

Connected Lighting

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Areas To Be Covered

■ Grounding the Discussion - A Perspective of Connectivity

- Data Security and Personal Privacy
- Expanding Ecosystem
- Retrofit vs New construction

■ Past vs Present

■ Harnessing the Power of Connectivity


■ Where to Start

■ Why Embrace Connectivity



Connected Lighting – The overall Ecosystem

Devices, assets and products that are embedded with processors, sensors, software and connectivity that allow data to be exchanged between the product and its environment, operator and other products and systems

 Access Control	 Alarm & Event Management	 Audio Visual	 Barrier Controls & Equipment	 Cable Support	 Conference Room Scheduling	 DAS
 Digital Whiteboards	 Distribution	 Fire & Life Safety	 GPON	 Identity Management	 Location-based Services	 Micro-Cell
 Middleware	 Network Electronics & VoIP	 Nurse Call	 Paging & Sound Masking	 Power Management	 Security Communications	 Structured Cabling
 Synchronized Clocks	 Time & Attendance	 Way Finding	 Wi-Fi	 Wireless Communication Devices	 Video Surveillance	



Data Security & Personal Privacy

- A facility manager survey found that only 29% had taken action to improve the cybersecurity of their respective internet-connected building automation systems

Source: facilitiesnet.com, January, 2015.

- Public fears that an attack could result in a cybercriminal gaining control of building systems and **personal data**

- Convenience vs. privacy

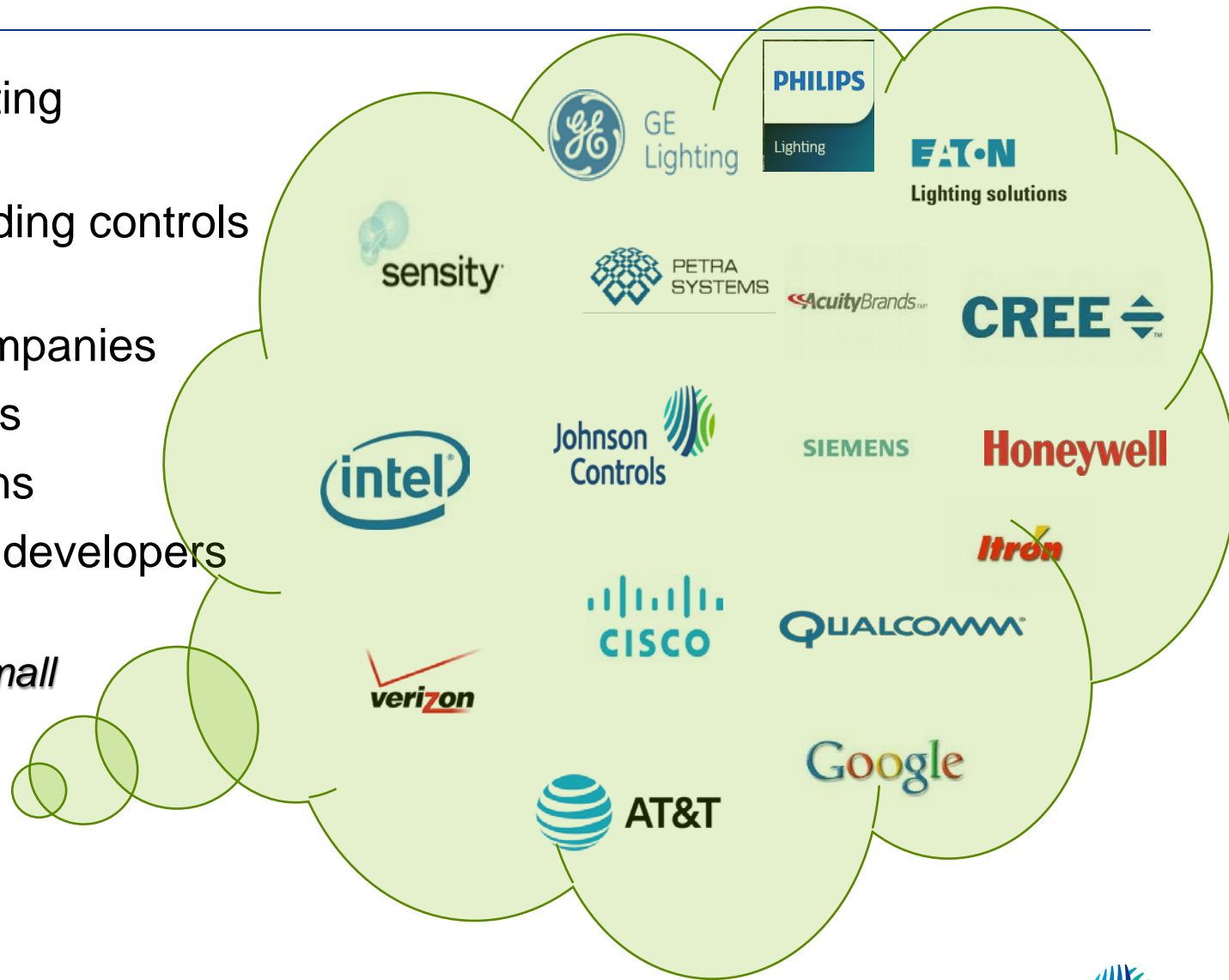
- Communication and building public support



The Connectivity Marketplace Has Expanded

- Traditional lighting companies
- Traditional building controls companies
- Networking companies
- Semiconductors
- Communications
- Software (API) developers

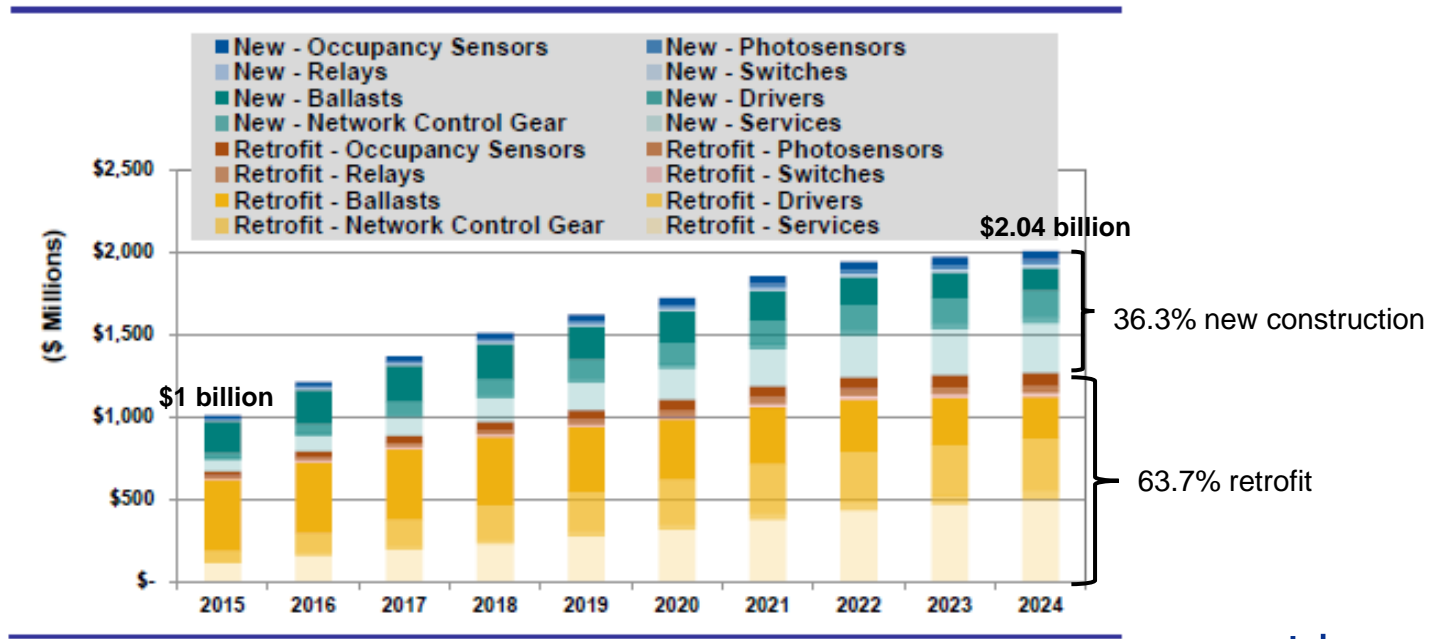
And this is just a small sample of all the companies in the connectivity marketplace!



Retrofit vs New Construction

- In 2015 approximately 65% of the market was for retrofits while new construction comprised 35%.
 - In 2024 retrofit composition of the total market will dip slightly to 63.7% owing to a slightly higher growth rate for new construction (9%) than for retrofit (7.3%).
- Interestingly, the overall market for networked lighting controls will grow from \$1 billion in 2015 to \$2.04 billion in 2024.

Chart 5.10 Networked Lighting Controls Revenue by Equipment Type and Segment, North America: 2015-2024



(Source: Navigant Research)

What Are Some Differences Between the Past and Today?

Compatibility



Past – Hardware driven, manufacturer specific limited options

Today – More flexible hardware designs, expanded technology options & standards

Interoperability



Past – Interoperability relied on the electromechanical connects between the devices and systems (Relays, switches, etc.)

Today – More flexible connectivity options, higher degree of reliance on software

Interchangeability



Past – Interchangeability, limited connectivity options. 'Proprietary' protocols, limited vendors

Today – Interchangeability, expanded connectivity options, movement towards more 'open' protocols

Harnessing the Power of the Connectivity Ecosystem



■ Major K-12 Pilot

■ Needs

- Lighting retrofit that is compliant with all local codes and standards. Ability to tie into district network and bring all facilities back to facilities operations center.

■ Challenges:

- Customer concerns with wireless technology (student harm)
- WAN network requirements

■ Solution

- LED retrofit with wireless lighting control system in each building. WAN solution still under development. (Data security / Privacy)

■ Benefits

- Point connectivity, remotely managed system
- Optimized light levels increasing energy savings with controls
- Wireless system easy commissioning

■ CI^2 matrix scoring...

- Compatibility – Good
- Interoperability – Fair
- Interchangeability – Poor (at WAN / Cloud level)



Harnessing the Power of the Connectivity Ecosystem



■ Major Airport

■ Needs

- Reduce maintenance issues and gain 'automated' control of the system .

■ Challenges:

- Various BMS, time clock and lighting panels were installed throughout airport.
- No local / area control.
- New fixtures were 0-10VDC compatible but not able to be networked.

■ Solution

- Connected IP addressable drivers, gateways, & controls.

■ Benefits

- Point connectivity with compatible drivers for both styles of fixtures
- Networked system vs. grouped areas provided energy monitoring

■ CI^2 matrix scoring...

- Compatibility – Poor then Good (Analog vs Digital)
- Interoperability – Poor then Good (Analog vs Digital)
- Interchangeability – Fair – future proofed for BMS integration



Harnessing the Power of the Connectivity Ecosystem



■ DOT tunnels/roadway/harbors

■ Needs

- Roadway/tunnel/harbor centralized asset management system with energy monitoring

■ Challenges:

- Outages, Knockdowns, tunnel shut downs led to high maintenance costs
- Current pedestal system shut off system during day resulting in copper theft
- Existing system mislabeled, GIS information old and asset info not up to date
- Harbor had multi tenant with shift area needs and lighting requirements

■ Solution

- Cloud based wireless control system with GPS, energy monitoring

■ Benefits

- Point connectivity, remotely managed system
- Reduced maintenance, energy monitoring, reduced copper theft

■ CI^2 matrix scoring...

- Compatibility – Fair
- Interoperability – Good
- Interchangeability – Fair, (Good at the cloud Layer)



Harnessing the Power of the Connectivity Ecosystem

■ Large Scale Applications – University, Pharmaceutical & Industrial Campuses

■ Needs

- Connectivity of the Lighting, BMS and other systems including Power monitoring, .

■ Challenges:

- Large campuses with various automation systems.
- Upgrades need to have minimal impact on plant operations.
- Upgrades and configurational changes ongoing

■ Solution

- Developed and implemented connectivity / integration roadmap

■ Benefits

- Minimal disruption to daily plant operations.
- Work within clients budget, prioritizing needs and wants
- Clients achieving project economic and operational goals

■ CI² matrix scoring...

- Compatibility – Good
- Interoperability – Fair
- Interchangeability – Poor



So Many Devices, Systems and Options: Where to Start?

■ Know Your Needs

- What use cases & sequence of operations are you trying to achieve?
- What information do you need to obtain from each building system (occupancy, etc.) and from where will you get it?
- What devices will you control and what type of signal is required to have that control?
- What measures for lighting / controls will occupants need / want?



■ Envision the End Result

- Think past the first cost.
- Many systems today have much longer lifespans than older, similar systems.
- Many studies show productivity gains associated with various dim/color strategies.

■ Understand the Challenges

- Age of existing systems.
- Compatibility of existing systems.
- Combining systems that speak different languages and are built using different standards.

“It is far better to adapt the technology to the user than to force the user to adapt to the technology.”

Larry Marine, User Experience Design Consultant, Intuitive Design Group, Inc.



Why Embrace Connectivity?

■ Economics:

- Reduced costs for energy and maintenance
- Potential for revenue generation



■ Competitive pressure:

- Your competitors may be investing in connected systems



■ Ongoing productivity improvement requirements:

- Doing more with less is a trend

