LUMEWAVE
By ECHELON

Smart Networked Lighting for Cities and Campuses

Flexible, scalable, complete solutions for now and the future

ENABLING SMART APPS THROUGH CONNECTED LIGHTING PLATFORM

Echelon offers an extensible and flexible approach to connected lighting that makes it easy and affordable for lighting owners to increase the efficiency, safety, and versatility of their municipal, campus or commercial infrastructure.

Connectivity and Application Platform

The Lumewave by Echelon® technology platform is the foundation of a responsive infrastructure that helps customers satisfy immediate energy-saving and regulatory needs with an architecture that can expand now and in the future to provide additional operational and strategic value.

Each deployment connects new or existing lighting, preserving historical and decorative fixtures while modernizing their control. Intelligent applications deliver added benefits to meet the specific needs of the community.

Imagine the value of a city- or campus-wide outdoor lighting network **empowered** to automatically alleviate common **safety** concerns and improve **quality of life**.

QUALITY OF LIFE

- Enables white tuning for human centric, environmentally friendly lighting
- Provides optimal light levels for traffic conditions
- Communicates information about parking availability
- Predicts direction of travel for pathway illumination

SAFETY

- Enables emergency scene assist lighting on demand
- Automatically adjusts lighting in response to adverse weather conditions
- Schedules school zone safety beacons
- Deters theft, vandalism and violence

OPERATIONAL EFFICIENCY

- Simplifies creation of digital database for lighting asset management
- Lowers maintenance and operating costs through predictive failure alerts and extended LED lamp life
- Integrates outdoor lighting with BMS for seamless operation
- Provides visibility into utilization of parking spaces

ENERGY SAVINGS

- Boosts energy savings through scheduling and continuous dimming
- Supports adaptive control strategies such as motion sensors and traffic counting
- Provides revenue grade energy metering

CONNECTIVITY/APPLICATION SERVICES PLATFORM

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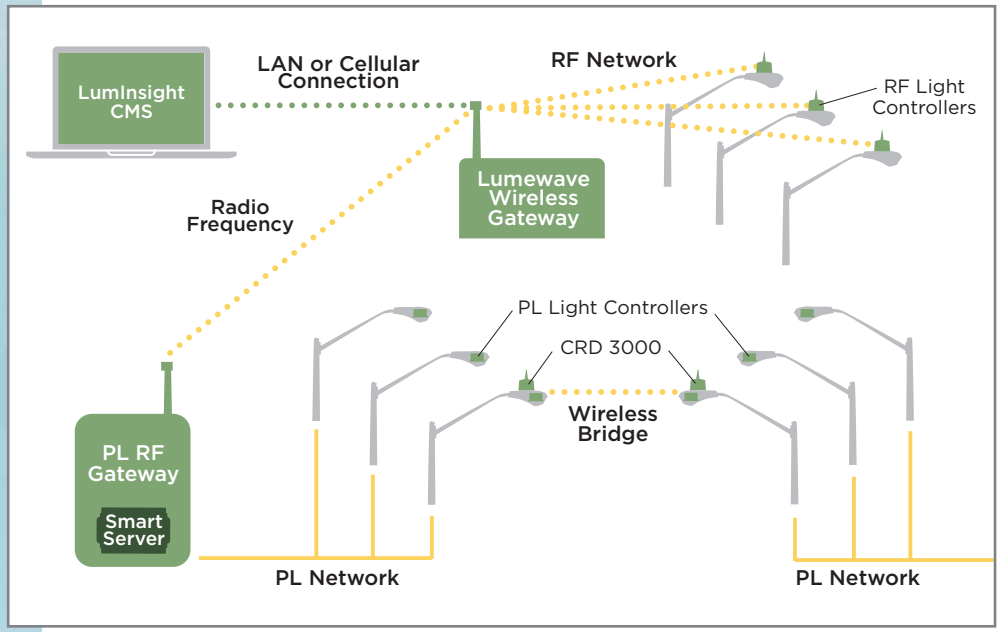
PRODUCT PORTFOLIO

The *Lumewave by Echelon* portfolio includes an **industry exclusive** hybrid technology solution integrating power line and RF communications for connecting street, area, garage and outdoor lighting.

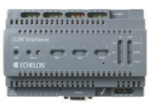
- Scalable architecture for large installations with multi-site support
- Compatible across all commercially available fixture types
- Maximum range and robust data communication
- Native support for light and motion sensors for responsive, event-based control strategies
- Easy to navigate central management system (CMS) for single system view and adminstrative flexibility
- Easy to install, provision and manage



Power Line	• No new wiring • Adds modulated communication signal to existing AC power wiring • Highly secure and reliable performance	• Challenging environments such as tunnels and bridges • Underground parking • Historic districts, city centers, or other locations with decorative fixtures
Radio Frequency (RF)	• Easy installation • NEMA twist lock • Uses secure bi-directional RF communication between fixture-mounted controllers and gateways	• Large scale deployments that scale across a wide geographic area • Street and roadway lighting
Hybrid (power line and RF networks)	• Combines both technologies into a single intelligent platform	• City-wide deployments that combine street lighting with all other lighting infrastructure

Central Management System (CMS) Software		Description
	**LumInsight™ Desktop (formerly LumeStar)**	• Central management system for wireless and hybrid lighting systems • Provides provisioning and enterprise level lighting control functions • Simple, easy to navigate interface with energy monitoring, mapping, asset management, and alarm notification functions
	**LumInsight Cloud CMS**	• Cloud-based central management system for smart lighting networks • Provides a secure, cloud-hosted environment for managing lighting networks without any upfront investment or setup • Highly scalable smart city and campus platform for multi-site asset and energy management
	**LumInsight Enterprise CMS**	• Browser-based on-premise central management system for smart lighting networks • Provides on-premise installed access to lighting network from desktop, laptop, or mobile device • Highly reliable smart city and campus platform for asset and energy management

Gateways		Description
	**Lumewave Gateway**	• Gateway for wireless lighting controllers covering 2 mile radius and up to 2000 controllers • Ethernet and 4G cellular modem versions available for a choice of a LAN connection or cellular WAN connection using any wireless carrier service • Open gateway platform can be used to create interfaces to a rich set of smart city sensors and smart city services and applications
	**Lumewave Base Station**	• Doubles the range of the Lumewave Gateway with support for up to 2,000 wireless lighting controllers with up to a 4 mile line-of-sight • Ethernet and 4G cellular modem versions available for a choice of a LAN connection or cellular WAN connection using any wireless carrier service • Open gateway platform can be used to create interfaces to a rich set of smart city sensors and smart city services and applications
	**Lumewave Power Line RF Gateway**	• Gateway that combines power line with wireless systems • Available with or without enclosure • Enables management of power line and wireless networks through a single central management system (LumInsight Desktop)

Routers and Controllers		Description
	**CRD 3000**	• Power line and wireless outdoor control router • Connects separate power line segments together via an RF wireless bridge • Mounts on existing ANSI standard twist lock photocell sockets of streetlight fixtures
	**SmartServer**	• Segment controller, router, and smart energy manager for power line lighting controllers • Provides network management, scheduling, alarming, and repeating services • Manages up to 300 devices as a standalone network manager

Lighting Controllers		Description
	**TOP900TLX**	• Wireless outdoor lighting controller with isolated sensor inputs • Twist lock NEMA ANSI 136.41, 7-pin connector • Available with integrated GPS option, 120-277V or 347-480V input, and revenue grade energy metering • Provides bi-directional communication with gateway, sensor support, and distributed intelligence capability
	**TOP900TN**	• Wireless outdoor lighting controller with isolated sensor inputs • Threaded nipple connection • Available with integrated GPS option, 120-277V or 347-480V input, and revenue grade energy metering • Solution for fixtures without NEMA receptacles
	**TOP900TLX-E**	• Small wireless outdoor lighting controller for 120-277V applications • Twist lock NEMA ANSI 136.41, 7-pin connector • Energy metering calibrated to 0.5% accuracy • Available with integrated GPS option • Provides bi-directional and peer to peer communication between nodes and gateways
	**EMB900**	• Wireless lighting controller for in-fixture mounting • Embedded or external RF antenna options • Available in horizontal or vertical mounting configurations, or embedded with an external antenna • Mounts directly to an indoor lighting fixture, providing remote monitoring and control
	**EMB901**	• Fixture integrated wireless control module • Cost-effective integration to drivers with DC output or external power pack • Provides dimming, scheduling, adaptive control, and wireless connectivity features
	**CLP 4000**	• Power line outdoor lighting controller with native sensor support • DALI control for up to 16 devices • Provides power line meshing and ISO/IEC 14908-1 and -3 compliant, two-way communication between lamps and segment controllers • Provides sensor and smart application support in addition to energy and operations data to segment controller
	**CPD 3000**	• Power line outdoor lighting controller • Provides power line meshing and ISO/IEC 14908-1 and -3 compliant, two-way communication between lamps and segment controllers • Provides operational and energy data to segment controller
Sensors		**Description**
	**MWX-LVE-180U**	• Programmable outdoor bi-directional microwave/radar sensor • Available in vertical or 90-degree angle mounting configurations • Can detect approaching vehicles at >400 feet and pedestrians at 100 feet
	**EW-205-LU**	• Outdoor passive infrared (PIR) motion sensor • Connects to TOP900 and EMB900 series lighting controllers • Up to 50 feet of coverage at a mounting height of 8 feet
	**FS-305-LU**	• Outdoor and indoor fixture mounted omni-directional passive infrared (PIR) motion sensor • Four available lens choices (sold separately) provide flexibility for varying mounting heights • Connects to TOP900 and EMB900 series controllers

LEARN HOW EARLY ADOPTERS HAVE ENHANCED QUALITY OF LIFE

Comfort, safety and energy savings for White Bear Lake's Railroad Park, Minnesota

- Adjusts white LED lighting color and intensity each evening; according to the AMA, warm white lighting supports restful sleep
- Ensures optimal illumination by using predictive weather data to override scheduled lighting when needed
- Reduced energy use by approximately 80% through connected LED upgrade using existing decorative fixtures

"Being the first to try this new technology and see it in action was very rewarding . . . With a scheduled scenario, we could shift the lights to a warmer hue at 2:00 a.m. when there are rarely park visitors, other than our nocturnal wildlife. We could also program sensors along with the lights to automatically respond to higher foot traffic or certain weather conditions for optimal visibility. The new technology could give us the power to elevate the level of public safety and quality of life across our entire community."

- Mark Burch | Public Works Director/ City Engineer | White Bear Lake

Comfort, safety and savings throughout the city of Bloemfontein, South Africa

- Enhances quality of life for residents and visitors by coordinating outdoor lighting city-wide
- Simplifies city operations, especially for high-profile sporting events
- Decreases maintenance costs and reduces energy use by 30%

Operating efficiency and safety in Kimco Realty Corporation Shopping Center Parking Lots

- Reduces maintenance costs through automated fault detection notifications
- Enhances safety and security with motion-based responsiveness

"We are very proud to be recognized by the LEEP Campaign [as] an example of how lighting control systems will continue to be stretched beyond traditional uses to increase value and services for property owners, managers, and occupants."

- Nate Mitten | Senior Manager of Property Standards and Improvements | Kimco Realty

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