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# City of Pittsburgh

*Request for Information for Smart Streetlights*

*RFI#:2017-0001*

*Technical Solutions Response*

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## **CIMCON Lighting**

April 10, 2017





Mr. Thoryn Simpson  
Senior Procurement Analyst  
Office of Management and Budget  
City-County Building, Room 502  
Pittsburgh, PA 15219  
thoryn.simpson@pittsburghpa.gov

Dear Mr. Simpson,

CIMCON Lighting, Inc. is pleased to provide our submission to your Request for Information for Smart Streetlights, (RFI# 2017-0001). Please note that this submission is for Technical Solutions.

**Firm Name:** CIMCON Lighting, Inc.

**Address:** 600 Technology Park Drive  
Billerica, MA 01821  
[www.cimconlighting.com](http://www.cimconlighting.com)

**Contact:** Martin Woolard – Sales Director - Midwest  
Regional Office: 740-502-9476  
[martin.woolard@cimconlighting.com](mailto:martin.woolard@cimconlighting.com)

The attached submission may be considered public information in accordance with the Commonwealth of Pennsylvania Right to Know Laws as described in Section 5 of the RFI.

Please note that neither CIMCON Lighting nor any of its employees or subcontractors has any relationship, knowledge of a relationship or has had contact with any official or employee of the City of Pittsburgh.

Thank you for the opportunity to submit this information to you and the offices of the City of Pittsburgh. We look forward to the opportunity to participate in further discussions and the potential for a future partnership.

Sincerely,

*Martin Woolard*

Martin Woolard  
Sales Director, Midwest U.S.  
**CIMCON Lighting, Inc.**  
[martin.woolard@cimconlighting.com](mailto:martin.woolard@cimconlighting.com)  
Regional Office: (740) 502-9476

## Introduction

CIMCON Lighting is focused solely on developing innovative wireless controls for outdoor street and roadway lighting and associated devices and sensors. We do not make lights – all our attention is devoted to managing, monitoring, metering and in some cases, monetizing the streetlight, other assets affixed to the streetlight and those assets (including people) that are located near the streetlight. This RFI response is organized around those three high-level use cases and their application to the City's Smart City priorities for Traffic Management, Public Safety, Air Quality and Shared Capacity.

We think of streetlight controls as one of (if not the) primary gateway application to the Smart or Connected City. Our development philosophy, products and services offerings, future roadmap, technology partners and go-to-market channels are all pointed squarely in this direction.

With the move back to urban areas and the growth in LED upgrades as background macro events, CIMCON Lighting has adopted a set of design principles that govern our product offerings today and drive our technology roadmap for the future to create value for our customers. These are:

1. **Value Today** - provide products and services to customers that deliver measurable value, including lower energy, repairs and maintenance costs, higher quality of services and ancillary benefits such as reduced crime and higher property values, along with the hardware and software platforms to create connected city applications;
2. **Network Independence** – create solutions that work in multiple network environments;
3. **Modular Approach** – protect today's investments while building "plug & play" modules that are compatible with existing installations and provide new features and benefits;
4. **Open Architecture/APIs** - enable third-party, "best-in-class" solutions to join the street lighting network and take advantage of an extensive development community and wide variety of sensors and other devices; and.
5. **Partner Ecosystem** – utilize a go-to-market and technology development strategy that leverages key partner strengths.

CIMCON's heritage lies in over 25 years of experience in developing industrial-strength, outdoor wireless applications in demanding environments. These include monitoring and control systems for such applications as power management and demand-side monitoring, water wells and water treatment plants, pumping stations, oil wells, electrical transformers, water and electricity meter reading and pipeline monitoring.

This legacy experience is embodied in our Street Light Controllers (SLCs), Lighting Management System (LMS), web services APIs and such advanced products as our co-located sensor platform, "small cell" and EV metering devices and smart phone apps.

We currently have approximately 150,000 controllers installed in 15 countries worldwide and a pipeline of an additional 150,000 controllers for 2017. Our largest installations include 12,000 controllers in Brazil and 14,000 controllers in the US Virgin Islands; both installations will be surpassed shortly by a 15,000-controller installation underway in Worcester, MA, a 43,000-controller installation currently underway in Halifax, Nova Scotia and approximately 20,000 controllers for the City of Providence and the Rhode Island DOT.

In addition to the City of Worcester, other installations in the Commonwealth of Massachusetts include the towns of Randolph, Fitchburg, Somerville (bike path) and Hull along with 42 parks under the management of the Department of Conservation and Recreation (DCR) performed in partnership with the Massachusetts Clean Energy Center (MassCEC).

We are headquartered in Billerica, MA with offices in London and Ahmedabad, India (R&D Center) and are a Minority Business Enterprise certified by the Greater New England Minority Supplier Development Council (NAICS Codes: 518210, 541511).

We are a SolutionsPlus partner of Cisco, a certified Street Light Controller partner for Silver Spring Networks, a Street Light Controller partner for Itron and National Grid's selected Smart Grid provider for Massachusetts.

All of us at CIMCON appreciate the opportunity to submit this response to you and the offices of the City of Pittsburgh. For more information, please visit [www.cimconlighting.com](http://www.cimconlighting.com) or contact:

Martin Woolard  
[martin.woolard@cimconlighting.com](mailto:martin.woolard@cimconlighting.com)

## Technology Overview

CIMCON's approach is to offer universally networkable Street Light Controllers that work in the different networks our customers already have or are planning to implement. These include our 7-pin, ANSI 136.41 Controllers that support ZigBee, Silver Spring Networks, Cisco and Itron mesh networks.



### CIMCON iSLC3100-7P (external)



### CIMCON iSLC3300/iSLC3500 (internal; for decorative lights)

Regardless of the mesh network selected, each external Controller has the following features:

**A Photocell in every Controller.** All CIMCON's Street Light Controllers (SLCs) come equipped with built-in photo-sensors which enable the units to be operational the moment they are connected to the lighting fixture and powered on. Photocell inputs also provide override functionality to time and/or event-based scheduling in the event of daylight weather changes.

**Extra Digital & Analog Inputs.** All CIMCON SLCs support Pins 6 & 7 on the ANSI C146.31 7-pin receptacle. These inputs enable the SLCs to interface with external analog or digital sensors to implement adaptive lighting schedules and/or send alerts to the LMS. The most popular sensor inputs from our customers are motion sensors for adaptive lighting controls (dimming and up lighting). Other typical A/D sensor inputs through the existing Pins 6 & 7 include environmental sensors for pollution monitoring, access door sensors for wire theft alerts (i.e. send alert and flash the light), traffic counts, pedestrian sensors, etc.

**Energy Metering.** Each SLC is equipped with a highly accurate (up to .5%) energy-monitoring module that updates the Lighting Management Software (LMS) at programmed intervals. Reports, dashboards and "virtual meters" of energy usage are easily generated.

**A GPS in every Controller.** A built-in GPS chip enables the Controllers to send their exact location data to the LMS server within seconds of initial power up during installation. GPS capabilities reduce install times, speed deployments and can be used to cross-check GIS mapping.

**Fault Monitoring.** In case of any faults, the controller automatically generates alarm messages and sends them to the LMS for routing via email or text messages. Alerts can also be integrated into the City's maintenance applications through CIMCON's web services APIs.

**Dimming Interface.** Each SLC supports 0-10v, PWM or DALI-based dimming. Also, a group of fixtures can be controlled by a single motion, occupancy or other sensor. This is known as a "motion group".

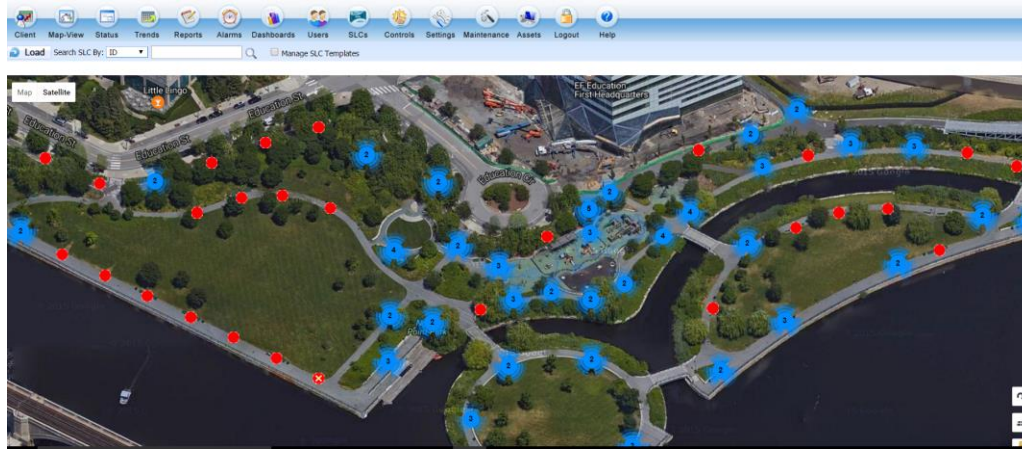
**Integrated Tilt and Temperature Sensors.** Each SLC has an integrated tilt sensor for immediate knock-down alerts passed to the LMS. All SLCs include an on-board temperature sensor for reporting to the LMS.

**Real Time Clock.** Each SLC has a built-in Real Time clock which is backed-up by an onboard battery. It ensures all time-based modes are completely operational as soon as power is restored to the lighting fixture and SLC.

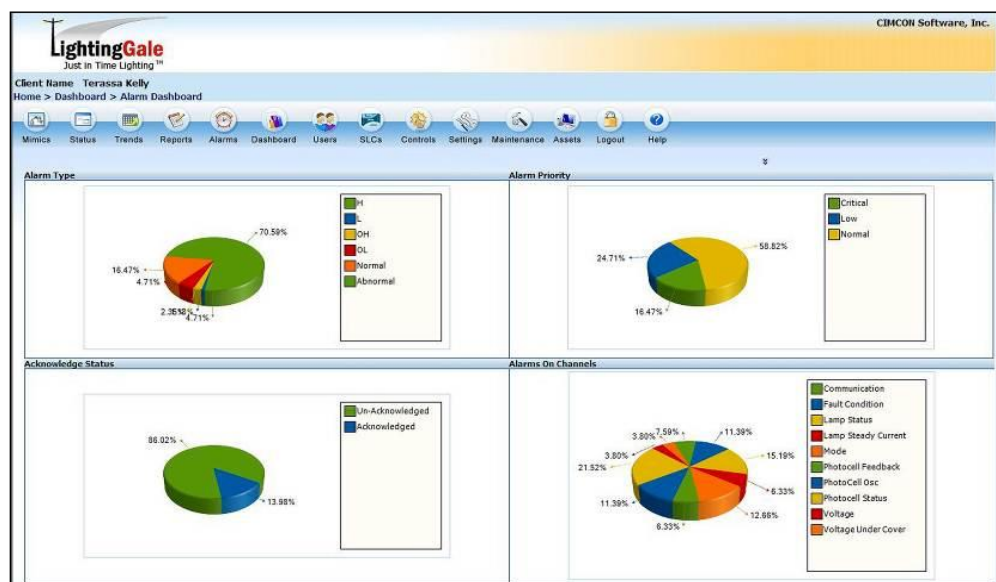
## Lighting Management System, Reporting & Analysis

CIMCON's powerful and intuitive web-based Lighting Management System provides the interface between the system users and the lighting Controllers. The software provides highly secure access, an easy to understand graphical interface, comprehensive Alarm, Report and Asset Management and easy integration with other systems through web services APIs. Sample screen shots follow:

### Google Maps Interface

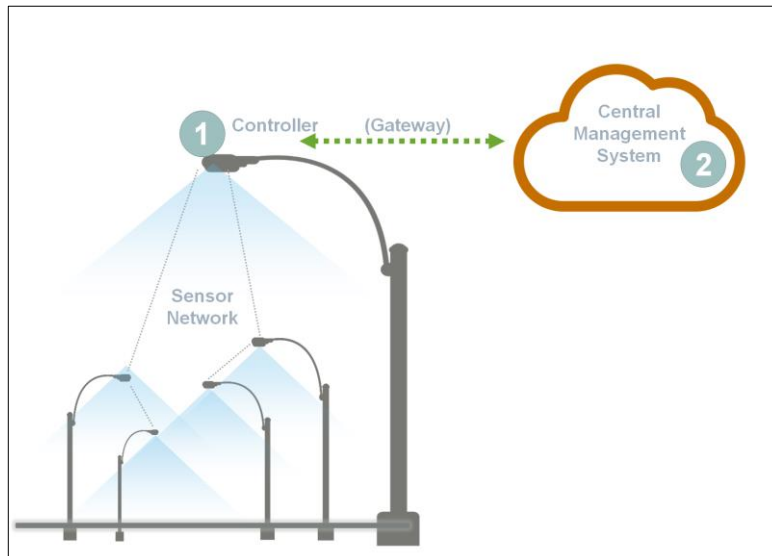


### Reports & Dashboards



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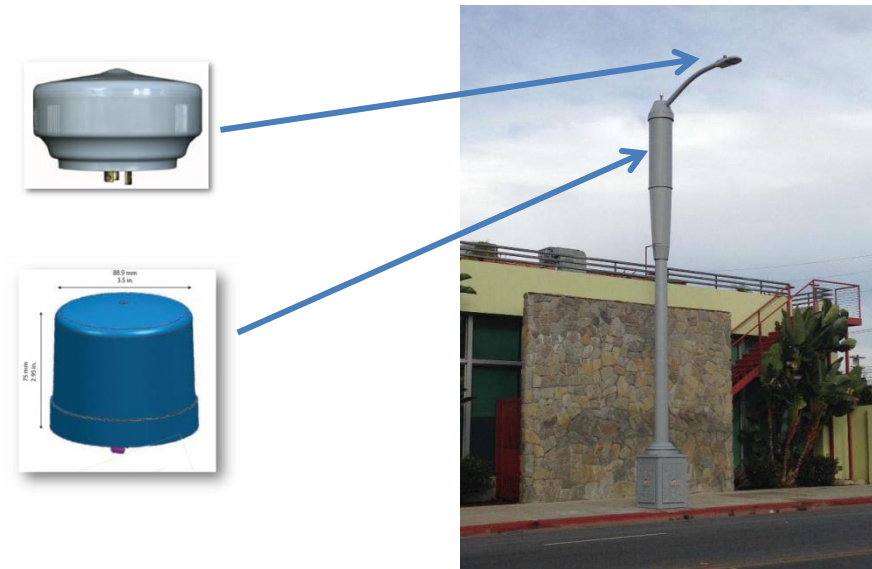
As we build out the pieces for a Connected City, these components of (1) Controllers, Gateways and (2) Lighting Management System look like this:



Smart City Example	Description
<b>Public Safety &amp; Shared Capacity</b>	Small Cell Mobile Network Monitoring and Metering (Femtocell) EV Charger Monitoring and Metering
<b>Goals</b>	Increase digital access. Deliver exceptional city services. Spark business growth.
<b>Stage</b>	Implemented in pilot locations in San Jose and San Francisco; <b>Ready to scale.</b>

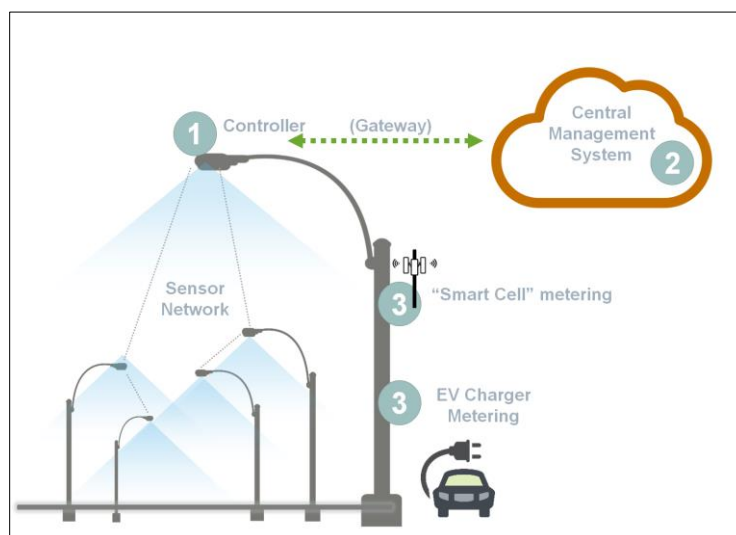
CIMCON works closely with customers to jointly develop new platforms and new products. One such technology partnership exists with Pacific Gas & Electric (PG&E) and is indicative of the type of technology partnership we would wish to form with the City of Pittsburgh. Together with PG&E, we created a device known as an **iSLC-4000**. The iSLC-4000 is an intelligent transformer-rated metering controller that is designed to monitor and report on devices such as wireless telecom transceivers (“small cells”), EV chargers and digital signage located on or within the street light pole. Applications also include smart inverters for photovoltaic solar systems and battery storage applications. The iSLC-4000 is capable of measuring delivered kilowatt-hours, delivered kilowatt demand, received kilowatt-hours, delivered kilovar-hours and received kilovar-hours. The device has a metrology accuracy class of 0.2% with an exceptionally small footprint which can be mounted on top or inside a street light pole. Metering usage for charge back can be transmitted on the same streetlight network. Additional revenue share opportunities can be created for the City while offering better services and a higher quality of city life. Data from these connected devices can be made available to 3rd party apps (Is the EV charger available?, Can I reserve it?, etc.).

As part of their LED upgrade, the City of San Jose has installed 250 “small cells” with several hundred more in the pipeline. These “small cells” accommodate the installation of one CIMCON Controller for the street light (external iSLC-3100) and one CIMCON Controller (iSLC-4000) to meter the energy consumed by the telecom equipment installed inside (see below).



<http://www.computerworld.com/article/3013031/sustainable-it/san-jose-gets-smartpoles-with-lte-led-lights-and-energy-meters.html>

As we continue to build out the pieces for a Connected City, these components of (1) Controllers, Gateways, (2) Lighting Management System and (3) Transformer Rated Metering Controllers look like this:

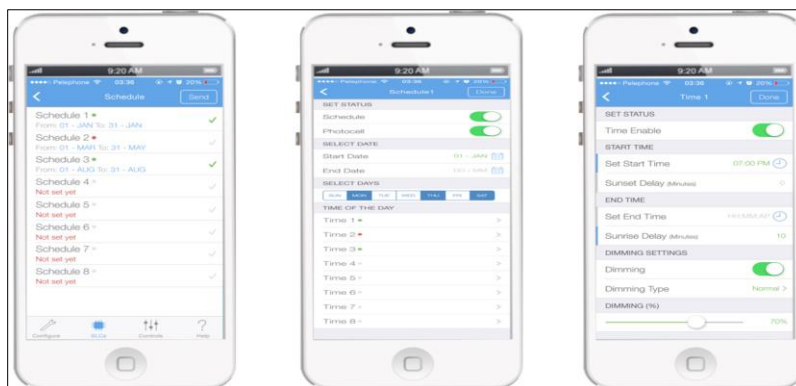




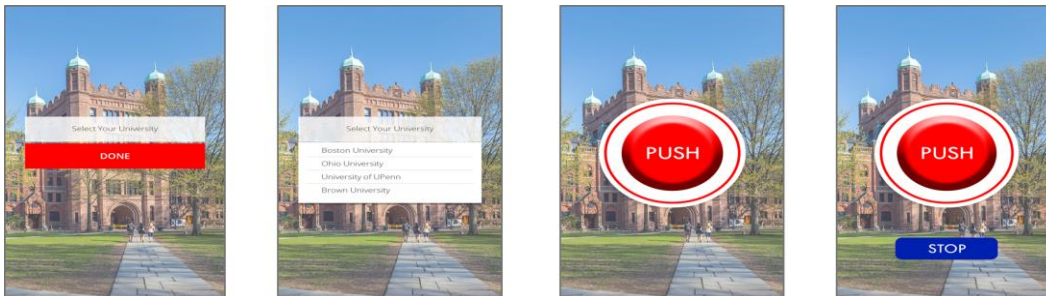
Smart City Example	Description
<b>Public Safety</b>	Smart Phone apps
<b>Goals</b>	<p>Create accessible, practical and delightful public spaces and 3<sup>rd</sup> party spaces.</p> <p>Deliver exceptional city services.</p> <p>Spark business growth.</p> <p>Build a platform for learning.</p>
<b>Stage</b>	<b>Ready to scale.</b>

CIMCON's Lighting Management System offers a RESTful API Web Services interface allowing IT integration to existing and new city owned applications that could benefit from integration to the Street Lighting network and provide added benefits to the City.

Through our APIs, we have developed smartphone apps that complement our LMS. The first is an iOS-based app to allow users to locally diagnose, schedule and control Streetlights via their iPad or iPhone. This app can be used for local diagnostics by repair crews and by EMT/First Responders for override of a street light or group of street lights.

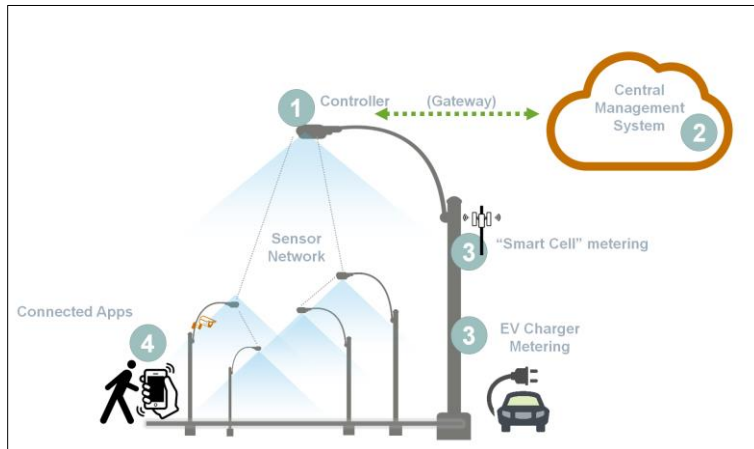


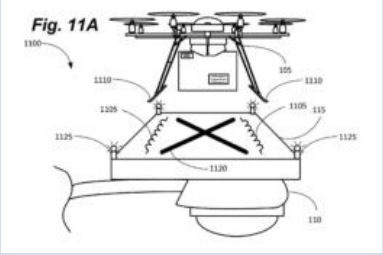
A second app is based on collaboration with a University that needed to expand the security benefits of their "Blue Light" security kiosks located on campus. Working with them, we designed a smartphone app that, once users download and register, gives students, faculty and staff the ability to mimic the exact functionality of the campus "Blue Lights" through their smartphones. With this approach, we have reduced a ~\$37,000 legacy solution per physical Blue Light to a smartphone app.



When pressed, the button activates all lights within a geo fence of the user who has pushed the button (~150-~200 meters). Campus security is notified and given a map to the user and lighting within the geo fence comes to full brightness (if dimmed) and flashes.

Continuing to build out the pieces for a Connected City, the components of (1) Controllers, Gateways, (2) Lighting Management System, (3) Transformer Rated Metering Controllers and (4) Apps built on APIs look like this:

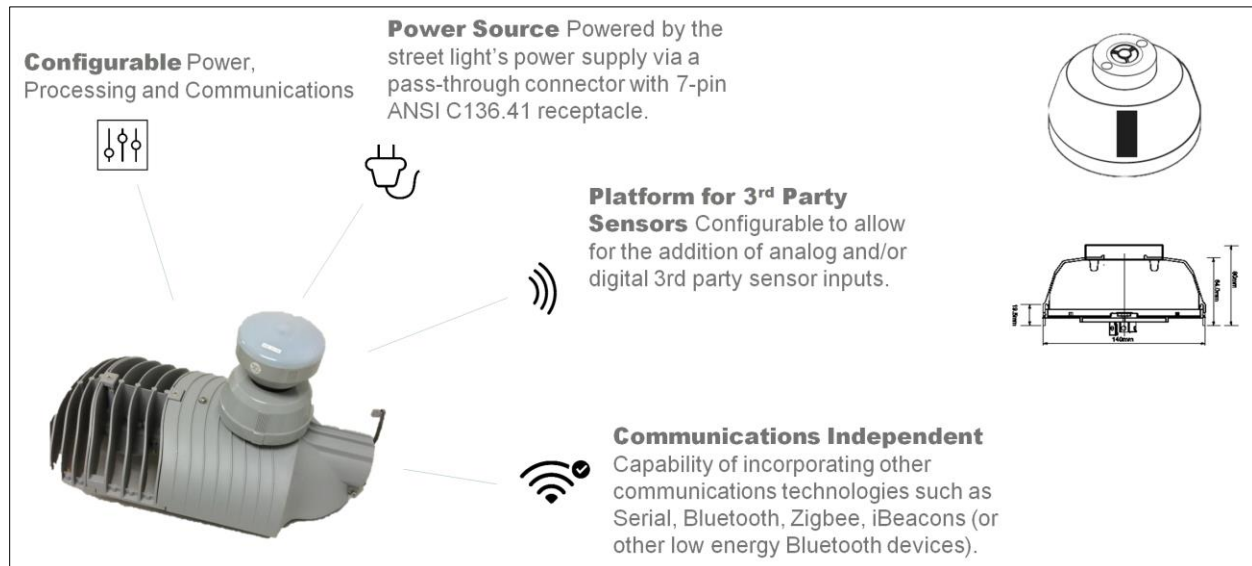


Smart City Example	Description
<b>Public Safety, Air Quality, Shared Capacity, Traffic Management</b>	Co-located Sensor Platform
<b>Goals</b>	Deliver exceptional city services. Expand constituent engagement. Spark business growth. Build a platform for learning.
<b>Explanation</b>	<p>Our goal is to provide a flexible hardware and software environment for the idea and application that has not been identified (yet). For example, the combination of our co-located sensor platform, APIs and streetlight network lends itself quite well to applications such as water pressure monitoring for fire hydrants, “zombie” house fire detection, beaconing to nearby pedestrians, etc. Our intent is to provide an environment so that as these needs are identified, they can be quickly created and tested for feasibility. For example, “zombie house” monitoring was a specific need identified by the Mayor of northeast city as a “must have” with huge value to first responders and residents. (“Zombie house” monitoring is the remote detection of smoke/fire in abandoned houses and storefronts.) We were able to produce a working bench prototype that proved the concept and economics in two days. In another case, a recent patent filing by Amazon covered “delivery drone recharging” via streetlight fixtures. When this business use case materializes, Cities may find themselves able to charge landing fees, drone charging fees and takeoff fees (dynamically priced?) and we will be there with the appropriate technology to help enable this application. Our approach is to position our technologies to accommodate these and others to come.</p>  <p>To help in providing a steady supply of those ideas to come, and to complement the City of Pittsburgh’s vision, we would be pleased to establish an educational partnership with the City that will leverage your vision and role as a world-leading Smart City. Guided by your team, we would assist in helping to create a Smart City curriculum to complement the City’s support for science and technology. This could include a “living lab” that empowers students to learn first-hand about the City’s plans and rollout, learn and use the technologies in a development or “sandbox” environment and create additional hardware and software applications for the City that would utilize the technologies in place and planned. Regardless of the technologies or vendors ultimately chosen, we agree that this initiative represents a unique opportunity for the City of Pittsburgh to further the educational vision for the students and citizens it serves and drive the potential for totally new applications and services.</p>
<b>Stage</b>	<b>Available Q2’17 to Pilot.</b>

We currently have on-board tilt sensors (for knockdown alerts) and temperature sensors incorporated directly inside our iSLC3100-7P controllers. We also support external sensor inputs (digital or analog) through pins 6 and 7 of the 7-pin receptacle (motion sensors, noise sensors, environmental sensors, etc.) to change the behavior of the light and/or pass information back to the Lighting Management System. This quarter (Q2’17), we will introduce a customizable sensor platform that will provide power, computing resources and secure communications for a variety of third party sensors for transmission back to our LMS

or headend database. This device is known as CIMCON's patent-pending, **Co-Located Sensor Node Platform**.

As an example of the types of sensors that would be suitable to this customizable platform, we are working with the environmental and gas sensor platforms from Texas Instruments and Analog Devices as reference designs and PTC's ThingWorx as a sensor platform. Other sensors include ambient light, external noise and threat sensors. On the communications side, options will include Serial, Cellular, Wi-Fi, WiMAX, Bluetooth, ZigBee, iBeacons (or other low energy Bluetooth devices), per customer specifications.

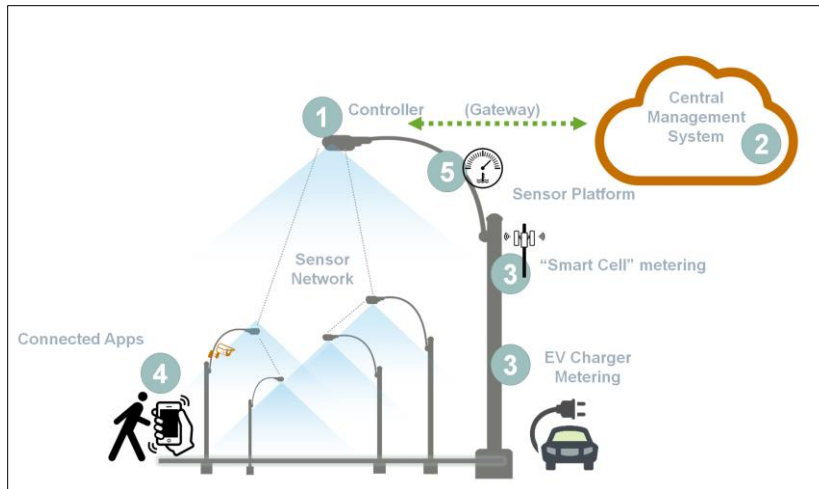


*Lighting fixture with 7-pin receptacle.....with Co-located Sensor Platform.....with Street Light Controller*

Our goal is to provide a flexible, easy-to-install platform for additional Smart City services that would allow the 3<sup>rd</sup>-party development community and owners to specify and assemble **"best-in-class"** devices for

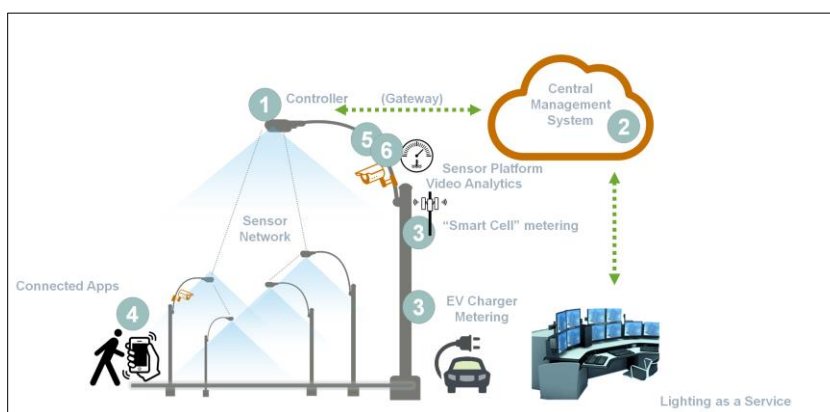
such applications as traffic management, threat management, waste management, smart parking, environmental sensing, digital signage, noise management and others we have not considered.

Continuing with our vision for the Smart City, the components of (1) Controllers, Gateways, (2) Lighting Management System, (3) Transformer Rated Metering Controllers, (4) Apps built on APIs and (5) our Co-located Sensor Platform looks like this:



A second iteration of our Co-Located Sensor Platform is being designed specifically for edge-processed, video analytics applications and streaming video. This device will provide power, application specific, processing and communications to enable video analytics for threat identification, traffic and pedestrian analysis and parking management, among other applications. The results of the edge processing performed by the analytics engine contained within the sensor platform on the street lighting pole will be sent back to the Lighting Management System via the existing mesh network (low data, low bandwidth) while streaming video from each site can be relayed via Wi-Fi, cellular or network connections. The Co-located Sensor Platform will also offer Power over Ethernet (POE), Serial and USB external connections.

Thus, adding to our vision for the Smart City, the components of (1) Controllers, Gateways, (2) Lighting Management System, (3) Transformer Rated Metering Controllers, (4) Apps built on CIMCON APIs and (5) our Co-located Sensor Platform with (6) video capabilities look like this:



Thank you for your time and consideration to review this material.