Luminaire-Level Lighting Controls *MYTHBUSTERS*

This guide spotlights popular claims about luminaire-level lighting controls (LLLCs) and examines their origins vs. the reality today.

GUIDE AUDIENCE & INTENDED USE

This guide has been crafted to inform the lighting controls supply chain and customers about rapidly changing technology and market trends specific to LLLCs.

Lighting Controls Supply Chain:

Informs electrical contractors, distributors, and lighting designers on key performance issues that streamline design, installation, and user acceptance.

Building & Business Owners:

Informs decision-makers about key performance features that reduce costs, increase tenant comfort, and minimize operations expense.

LLLC MYTHBUSTERS

For decades, manufacturers have been integrating sensors into lighting fixtures to achieve greater sensor coverage, increase tenant comfort, and maximum energy savings.

What makes LLLC unique is its networked status and ability to leverage advancements in technology that didn't exist a decade ago. This guide identifies 10 myths about LLLCs and addresses their origins and the state of the market today.

Today's LLLC products have addressed legacy challenges from the past, incorporated new features, and even taken on new form factors. The myths in this guide address all the stakeholders who work with lighting controls systems throughout their lifecycle including designers, installers, facility operators, IT professionals, and building occupants.

LLLCs are built around technologies you already know and trust

From wireless headphones to mesh networks that provide fast and reliable Wi-Fi, LLLCs leverage the same technologies that are already ubiquitous throughout our lives. Recognizing how these technologies have improved is key to making sense of LLLC fact vs. fiction.

Consumer don't need to look far for common examples that mirror the transformation of legacy lighting controls technologies to LLLC.	**Legacy Technology**				
	Modern Solution				

MYTH #1:

Due to cost and limited fixture selection, LLLC only makes sense in new construction or major renovation projects.

Origins of the Myth	The Reality Today
Between about 2015–2021, few lighting companies manufactured LLLCs and even fewer offered retrofit solutions. Due to these market conditions, LLLCs tended to be more expensive (on a fixture basis) and were most cost-effective in new construction applications.	Currently, there are more than fifty networked lighting systems on the market and nearly every manufacturer offers a wide selection of LLLC-ready fixtures. Several offer retrofit kits for popular applications such as 2x2’ and 2x4’ recessed fixtures. The mass proliferation of LLLC fixtures and retrofit kits has reduced product cost and simplified installation in existing building retrofit projects. As a bonus, the unparalleled flexibility of LLLCs means 1:1 replacement projects will provide desired light levels without the additional cost of a space redesign

MYTH #2:

A gateway network device is required to meet scheduling requirements in code.

Origins of the Myth	The Reality Today
Energy code requires that many spaces be controlled with scheduling. Circa 2013–2021, networked lighting control systems required a gateway device for scheduling. During this period, lighting designers were forced to pick between standalone control systems that relied on either timers, astronomical clocks, or gateway devices. Gateway devices add cost and complexity, so it is better to design a system with standalone controls and rely on a manual on-sight scheduling controller.	Technology introduced circa 2021 added the capability for mesh-based networks to provide timer and scheduling capabilities without a dedicated gateway device. Mesh networks built around LLLC systems are especially resilient and reliable because the high concentration of light fixtures throughout a building ensures strong signal coverage. As a result, LLLC systems with mesh networks can achieve the scheduling requirements of code without a dedicated gateway.

MYTH #3:

Wireless communication is unreliable and difficult to troubleshoot.

Origins of the Myth	The Reality Today
For the simplest operations, wireless communication has always been a reliable and effective solution (think of your garage door opener). From 2010–2020, advances in low-energy wireless technology (like Bluetooth and Zigbee) led to the introduction of new capabilities in lighting control systems. In their early iterations, many of these products overpromised and underdelivered, leaving consumers and installers with a negative experience. Further confusing matters, lack of standardization made troubleshooting wireless issues more complicated.	Wireless communication in lighting has improved dramatically since 2020. Modern wireless systems widely make use of the same secure and reliable technology that makes AirPods and Wi-Fi ubiquitous in our lives. Modern lighting control systems can maintain wireless connections after power outages and do not rely on dedicated network hardware. Lastly, major wireless protocols are aligning standards that make troubleshooting easier, with many systems being described as resilient for their ability to self-heal when devices drop offline.

MYTH #4:

Individual sensors in every fixture means every luminaire acts autonomously and system setup is cumbersome.

Origins of the Myth	The Reality Today
Lighting manufacturers have been integrating standalone (non-networked) controls into individual luminaires for over 30 years. While these standalone fixtures do have integrated sensors, they are not networked, meaning they are not capable of being zoned or grouped together. Additionally, because of their non-networked nature, fixtures with integrated standalone controls must be programmed individually.	Modern LLLC systems are networked by their definition and form a distinct class of products from their integrated but non-networked cousins. In most applications (for both practical and aesthetic reasons), lighting designers and tenants prefer lighting that operates as zoned or grouped. An additional benefit is that networked LLLC systems are capable of rapid system setup, which allows installers to discover, assign, and program the behavior of lights by rooms or zones.

MYTH #5:

Increasing the number of networked devices in your lighting systems only results in increased system complexity.

Origins of the Myth	The Reality Today
From 2010–2020, networked lighting control systems were often limited in terms of how many devices could be connected before additional networking hardware was required. Adding network hardware can increase project cost and complexity. Additionally, system setup methods available at this time were less user friendly and commonly required manual commissioning of individual devices.	Adding more devices to a lighting network does not necessarily add complexity. Networked LLLC systems that use mesh networks can typically support several hundred devices before additional network hardware is required. Additionally, modern mesh networks make initial system setup considerably faster by allowing dozens of devices to be discovered and located in the same process. Modern LLLC systems keep network architecture simple and streamlines system setup.

MYTH #6:

The best way to satisfy tenant needs is to provide them with maximum personal control and custom options.

Origins of the Myth	The Reality Today
LLLC systems are highly flexible and increasingly offer more personalized ways for users to interface with the system. Lighting designers and installers are encouraged to incorporate the input from multiple stakeholders. Ironically, these dynamics create the potential for an end product that is over-customized and fails to meet key design goals.	There will always be exceptions to when light levels and controls behaviors need to deviate, and LLLC provides the perfect level of adaptability. Developing a sequence of operations informed by key stakeholders, programming the lighting system accordingly, and giving people time to adjust is the best practice for managing customer and tenant expectations after a lighting retrofit. While some applications (like teachers in classrooms) benefit from personal control without disruption to others, the same could not be said for open office applications.

MYTH #7:

Lighting control networks are connected to the corporate network, which creates the potential for additional cyber vulnerabilities.

Origins of the Myth	The Reality Today
The source of this myth is likely due to general misconceptions about network architecture and modern cyber s ecurity protocols. Modern NLC systems can integrate with other building system networks, which may also be a source of confusion. The myth also commonly persists in sales conversations when IT professionals have not been consulted.	Lighting control systems have never been recommended to operate on existing corporate networks. Modern LLLC systems are designed to operate as independent networks that are isolated and restricted to prevent malicious activities and safeguard digital assets. Networked lighting controls systems are capable of being integrated with other networks such as HVAC or building management systems. In all cases, company IT professionals should be consulted, and cyber protocols should be provided prior to system design and installation.

MYTH #8:

Lighting network requires a gateway device, which can increase cyber security vulnerabilities.

Origins of the Myth	The Reality Today
From 2010–2020, gateway devices were required to achieve most capabilities associated with networked lighting control systems and were very common. Today, gateways are still required for capabilities including remote access, building systems integration, demand response, and others. Adding a gateway to a network creates potential cyber security vulnerability.	Thanks largely in part to advances with mesh networks, today's LLLC systems offer most capabilities customers care about without requiring a gateway device. Most networked systems on market today are described as "scalable," which refers to their capabilities with and without a gateway device. With proper notice, IT professionals can easily manage this familiar risk.

MYTH #9:

Customers want the cheapest solutions (and that isn't LLLC).

Origins of the Myth	The Reality Today
Early LLLC products were more expensive than their less integrated competitors, which restricted their cost-effectiveness to select new construction applications. Additionally, the proliferation of LED products from 2010–2020 resulted in significant cost decreases in commodity and standalone products as competitive market forces drove prices down. Several market segments found themselves in a race to the bottom trying to win sales with low-cost basic lighting solutions.	What customers really care about is value. When it comes to commercial and industrial lighting, customers routinely cite reduced operating expenses, flexibility, ease of use, and low maintenance as key features that provide value. These features are routinely cited because of the cost savings they produce over the entire system lifecycle. While LLLC fixture costs have decreased significantly, they should not be directly compared to standalone fixture costs, which only deliver a fraction of the value and ultimately cost more to install and maintain.

MYTH #10:

Customers want the simplest solution (and that isn't LLLC).

Origins of the Myth	The Reality Today
Most people have been annoyed with lighting controls at least once in their life. Basic lighting controls from the 2000s were limited in functionality and many networked control solutions from 2010–2020 overpromised and under-delivered. This led to a general maxim that customers just want their lights to work, and the best way to accomplish that was by designing and specifying the simplest products.	When it comes to balancing system features and simplicity it helps to consider The Goldilocks Principle and remember that control system needs vary by both application and customer. For certain applications and customer types, the simplest lighting controls solution might be the best, but the vast majority of customer needs are somewhere in the middle. Whether customers perceive a system as simple or complex is also a function of their user experience. Modern LLLC systems offer a wide array of methods to control and configure settings. Working to identify and document system needs and user-interface preferences ahead of product specification is key to making sure system performance and ease-of-use is just right.

To learn more, email info@mnLLLC.org or visit www.mnLLLC.org.

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