Intelligent Building research firm Memoori projects wireless lighting controls will account for 25% of the total lighting controls market by 2020.

CUTTING THE CORD:

A feature on the increased adoption of wireless lighting control systems

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In this issue, the author discusses the increase in adoption of wireless lighting control systems and what technologies the market may adopt next.

A shift in priorities

We've all been there. Nothing brings productivity to a screeching halt in the work place (or on the home front, for that matter) than when the internet "goes down". Humans are very resilient, in general, and can put up with almost anything for a short period of time. Natural disaster? We band together. No hot water? We'll suck it up and get it done quickly, or we'll just stink for a little longer. No power? No problem, we've got our phones. The Internet's down? Houston…we have a problem.

So…since lighting falls into the life safety category, and Wi-Fi is *perceived* by many to lie there, too, why is the market continuing to rapidly adopt wireless lighting control solutions? The three main reasons are:

1. Reliability of wireless communication
2. Reduction of the total installed cost of controls
3. Energy codes increase the adoption of systems

How "wireless" is "wireless"?

The term "wireless lighting control system" is at least 50% a misnomer, as wired 120V/277V connections are still required to power fixtures and load controllers, such as dimmers, switches, and power packs. The wireless elements of these systems pertain to communication between input devices (e.g. sensors, keypads, timeclocks) and load controllers. In some cases, input devices such as Passive Infrared Occupancy Sensors, Daylight Sensors, and Keypads are truly wireless, as they communicate wirelessly to load controllers and are powered by batteries. The industry standard on battery

life for these types of input devices has become 10 years.

Wireless Communication Reliability

Due to the crowded radio spectrum (think Bluetooth, RFID, Wi-Fi, etc.), there are some who simply don't trust wireless communication as much as communication sent across a wired connection. However, when installed in accordance with the manufacturers' specifications, these systems stack up well, and, in some cases, better than their wired counterparts.

The communication protocol used in most wireless lighting control systems is a mesh network, which is reliable and offers redundancy. Essentially, every dimmer, switch, power pack, sensor, and keypad contain a radio, and acts as a wireless node in the wireless network. When one node can no longer operate, the rest of the nodes can still communicate with each other, directly or through one or more intermediate nodes. Translation: the technology works, even in a crowded radio band such as 2.4GHz. The communication between a sensor and a dimmer, for example, requires a signal to be sent for only a fraction of a second, versus the connections between a cell phone and cell phone tower, or laptop computer and Wi-Fi router, which require constant communication.

Who are the players?

The usual suspects (e.g. Lutron, Crestron, Acuity, Eaton) offer reputable wireless lighting control systems, and

the list of additional manufacturers that offer wireless systems (Daintree, Legrand, LG) seems to grow by the day. Let's examine a few of the commercial systems:

Lutron's Vive solution was one of the first commercial systems to market, as Lutron has been in the residential wireless lighting control game since the late 90s. There is already a healthy base of installed systems in the market, as it has been shipping for over a year. The commissioning software and the array of dimmers and sensors are the strengths of Vive.

Eaton's Wavelinx is leading the pack in wireless communication security, as it is equipped with a 7-tier network security feature, making it nearly impossible to hack the system. To comply with projects that are governed by ASHRAE 90.1 -2013, Eaton also offers the Wavelinx Receptacle, which communicates with wireless occupancy sensors and turns off the top outlet when the space is unoccupied.

Crestron Zum (pronounced, Zoom) solution offers scalability to support up to 200 rooms of wireless lighting controls with its Hub, along with the ability to integrate with other Crestron lighting, touch screens, shading, and HVAC systems.

Even the two predominant, energy code compliant, "plug and pay" wired systems are joining the ranks of wireless lighting control providers. Acuity's nLight and Legrand's Wattstopper DLM solutions have used wired systems, with CAT-5E communication topology to drastically broaden the market's adoption of modular systems, and both have recently launched nLight Air and a Wireless Bridge Network, respectively. Similar to Eaton's Wavelinx solution, Acuity's nLight Air wirelessly connects keypads and a timeclock to a network of fixtures that have integral sensors that provide occupancy sensing and daylight harvesting. Wattstopper's new Wireless Bridge eliminates many of the common wiring issues associated with the DLM system by providing a network connection for rooms that have DLM devices.

What's next?

There's no denying that wireless lighting controls have staying power, as the market continues to demand intuition, scalability, and a reduction of total installed costs from lighting control manufacturers. Whether mesh networks and proprietary RF communication remain the primary mode of wireless communication for these systems remains to be seen.

As previously mentioned, the quantity of devices that use radio frequency continues to increase. That trend, and the rise of the Internet of Things (IoT) is spawning an interest from researchers (and R&D investments by some manufacturers) in Li-Fi enabled devices. Rather than sending radio waves to communicate, LEDs in luminaires can instead send high-frequency light bursts to transmit data the way that a Wi-Fi router would.

Until Li-Fi, or other emerging technologies become prominent in the market, expect RF technology to continue to become more widely available, and more widely accepted in all applications, as wireless communication infrastructure facilitates quicker adoption of intelligent lighting, and makes retrofits involving more sophisticated control schemes easier to implement.

Have questions, concerns, and/or need some help with one of the aforementioned systems? Lonestar is here to help, as we have applications engineers on staff who can assist with design, layout, and takeoff services for lighting control systems.