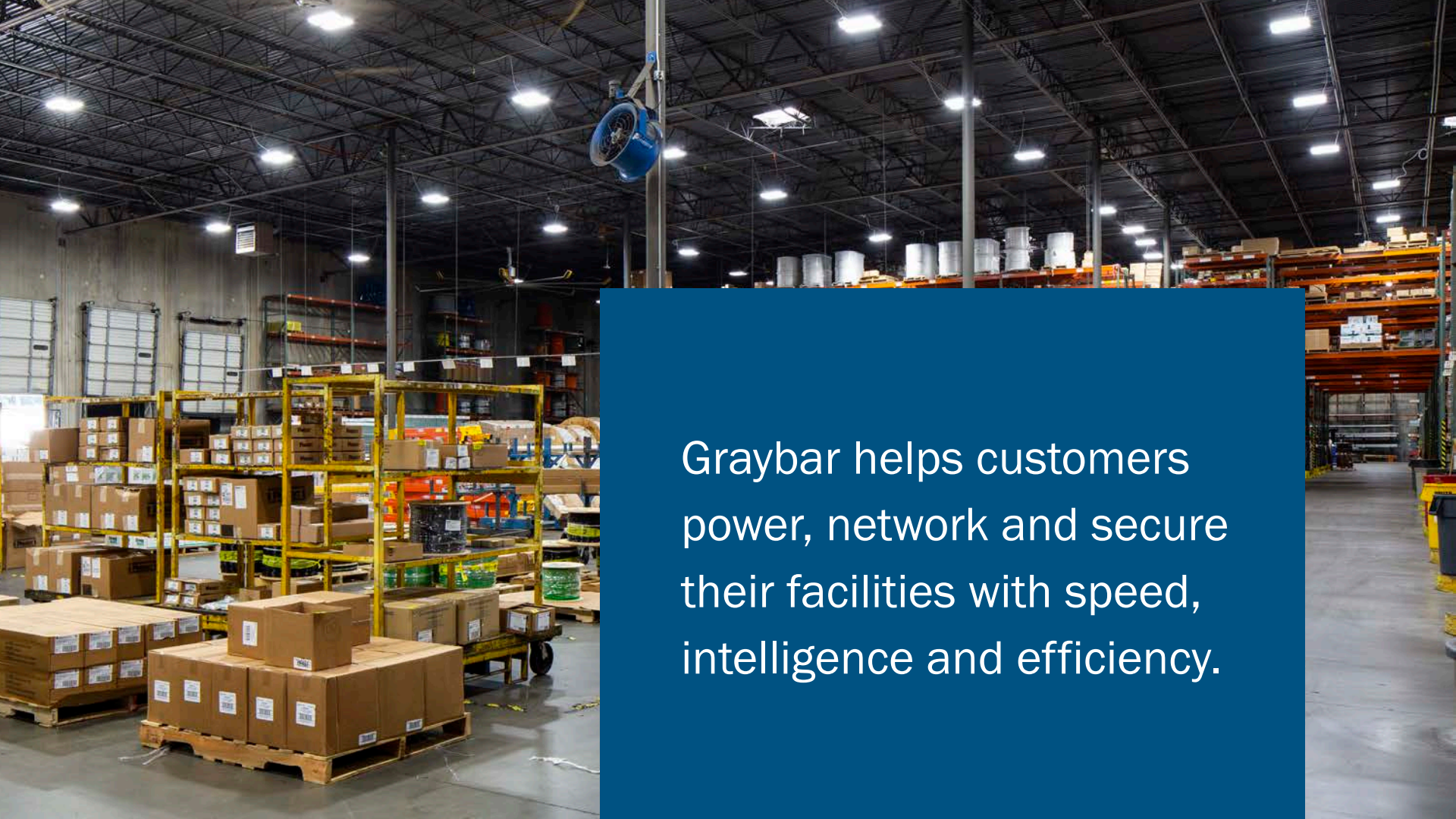
GraybaR

Enabling the Sustainable Intelligent Building:

90W PoE and Extended Distance Applications

SUPERIOR ESSEX



Graybar helps customers power, network and secure their facilities with speed, intelligence and efficiency.

Brian Ensign

Vice President, Marketing
Superior Essex Communications

SUPERIOR ESSEX | COMMUNICATIONS PRODUCTS

Enabling the Sustainable Intelligent Building

90 Watt PoE and Extended Distance Applications

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Discussion

- Why Sustainable Intelligent Buildings?
- 90W PoE and other power delivery strategies
- How 90W PoE is enabling more applications
- How 90W PoE is being applied today
- The Need for Extended Distances beyond 100m
- Extending the Distance (Considerations)
- Key Takeaways

WHY SUSTAINABLE SMART BUILDINGS?

ENHANCED OCCUPANT SATISFACTION

Guests can experience advanced control and customization using connected technology, and Operations will be made easy with accessible centralized control and notification platforms

CAPEX & OPEX COST SAVINGS

By using less physical materials, utilizing less expensive labor, and reducing energy consumption, luxury hospitality projects can save money on both capital and operational costs

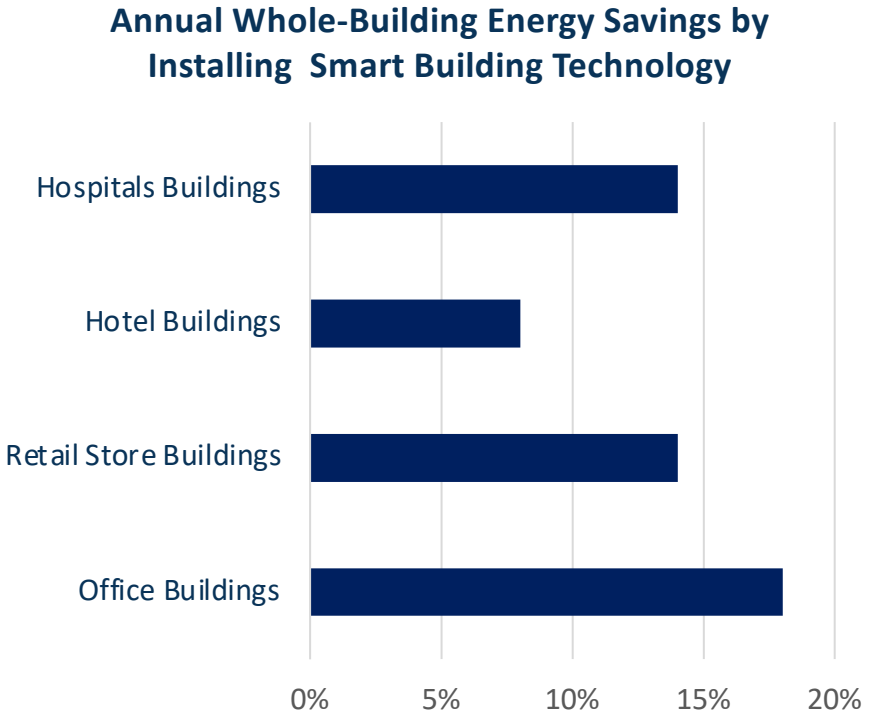
REDUCED ENVIRONMENTAL IMPACT

Using DC Technology, we can eliminate the use of fossil fuels, and substantially reduce the operational and embodied carbon being used in the project

MORE USABLE SPACE

Using intelligent distributed design gives the opportunity to generate more usable space by eliminating the need for IDFs and Electrical Closets

Sustainability through Smart Technologies



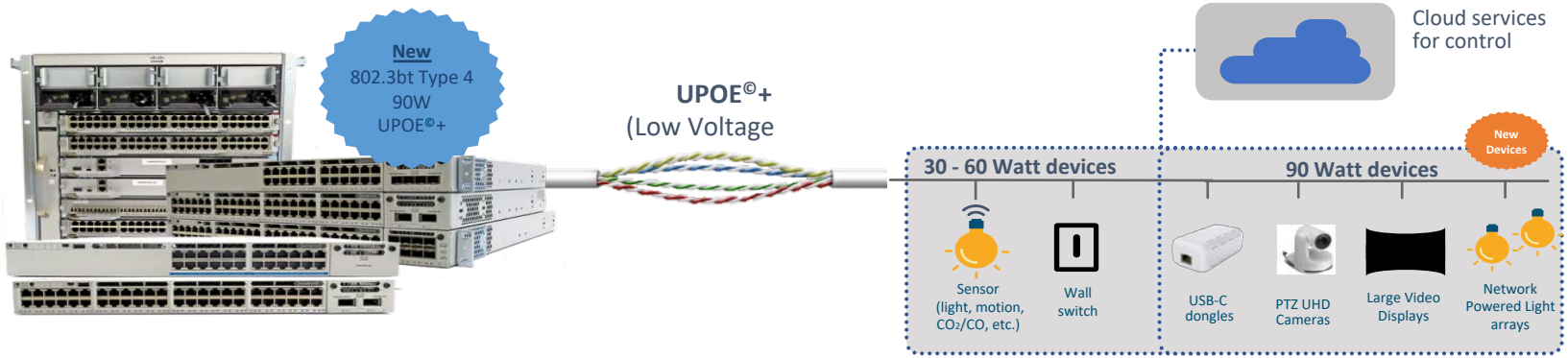
Smart building technologies like occupancy sensors, smart thermostats, HVAC and lighting controls can significantly reduce energy consumption in a variety of building types.

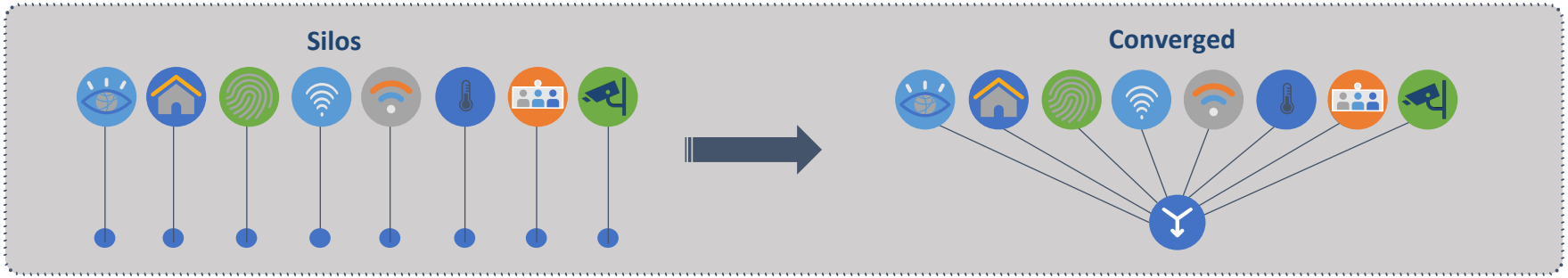
Intelligent Buildings & Sustainable Cabling

Environmental & Economic Benefits

- 30-50% reduction in energy usage
- 14% savings in building operation and maintenance costs
- 5% higher operating income and building asset value

90W enables greater ROI for IT/OT convergence





End-to-end solution managed by central IT provides lowered costs, intelligent control, new experiences

Creating a world of Building PoE Endpoints

Base building services


Access Points


HVAC VAV's


Ceiling Fans


Smoke alarm


Power Meter


Touchscreen PC's

Tenant Access & Security


Surveillance cameras


Biometric Door Locks


Facial Recognition Systems


Entry Barriers And Turnstiles


Badge readers


IP Call Tower

Workspace Transformation

Meeting Room Nameplate


POE Displays


Temp Sensor


Light Fixtures

Status Signs


Horns and Sirens

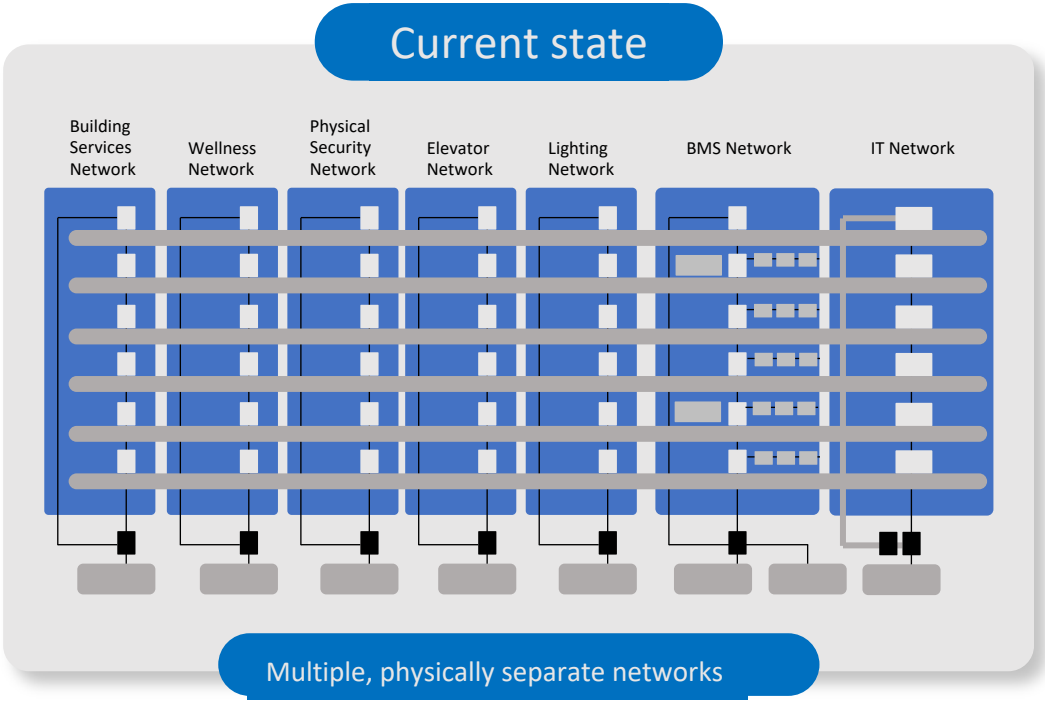

IP Call Stations

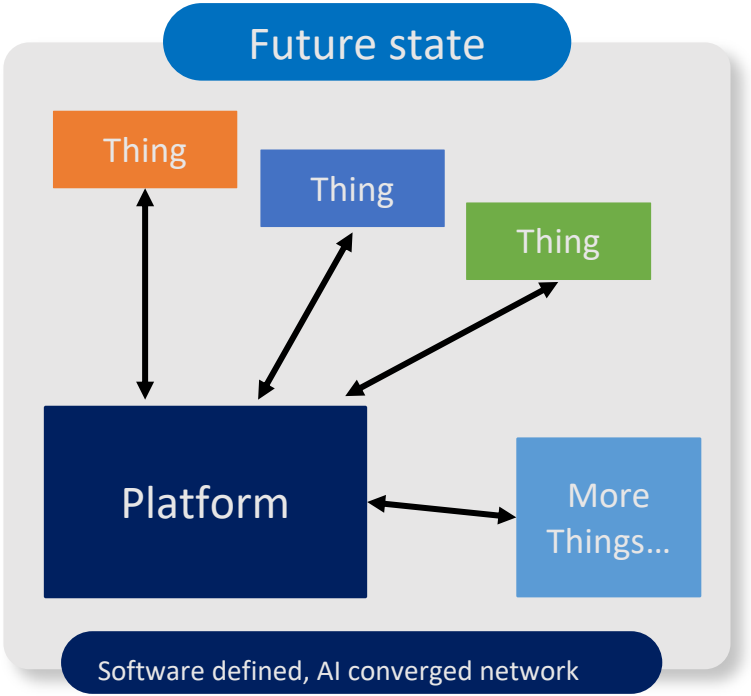
Environmental Sensor Hubs


Blind Motors


Curtain Motors

Eliminate Duplicity & Waste - Convergence





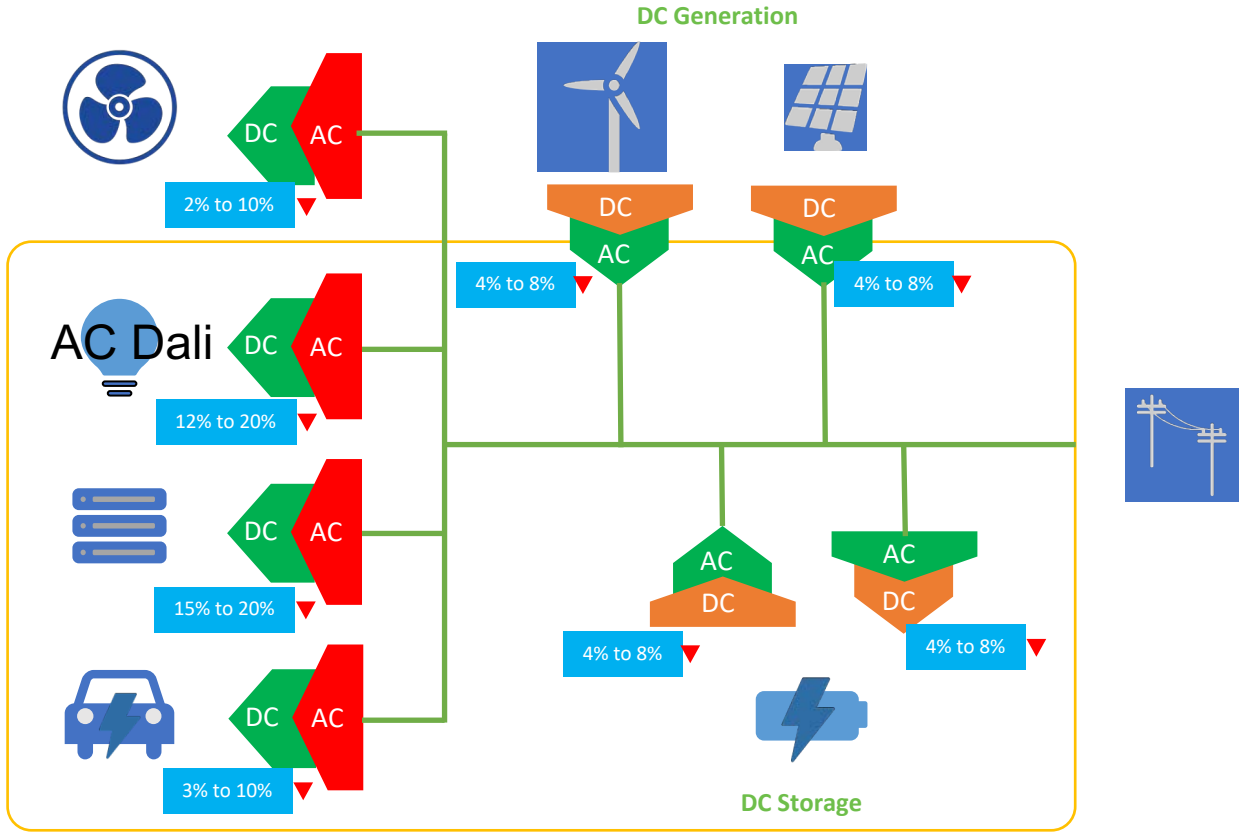
Courtesy of ACA

The traditional approach to power is wasteful

Up to

20%

of power wasted in conversion loss

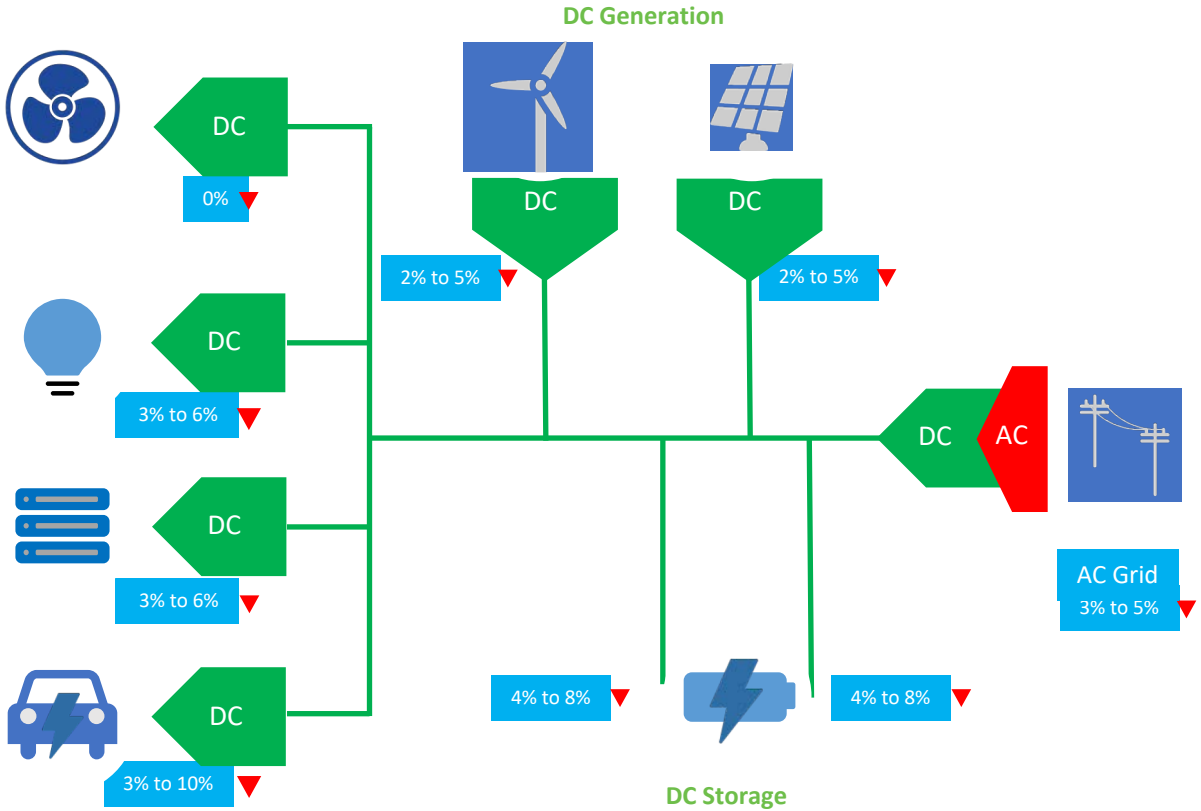


Source: CSA Group

Smart buildings save energy, cost less to operate

45%+

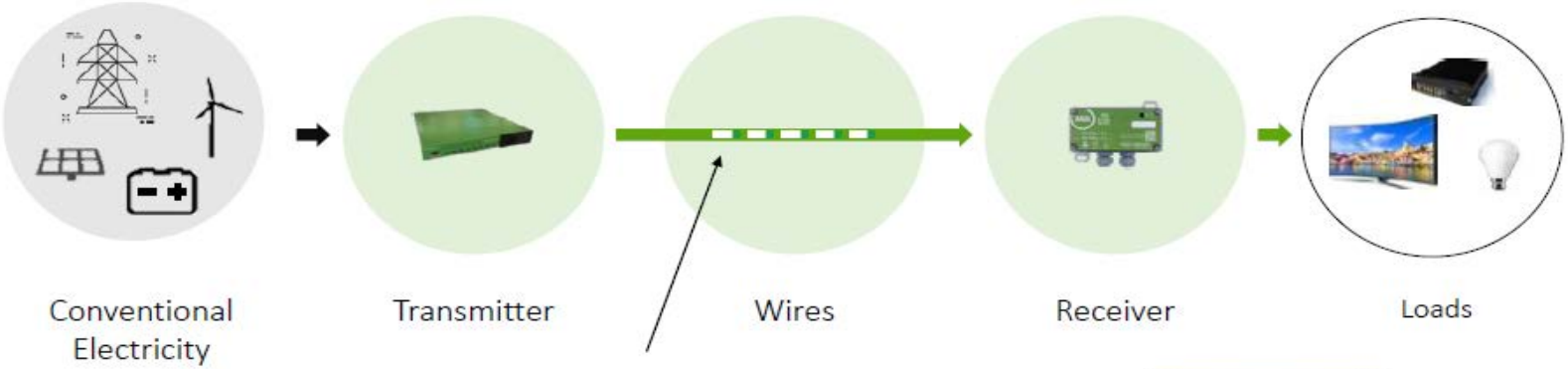
Reduction in energy waste by using DC power



Source: CSA Group

Digital Electricity – Fault Managed Power (Class 4)

The next format for a digitally connected world



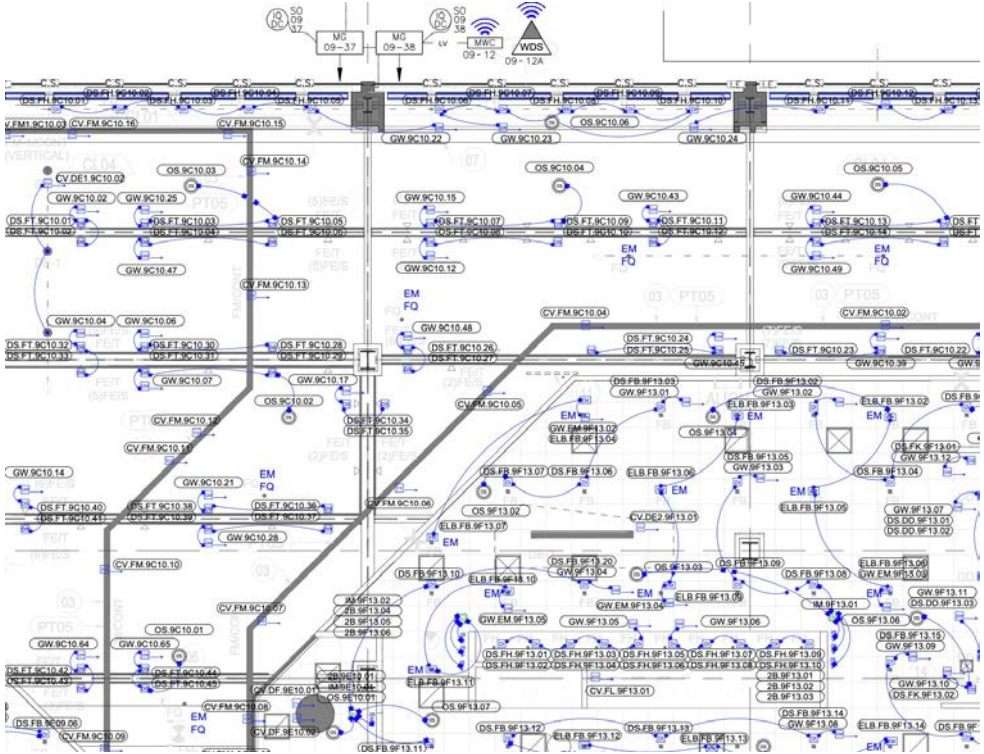
Energy Packet

Energy: 1.5ms	Data: 0.5ms

Discrete "packets" of electricity and data, checked for safe transfer from transmitter to receiver 500 times per second

Software Control and Analytics

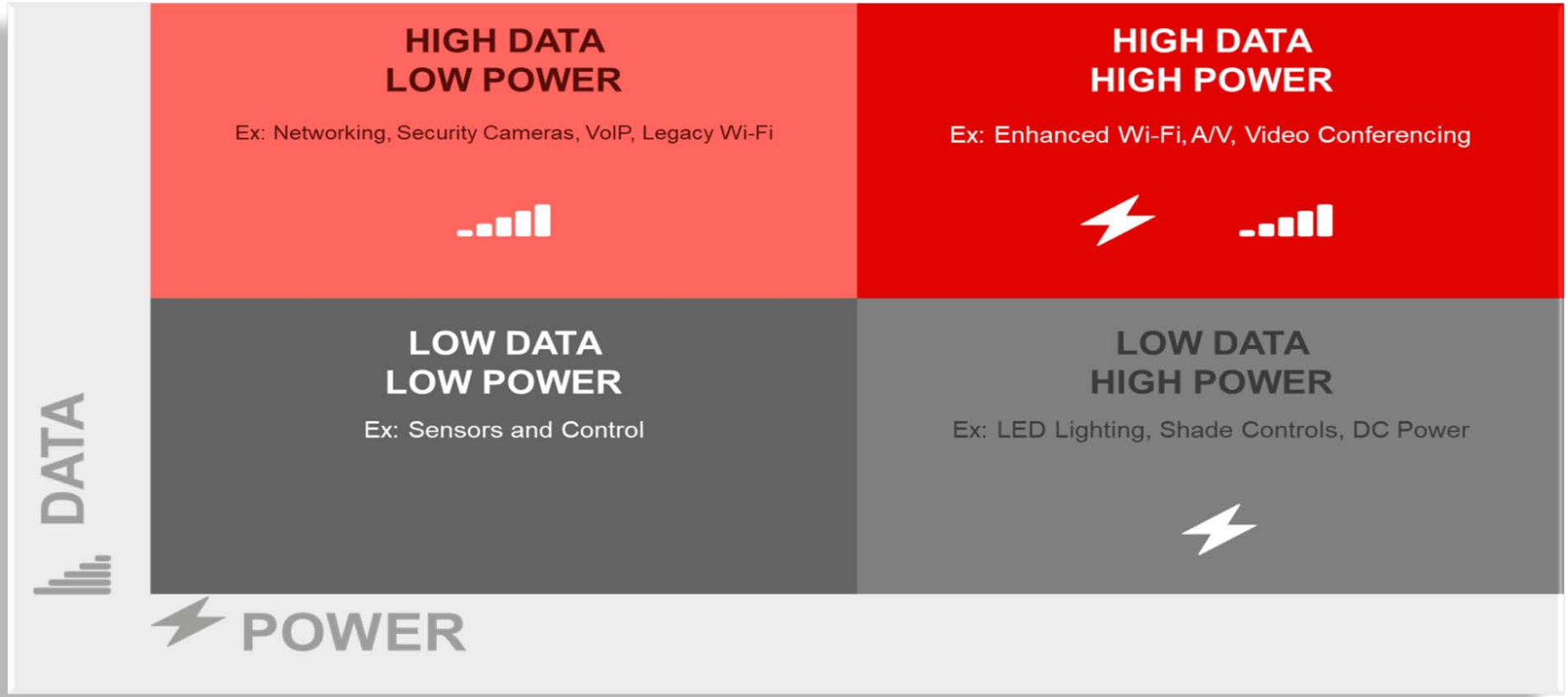
Low Voltage Design Expansion



Combination of multiple devices and manufactures with structured cabling to connect it all!

- Design work shift to low voltage
- PoE disciplines emerging
- Millions of square feet deployed

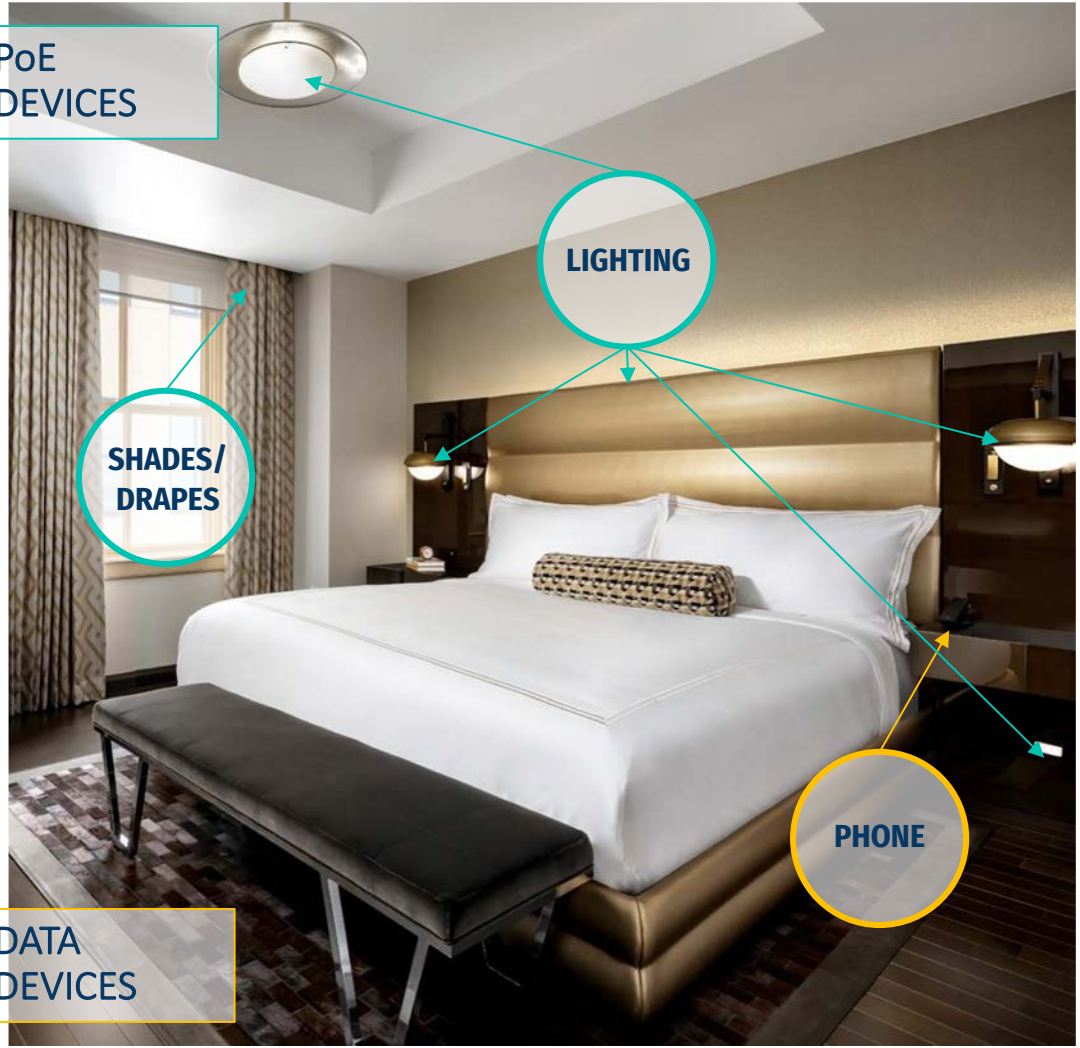
Structured Cabling Considerations

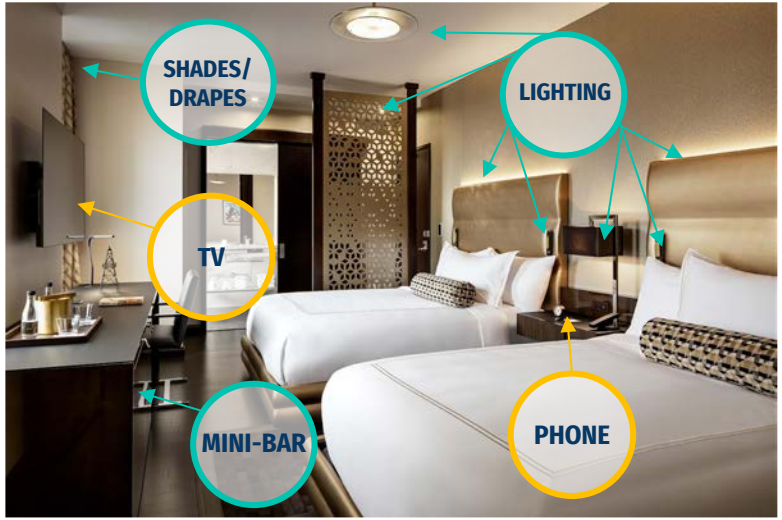


The Sinclair Hotel

A Marriott Autograph property

Fort Worth, Texas


PoE
DEVICES
LIGHTING
SHADES/
DRAPES
PHONE
DATA
DEVICES


SHADES/
DRAPES
LIGHTING
TV
MINI-BAR
PHONE


MIRROR
LIGHTING
TV

Network Switch: 1X CAT Cable
GPON: 1X Fiber
DE Receiver: 1X 18/2
Lighting Drivers: 4X CAT Cable

SINCLAIR HOTEL ROOM TYPICAL TYPOLOGY

The Sinclair Hotel rooms use a distributed network to **eliminate IDF closets** from the floor by locating the switching and GPON components inside the room.

Other key features to point out include:

- Use of smurf tube behind sheet rock to enable future proofing of infrastructure
- Customizable Touch Panels: 2X Category Cable
- PoE smart mirror: 2X Category Cable
- LV light fixtures: 10X 18/2
- PoE mini-refrigerator: 1X Category Cable
- PoE window treatments: 3X Category Cable
- Bluetooth sensors enabling occupant detection, associate alert, people counting, and device tracking: 1X Category Cable

Customizable Touch Controllers

PoE Smart Mirror

PoE Headboard Lighting
PoE Phone

PoE Mini-Bar
PoE Access Point

PoE Window Treatments

The Need For XD Beyond 100m Over Copper

- Reduced Technology Deployment Costs (CAPEX)
- Improves Performance for Certain Applications
- Deployment of Sustainable Technologies = Lower Operational Costs (OPEX)

XD Applications

System Requirements

- Distances beyond 100m
- Bandwidth
- PoE
- Future Proof
- Indoor or Indoor/Outdoor environment

Applications

- Wireless Access Point
- Security Cameras
- LED Lightning
- Digital Signage
- Electronic Access Control
- VoIP
- Motorized Shades

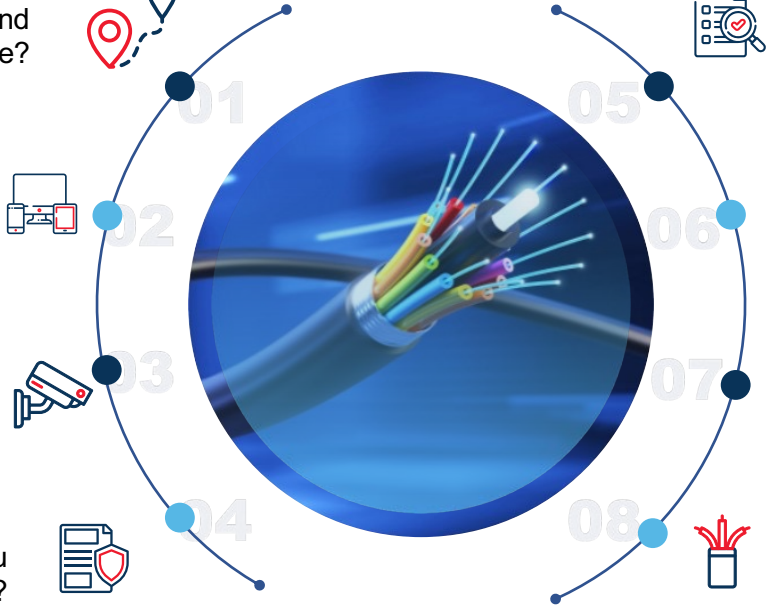
XD - Marketplace Confusion

How far can I get 1G and with which cable?

Is my extended distance installation future proof if I change the end device (more power and / or more data) or my source?

How far I can use this camera?

What type of warranty do you provide on my install?



How should I test the channel or the link?

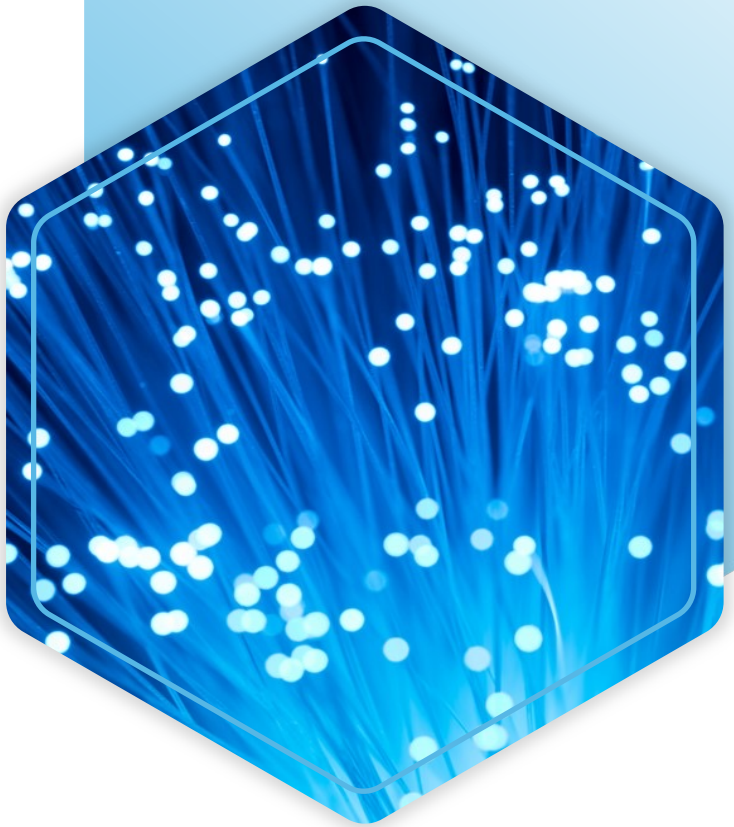
Do I need Cat 6 for 1G XD?

Cat 6A will go further and support more data than 5e or 6

Do you have a Cat 6 cable for 1G up to 200m?

What About Standards for XD?

No Standard



What are Standards?

A standard is a document that provides rules or guidelines to achieve order in a given context

Why Use Standards?

- They address the needs for interconnection and interoperability
  This is particularly important for open markets, where users, who are increasingly mobile, can ‘mix and match’ equipment and services, and where suppliers can benefit from economies of scale

- They are equally important for ensuring safety, reliability and environmental care
  They are also frequently referenced by regulators and legislators for protecting user and business interests, and in support of government policies

Source: http://www.etsi.org/standards/what-are-standards

When do you Deviate from Standards?

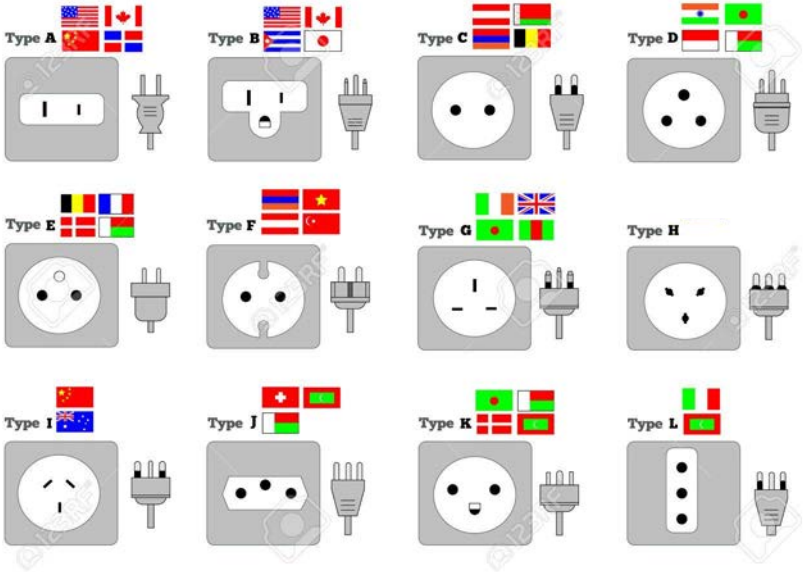
Standards are in constant development and must also provide sufficient flexibility

to allow for entrepreneurship and innovation

Source: https://blog.oup.com/2021/10/why-do-companies-deviate-from-standards-and-what-shall-we-do-about-it/

Oh, By the way . . .

- A great example of standards:



PoE (power over ethernet) STANDARDS

IEEE Extension	Type	Power Budget per Device
IEEE 802.3af	Type 1	15.4W
IEEE 802.3at / PoE+	Type 2	30.8W
IEEE 802.3bt / UPoE	Type 3	60W
IEEE 802.3bt	Type 4	90-95W

	POE	POE+
Standard	IEEE 802.3 af	IEEE 802.3 at
Max. PoE Output	15.4 watts	30 watts
Min. PoE Output	12.95 watts	25.5 watts

Source: https://www.123rf.com/photo_77571970_stock-vector-different-type-power-socket-set-electric-outlet-illustration-for-different-country-plugs-vector-illu.html

How About XD Performance?

Performance and future proof depend on many variables: distance, source, end point.

Bandwidth Power

Direct attached 2, 3, or 4 connector; channel plug or jack type; patch cord type and length; cable type and length

Bandwidth Power

What about Heat?

Heat generated by PoE may affect performance the distance capability

- A link with 3 or 4 connections will not extend as far as link with 1 or 2 connections
- May affect “future proof” capabilities of the installation

In Reality . . .

The longest the twist lay and core lay affect how far you can extend the distance

Not a question of Category

Cat 6A will not necessarily extend the performance distance further than Cat 6 or Cat 5e

Critical electrical characteristics: Delay Skew and Propagation Delay

Cables are designed for 100m per the standard

The Facts

Through our Product Development Center:

BER, is the only valid test to check how far a signal will transmit for a device

Test performed at ambient temperature (Type 1 and 2) and LP temperature of the cable (Type 3 and 4)

Direct attached: furthest horizontal cabling

Power efficiency

For security cameras, we tested low grade, mid grade and high grade cameras from Panasonic, Hanwa, Bosch and Axis

What is “BER” or Bit Error Ratio?

- It is a Signal Quality Quantitative Measurement of Digital Communication Systems
- It is defined as where image is the number of bits received in error over time *E(t),* and *N(t)* is the total number of bits transmitted in time t

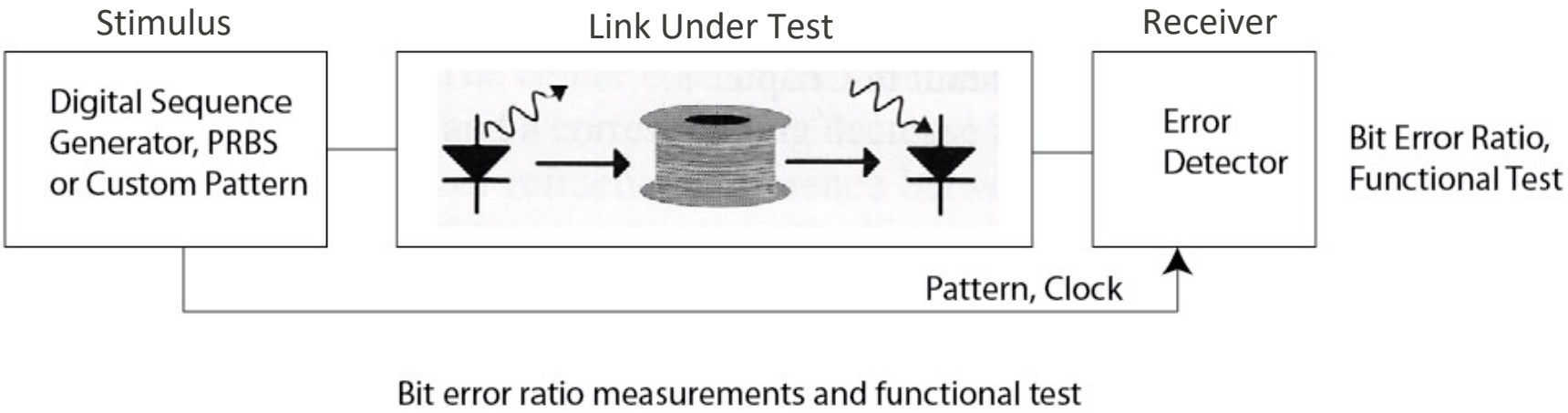
$$BER = \frac{E(t)}{N(t)}$$

- The BER essentially specifies the average probability of incorrect bit identification. Thus, a BER of 10-9 means that 1 bit out of every 109 bits is, on average, read incorrectly. If the system is operating at 100 Mb/s – that is, 108 pulses per second – then to receive 109 pulses, the time taken would be

$$\frac{10^9}{10^8} \approx 10\text{s}$$

- which is the average time for an error to occur. On the other hand, if the BER is 10-6, then, on average, an error would occur every 0.01s, which is unacceptable

How is “BER” or Bit Error Ratio Tested?



Bit error ratio measurements and functional test

- There are two types of bit error ratio testing: ***In-service Testing*** and ***Out-of-service Testing***
- 10^{-9} is often considered the minimum acceptable BER for telecommunication applications
- 10^{-13} is often considered minimum for Data communications

Ongoing Performance Testing

3 and 4 connector channel

2.5 and 5G applications

Takeaways

- 90 Watt PoE is Enabling New and More Applications
- Options to enable innovative power distribution
- Going Beyond 100m Over Copper is Achievable:
  - Dependent on the Application and Installation
  - Offers Advantages and Provides and ROI
- Select Products Offer Advantages to go Beyond 100m:
  - Can be part of a Warranty Solution
  - Performance Considerations
- Smart and Sustainable Technologies:
  - Reduce TCO and are Environmentally Friendly
  - Provide a Futureproofing Pathway to New Technologies

Thanks!

Do you have any questions?
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QUESTIONS?