INCREASE THE POWER
OF YOUR NETWORK

PoE++
READY

011 POWER OVER ETHERNET
000 & INTERNET OF THINGS

0 APPLICATION 010
1 GUIDE 011001110

Llegrand®

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POWER OVER ETHERNET

Power over Ethernet (PoE) is a technology that enables powered devices, such as wireless access points (WAPs), security cameras, IP phones (VoIP), building automation and control systems, lighting and more generally the Internet of Things (IoT), to receive electrical power and data over the same Ethernet cabling, supporting the same 100 m transmission distance.

POWER OVER ETHERNET IS PART OF THE LEGRAND LCS³ SYSTEM: 3 DIMENSIONS OF EXCELLENCE FOR DATA CENTERS AND LOCAL AREA NETWORKS

LCS 3

3 DIMENSIONS OF EXCELLENCE

● PERFORMANCE ● SCALABILITY ● EFFICIENCY

TABLE OF
CONTENTS

PoE | THE POWER OF THE NETWORK

POWER OVER ETHERNET IS A SIMPLE, COST-EFFECTIVE WAY OF DELIVERING DATA AND POWER TO ETHERNET CONNECTED DEVICES

Power over Ethernet (PoE) has emerged as a key powering strategy, allowing network managers, installers and integrators to use structured cabling to provide both power and data to many of their network devices.

PoE minimises the number of cables required to install a network device, resulting in lower costs, less downtime, increased flexibility and simplified maintenance.

PoE APPLICATIONS:

1. Wireless access points
2. Security cameras
3. IP phones
4. Intelligent LED lighting
5. Occupancy sensors
6. Climate sensors
7. Access/Building automation controls
8. Digital signage
9. Loudspeakers
10. Visible light communication (i.e. Li-Fi)

NETWORK INFRASTRUCTURE

1

7

10

6

2

3

CLOUD

PoE IOT INFRASTRUCTURE

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The Internet Protocol (IP) has played a key role in the convergence of information and media delivery, and it will empower the Internet of Things era as well.

IP convergence will be especially important within the next generation of commercial buildings, an ecosystem of ubiquitous heterogeneous devices, people and systems interacting in real time. As we migrate towards an inevitably fully IoT-enabled building, we will see the convergence of power, light and data over a common cabling system for a variety of applications.

CONNECTED DEVICE

This can refer to a wide variety of "Things" such as smart thermostats, phones, security cameras, security badges, and more. These devices support various applications by collecting useful data with the help of various existing technologies and then autonomously communicating the data between other devices to make enhancements to the surrounding environment without human interaction. Connected devices often leverage IP and many are PoE ready.
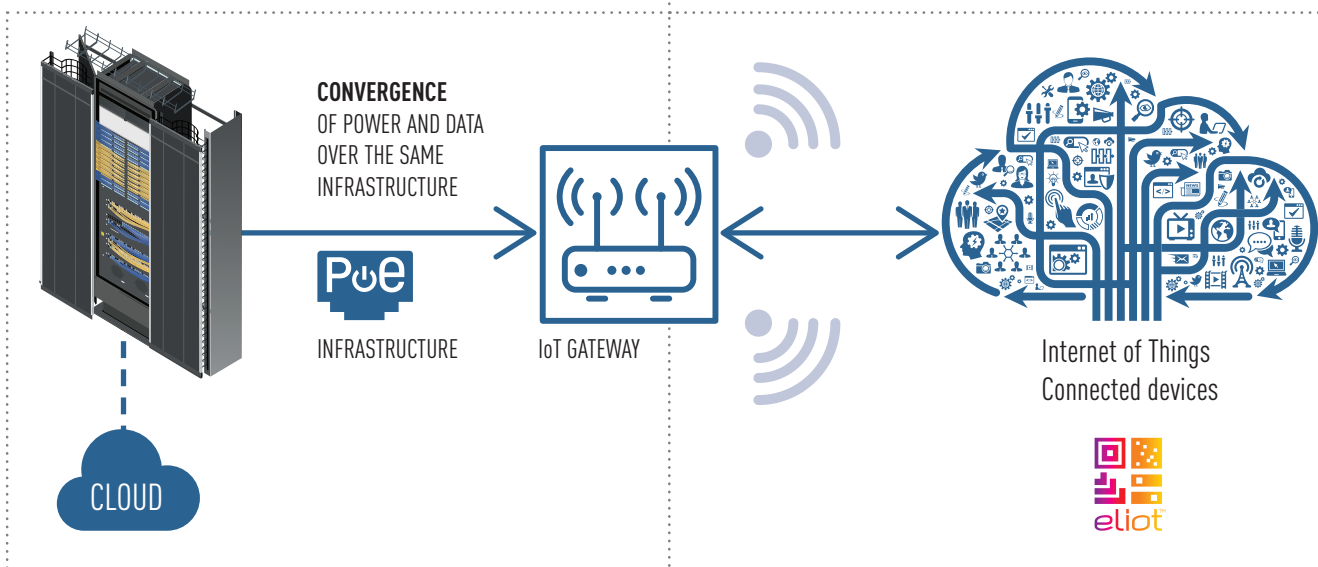
ENABLING INFRASTRUCTURE

This refers to the structure beyond the "Things" that make the IoT philosophy possible. It includes the platforms which facilitate a common language for all devices to communicate freely, the "collect and act" scenarios that are the essence of the IoT movement and the "enablers", such as PoE delivery, WAPs, gateways and edge devices. The cabling infrastructure that makes up the "physical" deployment of the IoT installation is at the core of these systems. A structured cabling infrastructure provides the required foundation to support these applications.

A STRUCTURED CABLING INFRASTRUCTURE PROVIDES THE REQUIRED FOUNDATION TO SUPPORT THESE APPLICATIONS

BIoT

BIoT stands for the BUILDING Internet of Things which allows us to focus on all the components in a building that could be connected to the network (the Internet) for the purpose of creating operational efficiencies, reducing energy consumption, improving occupant experiences, achieving sustainability goals and effectively optimising financial performance.

CONVERGENCE OF POWER AND DATA OVER THE SAME INFRASTRUCTURE

PoE

INFRASTRUCTURE

IoT GATEWAY

Internet of Things
Connected devices

CLOUD

eliot

PoE
ADVANTAGES

In addition to cost savings, PoE provides multiple benefits, including design flexibility, increased reliability and simplified global deployment due to the use of a common power connection in all regions of the world.

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COST SAVINGS

PoE helps you to save time and money by avoiding the need to install electrical infrastructure near the Ethernet devices to be connected.

PoE++
READY

DESIGN FLEXIBILITY

Networking devices can be easily moved without the need to schedule an intervention to install an electrical outlet. Ethernet equipment can be connected wherever there is an RJ 45 socket.

INCREASED RELIABILITY

A UPS will protect against power cuts on all PoE connected equipment.

SIMPLIFIED GLOBAL DEPLOYMENT

Using a universal RJ 45 socket to connect equipment anywhere in the world.

PoE STANDARDS

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Applications converging over IP allow communications to occur over Ethernet, a common standard which has evolved to support both data and low voltage power over industry standard category cabling. Many of the applications mentioned previously are also leveraging devices that have become more power efficient. With these devices having lower power requirements, they are now able to be powered using low-voltage direct current (DC) over a single Ethernet cable.

The IEEE sets the standard for Power over Ethernet (PoE) which allows for the simultaneous transmission of data and low-voltage power over Ethernet cabling. With the upcoming ratification of 4-pair PoE, 802.3BT, the latest IEEE standard will allow up to 100 Watts of DC power to be delivered from the power source equipment alongside data transmissions in a single category cable.
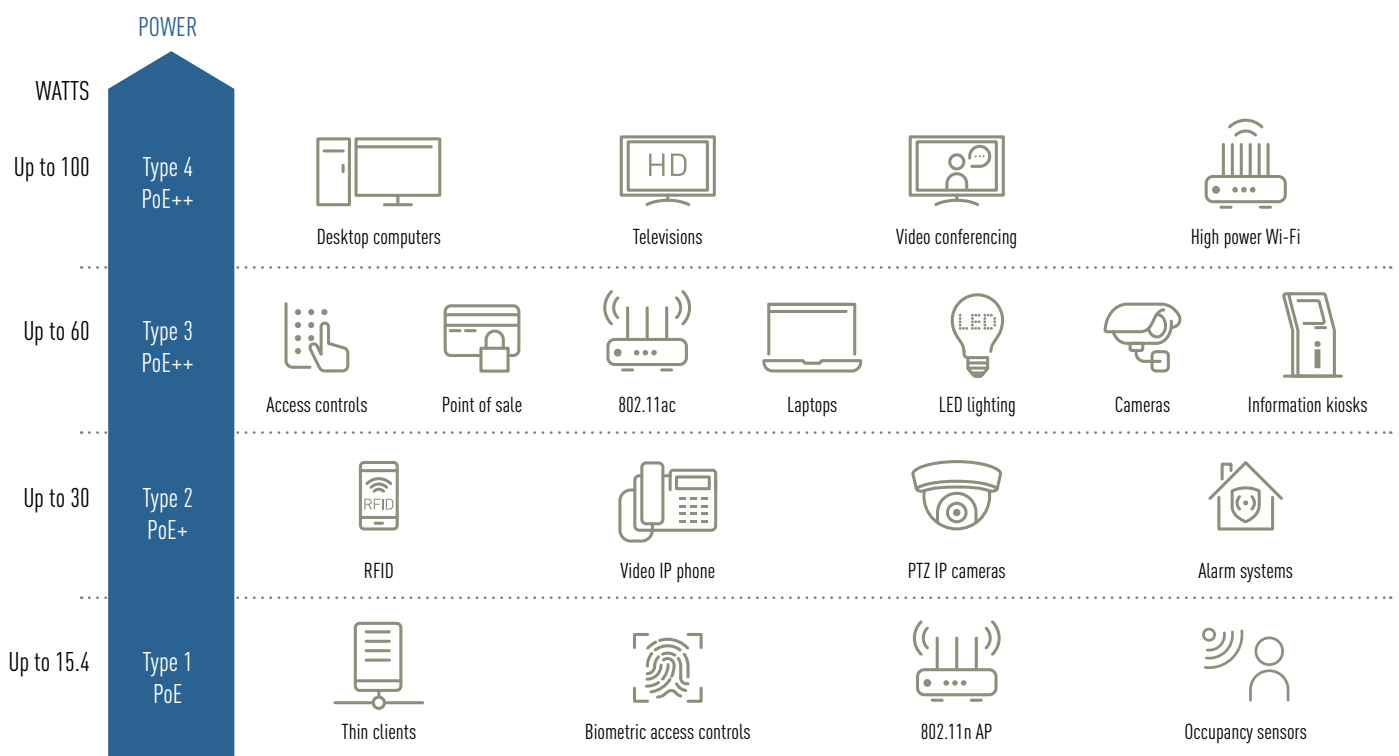
STANDARDS AND APPLICATIONS

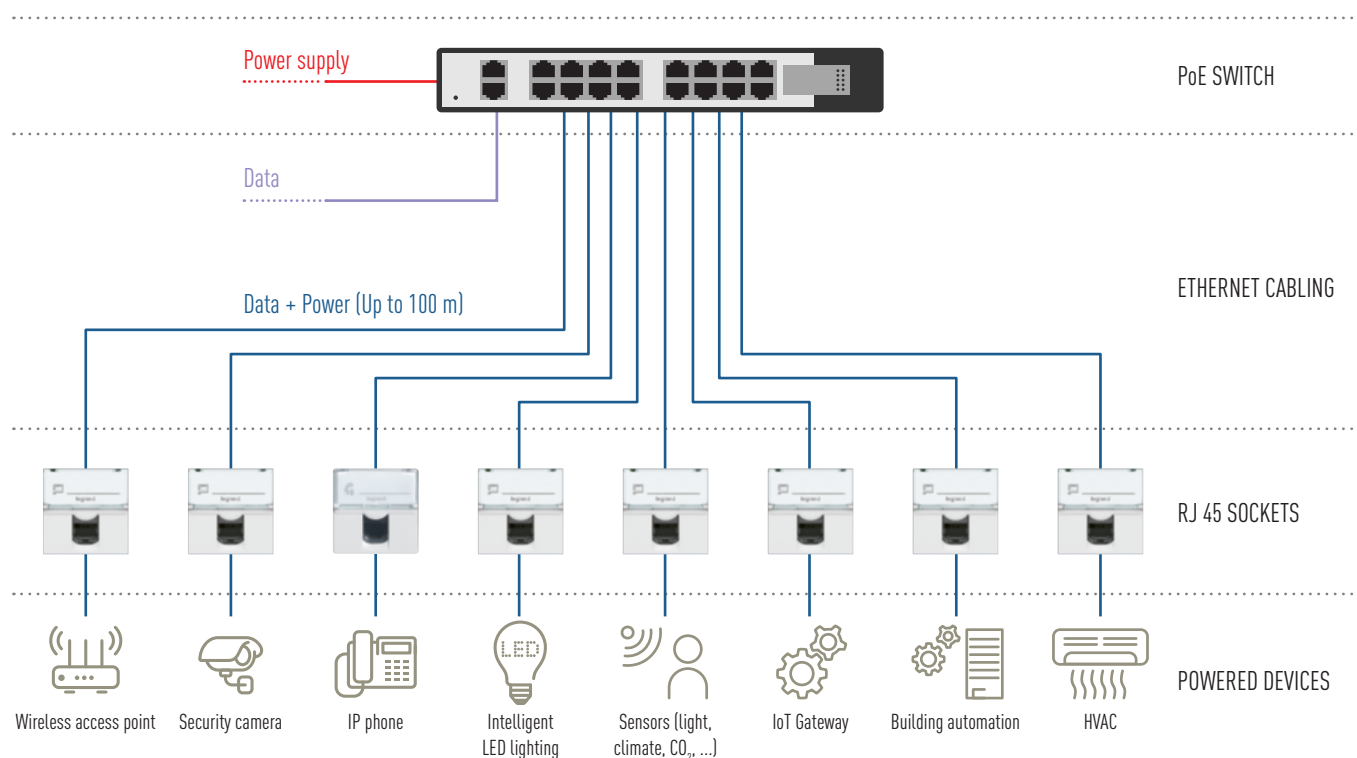| Organisation/standard	Watts from power source equipment
IEEE 802.3AF 2-pair PoE	Up to 15.4 W
IEEE 802.3AT 2-pair PoE+	Up to 30 W
IEEE 802.3BT (Type 3)* 4-pair PoE	Up to 60 W
IEEE 802.3BT (Type 4)* 4-pair PoE	Up to 100 W

*Proposed standards, not yet ratified

When considering a connected infrastructure design, it is important to start by determining the type of applications that will be implemented, both now and in the future, and then determine the power supply requirements needed to power the connected devices.

POWER

WATTS		
Up to 100	Type 4 PoE++	Desktop computers · Televisions · Video conferencing · High power Wi-Fi
Up to 60	Type 3 PoE++	Access controls · Point of sale · 802.11ac · Laptops · LED lighting · Cameras · Information kiosks
Up to 30	Type 2 PoE+	RFID · Video IP phone · PTZ IP cameras · Alarm systems
Up to 15.4	Type 1 PoE	Thin clients · Biometric access controls · 802.11n AP · Occupancy sensors

PoE ARCHITECTURE

BUILDING SYSTEMS ARE MOVING TO A SINGLE IP NETWORK

Power supply

Data

Data + Power (Up to 100 m)

PoE SWITCH

ETHERNET CABLING

RJ 45 SOCKETS

POWERED DEVICES

Wireless access point · Security camera · IP phone · Intelligent LED lighting · Sensors (light, climate, CO_2, …) · IoT Gateway · Building automation · HVAC

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1 PoE SWITCH

A Power over Ethernet switch is a device which supplies power and data on Ethernet cabling. It will draw power from its own conventional power source and provide power to the rest of the PoE system.

2 ETHERNET CABLING

The Ethernet cable is the power and data transmission medium of a PoE system. It is used to provide the link between two devices enabling bi-directional communication and uni-directional supply of power.
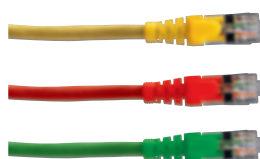
3 RJ 45 SOCKETS

Universal RJ 45 socket to connect devices.

4 POWERED DEVICES

A powered device is a device which receives power from the power sourcing equipment. It does not require its own conventional power source.
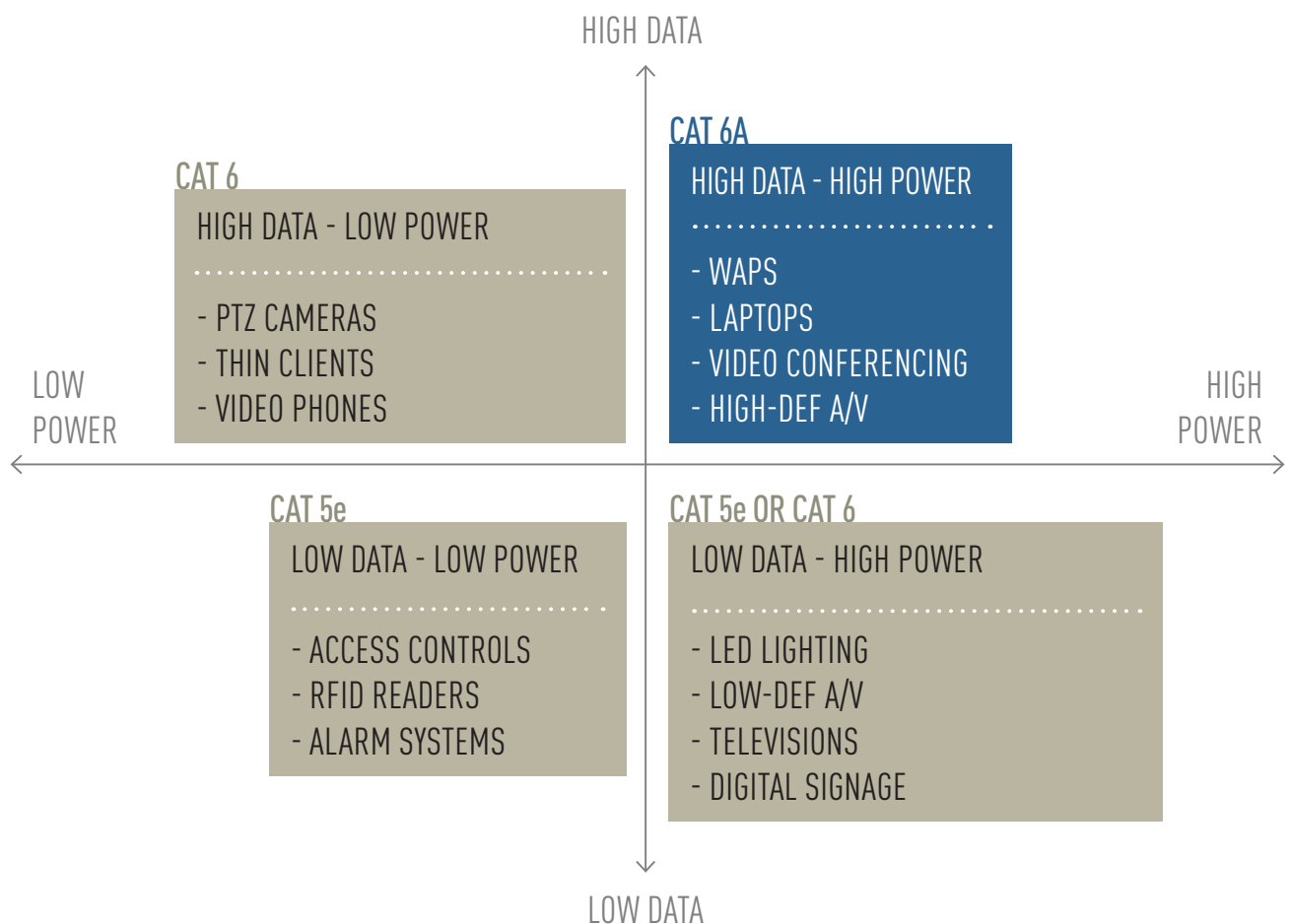
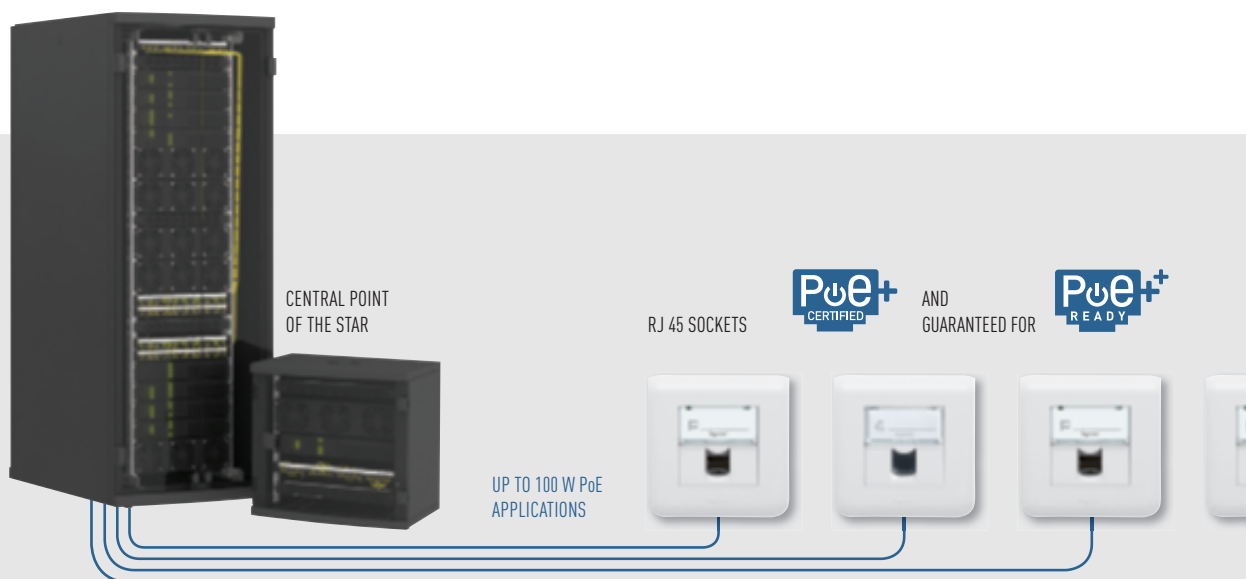# CHOOSE THE CONNECTIVITY
SYSTEM FOR YOUR APPLICATIONS

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When deploying a powered device using Ethernet cabling, it is important to take into consideration the mix of power and data that a device requires.

Applications like LED lighting require higher power, but low data bandwidth. In contrast, applications like multi-band and multi-antenna wireless access points require high bandwidth and high power throughput.

CATEGORY 6$_A$ CABLING IS RECOMMENDED FOR OPTIMUM FUTURE-PROOFING AND IS THE BEST CHOICE FOR THE INTERNET OF THINGS.

HIGH DATA

CAT 6A

HIGH DATA - HIGH POWER
....
- WAPS
- LAPTOPS
- VIDEO CONFERENCING
- HIGH-DEF A/V

CAT 6

HIGH DATA - LOW POWER
....
- PTZ CAMERAS
- THIN CLIENTS
- VIDEO PHONES

LOW POWER

HIGH POWER

CAT 5e

LOW DATA - LOW POWER
....
- ACCESS CONTROLS
- RFID READERS
- ALARM SYSTEMS

CAT 5e OR CAT 6

LOW DATA - HIGH POWER
....
- LED LIGHTING
- LOW-DEF A/V
- TELEVISIONS
- DIGITAL SIGNAGE

LOW DATA

CENTRAL POINT
OF THE STAR

RJ 45 SOCKETS

PoE+ CERTIFIED AND GUARANTEED FOR

PoE++ READY

UP TO 100 W PoE
APPLICATIONS

CABLING

Cabling must support enough power throughput and efficiency in addition to the heat dissipation capabilities.

Category 6$_A$ cabling:
To improve thermal performance and energy efficiency while minimising the cost of moves, additions, changes and upgrades. We recommend running Category 6$_A$ cabling to each powered device, preferably using a zone cabling architecture.
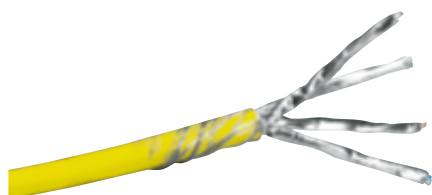
CONNECTIVITY

Connectivity must be robust, durable and provide power headroom for current carrying capacity.
Arcing is inevitable with PoE systems, but Legrand's connectivity locates the last point of contact away from the mated connection, protecting the critical area from spark gap erosion. 50 microinch gold plating of the full mated surfaces and maximum contact area in the full mated position extend the life and performance of the connection.
In addition, the connector should have a minimum current carrying capacity of paired traces for structured cabling of 1 amp. Legrand's connectivity provides up to an additional amp of headroom for superior performance.

RELIABILITY TESTING

If connectors are unplugged under load, an inductive current is created within the connector that may spark at one or more contact surfaces, causing the surfaces to corrode.
It is recommended that connecting hardware be qualified to support PoE and four-pair PoE applications by using the test schedules in IEC 60512-99-001 (PoE and PoE+) and IEC 60512-99-002 (PoE++).

PoE | BUILDING INFRASTRUCTURE

With devices and applications leveraging the IP for communication and Ethernet providing a standard method for delivery, we are seeing the convergence of connected devices over Ethernet. This allows for IoT networks to be designed and managed alongside existing and evolving industry standards, including TIA and IEEE, to ensure safe and consistent operation of devices on a common infrastructure.

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CLOUD
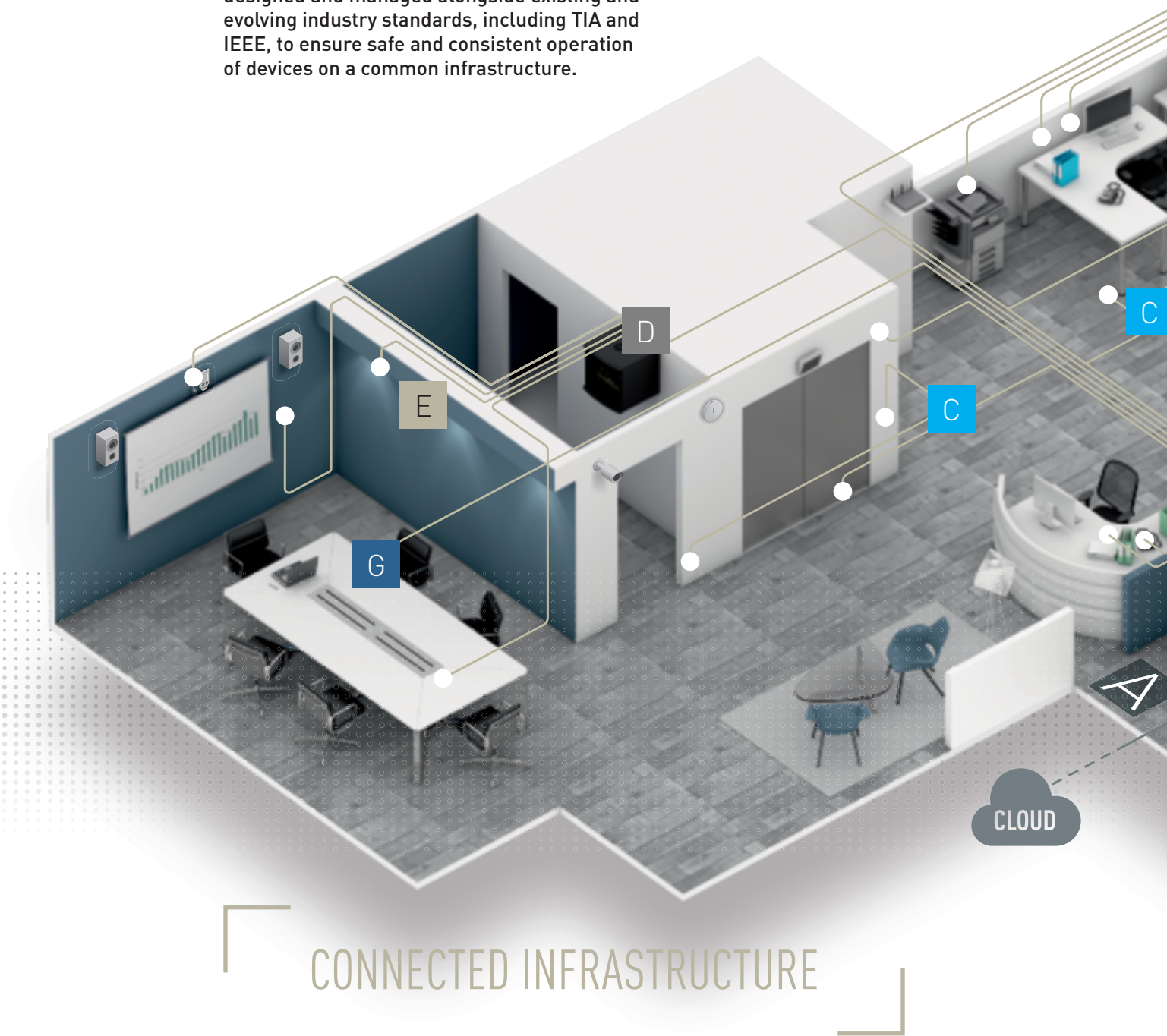
CONNECTED INFRASTRUCTURE
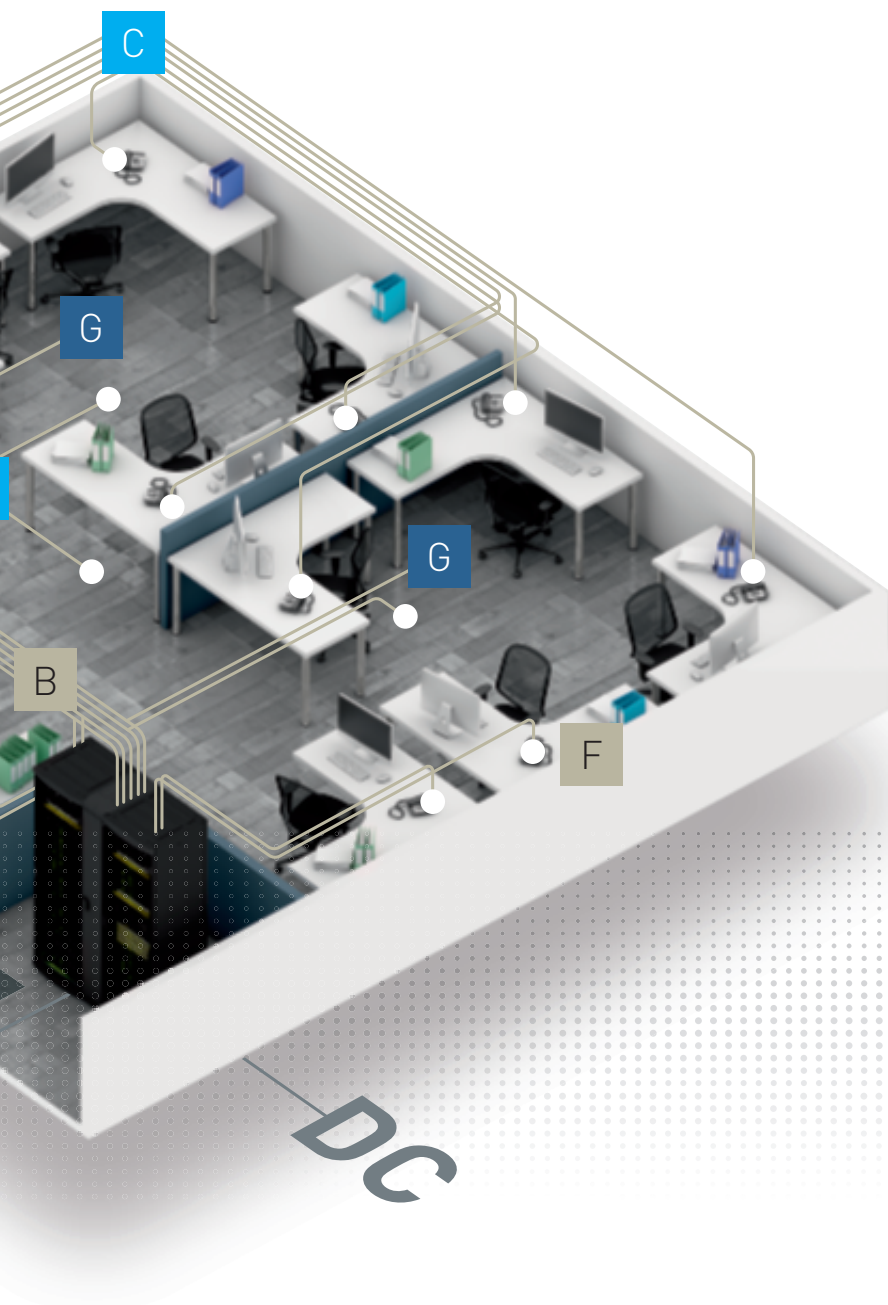
LEGRAND'S SOLUTIONS FOR PoE

PoE+ CERTIFIED AND GUARANTEED FOR **PoE++ READY**

eliot ENABLER

DC DATA CENTER
• Server system

A TELECOMMUNICATIONS ROOM
• Racks • Cabinets • Cable management
• Power distribution units • Patch panels
• Connector blocks • Patch cords
• Fibre cables • Fibre optic drawers
• PoE switch • UPS

B CABLING/CABLE MANAGEMENT
• Copper cable • Wire mesh cable tray
• DLP trunking

C CONSOLIDATION POINT
• Area distribution boxes

D WALL-MOUNTING CABINETS

E POWERED DEVICES
• Emergency lighting luminaires

F WORKSTATION RJ 45 SOCKETS
• RJ 45 sockets • Patch cords


G WI-FI ACCESS POINTS

PoE | CONNECTED INFRASTRUCTURE

LEGRAND PROVIDES
THE INFRASTRUCTURE
SOLUTIONS FOR PoE
ENABLEMENT

Legrand is an enabler providing the physical infrastructure and connectivity required to support your PoE installation.
With over 50 years of data communications excellence, the breadth of our offer positions us as an all-in-one infrastructure provider to enable whatever powered device you deploy, in any environment.

At Legrand, our design philosophy is centred around connected infrastructure and the 5 elements which ultimately drive value to you, our customers.

Connected infrastructure combines our solutions, industry leading customer advocacy, design and support teams, for a comprehensive approach to your network.
Through connected infrastructure, we aim to deliver maximum performance, time savings, space optimisation, superior customer experience and sustainability by design, to address your challenges, today and tomorrow.

CONNECTED INFRASTRUCTURE
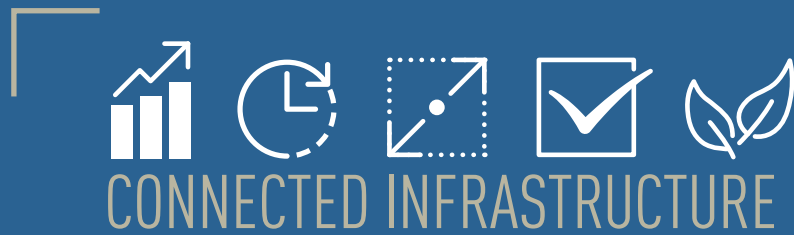
PERFORMANCE
- Efficient power delivery
- Robust current carrying capacity
- Arcing protection

TIME
- Automated control
- Efficient moves, additions or changes
- Easy installation and deployment

SPACE
- Support any density
- Flexible design
- Support for centralised or decentralised models

EXPERIENCE
- Application tested solutions
- Complete library of resources and white papers
- Partnerships with industry leaders

SUSTAINABILITY

- PEPs contribute towards LEED
- Legrand is a sustainability leader
- Expertise in power efficiency

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