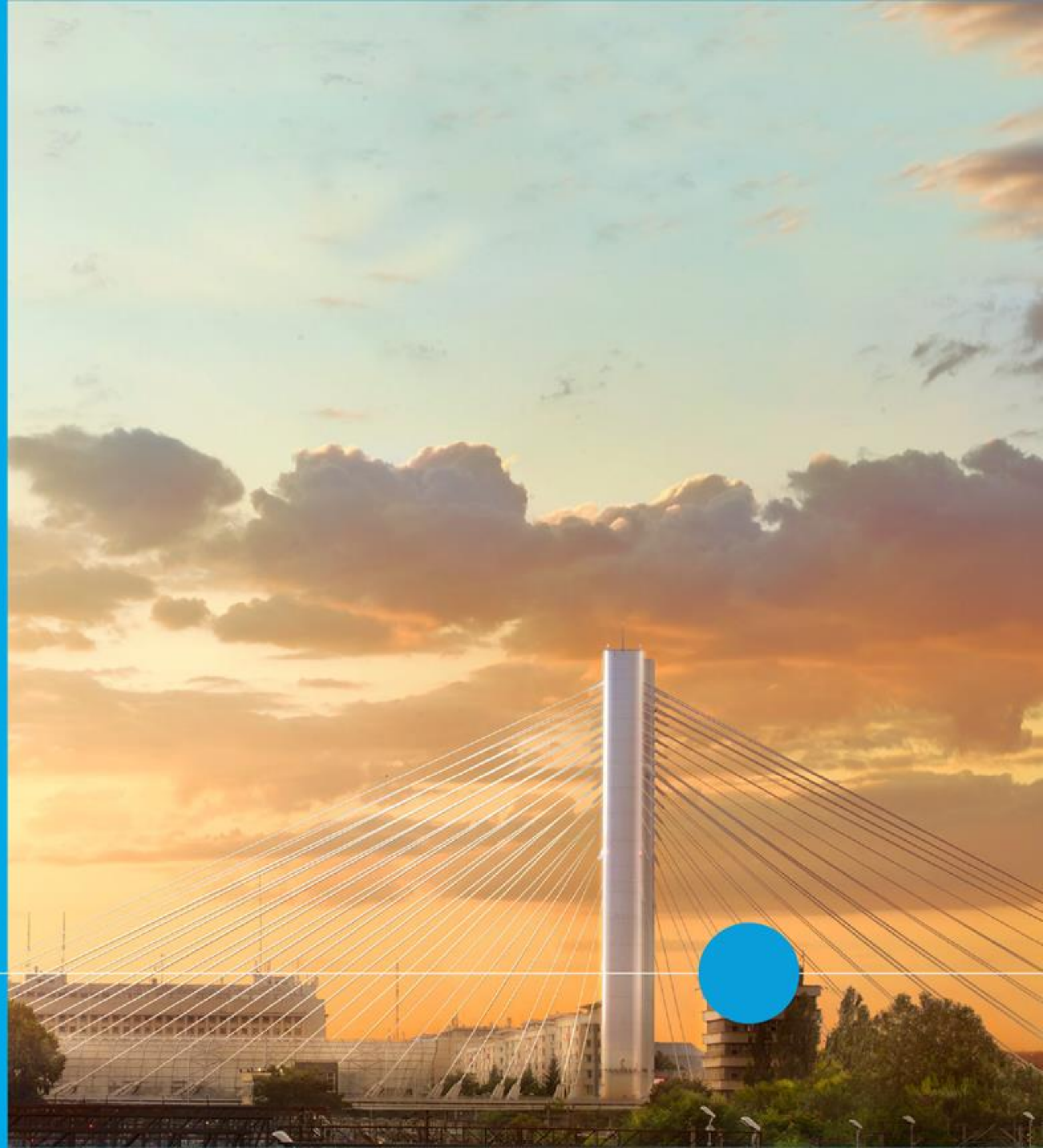


Connected Office- IoT „Walk the Talk“ in modern Office Buildings

Boris Zupančič

Enterprise Business Development CEE

Oct 2016



Together
we make
connected
lighting
a reality



We live in the era of data

- 1.8 zettabytes of data in 2011
- Internet use still growing, expectation 40 zettabytes in 2020
- Every day, we produce more data than was produced from the beginning of civilization until 2003

A close-up, shallow depth-of-field photograph of a person's hand with light-colored nail polish touching a smartphone screen. The background is blurred, showing what appears to be an office setting with a desk and other equipment.

We are always **connected**

The internet has changed everything

The shift from analog to digital has completely changed our world over the last 30 years. We walk around with smartphones in our pockets containing more computing power than that which helped Neil Armstrong set foot on the moon in 1969. Technology is a personal tool and we want and need to be connected with people and organizations, wherever they are globally.



And what about **a smart building?**



It's **the building advising** you.

Imagine...

- ... the Lighting Solution which does more than just light your spaces
- ... that you can learn and sense things
- ... that it can interact with people and places
- ... that it can gather and share data.
- ... gearing up these capabilities to work through integration with the software programs & app's that bring them to life.
- ... creation of opportunities to contribute to the performance of the company



A digital ceiling
(floor?) infrastructure
as pathway for
information



Every mobile
phone a personal
service portal, location
based



Indoor positioning
for advanced in context
information and indoor
navigation



Wide range of
sensors to learn from
the indoor
environment

Connected lighting – how it works



In a connected lighting system that uses Power-over-Ethernet (PoE), each luminaire is directly connected to a building's IT network via an Ethernet cable and PoE switch. Each luminaire has a unique IP address so that it can be individually monitored and managed.

With integrated sensors, each luminaire becomes a point of intelligence that shares data on occupancy, activity patterns, and changes in temperature, humidity, and daylight levels.

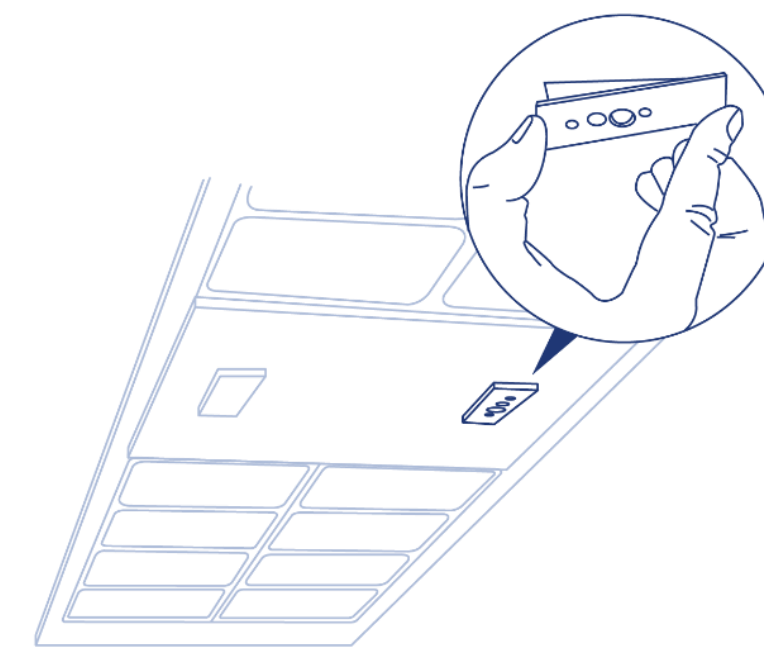
PoE-based connected lighting makes integration of data, monitoring, and management of the lighting system fast and easy – delivering extraordinary value beyond illumination to the users and building managers.

PHILIPS



Future proof

- Sensor slots in luminaires provide an easy upgrade path, the Connected Lighting System can grow over time by adding new data sources
- Additional features are delivered by software, firmware updates, integration with other systems, and additional sensors
- Since every luminaire has an IPv6 address, reconfigurations of the lighting system are completely software-based, avoiding the need for rewiring the physical network



Lighting as a First Step to Creating a Digital Ceiling

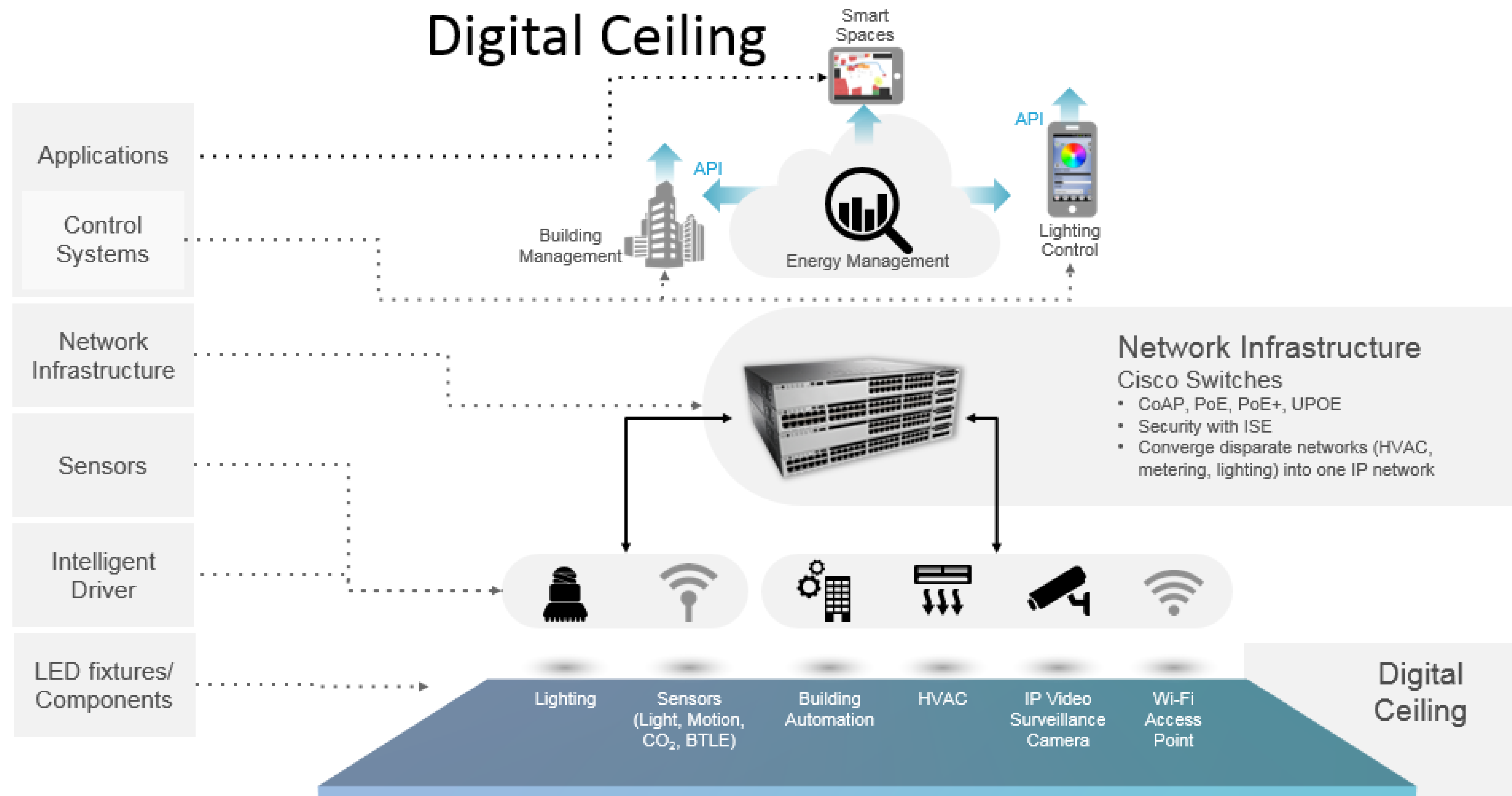
Separate Building System Networks

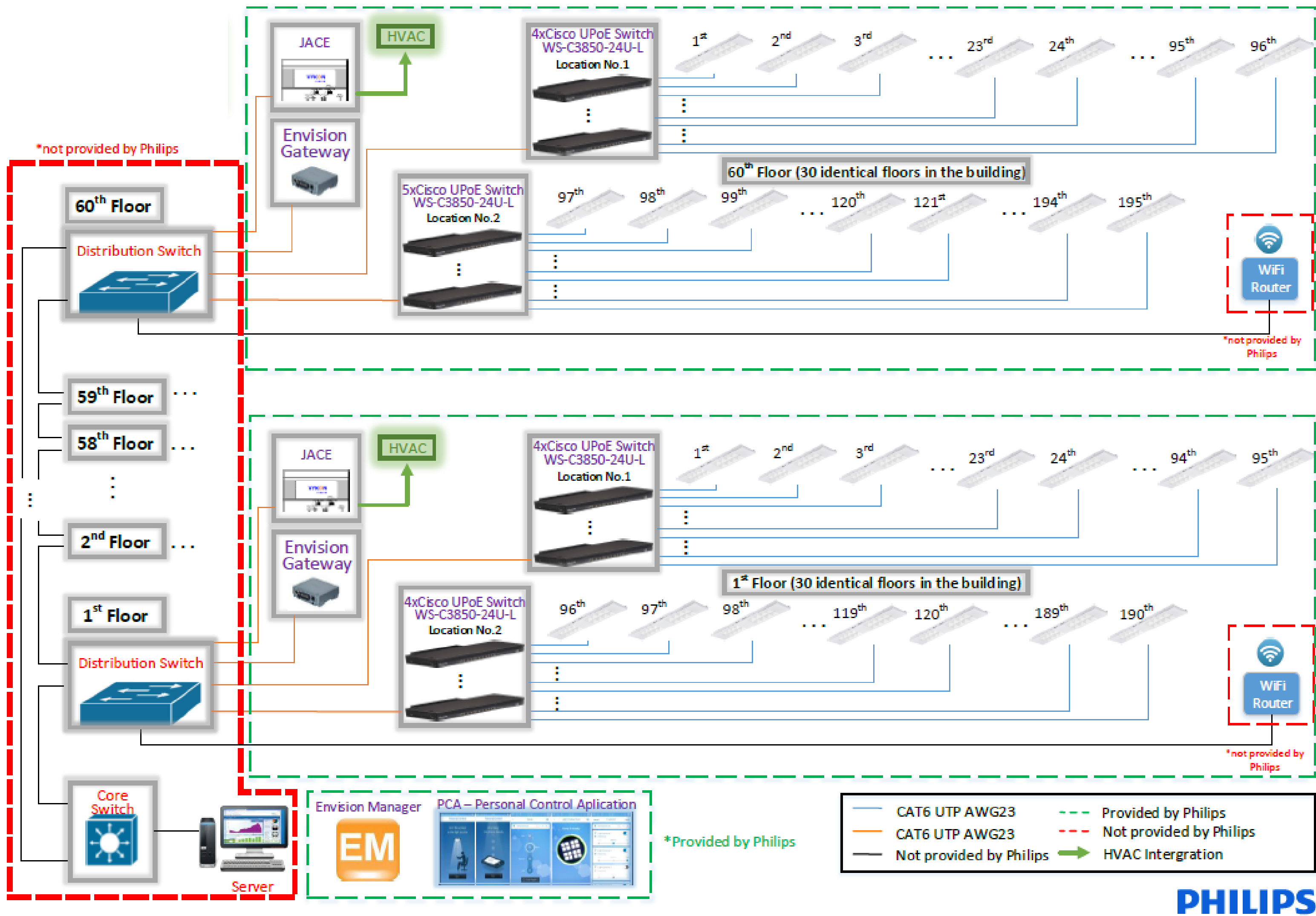


Single Converged IP Network

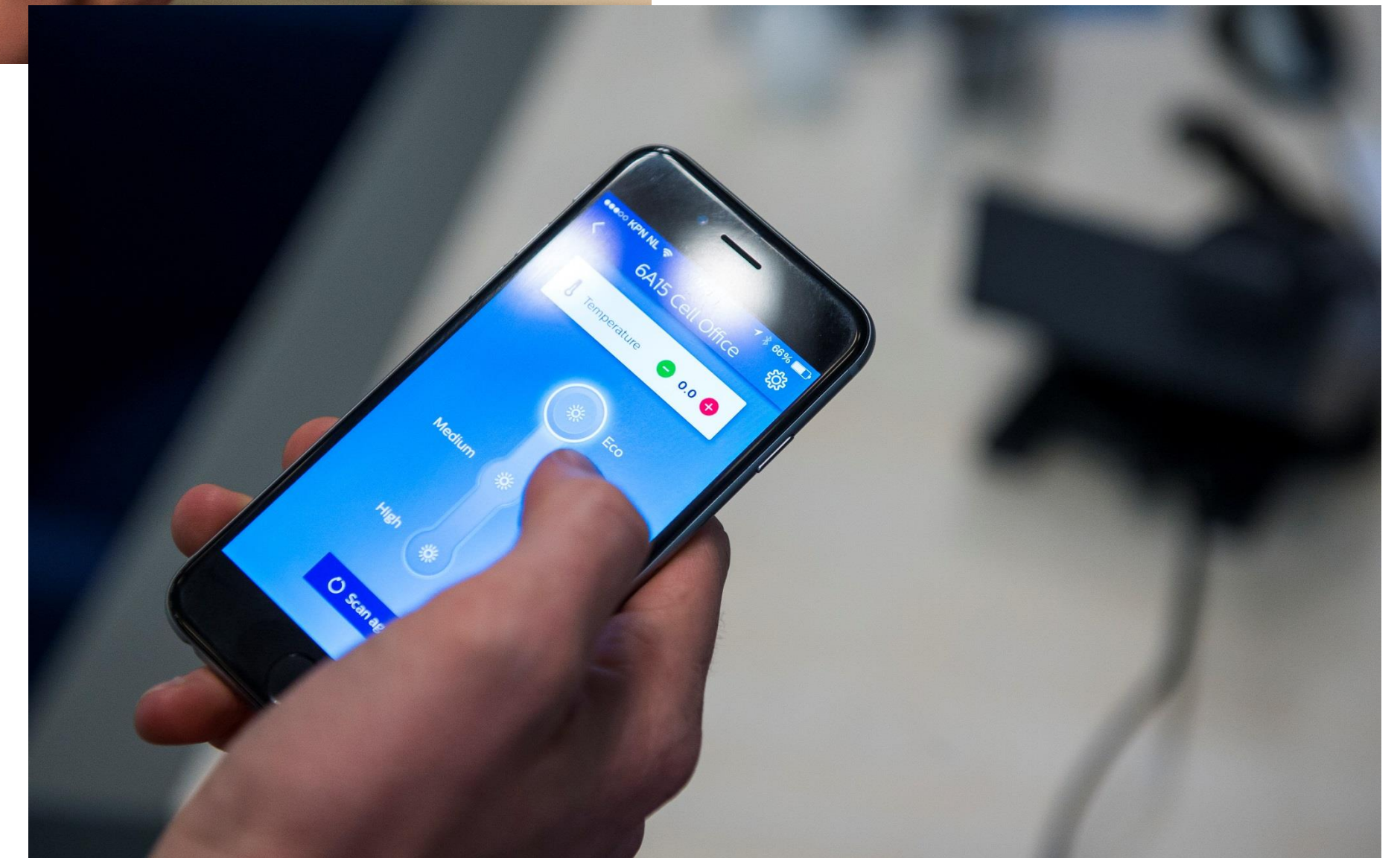
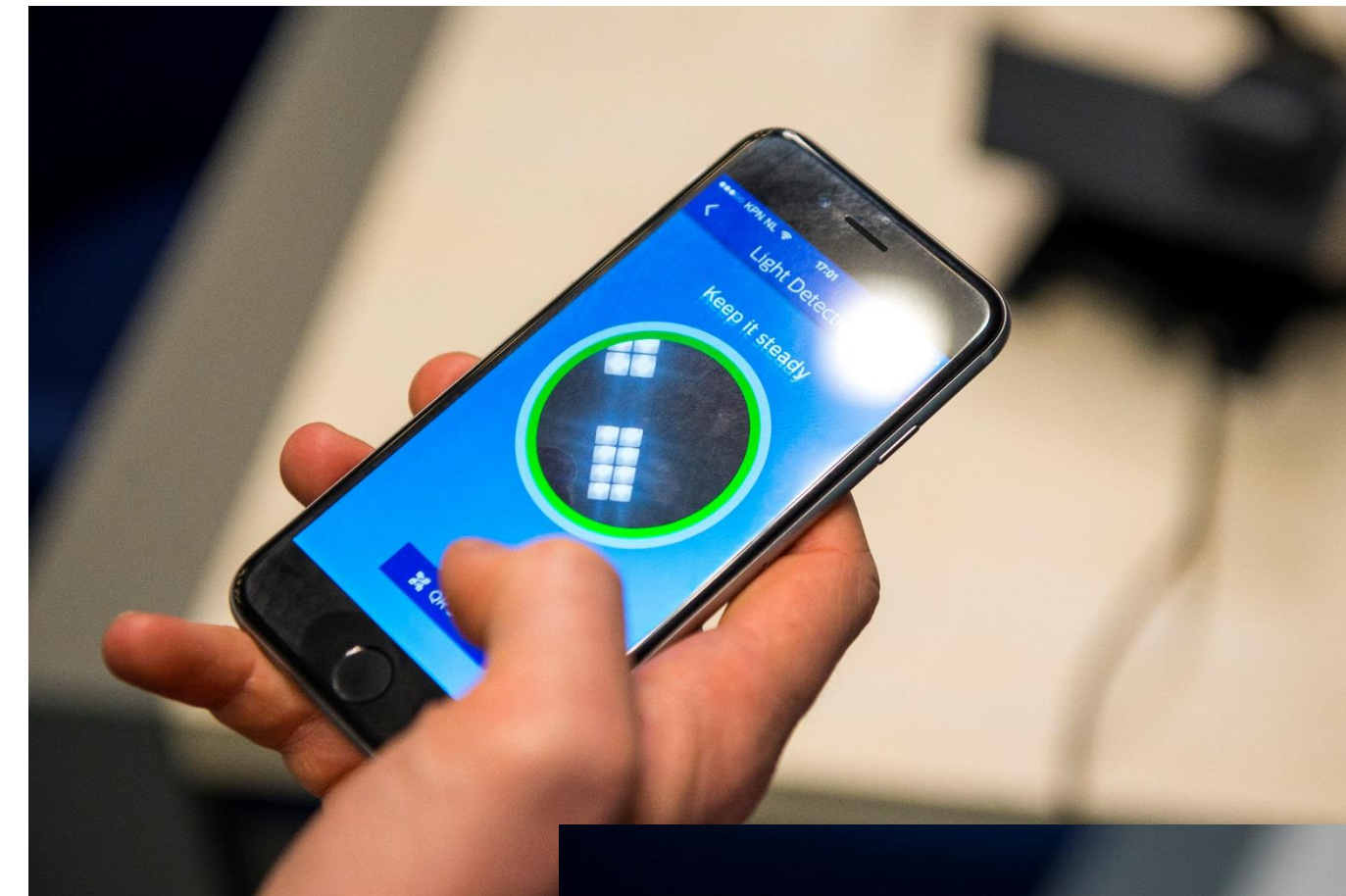


Light Fixture Becomes a Data Source;
Broken Silos Enables Analytics





- Our connected lighting system communicates data through the light itself
- More accurate positioning than other indoor positioning methods through a ‘highly granular’ lighting grid
- Office workers control lighting and comfort levels via a smartphone app

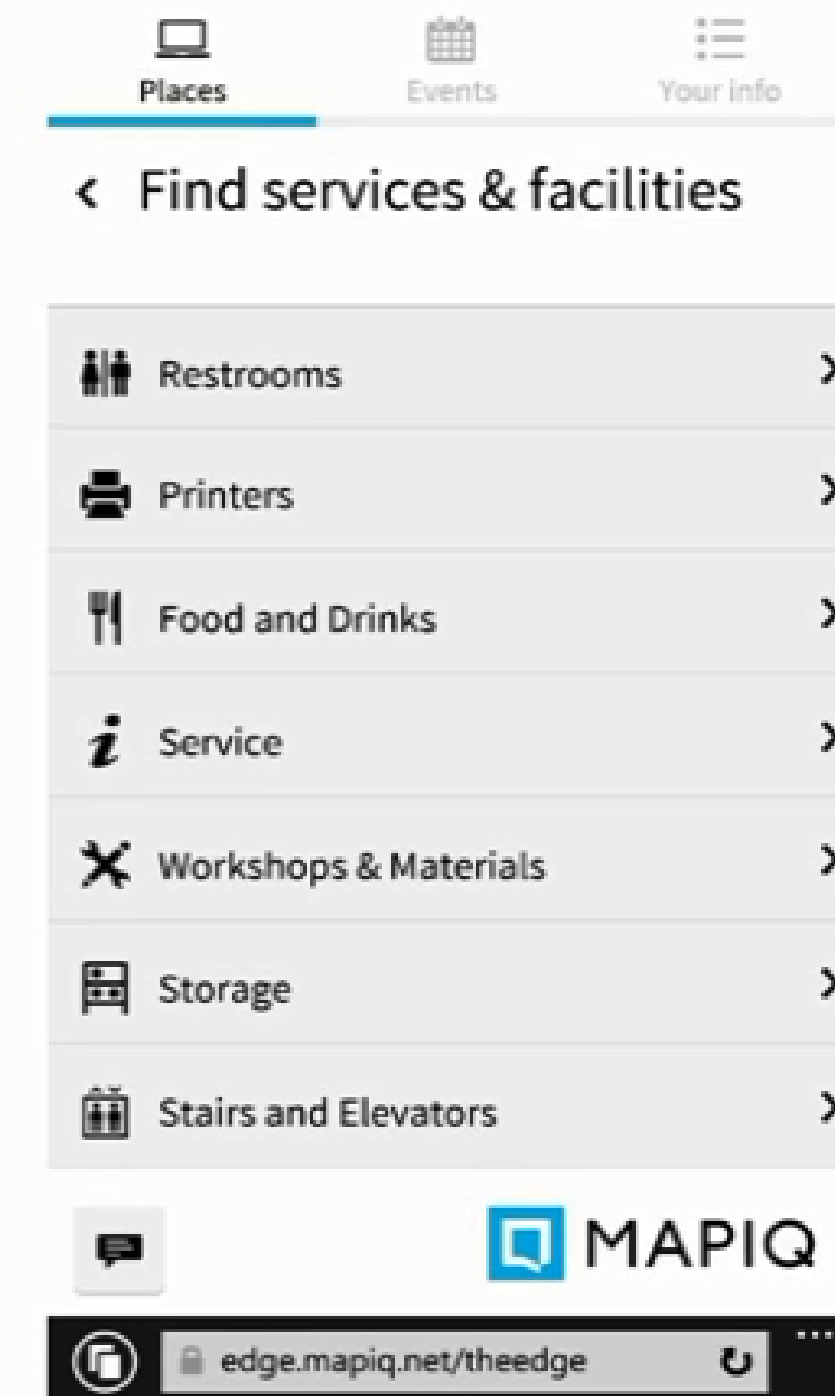
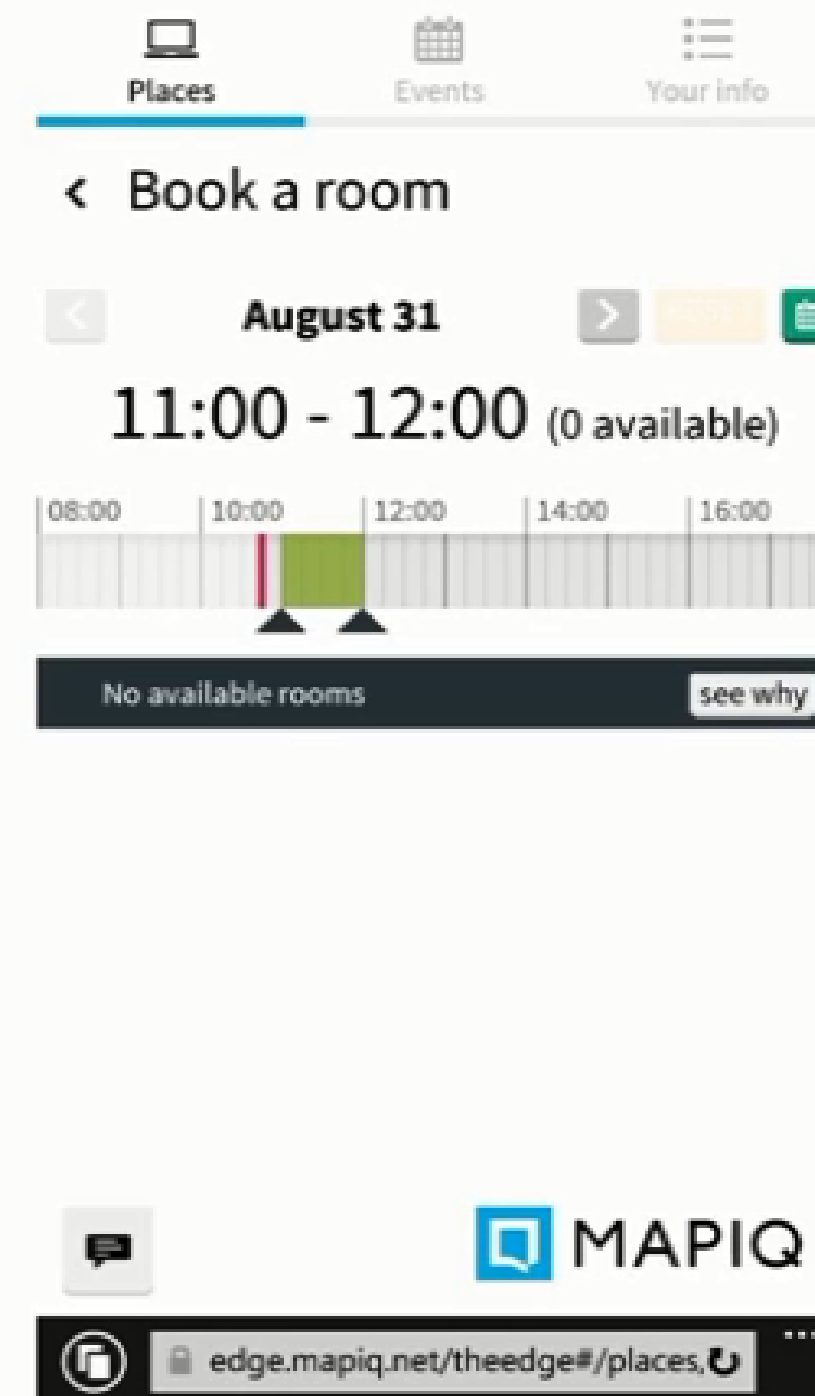
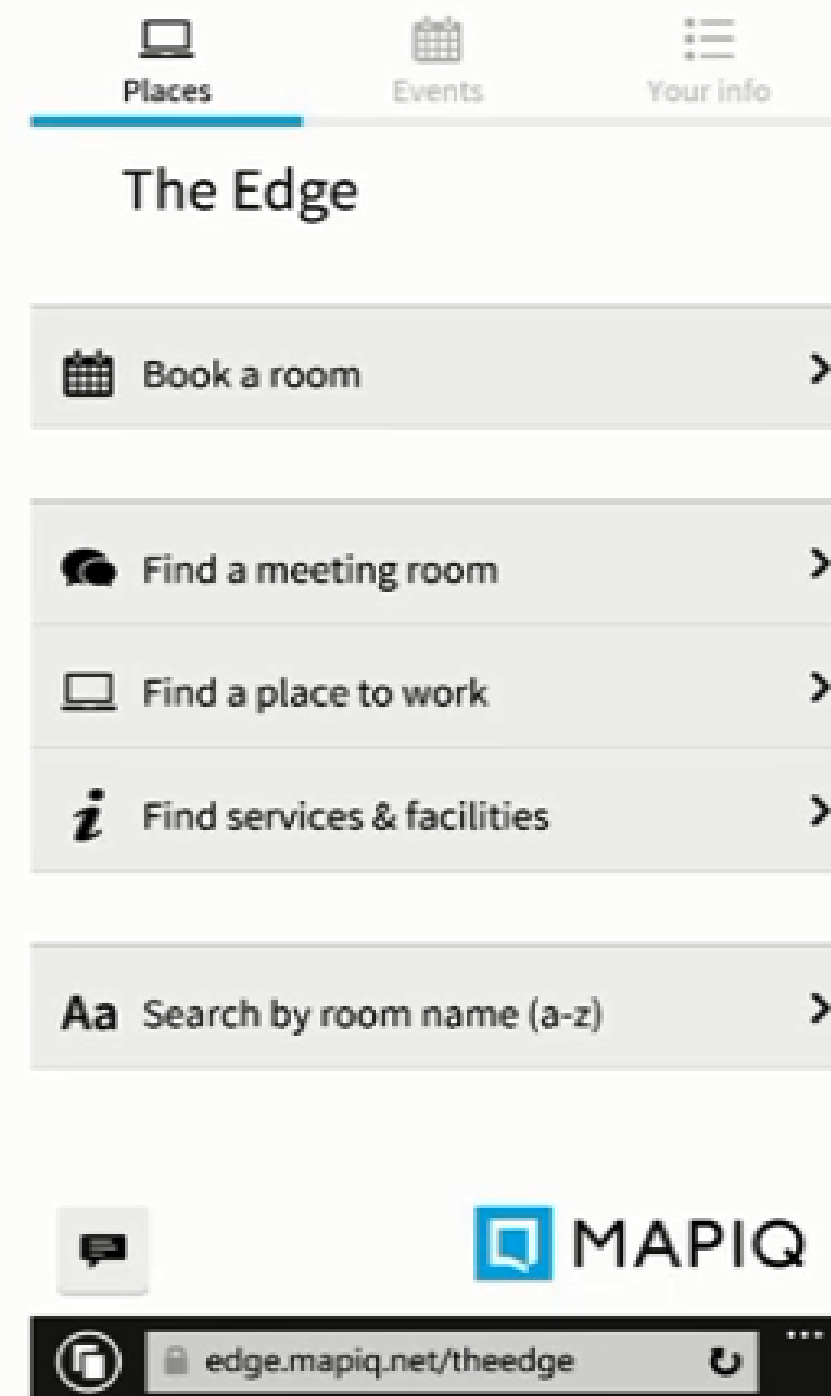


Smart building

ONE SMARTPHONE APP

SMARTPHONE

Any of the internet connected feature of the building comes along with a vendor/product specific app, a situation that is not desirable and unworkable for the end-user. All of the 21 new technologies, applied for the first time in The Edge for Deloitte have been brought together into a single HTML based application.



Smart building

DATA ANALYTICS

DASHBOARDS

All of the 21 technologies as well as the combination of 28.000 sensors provide data into a single data lake. From the data lake data is analyzed and made available to the day-to-day dashboard to manage the building. Using Microsoft technology the data will be used to combine machine learning across all systems, optimizing algorithms and further improve the sustainability and employees well being.





RBC **OXFORD**
WATERPARK PLACE III

The Challenge

- Build an Innovative, Efficient Workspace Environment

Digital Transformation

- PoE-powered Lighting with Catalyst switches
- Sensor-based Access to Workspaces
- Analytics with Fixture-level Visibility

Business Outcomes

- Lowered CapEx (~10%) and OpEx (~\$600k)
Converging Five Networks into One
(HVAC, Metering, Lighting, CCTV, Access)
- 50% Energy cost savings with LED instead of fluorescent lights
- Toronto's First Enterprise LEED Platinum Certification

© 2015 Cisco and/or its affiliates. All rights reserved. Cisco Confidential



The Edge Amsterdam

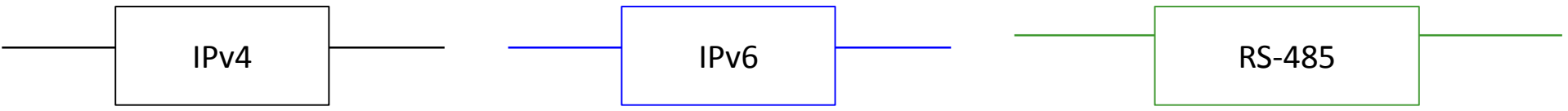
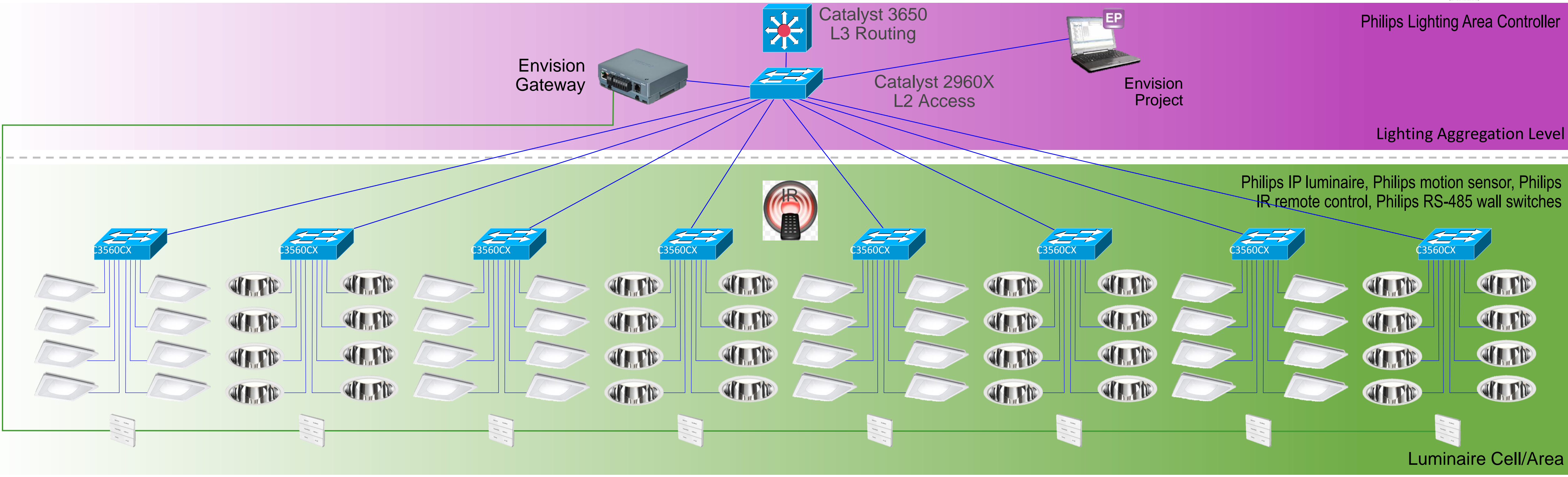
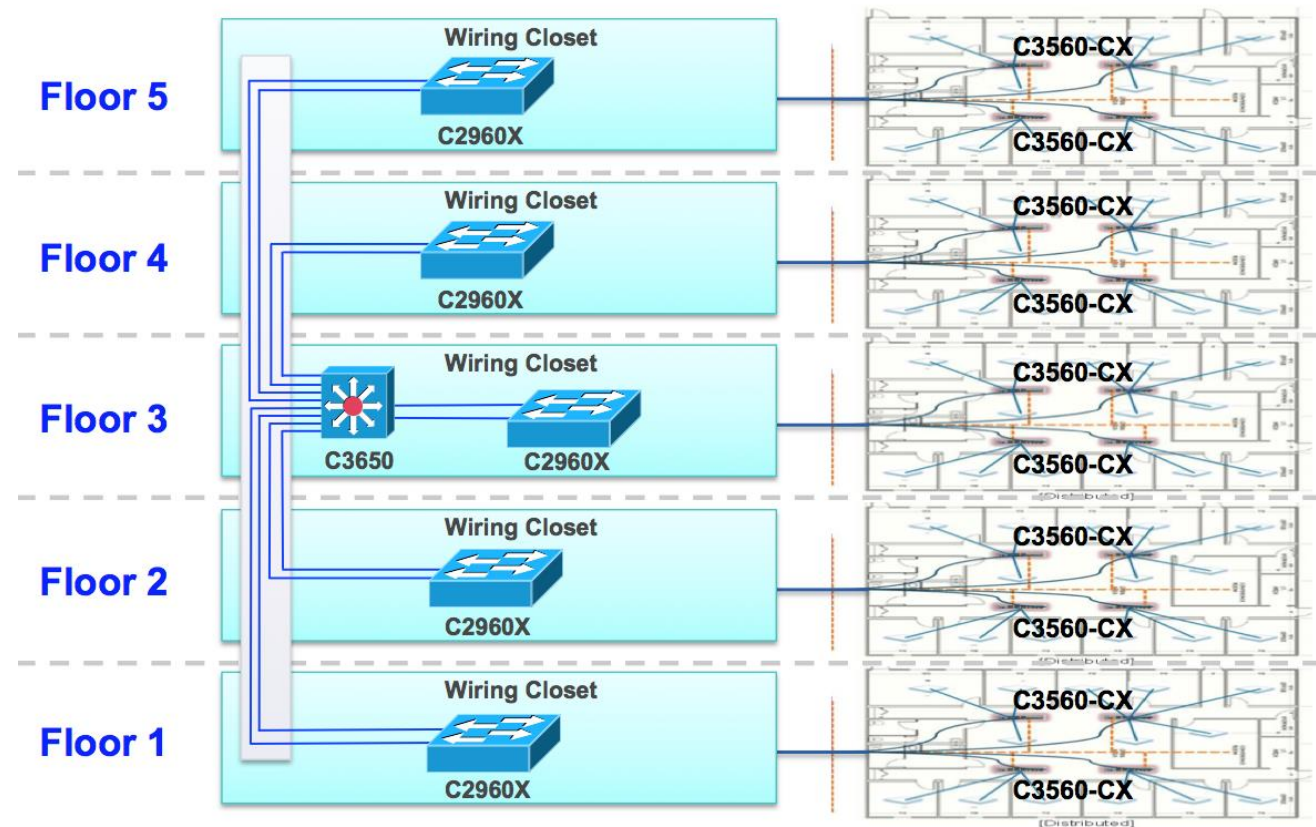
Connected Lighting - Power over Ethernet

- Make building future proof through ability to add sensors and locator beacons
- Work Place Innovation through relevant information / Dashboards supporting facility managers
- Every phone a remote control (with mobile APPs)
- 40.000 m2
- 6.000 luminaires over 15 floors
- 3.000 luminaires with built-in sensors
- 750 PoE switches to provide connectivity and power
- 30 Sub Floors: 30 Floor Controllers + 30 JACE (Java Application Control Engine) Boxes
- 1 Envision Suite
- Luminaires identified by IPv6 address

Philips Connected Lighting Reference Architecture

installations

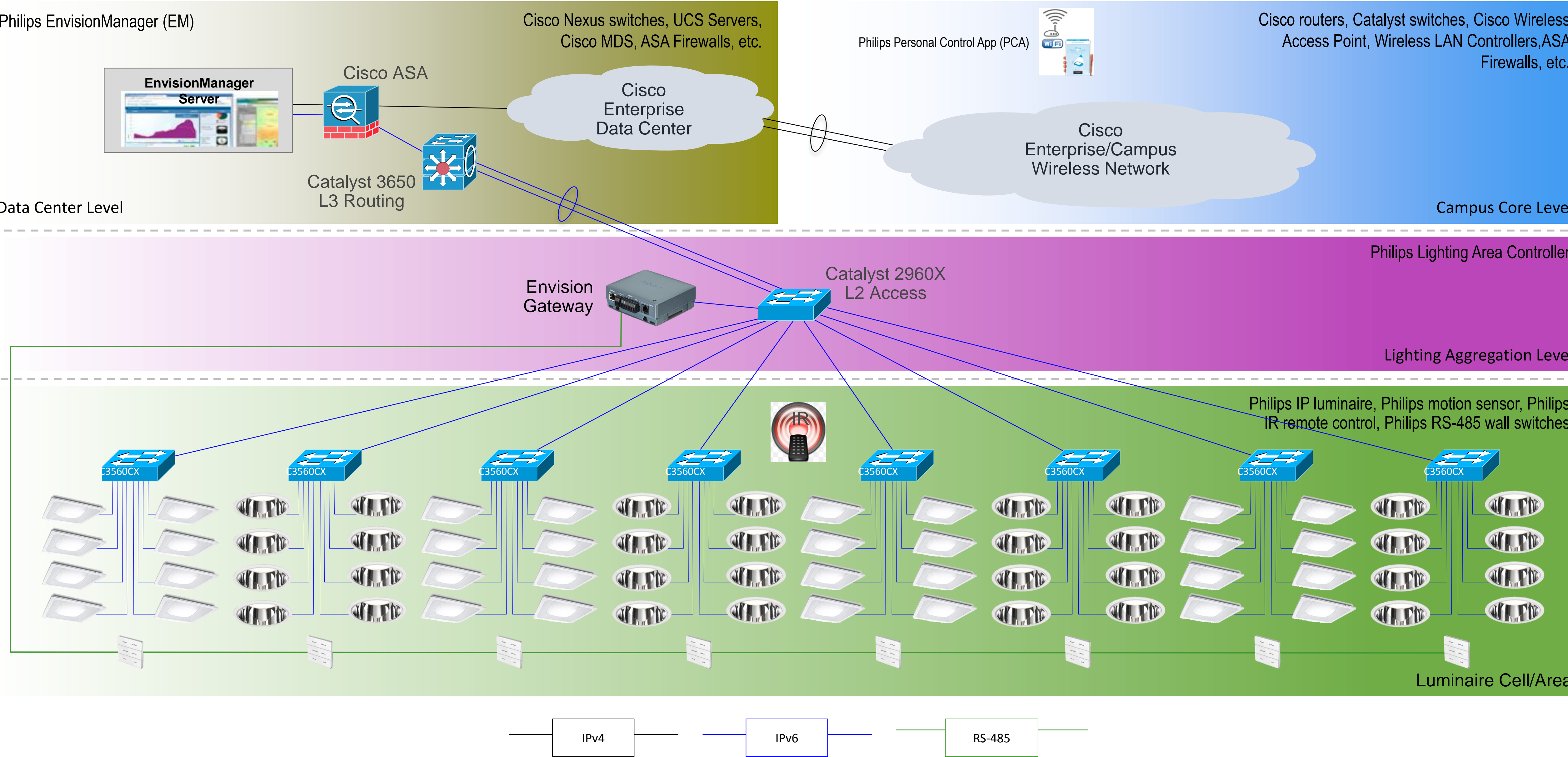
PHILIPS



Cisco/Philips Connected Lighting Reference Architecture

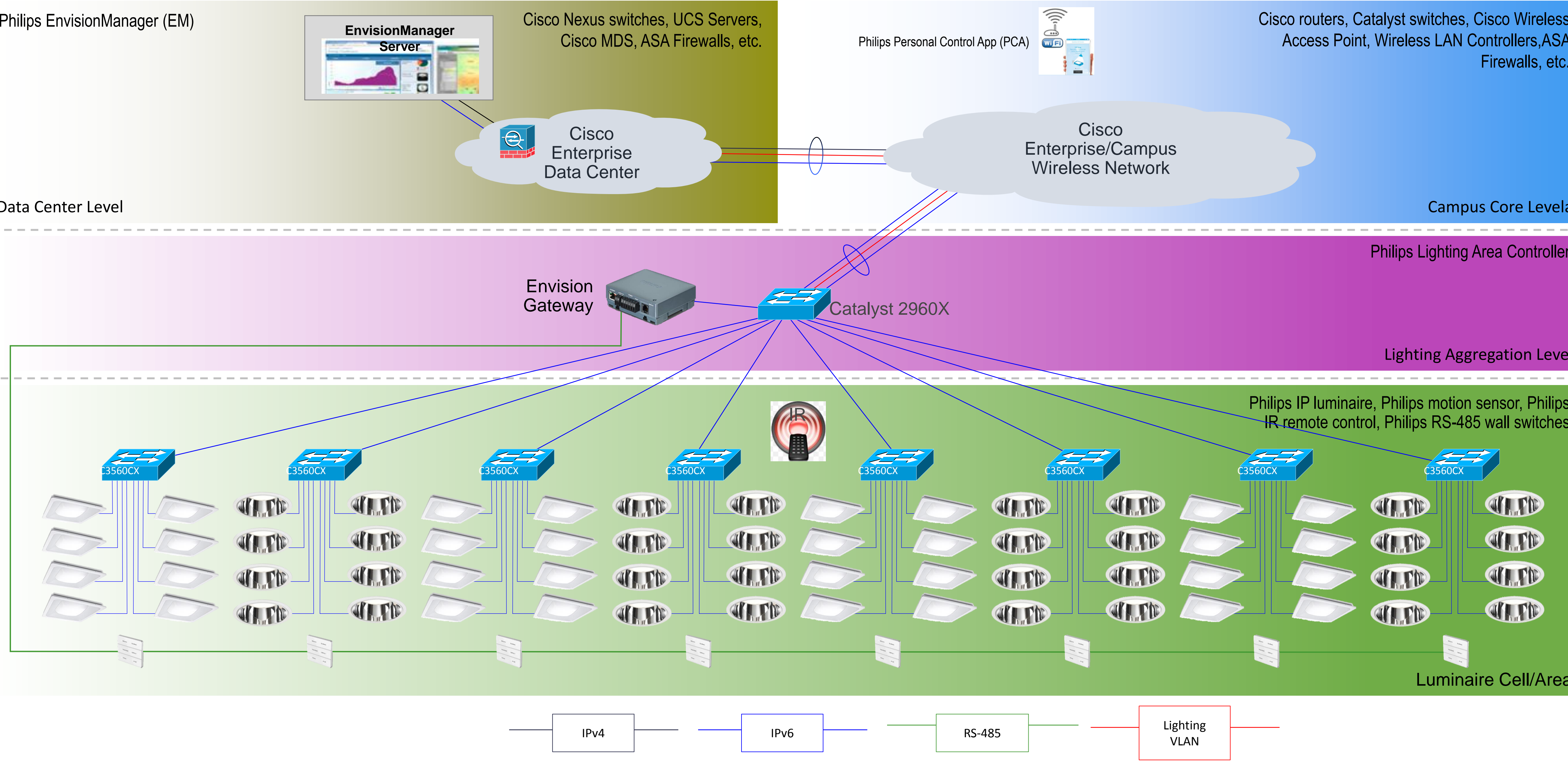
Standalone Lighting Network with Integration to Enterprise Network for PCA

PHILIPS



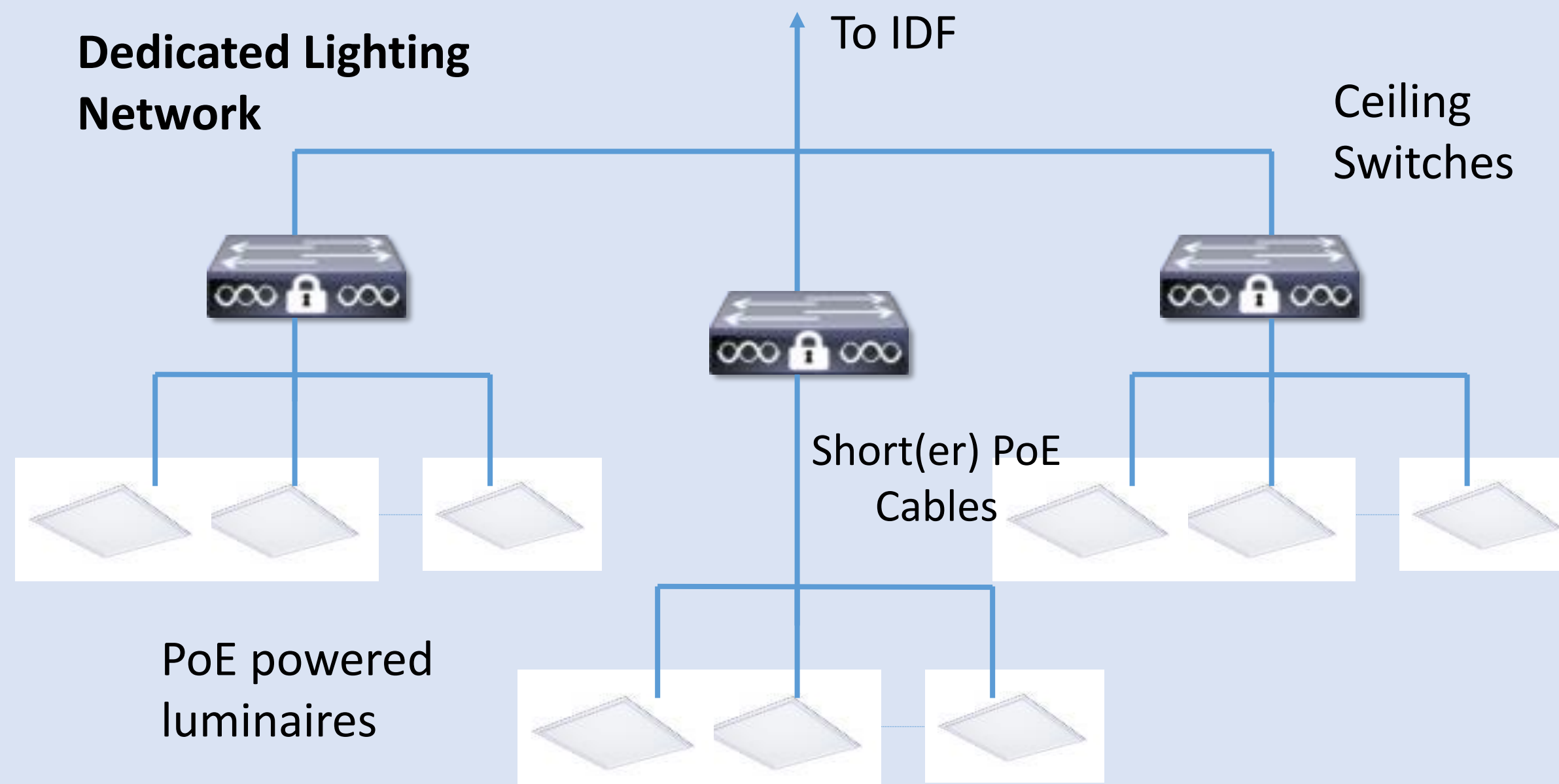
Cisco/Philips Connected Lighting Reference Architecture

Integrated Lighting and Enterprise Network



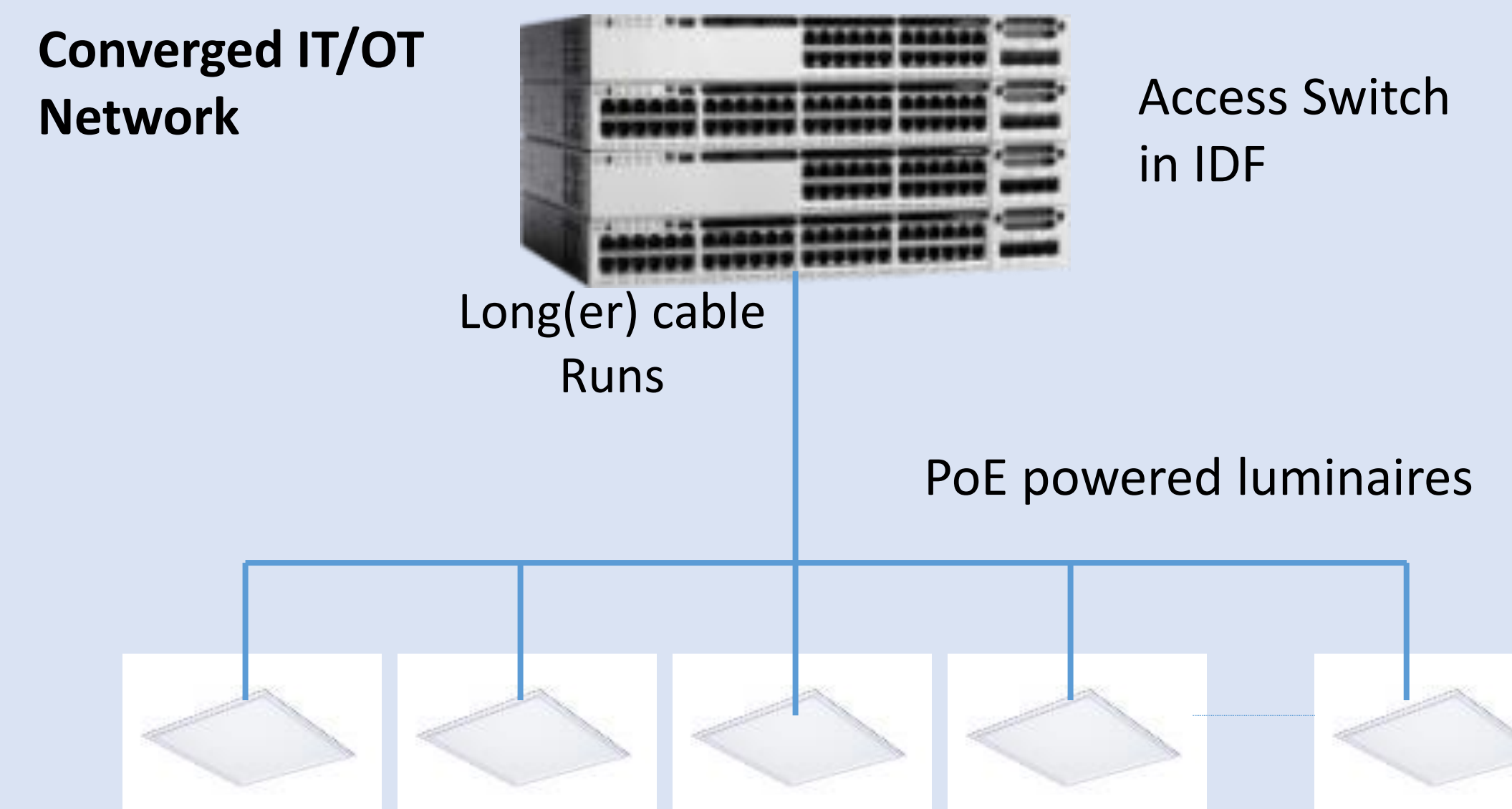
Network Deployment Modes

Distributed “Switches in Ceiling”



- *Energy efficient*, shorter cheaper cables,
- Preferred by *Philips, Eaton*
- Deployments: Alliander, Cisco Toronto HQ with 3560-CX compact
- Existing compact switches are not optimal (do not meet compliance, power or cost targets)

Centralized “Switches in Wiring Closet”



- *Higher resiliency* due to HA features
- Preferred by *corporate IT*
- Deployments (sample): Miami Dade Schools, Cisco Bldg 10,12,14.
- Leverage existing 3850 UPOE switches for initial installations and POCs

Supported Platforms

3560CX Compact Switch



- Fanless design with flexible mounting options
- 240W power budget for POE+
- Option to run instant access with optional 10G uplink ports
- Industry first to support Perpetual POE
- 2-event POE classification support
- Ideal for in-ceiling applications / distributed deployment model

3850UPOE Switch Family



- Flagship UPOE switch with and dual 1.1KW Power Supplies
- Converged Wired and Wireless access
- Stack Power support
- Foundation for Open Network Environment (SDN And Cisco One)
- COAP Proxy, Perpetual POE, and 2-event classification support,

Other Platforms supported NOW for Over-the-Top Protocol Implementations
Digital Ceiling Features in other Catalyst platforms: CY2016