

Intelligent Wireless Outdoor Lighting Control



Street and Highway Lighting • Campus Lighting • Parking Lot and Garage Lighting

Taking Control of Outdoor Lighting

Trilliant's Streetlights family of intelligent wireless outdoor lighting controllers provide the tools necessary to take control of your energy and maintenance costs.

As energy costs continue to increase, taking control of outdoor lighting costs while keeping lights turned ON is imperative to cities, towns, colleges, parking garages, utilities and industrial operations. In addition, if left ON for long periods of time, outdoor lights can adversely affect the environment. Outdoor light maintenance is also a major source of expenses, and if not properly done, can result in significant cost, inconvenience, liability, and safety risks. Trilliant Streetlights is the solution for these problems. Trilliant Streetlights CMS is an intelligent, centralized wireless outdoor lighting management solution that is powerful, yet economical enough to provide a quick Return on Investment (ROI) by utilizing its advanced features for control, safety and maximized cost savings. Trilliant Streetlights CMS provides:

- tools to achieve reduced energy and maintenance costs
- intelligent switching for sunset/sunrise based ON/OFF and dimming scheduling
- increased lamp life operation with fault interlocks
- revenue grade energy metering
- extensive reporting on performance and energy savings
- powerful asset management with complete and accurate inventory control
- powerful industry standard web-based software with GPS mapping
- easy installation and operation

Trilliant Streetlights CMS provides all the tools and capabilities organizations need to maximize the energy and operational cost savings from their outdoor lighting systems.

Trilliant Streetlights Solution Provides Wireless Capabilities That Save Money

Trilliant Streetlights solution is an intelligent wireless outdoor lighting control system that can be easily retrofitted for traditional outdoor lights, be installed on new LEDs or Solar-based LEDs, or be easily transferred from traditional lights to LEDs.

A true "plug & play" system, Trilliant Streetlights Wireless Controllers can be easily installed on any outdoor light fixture in a matter of minutes and begin communicating with the Wireless Gateway via Mesh or LPWAN technology. The Trilliant Streetlights family of wireless lighting controllers provides advanced capabilities for a wide variety of outdoor lighting applications, including but not limited to: street and highway lights, area lighting, parking and campus lighting.

Applications for Wireless Outdoor Lighting Systems



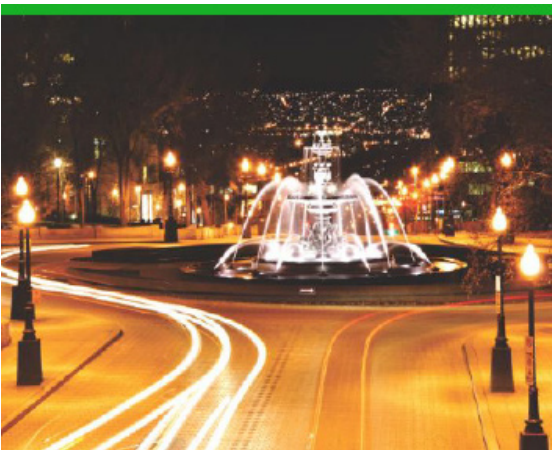
Street and Highway Lighting

For cities, towns, and utilities, Trilliant Streetlights CMS reduces street light energy usage, maintenance costs, and light pollution, while preserving public safety through the use of the latest LPWAN and mesh technologies. It enables remote programming, monitoring and control of street lights. Easily installed or retrofitted on traditional, LED, or solar-based LED street lights, Trilliant Streetlights can be used to monitor and control anywhere from a few street lights on a given street to hundreds of thousands of street lights within a city, all from the comfort of your office. Trilliant Streetlights CMS's scheduling and grouping capabilities, along with its Street Light Health Monitoring and Fault Notification capabilities, drive the cost of maintaining large numbers of street lights down by at least 50%, and can provide a reduction in energy usage by 30%.



Parking Lot and Parking Garage Lighting

Adequate lighting in parking lots and parking garages at retail malls, car dealerships and office parks is important for maintaining visitor and employee safety; however, during late night hours when there is little or no traffic, keeping lights on at full power is both a significant expense and contributor to environmental light pollution. Trilliant intelligent streetlight controllers allow retail and business facilities to easily control when and for how long lights are on. Trilliant Streetlights CMS's support for motion-based control and daylight harvesting allows for advanced dimming controls that reduce costs without sacrificing safety. This enables additional lights to be dimmed while ON based on pedestrian or traffic movement.



Area Lighting

Lighting on college and business campuses and in parks is critical to public safety; however, it represents a significant operations and maintenance expense. Trilliant Streetlights solution allows colleges and businesses to fully control their campus-wide lighting from a web-based control interface that allows them to turn lights ON/OFF or be dimmed either on predetermined schedules or based on pedestrian activity in the area. Safety considerations are also maintained by Trilliant Streetlights CMS's automated fault detection and alert system, which notifies facilities management via email and text messages when a fault occurs. This enables quick and timely repairs.

Key Features of Trilliant Streetlights Software

Wireless Technology

Trilliant Streetlights utilizes the latest developments in wireless technology and employs LPWAN and Mesh technologies to program, monitor, and control outdoor lights.

Google Maps and Google Earth User Interface

Fully integrated with Google Maps, Trilliant Streetlights CMS provides an intuitive and familiar interface for users that requires little or no training.

Remote Control and Scheduling

Individual lights or groups of lights can be controlled based on sunset/sunrise times, remotely programmable schedules, photocell feedback, or on demand.

Dimming

Lights or groups of lights can be dimmed based on a programmable schedule. Dimming is only limited by the fixture's electronics.

Health Monitoring, Asset Management, and Fault Notifications

The system provides comprehensive asset management, which coupled with health monitoring and fault notifications allows for "one trip" repairs.

Fault Tolerant Intelligent Light Controllers

The lighting controller operates independently from the gateway, network, and management software. This provides the highest level of operational reliability.

Highly Scalable and Reliable Management Software

Multi-threaded web-based architecture with clustering enables support for hundreds of thousands of outdoor lights.

Revenue Grade Energy Metering

The wireless controllers contain a dedicated energy measurement engine for revenue-grade metering.

Light Agnostic

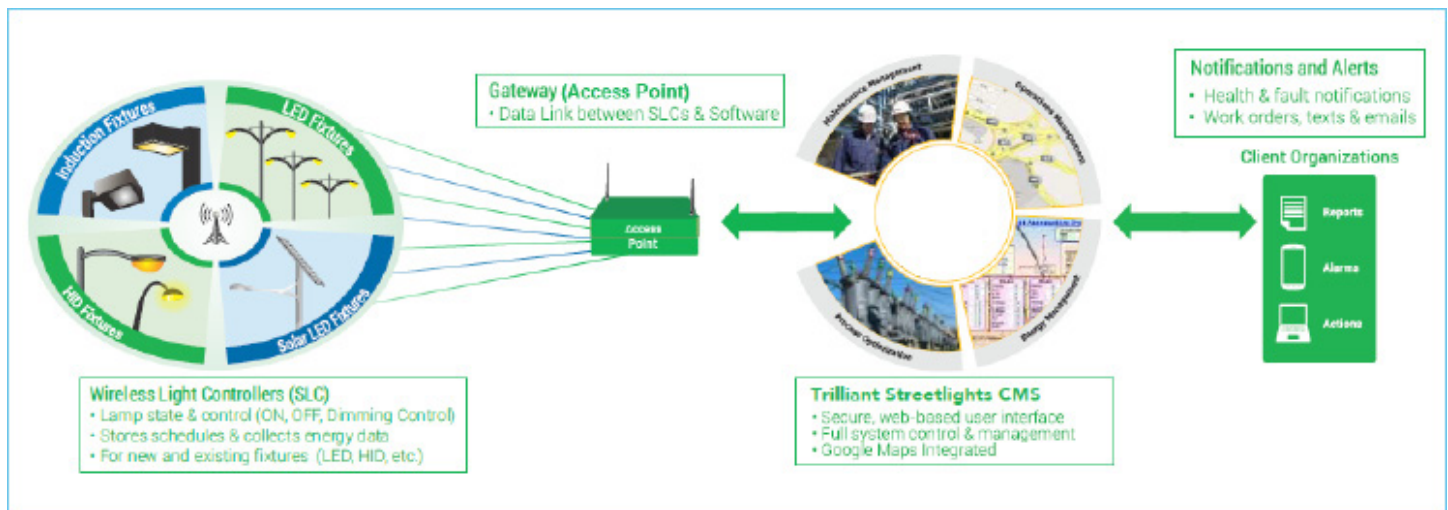
Trilliant Streetlights works with any lamp type or manufacturer. Multiple light fixture installation options include: standard NEMA, NEMA threaded replacement, and integrated board options for LED fixtures.

Easy Field Configuration using Handheld Configurator

A dedicated, simple handheld configurator enables quick verification of the installation, energy metering, GPS location stamping, lamp condition monitoring, and commissioning of the wireless mesh network.

Trilliant Streetlights Software Architecture

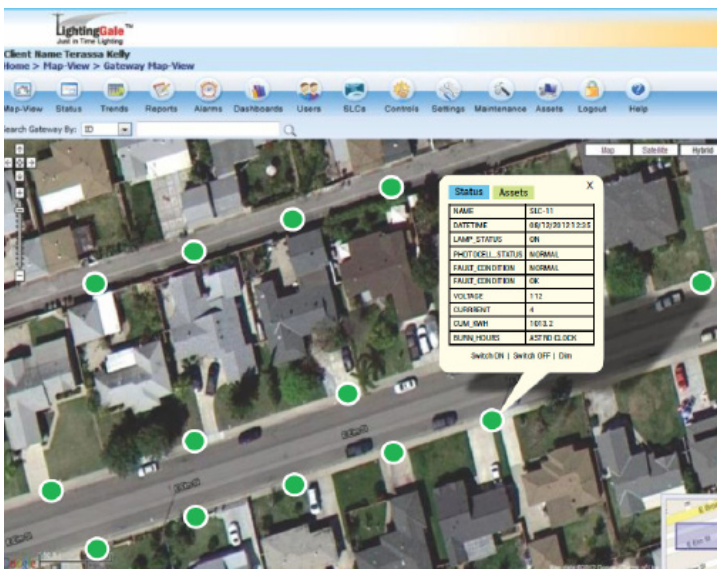
Trilliant's control system is made up of Light Controllers (SLC units), Gateways, and Trilliant Streetlights CMS web-based management and control software. Trilliant's control systems are available for traditional, LED and solar-based LED light fixtures, and can be utilized in a wide variety of outdoor applications. This includes but is not limited to: street lights, highway sighting, area lighting, and parking lot and garage lighting.



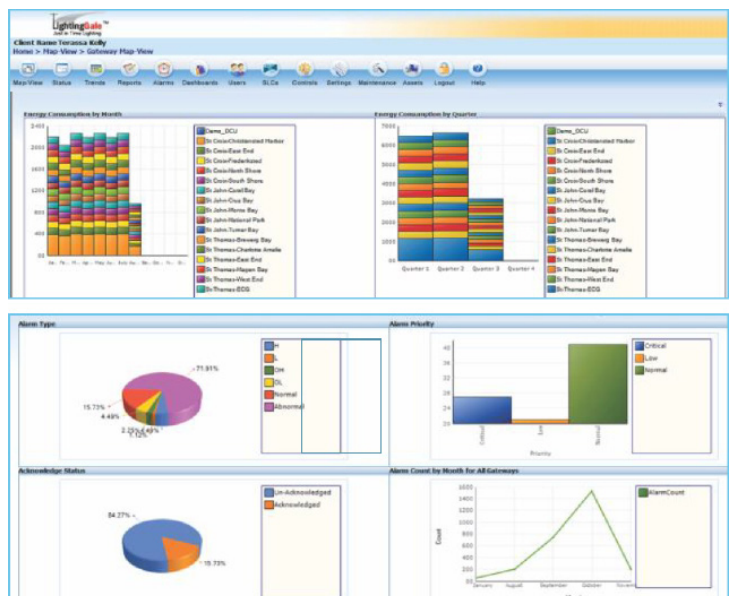
Key Benefits of Trilliant Streetlights Software

- Maintains Public Safety**
 The system assures that lights are ON when they are needed and scheduled.
- Failure-Based Reporting**
 Notification is provided automatically in real-time to the responsible individual(s) as soon as a fault occurs.
- Reduced Light Pollution and Increased Lamp Life**
 By dimming or turning lights OFF when and where they are not needed, light pollution is reduced and lamp life is increased.
- Easy Expansion**
 Scalable to new or remote areas quickly and easily since no cables are involved.
- No Photo Cell Required**
 The controller has a built in astro-clock that can accurately compute Sunset and Sunrise times, eliminating the need for a photocell. A photocell option exists as a backup.
- Power Savings**
 Reduces energy costs by as much as 30% through intelligent scheduling and by minimizing wastage.
- Maintenance and Repair Savings**
 Save 50-80% on repair costs with the "1 Trip Repair" capability of Trilliant Streetlights CMS.
- Low Initial Costs**
 Very low investment cost because no cable installation is required.
- No Training Required; Simply "Plug and Play"**
 If you can install a photocell, you can install the Trilliant Streetlights Controller.
- Robust and Reliable**
 The system has been designed and proven in field operations to offer unmatched reliability for sustained performance over a wide range of operating conditions.

Trilliant Streetlights CMS's web-based management platform provides outdoor lighting operators with full system control to maximize energy and maintenance cost savings



Pole View of Street Lights; Full Status and Control from Google Maps



Energy Savings Dashboards; Complete Energy Savings Data

Hardware and Software Requirements

Trilliant streetlights software is available as an enterprise install or cloud hosted solution.

SERVER HARDWARE REQUIREMENTS (ON-PREMISES)

Dual Server	RAM (Memory)		Storage (Hard Drive)		CPU Core	
	Minimum	Recommended	Minimum	Recommended	Minimum	Recommended
Application Server	6 GB	8 GB	80 GB	1 TB	Dual Core Intel® Pentium® Processor, 2.0 GHz	Quad Core Intel® Xeon® Processor (3.0 GHz or higher) or higher
Database Server	6 GB	8 GB	2 TB	3 TB or higher		

SERVER SOFTWARE REQUIREMENTS (ON-PREMISES)

Component	Supported Versions	Recommended Version
Operating System	Windows Server 2008 R2 Windows Server 2012 Windows Server 2012R2	Windows Server 2008 R2 64 bit
Internet Information Server (IIS)	7.0/7.5/8.0/8.5	7.5
.NET Framework	4.0	4.0
Database Server	SQL Server 2008 R2 SQL Server 2012 SQL Server 2014	SQL Server 2008 R2 64 bit

USER REQUIREMENTS (ON-PREMISES OR HOSTED)

Operating System:

- Windows 7
- Windows 8
- Windows 10

Web Browser:

- Internet Explorer 8.0/9.0/10.0/11.0
- Safari 5.17 or higher
- Firefox 17 or higher
- Chrome 23 or higher

.NET Framework: 4.0

Database Server:

- SQL Server 2008 R2
- SQL Server 2012
- SQL Server 2014

EXPERIENCE YOU CAN COUNT ON

We find ourselves in an ever changing and dynamic industry. Utilities, energy retailers, cities, and municipalities are under increasing pressure to deal with supply limitations, environmental mandates, intermittent renewables, and changing demand with the growing popularity of plug-in electric vehicles, distributed generation, and consumers' desire to use energy more efficiently. We're also faced with the daunting technical complexities to unify the disparate information from the many systems resulting from the evolving landscape of systems, energy devices, and applications.

Trilliant believes that the next generation smart grid must be built on a network that allows for frictionless exchange of data. Our advanced technologies are designed to work with virtually any system to provide an open, secure, powerful source of data now and for generations to come.

The future is bright, and innovation will be rapid. We are honored to have worked with leading utilities and cities around the world who collectively serve more than 100 million customers, in developed countries like North America and Europe and with developing countries in Asia Pacific and Latin America. We look forward to continuing to innovate and partner with our energy, utility, city, and municipality customers to deliver real benefits of smart energy to their operations, their consumers, and society.

WE EMPOWER YOU - BY CONNECTING THE WORLD OF THINGS®

At Trilliant, we're passionate about empowering you through connectivity. We enable actionable intelligence for our customers and their customers through an open and secure communications platform. We believe that the next generation smart grid built on a network that allows for the frictionless exchange of data will propel the energy industry to a bright future. Our advanced technologies are designed to work with virtually any system to provide a secure, powerful source of data now and for generations to come.



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