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LIGHTING
CONTROLS
2019

INTELLIGENT LIGHTING +

PRESENTED TO
APEC – SOUTH IL CHAPTER
NOV 8, 2019

BACKGROUND

SMG – MANUFACTURER'S REP AGENCY

CO-FOUNDED IN 1976

COVERING SOUTHERN IL & EASTERN MO

**SPECIAL EMPHASIS:
ENERGY REDUCTION
BY
MORE EFFICIENT
LIGHTING**

RECENT QUOTE FROM A LIGHTING EXEC:

“MANY IN OUR INDUSTRY ARE TALKING ABOUT LIGHTING CONTROLS, BUT ONLY A FEW ARE BUYING THEM.”

**DRIVERS OF LIGHTING CONTROLS:
CALIFORNIA TITLE 24
ILLINOIS ADOPTS IECC 2018
(EFFECTIVE 7-1-19)
(INTERNATIONAL ENERGY CONSERVATION CODE)
AMEREN IL INCENTIVES AND DLC**

43 STATES HAVE ADOPTED THE IECC

ILLINOIS – YES

MISSOURI – NO

BUT STL, KC, SPR, COL - YES

43 STATES ADOPT THE IECC STATE

ILLINOIS – YES

MISSOURI – NO

BUT STL, KC, SPR, COL - YES

ILLINOIS IECC – 2018

BASED ON
ASHRAE STD 90-1-2016
(AMERICAN SOCIETY of HEATING, REFRIGERATION
&AIR CONDITIONING ENGINEERS)

***ASHRAE 90.1 and IECC ESTABLISHED MINIMUM ENERGY
EFFICIENT REQUIREMENTS FOR
DESIGN, CONST, OPERATION & MTCE OF BLDGS***

Exception Low-Rise Residential

Lighting Updates in 90.1-2016

- Exterior lighting and parking garage lighting controls
- Reduce power by 50% (was 30%) during unoccupied periods or after business hours
- Some outdoor parking areas automatically reduce by at least 50% as detected by occupancy sensors.



Power Updates in 90.1-2016

- Automatic Receptacle Control

- First introduced in 2010, updated in 2013
- 50% of all general-purpose receptacles in offices, conference rooms, break rooms, classrooms, and workstations.
- At least 25% of branch circuit feeders installed for modular furniture.
- This control shall function on time-of-day schedule, an occupancy sensor, or signal from another control system.
- Controlled receptacles shall be visually marked and uniformly distributed.

- Exemptions

- Receptacles for equipment requiring continuous operation.
- Spaces where an automatic control would endanger the safety or security of the room or building occupants.

WHAT IS “INTELLIGENT LIGHTING”?

DLC Networked Lighting Controls (NLC) Project

- Networking of Luminaires and Devices
- Occupancy Sensing
- Daylight Harvesting / Photocell Control
- High-End Trim
- Zoning
- Luminaire and Device Addressability
- Continuous Dimming



...but we're talking way more than energy savings!

ENABLING TECHNOLOGIES

- 1. Sensors**
- 2. Networking**
- 3. Software**

A SENSOR-PACKED FUTURE

- **Produces data for some purpose**
- **Sensor variety produces more dynamic data**
- **Sensor proliferation produces more data volume**
- **Smartphones, industry**



ADDING THE INTERNET TO “THINGS”

- **IoT = Internet of Things**
- **Adding Internet connectivity to any *thing***
- **A “thing” could be physical (hardware)**
- **A “thing” could be virtual (software)**
- **Enables communication, networking, cloud**



CONVERGENCE OF ENABLING TECHNOLOGIES

- **Sensors = more dynamic data**
- **IoT = networking, communication**
- **Software = automates, translates**

Enables machine learning, automation, AI

Lighting's Unique Real Estate

- Distributed across the building
- Power access at every luminaire



**DISCREET SENSORS
STAND ALONE**

EX: AUDACY

Fixture-Integrated Sensors

TODAY

- **Motion (occupancy)**
- **Light (daylight harvesting)**

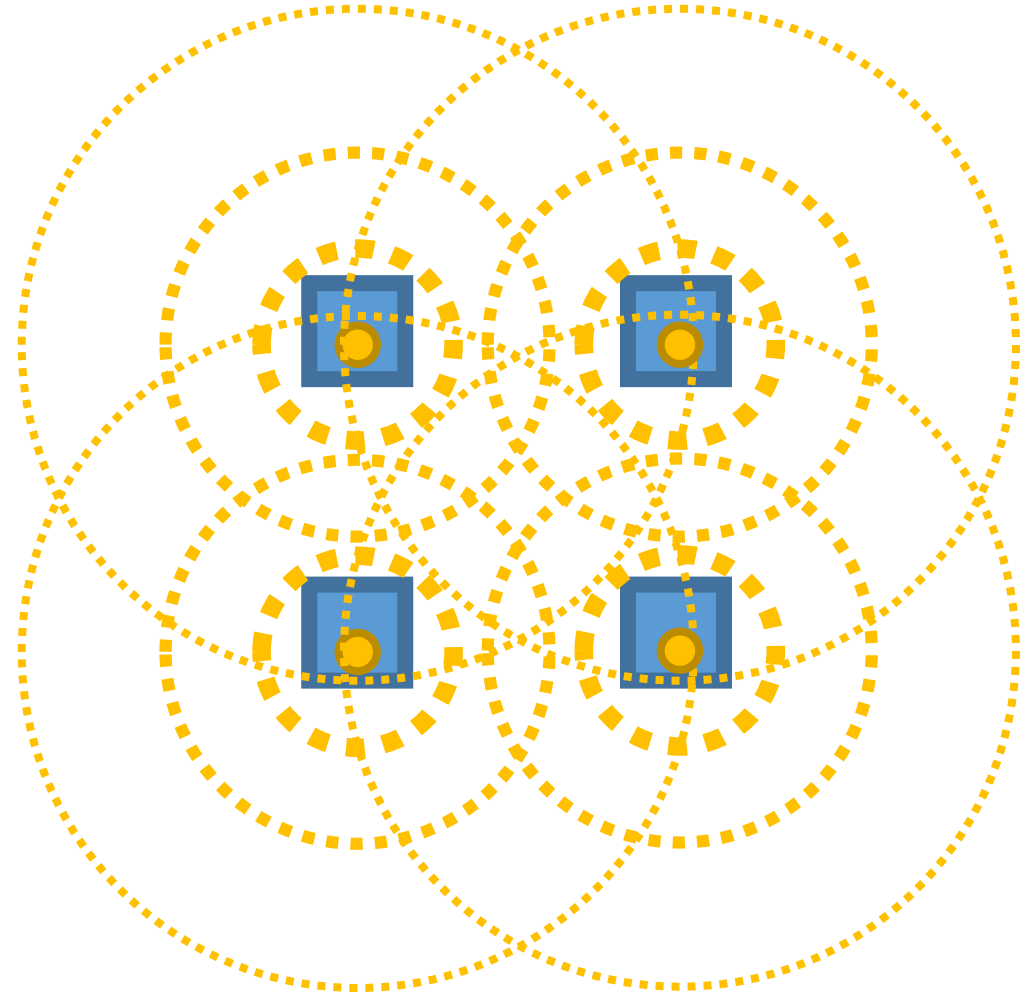
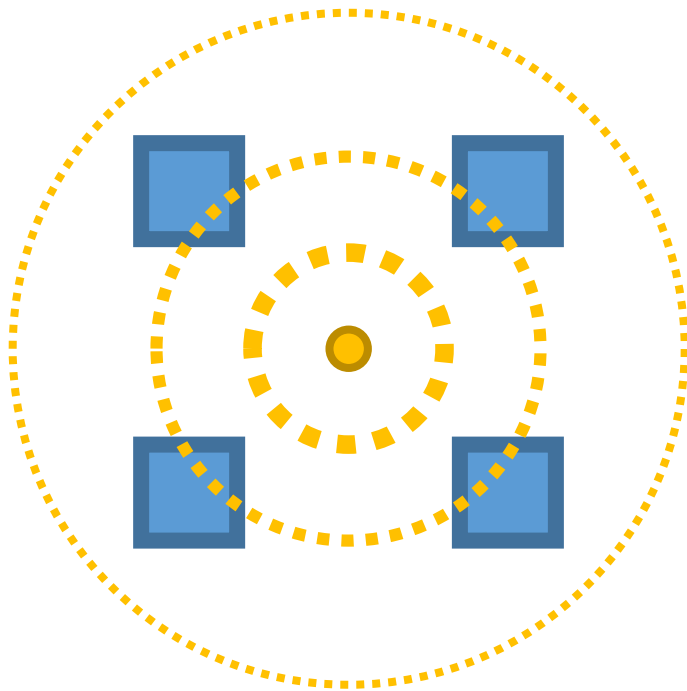


Distributed sensors = more effective coverage

Integrated sensors = fewer devices, simpler install

Reduced total cost, more effective lighting control

More Effective Sensor Coverage



Fixture-Integrated Networking

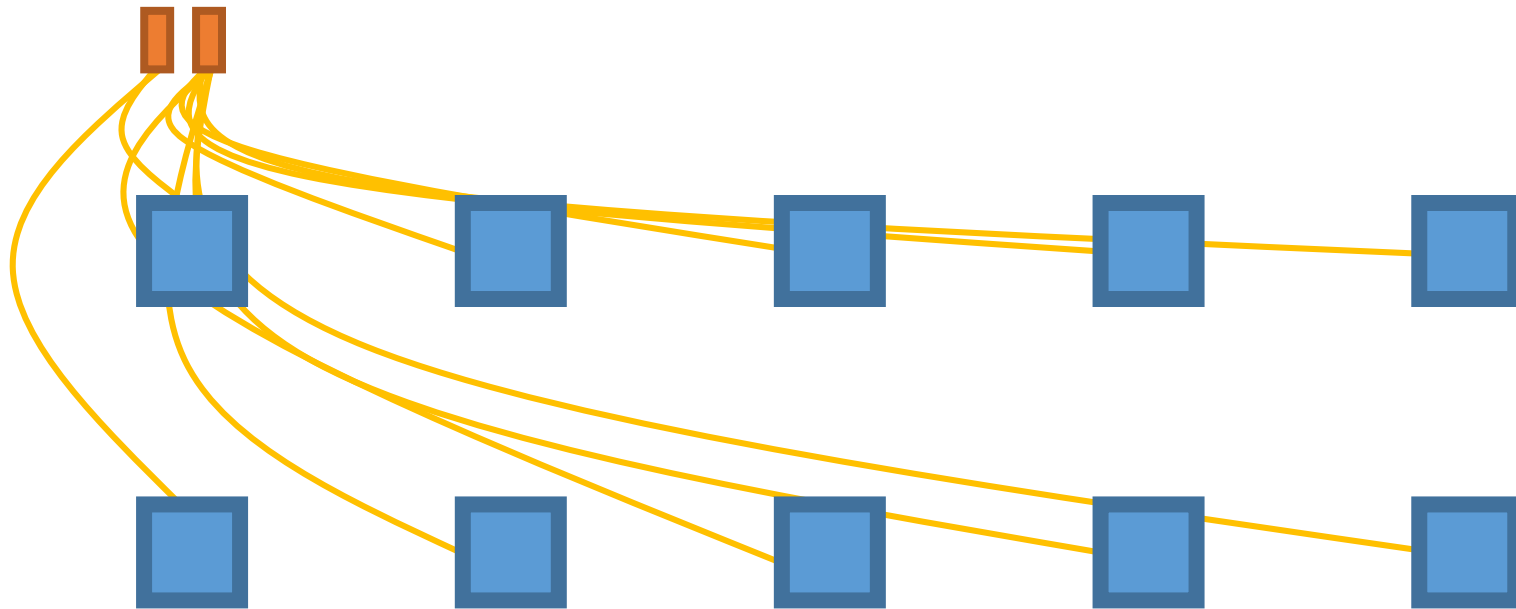
TODAY

- **Traditional wiring**
- **Wireless**
- **Power over Ethernet (PoE)**
- **LiFi (visible light communication)**

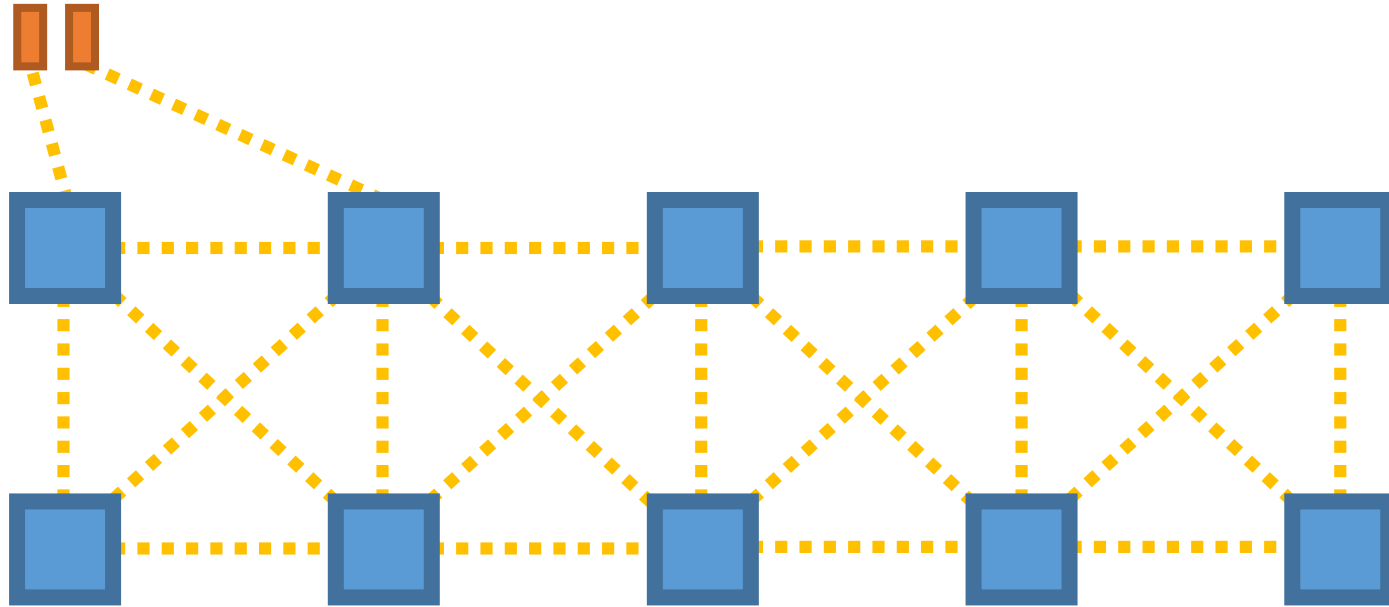


Enables sharing of data, software integration

Hard-Wired “Networking”



Wireless or POE Communications



Integrating Software

TODAY

- **On-board programming (firmware)**
- **Externally connected**
- **Cloud-based**

Enables automation, analytics, control, integration

Simple Switched Lighting System

Design

Layout fixture locations

Layout switch locations & zones

Installation

Install fixtures

Install switches

Pull line voltage to fxt & switches

Commissioning

Energize ltg. circuits at panel

Progression of Lighting Control into Building IOT

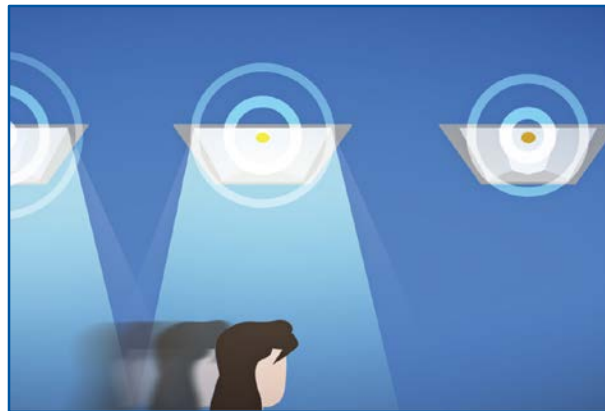
Sensor Network

Motion (PIR) + light sensors
Wireless or wired (PoE) network
Imbedded into luminaires



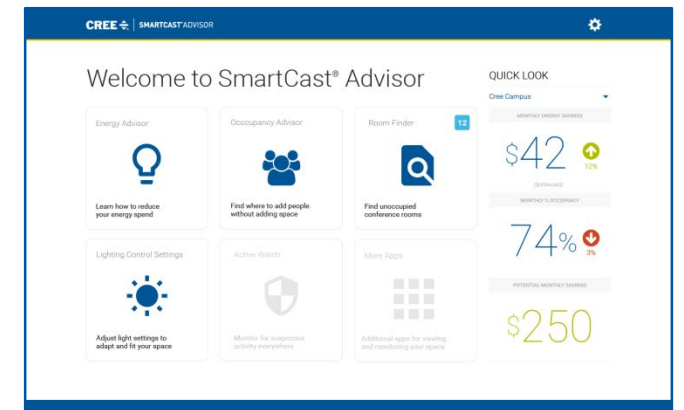
Lighting Control System

Occupancy + daylight controls
Automated setup, operation
“Future-ready” hardware



Building Intelligence

Lighting analytics + control
BAS/BMS integration
Open API (software dev)



Traditional Lighting System + Controls

Design

Layout fixture locations

Layout switch locations & zones

Select control protocol/approach

Determine daylight zones

Select daylight sensors

Locate daylight sensors

Select occupancy sensors

Locate occupancy sensors

Create one-line for submittal

Create/review controls submittal

Installation

Install fixtures

Install switches

Pull line voltage to fxt & switches

Install occupancy sensors

Install daylight sensors

Connect fixtures to control bus

Connect sensors to control bus

Connect sensors to power

Install and power gateway

Connect control bus to hub

Commissioning

Energize lgt. circuits at panel

Address all fixtures

Group fixtures in zones

Associate zones with switch

Associate zones w/daylight sensor

Associate zones w/occ sensor

Verify occ sensor placement

Calibrate daylight sensors

Intelligent Lighting Systems

Design

Layout fixture locations

Layout switch locations & zones

Installation

Install fixtures

Install switches

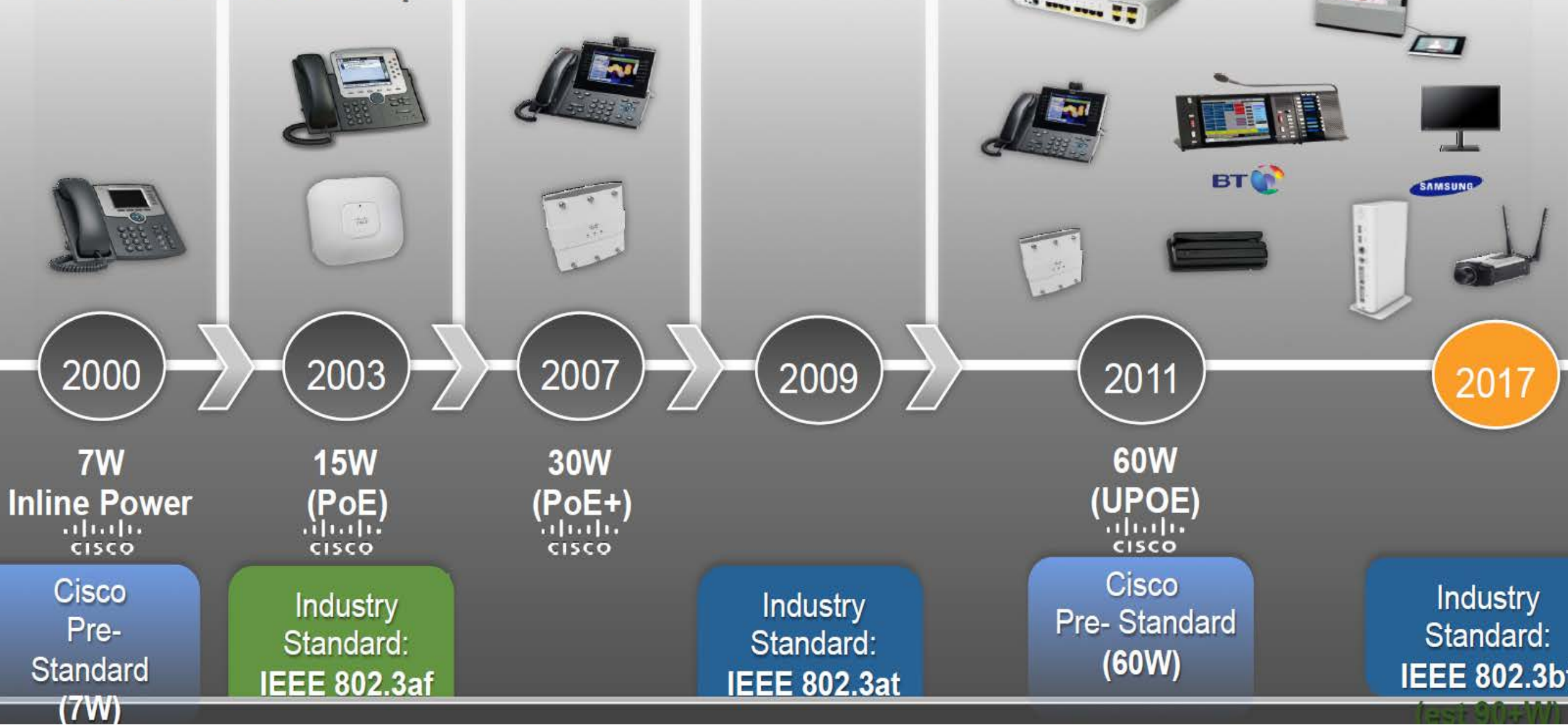
Commissioning

Energize lgt. circuits at panel

Automated Commissioning

Power Over Ethernet

A Historical Perspective

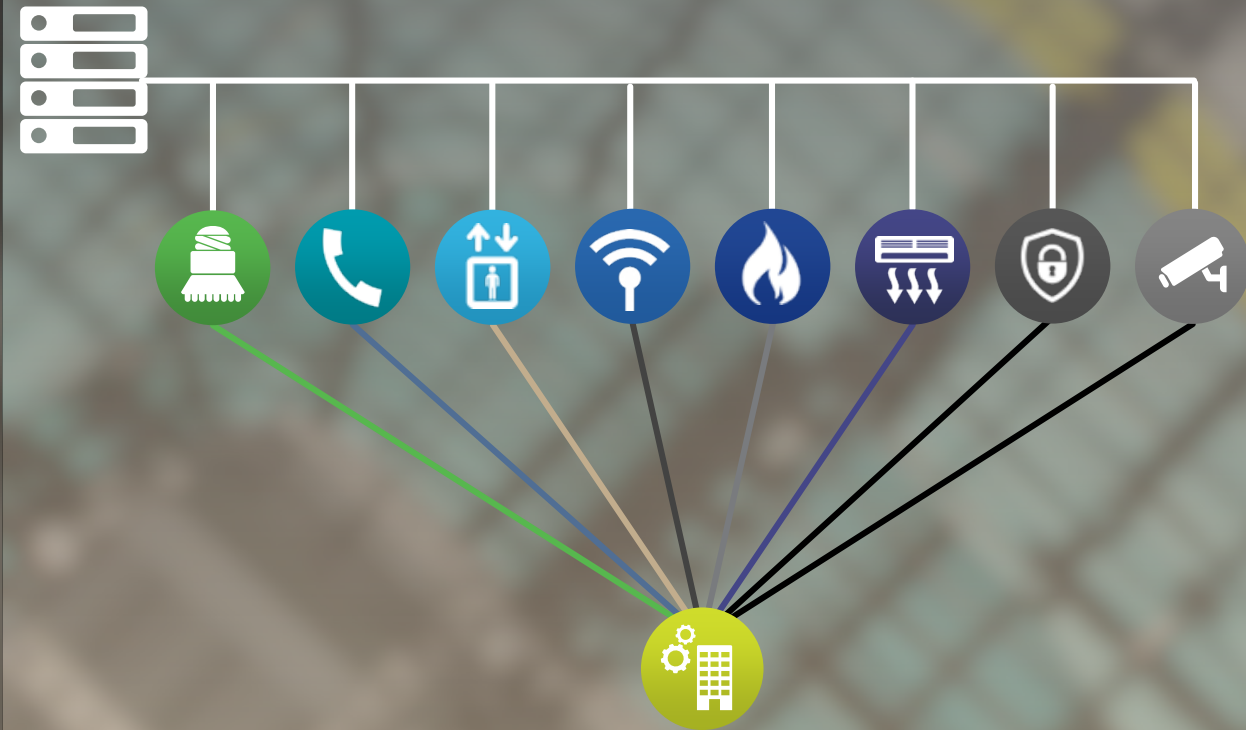


THE SMART BUILDING & INTELLIGENT LIGHTING MOVEMENT

Separate Building System Networks



Single Converged IP Network & Media



Broken Silos Enables Analytics

SIMPLIFIED MANAGEMENT, LOWER COSTS

Outcomes of Intelligent Lighting

- **Simpler to design, install, operate, persist**
- **Integrate into BAS/BMS**
- **Support security, HVAC, plug load, etc.**
- **Drive deeper controls energy savings**
- **Circadian rhythm white color tuning**
- **Open software development (APIs)**

Fixture-Integrated Sensors

TODAY

- **Motion (PIR)**
- **Light**

TOMORROW

- **Microphone**
- **Speaker**
- **Camera**
- **Air/Chemical**
- **GPS**
- **Accelerometer**

Future of Intelligent Lighting

- **Full spectrum (RGBW) color tuning**
- **Flicker-free dimming**
- **Noise cancellation**
- **Tracking assets or people**
- **Pervasive voice control (Alexa everywhere!)**
- **Medical lighting prescriptions**

WHAT ABOUT THE ENERGY!?!?

Intelligent lighting systems can deliver...

- **More effective lighting and BMS control**
- **Much deeper energy savings**
- **More adaptable systems = More persistence**
- **Longer-term energy savings**

NEBs beginning to drive EE technology adoption?

TAKE AWAY:

NEW CONSTRUCTION OR COMPLETE RENOVATION:

USE INTEGRATED CONTROLS

RETROFIT PROJECTS

USE DISCREET CONTROLS

THANK YOU !

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Note: Several slides courtesy of Kris Evans, CREE LIGHTING, a company of IDEAL Industries

www.creelighting.com