



**Echelon intro**  
**General lighting**  
**Street lighting**

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**Echelon Europe**

# Echelon Profile



- Founded in 1988
- Inventor of the ISO 14908 LonTalk protocol
- LonWorks control network technology platform
- Building Automation, Smart Grid, Street Lighting, Enterprise Energy Management

# LONWORKS Products – Delivering “Green”

## Building automation

10-70% electricity consumption reduction

## Street lighting systems

30-50% electricity consumption reduction

LONWORKS  
SmartGrid

## Enterprise Energy Management

15-25% electricity consumption reduction

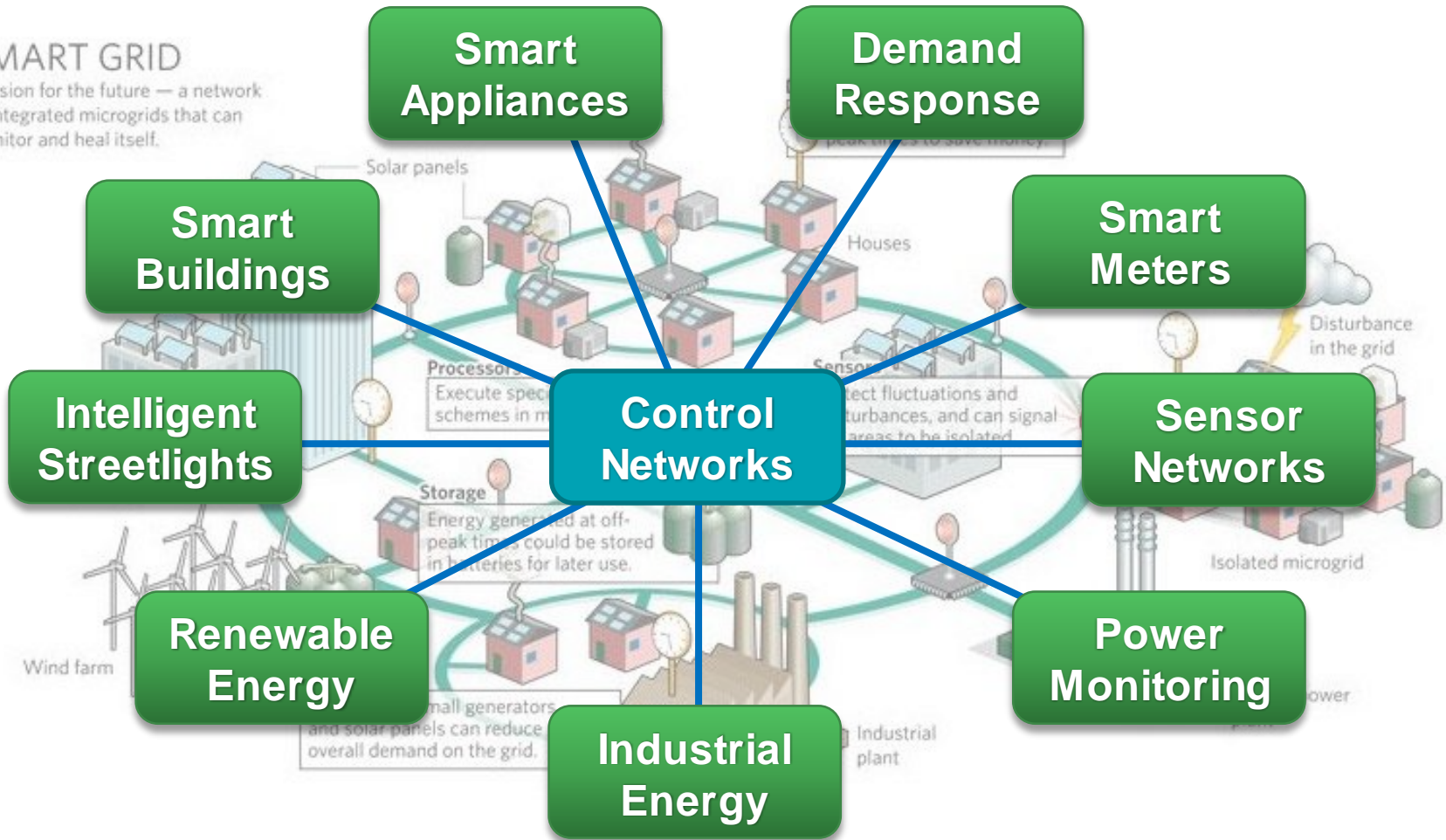
## Home control

Load control, appliance “sleep state”

# Smart Grid – A Key Opportunity

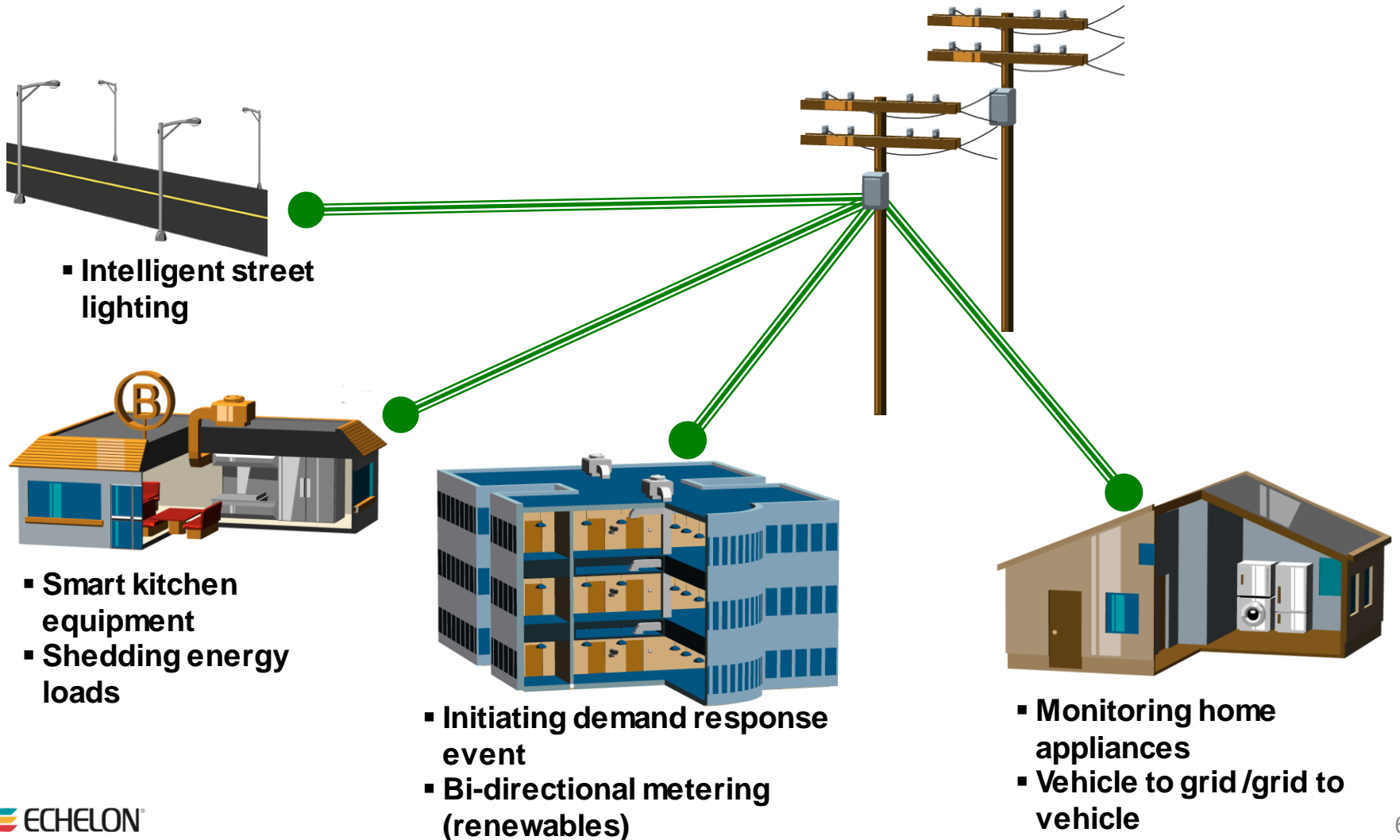
## SMART GRID

A vision for the future — a network of integrated microgrids that can monitor and heal itself.



# LONWORKS® Platform

## Embedded Intelligence Extends The Smart Grid Opportunity



## General Lighting



# Lighting Market Segmentation



Architectural/  
Outdoor  
Lighting



Residential/  
Commercial  
Lighting



Hospitality  
(Restaurants/  
Lounge/Hotels/  
Warehouse)



Display/  
Shelf  
Lighting



Theater/  
Stage  
Lighting

## Power Requirement

High



Med



Med



Low



High



## Bandwidth Requirement (how frequent these lights need to change)

Low/  
Med



Low



Low/  
Med



Low/  
Med



High



No single control technology can serve all the lighting market segments



## General Illumination

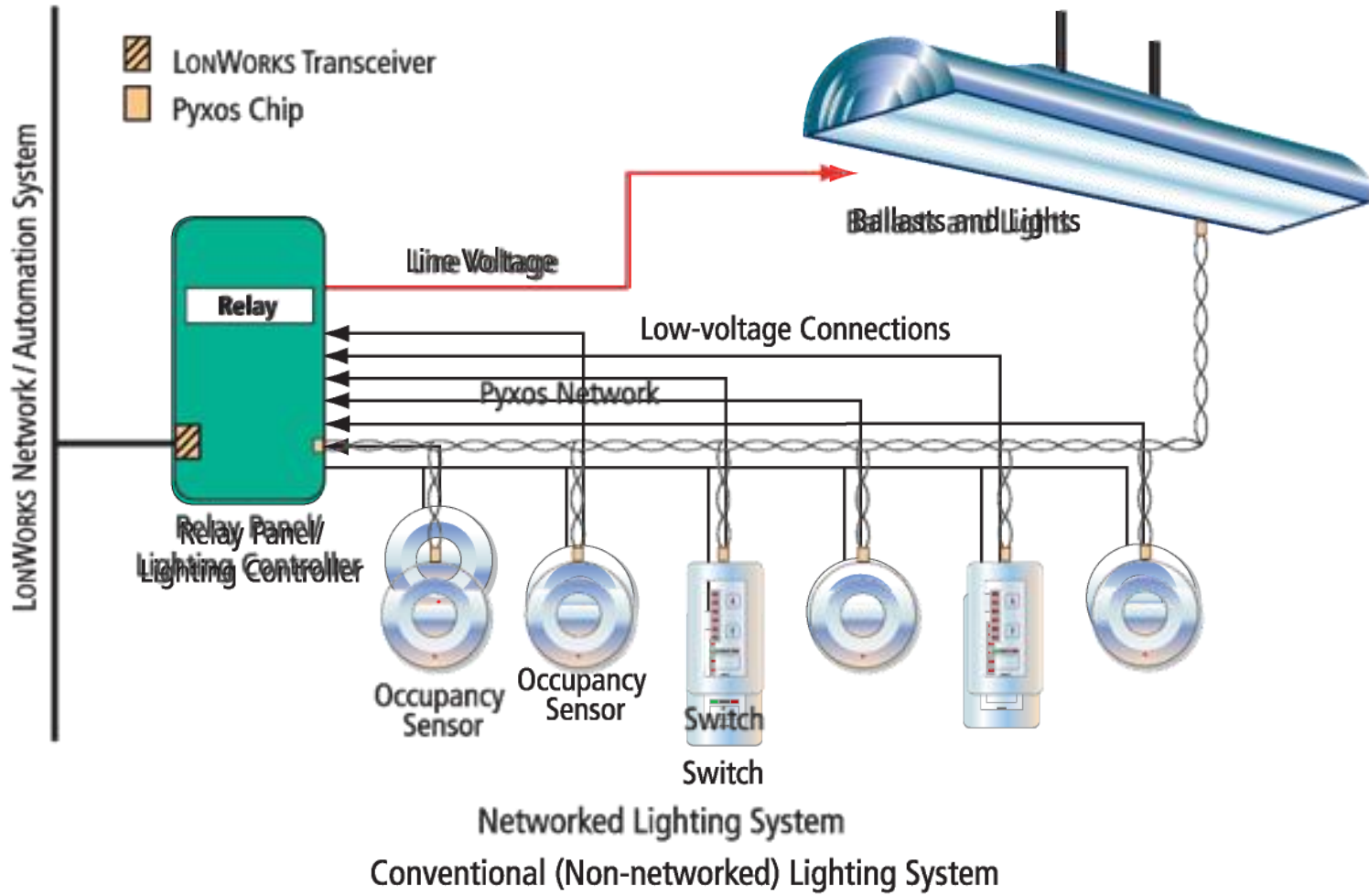


- No extra hardware cost for dimming circuit with LED lights

### Benefits of control

- Dynamic scene configuration
- Multi-way switch operation without extra wiring
- Inexpensive installation by general electricians

# Example – Hotel Room Control System

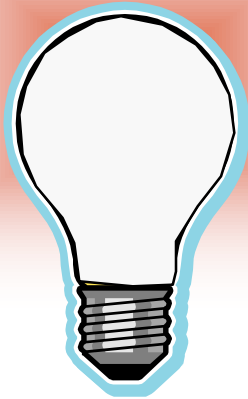


## Architectural Accent Lighting

- Outdoor landscape lighting
- Signage and Displays
- Benefits of control
  - Color changing and scene configuration
  - Easy installation and maintenance
  - One flat cable used for both power and data
  - Fault Detection



## Without Controls



Without Controls, LED lights also behave like conventional lights

Yes, we get the energy savings typical of LED lights...

...but there are more reasons to add controls

# Example Applications



Architectural/Accent



Retail/Display

Residential/General



## LED Lights + Control – End User

### Dimming

- Even more power saving

### Color changing and scene configuration

- Architectural differentiation
- Hotels/Restaurant Lounges
- Retail Display

### Dynamic scene configuration

- Dim lights as required
- Change of scenes by end user without complex software tools

# LED Lights + Control – Manufacturer

Low cost installation and maintenance

- Self-configuration
- Polarity insensitive
- Installation possible by a general electrician

Link-Power

- Less wires
- Easy to source and inexpensive

Fault Detection

- Two-way communication to communicate node faults back to controller
- Preventive maintenance

Multi-way switch operation

- Single wire
- Flexible for future changes



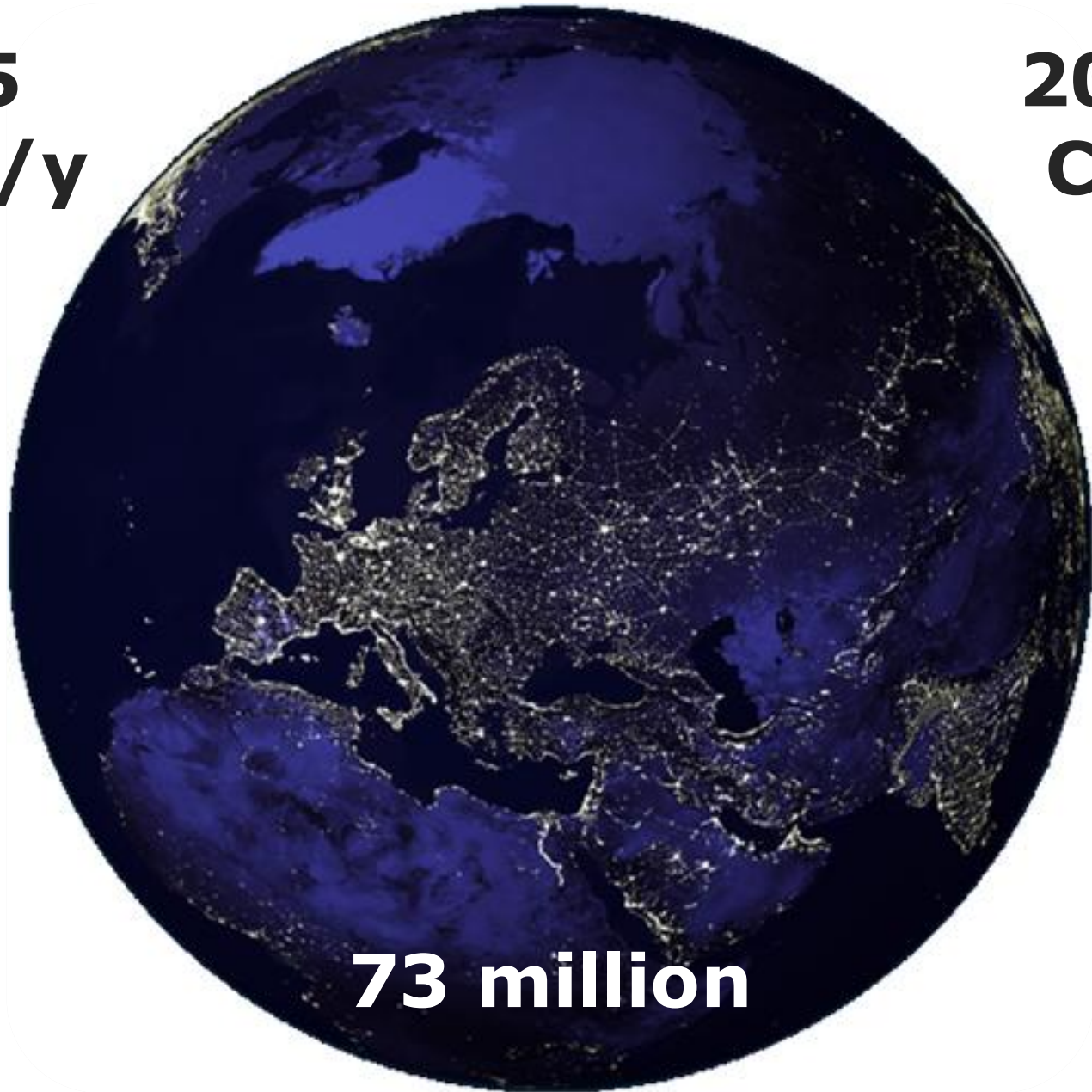


# *Section 1* **Why?**



**615  
KWh/y**

**200 KG  
CO<sub>2</sub>/y**



**73 million**

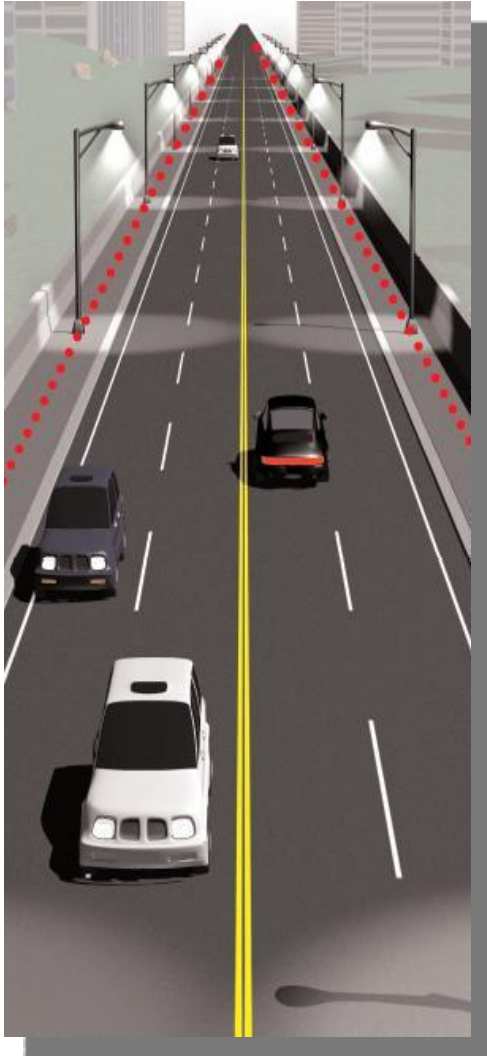
# Street Lights Market Size

	POPULATION (MILLIONS)	EST. # OF STREETLIGHTS
<u>Europe</u>	<u>728</u>	<u>73</u>
North America	400	40
South & Latin America	450	23
Japan	130	13
South Korea	50	5
<b>TOTAL</b>	<b>1,758</b>	<b>154</b>
<i>(Rest of the world)</i>	<i>(4,400)</i>	<i>(Unknown)</i>

# Issues with Outdoor Lighting

- Growing Energy cost: **50 €** per streetlight per year
  - Outdoor light energy costs makes up to 40% of municipal budget
  - Growing cost of electricity: +40% in the UK since 2001
- CO<sup>2</sup> impact : **200 KG** per streetlight per year
- Maintenance cost and limitations
  - Expensive manual failure check
  - Night patrols with cars and trucks
  - Many hours between lamp failure and replacement
- Dark areas and broken lights lower safety and security
- Light pollution
  - Energy wasted illuminating the sky
  - Ecological damage to birds and insects
- Limited use of illumination for city centers beautification

# Target Benefits of Intelligent Outdoor Lighting



- Lower energy costs
- Lower operations & maintenance costs
  - Control of individual luminaires
  - Automatic fault detection for each luminaire
- Low installation costs
- Environmentally friendly
- Supplier independent

# Observed Benefits with Intelligent Outdoor Lighting

## ■ UP TO 50% ENERGY SAVINGS

- Dimming at fixed time = 50% savings with HPS lamps
- Dimming based on weather conditions and traffic
- Managing peak demand
- Save energy on home market to export at a higher price

## ■ 30% MAINTENANCE SAVINGS

- Remove night patrols
- Group onsite operation
- Reduce use of service trucks and cars
- Drastically reduce number of incoming calls

## ■ ENABLE «GREEN DIGITAL CITY» APPS

- Pollution sensors
- Parking management
- Control panel information and signage
- Supplying energy to camera and WiFi hotspots



# EU E-street Project – [www.e-streetlight.com](http://www.e-streetlight.com)

*Intelligent Outdoor Lighting*

*On the road for standardization...*

*“...Europe can achieve an annual savings of 38 TWh electricity (about 63.7%) on our annual energy consumption for street lighting”*

*“...a new standard is being developed taking into account adaptive street lighting”*

(E-Street Project)



Hafslund

IB



ECHELON



SITO

SELC

ELTODO

PHILIPS



*Bulb status*

*Energy consumption per  
segment (measured)*

*Individual luminaire  
on/off*

*Traffic density  
measurement*

*Astronomical-clock  
driven schedules*

*Burn hours*

*Automatic fault  
notification*



*Ambient light sensors  
for light level  
optimisation*

*IT  
Integration*

*Energy consumption  
per luminaire*

*Automatic fault  
detection*

*Centralised installation,  
maintenance and control*

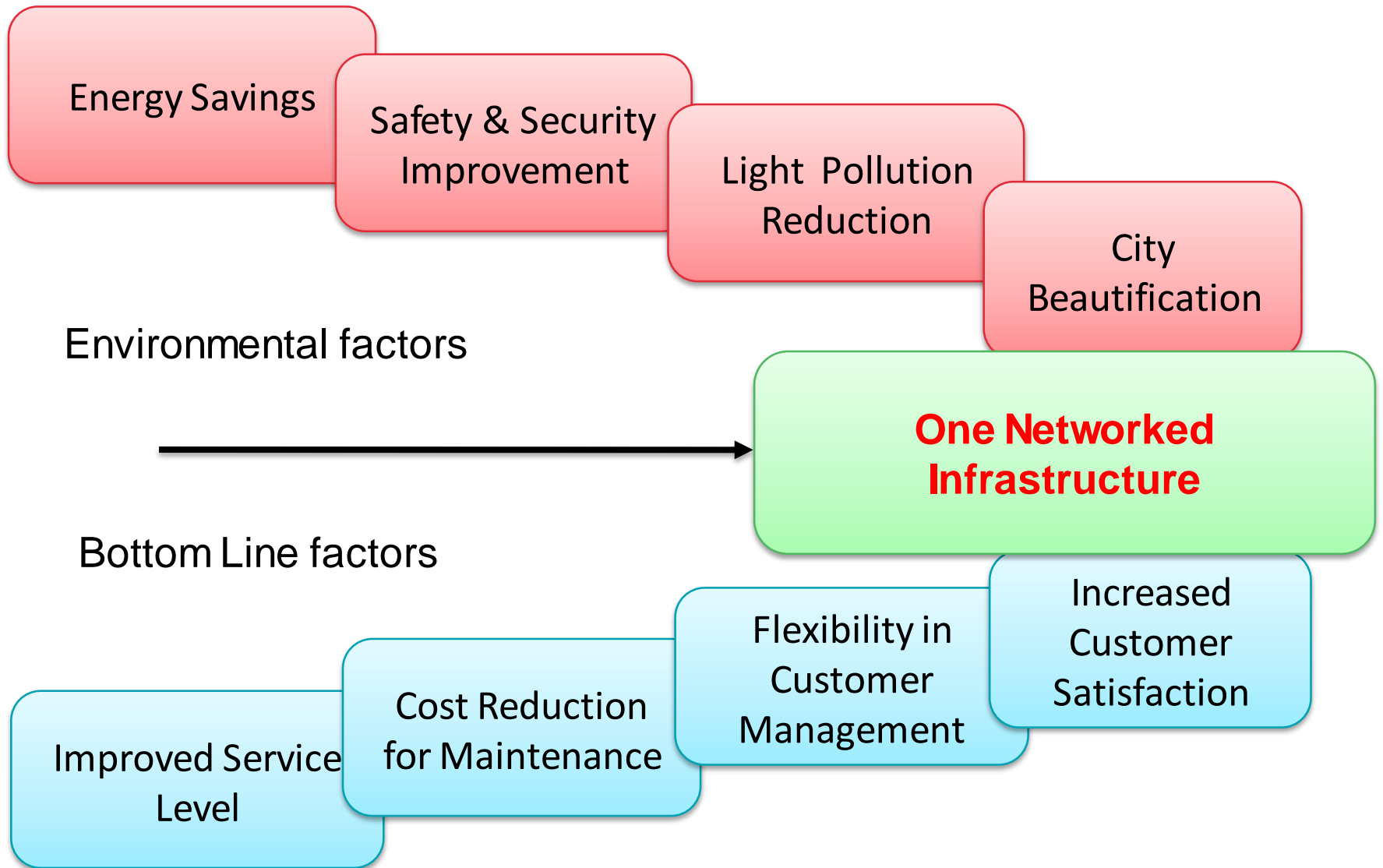
*Individual dimming*

*Weather sensors*

*Open and interoperable  
communication protocols*

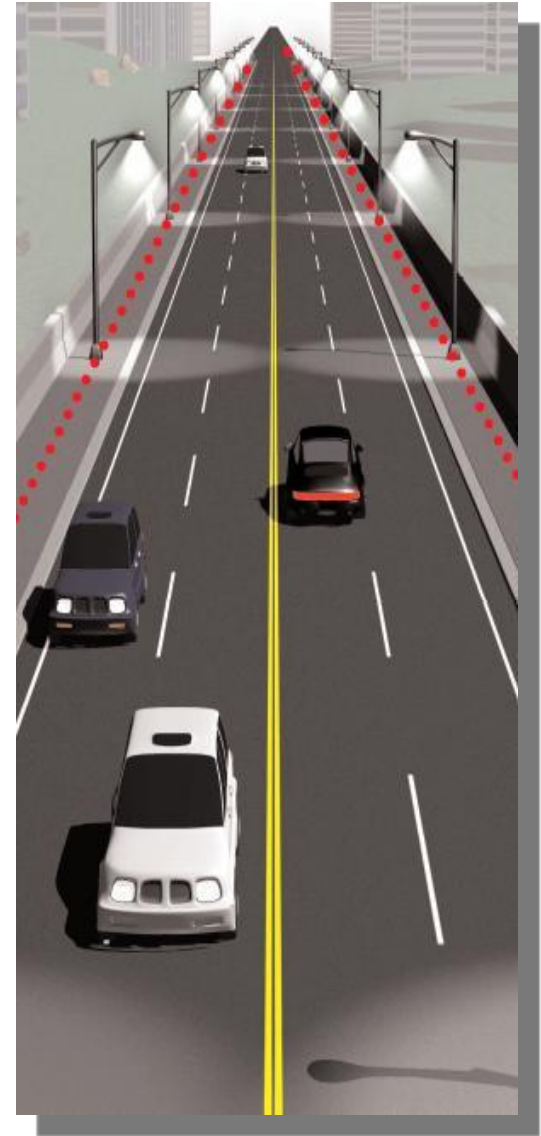


# Convergence of Environmental and Bottom Line factors



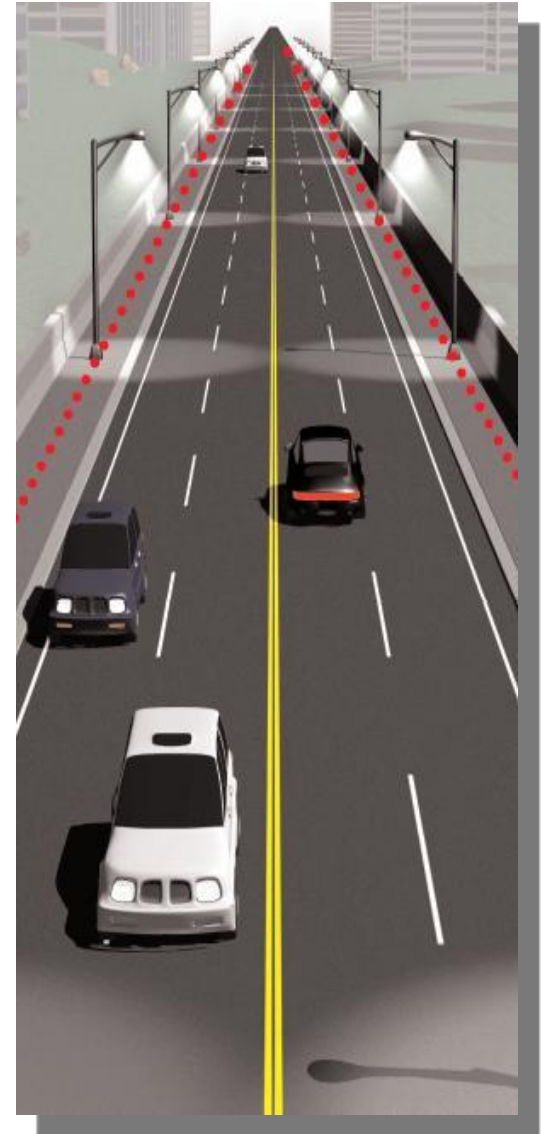
# Benefits of a Networked, Infrastructure Approach

- Environmental
  - Dramatic reductions in energy use
  - Reduced CO<sub>2</sub> emissions
  - Reduced light pollution
  - City Beautification
- Cost & quality of maintenance
  - Individual luminaire monitoring
  - Outage detection
  - Early failure monitoring
- Liability, security and safety
  - Real-time status reporting and monitoring
  - Historical performance data



# Benefits of a Networked, Infrastructure Approach

- Not limited to single luminaire choice
  - Compatible with future lamp technology
  - Phased approach as existing technology rides the cost curve
  - HPS, LED, induction, metal halide
- Single, multi-purpose city network
  - Easily add future sensors such as pollution, traffic, parking management
  - Independent of wide-area network choices (WiMax, LTE, etc.)
  - Implement new services without changing the infrastructure
- Scalable solution
  - Start with panel-only projects
  - Add infrastructure components as required



# The Important Players in the Market

- **Municipalities**, city counsels and road authorities
- **Lighting companies**
  - Luminaire manufacturers
  - Ballasts manufacturers
  - LED manufacturers
  - Manufacturers of Light Controllers
- **System integrators** packaging the solution and selling it to the municipalities
- Service and **maintenance companies** running outdoor lighting on behalf of the end-user
- **Consultants** and Energy Agencies
- Energy Companies (**ESCO**)

# Positioning

- Municipalities and Road Authorities
  - Immense savings in energy consumption
  - Lowest maintenance cost possible
  - Increased safety and security
  - Make outdoor lighting environmentally friendly
  - Wide choice of interoperable solution providers and components, based on ISO 14908 and SOAP/XML communication standard
  - Political incentives to being *green*

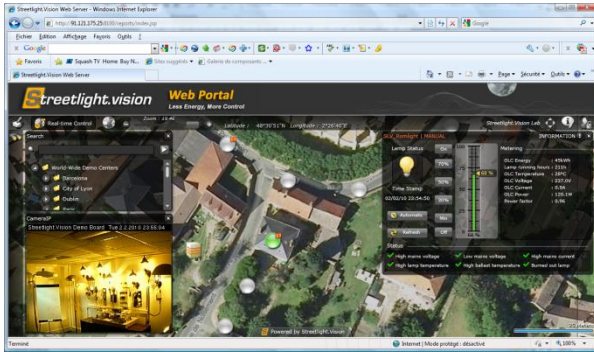
# Positioning

- Public Lighting Service Providers
  - Lower maintenance cost
  - Increased service level
  - Increased customer control
  - Generate new revenue by providing additional related services
  - Extend their green business opportunities
  - Differentiate from competitors
  - Increase their profit margin thanks to added-value services

# Positioning

- Luminaires manufacturers
  - They (re)gain control of their customers by offering a total solution
  - Stop competing on price against low cost products
  - Compete on added-value and energy efficiency
  - Shortest time to market
  - Bid for large contracts where LonWorks-based monitoring system is already in place
  - Best way to play in a fast growing new market
  - System based on a reliable ISO standard technology

# Components of an Intelligent Streetlight Solution



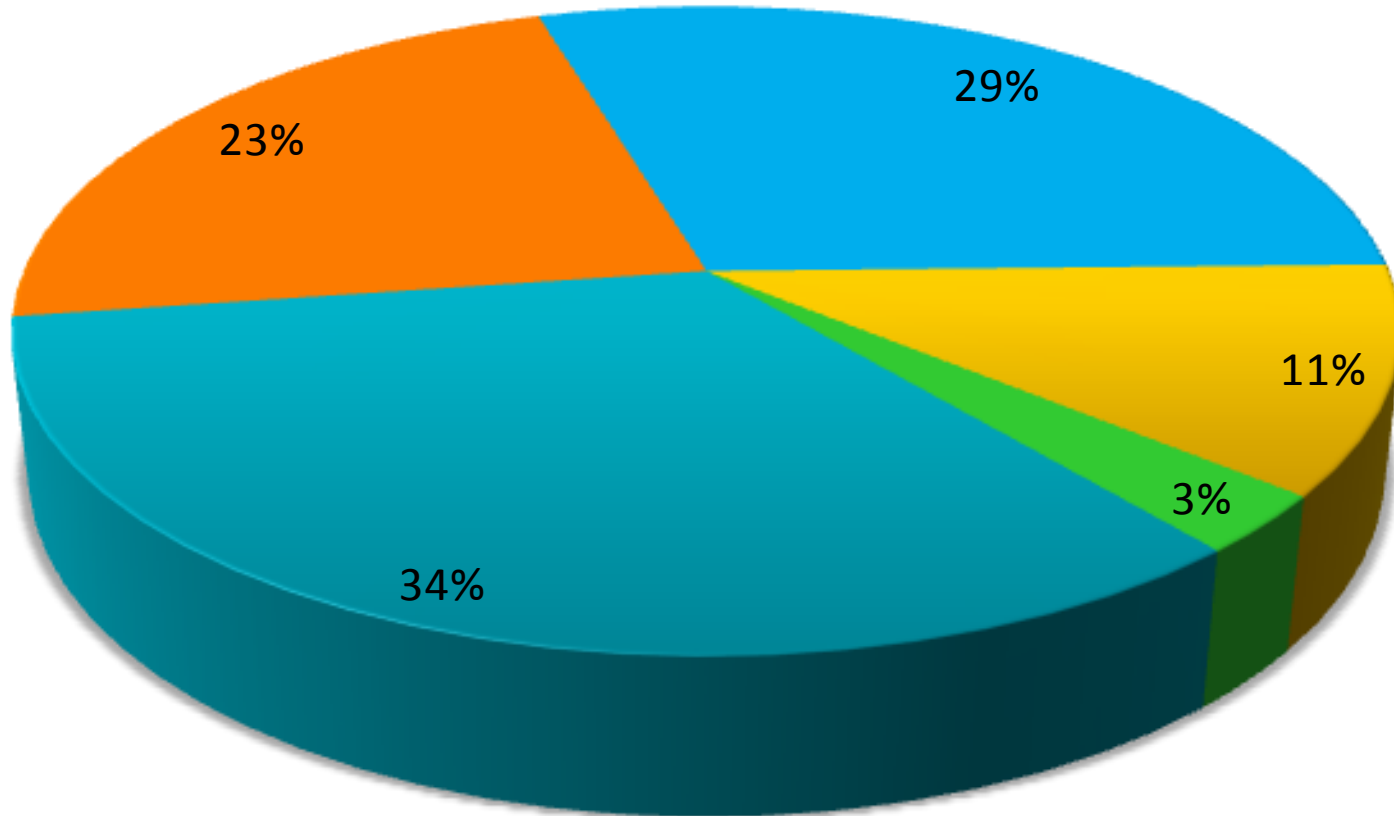
- Installation and management central software
  - Automatic installation
  - Information flow management
  - Maintenance management
  - Real-time control
  - Energy Management
- *i*.LON SmartServer segment controller
  - Standards-based advanced bridge to IP networks
  - Power line network, meter interface, connection to future equipment
  - Powerful segment controller
- Power line light controller
  - Use existing city electricity wires for power and communications: no new wires needed
  - Standards-based signaling
  - Many suppliers on the market
    - Philips, ROMLIGHT, SCS, SELC, Citylone, Siteco, Rongwen



# Distribution of Costs

## Typical Retrofit Installation

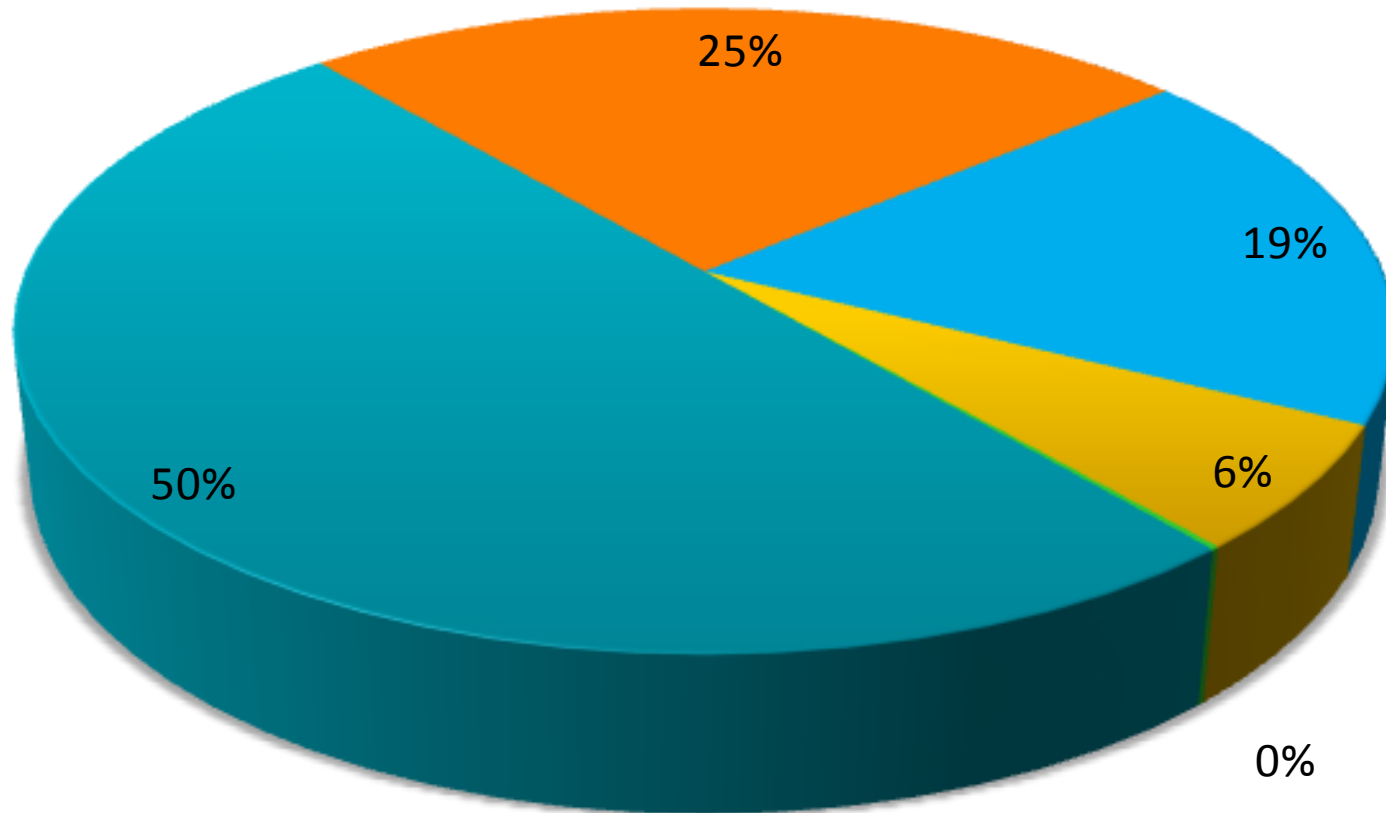
- Electronic Ballast
- Lamp
- Controller
- Field Installation
- PL Technology



# Distribution of Costs

## New Installation

- Field Installation
- Pole
- Luminaire
- Intelligent ballast
- PL Technology



# Costs Benefit Analysis

## ■ Cost < 250 € per streetlight

- Electronic dimmable ballast ... < 90 €
- Outdoor Lighting Controller ... < 110 €
- Segment Controller including Software ... 10 € per streetlight
- GPRS Communication ... 10 € per streetlight (incl. 10 years)
- Installation ... 30 € per streetlight

## ■ Benefits

- Up to 50% energy savings ... 25 € per streetlight in average
- Remove night patrol ... 4 € per streetlight in average
- Lamp change savings ... 5 € per streetlight
- Energy certificate ... 5 € per streetlight (depend on countries)
- Reduce onsite trips ... 7 € per streetlight

## ■ Return on Investment

- < 4 years in countries with high price of electricity (Portugal, Ireland, China, ...)
- < 5 years when segments have 250W and 400W HPS lamps
- < 3 years for Parking Lots (high wattages + possibility to dim lower in the middle of the night)
- < 3 years for Warehouses (high wattages, dimming based on presence)

# Financing models

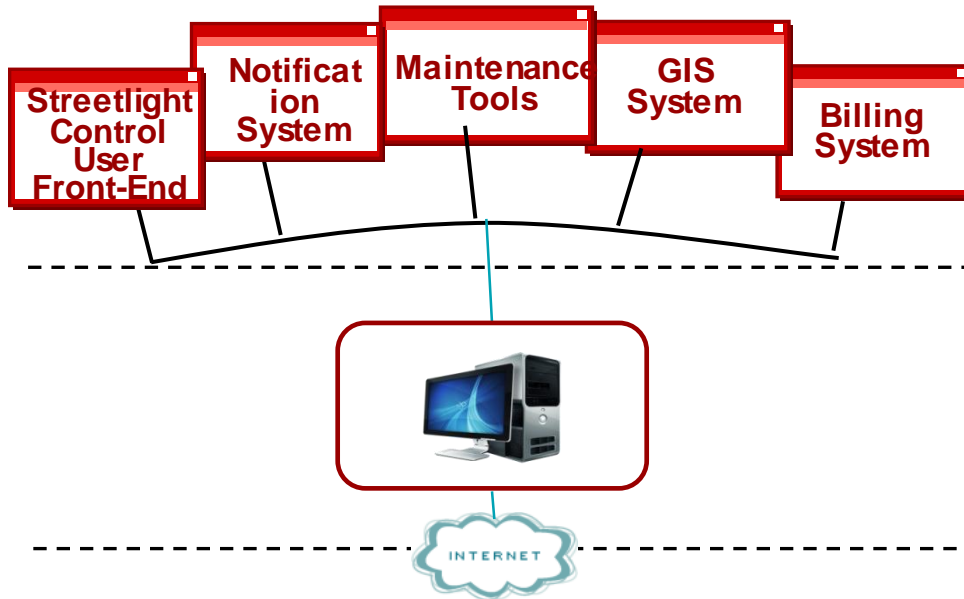
- Self-financed
  - City pays for the system and receives direct benefits
- Bank loan
  - Bank finances the system for the city and recover the investment with interests
- Service provider-financed (PFI or ESCO-like)
  - Service provider pays for the system
  - City keeps paying the SP what was paying before (energy and maintenance)
  - SP recovers the investment from savings in energy and maintenance



## ***Section 2*** **System Architecture Overview**



# Solution Architecture



## End User Access

- Energy management systems
- Fault management
- Automated service requests
- Billing services

4

## Web Hosted Software

- Installation and maintenance
- Central database and control
- Organize and store data
- Interface with GIS systems

3



# Web Hosted Software

## Web Hosted software



- Enables easy and automatic installation
- Collects, Organizes & Stores Data
- Track where the failures are
- Check the system health
- Provide energy consumption analysis
- Enable lamp lifetime analysis
- Manage alarms
- Enable real-time control on maps
- Expose/exchange data with other application and systems



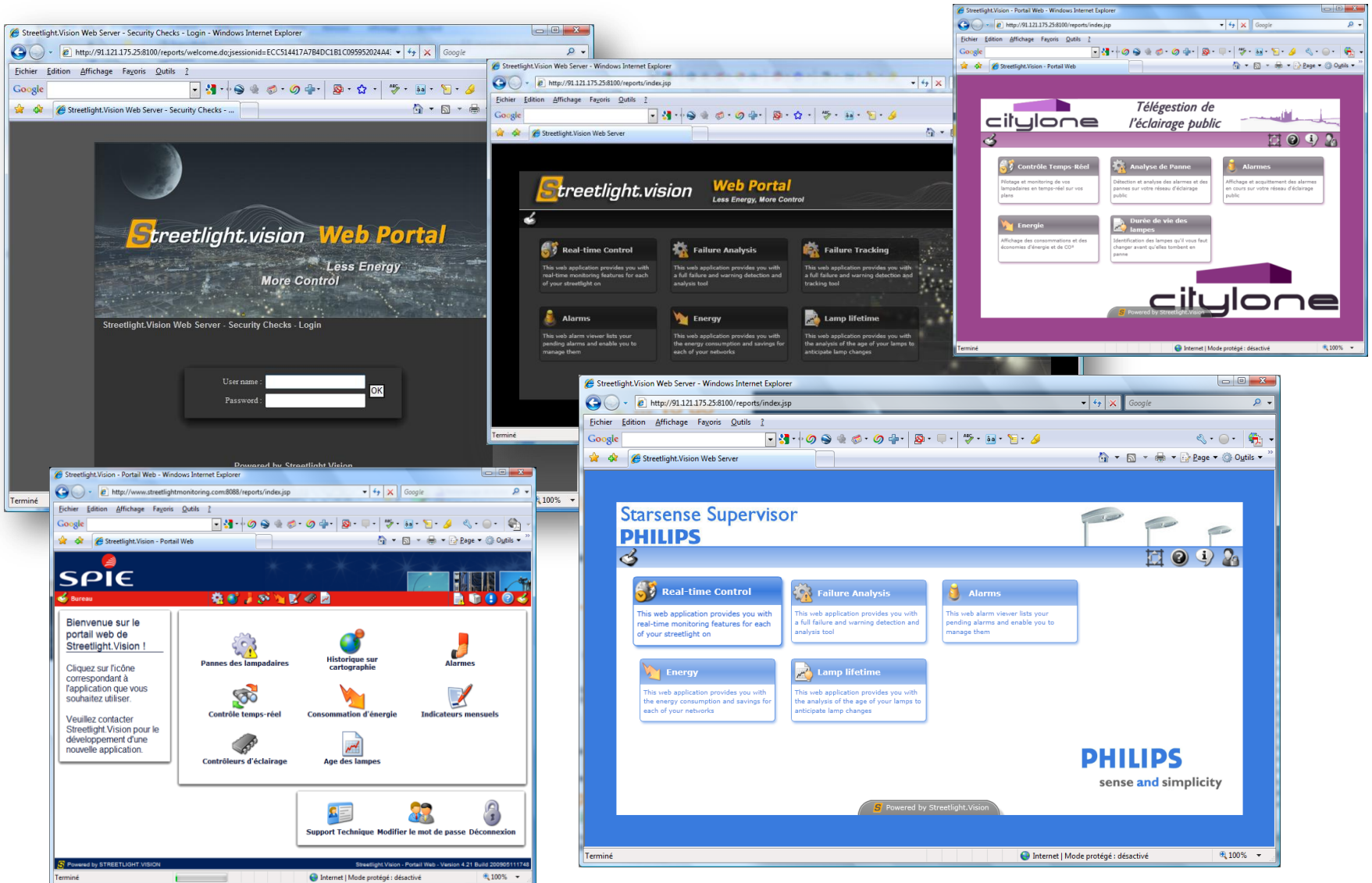
# Web Hosted software



- Enable easy and automatic installation
- Collect, organise & store data
- Track where the failures are

# Streetlight Control Front-End

## Customized look and feel depending on user access rights



# Streetlight Control Front-End

## Identify & Diagnose Failures

Streetlight.Vision Web Server - Windows Internet Explorer

http://91.121.175.25:8100/reports/index.jsp

Streetlight.vision Web Portal  
Less Energy, More Control

Failure Analysis GeoZone : World-Wide Demo Centers/City of Lyon/Lyon 1er Arrondissement/Quai Saint-Vincent

Search

- World-Wide Demo Centers
  - Barcelona
  - City of Lyon
    - DEMO - Place des Terreaux
    - Lyon 1er Arrondissement
      - Quai Saint-Vincent
        - Rue Royale
        - Rue Sainte-Catherine
      - Lyon 4ème Arrondissement
        - Boulevard des Canuts
        - Croix Rousse
        - Rue du Chariot d'Or
      - Lyon 6ème Arrondissement
    - Dublin
    - Hong-Kong
    - Paris

Failures Report

Name	address	faulty	criticalFaulty	failure
device device[26] on SC_of_zone.2[2]	?	?	?	Lamp
device device on SC_of_zone.2[2]	?	✓	✓	...
device device[1] on SC_of_zone.2[2]	?	✓	✓	...
device device[10] on SC_of_zone.2[2]	?	✓	✓	...
device device[11] on SC_of_zone.2[2]	?	✓	✓	...
device device[12] on SC_of_zone.2[2]	?	✓	✓	...
device device[13] on SC_of_zone.2[2]	?	✓	✓	...
device device[14] on SC_of_zone.2[2]	?	✓	✓	...
device device[15] on SC_of_zone.2[2]	?	✓	✓	...
device device[16] on SC_of_zone.2[2]	?	✓	✓	...
device device[17] on SC_of_zone.2[2]	?	✓	✓	...
device device[18] on SC_of_zone.2[2]	?	✓	✓	...
device device[19] on SC_of_zone.2[2]	?	✓	✓	...
device device[2] on SC_of_zone.2[2]	?	✓	✓	...
device device[20] on SC_of_zone.2[2]	?	✓	✓	...
device device[21] on SC_of_zone.2[2]	?	✓	✓	...
device device[22] on SC_of_zone.2[2]	?	✓	✓	...
device device[23] on SC_of_zone.2[2]	?	✓	✓	...
device device[24] on SC_of_zone.2[2]	?	✓	✓	...
Total				

From : 12/01/2009 00:15 To : 12/05/2009 00:15

meters failures

Name	Value
Lamp Switch Command	
Dimming level - Comm	
Lamp Switch Feedback	
Dimming level - Feedba	12/26/2009 23:00 50.0
Main Current	
Mains Voltage	
Power	
Power Factor	
Energy	12/26/2009 22:00 2369.0
Lamp Burning Hours	

12/02/2009 12/03/2009 12/04/2009

Dimming level - Feedback

Name	Priority	Trigger	Creation time	State
GeoZone: DEMO - Place des Terreaux (4 items)				
Alarm Name User	3	Alarm Name Admin	09:10:19 09:33	🔴
Acknowledge alarm : This alarm is now fixed ! Thanks <input type="button" value="Ok"/>				
Alarm Name User	3	Alarm Name Admin	09:10:15 23:32	🟡
Alarm Name User	3	Alarm Name Admin	09:10:15 23:33	🟡
Alarm Name User	3	Alarm Name Admin	09:10:15 23:38	🟡
GeoZone: DEMO - Saint Stephen Green (5 items)				
No data from this Segment Controller	3	No data from this Segment Controller	09:10:19 09:32	🔴

Terminé

# Streetlight Control Front-End

## Monitor, test & Control in real-time

The screenshot displays the Streetlight.Vision Web Portal interface within a Windows Internet Explorer browser window. The browser address bar shows the URL `http://91.121.175.25:8100/reports/index.jsp`. The page header features the Streetlight.Vision logo and the tagline "Web Portal Less Energy, More Control".

The main interface is divided into several sections:

- Map:** A satellite view of a residential area with street names like "Rue de Noisement" and "Rue de la Providence". The map includes a search bar, zoom controls (Zoom: 19.46), and coordinates (Latitude: 48°30'51"N, Longitude: 2°26'40"E).
- Search:** A sidebar menu titled "World-Wide Demo Centers" listing locations: Barcelona, City of Lyon, Dublin, and Paris.
- CameraIP:** A window titled "Streetlight.Vision Demo Board" showing a live video feed of a streetlight installation, dated "Tue.2.2.2010 23:55:04".
- Control Panel (SLV\_Romlight | MANUAL):** A central control area for a specific streetlight. It includes:
  - Lamp Status:** A lightbulb icon and a slider set to 68%.
  - Time Stamp:** 02/02/10 23:54:50.
  - Mode Selection:** Buttons for "Automatic" and "Min".
  - Refresh:** A button to refresh the data.
  - Status:** A list of six status indicators, all marked with green checkmarks:
    - High mains voltage
    - Low mains voltage
    - High mains current
    - High lamp temperature
    - High ballast temperature
    - Burned out lamp
- Metering:** A panel on the right showing various energy and performance metrics:
  - OLC Energy: 45kWh
  - Lamp running hours: 211h
  - OLC Temperature: 28°C
  - OLC Voltage: 237.0V
  - OLC Current: 0.5A
  - OLC Power: 120.1W
  - Power factor: 0.96

The interface also includes a "Streetlight.Vision Lab" logo, a "Terminé" status indicator at the bottom left, and a "Mode protégé : désactivé" indicator at the bottom right.

# *i*.LON **SmartServer Simplifies Installation**

- Main challenge
  - Installation needs to be done by **electricians** with **no** LonWorks skills
  - Many devices of the same type (e.g. lamps) need to be installed on the **correct** location
  - Changing damaged devices needs to be **simple**
  - System functionality and **reliability** needs to be checked **easily and fast**

# Smart Network Management

Install the SmartNode  
in the luminaires  
or in the pole



SmartNode ID on a sticker



Contrat de partenariat  
pour l'éclairage public et  
la signalisation lumineuse tricolore

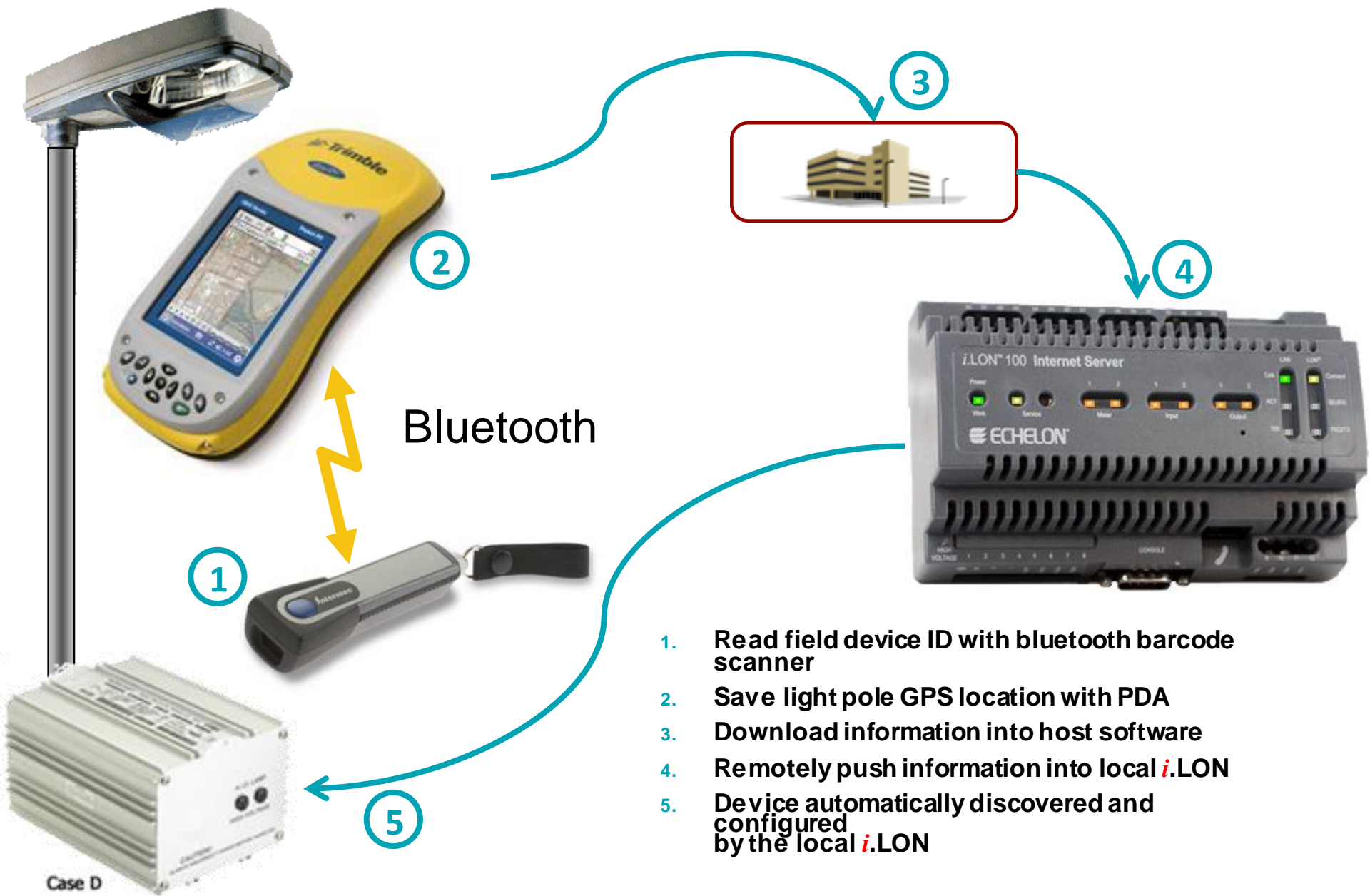


Contact : Cyril Bacque - 01.60.91.29.39 - 06.25.82.12.08

Date : 25 Février 2008

Référence du Lampadaire	Référence de l'armoire	Coller le "sticker" dans cette	Position GPS	Puissance de la lampe	Type
T0321	COLZA	0009 	E2,51280	N48,63365	
T0322	COLZA	 0501638DBC00	E2,51303	N48,63379	
T0323	COLZA	 050163884800	E2,51306	N48,63404	
	COLZA	 0501639F8A00	E2,51279	N48,63418	

Ballast/Node stickers are  
placed here by installer



Bluetooth

1. Read field device ID with bluetooth barcode scanner
2. Save light pole GPS location with PDA
3. Download information into host software
4. Remotely push information into local *i.LON*
5. Device automatically discovered and configured by the local *i.LON*

# Smart Network Management

Contrat de partenariat pour l'éclairage public et la signalisation lumineuse tricolore

senart  
SPIE

Contact : Cyril Bacque - 01.60.91.29.39 - 06.25.10.10.10

Référence du Lampadaire	Référence de l'armoire	Colonne dans la colonne				
T0321	COLZA		E2.51280	N48.63365	150	SON
T0322	COLZA		E2.51303	N48.63379	150	SON
T0323	COLZA		E2.51306	N48.63404	150	SON
T0324	COLZA		E2.51279	N48.63418	150	SON

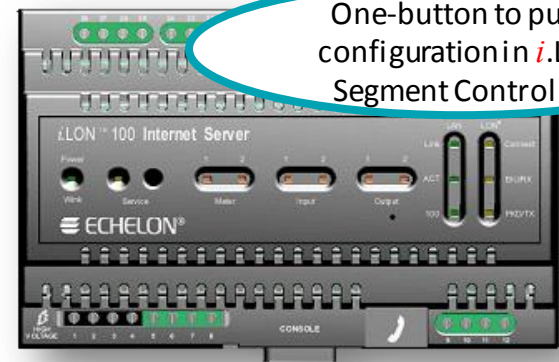
1 Collect Node Addresses

2 Group Lamps and define Dimming Schedulers

3 One-button to push configuration in i.LON Segment Controller



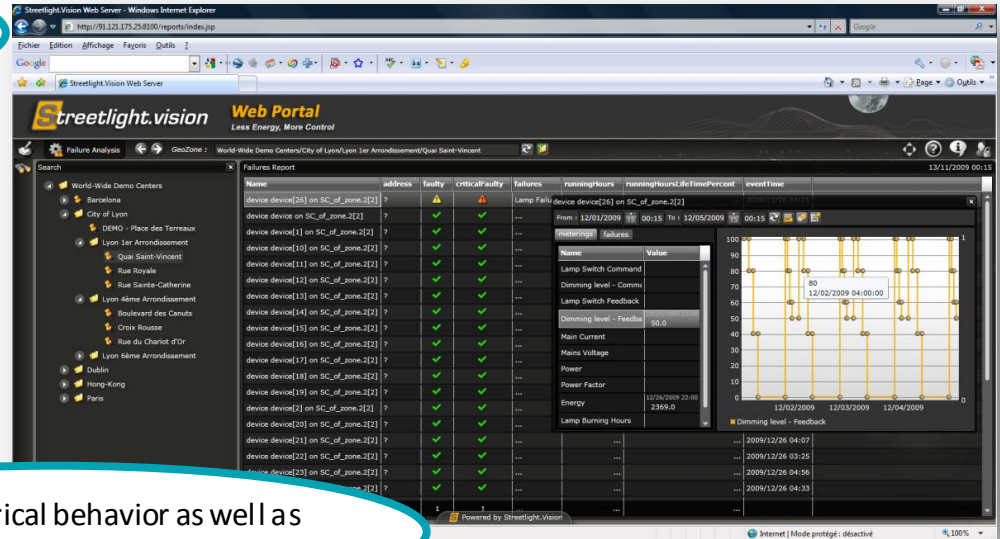
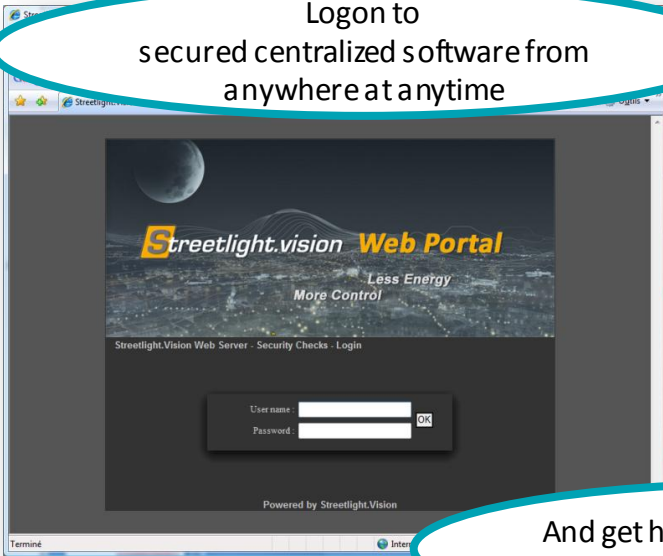
4 i.LON automatically discovers all street lights and dynamically manage repeating if needed



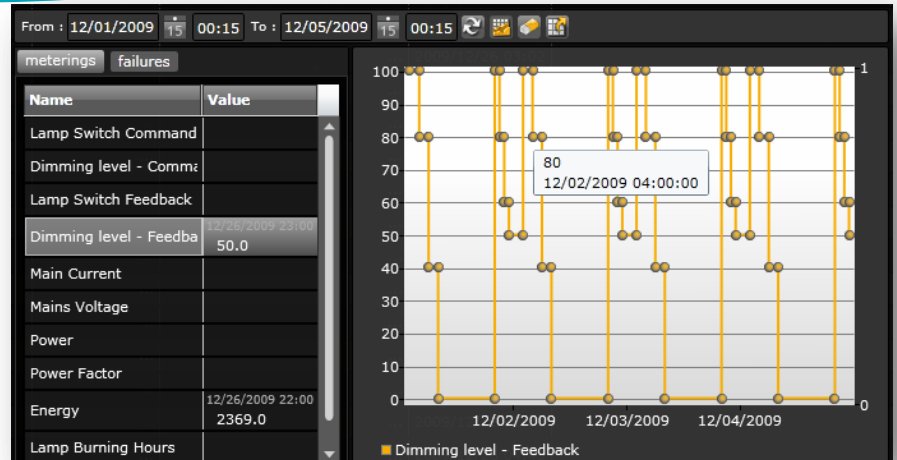
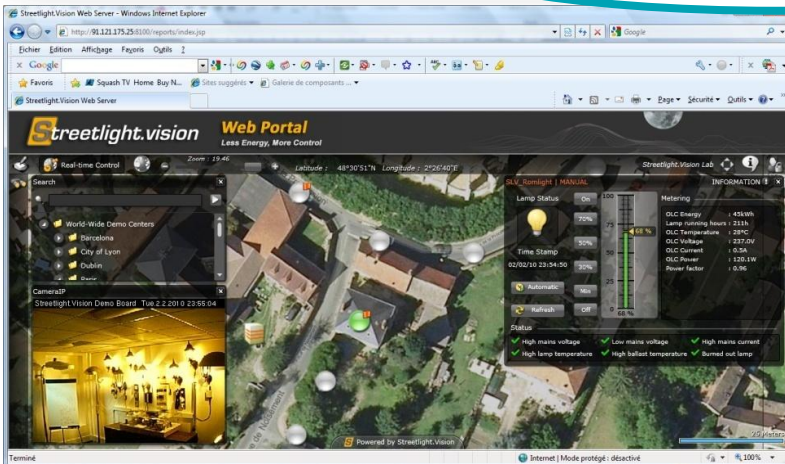


# Smart Network Management

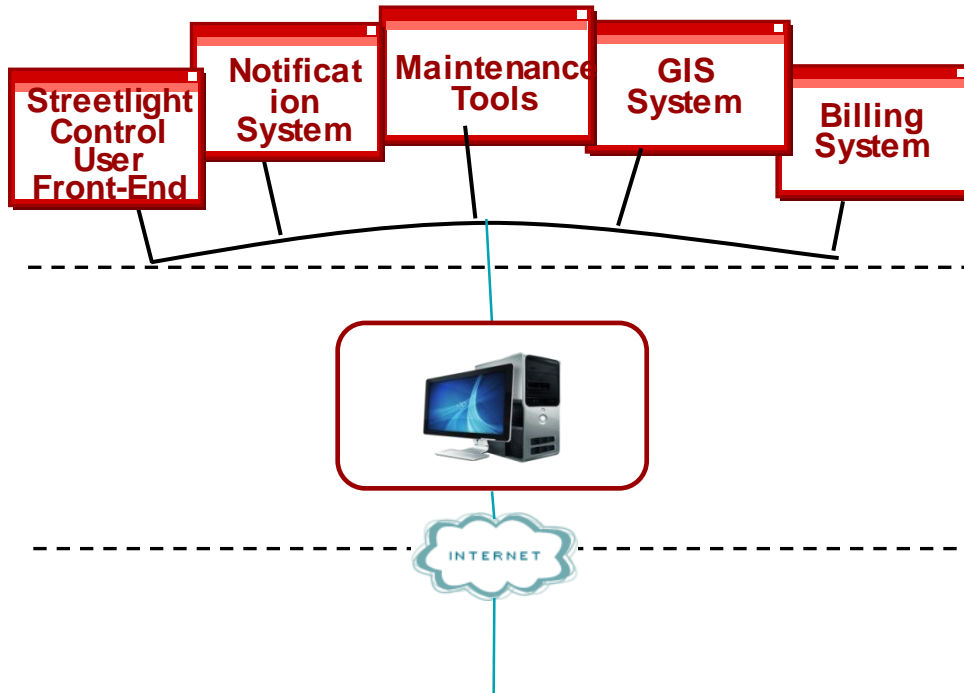
Logon to secured centralized software from anywhere at anytime



And get historical behavior as well as real time monitoring online



# Solution Architecture



## End User Access

- Energy management systems
- Fault management
- Automated service requests
- Billing services

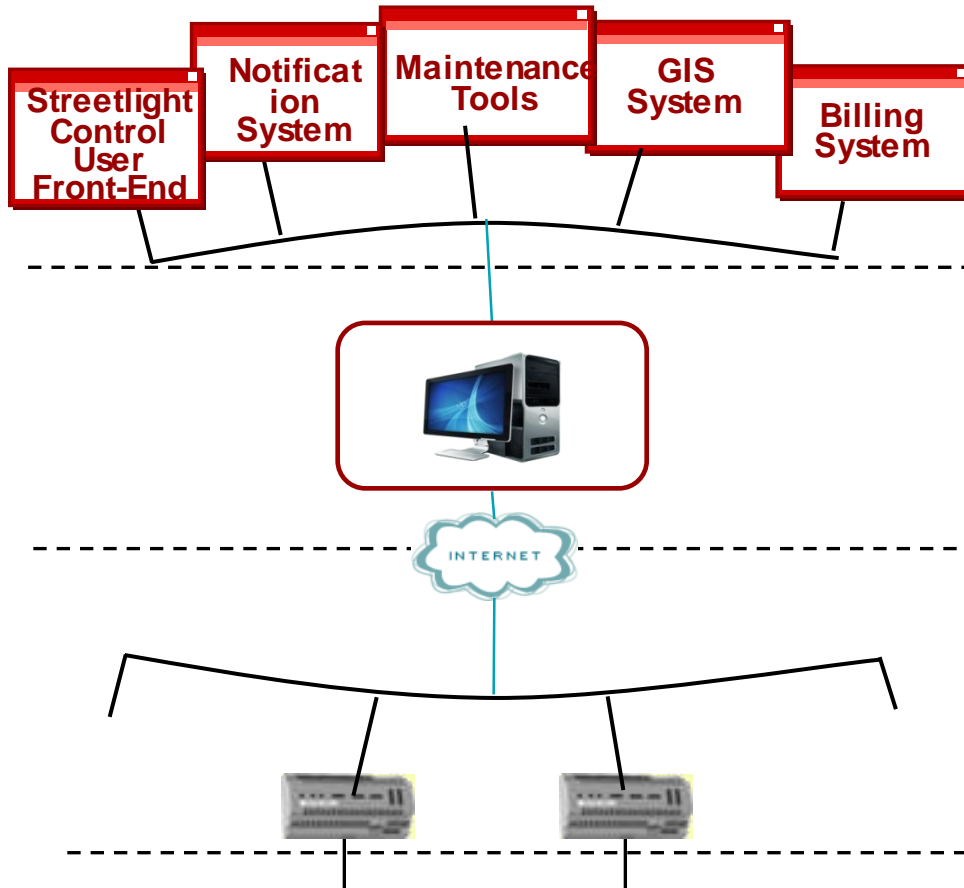


## Web Hosted Software

- Installation and maintenance
- Central database and control
- Organize and store data
- Interface with GIS systems



# Solution Architecture



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## Web Hosted Software

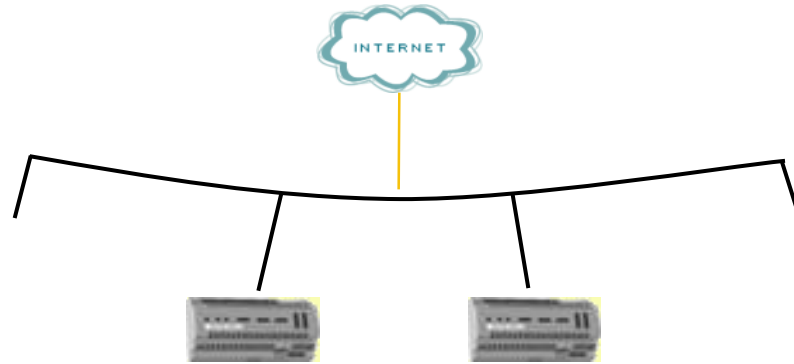
- Installation and maintenance
- Central database and control
- Organize and store data
- Interface with GIS systems



## Segment Controller

- Manage ON, OFF and dimming
- Collects lighting data
- Manage communications
- Interface with installation tool

2



# Segment Controller

# In the Cabinet

## *i.LON*<sup>®</sup> SmartServer



### ■ Local Segment Controller

- Point-point control
- Scheduling
- Data logging
- Alarming
- Metering inputs, digital relays
- ModBus meters
- Programmable

### ■ Bridge to Data Networks

- Integrated 10/100 Ethernet port
- Integrated serial ports for connectivity to GSM/GPRS modems
- Realtime collection using SOAP/XML protocol

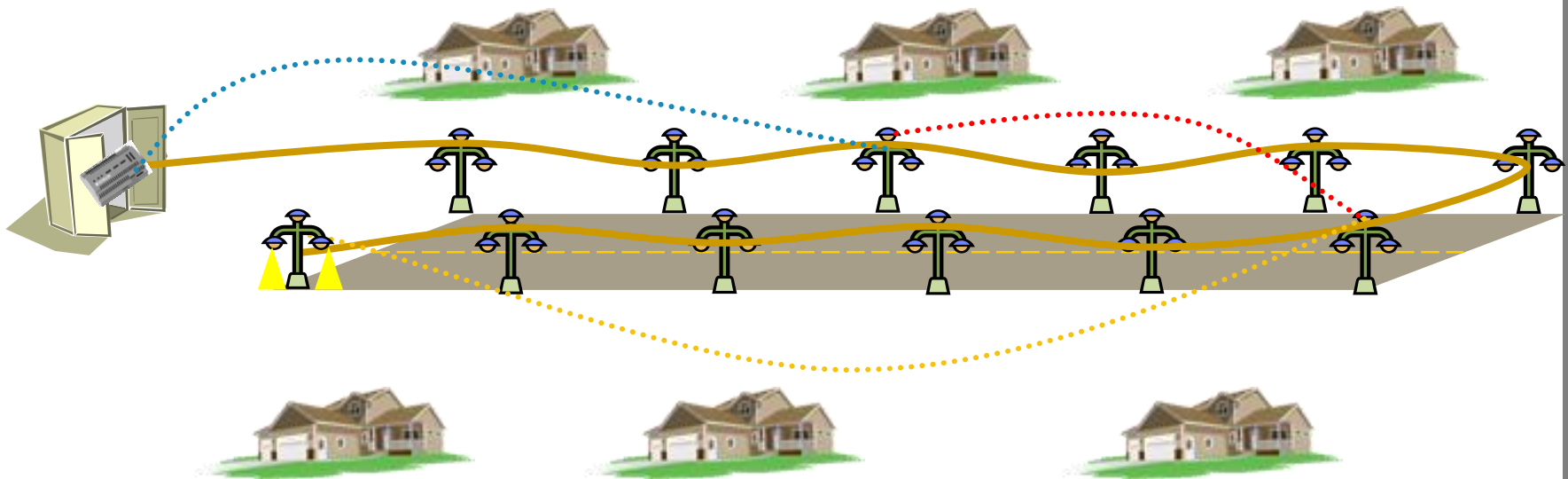
### ■ Remote Installation, Troubleshooting, & Upgrades

- No on-site system services required post installation

## i.LON PL Repeating

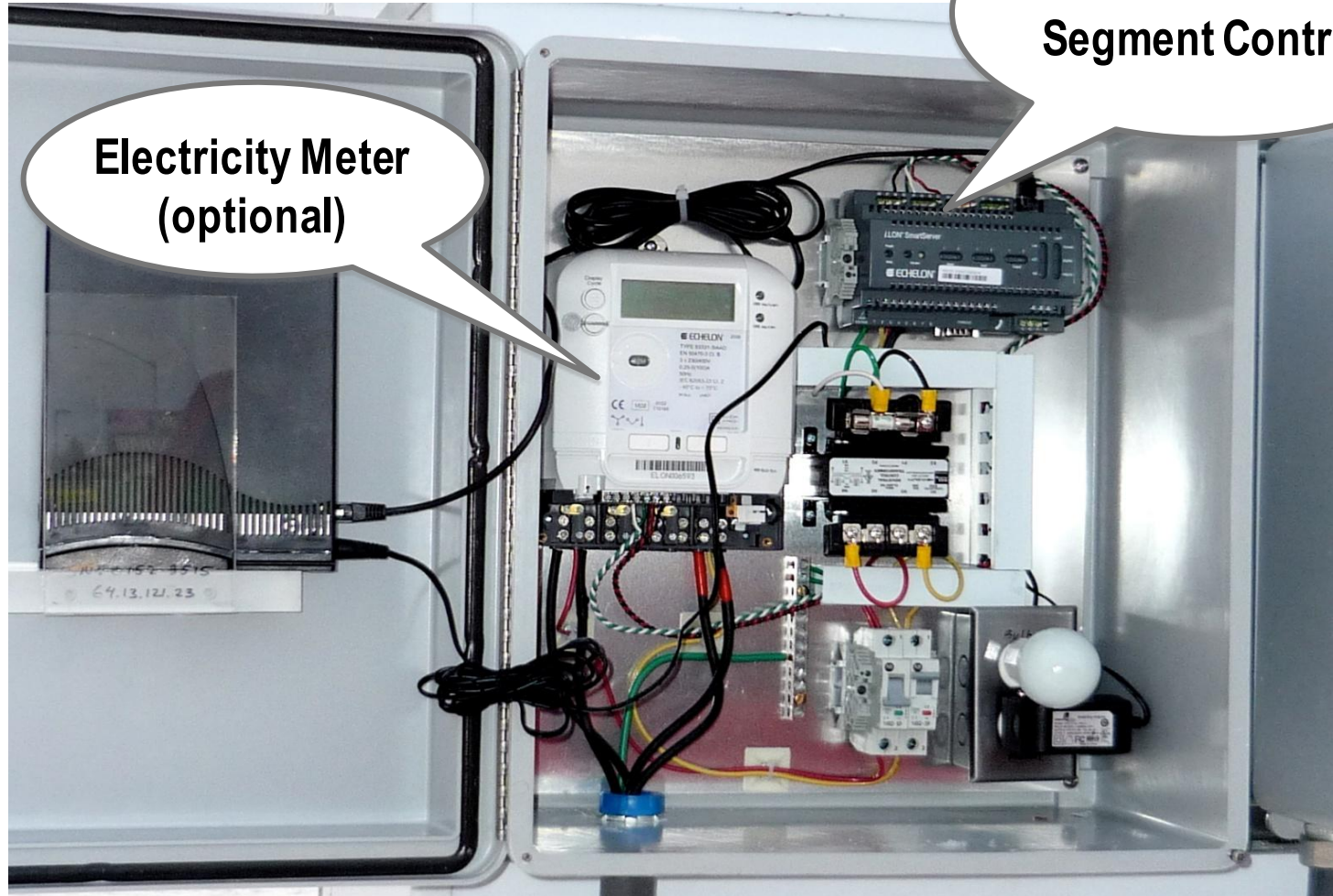
Power line repeating *dynamically* discovers and maintains the best communication path to every luminaire

- Interferences
- Long distances
- Road modifications (new buildings, etc.)
- Up to 200 nodes



# Smart Streetlighting Network

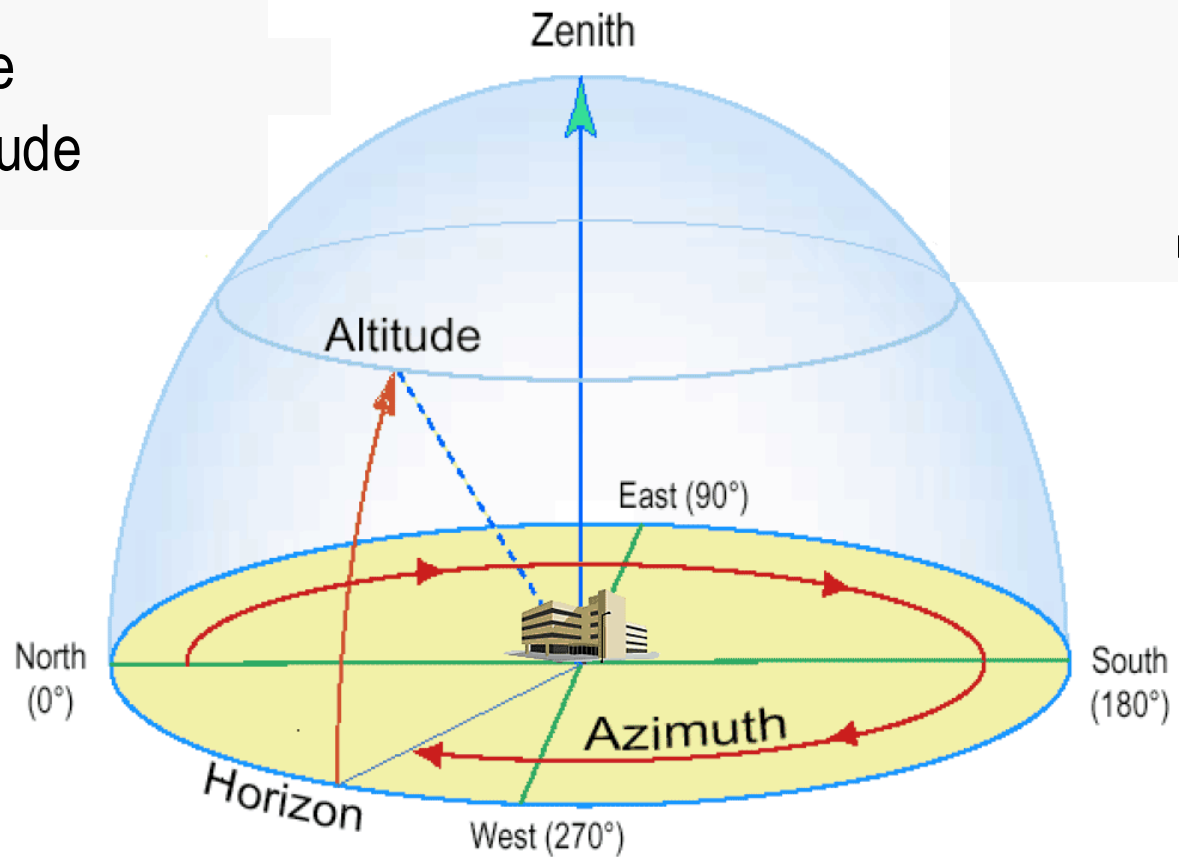
## *Behind the Panel*



# Astronomical Clock

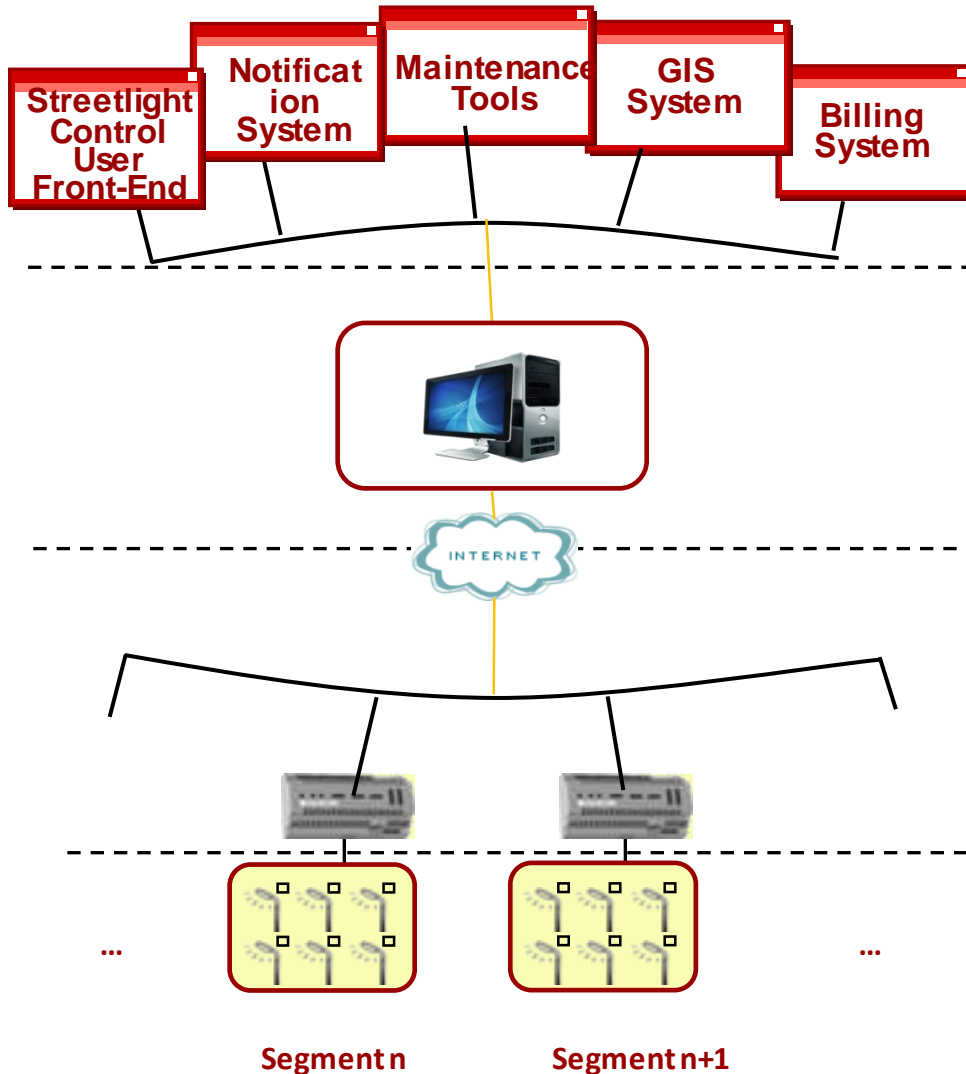
## ■ *i*.Lon SmartServer sun scheduler

- Sunset/sunrise
- Latitude/longitude
- Time-of-day





# Solution Architecture



## End User Access

- Energy management systems
- Fault management
- Automated service requests
- Billing services



## Web Hosted Software

- Installation and maintenance
- Central database and control
- Organize and store data
- Interface with GIS systems



## Segment Controller

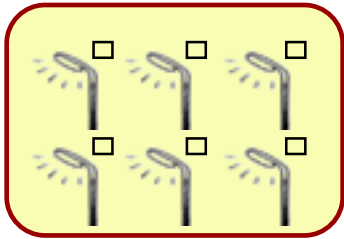
- Manage ON, OFF and dimming
- Collects lighting data
- Manage communications
- Interface with installation tool



## Outdoor Lighting Controllers

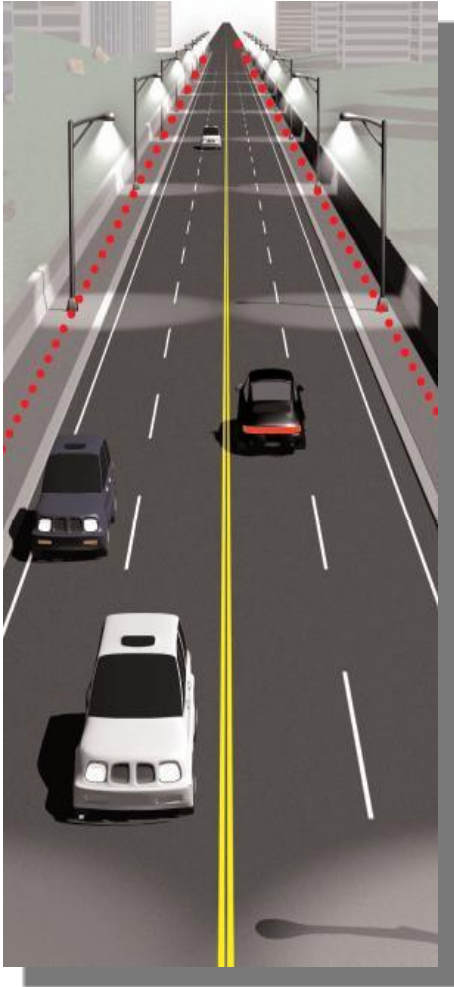
- On/Off, dimming, lamp status, power voltage, energy, run hours measures
- Traffic density measurement
- Luminance metering





# Luminaires and Outdoor Lighting Controllers

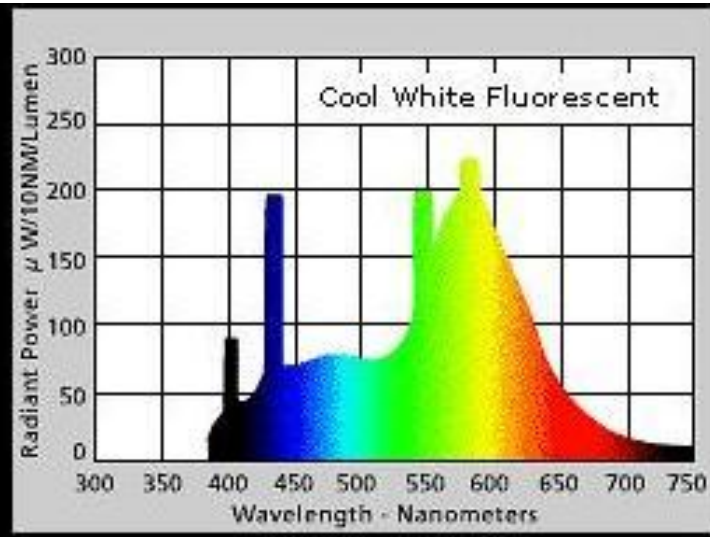
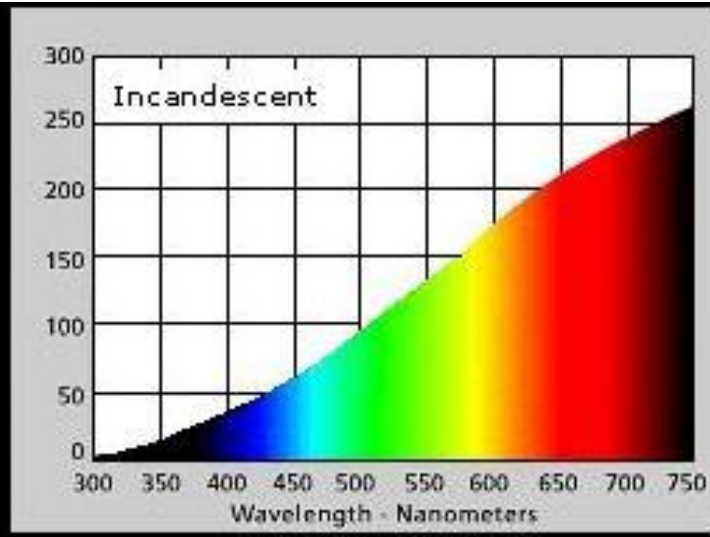
## **In the Street...** ***Intelligent Ballasts***

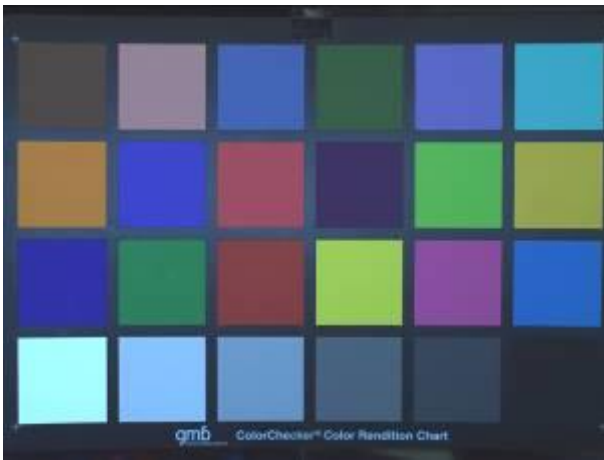


- Dimming
- Automatic failure identification
- Lamp burning hours
- Voltage, Current, Ballast Temperature, etc.
- Consumed energy (calculated)
- Standard Protocol for Communication
  - Utilizes ISO 14908-2 global standard
  - Bi-directional real-time communication

# What About LEDs?

- LED lights have many advantage...
  - Much longer life span
  - Much better CRI => less light needed => less energy used
  - Innovative luminaire designs
- ...and some disadvantages
  - Still expensive
  - Heat dissipation
  - Norm-compliant lenses/optics are just now hitting the market
  - Driver must be designed up front for control





**Ambient Light  
+ White LED**

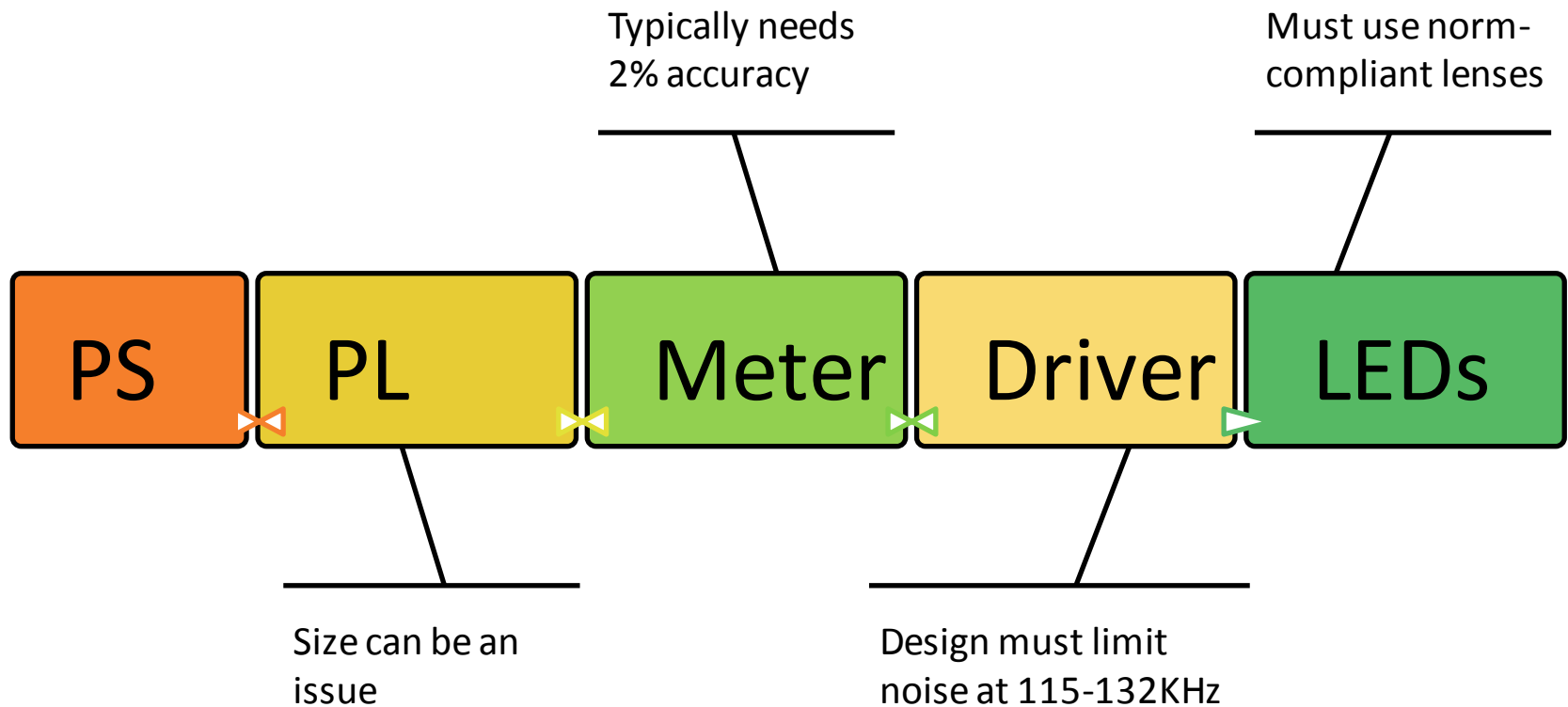


**Ambient Light  
(Incandescent Lamp)  
+ RGB-LED**



**Ambient Light  
+ RGB LED**

# LED Light Design Requirements



- Target market price must be \$80-\$100

## LED Light Design Requirements

- They are usually cost effective only in the low-power range of the installed lights

	Residential Low Power	Residential High Power	Roads Low Power	Roads High Power
No. of Lights	60%	25%	10%	5%
Sodium Light	85W	150W	250W	400W
LED Light	45W	75W	--	--
Cost	Comparable	Acceptable	Too high	Too high

- This is because as power increases, cost of LED has almost linear increase, sodium lamps increase much less



# Lamp Replacement Strategy

- Typically mercury vapor lamps are used for street lighting and other outdoor lighting (car parks, etc)

Lamps are being replaced with energy efficient lamp High Intensity Discharge (HID) as follows:

- **For Street Lighting**

- High Pressure Sodium - 200 to 400 W (Orange-White color Light)

- **For Warehouses, Outdoor & Parking Lots**

- Metal Halides – 100 to 250 W (Natural White color Light)

- Some cities (e.g. San Jose, CA) use

- **For Street Lights**

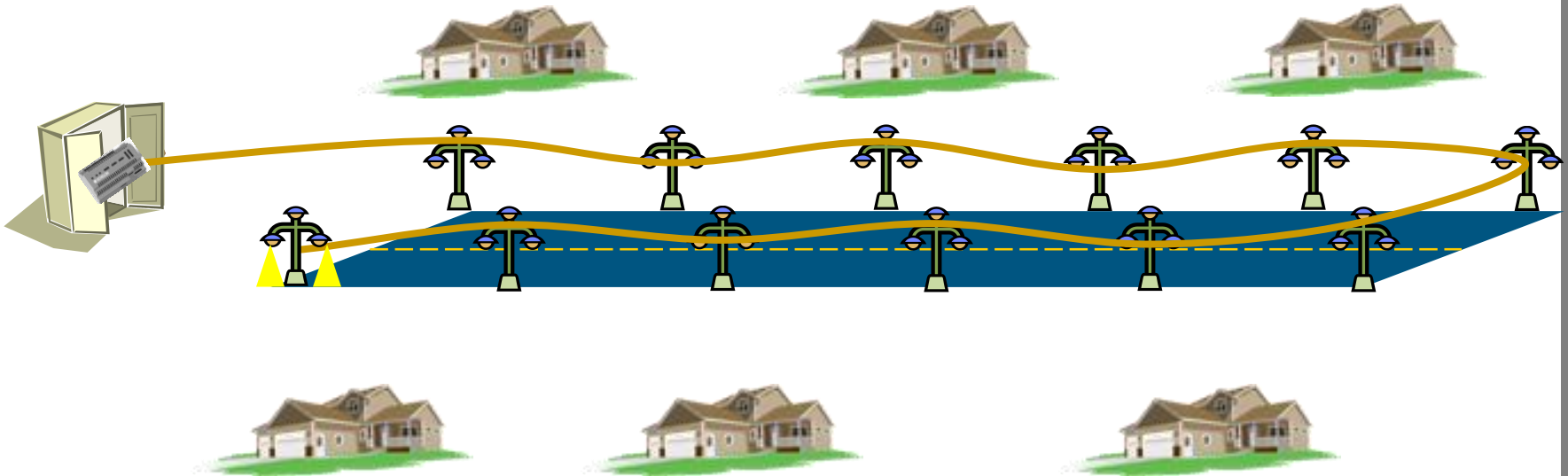
- Low Pressure Sodium – 180 W (Yellow Light)

# Types of Ballasts & PL Controller

- EMEA
  - 230V, 35W to 100W
  - Interface to ballast: serial, 1 to 10V, Dali, Madli, native PL
- US/Canada
  - 120V, 200W to 400W
  - Interface: serial, 1 to 10V, Madli, native PL
- Asia
  - 120 to 240 V
  - Interface = 1 to 10V, native PL

# Powerline to Control Luminaires

- **Why Powerline?**
  - Avoids *deadspot* issues typical of RF
  - No external repeaters
  - No problematic radio emissions
- **Open system**
  - Devices are interoperable
  - No customer lock-in
  - Modular and future-proof system deployment
- **Robust and field proven**
  - Over 30 million smart meters installed worldwide
  - Based on ISO 14908 standard
  - Tens of installations and pilots in intelligent street lighting systems
  - Supported by multiple manufacturers
- **Reduced time-to-market and certified device development**

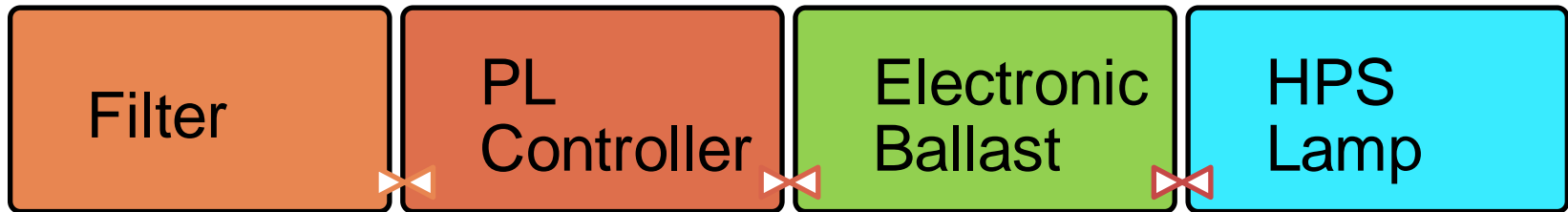


## PL Controller Versions – 1



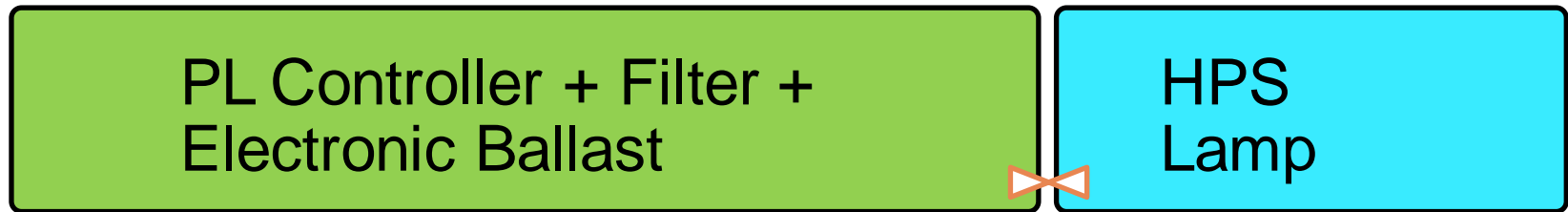
- For lowest cost retrofit
  - Limited functionality
    - On/off, bi-level dimming only, limited diagnostics
  - Low cost
  - Multi-box solution
    - Possibly size-constrained installation

## PL Controller Versions – 2



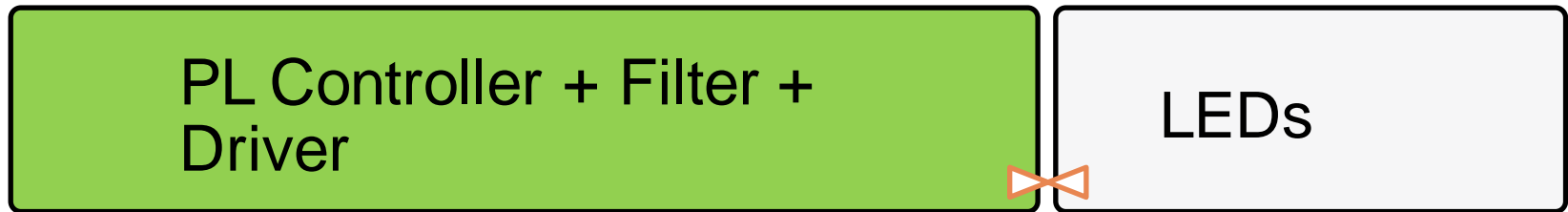
- For advanced retrofit
  - Advanced functionality
    - On/off, stepless dimming, advanced diagnostics
  - Higher cost
  - Larger energy savings
  - Better ROI
  - Multi-box solution
    - Possibly size-constrained installation

## PL Controller Versions – 3



- For most advanced retrofit and new applications
  - Advanced functionality
    - On/off, stepless dimming, advanced diagnostics
  - Lowest cost
  - Simplest installation

## PL Controller Versions – 4



- For new installations
  - The future
  - Not fully mature yet
  - Best energy savings
  - Top functionality

## OEM Differentiation

- OEMs using Echelon's PL protocol for communication in their controllers can differentiate:
  - By feature
    - On/Off, dimming, voltage measurement, run hours, fault detection, etc.
  - By price
  - By form factor
  - By supported lamp technology
- Just like web browsers are all based on TCP/IP but very different...



## Powerline vs. Radio-Frequency

- *Powerline is*... independent from future road environment modifications (new buildings, trees)
- *Powerline provides*... built-in and dynamic signal repeating
- *Powerline is*... widely deployed (30 millions units), extremely reliable and proven
- *Powerline gathers*... many manufacturers around one unique worldwide communication standard. We have a solution for all types of lamps (including LEDs) and all types of luminaires (pole mounted OLCs and luminaires mounted OLCs)
- *With Powerline*... Physical communication medium less susceptible to tampering and more easily detectable

# Many manufacturers = a solution for all your streetlights



	SELC 2000	SELC 3000	PHILIPS STARSENSE	CITYLONE FERRO	CITYLONE DALI	ROMLIGHT StreetROM	SCS ON/OFF	SCS BILEVEL	SITECO DALI
<b>Can be installed in the Pole</b>	<b>NO</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>
<b>Can be installed in the Luminaire</b>	<b>YES</b>	<b>NO</b>	<b>YES</b>	<b>NO</b>	<b>NO</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b> (specific model)
<b>Dimmable ballast</b>	Integrated elec. dim. Ballast	Integrated elec. dim. Ballast	Any 1-10V dim ballast	Any magnetic ballast	Any DALI dim ballast	Integrated elec. dim. Ballast	ON/OFF only	Any bilevel magn. ballast	Any DALI dim ballast
<b>Lamp Alarm</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>
<b>Current Alarm</b>	<b>NO</b>	<b>NO</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>NO</b>	<b>NO</b>	<b>YES</b>
<b>Voltage Alarm</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>NO</b>	<b>NO</b>	<b>YES</b>
<b>Temperature Alarm</b>	<b>YES</b>	<b>YES</b>	Only with model 7025 and 7026	<b>NO</b>	<b>NO</b>	<b>YES</b>	<b>NO</b>	<b>NO</b>	<b>NO</b>
<b>Other alarms</b>	Weak Lamp, Brown Out	Weak Lamp, Brown Out	Low power factor	Low power factor	Low power factor		Flickering, low power factor	Flickering, low power factor	Low power factor
<b>Metering values</b>	U, °C, KWH, H	U, °C, KWH, H	U, I, P, Cos Phi, KWH, H	U, I, P, Cos Phi, KWH, H	U, I, P, Cos Phi, KWH, H	U, I, P, Cos Phi, KWH, H	Cos Phi	Cos Phi	U, I, P, Cos Phi, KWH, H
<b>Max Power</b>	<b>150 W</b>	<b>100 W</b>	<b>400 W</b>	<b>250 W</b>	<b>250 W</b>	<b>400 W</b>	<b>400 W</b>	<b>400 W</b>	<b>250 W</b>

# Manufacturers offers compatible LonWorks products



**PHILIPS**



**siteco**



## Street Lighting References



# Over 30 Resellers and 300 Cities

## MANUFACTURERS



## STREETLIGHT COMPANIES



# City of DUBLIN (Ireland)

- **OVER 3000 STREETLIGHTS UNDER CONTROL**

- **SOLUTION DEPLOYED BY THE CITY**

- SELC BALLAST
- ILON SEGMENT CONTROLLER
- STREETLIGHT.VISION – WEB HOSTED BY SLV

- **STARTING DATE: 2009**

- **RETURN ON INVESTMENT < 5 YEARS**

- Electricity cost = 14 cents of Euros per KWH
- Average wattage 120 W
- Average dimming > 35%

- **NEXT STEPS**

- Deploying new cabinets every months
- About 10.000 lights by end of 2010
- Deploy additional Lonworks applications



# SENART en ESSONNES (France)

- NUMBER OF STREETLIGHTS UNDER CONTROL > 3800
- SOLUTION DELIVERED BY SPIE
  - PHILIPS BALLAST/NODE + CITYLONE NODES FOR MAGNETIC BALLASTS
  - I LON SEGMENT CONTROLLER
  - STREETLIGHT.VISION – WEB HOSTED BY SLV
- PRIVATE PUBLIC PERFORMANCE CONTRACT
  - Electricity cost = 8 cents of Euros per KWH
- Average wattage = 140 W
- Average dimming > 40%
- Energy certificate
- NEXT STEPS
  - Duplicate the solution to all their customers
  - Leverage this project to differentiate SPIE from competitors
  - Deploy additional Environmental Applications



# OSLO (Norway)

■ NUMBER OF STREETLIGHTS UNDER CONTROL > 8900

■ SOLUTION

- SELC 2000 ELECTRONIC DIMMABLE BALLAST AND NODES
- ILON SEGMENT CONTROLLER
- REPLACEMENT OF LUMINAIRES WITH LOWER WATTAGE HPS LAMPS

■ STARTING DATE : 2005

■ 70% SAVINGS IN ELECTRICITY CONSUMPTION

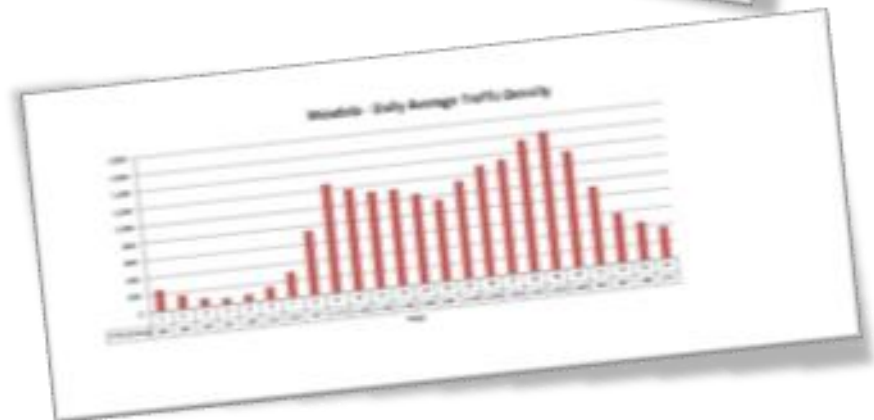
- Compared to previous higher-wattage luminaires
- Saving of 1440 tons of CO<sup>2</sup>
- Project included in the Clinton Climate Initiative Best Practices





# Highways North of Porto (Portugal)

- **NUMBER OF STREETLIGHTS UNDER CONTROL > 300 (10.000)**
- **SOLUTION DELIVERED BY ENLIGHT**
  - ROMLIGHT INTEGRATED BALLAST
  - ILON SEGMENT CONTROLLER
  - STREETLIGHT.VISION SOFTWARE
- **STARTING DATE: 2009**
- **RETURN ON INVESTMENT < 4 YEARS**
  - Electricity cost = 10 cents of Euros per KWH
  - Average wattage = 250 W
  - Average dimming > 40%
- **NEXT STEPS**
  - Duplicate to all Highways and Tunnel Lighting in Portugal



# Unique Benefits

## ■ MANY LONWORKS LIGHT CONTROLLERS AVAILABLE

- You negotiate prices, you do not depend on one manufacturer
- You can issue OPEN TENDERS along the deployment of your project
- More than 20 products on the market
- One new Light Controller every quarter
- OPEN = Choice in price and features

## ■ EASY, QUICK, «NO SPECIALIST» INSTALLATION

- Key to control many streetlights in short time
- No engineering cost involved
- Repeating technology, no network study prior to install

## ■ OPENESS = PRICE IS COMPETITIVE AND DECREASING

## ■ ROBUST, PROVEN, WIDELY DEPLOYED

- Thousands of Segment Controller deployed world-wide
- Robust and feature-rich telemanagement Software
- Hundreds of engineers at all levels of the solution

## ■ FUTURE PROOF

- Standardized protocol is a warranty for end-customers
- User Groups with Echelon, Streetlight.Vision and large Cities





**Thank You**