

PANDUIT®

Infrastructure for **SMART** Building Technologies

Foundation for networked building systems





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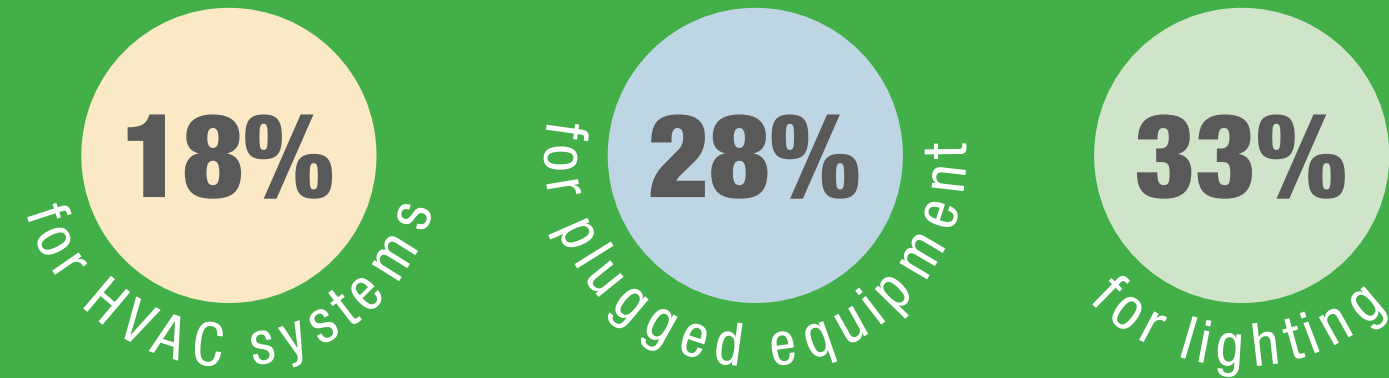
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Energy Savings, Net Zero, and Sustainability

Environmental and sustainability issues are top of mind in today's world. And, with commercial buildings responsible for a large chunk of energy usage, energy efficiency is often a main consideration in choosing smart building technologies. Building operators want the ability to measure energy use and efficiency gains, to monitor progress in sustainability goals and toward net zero goals that cities and governments have committed to. For example, commercial real estate company JLL has committed to achieve net zero carbon emissions across all JLL-occupied buildings by 2030.*

*www.us.jll.com. JLL to achieve global net zero carbon emissions by 2030.

Implementing smart building technologies could reduce the annual energy consumption of an average office by up to:



The commercial sector accounts for 18% of energy consumption in the U.S.*

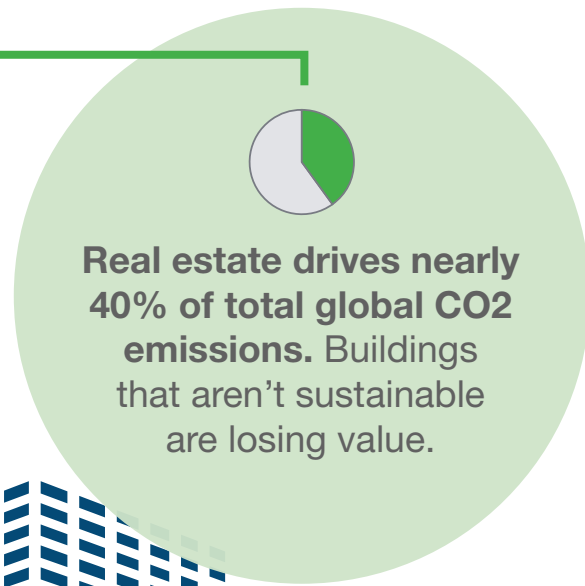
*Based on info from BSRIA





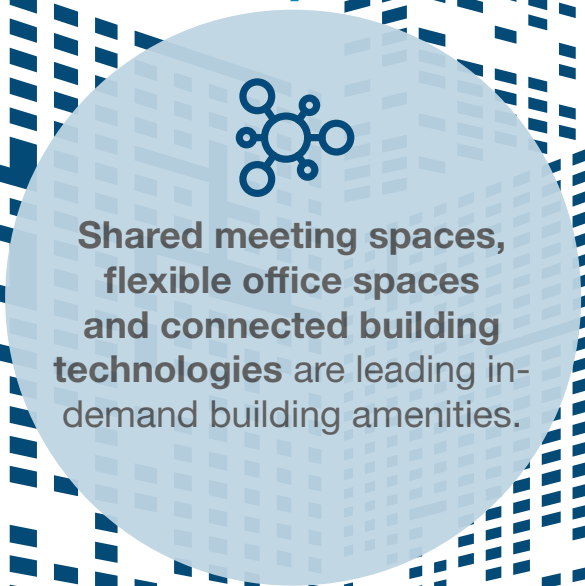
Sustainable

Use smart building features to efficiently manage energy, water, and materials, to reduce waste, minimize environmental impact, lower operating costs, and create a healthier environment.



Connected

Control and automate building functions like HVAC, lighting, and security to create a smarter, more efficient building. Connected building systems communicate with each other, optimizing operations.



Secure

Protect people, data, and property with careful implementation of intelligent building systems. Enhance security in the physical layer, document digital assets, control access to property and equipment, and plan for disaster recovery.



Smart Building Technologies Shape Buildings' Future

The concept of a smart building has been around since the early 2000s, but with each passing year, smart building applications are increasing, as is the standardization of infrastructure that supports smart building technologies.

A smart building uses technology to enable efficient and economical use of resources, thus meeting sustainability goals, while creating a safe and comfortable environment for occupants. Smart buildings utilize elements like sensors, building management systems, and artificial intelligence to integrate, monitor, optimize, and control systems such as HVAC, lighting, access control, and others.

Smart building adoption has accelerated, as building owners seek out ways to make their properties more attractive both operationally and for the people that use them. Smart building features can improve operational efficiency, while also being flexible to create spaces more enticing to occupants.

The global smart building market size is valued at about \$70 billion and growing at an 11% CAGR.

1–2%
Fully Integrated Smart Building

10%
Cutting Edge & Intelligent (with multiple integrated smart technologies)

40%
Mid-market businesses (with some element of smart technologies)

48%
Small-Mid size businesses (with older technology or with pending retrofits)



Smart Building Adoption

The adoption of smart building technologies isn't an all-or-nothing approach but is a continuum of different stages of smart actionable data intelligence and building automation. **About 1–2% of enterprises are deploying truly cutting-edge smart technologies with fully integrated products and services.** Another 10% are cutting edge and intelligent but not yet fully integrated. Another 40% have one or more element of smart technology. And nearly half (48%) of businesses have older technology that is due for retrofit to adopt smart technologies.

Generally, the businesses within each segment break down as follows:

Fully Integrated and Cutting Edge

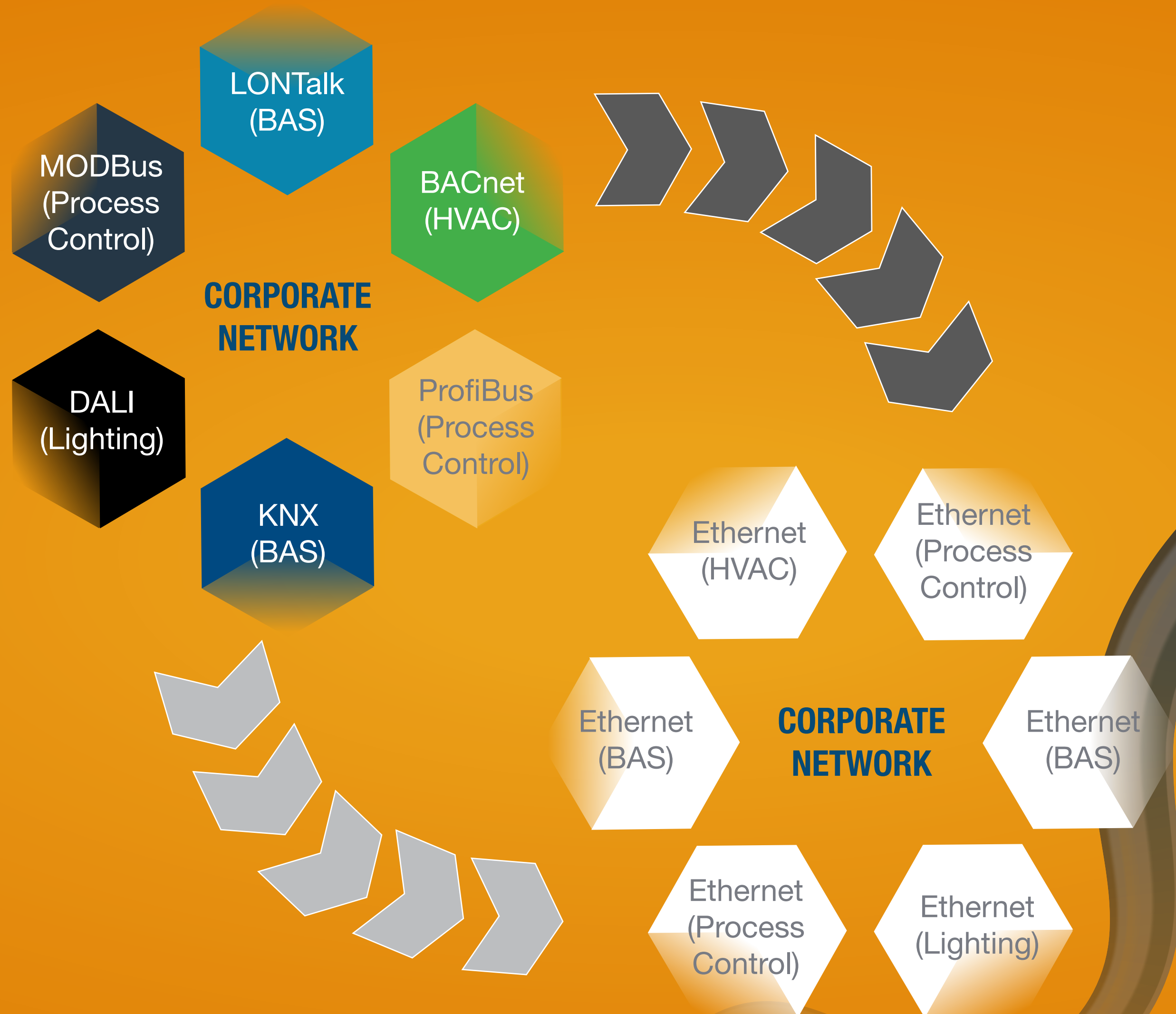
- Airports/transport hubs
- Office buildings (e.g. tech, finance, legal)
- High-end shopping malls
- Sports stadiums
- New data centers
- Hospitals
- High-end hotels
- Large manufacturers
- E-commerce logistics centers

Mid-market

- Retail
- Universities
- Manufacturing
- Mixed use spaces
- Mid-range hotels

Small- and mid-size

- Office buildings (small and medium-sized enterprises)
- Retail
- Small schools
- Small manufacturers



Historically, building systems have operated on a variety of protocols, such as MODBus, ProfiBus, and BACnet. In the evolution to a smart building, these systems will move to an IP Ethernet-based network.

Foundation of a Smart Building — Network Convergence

One of the critical parts of a smart building is having disparate systems converging on the same Ethernet-based network. This convergence allows the systems to share data and communicate with one another, leading to efficiencies.

Network convergence refers to a single, common network infrastructure across IT and OT. Rather than having many systems each running on a different protocol, a converged system will all run over the same Ethernet network. Historically, these facilities applications each operated on its own protocol.

Benefits of a Converged Network

There are many benefits to a converged network:

Reduced Implementation Cost
a converged smart building is estimated to cost approximately 30% less to implement than a smart building with similar functionality but using different systems

Simplified Upgrading
adding features, functions, and upgrades is simple and straightforward

Flexibility
a converged network is easy to change and add to over time

Importance of Infrastructure

Smart Building networks can control almost all elements of a building — lighting, HVAC, access control, and other critical systems. Therefore, a reliable network for these systems is critical to the overall functioning of the building. The most important element of ensuring a reliable network is a robust and high-quality cabling infrastructure.

59% of problems are directly related to physical infrastructure and its connections

— Gartner Group

70% of all network failures are attributed to network cabling”

— LAN Technologies

Infrastructure across the Building Spaces





Open Office

Building Control

Telco Room

Huddle Space

Data Center

Conference Room

Lobby

Equipment Room/Data Center

The equipment room of a smart building can be considered “the brain.” Everything is connected back to the equipment room and all data passes through here. Equipment rooms can make connections difficult due to the location not being able to meet the 100 meter length of copper run but with consolidation points located throughout the building data can be sent with ease. The performance of your data center depends on a complex interrelationship between cooling optimization, power management, space utilization, and high-speed data transmission, all of which are essential to getting the maximum performance and uptime from your critical systems and applications.

PLAN FOR THE FUTURE

Innovative solutions like FlexFusion™ cabinets and HD Flex™ High-Density Fiber Cabling System enable the utmost in flexibility and scalability, so you can meet growing bandwidth requirements

REDUCE OPERATIONAL RISK

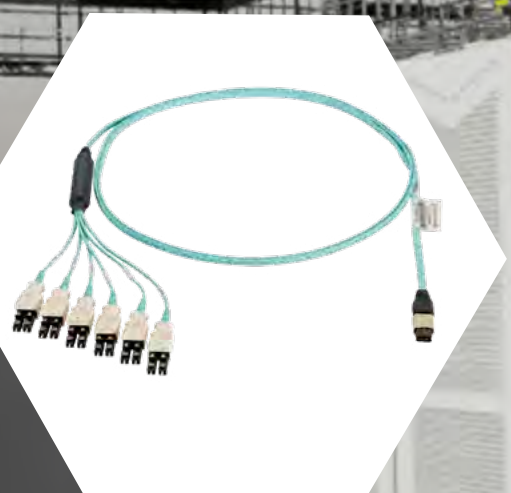
No details are too small when it comes to reducing risk and maximizing uptime: overhead pathways protect fiber and copper cabling to prevent damage; locking handles prevent unauthorized access to cabinets and enclosures; and high-quality fiber connectivity delivers needed performance

DRIVE NETWORK CONVERGENCE

Structured cabling is fundamental to buildings, supporting the communication of data between the data center and end devices on the network, making buildings smarter and more efficient

FiberRunner® Cable Routing System

Fiber Cable and Connectivity



HD Flex™ High Density Fiber Cabling System



Copper Connectivity



PdUs and UPS



FlexFusion™ Cabinets

Grounding and Bonding



See pages 22–26 for a more detailed product offering for this space.



Telecommunications Room

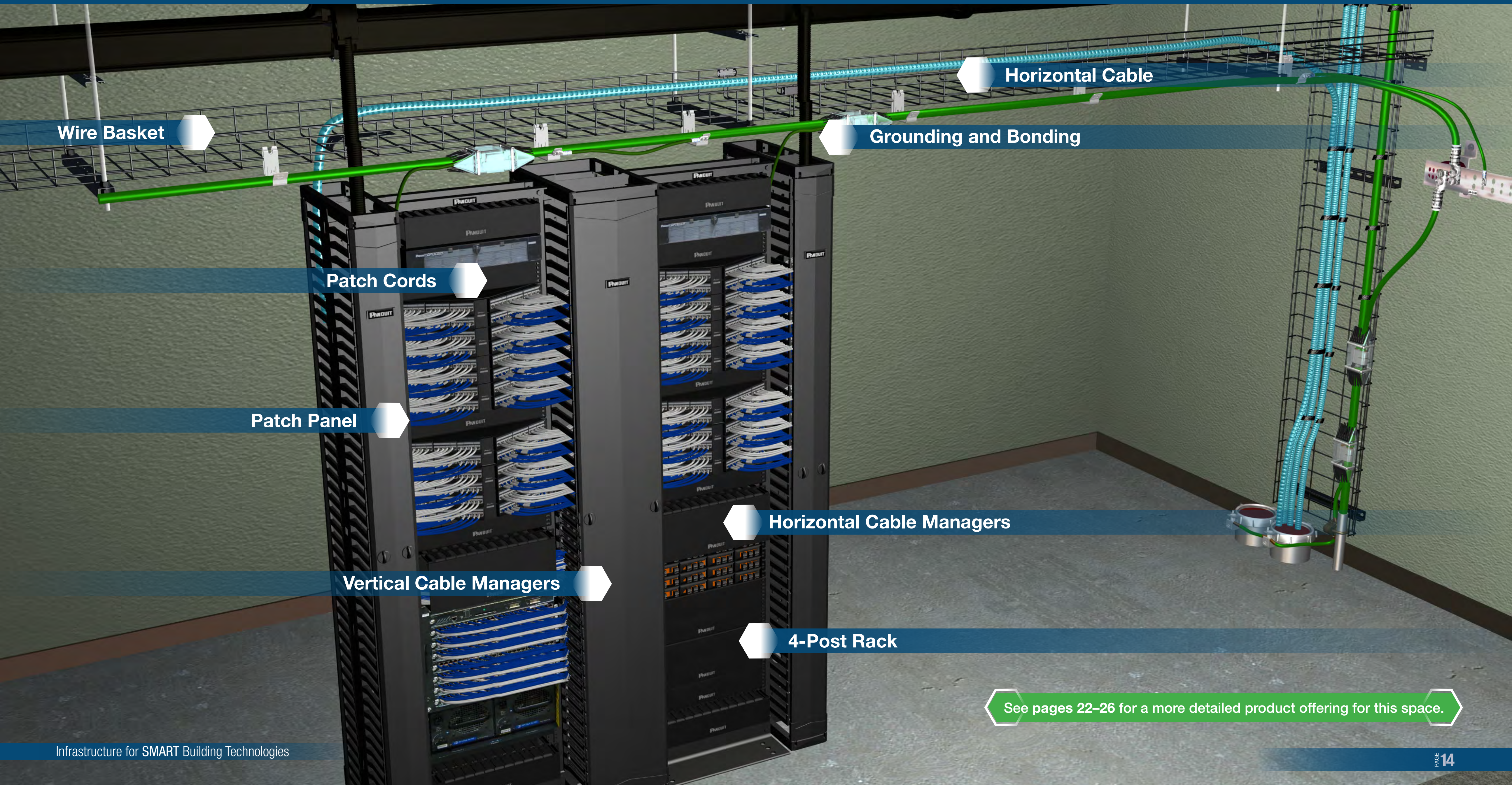
The telecommunications room (TR) serves as a central location that houses the equipment and devices that support the building's communication and data networking systems, including telephone lines, internet connections, wireless access points, and network switches. From the TR, the building's network connectivity and communication signals are managed and distributed. In a smart building, the TR plays an even more critical role as it houses the equipment that is the brains behind the building's smart systems, such as security, environmental controls, lighting, and other smart devices.

As buildings get smarter, space in the TR becomes more critical because each smart system drops another piece of equipment in the telco rack. High density solutions optimize space, making room for new equipment. Solutions like high-density patch panels, zero RU patching in the cable manager, and 28 AWG patch cables free up space for critical systems.

PLAN FOR THE FUTURE
Optimize the space in the TR with space-saving solutions like high-density angled patch panels, small-diameter patch cords, and vertical cable managers that allow for zero RU patching

REDUCE OPERATIONAL RISK
Vari-MaTriX HD Copper Cabling has the industry's best thermal properties to manage heat dissipation with Power over Ethernet, preserving network performance

BEWARE EXTENDED REACH CLAIMS
Beware of vendor solutions offering extended reach which claim the ability to eliminate a TR. These rooms are commonly used for other building systems as well.



Wire Basket

Horizontal Cable

Grounding and Bonding

Patch Cords

Patch Panel

Horizontal Cable Managers

Vertical Cable Managers

4-Post Rack

See pages 22-26 for a more detailed product offering for this space.

Open Office Space

Smart building technology can help with space planning, scheduling, and building efficiencies. Today, many companies have adopted a hybrid work schedule, where employees split their time between working from home and working at the office. This shift in schedules is also causing a shift in how office spaces are used. Collaboration spaces like conference rooms and huddle spaces are more important, while row after row of cubicles sit idle. Space planning systems can track traffic flow and occupancy of work areas, conference rooms, and other common spaces, helping drive decisions around the use of space. And, in offices where hoteling spaces are used by all employees, building automation systems can adjust systems like environmental controls and lighting to drive efficiencies.

DRIVE SUSTAINABILITY GOALS
Innovative infrastructure simplifies power and data delivery to the desktop

OPTIMIZE ENERGY USE
Keep lights at optimal settings when paired with automatic window shades, which in turn impacts HVAC operation

ENHANCE SPACE UTILIZATION
Rely on data to efficiently plan where additional space is needed (or not); allow occupants to adjust areas to meet efficiencies

PLAN FOR THE FUTURE
Repurpose under-utilized work areas into high-demand conference rooms or huddle spaces ... or whatever your data tells you, for optimal scalability and flexibility

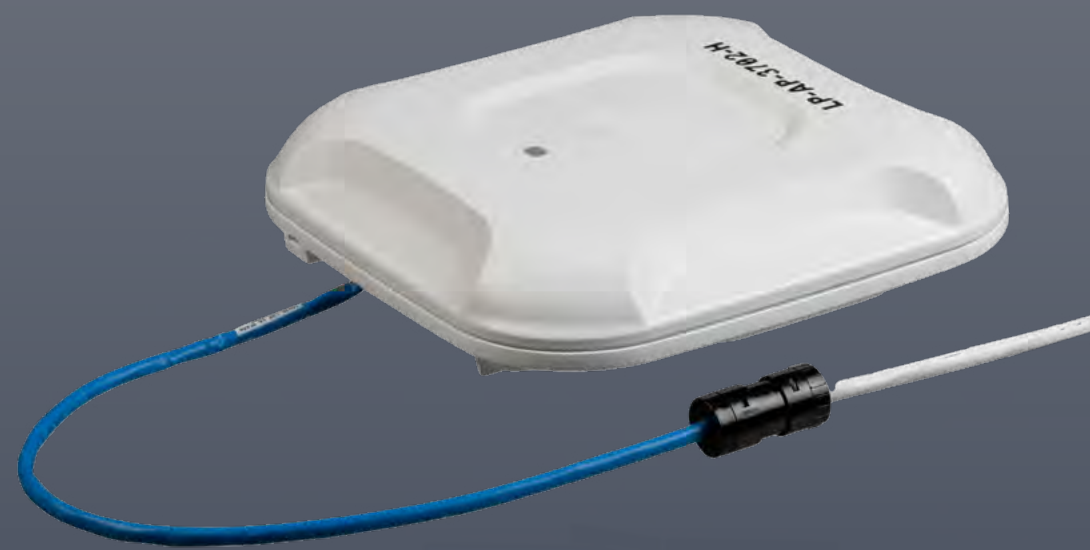
IMPROVE WORKPLACE WELLBEING AND SAFETY
Natural sunlight and healthy air quality improve productivity and wellbeing



Infrastructure Supporting IP Devices (Wireless Access Points / IP Cameras)

Connected devices in the ceiling — things like wireless access points and security cameras — have driven the need for new connectivity methods in buildings.

Today, standards allow for a Modular Plug Terminated Link — a field-terminated plug or the new FieldCord™ Connector terminated directly to the horizontal cabling which then connects directly to the device for a simple-to-install, standards-compliant option for connecting smart devices.



Field Term Plug and Jacks

Wire Basket

Horizontal Cable

FieldCord™ Connector

Faceplate

See pages 22–26 for a more detailed product offering for this space.

Conference Room/Huddle Space

Conference rooms in a smart building can be one of the busiest places in the building. Atlona AV systems allow you to equip conference rooms and huddle spaces with the exact features you need, including touch-free wireless connection from any device, and USB ports for easy connection of cameras, audio systems, and other peripherals to collaborate with remote audiences. Simple, reliable operation allows participants to focus on the topic — not the equipment. Additionally, the Atlona Velocity™ control system adds room scheduling capabilities so building occupants can see at a glance what rooms are available.

Structured cabling connects the room's systems: AV, wireless access points, PoE lighting, room occupancy, window shades, and more. This allows systems to communicate with each other and respond: when people enter the room, lights come on and HVAC adjusts; when the AV system is powered on, lights dim and window shades lower; all driven by the systems and sensors in the room.

OPTIMIZE ENERGY USE

Sensors detect occupancy and HVAC adjusts to maintain temperatures and ventilation; lights automatically adjust

REDUCE OPERATIONAL RISK

Connectivity is always on, thanks to wireless access points and in-building wireless systems, connected and powered via structured cabling

IMPROVE WORKPLACE WELLBEING

Easy-to-use AV equipment supports BYOD and touch-free operation

ENHANCE SPACE UTILIZATION

Bring remote and on-site employees together via video conferencing and video collaboration



Occupancy Sensor



PTZ Camera



*Velocity™
Room Scheduling



Atlona Velocity™ Control System



Atlona Captivate™ Speakerphone



Atlona Omega™ Series

See pages 22–26 for a more detailed product offering for this space.



Lobby/Entrance

A lobby offers visitors a first impression of a company, while also serving as a space where security ensures that building occupants are safe. Always-on cameras and sensors help security do their job, while digital signage welcomes visitors and shares announcements with employees. Structured cabling connects and powers cameras, access control systems, and AV over IP solutions throughout the lobby and the building.

OPTIMIZE ENERGY USE

Keep lighting at a consistent level and optimize HVAC efficiencies with occupancy sensors and automatic shades

ENHANCE SPACE UTILIZATION

Data will show where foot traffic is highest so space can be allocated appropriately

REDUCE OPERATIONAL RISK

Deliver wireless connectivity to visitors and staff with the latest Wi-Fi technology, connected and powered by Category 6A cabling

PLAN FOR THE FUTURE

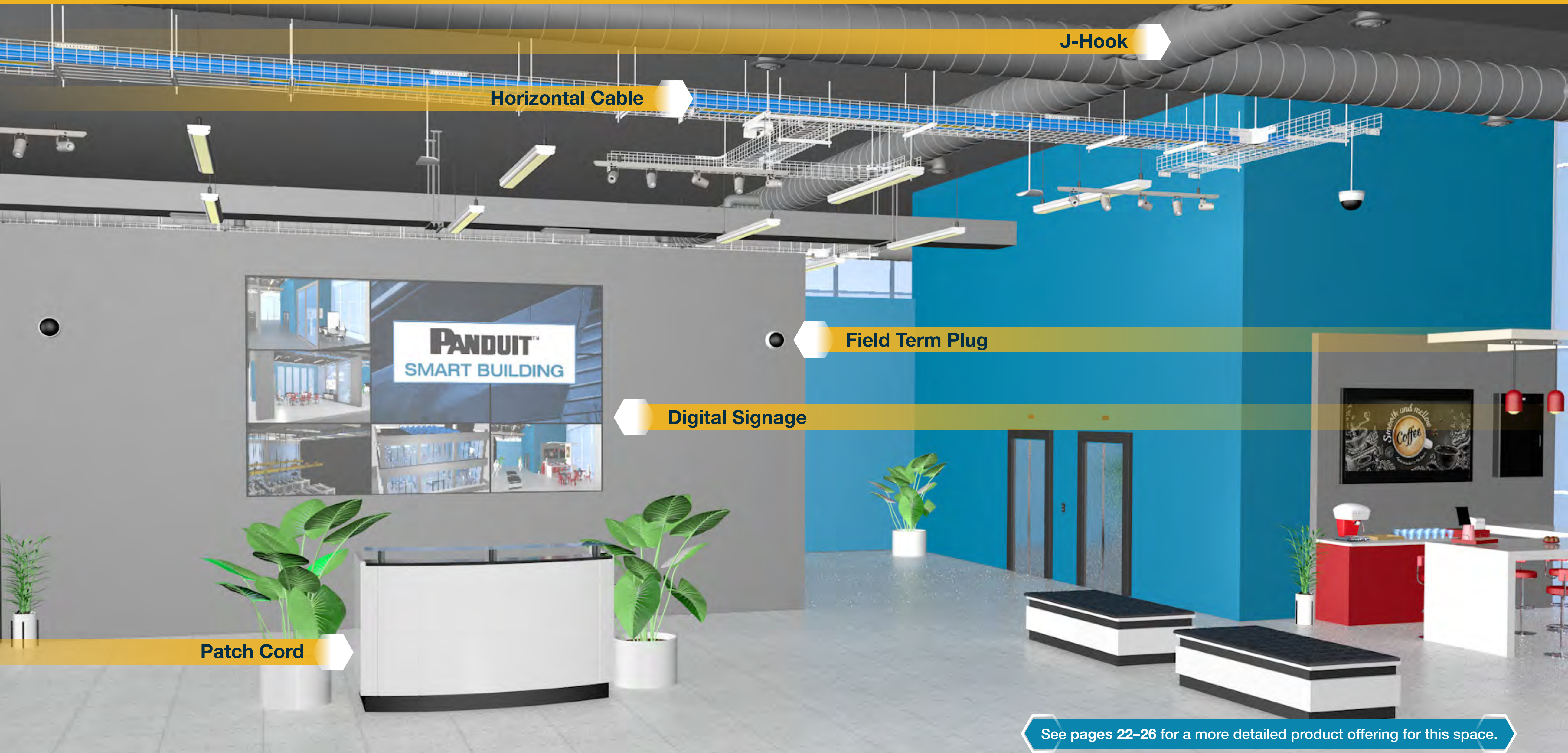
Modular spaces allow for building operations to repurpose and realign spaces based on occupancy data and traffic maps

IMPROVE WORKPLACE WELLBEING AND SAFETY

Maximize natural sunlight and healthy air to improve productivity and wellbeing; implement state-of-the-art security solutions to protect occupants

DRIVE NETWORK CONVERGENCE

Keep building systems on the same network to communicate



Horizontal Cable

J-Hook

Field Term Plug

Digital Signage

Patch Cord

See pages 22–26 for a more detailed product offering for this space.

Building Control

With all of the brains in a smart building, it's more crucial than ever to have a central point where data can be tracked. While systems are deployed throughout the building via sensors and devices and equipment in telco rooms, the data from the disparate systems is frequently collected and managed through a single pane of glass in a control room. Facilities managers rely on aggregated data to ensure systems are functioning properly, monitor energy usage and air quality, and observe security camera footage.

The latest Ethernet technology — 10BASE-T-1L over Single Pair Ethernet (SPE) — is ideal for connecting building automation components on a single platform. SPE extends data and power (SPoE) up to 1000 meters to connect smart building devices at the edge.

Refer to Building Control Table for part numbers for your Building Control System



OPTIMIZE ENERGY USE

Capture and monitor real-time data on energy usage for a building or a campus; remotely control HVAC, window shades, and lights as needed

REDUCE OPERATIONAL RISK

Always know the status of smart building systems via a single pane of glass to ensure peak performance

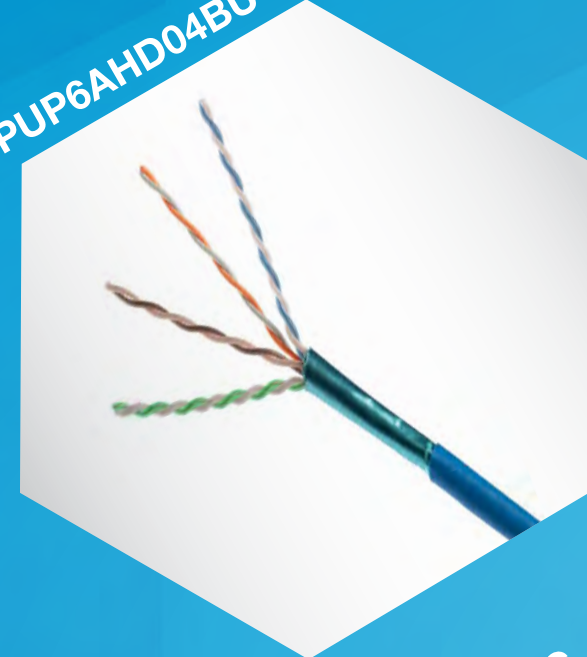
IMPROVE WORKPLACE WELLBEING

Building control is frequently paired with security camera monitoring to ensure occupant safety

DRIVE NETWORK CONVERGENCE

Keep building systems on the same network to communicate

PUP6AHD04BU-G



UTP28X7BU



RPDSCN



CJ6X88TGBU



FP6X88MTG



FC-ICCP1MBU



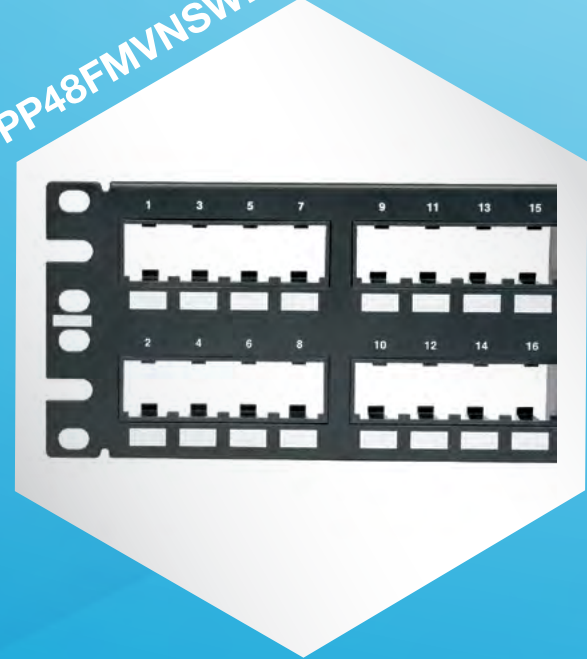
CFPL2WHY



CPPL48WBLY



CPP48FMVNSWBLY



Cabling and Connectivity

Equipment Room/Data Center
Telecommunications Room
Open Office Space
Conference Room
Lobby/Entrance
Building Control

Part Number	Description	A	B	C	D	E	F
Horizontal Cable							
PUP6AHD04BU-G	Category 6A U/UTP copper cable with Vari-MaTriX HD technology, plenum, 4-pair, Blue	✓	✓	✓	✓	✓	✓
Copper Patch Cords							
UTP28X7BU	Category 6A performance, 28 AWG, UTP patch cord, CM/LSZH, Blue, 7 ft.	✓	✓	✓	✓	✓	✓
RPDSCN	RapidID Network Mapping System Barcode Scanner for use with RapidID-enabled patch cords	✓	✓				
RJ45 Modules							
CJ6X88TGBU	Category 6A, RJ45, 8-position, 8-wire jack module with MaTriX Technology. Supports high-bandwidth applications and is ideal for running next generation Power over Ethernet (PoE++). UL Rated: UL 1863 and UL 2043.	✓	✓	✓	✓	✓	✓
FP6X88MTG	Category 6A UTP field term RJ45 plug for field termination of 4-pair unshielded twisted pair cable.			✓	✓	✓	✓
FC-ICCP1MBU	TX6A™ Category 6A UTP FieldCord™ Connector for field termination of 4-pair UTP cable to connect devices with confined port spaces.			✓	✓	✓	✓
Patch Panels and Faceplates							
CFPL2WHY	Single gang, flush mount vertical faceplate with label pockets; accepts two Mini-Com® modules.			✓	✓	✓	✓
CPPL48WBLY	48-port modular patch panel with labels, supplied with factory-installed front removable snap-in faceplates.	✓	✓				
CPP48FMVNSWBLY	Mini-Com® 48 port, 2 RU modular patch panel with vertical numbering to match switch numbering	✓	✓				

SP-SFCS1IG-CEG



SP-1LSA22BL



Cabling and Connectivity (Continued)

Equipment Room/Data Center
Telecommunications Room
Open Office Space
Conference Room
Lobby/Entrance
Building Control

Part Number	Description	A	B	C	D	E	F
Single Pair Ethernet							
SP-SFCS1IG-CEG	Single pair Ethernet Shielded Copper Cable, 18/7 AWG, S/FTP, CM/CMR, stranded tin copper conductors		✓				✓
SP-1LSA22BL	SP1 Single Pair Ethernet Shielded Plug Connector		✓				✓

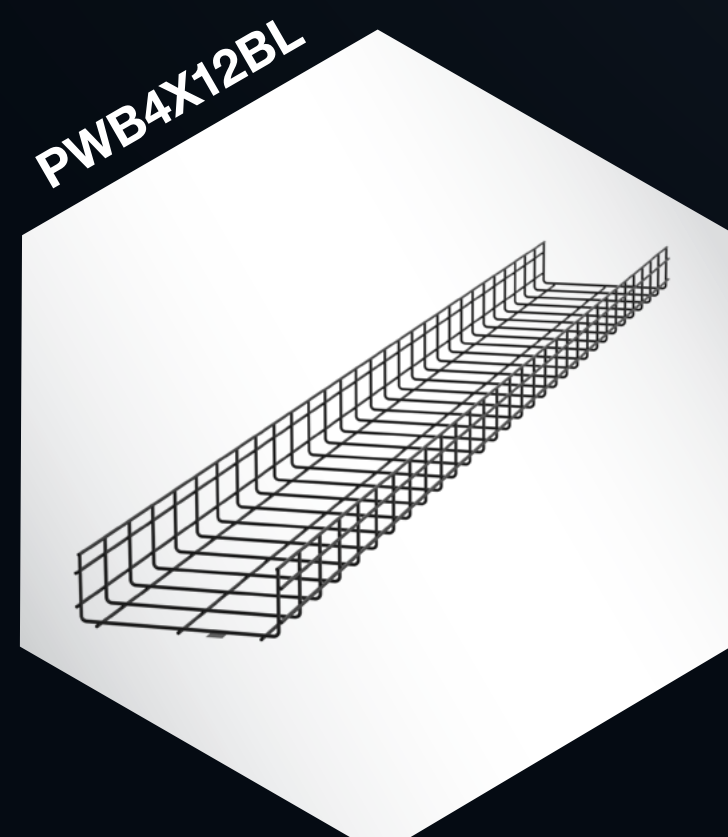
FYZTP77Y005F100



FLEX1U06



Fiber Optic Cabling and Connectivity		A	B	C	D	E	F
FYZTP77Y005F100	Fiber optic cable assembly, OM4, 12 fiber, OFNP, with PanMPO™ connectors		✓				
FLEX1U06	HD Flex™ Fiber Enclosure, 1 RU, with sliding front access drawers that accept up to 12 6-port HD Flex cassettes or fiber adapter panels for a maximum density of 144 fibers		✓				



Racks, Cabinets, Enclosures, and Pathways

Equipment Room/Data Center
 Telecommunications Room
 Open Office Space
 Conference Room
 Lobby/Entrance
 Building Control

Part Number	Description	A	B	C	D	E	F
R4P	4-Post rack, 45 RU, 30 in. deep, with 19 in. standard EIA mount; UL listed for 2,500 pounds	✓	✓				
PR2VD06	PatchRunner™ 2 Vertical Cable Manager, dual-sided with a metal backbone and molded plastic fingers with two full-length metal, dual-hinged push-to-close doors; 45 RU, 6 inches wide.	✓	✓				
PR2HF2	PatchRunner™ 2 Horizontal Single-Sided Manager, 2 RU with a dual-hinged, magnetic front cover.	✓	✓				
PE2VD12	PatchRunner™ 2 Enhanced Vertical Cable Manager, dual-sided manager has a metal backbone molded plastic fingers, with two full-length metal, dual-hinged, push-to-close doors; 45 RU, 12 inches wide, 15 bonus vertical RU.	✓	✓				
WME3BL	TrueEdge™ Vertical Wall Mount Enclosure, houses 3 RU of active equipment and 3 RU of passive equipment in a 9.5-inch deep enclosure.	✓	✓	✓	✓	✓	
XG84522WS0005	FlexFusion™ Cabinet, 800mm x 45RU x 1200mm	✓					
PWB4X12BL	Wire Basket 4" H x 12" W basket, black	✓	✓	✓	✓	✓	
FR4X4YL6	FiberRunner® 4x4 Channel to separate, route, and protect fiber optic and high-performance copper cables	✓	✓				
JP4HBC25RB-X20	StrongHold™ JP4HBC25RB-X20 J-Hook, Rotating, 0.25", Blk, PA 6.6/Metal, Hammer-on			✓		✓	

AT-OME-MS42



AT-OME-EX-RX



AT-HDVS-CAM



AT-CAP-SP100



AT-VTPG-1000VL-BL



AT-VGW-HW-3



AT-VGW-SW



AT-OCS-900N



AT-OMNI-112



AT-OMNI-121



AT-GAIN-60



AT-WAVE-101



AV Systems

Equipment Room/Data Center
 Telecommunications Room
 Open Office Space
 Conference Room
 Lobby/Entrance
 Building Control

Part Number	Description	A	B	C	D	E	F
AT-OME-MS42	Omega™ 4x2 matrix switcher with USB				✓		
AT-OME-EX-RX	Omega™ HDBaseT receiver for HDMI with USB.				✓		
AT-HDVS-CAM	PTZ Camera with USB				✓		
AT-CAP-SP100	Captivate™ USB/Bluetooth speakerphone				✓		
AT-VTPG-1000VL-BL	Velocity™ 10" touch panel provides user access to video controls.				✓		
AT-VGW-HW-3	Velocity™ hardware gateway handles routing for the encoders and decoders, as well as display power and audio level controls.		✓				
AT-VGW-SW	Velocity™ software server gateway that provides multiple rooms of IP-based AV control and room scheduling.		✓				
AT-OCS-900N	Network-enabled occupancy sensor				✓		
AT-OMNI-112	Dual-Channel Networked AV Encoder			✓		✓	
AT-OMNI-121	Single-Channel Networked AV Decoder			✓		✓	
AT-GAIN-60	Stereo / Mono Power Amplifier — 60 Watts				✓		
AT-WAVE-101	Wireless Presentation Platform				✓		

P30B06M



U01N11V



ACG24K



Power Solutions

Part Number	Description						
		A	B	C	D	E	F
P30B06M	G5 Basic PDU with (24) C13 and (6) C19 outlets; 32 amp, 230 V, single phase with IEC 60309 2P+E 6h 32A (IP44) input plug and 10 ft. power cord	✓	✓				
U01N11V	UPS, 1kVA, 2U, 120 V, VRLA, single phase, double-conversion on-line power protection with intelligent network card and rail kit	✓	✓				

Equipment Room/Data Center
Telecommunications Room
Open Office Space
Conference Room
Lobby/Entrance
Building Control

Grounding and Bonding

Part Number	Description						
		A	B	C	D	E	F
ACG24K	Grounding and Bonding	✓	✓				

Equipment Room/Data Center
Telecommunications Room
Open Office Space
Conference Room
Lobby/Entrance
Building Control

