

Physical Infrastructure Solutions

***Inžinjerska komora Crne Gore
Strukovna komora inženjera elektrotehnike
Podgorica, 27.11.2015.***

**Buzadžić Goran
Senior Territory Account Manager, Panduit EMEA
rs-gb@panduit.com**

11/27/2015

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Agenda

- **Standards** – basics, news and updates, Cat8 latest news
- **Fiber Optics** – standards info, latest updates
- **Zone Cabling** – standard model
- **PoE, Wi-Fi** – implementation model
- **System Warranty**

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

The Standard Committees

- **ANSI/TIA/EIA** – American National Standard Institute/
Telecommunication Industry Association/Electronic Industry Alliance
 - **US relevance**
- **ISO/IEC** – International Organization for Standardization / International
Electrotechnical Commission
 - **International relevance**
- **CENELEC** – Comite` Europeen Normalisation Electrotechnique
(European Committee for Electrotechnical Standardization)
 - **European relevance**

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

ANSI/TIA/EIA Standards

- **ANSI/TIA/EIA 568-C** is the new TIA/EIA standard which supersedes the legacy TIA/EIA 568-B family of standards
- The **568-C** new family of telecommunication standards include:
 - **TIA/EIA 568-C.0** Generic Telecommunications Cabling Standard for Customer Premises
 - **TIA/EIA 568-C.1** Commercial Building Telecommunications Cabling Standard
 - **TIA/EIA 568-C.2** Balanced Twisted Pair Telecommunications Cabling and Components Standard
 - **TIA/EIA 568-C.3** Optical Fibre Cabling Components Standards

These standards provide the foundations essential for design, installation and maintenance best practises you will need to understand your customer's needs

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Main changes in the 568-C series

TIA/EIA 568-C.0

- CAT6A has been added as a recognised media
- Optical fibre link test requirements were moved to this document
- Optical fibre link performance requirements were moved to this document

TIA/EIA 568-C.1

- CAT6A has been added as a recognised media
- OM3 is recommended if MM fibre is used as backbone
- CAT5, 150-ohm STP, 50-ohm and 75-ohm have been removed from the list

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Main changes in the 568-C series

TIA/EIA 568-C.2

- Balance twisted pair channel and permanent link are included in this session
- One laboratory test method has been defined for all categories and connecting hardware

TIA/EIA 568-C.3

- The ISO nomenclature for optical fibre cable types (OM1 – OM2 -OM3 – OS1/OS2) have been added to transmission performance table
- Recommended connector housing and adapter colours have been added to support installation when colour is used to identify fibre media (Panduit in line with recommendations)

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

ISO/IEC International Standard

- **The ISO/IEC 11801 2.1 edition** cover Information Technology – Generic Cabling for Customer Premises.
- ISO/IEC 11801 Amendment 1 cover new class Ea and Fa channel requirement.
- It can be compared to the ANSI/EIA/TIA 568-C family of standards
- ISO standards cover all technical fields except electrical and electronic engineering , which is the responsibility of the IEC. A joint technical committee called JTC 1 carries out the work in the information technology field and it is responsible for the creation of the famous ISO/IEC 11801

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

TIA & ISO/IEC classifications

TIA and ISO Equivalent Classifications

Frequency Bandwidth	TIA (Components)	TIA (Cabling)	ISO (Components)	ISO (Cabling)
1 - 100 MHz	Category 5e	Category 5e	Category 5e	Class D
1 - 250 MHz	Category 6	Category 6	Category 6	Class E
1 - 500 MHz	Category 6A	Category 6A	Category 6A	Class E _A
1 - 600 MHz	n/s	n/s	Category 7	Class F
1 - 1,000 MHz	n/s	n/s	Category 7 _A	Class F _A

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

CENELEC EN European Standard

CENELEC EN 50173-1/A1 Information technology - Generic cabling systems

Part 1: **General requirements**

CELENEC EN 50173-2 Information technology - Generic cabling systems

Part 2: **Office premises**

CELENEC EN 50173-3 Information technology - Generic cabling systems

Part 3: **Industrial premises**

CELENEC EN 50173-4 Information technology - Generic cabling systems

Part 4: **Homes**

CELENEC EN 50173-5 Information technology - Generic cabling systems

Part 5: **Data Centre**

- Every European country still maintain its own national standards body but CENELEC standards are adopted as national standards where they exist (i.e. BS is placed in front of the EN number - **BS EN50173-1**)

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Recognised “Link” & “Channel”

- *ANSI/TIA/EIA, ISO/IEC* and *CEN/IEC EN* standards refer to specific link and channel configuration used for design, installation and testing purposes:
 - Permanent Link
 - Channel Link
- A permanent link **must** not exceed 90m length and can consist of :
 - Telecommunications outlet/connector – this can be a faceplate
 - Cable between the telecommunications outlet/connector and the HC (FD)
 - TP, HCP, or CP connecting hardware (optional)
 - Connecting hardware at the HC (FD) – this can be a patch panel
- A channel link includes equipment cords and work area cords at both end respectively

Unified Physical InfrastructureSM

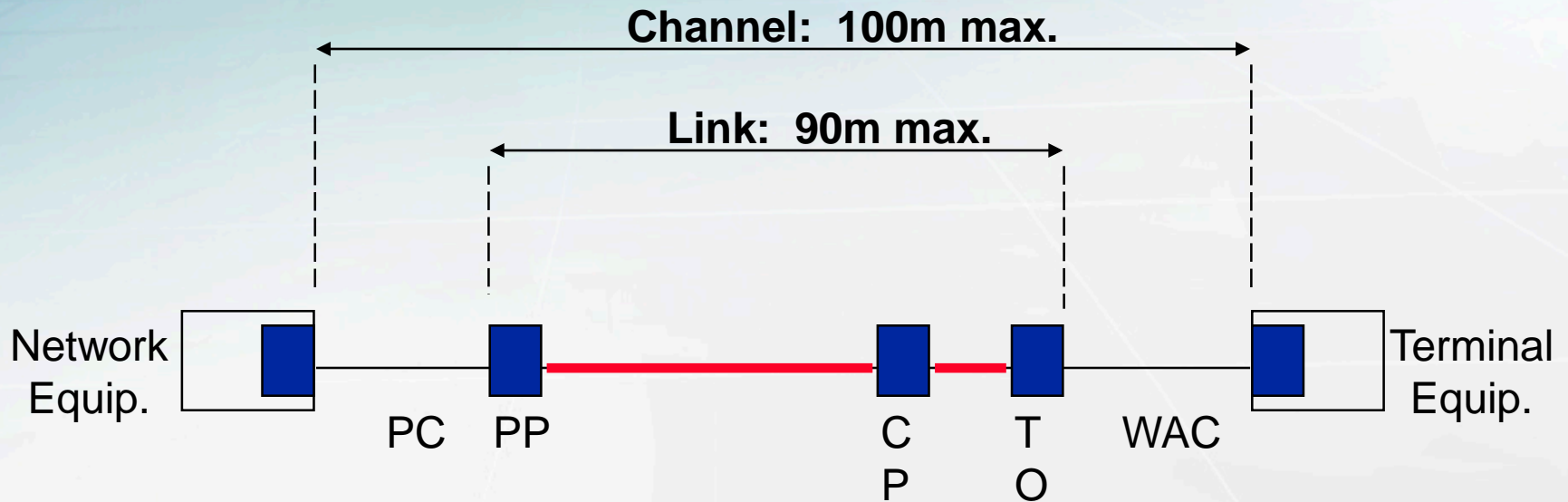


building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Recognised “Link” & “Channel”...cont

Channel link



Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Recognised Link & Channel...cont

Channel link options

Length of horizontal cable	24 AWG cords		26 AWG cords	
	Maximum length of work area cord	Maximum combined length of work area cord, patch cords, and equipment cord	Maximum length of work area cord	Maximum combined length of work area cord, patch cords, and equipment cord
H m (ft)	W m (ft)	C m (ft)	W m (ft)	C m (ft)
90 (295)	5 (16)	10 (33)	4 (13)	8 (26)
85 (279)	9 (30)	14 (46)	7 (23)	11 (35)
80 (262)	13 (44)	18 (59)	11 (35)	15 (49)
75 (246)	17 (57)	22 (72)	14 (46)	18 (59)
70 (230)	22 (72)	27 (89)	17 (56)	21 (70)

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Panduit Category 8 system gains third-party confirmation, meets draft standard

Panduit announced that its Category 8 copper cabling system has been tested and confirmed by Intertek, an independent third party laboratory, to meet the latest draft of the proposed Category 8 TIA-568-C.2-1 standard for data centers. “Panduit has successfully developed a full 30-meter system that meets the latest Category 8 draft standard,” stated Antoine Pelletier, project engineer, Intertek. “The successful performance of this system shows the industry is embracing this new challenging standard that has 4 times the bandwidth of existing Category 6A to support both 25 and 40 Gigabit transmission. Category 8 cabling systems are designed to support Ethernet data rates of 25GBASE-T and 40GBASE-T at channel lengths up to 30 meters. Panduit notes that these systems are designed for the data center of the future, by providing the simple, cost-effective, and universal RJ45 interface for both end-of-row and top-of-rack architectures. TIA standards for Category 8 and 25/40GBASE-T are expected to be ratified in 2016.

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Fibre Standard Nomenclature

OM1 is equivalent to standard 62.5/125µm MM fibre

OM2 is equivalent to standard 50/125µm fibre

OM3 is laser enhanced 50/125µm fibre

OS1 is equivalent to SM 8/125µm fibre

In essence when operating at speeds of 10Gb/s, OM3 fibre must be used up to 300m reach, beyond this distance, OM4 or OS2 fibre must be used.

Speed	Reach		
	300 m	500 m	2000 m
100 Mb/s	OM1	OM1	OM1
1000 Mb/s	OM1	OM2	OS2
10 Gb/s	OM3 / OM4	OM4 / OS2	OS2



Fiber Types In depth - Singlemode

- Highest throughput
- Lowest loss
- Longest lengths between signal regeneration
- Most expensive transceivers
- Cheapest fiber

- Most common in long distance runs
- Backhaul, aggregated connections
- High speed equipment links – switch to switch

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Low/Zero Water Peak Fibre (OS2)

Low OH⁻ Fiber Background

- The "water peak" is primarily due to hydrogen, which readily diffuses through the glass matrix of an optical fiber. It is trapped at defects in the glass structure and causes light attenuation at wavelengths between 1360 and 1460nm (1383 to be precise)
- The presence of moisture in conventional fibers causes high attenuation along a portion of the transmission spectrum
- To manufacture low water peak fibers, water levels in the fiber are reduced from **10 parts-per-billion (ppb) to less than 1 ppb**
- Low water peak fiber, has significantly more WDM capacity than conventional fiber and it is now standard offering as per **ITU-G.652 D**



Fiber Types In depth - Multimode

- Original Multimode had a 62.5 core and was designated “OM1”
- OM2 – 50/125
 - OM1 and OM2 originally utilized LED transceivers.
- OM3 – 10gb capable up to 300m
- OM4 – 10gb capable up to 500m
 - 10 Gig transmission made possible with Vertical Cavity Surface Emitting lasers
- OM5/”Wide Band” fiber is on its way, capable of 100gb
- Enterprise class (1gb /10gb) throughput over limited distances
- Less expensive transceivers than singlemode
- OM4 is the most expensive fiber
- Prevalent in data centers
- Used throughout the enterprise

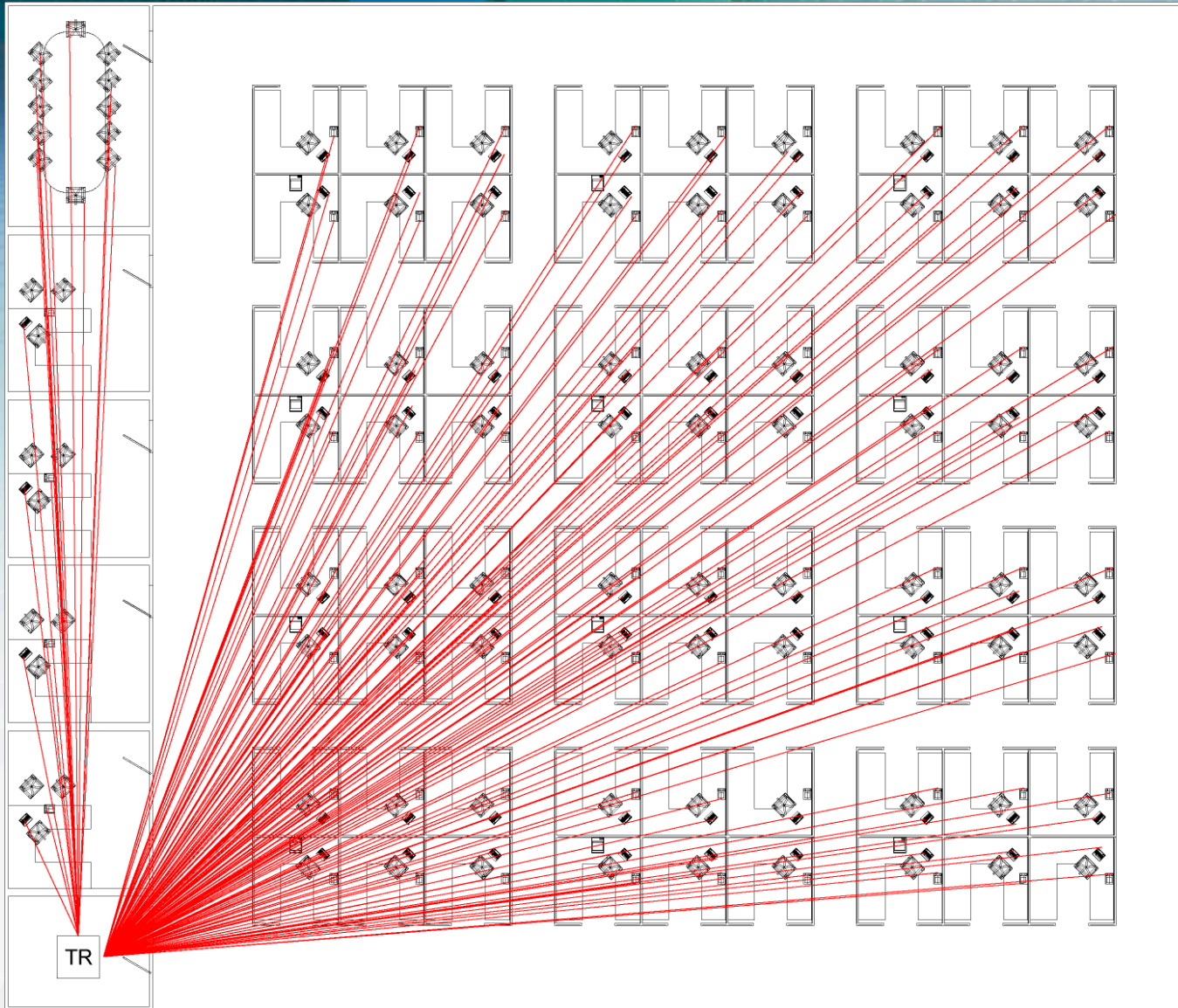
Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Traditional “Home Run” Cabling



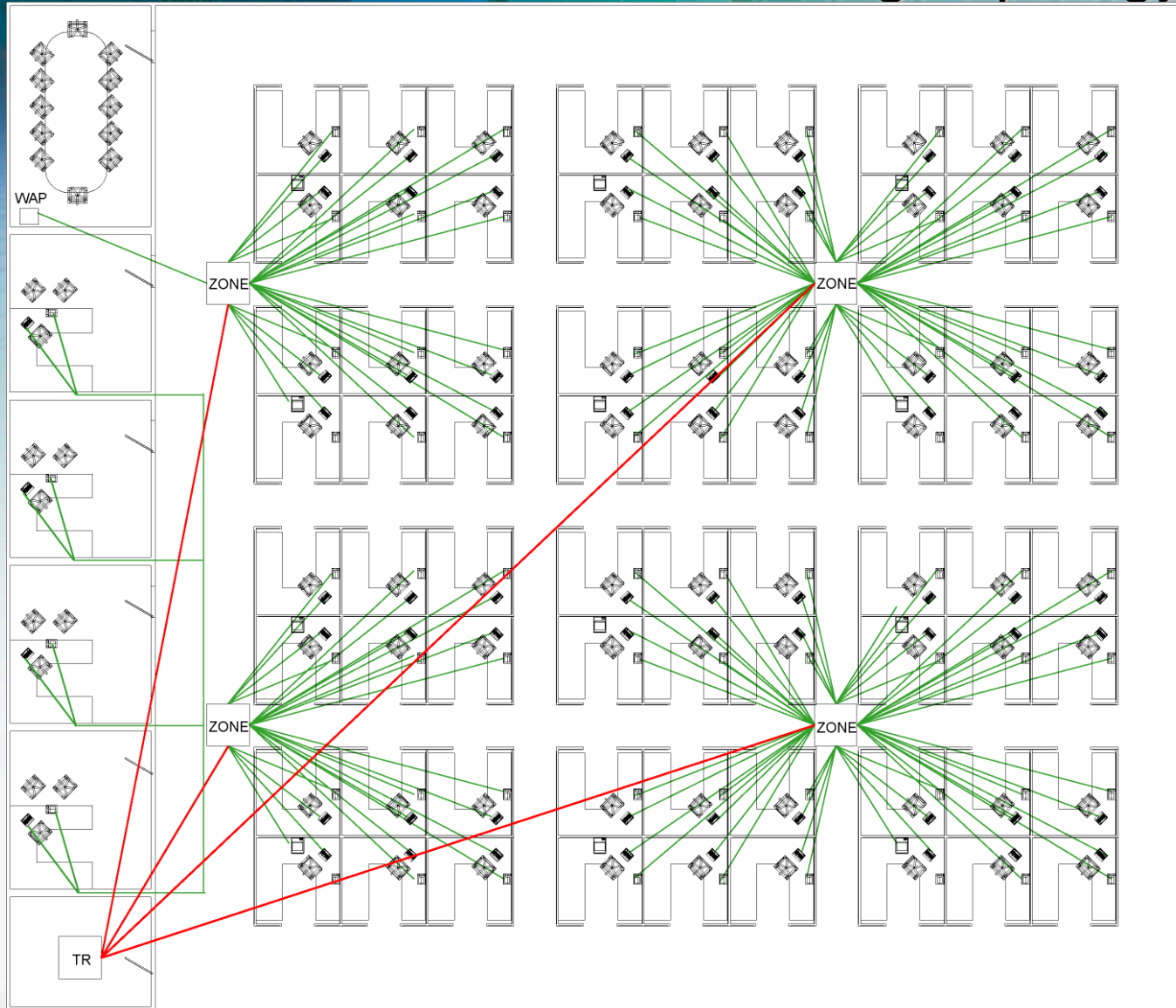
**Multiple cables
(copper) routed
from TR to each
Work Area.**



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Zone Cabling Topology



Route Horizontal cables (copper or fiber) from the TR to a Zone box near the work area.

Short cable runs (copper) go from the zone to each work area.



Traditional Vs. Zone Cabling

Traditional Structured Cabling:

- Multiple cables (copper) from the Telecommunication Room (TR) to each work station

Zone Cabling:

- I. Simply Put: It's a connection point in the horizontal cable
- II. The zone boxes can take any number of forms
 - Wall Mount Cabinets or Enclosures
 - In-ceiling boxes
 - In-floor boxes

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

PanZone[®] Zone Enclosure Network

Work Area Raised Floor Enclosure

Cabling consolidation for Modern building systems with raised floors

- Accessibility to connections
 - Allows access to the patch field within the local work area without removing floor tiles
 - Rapid deployment of connections
 - Reduces cable congestion
- Aesthetic design
 - Mounts in a raised floor environment and can be concealed with office flooring
 - Lockable for security from intrusion/damage
- Modularity
 - Accepts Mini-Com[®] Copper or Fiber Modules that snap in and out to simplify moves, adds, and changes



Unified Physical InfrastructureSM

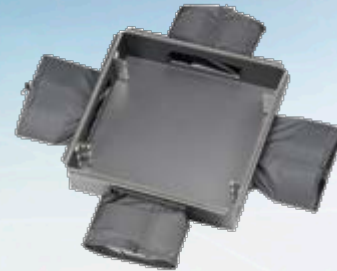


building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Solution Overview

- Use conventional 19" EIA patch panels
- Pushdowns, modular or pre-terminated, fiber or copper
- Three size units
 - PZRFE4U
 - Up to 4 RU
 - PZRFE8U
 - Up to 8RU
 - PZRFE12U
 - Up to 12 RU
- Optional cover
 - PZRFC
 - Lockable with one key type for all.
- Wider range of floor stanchion supported
 - Up to 2" in diameter
- Meets UL 2043 rating for plenum use.



PZRFE4U



PZRFE8U



PZRFE12U

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

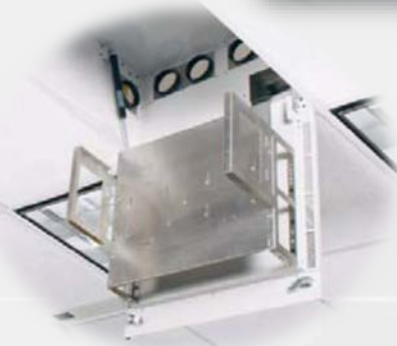
PANDUIT[®]

PanZone[®] Zone Enclosure Network

In-Ceiling Zone Enclosure

Build centralized or distributed network zone architectures

- Accessibility to connections
 - Active or passive consolidation
 - Allows access to the patch field within the local work ceiling
 - Rapid deployment of connections
 - Reduces cable congestion
- Reduce floor space
 - Minimizes floor space required in telecommunications equipment room to relieve congestion
- Modularity
 - Accepts standard Patch panels



Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

PanZone[®] Zone Enclosure Network

PanZone[®] Active Wall Mount Enclosure

Functions as a Mini Telecommunication Room

- Accessibility to connections
 - Allows access to the patch field local to the work area
 - Rapid deployment of connections
 - Reduces cable congestion
- Active low profile wall mount solution
 - Holds up to 3 RU of passive product and up to 3 RU of active equipment, while providing multiple cable entry/exit points via optional knockout points
- Security
 - Lockable for security
 - Matched keying for convenience



Unified Physical InfrastructureSM

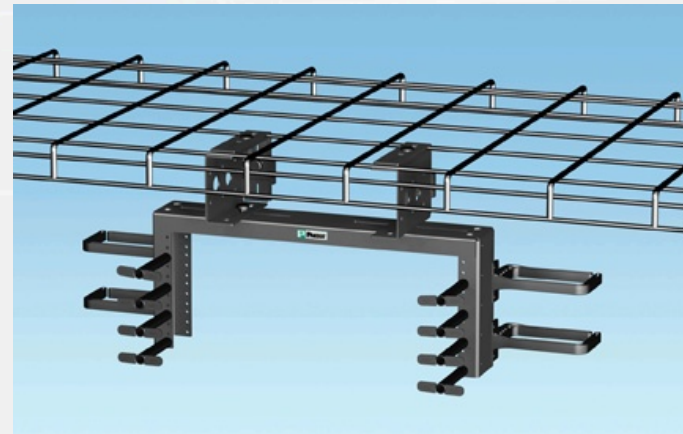


building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Market Overview

- Panduit adds overhead distribution racks for maximizing the real estate utilization by increasing the port density per square foot in Data Centers or Telecommunication Rooms
- The PanZone® Overhead Distribution Racks enable the deployment of Zone Distribution Areas within the Data Center for greater scalability and quicker server deployments



Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Product and Technical Information

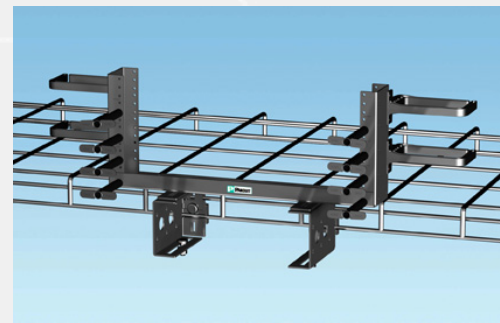
PanZone® Overhead Distribution Racks

I. Additional rack units

- 3 sizes available; 2, 4, & 6 rack units
- Provides higher port density per sq ft in data centers and telecommunication rooms
- Maximizes real estate utilization
- Alleviate space restrictions in telecommunication room

II. Universal mounting bracket

- Can mount to Wyr-Grid® and most industry ladder racks or cable trays
- Can also be suspended by threaded rod from ceiling



Unified Physical InfrastructureSM



Mounts to Ladder Rack

Mounts to Cable Tray

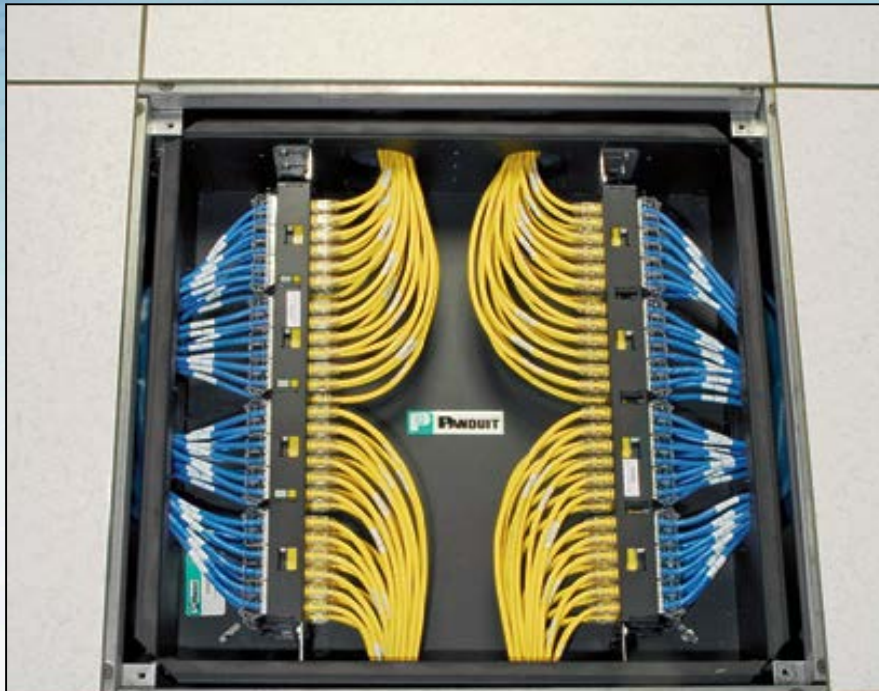
building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

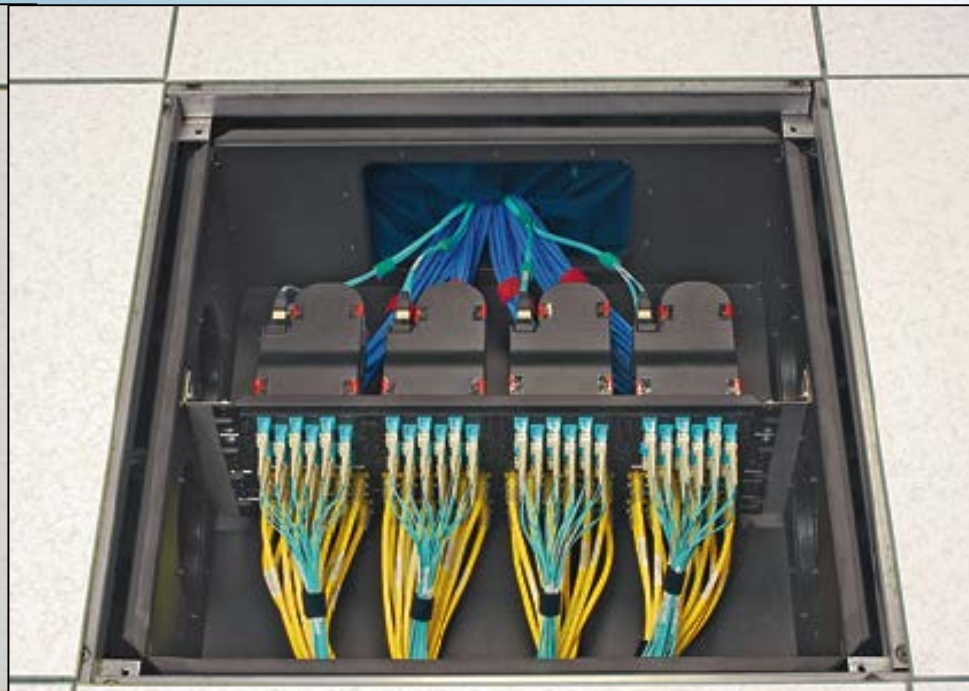
DataCenter Zone Cabling Solutions

Data Center – Zone Distribution Area Enclosures

TIA/EIA 942 Data Center Standard – Recommends terminating at the server or SAN cabinet



PANZONE® Raised Floor Enclosures with conventional fiber or copper terminations



PANZONE® Raised Floor Enclosures with pre-terminated fiber or copper

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT®

Enterprise Zone Cabling Solutions

Centralized Network – Consolidation Point Enclosures

ACE48 Office raised floor consolidation point enclosure



Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Solution Overview



What IS included:

- Cabinet
- Grounding system
- Patch panels
- Network Cabling
- Cable management
- Blanking Panels

What is NOT included

- Active devices (Servers, Switches, Storage, UPS)
- Power Outlet Units

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

A Critical Part of the Infrastructure

Wireless access points (WAP) are an essential part of enterprise deployments. There is virtually no corporation, school, hospital, or public building that does not include wireless as part of its connectivity strategy.

WAP's have one of the highest growth rates in Data Communications, at an overall 23.5% CAGR from 2010 to 2015. Market studies continue to identify large growth rates and opportunity.



Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

The Current State and Evolving Problem

Installing a WAP directly on a wall or ceiling:

- ✓ Does not meet the latest industry and business security recommendations.
- ✓ Creates the risk of non-compliance



Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

The Solution - Panduit Aruba WAP Enclosures



Wall Mount



Ceiling Tile Mount

Lockable enclosure

Protects against tampering and theft, reducing the cost of ownership

UL 2043 certified

Certified for plenum use when mounted per installation instructions

RF transparent design

Cover allows full transmit and receive for internal antenna WAP models

Opaque cover design

Blends in with office environment

Wall or ceiling mount

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Zone Cabling Solutions

PanZone® Industrial/Outdoor Wireless Enclosures

PANZONE® NEMA 4X/IP66 Wireless Access Point Enclosures

Applications

- Protects a wireless network from tampering and theft by enclosing WAPs
- Specifically designed for use in deploying a WAP in outdoor and industrial environments
- The universal design allows customization to accommodate most Wireless Access Points from various manufacturers including Cisco Aironet^ Wireless Access Points
- Supports WAP deployments using conventional power or Power over Ethernet



Unified Physical Infrastructure™

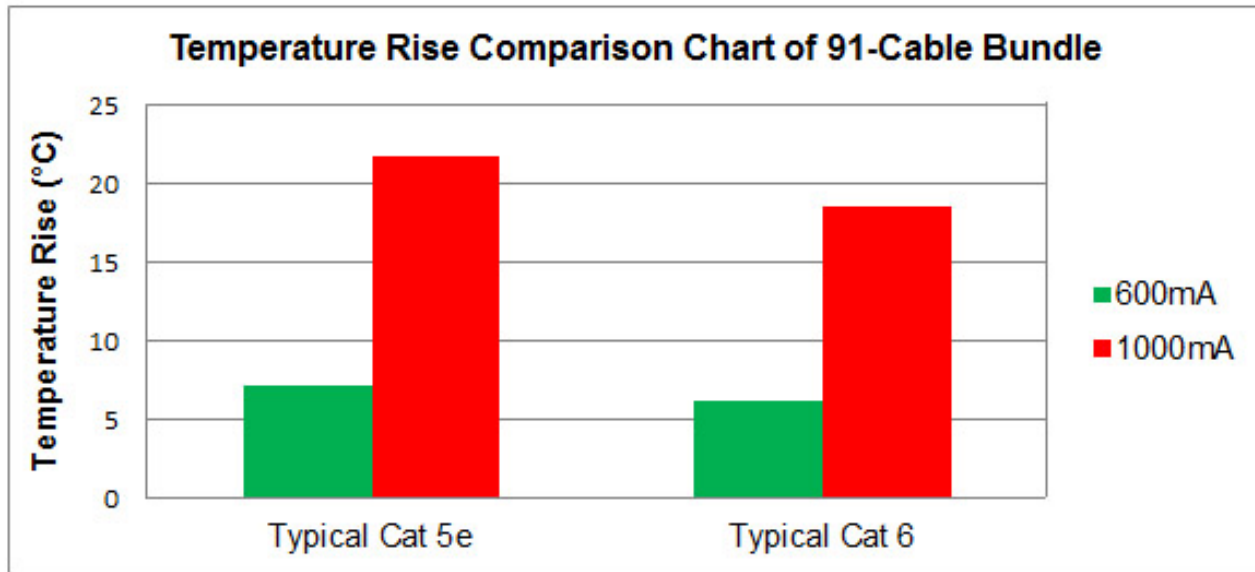


building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT®

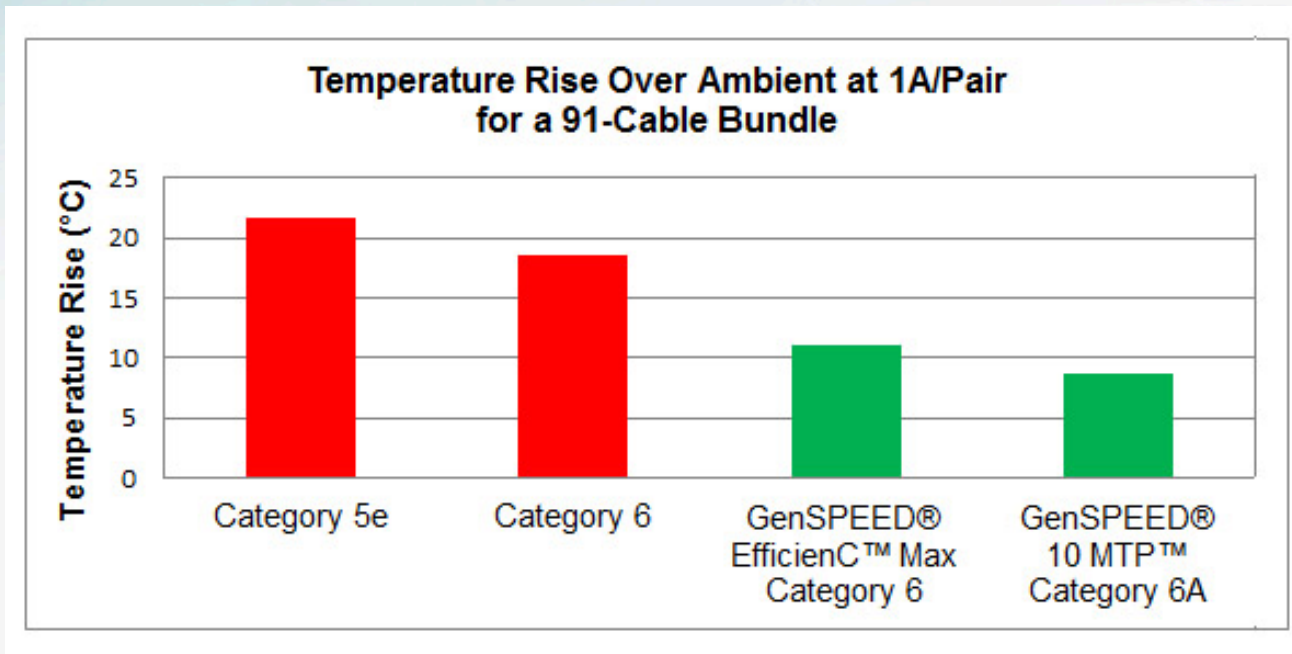
Power over Ethernet

Standard recommendation of PoE systems is that increased power will relate to increased category cabling. In 802.3at PoE+, category 5e cabling is the most basic construction, which provides sufficient conductivity without heat generation issues, therefore it is the minimum requirement. The same by TIA and the IEEE task force can then be expected with 802.3bt with the specified 600mA/pair maximum. Category 5e cable is constructed with 24 AWG conductors, category 6A has 23 AWG conductors. Now that 1000mA/pair is a real possibility, it will redefine what is acceptable for PoE between 60 and 100W.



Power over Ethernet

Specifically designed with larger conductors, these EfficienC Max cables offer reduced resistances, which directly reduces the amount of heat generated within a current-carrying cable. The large conductors also provide improved attenuation performance (insertion loss) to further protect against higher temperature data transmission losses. EfficienC Max cable is also rated to 90°C and constructed of 100% fluoropolymer insulation, offering higher protection against increased operating temperatures and preventing material degradation from elevated temperatures over extended periods.



Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Overview

- [1 year limited product warranty](#) went into effective globally March 1st
- Applies to all Panduit product lines
- Replaces standard product warranties (PanNet Performance Guarantee, Electrical Warranty, Tool and Printer Warranties)
- Certification Plus System Warranty continues to be available to structural cabling system installations that are 100% comprised of Panduit connectivity and Panduit-branded or an Approved Cable Manufacturer cable and meet other requirements

building a smarter, unified business foundation

WORLDWIDE [CHANGE] ENGLISH REGISTER / LOG IN FOLLOW US

PANDUIT SOLUTIONS PRODUCTS AND SERVICES SUPPORT ABOUT US

PARTNER ECOSYSTEM	DESIGN RESOURCES	LITERATURE LIBRARY	DOWNLOAD CENTER	CONTACT US
Distributors Contractors and Installers Technology Partners System Integrator Partners Design Community	Calculators and Design Tools White Papers Installation Guides Part Drawings MSDS Sheets	Product Catalogs Articles Brochures Case Studies	Power Distribution Units Support Software/Firmware/Printers Certifications Warranty	Contact Us Product Support Product Registration

Enable an Intelligent Enterprise
Harness the power of your Enterprise. [Learn more >>](#)

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]

Questions

Unified Physical InfrastructureSM



building a smarter, unified business foundation
Connect. Manage. Automate.

PANDUIT[®]