DPoE™ Power Over Ethernet Systems

Power Patch Panel,
Power Midspans,
Power Distribution

PANDUIT®

building a smarter,
unified business foundation

Connect. Manage. Automate.

Enhance Network Infrastructure with the Power of DPoE™

Power over Ethernet (PoE) expands the capabilities of network infrastructures by utilizing Ethernet wiring systems to send data and power to devices such as VoIP telephones, surveillance cameras, wireless access points, and other converged network applications. PoE offers cost savings, power management, and network reliability over traditional power sources.

Leading the way in PoE technology, Panduit offers several reliable, cost-effective solutions for the deployment of PoE with the DPoE™ Power Patch Panel and the DPoE™ Compact 8 Midspan. Flexible and scalable, these DPoE™ Power over Ethernet Systems enhance network design modularity, simplify installations, and lower total cost of ownership.

Panduit's Unified Physical Infrastructure (UPI)

A unified approach to physical and logical systems architecture is imperative for solutions to fully address the need for availability, agility, integration, and security.

Panduit has developed the industry's most comprehensive and holistic approach to a Unified Physical Infrastructure and can help enterprises align, converge, and optimize critical systems – communication, computing, control, power, and security – to build a smarter, unified business foundation.

Unified Physical Infrastructure

Applications Driving Power Over Ethernet

Convergence of IP telephony (Voice over IP), wireless access points (WAPs), IP surveillance cameras and advanced intelligent building applications necessitate reliable, flexible, and scalable powering solutions. PoE provides flexibility of device placement and enables a single common RJ45 connection to support both data and power for each connected device.

IP Telephony

IT managers must ensure that new IP telephony systems can be continuously powered and provide similar uptime to that expected from traditional telephone networks.

Traditional enterprise data systems utilize Uninterruptible Power Supplies (UPS), which in the event of a power failure allow sufficient time for critical operations, databases, and servers to shut down according to established operational procedures. This backup time is typically measured in minutes or quarter hours of standby time. DPoE™ Power over Ethernet Systems connect IP telephony systems in parallel to both the power patch panels and to UPS backup systems, meaning that devices are fed a constant stream of power from power patch panels and from the UPS systems, eliminating switchover delays and sustaining operations for prolonged periods.

IP Surveillance Cameras

With the acceptance of hard disk based recording devices and IP multicast solutions, security systems no longer require proprietary hardware and software. IP surveillance cameras with PoE connections provide the widest range of deployment options.

By eliminating the need to run separate power lines to specific locations, flexibility is improved and installation costs are reduced. Additionally, centralized monitoring and maintenance can be achieved locally or remotely utilizing the IP data stream (for camera resets and recalibration).

Wireless

Wireless installations have progressed from simple points of convenience to support of mission critical applications. The need to correctly position wireless access points (WAPs) in strategically defined locations is essential, as laptop computers and wireless IP handsets require seamless operations across enterprise, campus, and retail environments.

Because PoE eliminates the need to run electrical lines to specific locations, WAPs can be positioned for optimum coverage, overall cost of installation is greatly reduced, and design flexibility is enhanced. Remote management of the wireless system is also simplified. Wireless access points can be powered down during off-hours and resets of the WAPs can be performed remotely to facilitate upgrades of endpoint devices. Therefore, a DPoE™ Power over Ethernet System improves security and maintenance for your WAPs.

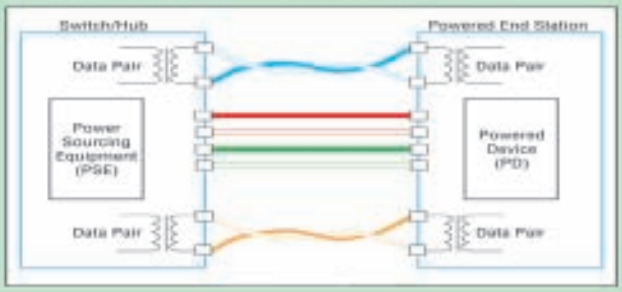
Advanced Intelligent Building Solutions

As building automation combines components such as environmental control, security, voice, data and power, building managers can improve efficiency and lower costs by eliminating proprietary systems in favor of a converged data infrastructure.

PoE provides a unified power system, as well as backup provisions for critical building functions, without any additional cables, outlets or connections. While structured network UTP cabling and IP protocols provide an integrated view and a common platform between the various building systems, the PoE powering standard specified by the IEEE 802.3af standard supports 48 VDC as a regulated supply across all platforms. Therefore, a DPoE™ Power over Ethernet System allows modularity and the cost of backup powering to be shared across multiple building functions.

Power over Ethernet Standards

The telecommunications industry was built around 48 V powering standards and IEEE 802.3af is the first international standard to define the transmission of Power over Ethernet. This standard is based on existing Category 5 infrastructures as a baseline requirement to support: (1) voltage supply between 44 and 57 VDC; (2) 350 – 400 mA; and (3) 15.4 W of power at the source. Category 5 (and higher) Ethernet cabling is capable of supporting these devices in today's infrastructure up to 100m (90m horizontal + 10m patch field).



Benefits of the Panduit Managed Power Solution

DPoE™ Power Patch Panels and Compact 8 Midspan

High-Density – Combine Ethernet patching and PoE in a single device that occupies only one rack space, while the DPoE™ Compact 8 Midspan fits three individual units horizontally across one rack space.

Optimized Performance – Identify and provide proper powering for connected devices, eliminating the need to install separate power modules per port to save space and providing network design flexibility that lowers overall cost of installation and peripheral components.

Power – Support 15.4 W to every port, eliminating power budget load re-balancing and providing greater design flexibility as PoE devices share power across all utilized ports. The DPoE™ Compact 8 Midspan delivers 2X power (up to 32 W per port) for increased capabilities.

Low Heat Dissipation – Realize 35% less power dissipation, in the form of heat from the powering source equipment (PSE), so that panels can be mounted directly on top of each other in a rack configuration.

DPoE™ Element Manager Software (included with all DPoE™ Power Patch Panels and Compact 8 Midspans)

Local Manageability – Allows devices to be powered on or off via SNMP/v3 control, eliminating the need to dispatch technicians to power cycle devices and reducing the total operating cost of a PoE system.

Remote Manageability – Automatically locates and provides visibility of all powered ports across the network and allows multiple site management with a single graphical user interface, resulting in lower total cost of ownership.

^Cisco is a registered trademark of Cisco Technology, Inc.

Panduit has taken an innovative approach toward providing a PoE solution that is scalable and that supports 48 VDC IEEE 802.3af and Cisco^ legacy devices for maximum interoperability. Additionally, by maintaining a DC powering infrastructure, DPoE™ Power Patch Panels and DPoE™ Compact 8 Midspans dissipate less heat compared to solutions that utilize direct AC inputs requiring power conversion.

Panduit's Physical Infrastructure Manager™ (PIM™) Software can also be used with the DPoE system for a more robust management option. The PIM Software Platform offers all of the capabilities and functionality of Element Manager, and tracks the allocation and utilization of critical IT assets within the data center and throughout the enterprise. For more information on PIM Software, visit www.panduit.com/pim.

DPoE™ Power System

DPoE™ Power Patch Panels are ready to connect directly to 110/220 VAC Power or through an Uninterruptible Power Supply (UPS) using the DPoE™ Power System. The DPoE™ Power System utilizes high efficiency power supplies (>92%) that can be hot-swapped for field upgrades, or for replacement, without taking the entire system down.

Space Saving – Saves rack space (as compared to traditional 48 V power sources), with low profile, 1 rack unit design.

Low Heat Dissipation – Emits 35% less heat (as compared to other power supply systems).

Increased Reliability – Provides safe powering of up to 14 individual DPoE™ Power Patch Panels or DPoE™ Compact 8 Midspans from a single power chassis using individual or replaceable fuses. In the event of a fault, problem isolation is reduced to a single patch panel versus the entire system.

Upgradeability – Allows for intelligent power monitoring and provides an upgrade path for extended features and services, including direct battery management, voltage regulation, and alarming, when used with network interface option.

Scalability – Provides consistent powering across a wide range of devices and application needs with 48 VDC power that is scalable from 1,250 to 3,750 W.

DPoE™ Power Supply

For lower port-count needs, the DPoE™ Power Supply connects directly to a single DPoE™ Power Patch Panel or DPoE™ Compact 8 Midspan.

Space Saving – Allows the power supply to be located anywhere within a 10 foot reach of the power patch panel.

Low Heat Dissipation – Removes any heat that would result from AC to DC power conversion, while providing up to 120 W of regulated power.

Status LED – Indicates when power is being supplied to the panel.

Designing a Power Over Ethernet System

When deploying PoE technology, choices need to be made regarding the environment in which the powering source equipment will be utilized. IT managers and facilities managers must consider the demands placed on space, power backup, and cooling, as well as management and scalability of the entire solution.

The location where the Powered Devices (PDs) will be installed is also critical to the overall design. Whether a permanent PoE deployment is required, or one that necessitates flexibility and growth, or a hybrid of the two, Panduit offers a power system solution that meets small to large enterprise needs.

DPoE™ Power Patch Panel

A Permanent Solution with Space Savings

Environments such as call centers, are typically sited in a permanent location with no immediate plans for relocation. As staffing grows, floor space becomes constrictive, and organizations face the expense of expansion. DPoE™ Power Patch Panels offer high density, managed power solutions in a space-saving 1 RU design that helps utilize available space by:

- Requiring only 38% of the rack space typically used by traditional midspans
- Using approximately half the patch cord necessary for traditional midspans
- Eliminating the need for additional horizontal cable management

DPoE™ Power Patch Panels are ideal solutions for integrating power and performance, while maximizing available space.

By eliminating the need to run separate power lines to specific locations, flexibility is improved and installation costs are reduced. Additionally, centralized monitoring and maintenance can be achieved locally or remotely utilizing the IP data stream (for camera resets and recalibration).

DPoE™ Compact 8 Midspan

A Flexible Solution for Modularity and Scalability

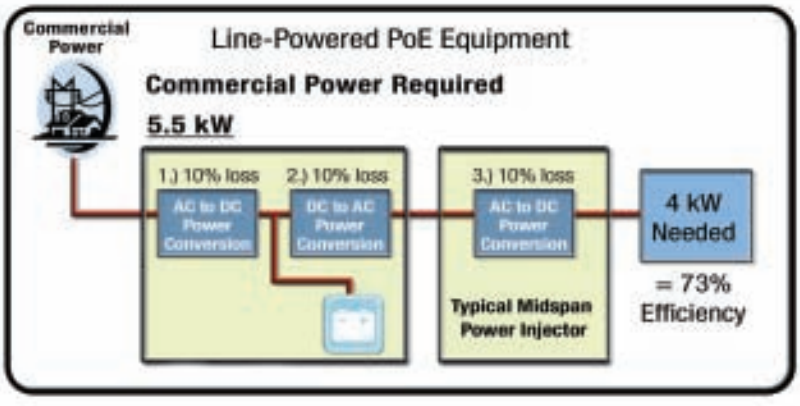
Small to medium sized businesses typically experience staffing growth, office relocations, or office reconfigurations. The DPoE™ Compact 8 Midspan offers adaptability to add or remove port modules as needed, providing the flexibility to accommodate on-going changes. For office relocations or reconfigurations, the modular design permits swapping out power modules for passive modules. Additionally, the DPoE™ Compact 8 Midspan provides:

- 2X power (up to 32 W) for future PoE demands
- Plug-and-Play features for quick installation and minimized implementation costs
- A modular design that can accommodate three 8-port units in 1 rack unit for easier expansion as needed

The DPoE™ Compact 8 Midspan is an ideal solution in a rapidly changing business environment where scalable power, performance, and mobility are required.

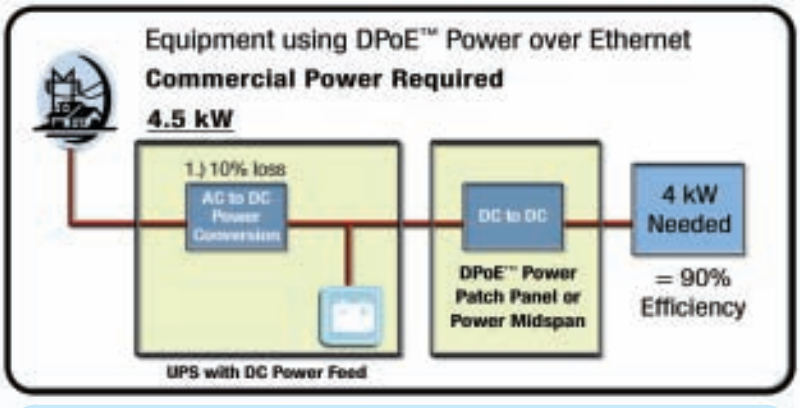
Efficient Power

Consider a system with 240 PoE ports. Allocating 15.4 W per port (according to the IEEE specification) would require a power source capable of supplying approximately 4,000 W (4 kW). While both line-powered and DC-powered equipment would consume the same amount of power, the amount of initial commercial power required would vary due to efficiencies from the conversion of AC to DC power. Traditional line-powered equipment connected to a UPS converts power in three stages, experiencing a 10% efficiency loss with each stage. Power is consumed, causing an increase in heat dissipation that requires additional resources to cool. Because DPoE™ Systems are engineered to be DC powered, they require only one conversion, reducing power loss and lowering operational expenses, as shown below:



Line-Powered Equipment: Effect of Power Conversion

Stage 1: 5.5 kW x 90% efficiency (10% loss) = 5.0 kW available
Stage 2: 5.0 kW x 90% efficiency (10% loss) = 4.5 kW available
Stage 3: 4.5 kW x 90% efficiency (10% loss) = 4.0 kW available



DPoE™ Equipment: Effect of Power Conversion

Stage 1: 4.5 kW x 90% efficiency (10% loss) = 4.0 kW available

Commercial Power Cost Savings

In this example, using DPoE™ Power over Ethernet System saves approximately 1 kW (5.5 kW for line-powered PoE vs. 4.5 kW for DPoE™). To understand the cost savings, let's look at the cost of power:

1	kilowatts (1,000 watts)
x $0.15	price/kilowatts per hour
x 365	days/year
x 24	hours/day
$1,314.00	Total Savings per Year

Reduced Cooling Costs

Since 1,000 W (1 kW) generates approximately 3,754 BTU/hr, it requires approximately 1/3 ton greater air conditioning (assuming an energy efficiency rating of 8.5). As such, line-powered equipment requiring two additional power conversion stages can potentially add more than $310 in expenses to cool the heat generated from these conversions. DPoE™ Power over Ethernet Systems convert power only once, minimizing cooling requirements.

Total savings per year amounts to approximately $1,624 (cost of power + cost of cooling), or about $162 per panel per year!

Power Management and Connectivity

The ability to monitor and control the power connectivity of devices within a network can significantly impact an organization's business continuity. DPoE™ Element Manager software is provided with all DPoE™ Power over Ethernet Systems to intelligently manage and monitor power to all connected devices with just a few mouse clicks – either locally or remotely.

Using the software, a network manager can be alerted that a device is no longer receiving or drawing power – allowing that manager to proactively take corrective action before costly downtime is even recognized. This is of significant importance in a call center environment where downtime can result in lost sales and revenue, and the expense of labor that is not being utilized.

The DPoE™ Element Management software also offers the ability to remotely switch devices on and off by individual port or by device. Remote manageability of PoE devices gives organizations the ability to access, manage, and control power to devices that are placed in inaccessible or hard-to-reach areas. Functions such as resets or calibrations of connected PoE-capable devices can be performed at an internal management workstation, or from an external web access point, without the need to physically touch a device.

Panduit's Physical Infrastructure Manager™ (PIM™) Software can also be used with the DPoE system for a more robust management option. The PIM Software Platform offers all of the capabilities and functionality of Element Manager, and tracks the allocation and utilization of critical IT assets within the data center and throughout the enterprise. For more information on PIM Software, visit www.panduit.com/pim.

Scalability of Power over Ethernet Systems

The ability to increase the capacity of a system without having to re-engineer or upgrade existing equipment is extremely important to enterprises that cannot afford downtime. That is why DPoE™ Power Systems allow capacity upgrades to take place while existing infrastructure continues in full operation.

DPoE™ Powering Options

Adding DPoE™ Power System rectifiers increases the wattage available through the PoE system, thus increasing the number of devices that can be powered. The number of devices that can be powered is calculated according to the IEEE minimum recommendation for class 1 devices at 3.84W, class 2 at 6.49W, and class 3 at 12.95W.

Option	Power System Configuration Options			Total Watts Available	Class 3 12.95 W	Class 2 6.49 W	Class 1 3.84 W
	Rectifier Slot 1	Rectifier Slot 2	Rectifier Slot 3		# of Ports Supported		
1	DPOEPWRR1250			1250	97	⟷	326
2	DPOEPWRR1250	DPOEPWRR1250		2500	193	⟷	336
3	DPOEPWRR1250	DPOEPWRR1250	DPOEPWRR1250	3750	290	⟷	336

Testing Cables for Proper Performance

When adding PoE to an Ethernet infrastructure, DPoE™ Power over Ethernet Systems are installed beyond the Ethernet switch connection to inject power for connected devices. If power were to backflow into the Ethernet switch, however, damage could occur. DPoE™ Power over Ethernet Systems block DC signals from flowing back to the Ethernet switch. This safety feature, however, affects cable testing, resulting in all wire pairs being inaccurately reported as “open”.

New testing equipment is available that utilizes AC signals to perform Wire Map measurements** that are not blocked by the DPoE™ Power over Ethernet Systems. This technique provides visibility of each wire in the cable to ensure that the wire pairs are correctly connected and that power will be properly supplied to powered devices.

**One such tool is the DTX Series CableAnalyzer^ from Fluke Networks.
^DTX and CableAnalyzer are trademarks of Fluke Networks.

Configuring for Power

Step 1. Determine the power (or class) rating of the devices. A mix of power devices can be averaged with various power ratings. If power rating is unknown, utilize the highest power rating.

Step 2. Determine the number of power devices to be supported.

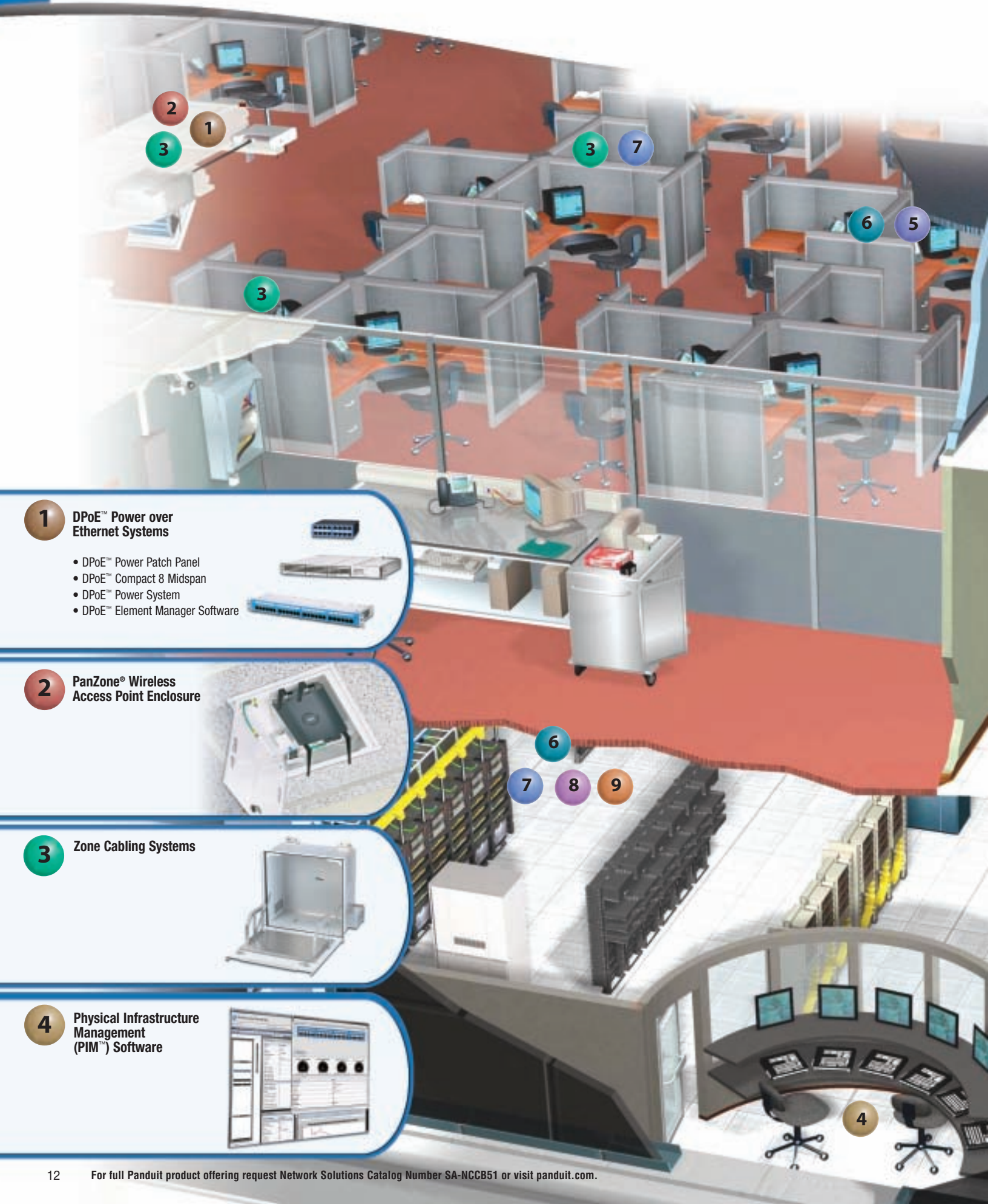
Step 3. Calculate the number of DPoE™ Power Patch Panels or Compact 8 Midspans to be installed by dividing the number in the previous step by 8 or 24.
Note: A single DPoE™ Power System can support up to fourteen panels or midspans.

Step 4. From the quantity determined in step 2, choose the powering option which best meets the needs of the configuration.

Example Configuration

Device	Individual Power Rating	Power Class	Number of Devices	Maximum Power Needed
IP Telephones	6.5 W	2	300	1,950 W
Wireless Access Points	10.4 W	3	5	52 W
IP Security Cameras	13 W	3	9	117 W
Total Installation	—	—	314	2,119 W
DPoE™ Solution				
Number of DPoE™ 24-Port Power Patch Panel	—	—	14	
Number of Power Chassis	—	—	1	
Number of Rectifiers provisioned			(2) 1,250 W	2,500 W supplied power

Enterprise Building – *Roadmap*



1 DPoE™ Power over Ethernet Systems

- DPoE™ Power Patch Panel
- DPoE™ Compact 8 Midspan
- DPoE™ Power System
- DPoE™ Element Manager Software

2 PanZone® Wireless Access Point Enclosure

3 Zone Cabling Systems

4 Physical Infrastructure Management (PIM™) Software

For full Panduit product offering request Network Solutions Catalog Number SA-NCCB51 or visit panduit.com.

Enterprise Building – *Roadmap*

DPoE ™ Power over Ethernet Components and Accessories

Part Number	Description	No. of Rack Spaces^	Std. Pkg. Qty.
DPoE™ Power Patch Panel			
DPOE24U1XG	24-port unshielded twisted pair 10/100/1000 patch panel supporting IEEE 802.3af-2003 and Cisco* Inline Power (CIP) protocols. (Contact Panduit for availability).	1	1

DPOE24U1XG

DPoE ™ Power Patch Panel and the Compact 8 Midspan include DPoE™ Element Manager software CD, rack mount screws, grounding strap and lug, and power harness.

DPoE™ Power Midspan			
DPOE8S2XG	8-port 10/100/1000 compact midspan supporting IEEE 802.3af-2003 and Cisco* Inline Power (CIP) protocols.	1	1
DPOE8KIT	DPoE™ Compact 8 Midspan Kit that includes one midspan unit, one 120 W power supply, and one 15 A 3-conductor power cord.	1	1
DPOESHELF	1 RU shelf for DPOE8S2XG.	1	1
DPOEPL8BU	8-port passive patch panel module (accepts all Mini-Com® Jack Modules).	1	1
DPOEWM8B	Wall mount bracket for DPOE8S2XG.	—	1

DPOE8S2XG

DPOE8KIT

DPOESHELF

DPOEPL8BU

DPOEWM8B

DPoE™ Power Supply			
DPOEPWRB120Y	120 W power supply. Suitable for single power patch panel installations with low power needs or a mixture of active and passive devices. Requires proper AC country specific power cord (Cord-A for Australia, Cord-E for Europe, Cord-S for United States or Cord-U for United Kingdom) ordered separately.	—	1
DPOEPWRB120Y-J	120 W power supply for use in Japan. Suitable for single power patch panel installations with low power needs or a mixture of active and passive devices. Includes Cord-J15 AC power cord.	—	1

DPOEPWRB120Y

DPoE™ Power Systems			
DPOEPWRCU	Modular chassis. Supplies power to single and multiple power patch panels when equipped with the appropriate DPoE ™ Power Rectifiers. Designed for use with AC UPS backup systems.	1	1
DPOEPWRR1250	1250 W power rectifier. Supplies power for multiple power patch panels. A combination of three of these rectifiers will support up to fourteen panels.	—	1

DPOEPWRCU

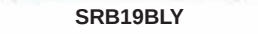
DPOEPWRR1250

^1 RU = 1.75" (44.45mm).
*Cisco is a registered trademark of Cisco Technology, Inc.

DPoE™ Power over Ethernet Components and Accessories

Part Number	Description	Std. Pkg. Qty.
Power Cords		
CORD-S15	Power cord rated at 15 A (for use in U.S., Canada, Mexico, Korea, Belgium, Bolivia, China, Columbia, Costa Rica, Dominican Republic, Guatemala, Honduras, Panama, Philippines, Taiwan, Thailand and Venezuela).	1
CORD-J15	Power cord rated at 15 A (for use in Japan).	1
CORD-U	Power cord rated at 15 A (for use in the U.K., Malaysia, Algeria, Costa Rica, Egypt, Hong Kong, Kuwait, Laos, Singapore and Uruguay).	1
CORD-E	Power cord rated at 15 A (for use in Algeria, Bangladesh, Bolivia, Brazil, Bulgaria, Burma, Chile, China, Denmark, Egypt, Finland, France, Germany, Greece, Holland, Hungary, Iceland, India, Indonesia, Iraq, Ireland, Iran, Italy, Kuwait, Laos, Luxembourg, Malaysia, Netherlands, Poland, Portugal, Romania, Russian Federation, Saudi Arabia, South Africa, Spain, Sweden, Switzerland, Turkey, Uruguay and Yugoslavia).	1
CORD-A	Power cord rated at 15 A (for use in Argentina, Australia, Austria, China, Guinea, Iceland, Iraq and New Zealand).	1
DPoE™ Adapter Cord		
DPOEPWRDUAL	Dual power bus adapter for connection to DPoE™ Power over Ethernet Systems. Provides mated connectors to accept individual power feeds from independent power sources on A and B input buses.	1

SRBCT



SRB19BLY

SRBBRKT

Recommended Strain Relief Bars

SRBCT	Cable strain relief bar with cable tie clips.	1
SRB19BLY	Cable strain relief bar with 2" extension off rack.	1
SRBBRKT	Quick release brackets for strain relief bars; convert conventional screw mounting of strain relief bar to quick release mounting/removal.	1

Component Labels for DPoE™ Power Patch Panel and Compact 8 Midspan

Suggested Label Solution for TIA/EIA-606-A Compliance				
Patch Panel Part Number	**Laser/Ink Jet Desktop Printer Label**	**Thermal Transfer Desktop Printer Label**	**PanTher™ LS8E Hand-Held Printer Label**	**Cougar™ LS9 Hand-Held Printer Label**
DPOE24U1XG DPOE8S2XG	**UILJ6**	**—**	**UILS8BW**	**UILS8BW**

Real-World Solutions to Ensure the Success of Our Customers

With a proven reputation for excellence and technology innovation, a robust ecosystem of global partners, and long-term alliances with top industry leaders, Panduit is a valuable, trusted partner offering strategic vision and real-world solutions to ensure the success of our customers.

Innovative Technology Leadership

Panduit is an industry leader in developing innovative technology solutions that meet the rapidly evolving needs of our customers around the world. Our commitment to continued leadership is supported by significant ongoing investment, dedicated manufacturing facilities, strategic technology alliances, and collaborative R&D with other industry leaders.

Global Business & Commitment

Panduit's ongoing commitment to excellence and our technology alliances with key industry leaders such as Cisco Systems, EMC, Emerson, and IBM enables our highly skilled and knowledgeable global sales, systems engineering, and technical support teams to engage with critical customer challenges that range from initial problem determination all the way to resolution. Local specialists, trained to global standards and competencies, provide consistent regional support that brings value to local business. Our global value chain, which combines manufacturing, distribution, and service, provides prompt responses to customer-related issues, and streamlines procurement and delivery to any global destination.

Best-In-Class Partner Ecosystem

Panduit employs a consultative approach to identify customer needs and engage appropriate partners in a collaborative fashion to serve our customers. Panduit's robust ecosystem of architects, consultants, engineers, designers, systems integrators, contractors, and distributors offer a full portfolio of lifecycle services. Our partners are trained on relevant services to Plan & Design, Build & Deploy, and Maintain & Operate to deliver predictable and measurable results.

Worldwide Alliances

Panduit has established long-term strategic alliances with top global industry leaders such as Cisco Systems, EMC, IBM, and Rockwell Automation to develop and integrate innovative, holistic solutions for our customers. We continually invest in relationships and resources for solving our customers' greatest business challenges.

Eco-Sustainability & Global Citizenship

With a long-standing commitment to environmental excellence, Panduit continually develops and implements solutions designed to protect, replenish, and restore the world in which we live and operate. This commitment is demonstrated by Panduit's LEED Gold certified new world headquarters and future sustainable building plans using its own revolutionary Unified Physical Infrastructure℠ approach to enable convergence of critical systems for driving energy efficiency.

Harness the power of your Enterprise Network

Call or visit us online, we can show you how.

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