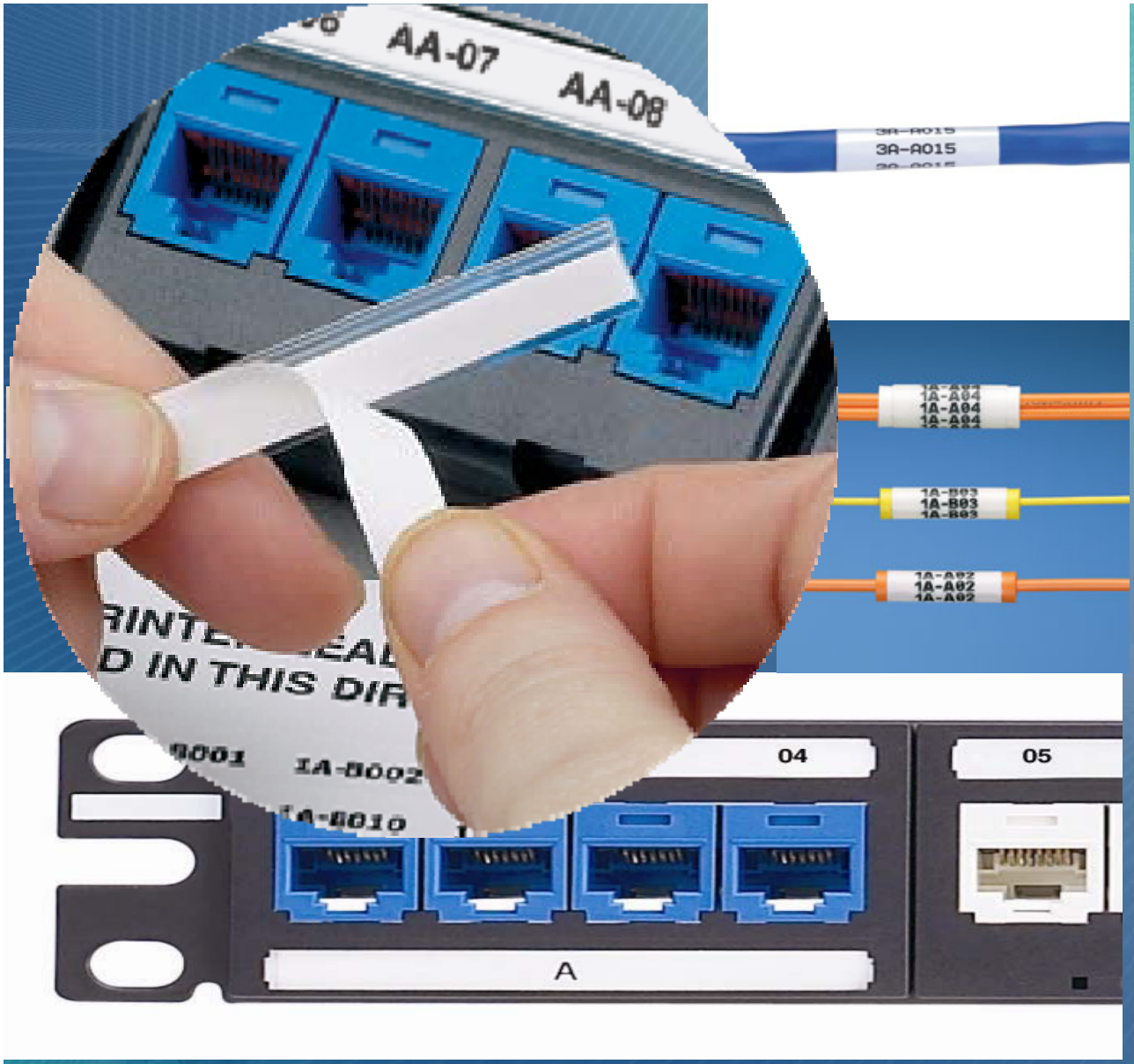
Labeling



Records

Elements of TIA/EIA-606-A

PANDUIT



- Cables
- Outlets
- Racks
- Patch panels
- Backbones
- Grounding Busbars
- Firestop locations
- Pathways
- Spaces

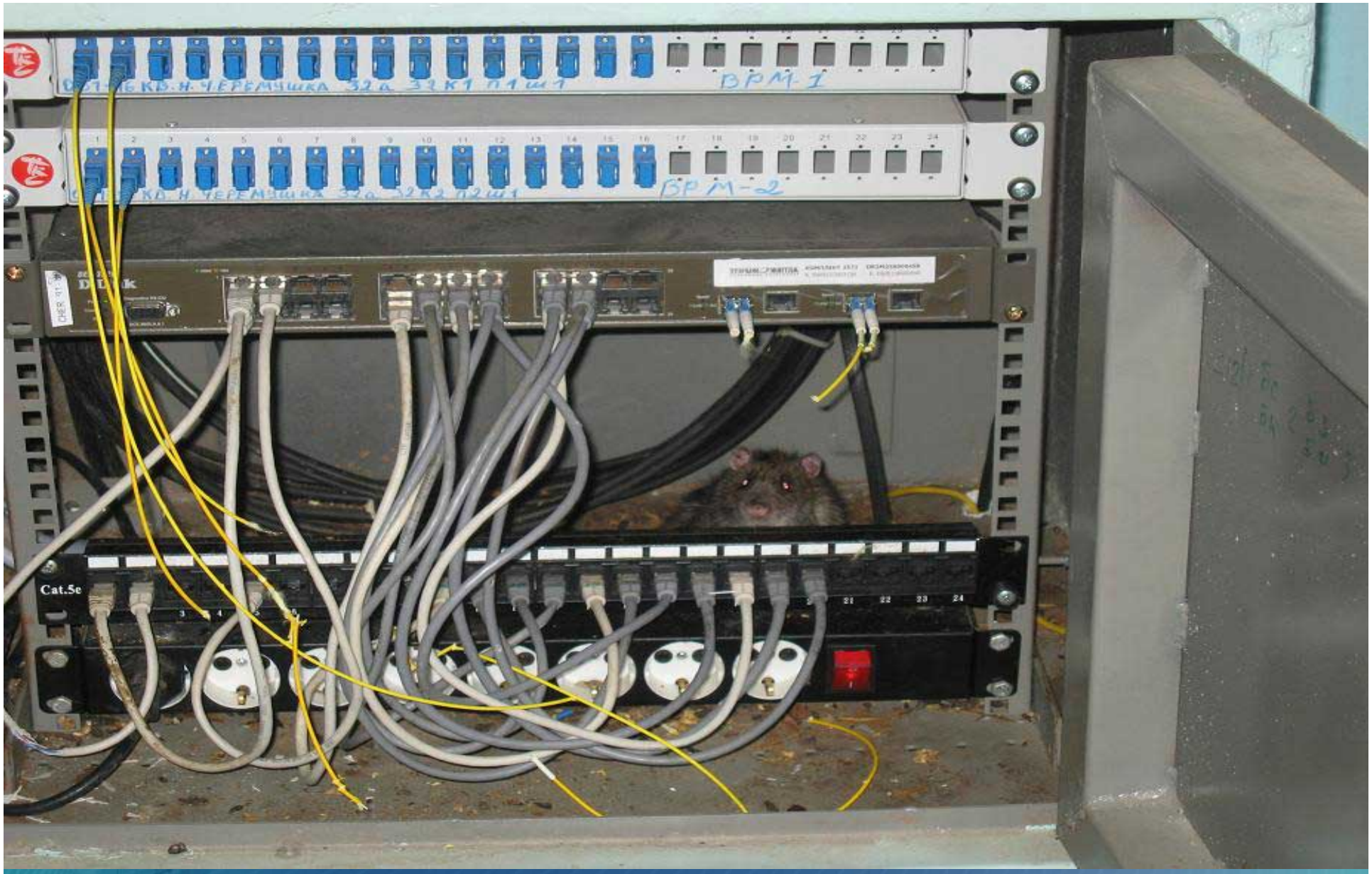
Documentation and Identification

PANDUIT

- Cooling
- Space
- Risk Aversion
- Power

We Build the physical foundation of the DC

PANDUIT



Cable Considerations

PANDUIT

Cabling Media	Connection Type	Diameter	Minimum Bend Radius	Maximum Data Rate	Maximum Distance*	Common Applications
Category 5E	RJ-45	0.19 in	1.00 in	1 Gb/s	100 meters	Older LANs
Category 6	RJ-45	0.26 in	1.04 in	10 Gb/s	55 meters**	IP Telephony, servers, switches
Category 6A Category 7	RJ-45	0.31 in	1.24 in	10 Gb/s	100 meters	High-end workstations
Infiniband (CX4 twin-axial)	XENPAK	0.37 in	4.00 in	10 Gb/s	15 meters	Server clusters
Multimode fiber (OM3)	LC, SC, ST, FC, FJ, MPO, XENPAK	0.06 in	2.00 in	10 Gb/s	300 meters	Storage Area Networks
Singlemode fiber (OS1)	LC, SC, ST, FC, FJ, MPO, XENPAK	0.12 in	2.00 in	10 Gb/s	40 kilometers	WAN

** Maximum distance where maximum data rate can be maintained*

*** Pending the approval of TIA-TSB-155*

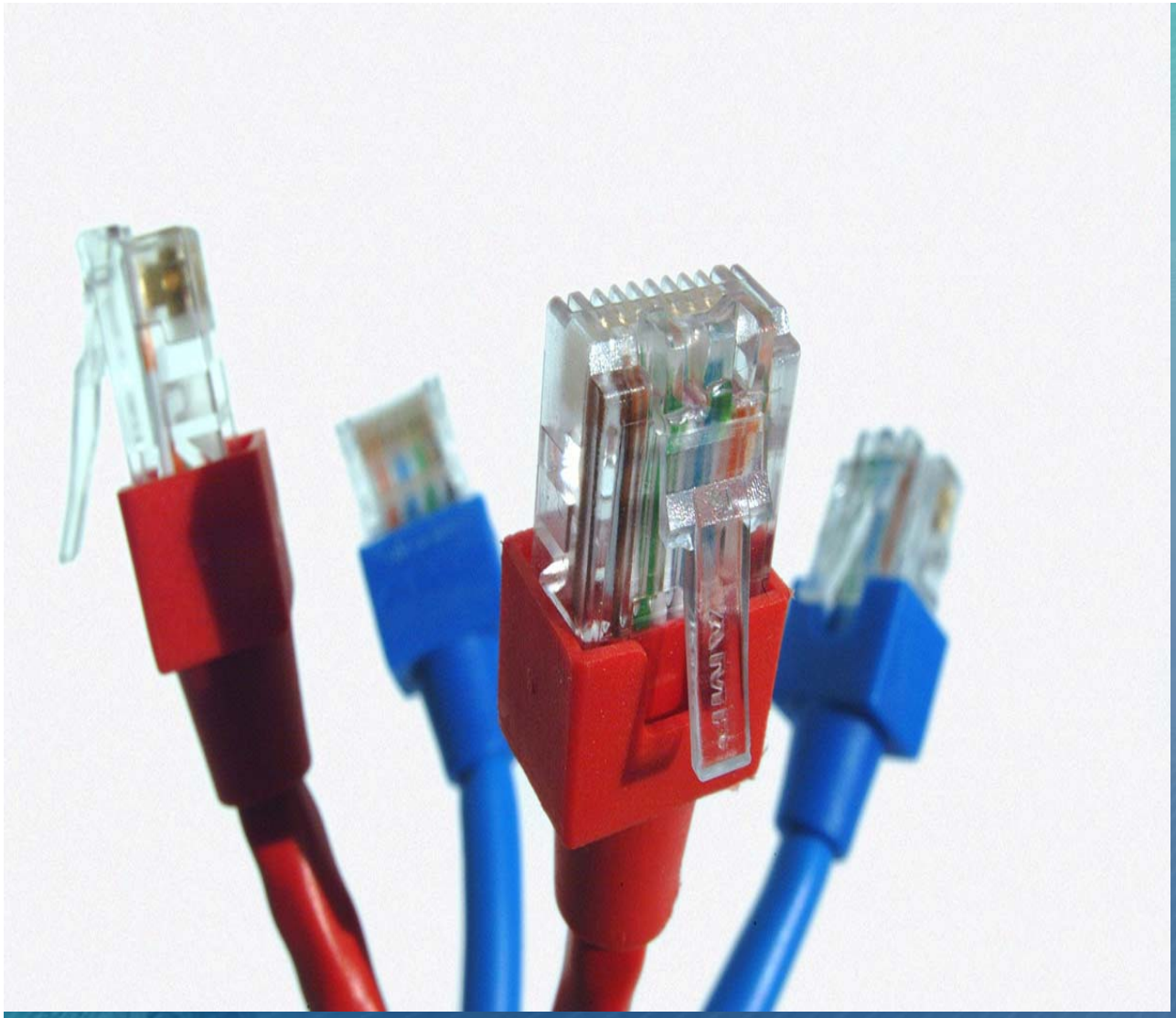
White Paper

End to End 25 Year System Guarantee

PANDUIT®

Speed of Installation

PANDUIT



- Fibre or Copper ?
  10-15 watts/port
- Fibre Ribbons?
- Copper Patching after Patching?
- Foil UTP or Shielded Grounding Mandatory

ISSUES TO CONSIDER FOR 10GIG

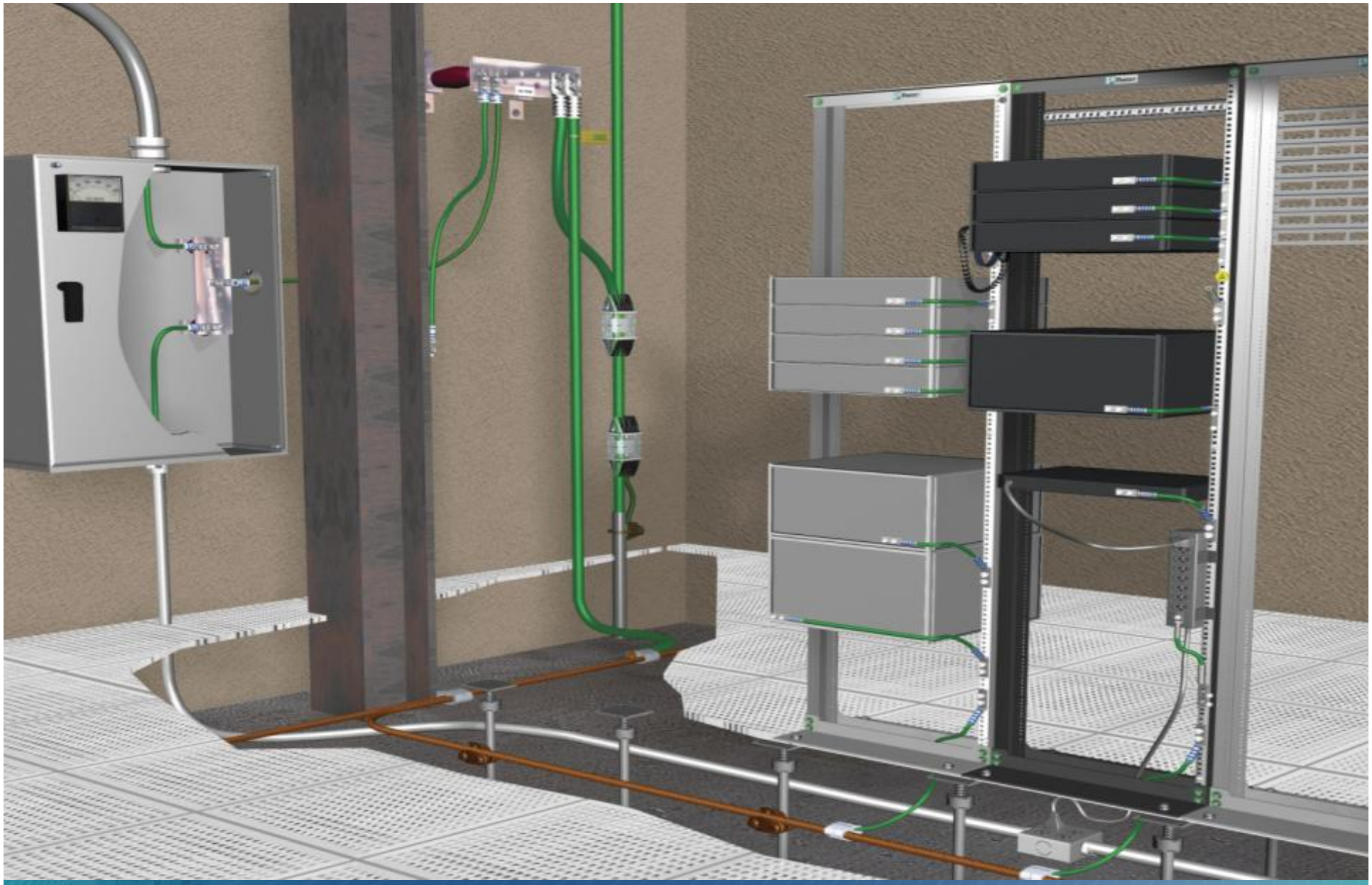
PANDUIT

Grounding / Earthing Solutions

PANDUIT

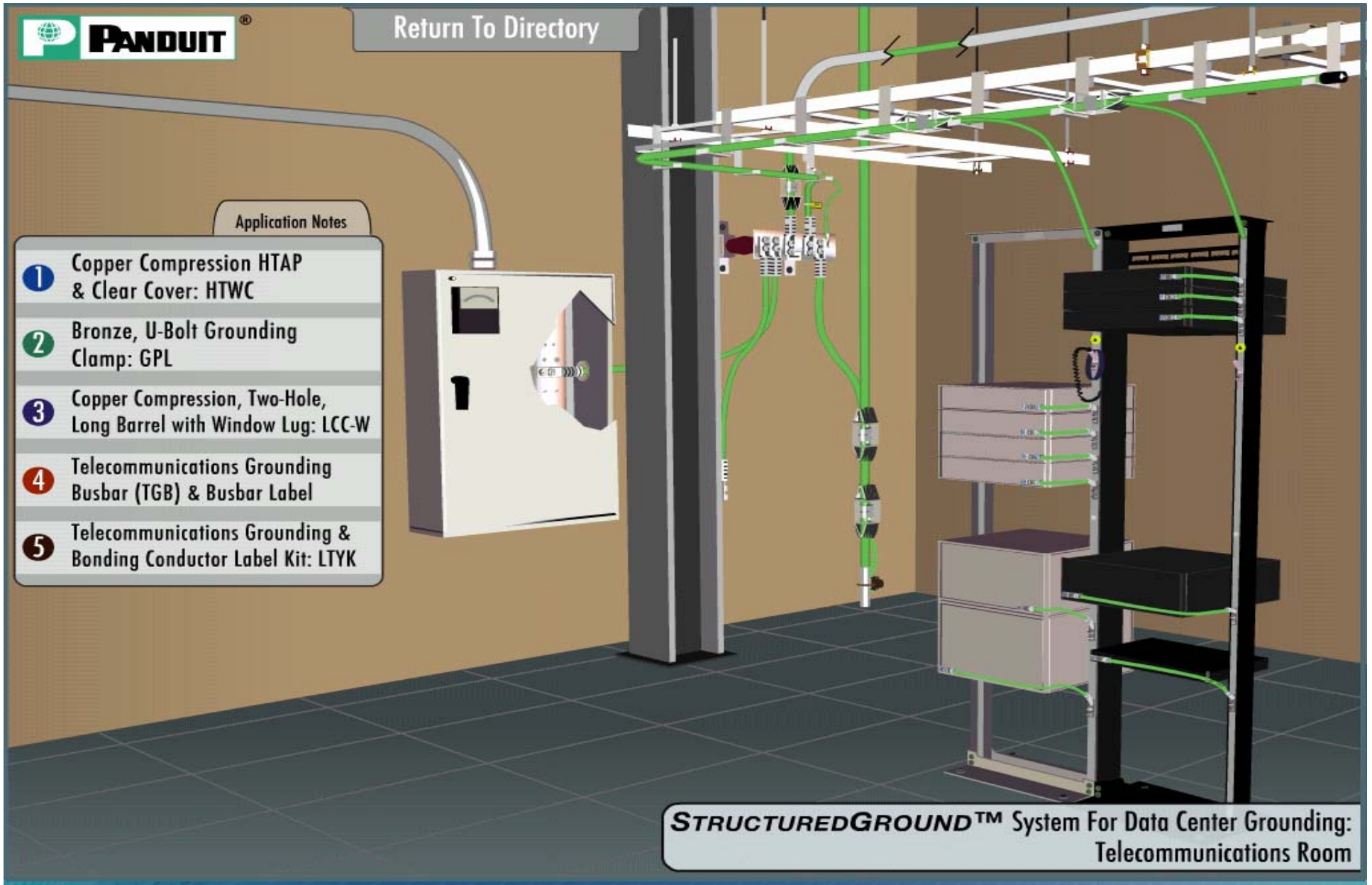
Telecoms Grounding Network

PANDUIT



Suspended Floor Grounding Network

PANDUIT

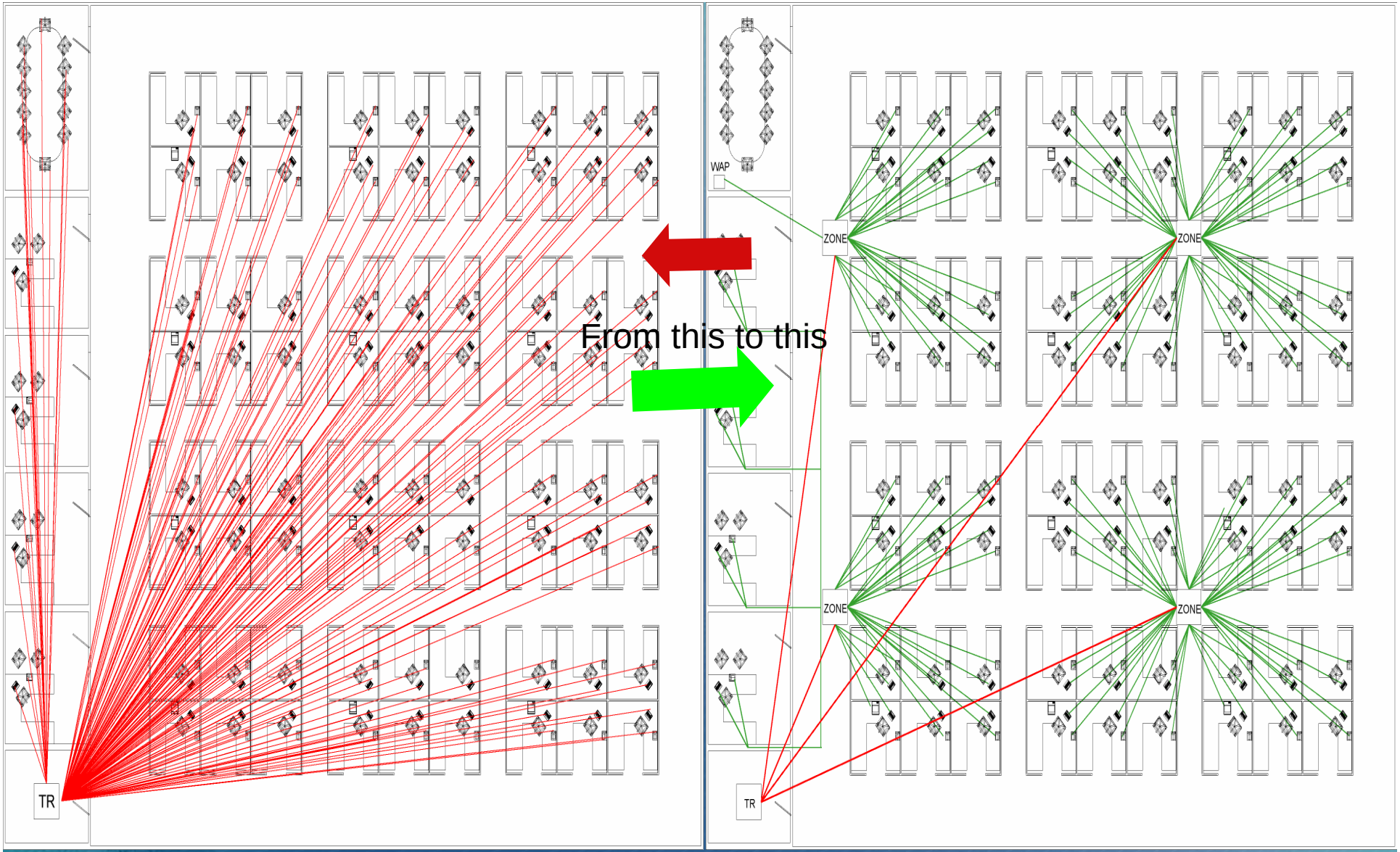


Solid Floor Grounding Network

PANDUIT

New Cabling Trend

PANDUIT

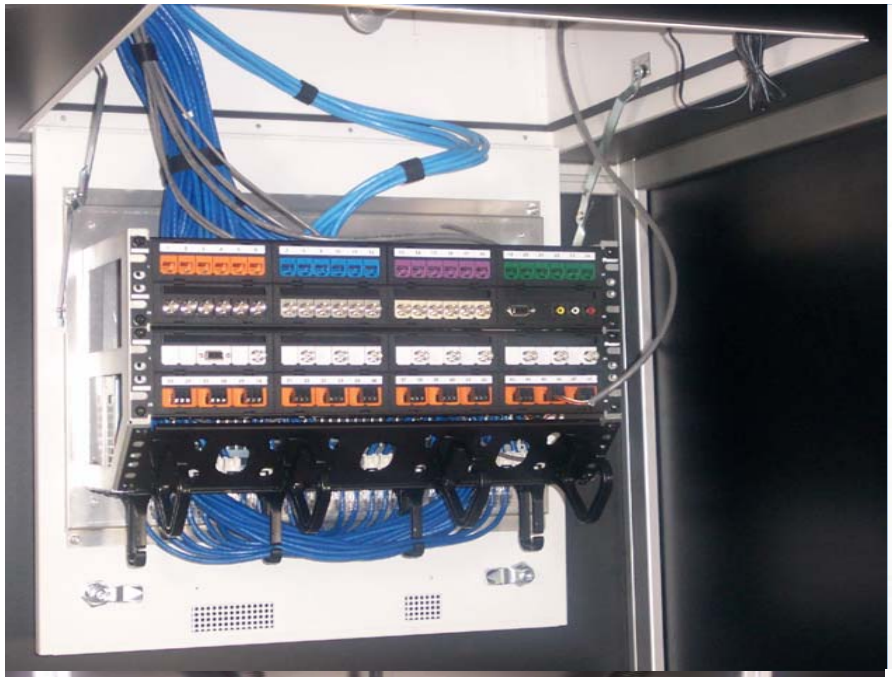


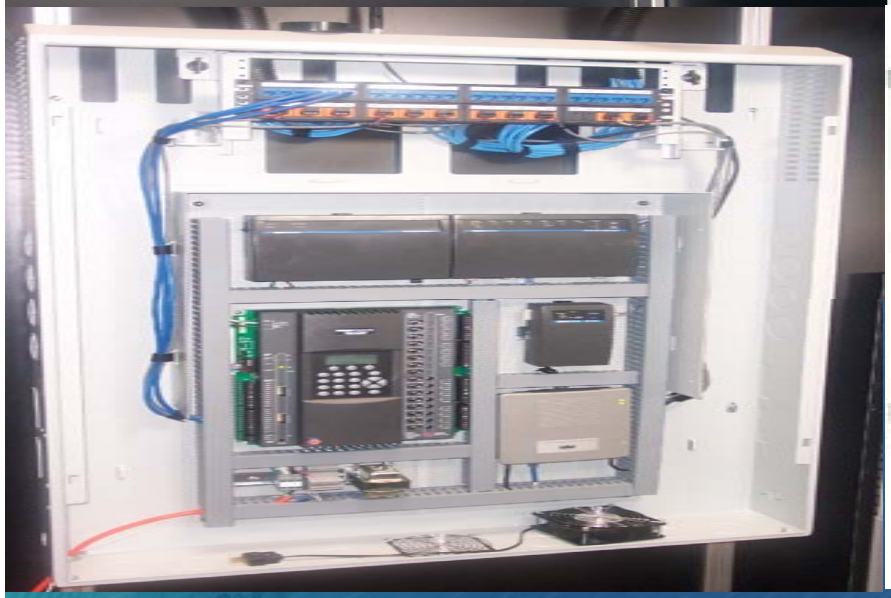
Zone Cabling Solutions

PANDUIT

Active Zone Enclosure

PANDUIT





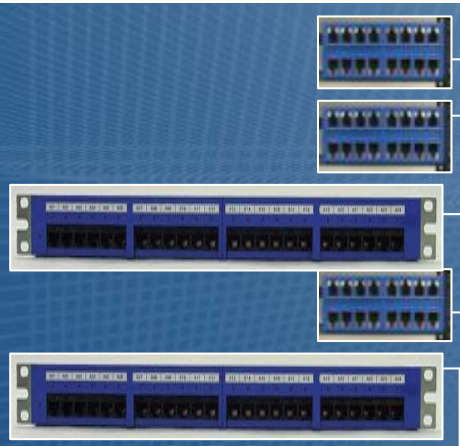
Zone Cabinets

PANDUIT

- Cooling
- Space
- Risk Aversion
- Power

We Build the physical foundation of the DC

PANDUIT



48 volt power distribution

Chassis and rectifiers
500w or 1250w units

Power redundancy optional

UPS Power Backup

IP Telephony

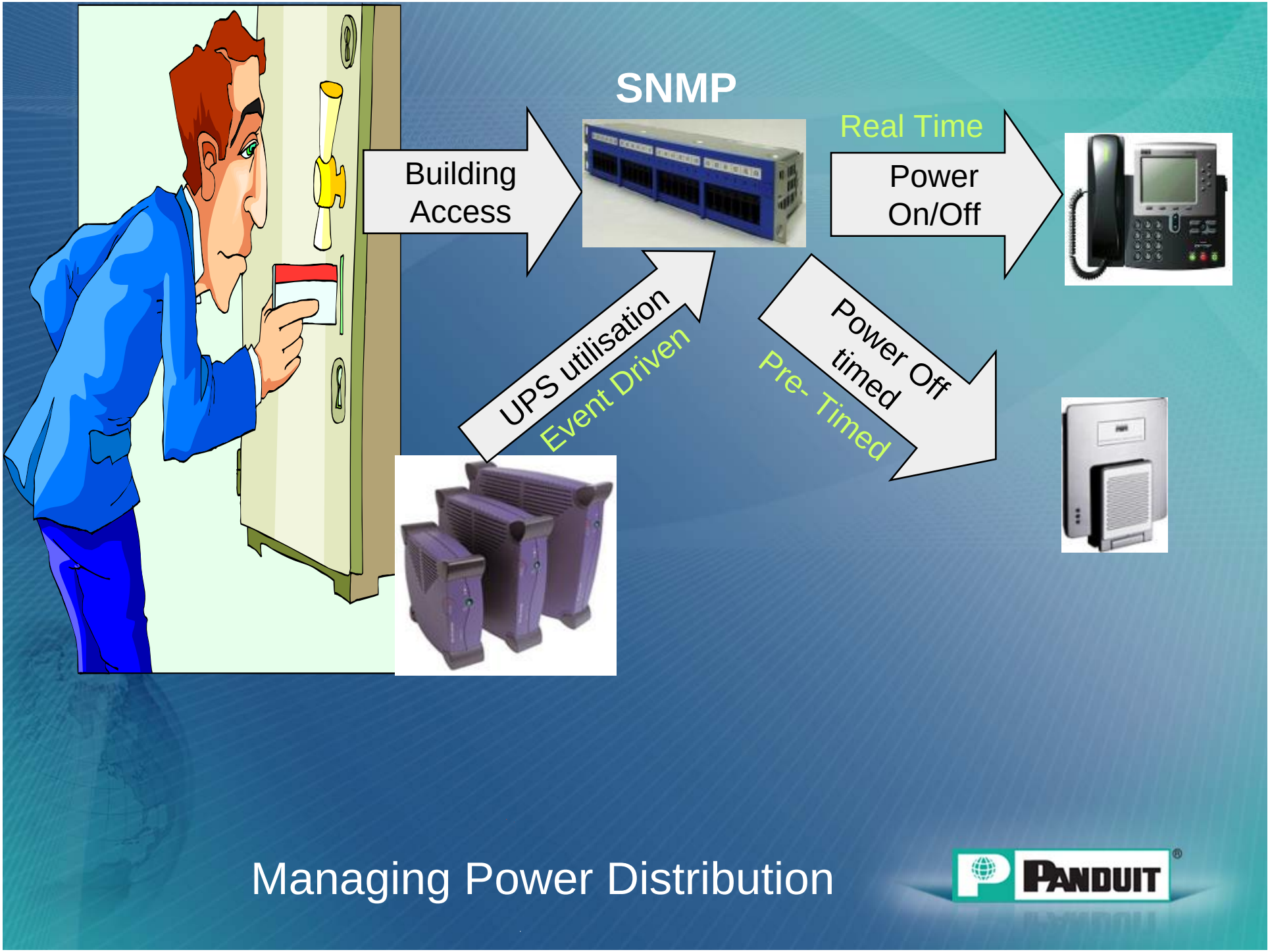
Building Access

Wireless Access

IP Security

PoE Implementation

PANDUIT



Managing Power Distribution

PANDUIT

1. IPT
2. Disaster recovery
3. Thin Client with LED Screen
4. LED Lighting ??????? –

Mass deployment of PoE.

PANDUIT

4 - 6 watts

VDI-Thin Client.

PANDUIT

Organic Light-Emitting Diode (OLED)

contrast 1,000,000 to 1,

1,000 times faster than LCD

40 per cent less energy.

Power saving at the desktop is 98%

Sony TV XEL-1

PANDUIT

Microvision.com

PANDUIT

Switch Example	1300 ACv Redundant		1300 ACv Combined		2800 ACv Redundant		2800 ACv Combined	
	Class 2 7 watts	Class 3 15.4 watts	Class 2 7 watts	Class 3 15.4 watts	Class 2 7 watts	Class 3 15.4 watts	Class 2 7 watts	Class 3 15.4 watts
Version 1	96	46	96	77	96	80	96	80
V2	102	46	170	77	179	80	240	134
V3	102	46	170	77	179	80	240	134
V4	102	45	170	77	179	80	240	134
V5	NA	NA	NA	NA	179	80	240	134

1000 WAC

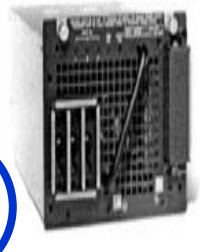
1300 WAC

1400 WAC

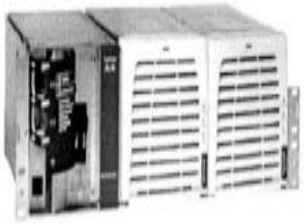
2800 WACV

1400 WDC with PEM

External AC Power Shelf 2500W



1400 WDC Triple Input



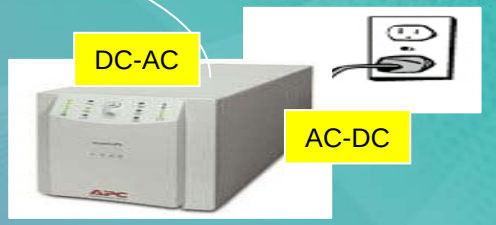
External AC Power Shelf

IP telephony

Wireless and Security

This Switch has 384 ports

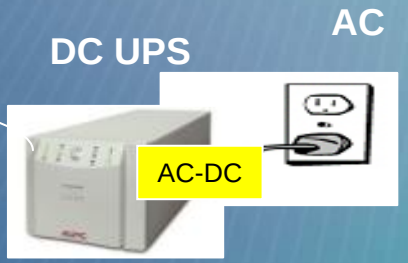
PANDUIT



UPS

33% power loss

PoE patch Panel



7% power loss

PANDUIT

Airbus A380

Saved .75 tons of on board power generators

Saved 7 tons of mains cable

ZERO heat

PANDUIT

Copper Solutions

Fibre Solutions

Outlet Solutions

Racks & Cable Mgt.

Fibre Cable Routing

Zone Cabling products

Surface Raceway

Wiring Duct

Wiring Accessories

Cable Ties

Identification & Labeling

Heat Shrink & Abrasion Protection

Power & Grounding Connectors

Safety & Facility ID products

Managed Network Solutions

End-to-end infrastructure solutions

PANDUIT

- Review business and technical drivers before starting
  - Immediate needs, availability and flexibility for future
- Use TR-942 as guidance
  - It defines tier levels and guidelines on how to achieve uptime
    - Give proper consideration to the trade-offs of cost and potential downtime
  - It recommends hierarchy for the structured cabling!
  - Use hot and cold aisles to maximize power density
- 10G – you have options; consider them carefully and ask good questions of potential suppliers
- Earthing – Not to be ignored if you value uptime and safety
  - Seems simple…don't be deceived
- Maximize equipment and cable infrastructure density
  - Space is money
- Physical layer management –
  - An uptime and security benefit and key to reducing insomnia
- Extend services to user areas in a structured way Zone enclosure
  - PoE is a facilities service and should be part of the cabling

PANDUIT