Bicsi®
ENDORSED EVENT

ICT FORUM COSTA RICA 2023

Expandiendo el universo de la inteligencia, la conectividad y el conocimiento

ORGANIZA:

LATAM RED

PoE Lighting

in Smart Building Design

Presented by

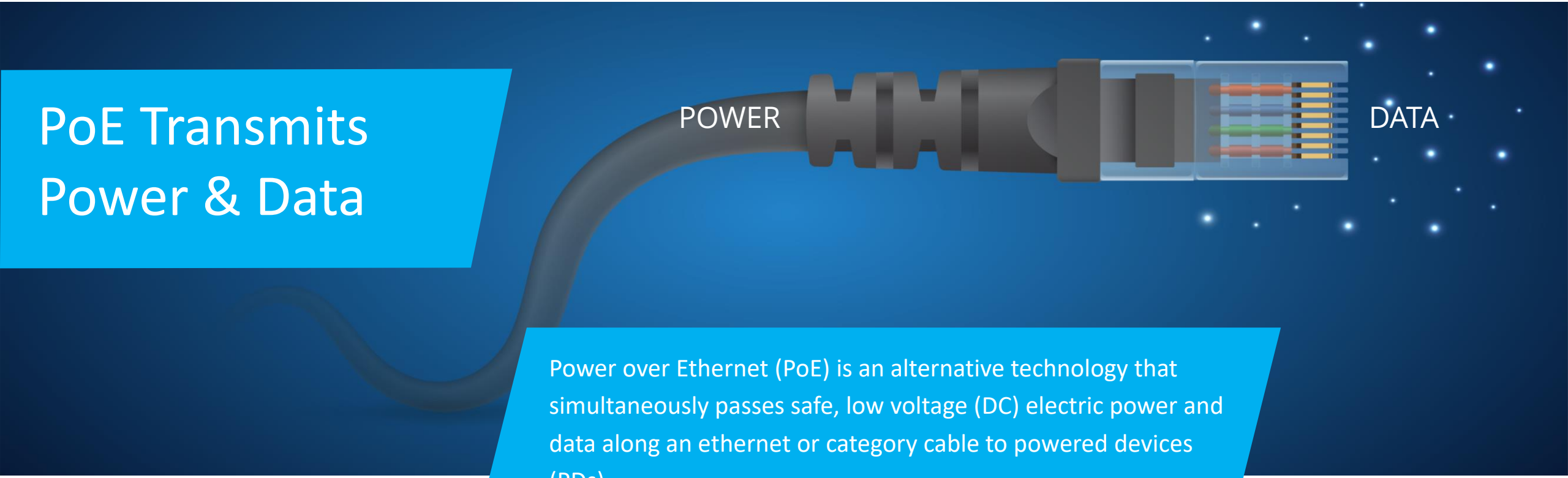
MHT Technologies

SUPERIOR ESSEX

Bicsi ENDORSED EVENT

What is PoE?

PoE Transmits Power & Data



Power over Ethernet (PoE) is an alternative technology that simultaneously passes safe, low voltage (DC) electric power and data along an ethernet or category cable to powered devices (PDs)

BICSI® ENDORSED EVENT

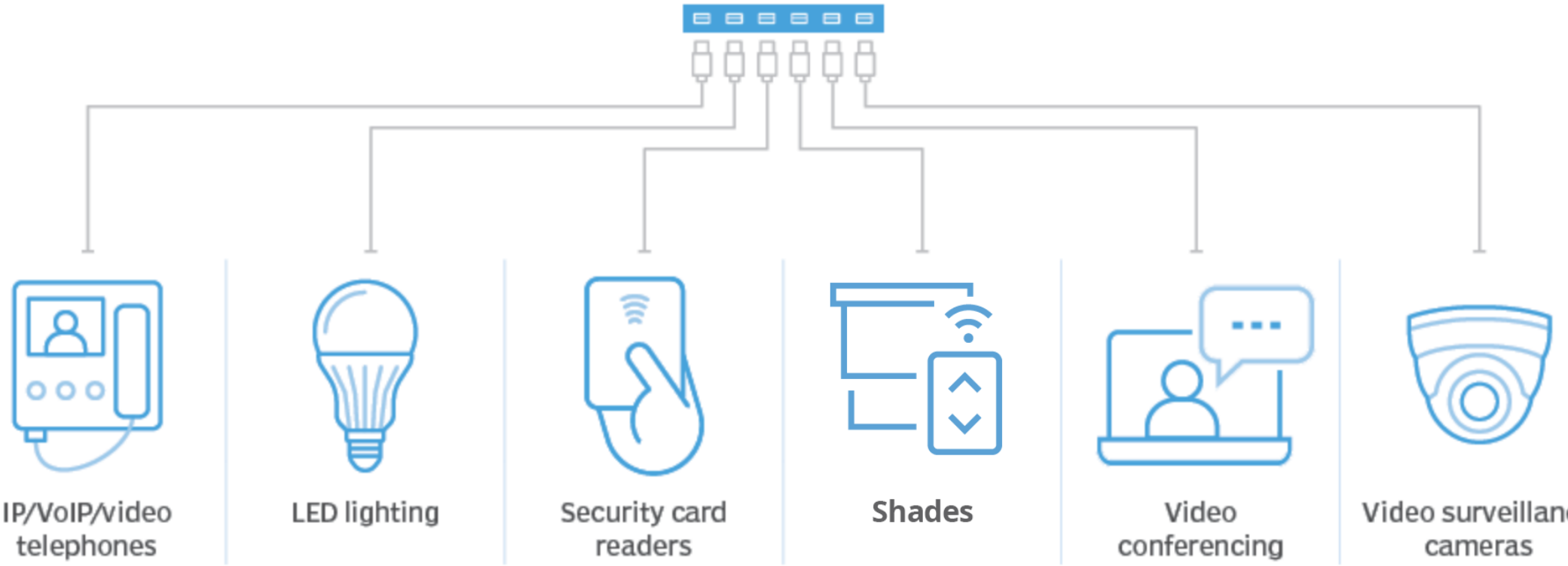
PoE & Smart Buildings

A smart building uses intelligent systems to collect actionable data from user devices, sensors, systems, and services on the premises to optimize energy efficiency and building health.

In a smart building, PoE can power and gather data on devices such as sensors, lighting, HVAC systems, and fire alarms, as well as USB-C laptops, TV and computer monitors, shades.

Bicsi®
ENDORSED EVENT

PoE Powered Devices



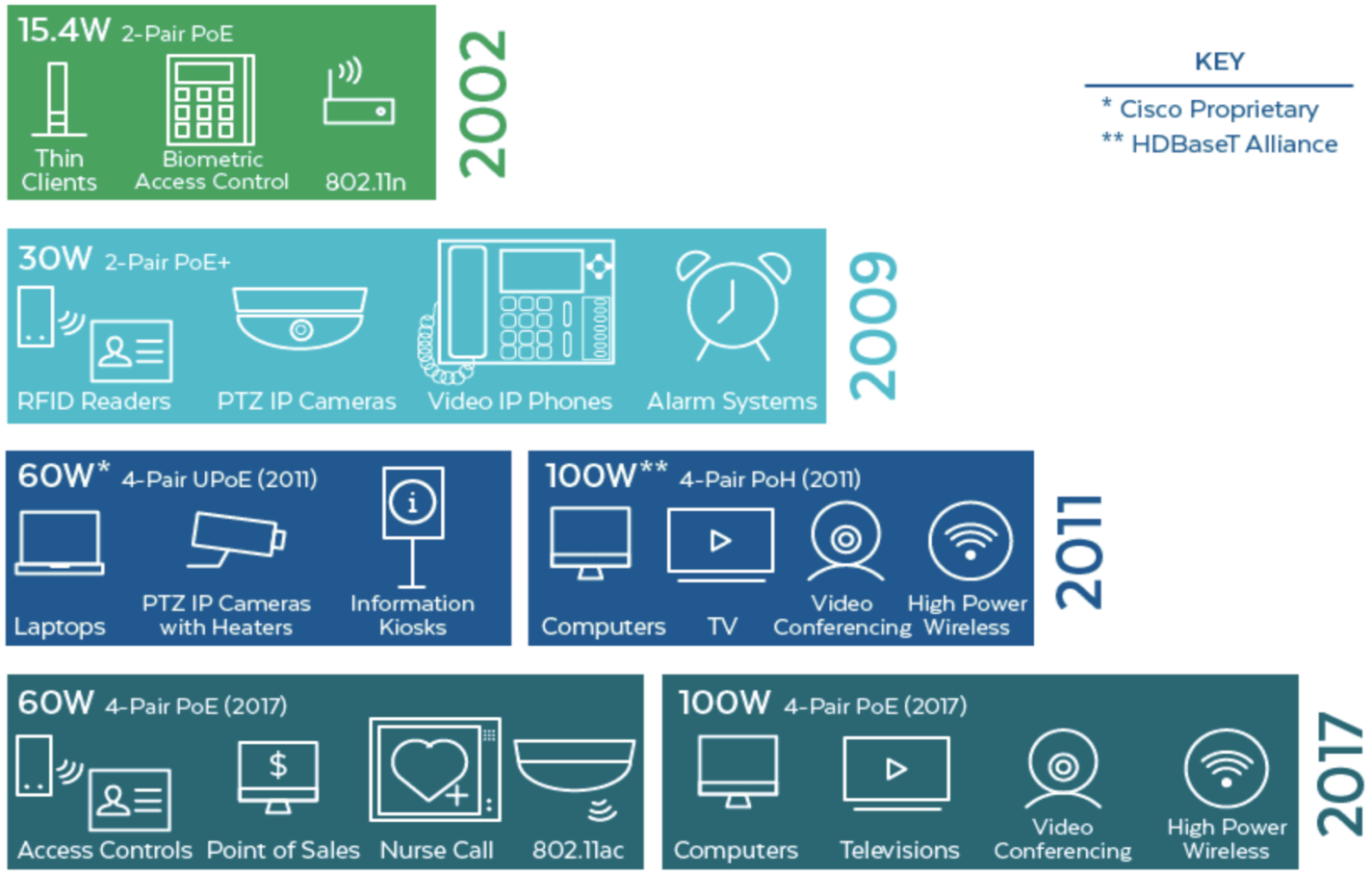
PoE Switch Standards

PoE vs. PoE+ vs. PoE++ Switches

PoE	802.3af	PoE+	802.3at	PoE++	802.3bt
	15.4 Watts		25.5 Watts		51/71 Watts
Types of Devices Supported		Types of Devices Supported		Types of Devices Supported	
 VoIPs		 Pan/Tilt/Zoom Cameras		 Laptops	
APs		 Video IP Phones		 TVs	
		 Alarm Systems			

Advances in PoE Power

PoE Wattage



Source: http://blog.leviton.com/cabling-and-connectivity-power-over-ethernet

BICSI ENDORSED EVENT

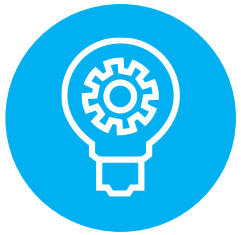
PoE Cable Standards

IEEE Standards and Available Wattage

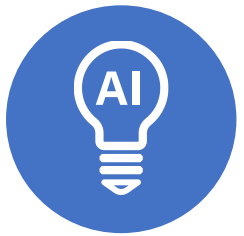
Levels of Power	IEEE Standard	Watts Supplied
Type 1	IEEE 802.3af	Up to 15.4W
Type 2	IEEE 802.3af	Up to 30.8W
Type 3	Ultra PoE / 802.3bt	Up to 60W
Type 4	IEEE 802.3bt	Up to 90W

Benefits of PoE

Safer and less expensive install



Increased comfort and productivity

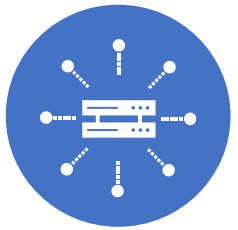


Control system that provides feedback and intelligence

Flexible, Data driven & Scalable

Smart policies and alerts

Control + Automation = Ongoing savings

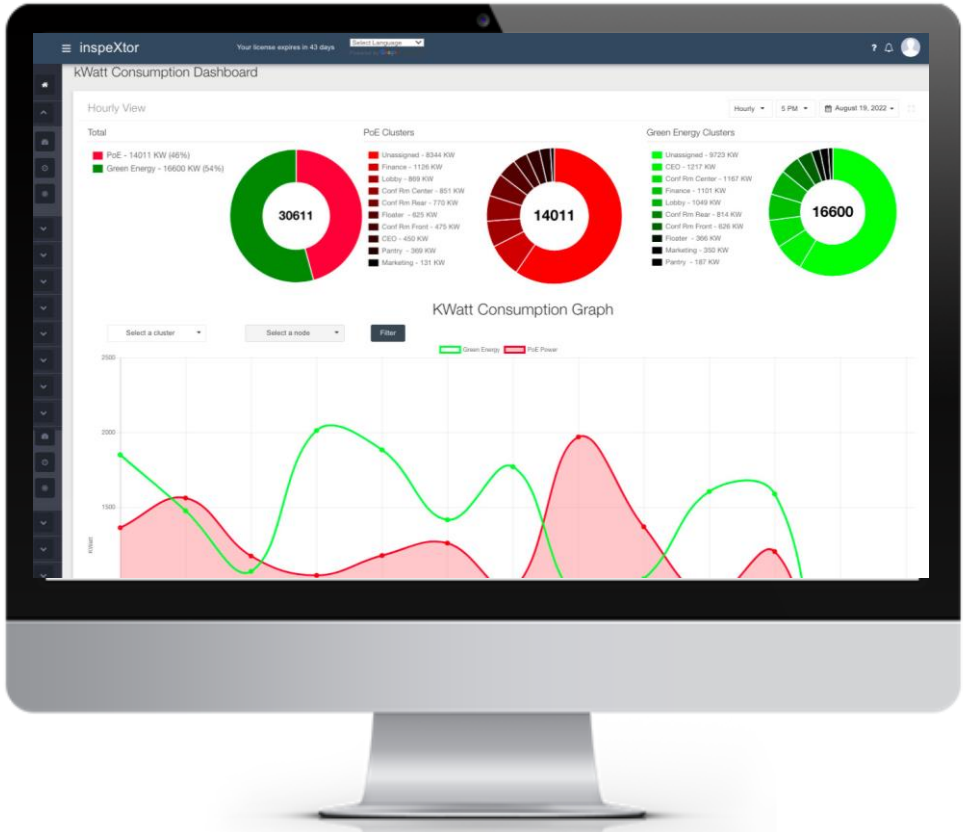


Integrate with BMS and other “smart” building options

Potential credits for LEED and Green Building incentives

BICSI® ENDORSED EVENT

PoE Lighting & Energy Efficiency



Sustainability Dashboard

- Energy Consumption Managed through a PoE software dashboard.
- Energy Efficiency from AC to DC conversion
- Overall PoE Energy Savings through Automation
- Connected systems help facility managers make energy-saving adjustments throughout the entire building ecosystem

BICSI® ENDORSED EVENT

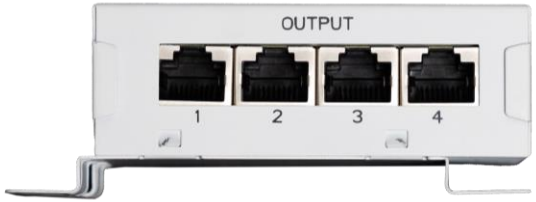
PoE Lighting Components

PoE Network Switch

Node/Driver

Advanced Sensors

Scene Controller

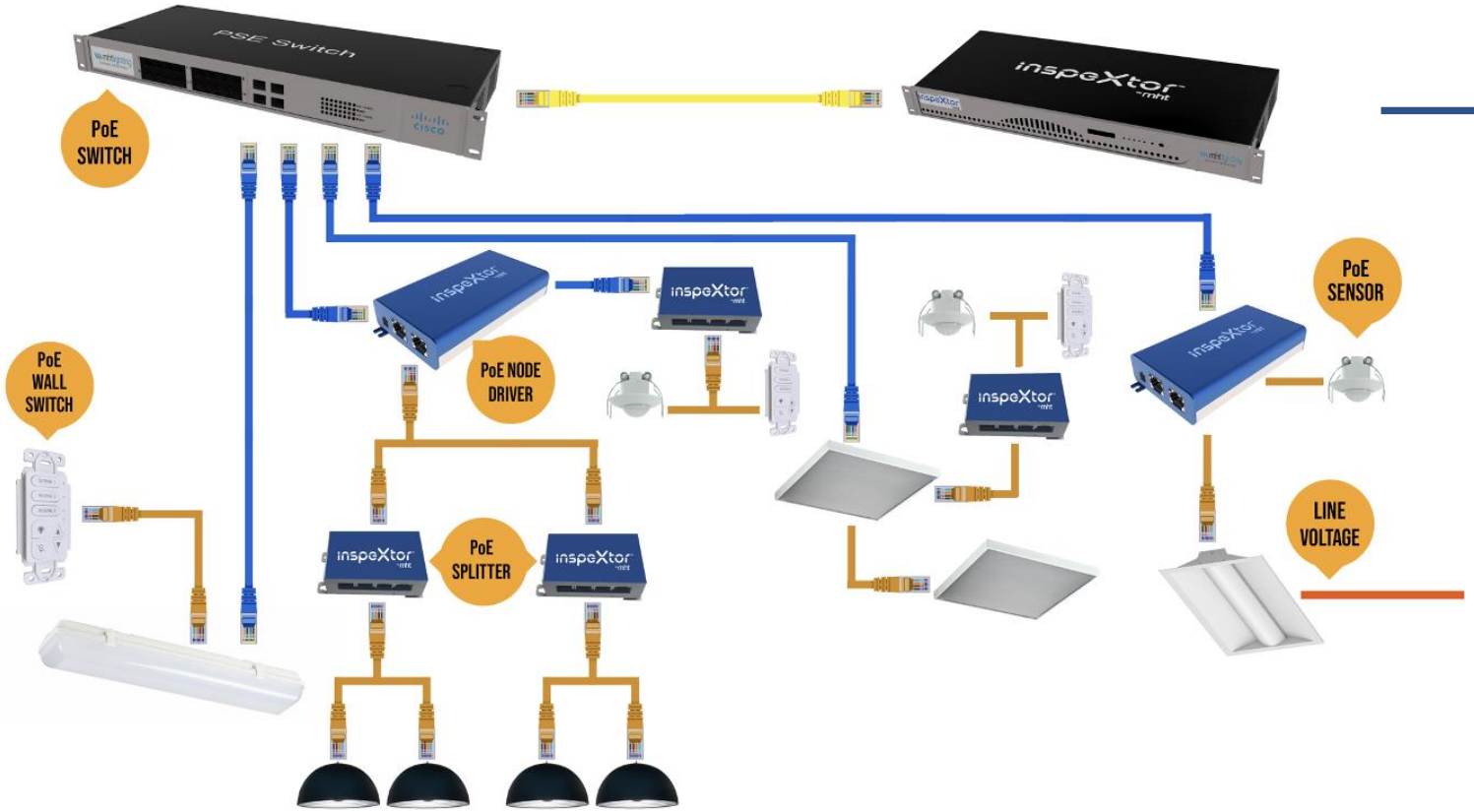


4- Port Splitter

2-Wire RJ45 Converter

BICSI ENDORSED EVENT

PoE Lighting Architecture



Application Software

A “PoE system” combines both a hardware and software solution. Used together, they can manage, integrate, and automate building systems, and then help run them more efficiently under a single technology platform.

Bicsi® ENDORSED EVENT

PoE Lighting is Fixture Agnostic

Compatible with virtually all LED light fixtures

access LIGHTING

ACULUX

AFX

amerlux

APOGEE LIGHTING

Coronet

dado lighting

Delta CONTROLS A Delta Group Company

FARADITE

HÈMÈRA

intra lighting

MERCURY ARCHITECTURAL LIGHTING

MHT LIGHTING

USAI Lighting

WAC LIGHTING Responsible Lighting®

Bicsi ENDORSED EVENT

Emergency Lighting Options

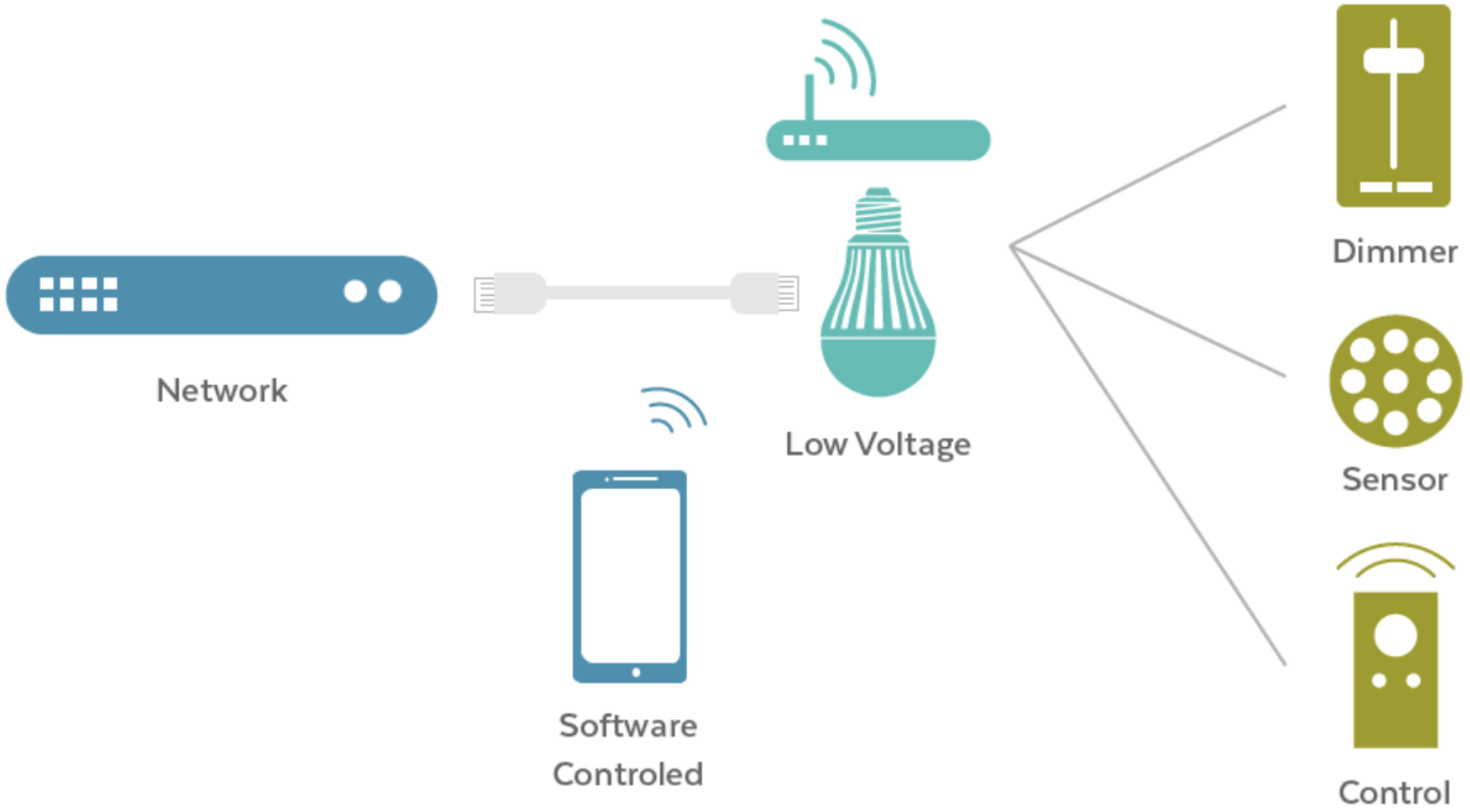
Centralized

In a centralized system you have to wait for the generator to power up before you enable the fixtures.

Decentralized

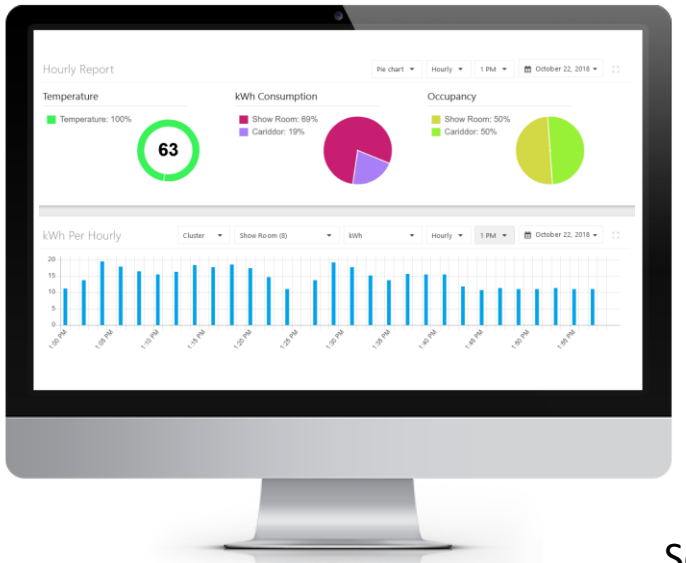
Battery back-up with a PoE system, in the event of a power outage, all fixtures attached to PoE switch remain functional.

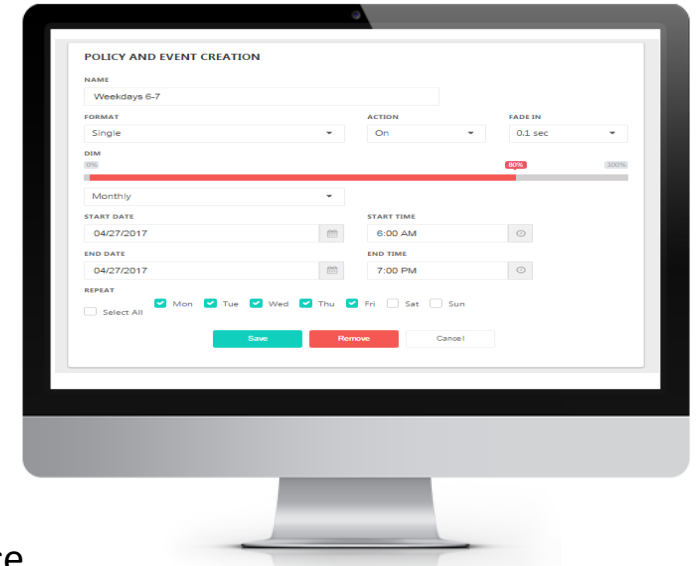
Software & Data Gathering



s://www.maximintegrated.com/content/dam/files/design/technical-documents/white-papers/led-white-paper.pdf

PoE Data Gathering



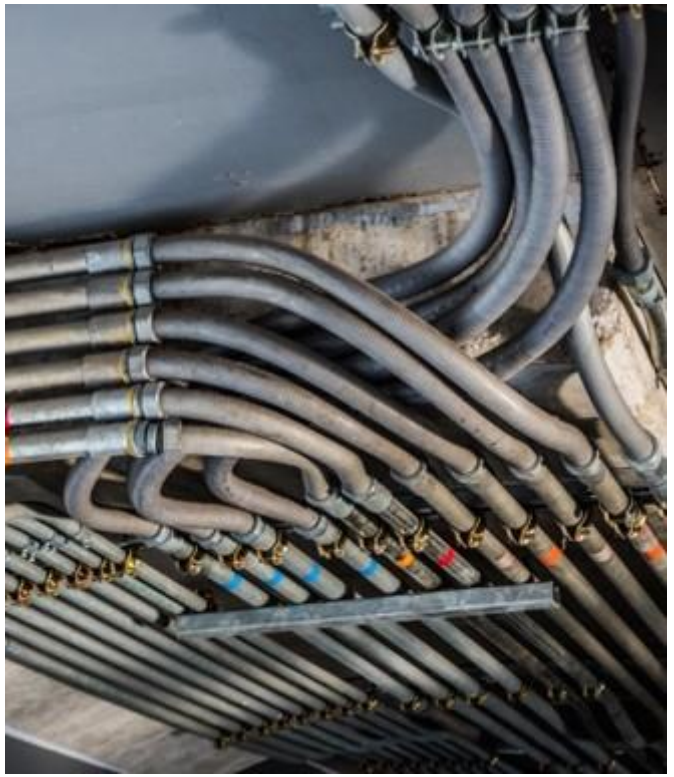


Software Interface

PoE lighting is managed by remote software, which means data metrics like power consumption / occupancy / people counting can be monitored and adjusted from anywhere.

Bicsi® ENDORSED EVENT

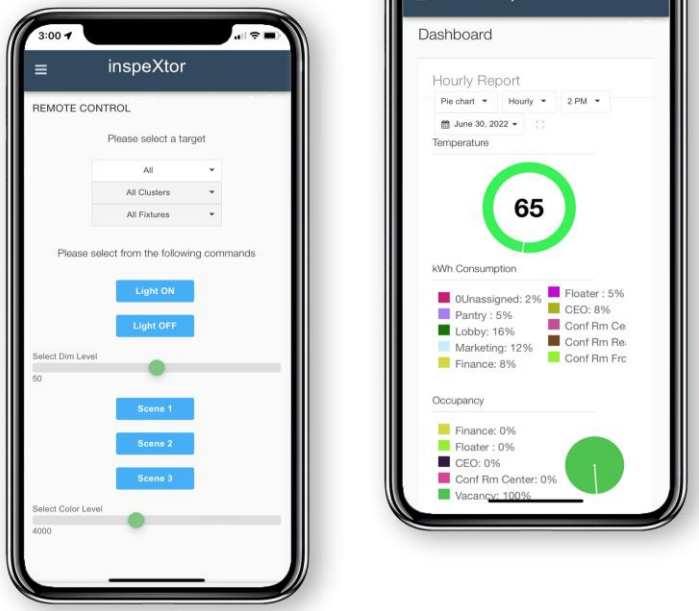
PoE Lighting Installation



PoE simplifies the electrical wiring needed for powering lighting fixtures

BICSI ENDORSED EVENT

PoE Lighting Controls



Daylight Harvesting

- The process of using daylight instead of artificial light to illuminate a space. This is accomplished through sensors and dimming technology.

White Temperature Tuning

- The ability to change the Kelvin Temperature from a warm 2700K to a cool 5700K.

Plug and Play Installation

- Installing a PoE lighting system is now safer, easier, and more affordable than it has ever been.

Demand Response

- In a PoE system you can easily dim lights to a pre-set level, and the sensors can relay information to the main BMS which will adjust accordingly.

BICSI® ENDORSED EVENT

Sustainable PoE Lighting

Installing a PoE lighting system and provide up to 35 points towards the requirements for LEED certification.

The total carbon footprint of the materials being produced, shipped and installed is lower, CAT cable vs BX, EMT, etc.

BICSI ENDORSED EVENT

PoE Lighting & Building Safety

SAFETY

- Power delivery using PoE is designed to intelligently protect network equipment from overload, underpowering, and incorrect installation. It also eliminates the danger of working with or around dangerous high-voltage power sources.

- IEEE 802.3af/at/bt compliant PoE technology is safe.

RELIABILITY

- PoE power comes from a central and universally compatible source and not from a collection of distributed wall adapters. It can be backed up by an uninterruptible power supply (UPS), allowing for continuous operation even during power failures. PoE also allows for devices to be easily disabled or reset from a centralized controller.

BICSI® ENDORSED EVENT

PoE Lighting is Scalable

Large Scale Project Profiles

33 story residential building including common areas, amenity spaces, gym, spa, basketball court and more!

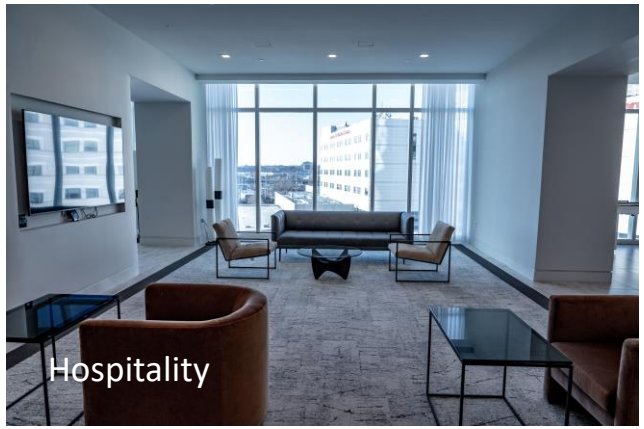
750,000 Sq. Ft mixed use project in Long Branch NJ. High-end residential, retail and dining experiences open to the public on the ground level. High-end facilities such as gyms, works spaces and amenity areas for residents

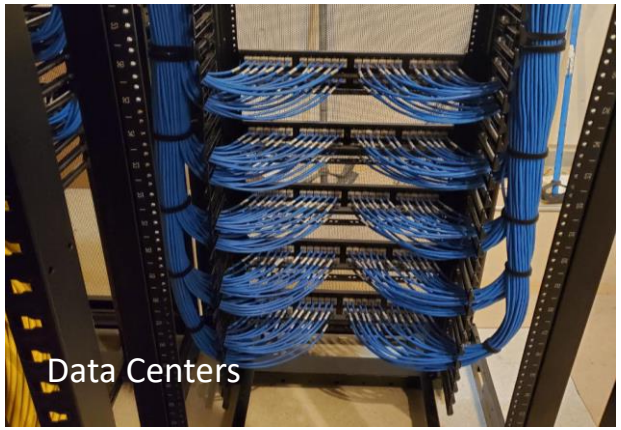
Scalable: PoE makes it simple to add new equipment to a network without the need for professional electrical installers.

BICSI® ENDORSED EVENT

PoE Industry Segments

Commercial Offices


Hospitality


Data Centers

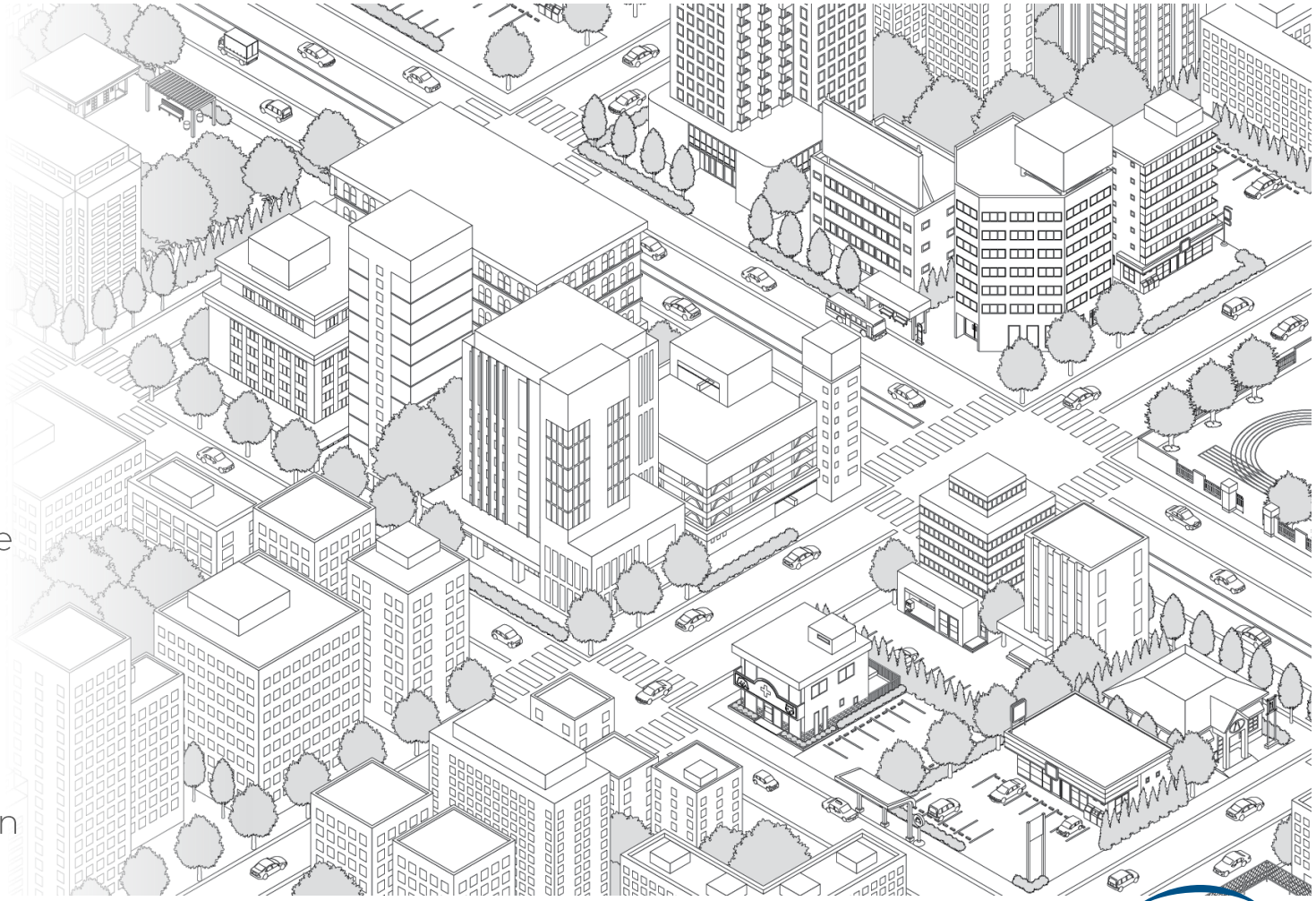

Multi-Unit Residential


Senior Living

Bicsi® ENDORSED EVENT

COMMON POE DEVICES

- Access Points
- Badge Readers
- Biometric Door Locks
- Ceiling Fans
- Entry Barriers & Turnstiles
- Face Recognition Systems
- HVAC VAVs
- Surveillance Cameras
- Horns & Sirens
- Smoke Alarms
- Temperature Sensors
- Touchscreen PCs



SUPERIOR ESSEX

Arthur J. (Art) Bolt
art.bolt@spsx.com
+1 (404) 889-5677

Bicsi® ENDORSED EVENT

PoE – Extending the Distance

TO TRULY CHANGE THE GAME

YOU HAVE TO REALLY GO THE DISTANCE

Going beyond the 100-meter barrier

SUPERIOR ESSEX

BICSI ENDORSED EVENT

PoE – Extending the Distance

Methods to Achieve Distances Beyond the 100 Meters Barrier

SUPERIOR ESSEX

BICSI ENDORSED EVENT

DISTANCES BEYOND 100M, HOW?

- Add a TR or Mini TR
- Use PoE Extenders
- Use Fiber and Media Converters
- Use Hybrid Copper-Fiber Cables
- Use High Performance PoE Cables

SUPERIOR ESSEX

BICSI ENDORSED EVENT

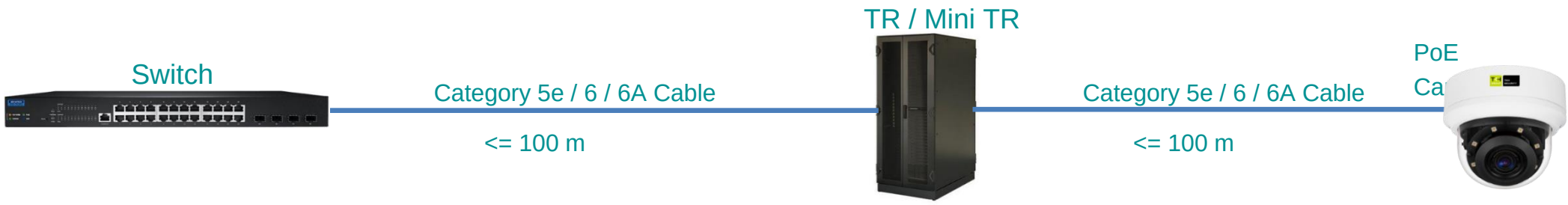
EXTENDING DISTANCES BY ADDING A TR OR MINI TR

Benefits

- Standards Compliant
- Centralized Management
- Supports up to 10Gb and 90W PoE

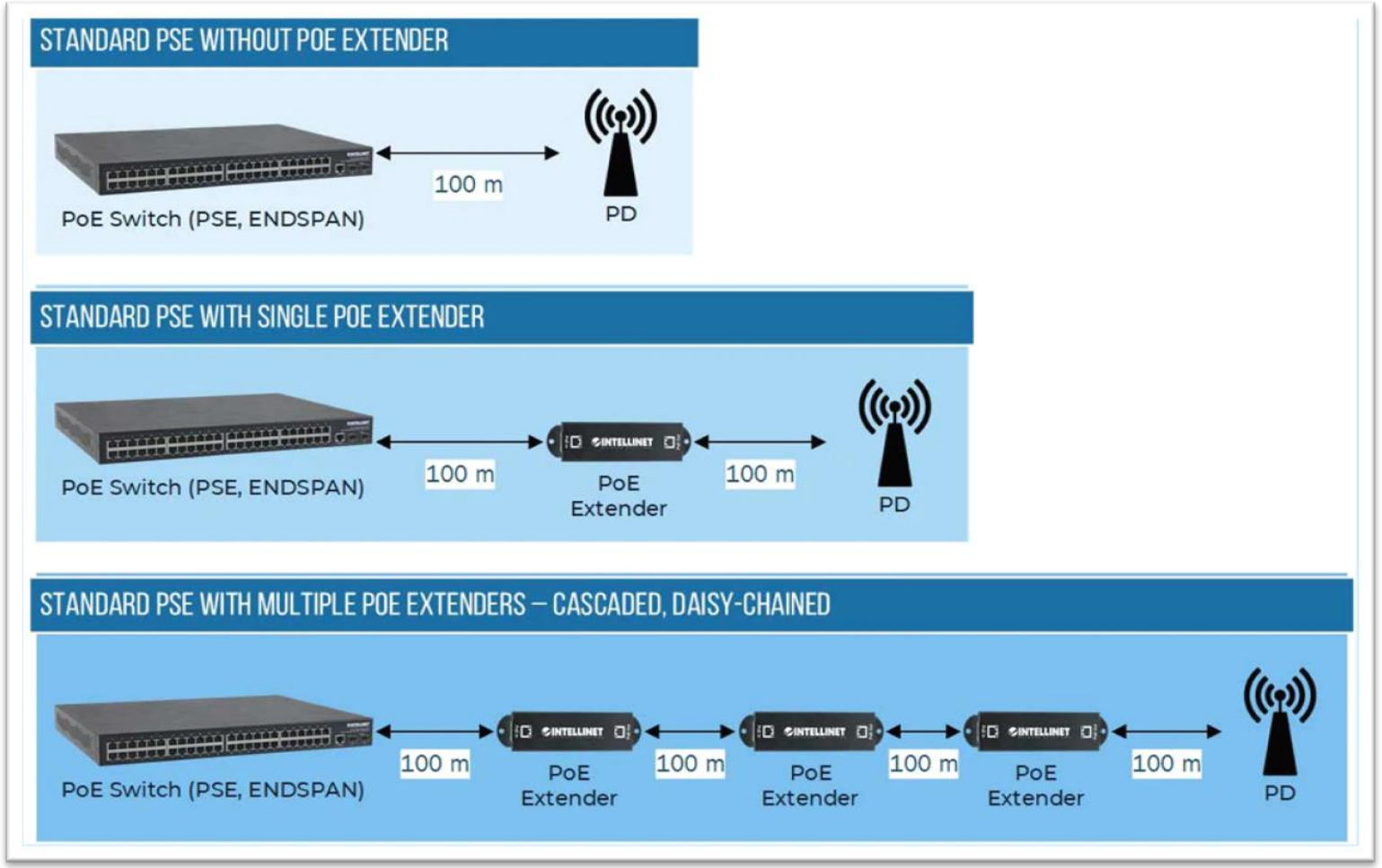
Challenges

- Costly
- Uses Valuable Real Estate
- Requires Local Power
- Adds Point(s) of Failure



Source: CCCA – Going the Distance

Extended Distance with PoE Extenders



SUPERIOR ESSEX

Bicsi ENDORSED EVENT

PoE EXTENDERS - Limitations

Number of extenders	Distance	Maximum power available from PSE (input)	Maximum power for PD (output)
1	200 m	25 W	20 W
2	300 m	20 W	15 W
3	400 m	15 W	10 W
4	500 m	10 W	5 W

The figures above assume that the PoE extender draws 5 watts for itself. While that is on the high side, to be sure - you may only lose 4 watts per extender - it is good to be conservative about power availability in such scenarios.

Other things to keep in mind with PoE extenders:

- Some PoE extenders can be used outdoors, but not all
- Some PoE extenders can be daisy-chained, but not all
- Not all PoE extenders support Gigabit speeds; some are only Fast-Ethernet
- Some PoE extenders have two outputs and allow you to connect two PDs to the PSE at a distance of 200 meters

SUPERIOR ESSEX

Source: Intelligent Network Solutions

BICSI ENDORSED EVENT

Extended Distance with PoE Extenders- CONCLUSIONS

Benefits

- Standards Compliant
- May Leverage Existing Infrastructure and Power
- May support up to 10Gb and 90W PoE

Challenges

- Costly (Less than a TR or Mini TR)
- Eliminates Centralized Management
- May Require Local Power
- Adds Point(s) of Failure

Source: CCCA – Going the Distance

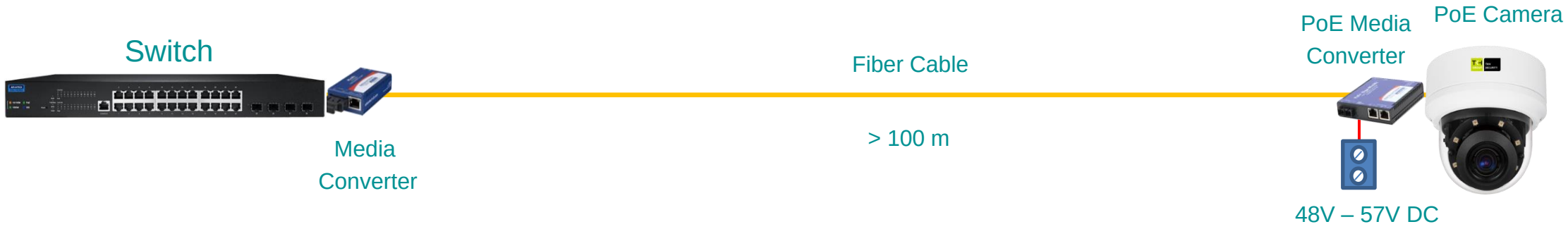
Extended Distance with Fiber- Media Converters

Benefits

- OM3 & OM4 Multimode can support 10Gb up to 300m or 1Gb to 550m
- Singlemode fiber can support 10Gb to 10km
- Standards Compliant

Challenges

- Costly
- Requires Local Power
- Adds Point(s) of Failure



Source: CCCA – Going the Distance

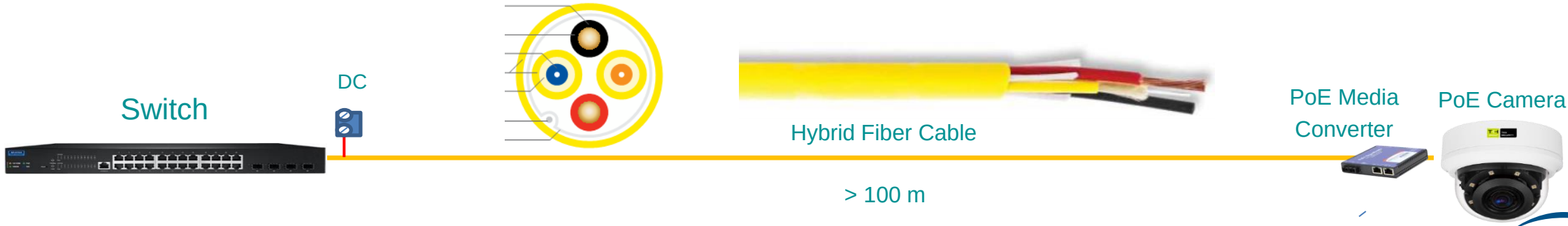
Extended Distance Hybrid Copper-Fiber Cables

Benefits

- Copper & Fiber in a Single Cable
- Can Support up to 10Gb at Extended Distances
- Standards Compliant

Challenges

- Costly - Requires Expensive Fiber Transmission Equipment & Class 2 Power
- Distance limitations dependent on copper cable size (AWG) and voltage drop
- Not Moves, Adds, or Changes Friendly



Source: CCCA – Going the Distance

Extended Distance with PoE Optimized Cables

Benefits

- Standards Compliant to 100m and provides 100m performance beyond 100m
- Cost-Effective Solution
- No Extra Space or Equipment
- No Added Point(s) of Failure
- Centralized Management
- May be Supported by a Warranty

Challenges

- Not Supported by Standards Today
- May be Application Specific
- Testing Limitations
- Limitations to how far the distance can be extended

SUPERIOR ESSEX

Source: CCCA – Going the Distance

BICSI ENDORSED EVENT

ELECTRICAL SPECIFICATIONS OF POE STANDARDS OVER UTP

For most users, the "Minimum power for PD" value is the most significant, as that value dictates which PoE standard provides sufficient power for the required application.

PoE Standard	Voltage @ PD	Voltage @ PSE	Minimum power for PD*	Minimum output @ PSE	Supported Modes	Maximum cable length
IEEE 802.3af	37-57 V	44-57 V	12.95 W	15.40 W	Mode A + B	100 m
IEEE 802.3at	42.5-57 V	50-57 V	25.5 W	30 W	Mode A + B	100 m
IEEE 802.3bt Type 3	42.5-57 V	50-57 V	51 W	60 W	Mode A + B, 4-pair mode	100 m
IEEE 802.3bt Type 4	41.1-57 V	52-57 V	71 W	100 W	Mode A + B, 4-pair mode	100 m

* Short distances via high-quality cable result in power values that are closer to the power output at the PSE.

A high-quality cable may achieve power and data transmission beyond the 100m standard

SUPERIOR ESSEX

Source: Intelligent Network Solutions

BICSI ENDORSED EVENT

Achieving Extended Distance - Summary

Approach	Design	Material	Power	Labor	Maintenance
TR/mini TR	$$$$	$$$$	$$$	$$$$	$$$$
Extender Switch	$$	$$	$$	$$	$$$
Fiber with Media Conversion	$$$	$$$	$$	$$$	$$$
Copper-Fiber Hybrid Cable	$$$	$$	$$	$$	$
Twisted-Pair Copper Cable	$	$	$	$	$

Figure 2: Despite being non-standards compliant, twisted-pair copper cable is the most cost effective option for extending distances beyond 100 m.

SUPERIOR ESSEX

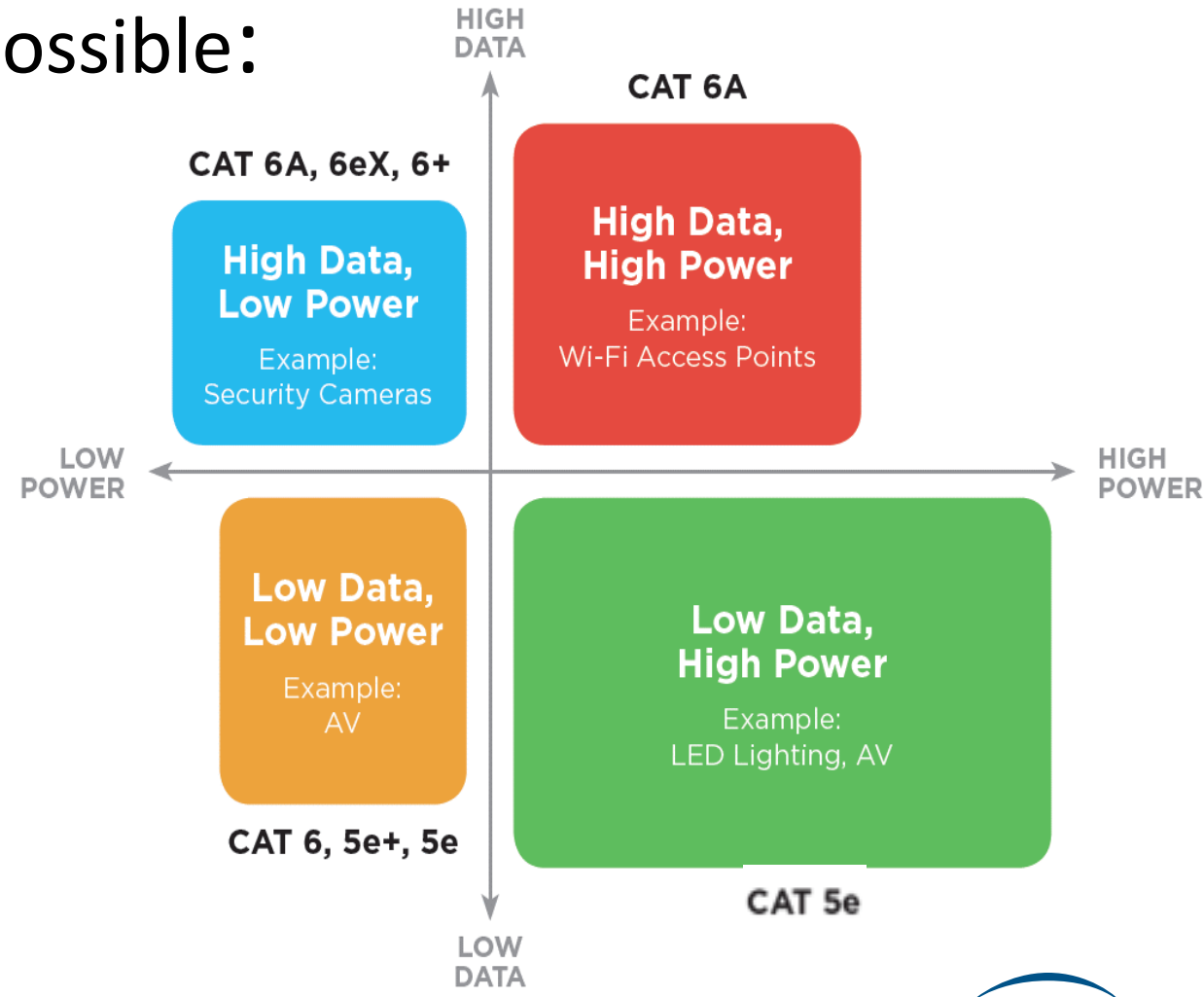
Source: CCCA – Going the Distance

BICSI ENDORSED EVENT

Extended Distance Performance beyond 100 meters over Copper Cables is possible:

- **Not a question of Category**
- **Depends on the Application**
- **Depends on the Cable Type**
- **Depends on the Number of Connections**

Most Category UTP cables are designed and manufactured to the 100m Standard



SUPERIOR ESSEX

BICSI ENDORSED EVENT

CONCLUSIONS

- PoE is becoming increasingly important in Digital Buildings;
  - ✓ Some endpoint devices are beyond the 100-meter TIA standard
  - ✓ Traditional category cables don't do well over 100 meters.

- Several options exist for extending distances
  - ✓ There are varying cost vs. capability considerations.
  - ✓ Each adds additional failure points in the links.

- Extended distances beyond 100m with Copper are achievable:
  - ✓ Using a quality, high-performance cable designed for Extended distances.
  - ✓ Offers Advantages and Provides an ROI over other methods.

SUPERIOR ESSEX

THANK YOU

BICSI ENDORSED EVENT

Further Reading

PoE Consortium

Intelligent Building Resource Center Outreach

https://poeconsortium.com/

Cisco Systems:

What Is Power over Ethernet (PoE)?

https://www.cisco.com/c/en/us/solutions/enterprise-networks/what-is-power-over-ethernet.html

The Ethernet Alliance:

Power over Ethernet Standards

https://ethernetalliance.org/wp-content/uploads/2018/04/WP_EA_Overview8023bt_FINAL.pdf

BICSI® ENDORSED EVENT