

# Cisco Smart+Connected City Lighting

## A Multi-Sensor Internet-of-Everything Platform for Applications



### Introduction

Electric street lights are essential elements of municipal environments. They affect residents' sense of safety and place while influencing a city's ability to create an inviting environment for business and tourism. Unfortunately, outdoor lights are also a major energy draw. To reduce electrical demand, the trend is moving toward light-emitting-diode (LED) technology. Over the next 10 to 15 years, a large percentage of four billion outdoor lighting fixtures will be upgraded to LEDs. With energy-saving initiatives budgeted for and already under way, this global transition is an opportunity for much more than a replacement of lighting technology: it can become a gateway to adopting a common platform on which to launch a number of critical smart-city solutions.

### Value Proposition

The Cisco Smart+Connected City Lighting solution, when combined with the Smart+Connected City Multi-Sensor Node, leverages the lighting infrastructure to create a powerful Light Sensory Network (LSN). LSNs have City Multi-Sensor Nodes embedded in lighting infrastructures to allow these ultra-capable, standards-based systems to gather a wide variety of data from the environment, including levels of humidity, CO<sub>2</sub>/O<sub>2</sub>, UVA/UVB, particulate matter, motion and seismic activity, video, sound, and more. This data, transmitted over an LSN, is capable of supporting many city services and initiatives across a single common infrastructure: from law enforcement to environmental improvement, transportation oversight and earthquake preparedness.

Using Cisco Smart+Connected City Lighting with the City Multi-Sensor Node, municipalities can:

- Drastically reduce city energy consumption, cost, and maintenance using LED technology combined with dynamic, per-light controls
- Improve citizen vehicle compliance and increase violation capture and city revenues
- Enhance situational awareness, real-time collaboration, and decision-making across city agencies, helping optimize urban planning
- Add intelligent, sensor-based Internet-of-Everything (IoE) innovations to transportation, utilities, public safety, and environmental monitoring without adding significantly more physical infrastructure

### Solution Overview

The Cisco City Lighting solution creates LSNs that transform LED light fixtures into sensor-equipped, smart devices capable of capturing and transmitting data in near real-time. This provides unprecedented actionable insight and enables an array of applications and services for cities, citizens, and businesses.

### Use Case 1: Lighting Control and Energy Optimization

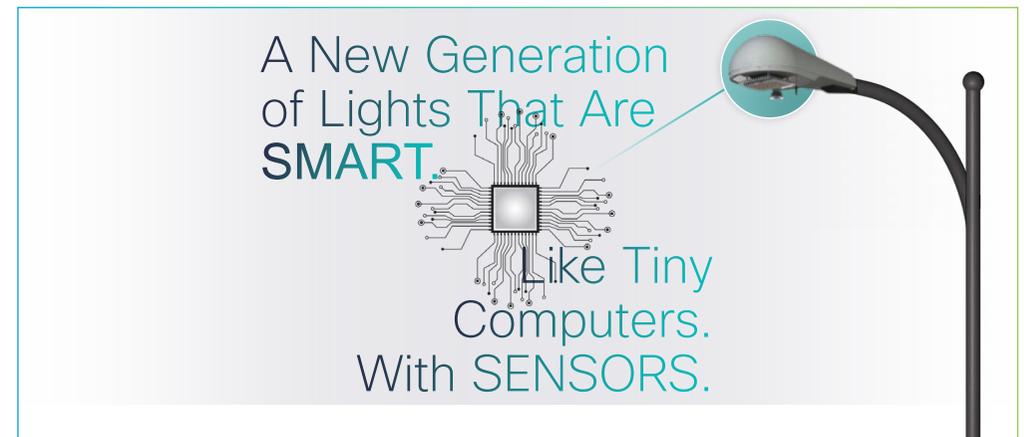
Because energy savings and lighting optimization are the primary drivers for lighting upgrades, this solution focuses on improving management of lighting, energy, and maintenance for all light fixtures on the network. These applications can be accessed securely through a web browser to set such controls as occupancy-based dimming, daylight harvesting, copper-theft alerting, energy usage, savings reporting, and real-time maintenance status.

### Use Case 2: Public Safety and Security

The solution includes video, sound, and motion capture capabilities that enable security services management for parking lots and garages, across college and corporate campuses, and on city streets where there is a need for enhanced security, asset protection, and perimeter detection. It's capable of streaming video, but more importantly, it provides edge-based intelligence for analyzing data at the capture point. It can transmit the analytics, along with alerts to a central cloud database and to appropriate agencies based on system rules. These edge-based, real-time analytics might include:

- Configurable events and alerts that can trigger lighting conditions and other actions
- Cost-effective extension of the security perimeter
- License plate, or facial recognition, and more

Figure 1 Transforming LED lighting into sensor-equipped, smart devices





### Use Case 3: Smart Parking

Gathering real-time parking availability data, the solution makes this information available to parking-application providers through an open application programming interface (API). This data enables real-time way-finding, dynamic pricing, and parking management, benefiting drivers, cities (in terms of reducing congestion) and owners of parking facilities. By leveraging this common infrastructure, cities can reduce the hardware cost and service fees associated with traditional smart parking deployment, leveraging existing parking structures in malls or public parking lots, for instance, to offset street parking shortages. Other benefits to cities include:

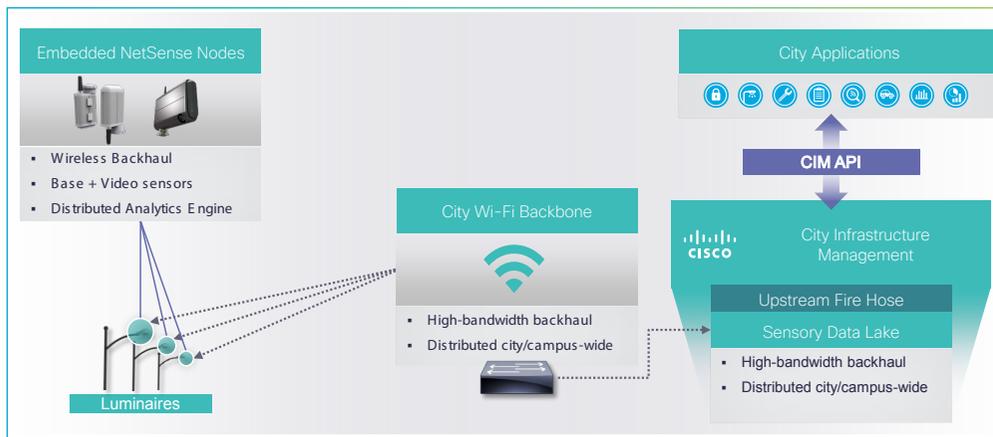
- Lower vehicle miles traveled and carbon emissions
- Improve the parking utilization
- Optimize parking revenue through dynamic pricing

### Use Case 4: Location Analytics

The solution enables analysis of various city areas, generating essential metrics for operational and marketing insights. These include traffic counts by location or time of day, number of visitors, and visit duration offering key information to managers of airports, malls, or business districts, for instance, about their patrons and facilities use. The data collected by the platform will allow location analytics partners to generate:

- A deeper understanding of populations served
- Detailed reports comparing traffic over time
- Traffic counts by visit frequency and duration

**Figure 2** Cisco Smart+Connected City Lighting Solution Architecture



### Key Features

#### High speed and real-time

- Data communicated in real-time must have low latency (or minimal delay). This is critical for monitoring safety and security factors, such as sensing suspicious behavior like sounds that could be gunshots, which require analysis in milliseconds.

#### Distributed intelligence

- City Multi-Sensor Nodes have advanced analytics capabilities powerful enough to perform real-time video analysis on raw, high-definition (HD) video streams.

#### High data throughput rate

- Sensors that must capture highly detailed data, such as HD video require high bandwidth networking technology, which is both costly and energy-intensive. The hardware and network architecture of Cisco Smart+Connected City Lighting employ unique algorithms capable of transmitting data-rich content without the need for high bandwidth equipment and its associated costs and bottlenecks. By leveraging 802.11a/n Wi-Fi for local area networking and cellular, or fiber for data backhaul, the platform can accommodate the most data-intensive sensors.

#### Data security

- Designed to support rich datasets, Cisco Smart+Connected City Lighting is a cloud-based architecture designed from the ground up to safeguard data. Security is layered throughout the system from node to cloud. It can evolve to support new applications and requirements over time. Applications, feature updates, and firmware upgrades are delivered seamlessly, enabling new capabilities, enhanced functionality, and increased security.

### For More Information

To learn more about Cisco Smart+Connected City Lighting please contact Lou Cirillo at [lcirillo@cisco.com](mailto:lcirillo@cisco.com), or visit [www.cisco.com/go/smartconnectedcommunities](http://www.cisco.com/go/smartconnectedcommunities).