Infrastructure Challenges and Solutions for IoT and Intelligent Building Integration

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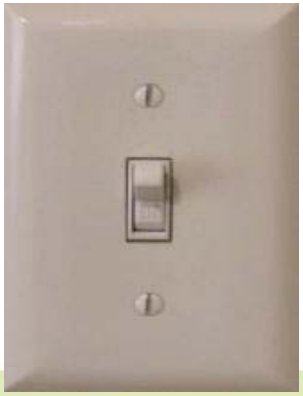
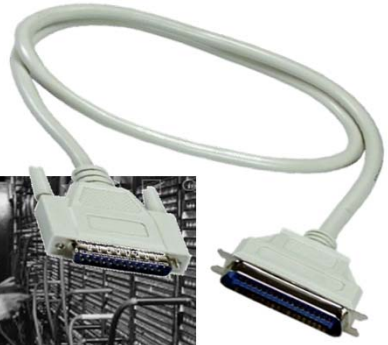
Yesterday …



History Repeats Itself... Yesterday...

Pre-standards & Proprietary Systems



Today… Integrated Cabling

Fiber and copper for integrated applications

Tomorrow … Segmented networks?

Additional applications. Same infrastructure?

Agenda

IoT and Intelligent Buildings...

- Trends & Challenges
- Design Considerations
- Standards Update
- Solutions in Practice: Case Study

What is IoT?

The Internet of Things is a network of uniquely identifiable endpoints (or “things”) that contain embedded technology to sense, collect, communicate and, exchange data locally or with external environments, without human interaction, affecting our daily life.

Evolution of Communication through IoT

Human to Human

Human to Device

Device to Human

Device to Device

What is an Intelligent Building?

An Intelligent Building is a building that integrates technology and process to create a facility that is safer, more comfortable and productive for its occupants, and more operationally efficient for its owners.

Source: Intelligent Buildings Institute

Applications in Building Networks

Connected World Trends

Building Networks

Intelligent Buildings

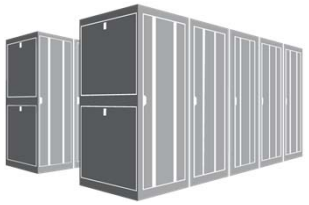
Data & Power Convergence

Building Wireless

Fog Computing and IoT Gateways

Data Centers

Cloud vs. Building Enterprise

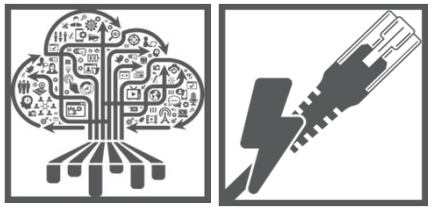


Micro Data Centers

Control/DCIM

Infrastructure Challenges

Building Networks



IoT and PoE

Trade Convergence

Increased
Mobility Demands

Security
and IAM

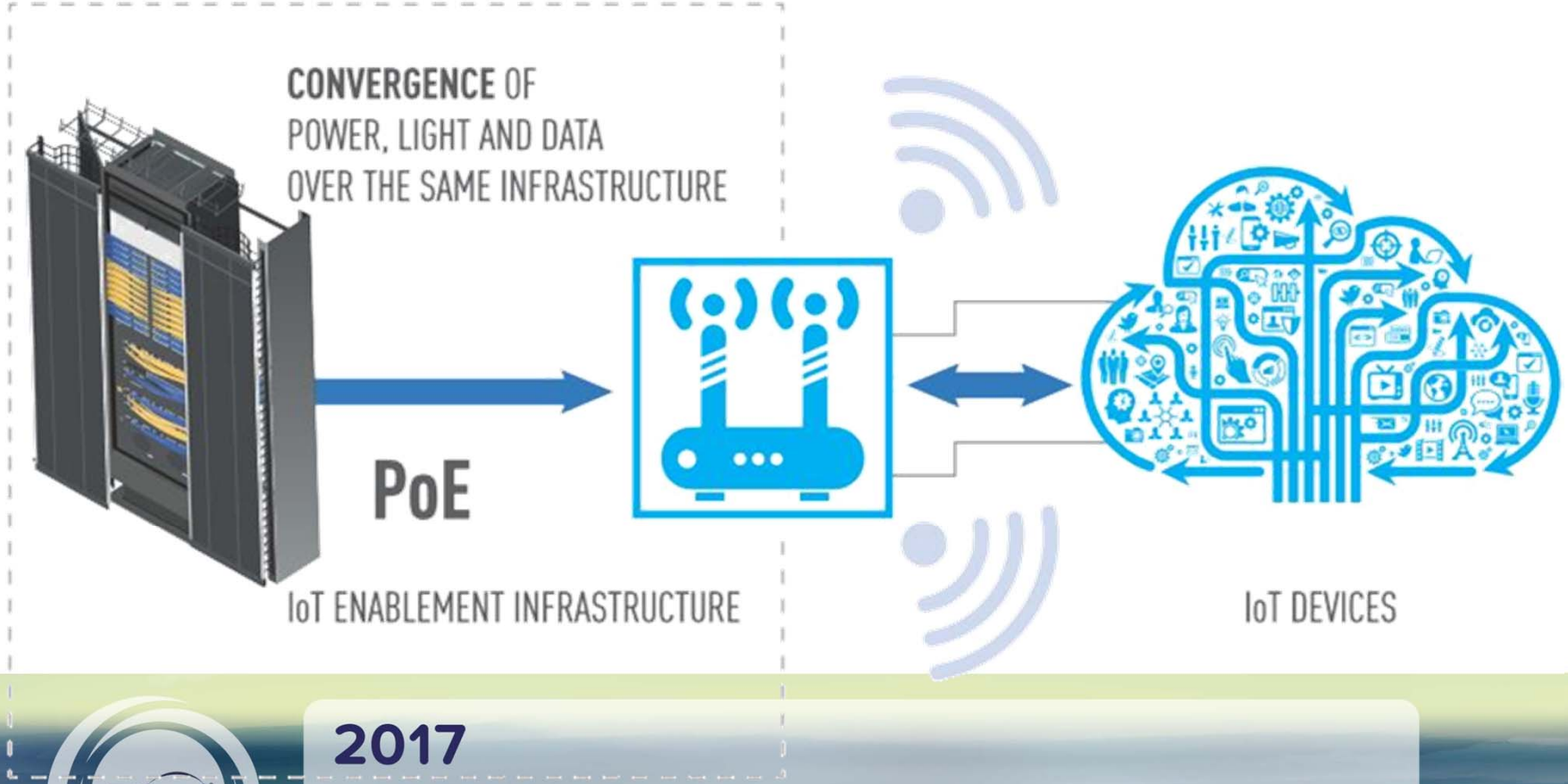
Data Centers

Increased
Density Demands

Availability, Latency, and
Bandwidth

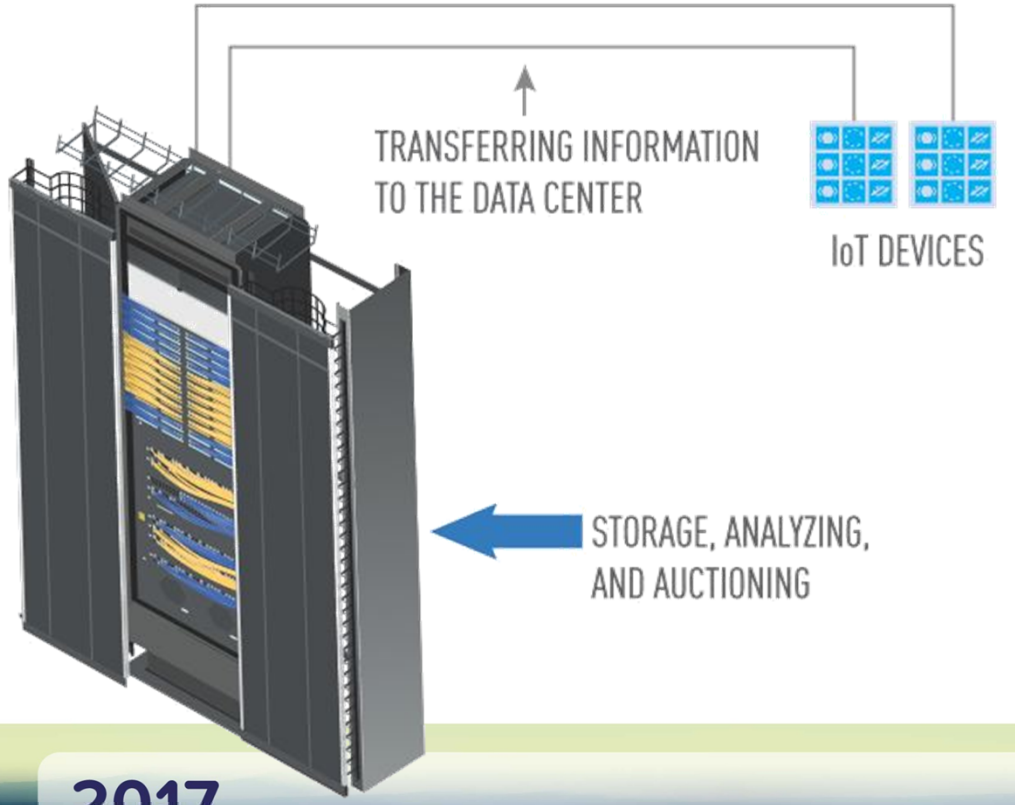
Power from Data Centers

Infrastructure to support the evolution to IoT

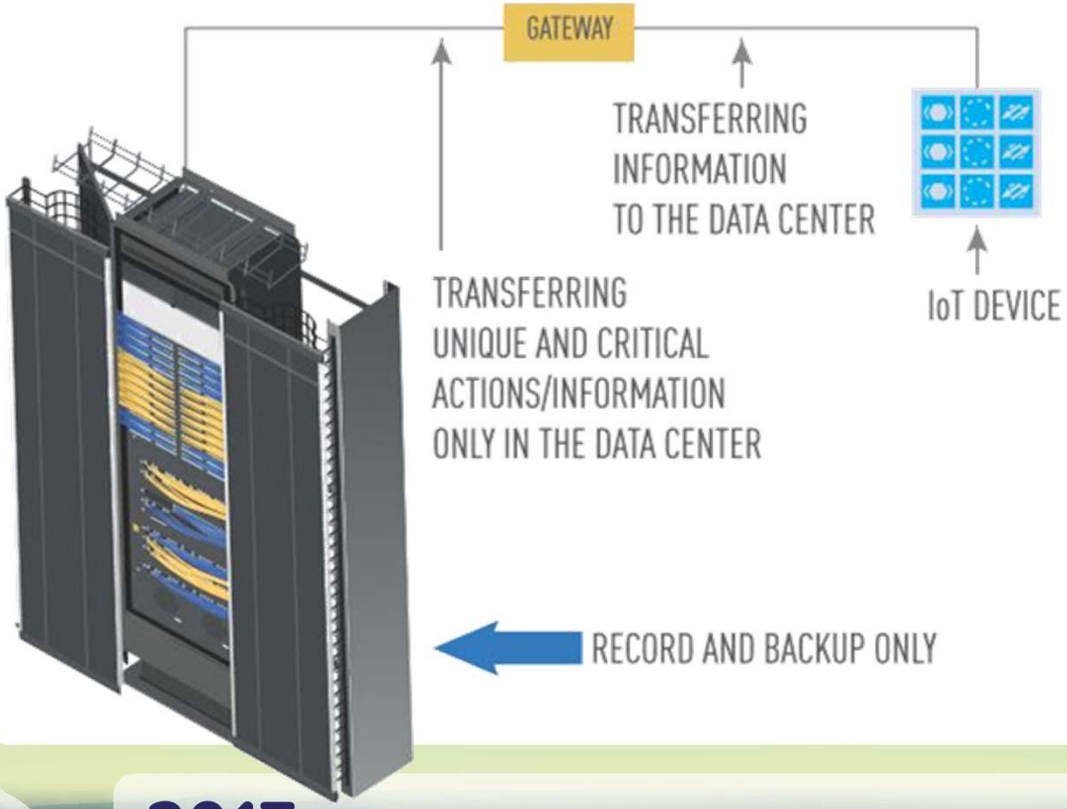


Network Architecture Selection

Centralized Approach



Decentralized Approach

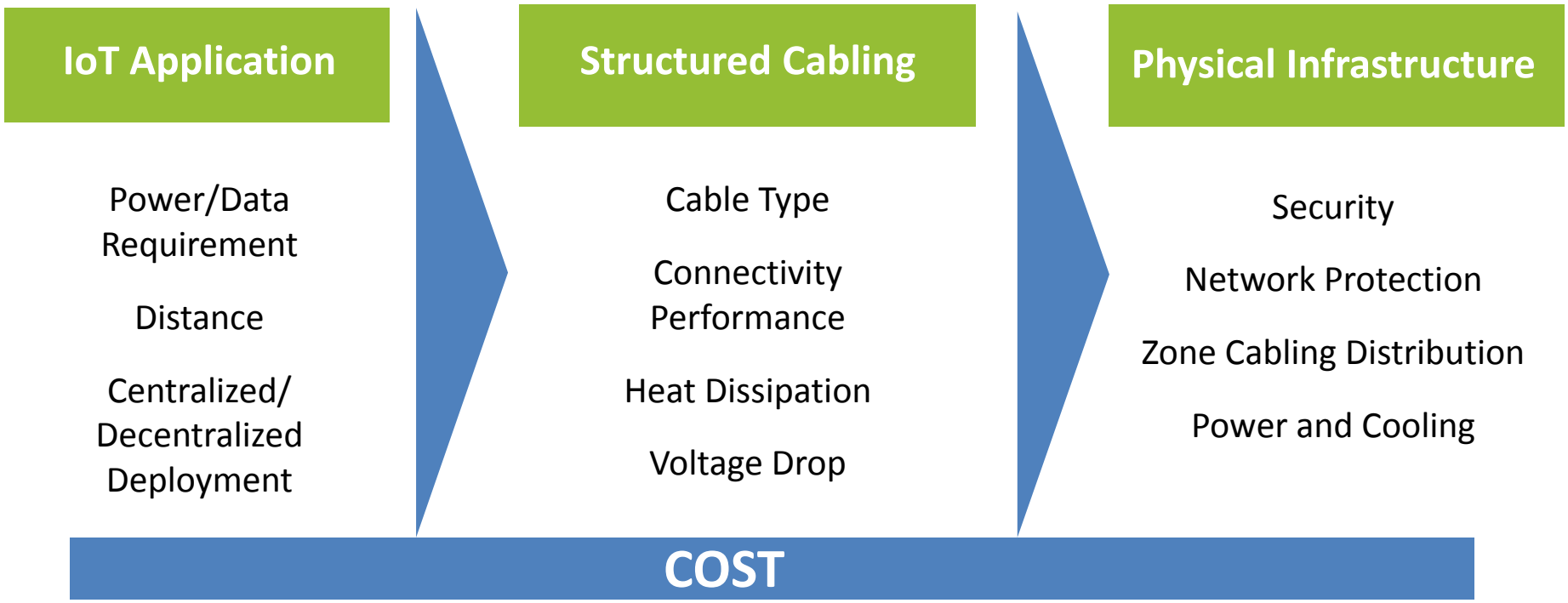


Hybrid Solution

- PoE Lighting
- PoE Light Switch
- CCTV Camera
- Network Jacks
- H — Wireless Access Points
- Twisted Pair
- AC Power

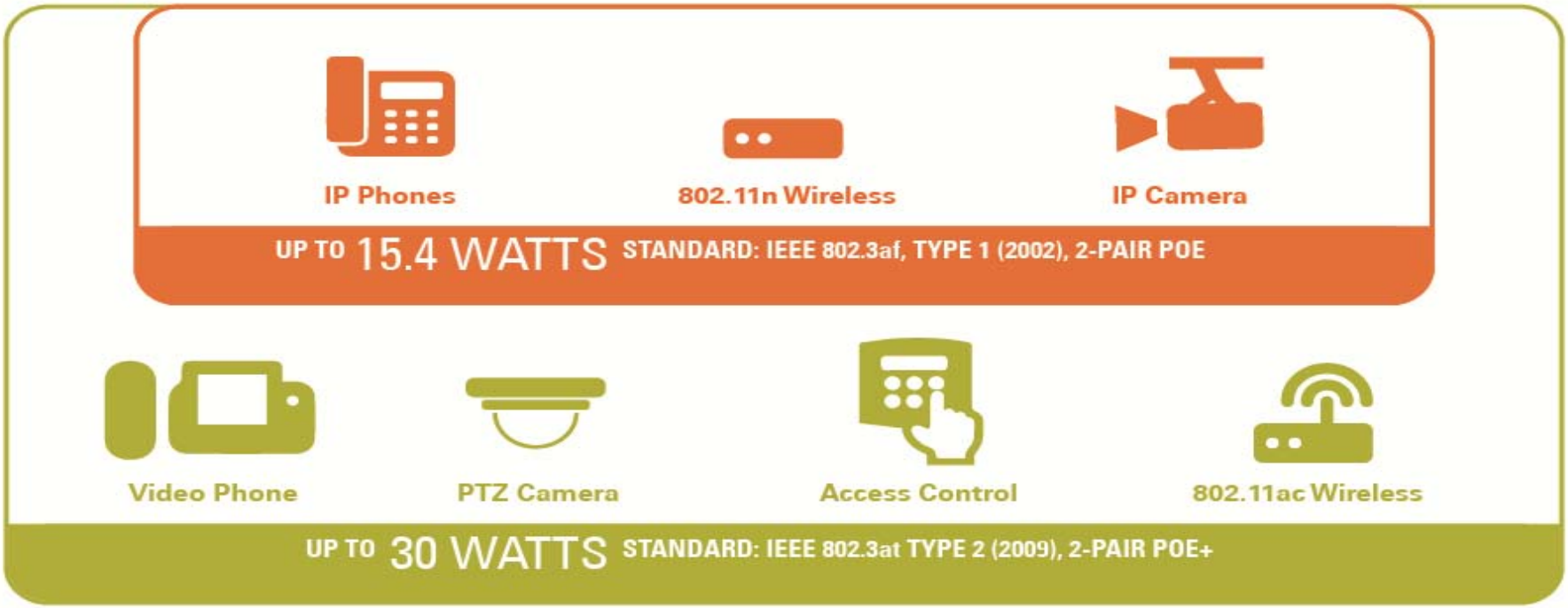
- A — Telecom Room
- B — Pathways
- C — Cabling
- D — Consolidation Point
- E — Wall-mount Cabinets
- F — Device Termination
- G — Workstation Outlets
- H — WAP Enclosures & Connection Points

PoE Design Considerations



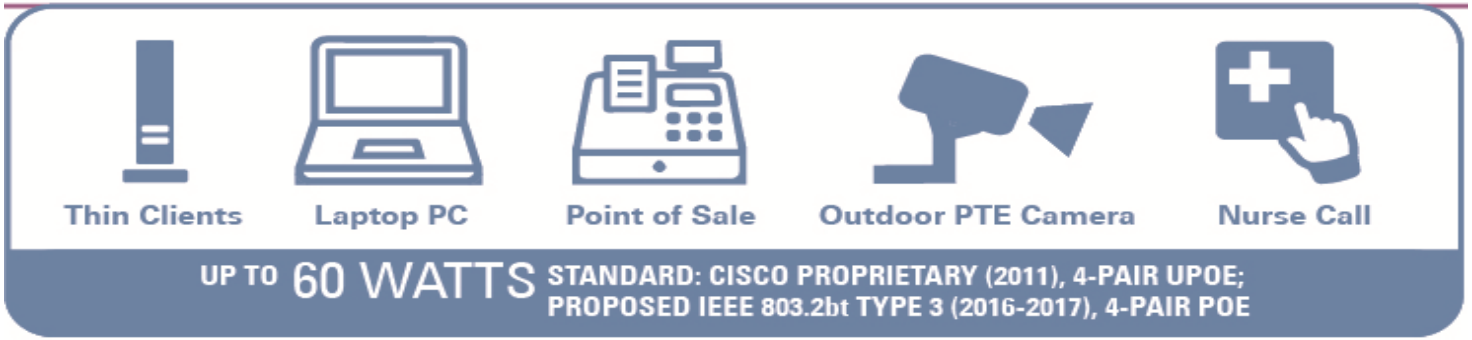
Power-over-Ethernet Standards

Power-over-Ethernet Standards



Power-over-Ethernet Proposed Standards

New Applications Are Using IP Protocols and PoE



Power-over-Ethernet Proposed Standards

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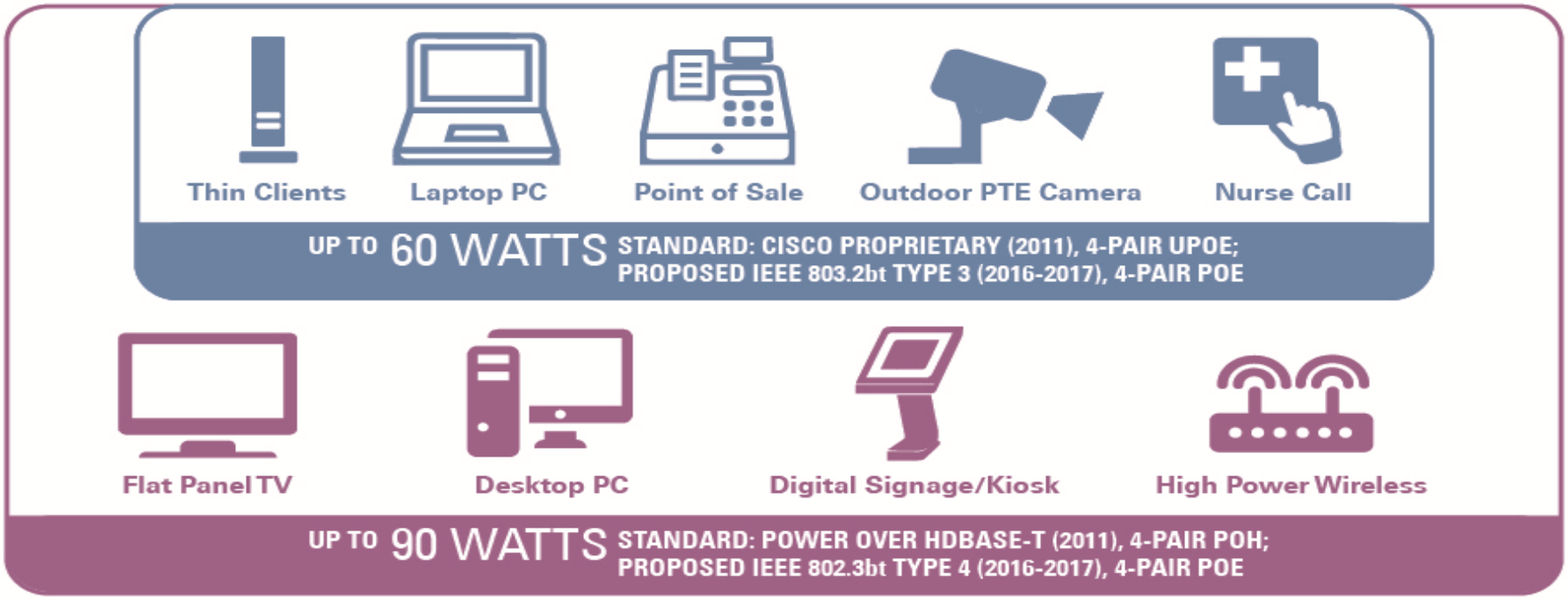
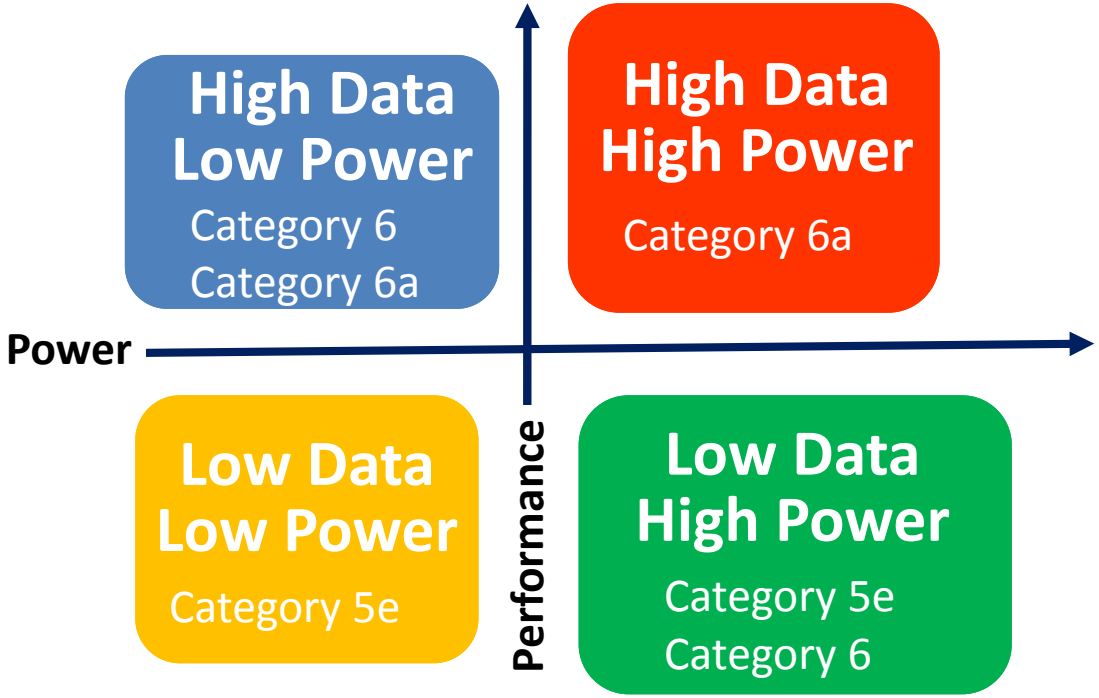


Power and Data Requirements by Application



References for Supporting Power over Twisted Pair

NEC 2017 Handbook

- Cable Ratings and Markings for Safety
- Ampacity Table for Bundles

TIA TSB-184

- Copper Cable Installation Requirements for PoE
- Bundle Size & Max. Temperature rise (+15°C)
- De-rating of cable

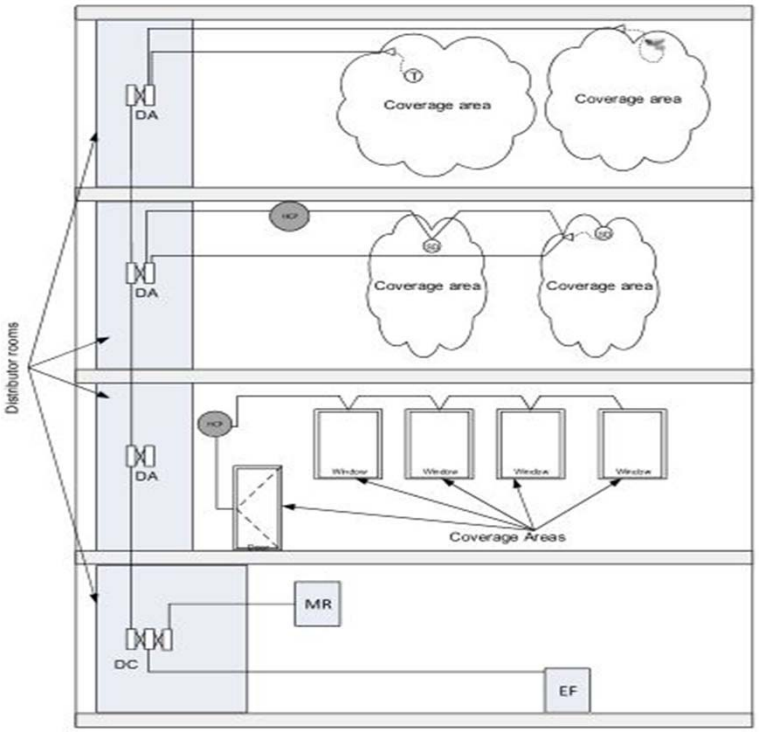
TIA
ADVANCING GLOBAL COMMUNICATIONS

Additional Infrastructure Planning Challenges

- System design/integration: application specific vs. structured cabling
- Pathways
- Telecom rooms: size & layout
- Outlets: facilities connections vs. telecom outlets (“user” administered)

New Standards Addressing Infrastructure Challenges

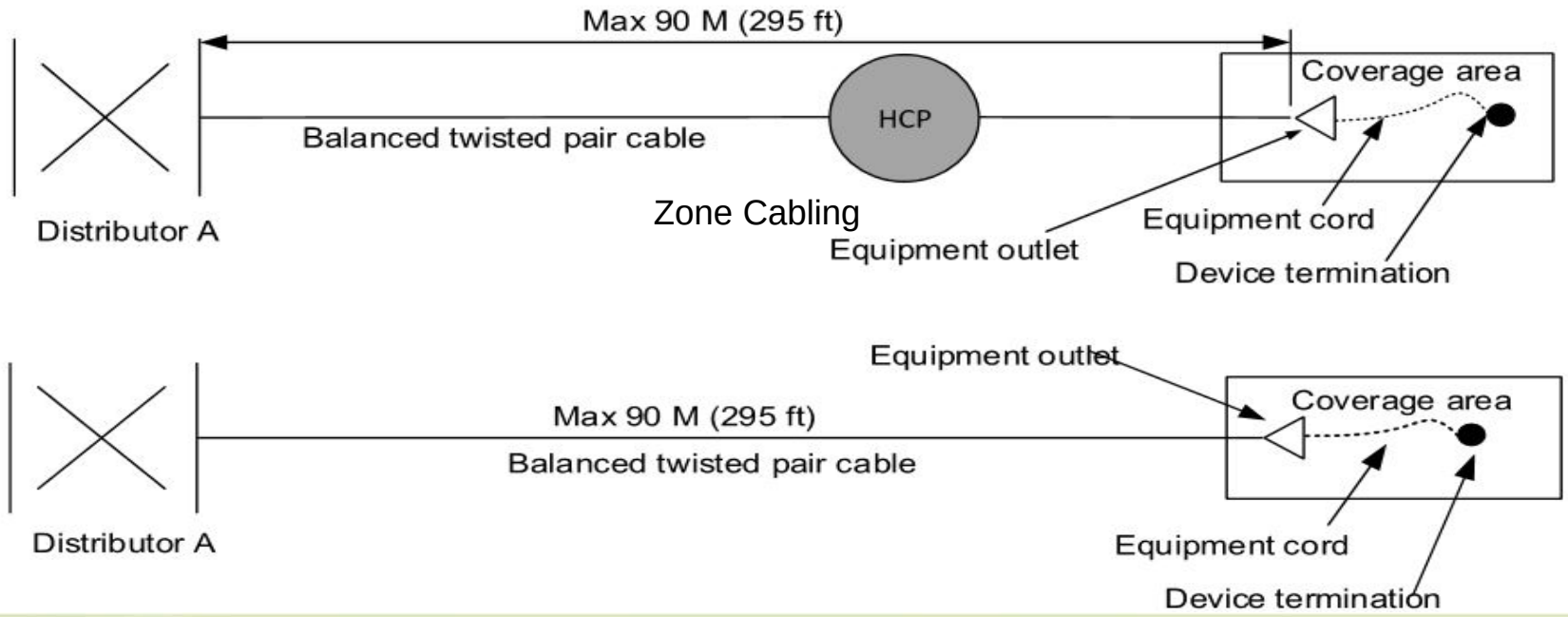
TIA-862-B Structured Cabling for Intelligent Building Infrastructure – System Layout



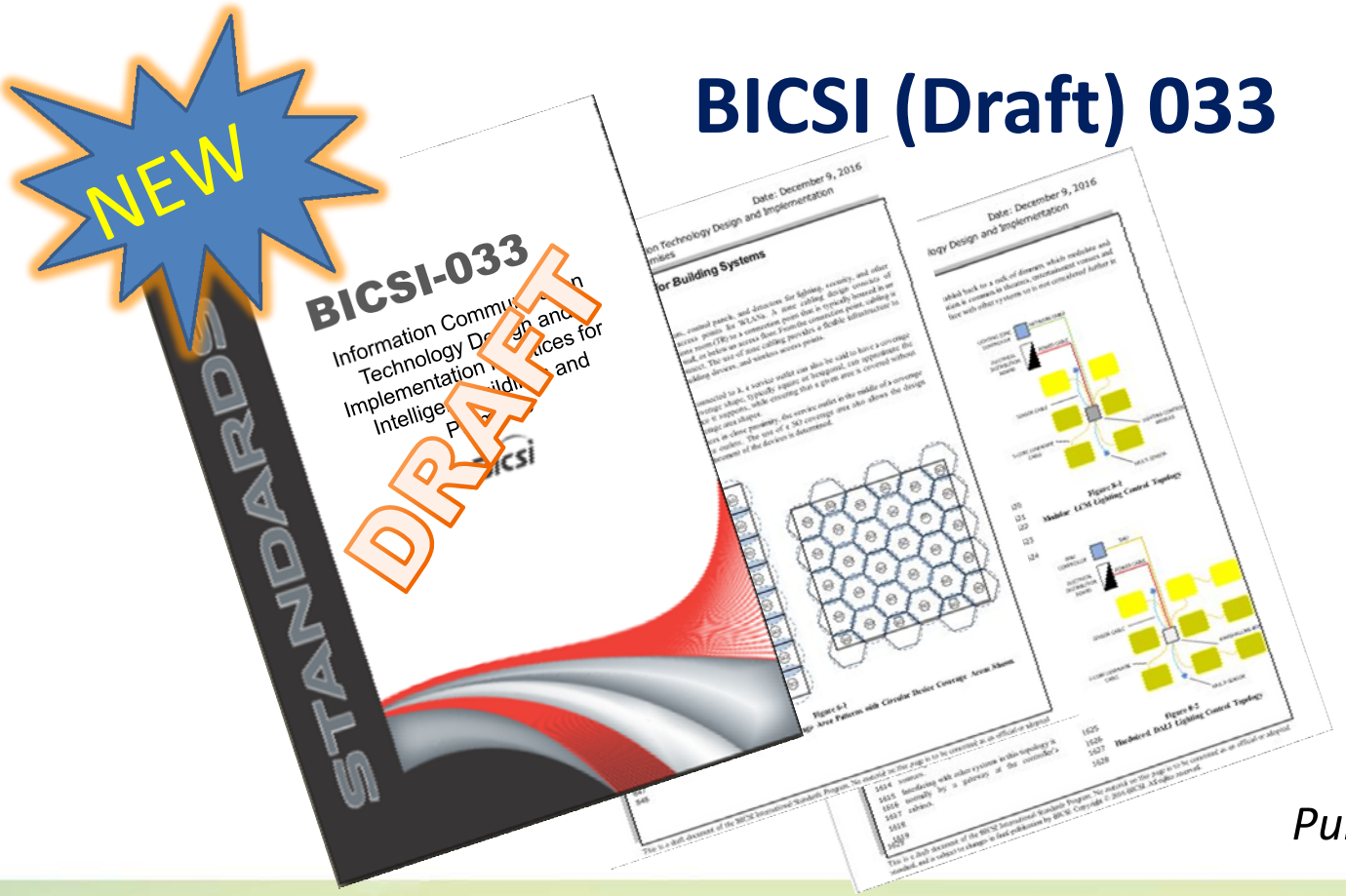
LEGEND

EF	Entrance facility
DA	Distributor A
DC	Distributor C
HCP	Horizontal connection point (HCP)
MR	Mechanical room
SD	Smoke detector (IBS device)
T	Thermostat (IBS device)
◁	Equipment outlet
	Camera (security device)

TIA-862-B Structured Cabling for Intelligent Building Infrastructure - Device termination



BICSI (Draft) 033

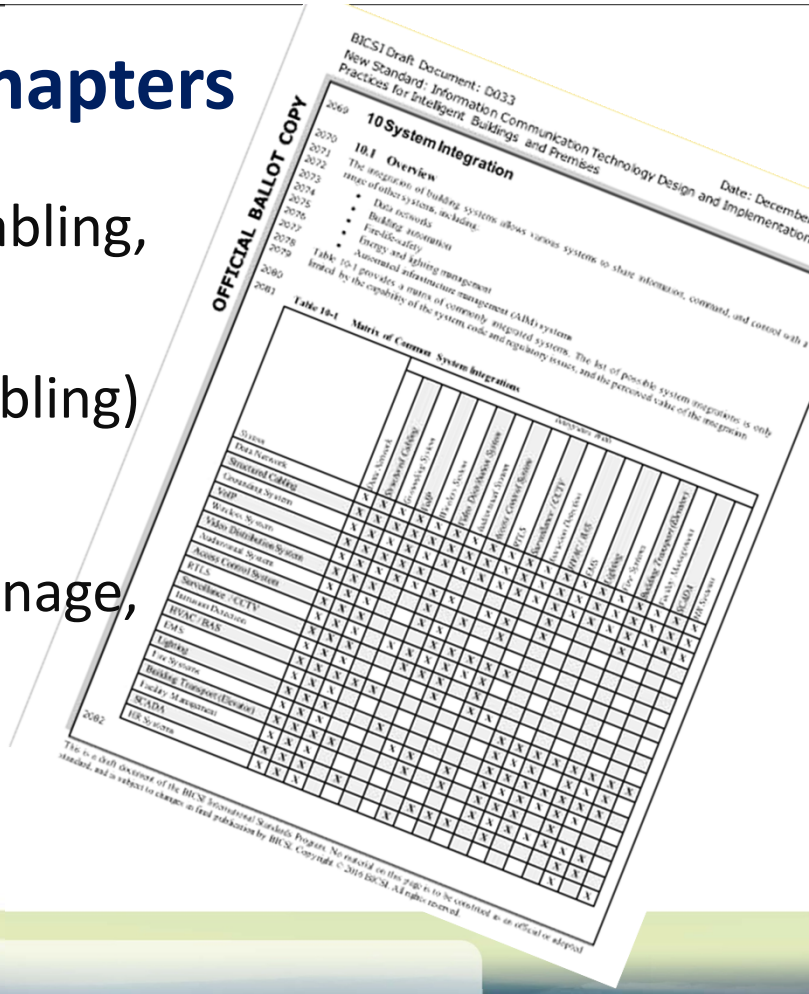


Purpose:
Best practices for integrating diverse applications on the ICT network

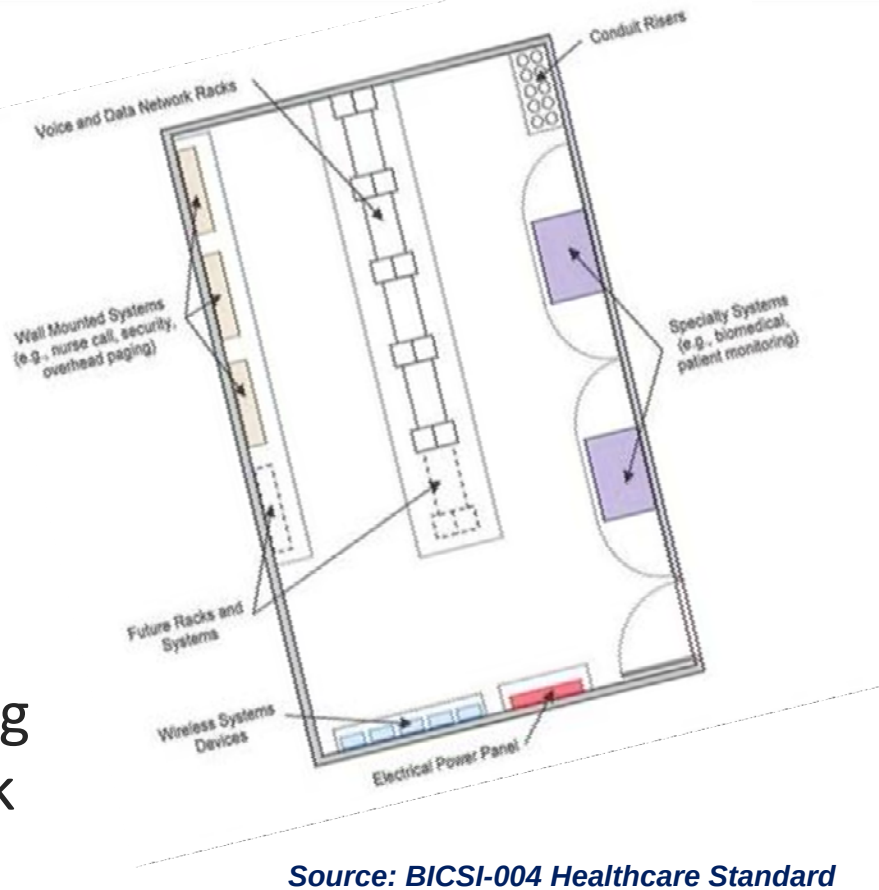
Publication Target Date: 2017

Applications & Main Chapters

- Communications Infrastructure (Topology, Cabling, Pathways)
- Design Considerations (Power, Data, Zone Cabling)
- Building Monitoring Systems (BAS, Utility)
- Unique Building Systems (Lighting, Digital Signage, Vertical Transportation, Sound Systems, ESS)
- System/Network Integration



Planning Telecom Rooms

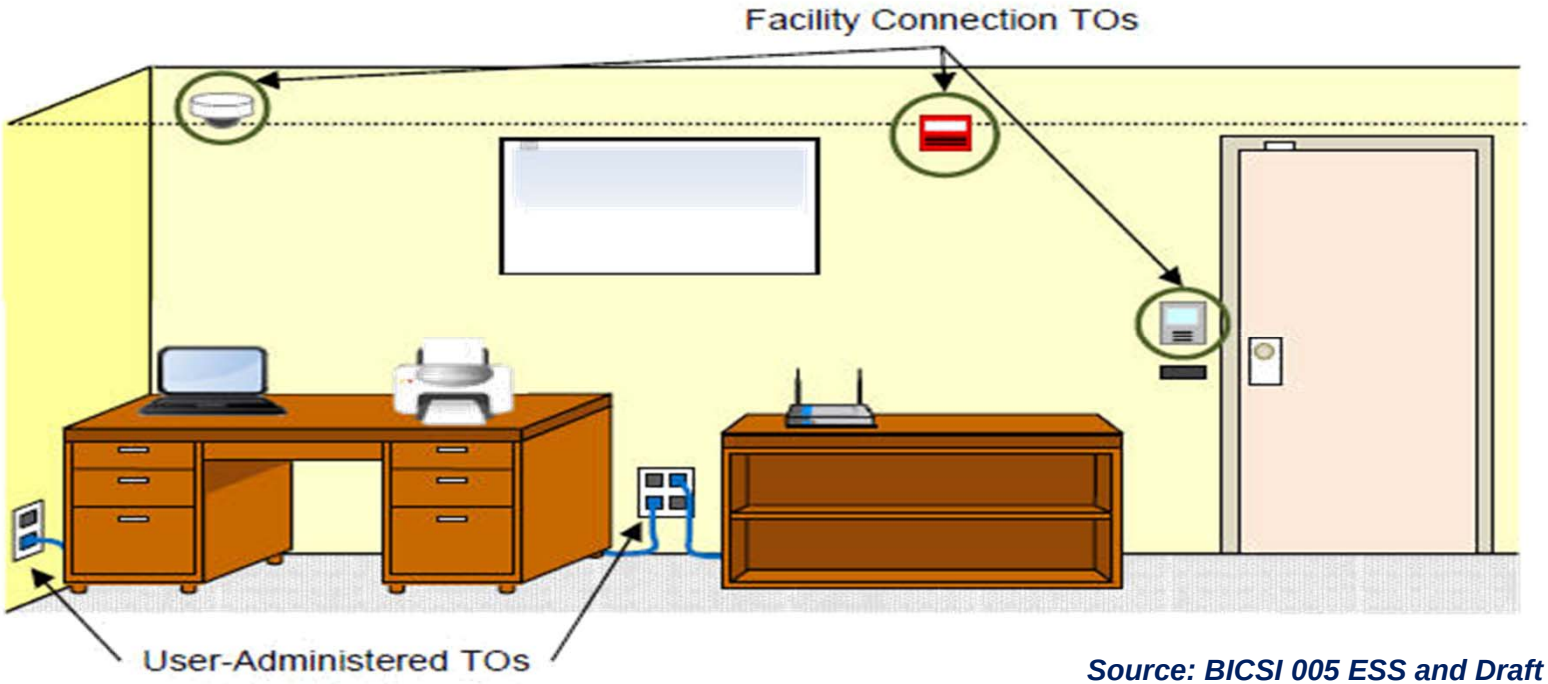


- Allow for additional systems and cabling
- Segmenting systems from core network
- Allow for future racks and systems

Source: BICSI-004 Healthcare Standard

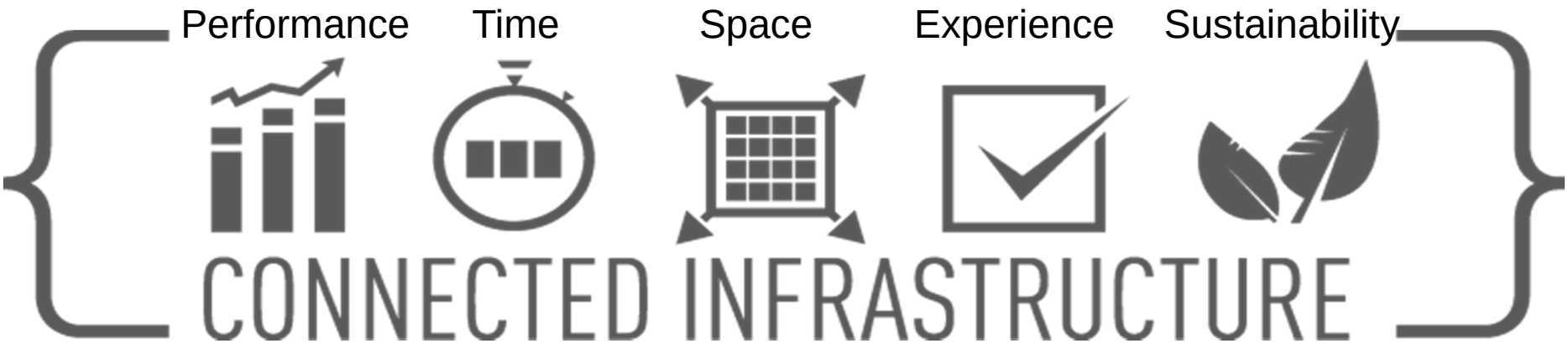
Device Terminations (BICSI 005 & 033)

Unique coverage areas – application dependent



Source: BICSI 005 ESS and Draft 033

Key Elements in Planning the Infrastructure



Reliability guarantee

Network protection

Uptime

Higher

Flexible

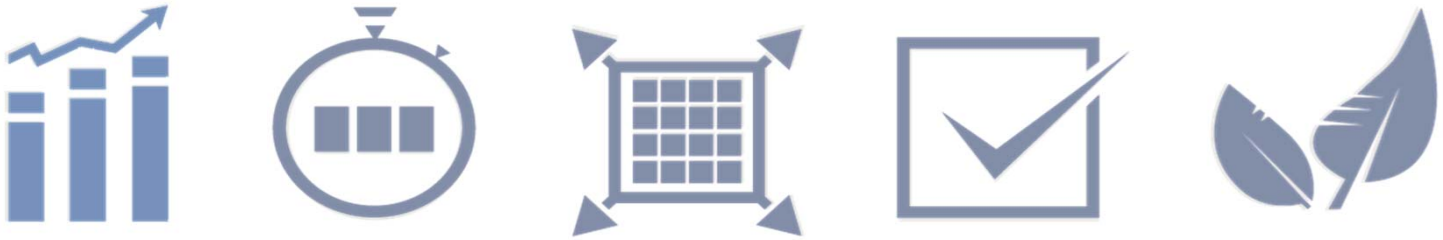
Better F

Environmental Stewardship

Regulatory Compliance

Energy-efficient operations

Performance Time Space Experience Sustainability



CONNECTED INFRASTRUCTURE

Faster deployment

Easy installation

Efficient Moves, Adds & Changes

Engineering expertise

Collaborative design

ference & Exhibition

January 22-26 • Tampa, FL

Key Questions for ICT Infrastructure Planning

- What applications will be going on the core network (Ethernet/IP-based) and what applications will be on separate networks?
- How many will utilize PoE and how much wattage will be required?
- Will the network and applications utilize a centralized or decentralized topology – or a hybrid?
- Where are the devices located (distance & location)?

The Sinclair Hotel Fort Worth
A Marriott Autograph Collection Hotel
Case Study

Farukh Aslam
CEO, Sinclair Holdings LLC
Developer/Owner/Operator

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Driving Factors

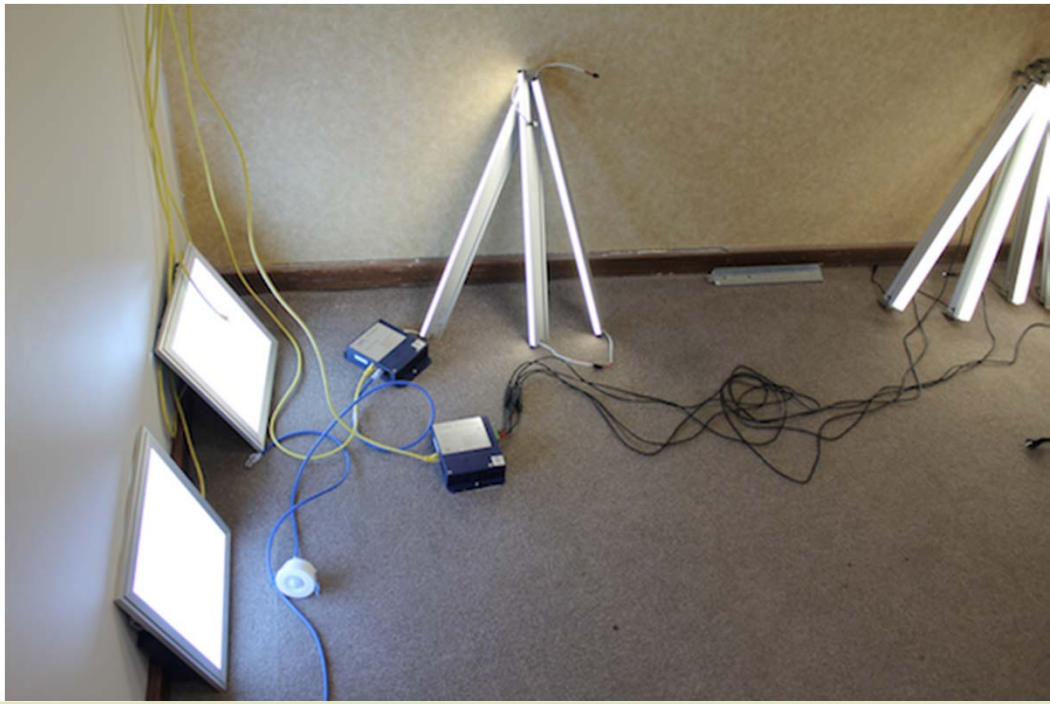
- Technology drives Customer Satisfaction and Repeat Business
  - HSIA, Room Automation, Scene Control
- Low Voltage Lowers Construction Costs
  - Faster Installation
- IP Enables Systems Integration and Better Management
  - More Energy Efficient
  - Granular Energy Measurement Tools
- Future Proof the Building
  - Long Term Owner/Operator

Approach to Technical Disruption: Crawl, Walk, Run

Crawl Phase:

Office Small POC

- Simple Network
- Touch/Feel Products
- Evaluate Network Power and Control
- Define Quick Installation needs
  - Quick Connect Plugs and Cabling
- Define/Refine Lighting Products



Approach to Technical Disruption: Crawl, Walk, Run

Walk Phase:

Sanger Office Building Deployment (Adjacent to future Sinclair Hotel)

- Phase 1: Deploy Floors 5-7
- Phase 2: Deploy Ground Level Retail Space

Approach to Technical Disruption: Crawl, Walk, Run

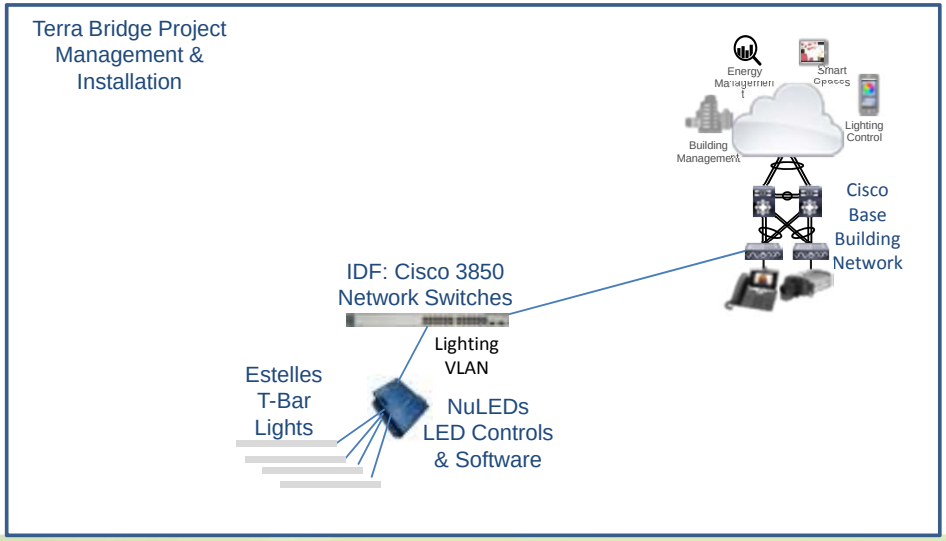
Run Phase:

Sinclair Hotel

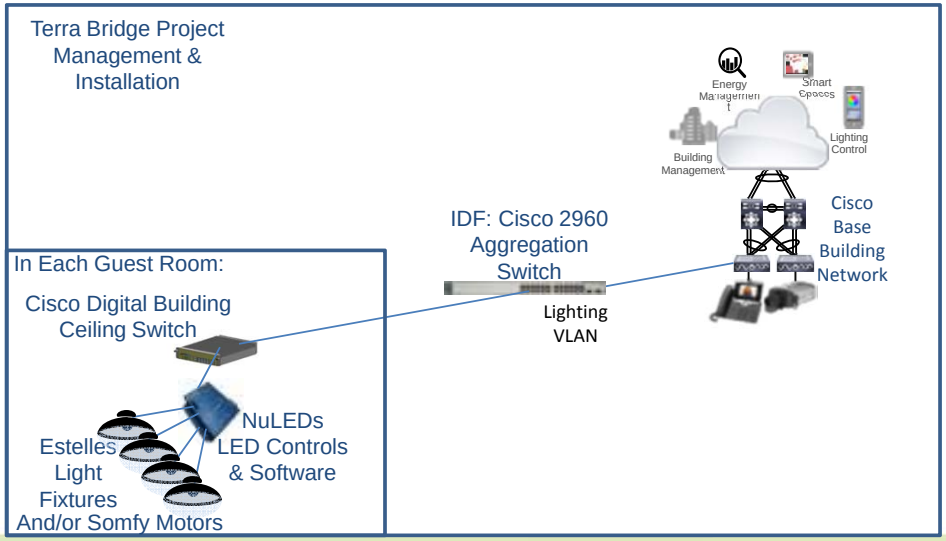
- In Room Digital Ceiling:
  - Lighting
  - Automated Window Blinds
  - Automated Curtain Motors
- Hallway Lighting
- Exterior RGB Accents

The Digital Building Infrastructure

Centralized Approach: Office Bldg.



Decentralized Approach: Hotel



Summary

- Technical Innovation Lowers Cost Structure (CapEx/OpEx)
- Better Experiences lead to higher Occupancy and Customer Satisfaction
- Low Voltage/PoE is Future Proof Building Infrastructure

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