



# The 'Internet of Everything for Cities'

## Towards New Models for the Smart City

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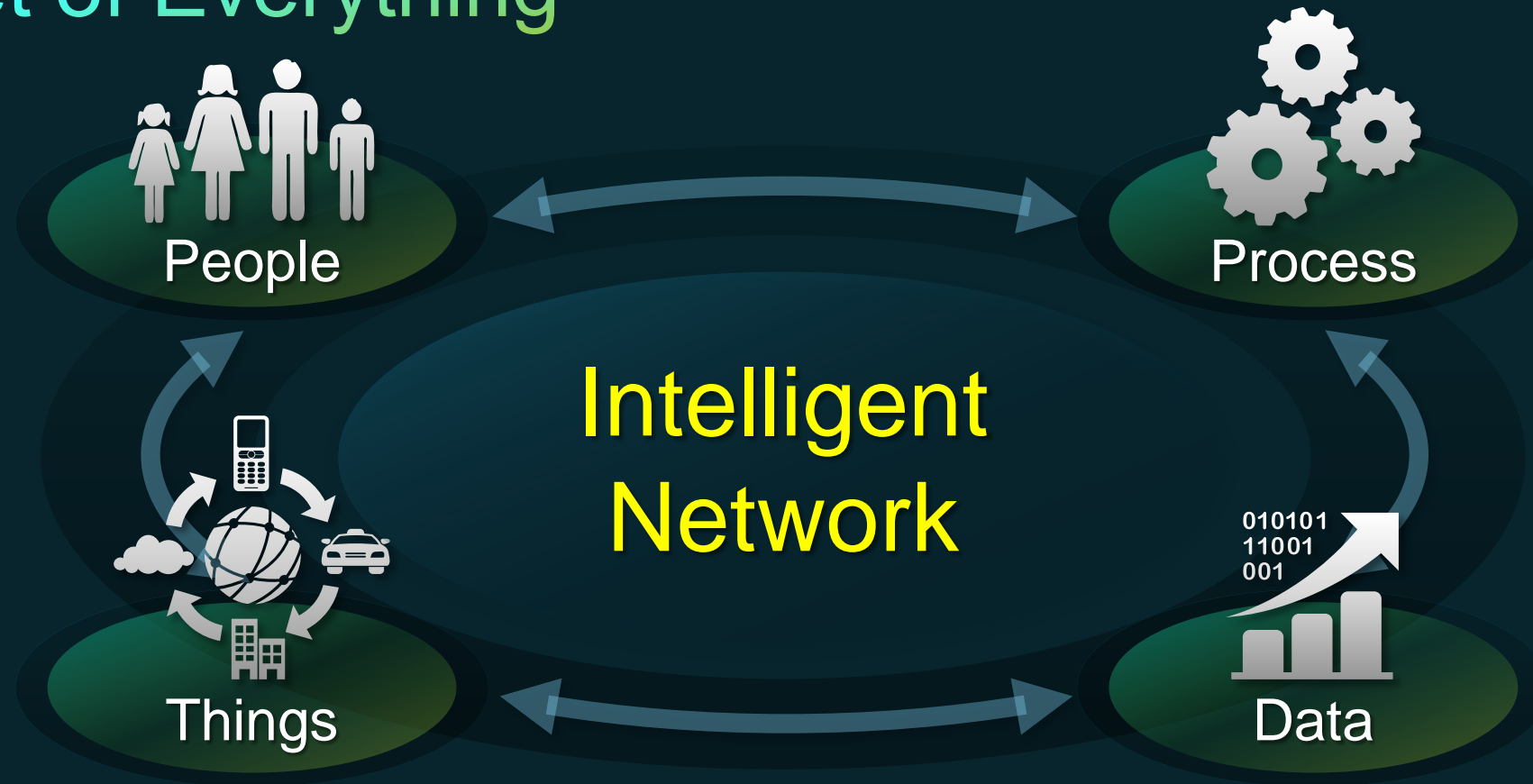
October 2014

# Agenda

- IoE Definition
- Cisco's Role in IoE for Cities
- Solutions and Use cases
- Global References



# Internet of Everything



The Internet of Everything brings together **people, process, data and things** to make **networked connections** more **relevant** and **valuable** than ever before, turning information into actions that create **new capabilities, richer experiences** and **unprecedented economic opportunity** for businesses, individuals and countries.”

# The Internet of Everything



People-to-People + People-to-Machine + Machine-to-Machine

Source: Cisco Internet Business Solutions Group, 2012

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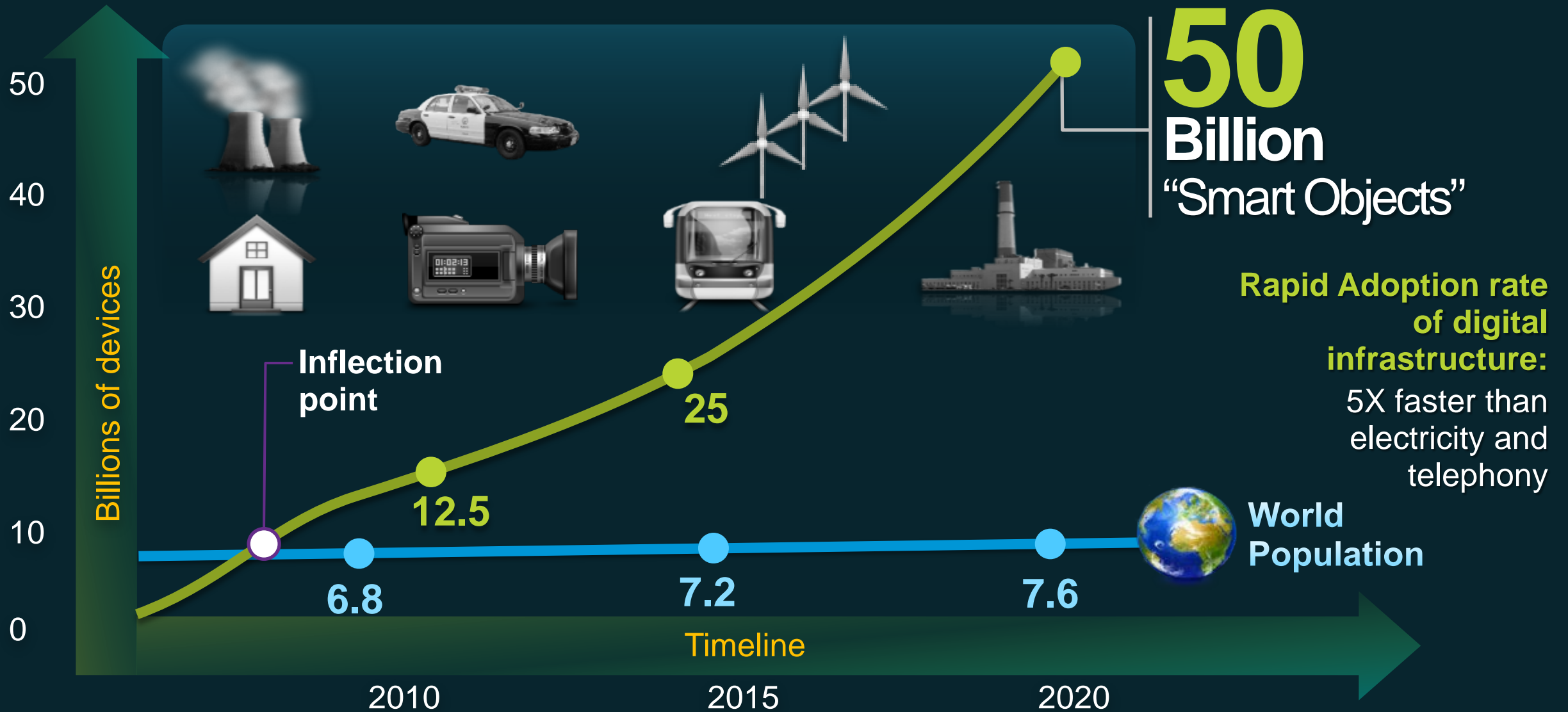
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# Cisco's Role in IoE



# Increasingly Everything will be Connected to Everything



# Amazing Things Happen When You Connect the Unconnected

99%

*of the World is Still  
Not Connected*



# Cisco Internet of Things Portfolio



Manufacturing



Mining



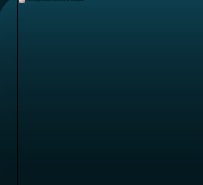
Energy-Utility



Oil and Gas



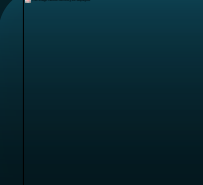
Transportation



City



Defense



M2M

Plantwide Ethernet, Intelligent Transportation, Smart Cities, S&C Refinery, Smart Connected Vehicle, Smart Grid

## Plant Switching



## Plant Routing



## Field Network



M2M ISR /  
Gateway  
Router



Rugged  
Wireless

## Embedded Networks



## Physical Security



Video Surveillance  
Manager and  
IP Cameras

IPICS



Physical Access  
Manager

Network Management and IoT Security

Fog Computing

Data Center/Virtualization



# Building an IoT Ecosystem



## Cisco's Approach to IoT

### "Customer-In" Approach

- Understanding of key business care about and pain points
- Relevance to LOB leaders / CXOs

### Products/Technologies

- Best-in-class ruggedized products
- Smart solutions for verticals
- IoT architectures

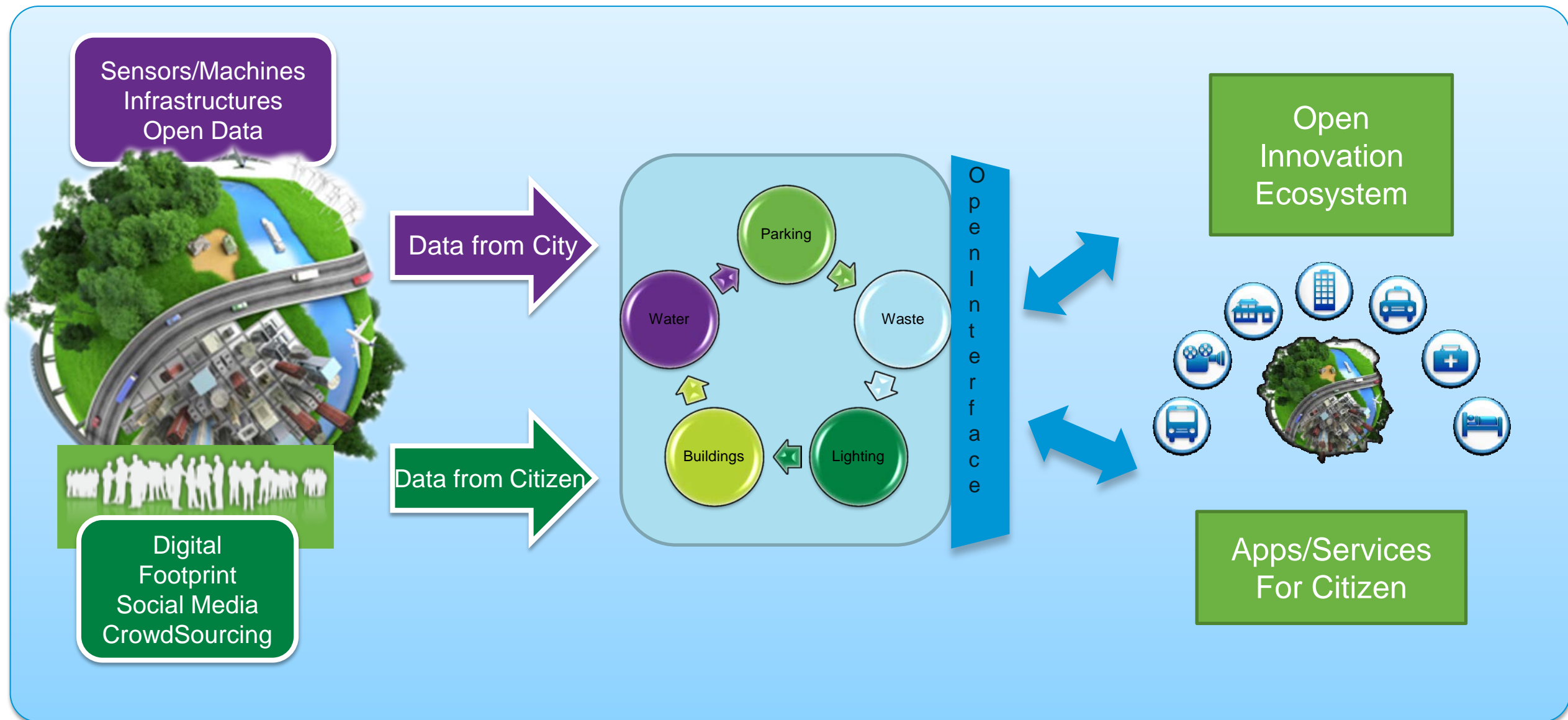
### Strategic Partnerships

- Industry partners
- Vertical software / service partners
- Service providers

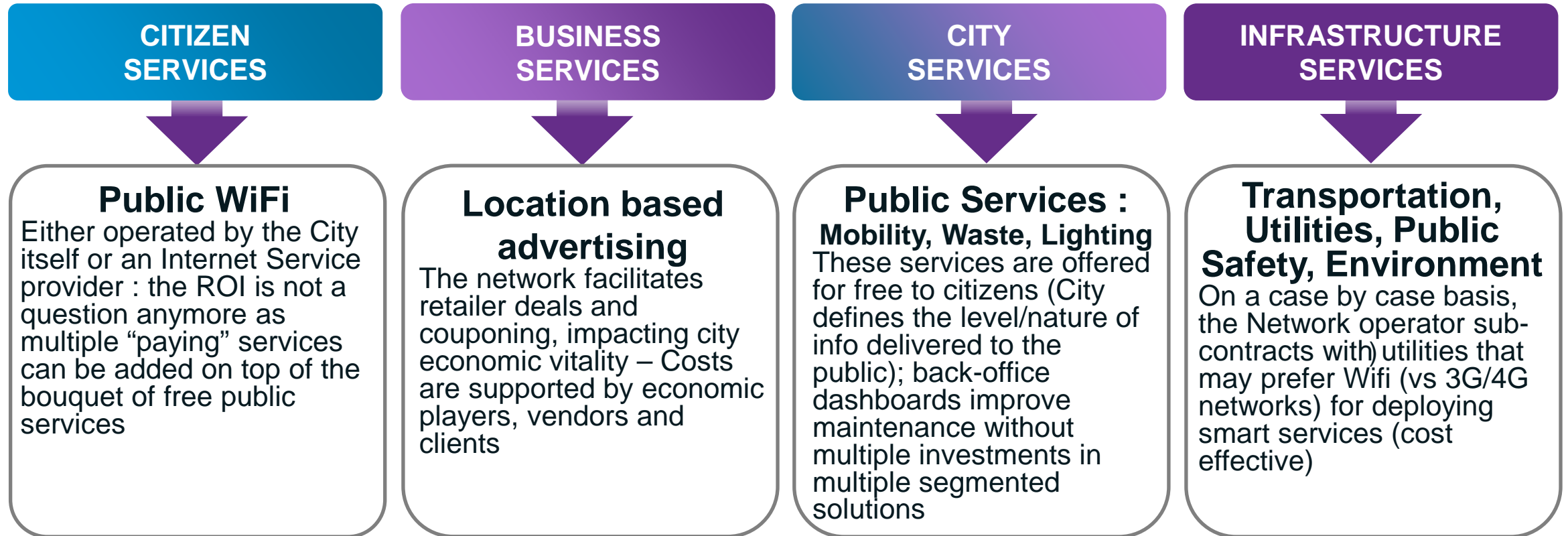
# IoE for Cities



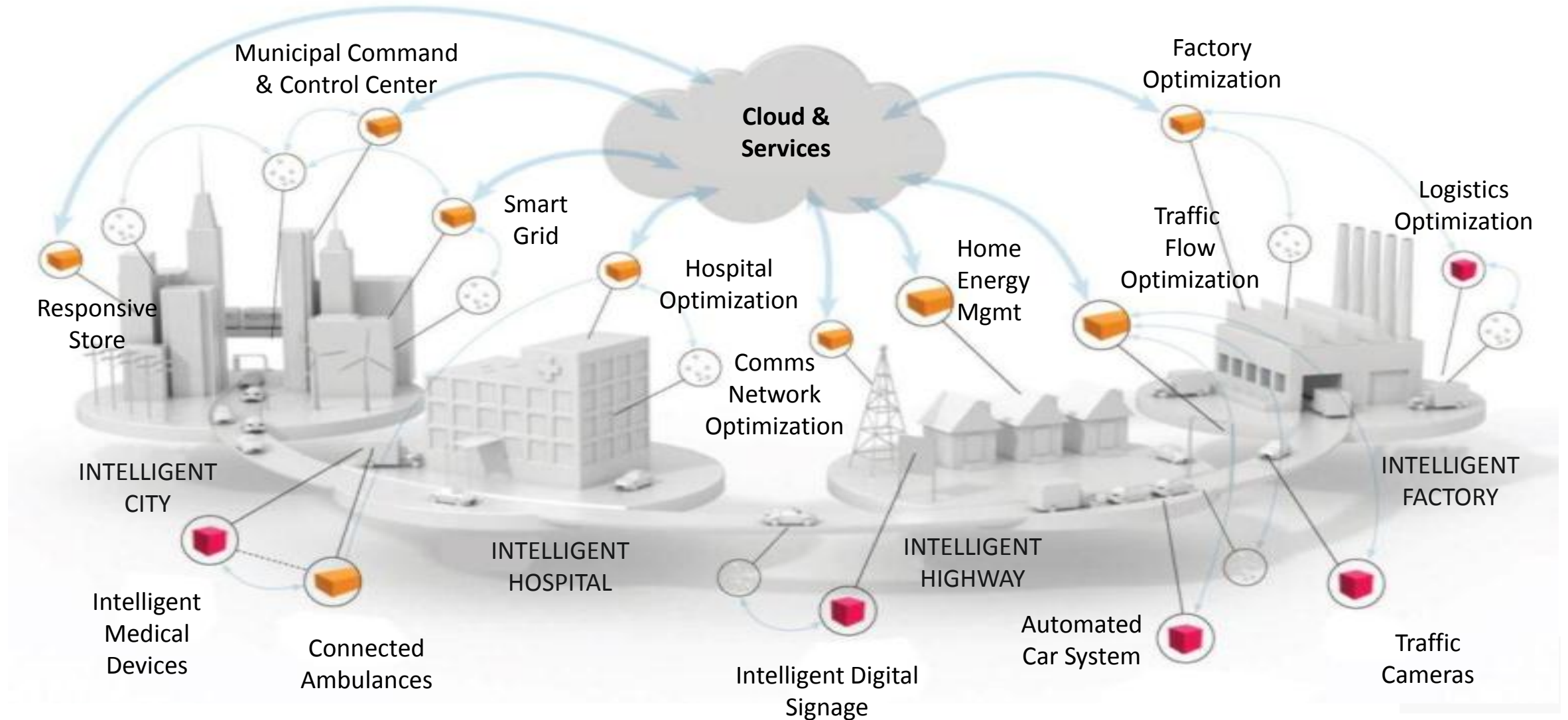
# IoE for Cities: High Level Architecture



# Overview of Smart City Services



# Where does it Start? A Pervasive IP-enabled Network



# Use Case Examples

**Public Wi-Fi**

**Information  
Services**

**Virtual Tourist**

**S+C City Network**

**Citizen  
Engagement**

**City  
Infrastructure  
Management**

**Commerce**

**Location  
Analytics**

# Smart City Infrastructure Management

» Smart Traffic

» Smart Parking

» Smart Public Safety

» Smart Street Lighting

» Smart Waste Management

» Smart Environment Monitoring

Communications platform for delivering smart services e.g. parking, water metering, and traffic monitoring

Built using open standards/APIs to simplify integration with existing systems/apps

Drives investment consolidation and faster, improved return on capital employed

# The Nice Connected Boulevard

## SMART MOBILITY

Smart Parking funds the entire “mobility” offer for the good of city traffic, the environment & economic growth



## SMART WASTE

The reducing of rounds of waste collection has an impact on costs and carbon footprint



## SMART LIGHTING

The “Just Lighting” reduces the electricity bill and maintenance costs



## ENVIRONMENT

The solution improves effective management of pollution picks & noise nuisances





# Barcelona Project Highlights

## Born District

### Temperature, humidity, noise, dust and gases Sensors

- In Born District
- Zolertia sensors



### Parking Management

- In Plaza Palau
- Streetline sensors



### Waste Management

- Urbiotica sensors
- in Born District



### Smart Lighting

- Monitored LED in Born Area
- Street light vision solution



### Office of Virtual Attention to Citizens

- REGS In Born District



### Wifi Based Location Analytics

- In Arts hotel
- In Born Area



### Watering System

- In Turo Parc



### Smart Citizens

A Crowdfunding initiative to deploy Arduino-based outdoor sensors, that collect real time environmental data



### Connected Bus

- TMB buses with 819

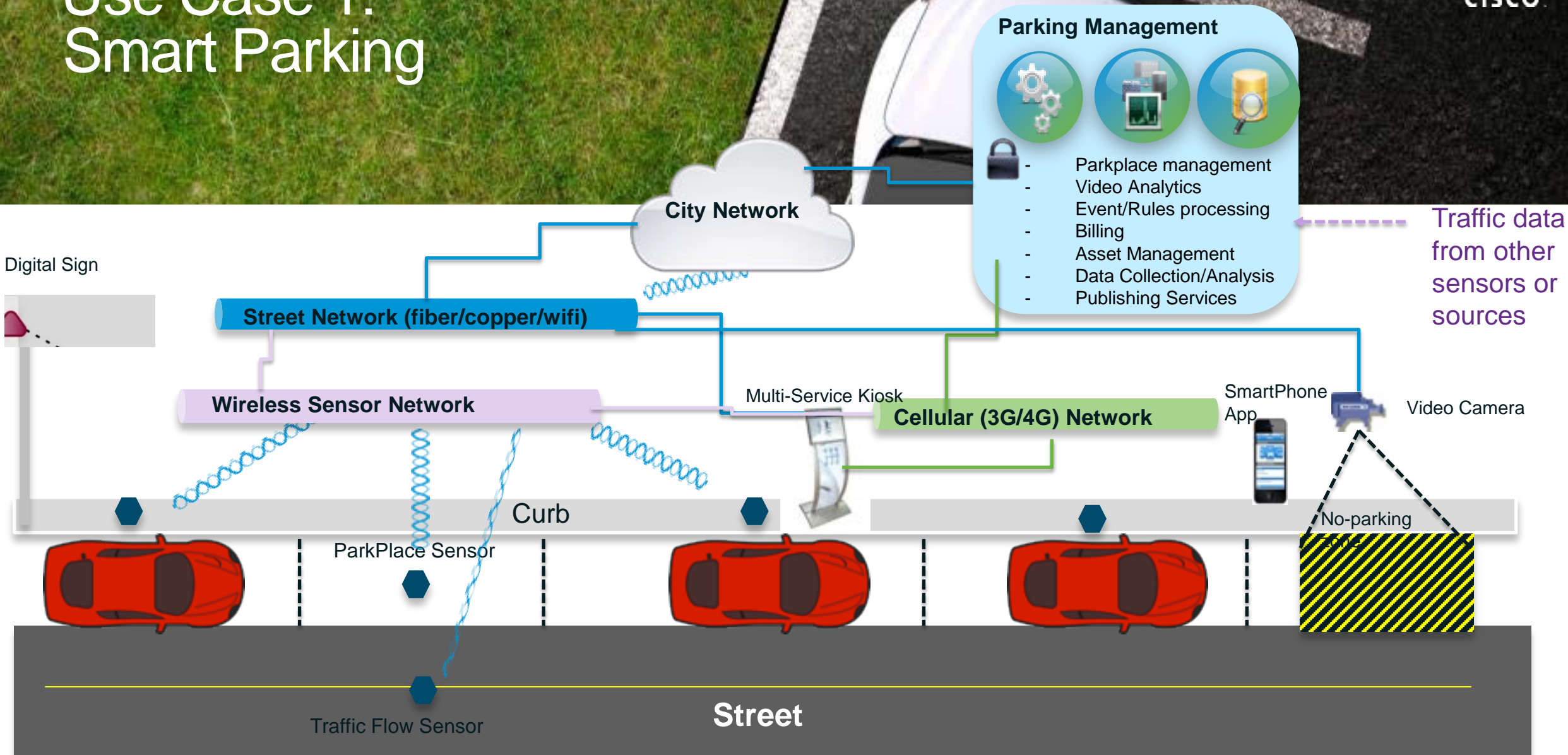


### Smart Bus Stop

- Digital Signage, Wi-Fi
- JC Decaux



# Use Case 1: Smart Parking



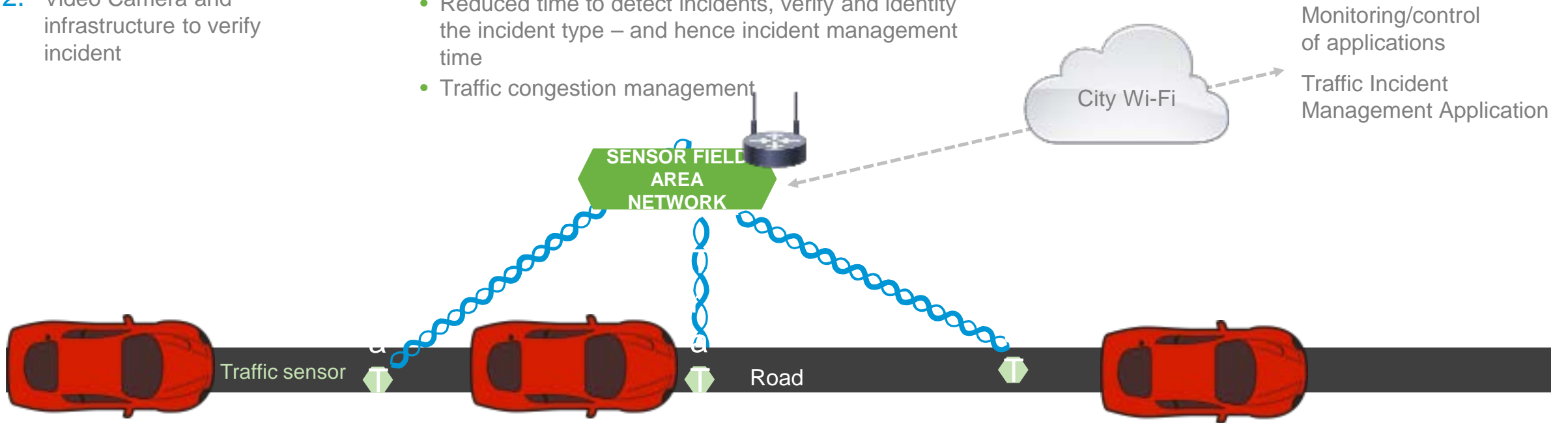
# Use Case 2: Smart Traffic Incident Management



1. Installation of sensors along road network
2. Video Camera and infrastructure to verify incident

## Benefits include:

- 'Eyes' on the live situation on road network
- Reduced time to detect incidents, verify and identify the incident type – and hence incident management time
- Traffic congestion management



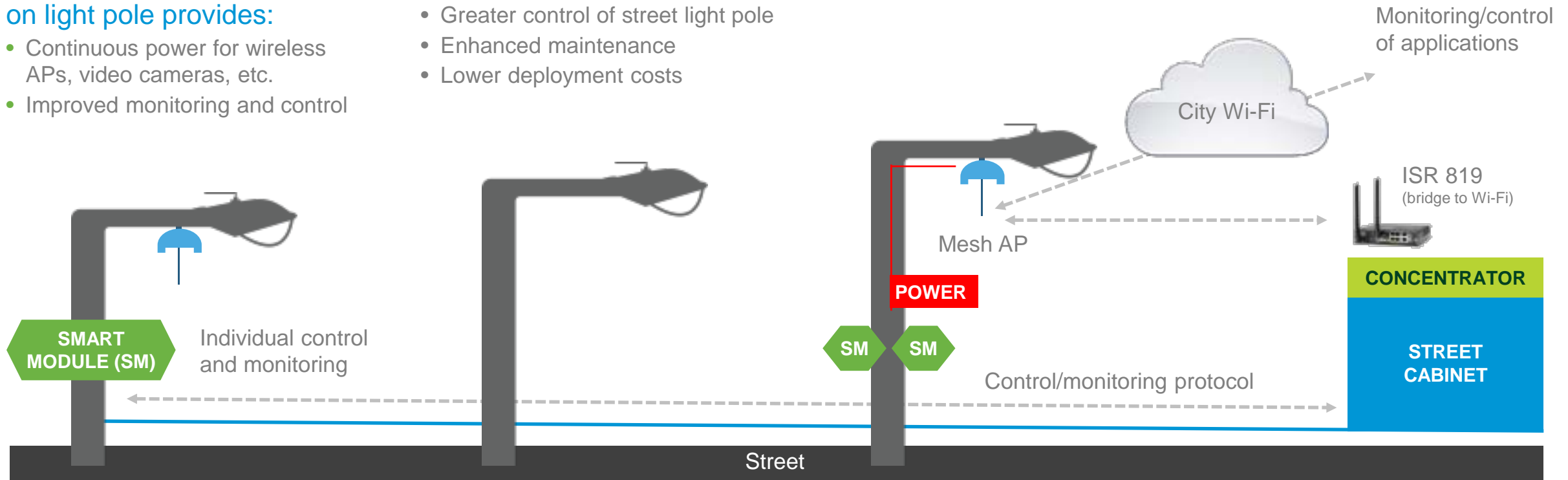
# Use Case 3: Street Light Management

## Installation of smart devices on light pole provides:

- Continuous power for wireless APs, video cameras, etc.
- Improved monitoring and control

## Benefits include:

- Greater control of street light pole
- Enhanced maintenance
- Lower deployment costs



# Smart Lighting\*

\* Based on Nice Connected Boulevard Case, Courtesy of Think Global



## The right light

### Street Light Management

- Lamp intensity monitored according to information sent by luminosity & traffic sensors
- Diverse sensors taking into account multiple criteria: natural light (day or night), weather conditions (eg: more light in the event of fog), presence of cars (Light substitute with car headlight), presence of physical persons (less light in case of higher concentration of persons and more light in the event of an isolated person)
- Match comfort and security dimensions

### Back Office Monitoring Tool \*

- Remote Switch on/off per light point/lamp as opposed to per zones
- State of the park: real time reporting of defective lamps, with detailed diagnosis (bubble issue, or socket issue, or light network issue clearly identified)
- Scoreboard on Energy savings
- Priority levels

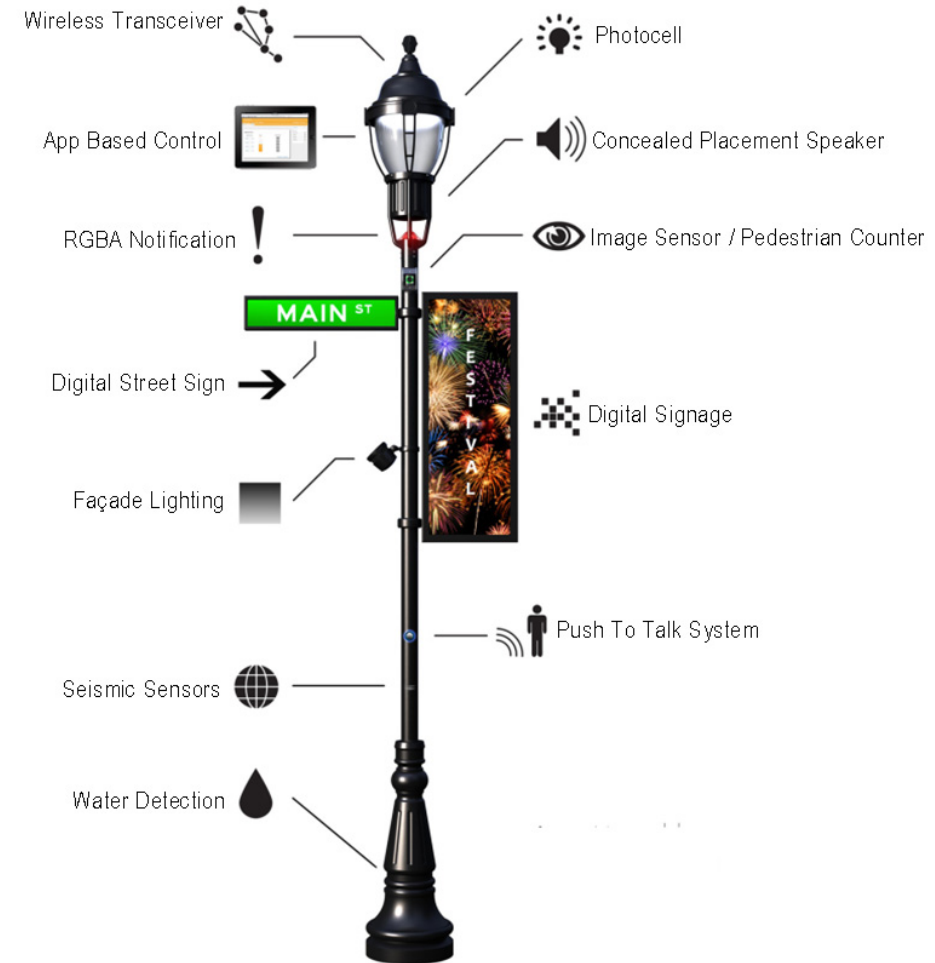
## Impact

- ✓ Smart lighting is expected to reduce the energy bill by 30%, out of a total of 6.3M€ in Nice
- ✓ Improved street lighting will lead to a 5% reduction in car theft, assaults and home burglary
- ✓ Smart lighting will likely improve the liveability of the area, reducing accident and time loss
- ✓ Smart lighting will value real estate

\*\* Q1 2014 upgrades

# Street Lighting Evolution

- Beyond smart LED, city leaders and street lighting vendor are envisioning street light as a multi service platform
- Street lights are everywhere and once connected to power and network they could host many services: sensors, wireless transceiver (wifi, PAN, small cell), digital signs, communication
- Philips (e.g. Barcelona) and others are leading the initiative
- However average lifespan of street light pole is 30 to 40 years.
- Replacing all light pole with next-generation street light is a long term process

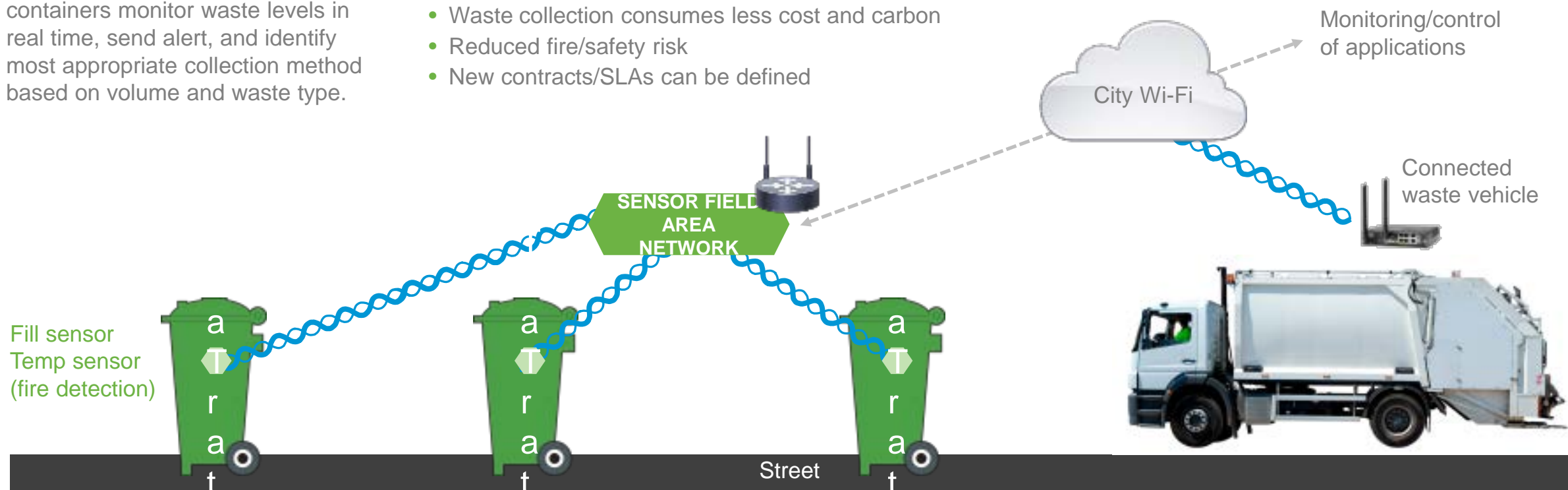


# Use Case 4: Waste Management

Sensors deployed in recycling containers monitor waste levels in real time, send alert, and identify most appropriate collection method based on volume and waste type.

## Benefits include:

- Waste collection consumes less cost and carbon
- Reduced fire/safety risk
- New contracts/SLAs can be defined



# Smart Waste\*

\* Based on Nice Connected Boulevard Case, Courtesy of Think Global



## Smart Waste

### Waste collection

- Sensor measures the amount of filling in the waste container
- The monitoring apps delivers statistics by type of waste and by zone

### Waste nuisance

- Sensors prevent the risk of fire
- Waste sensors combined to environment sensors change the rules of waste collection : in the event of hot weather, truck rounds are increased

## Impact

- ✓ Better control of dumpster levels
- ✓ Optimized itinerary of waste connection
- ✓ Reduction of operational costs (number of trucks, number of agents, gaz consumption)
- ✓ Reduction of CO2 emissions
- ✓ Better comfort
- ✓ Improved safety



# Nice Pilot: Fill Sensor on Waste Containers

- Fill Sensor installed on 15 recycling containers (paper/glass) in the street of the pilot area (cost 250 euros/sensor with installation)
- Sensor measures the fill level and temperature (fire detection)
- Sensors run on battery for 8 years
- Sensors uses 802.15.4 mesh network common to other services (parking, environment)
- Data is collected in city data center to be analyzed

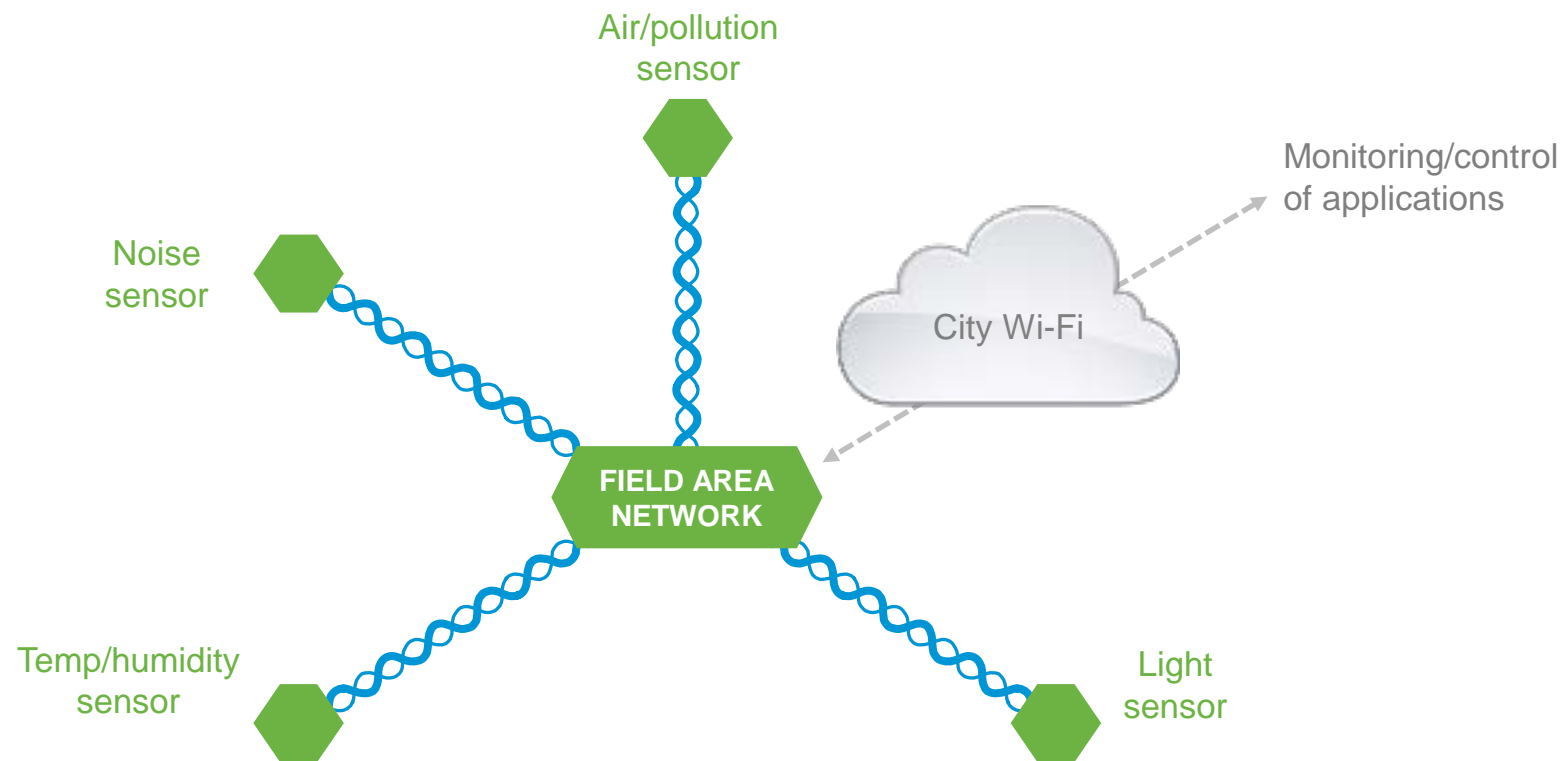


# Use Case 5: Environment Management

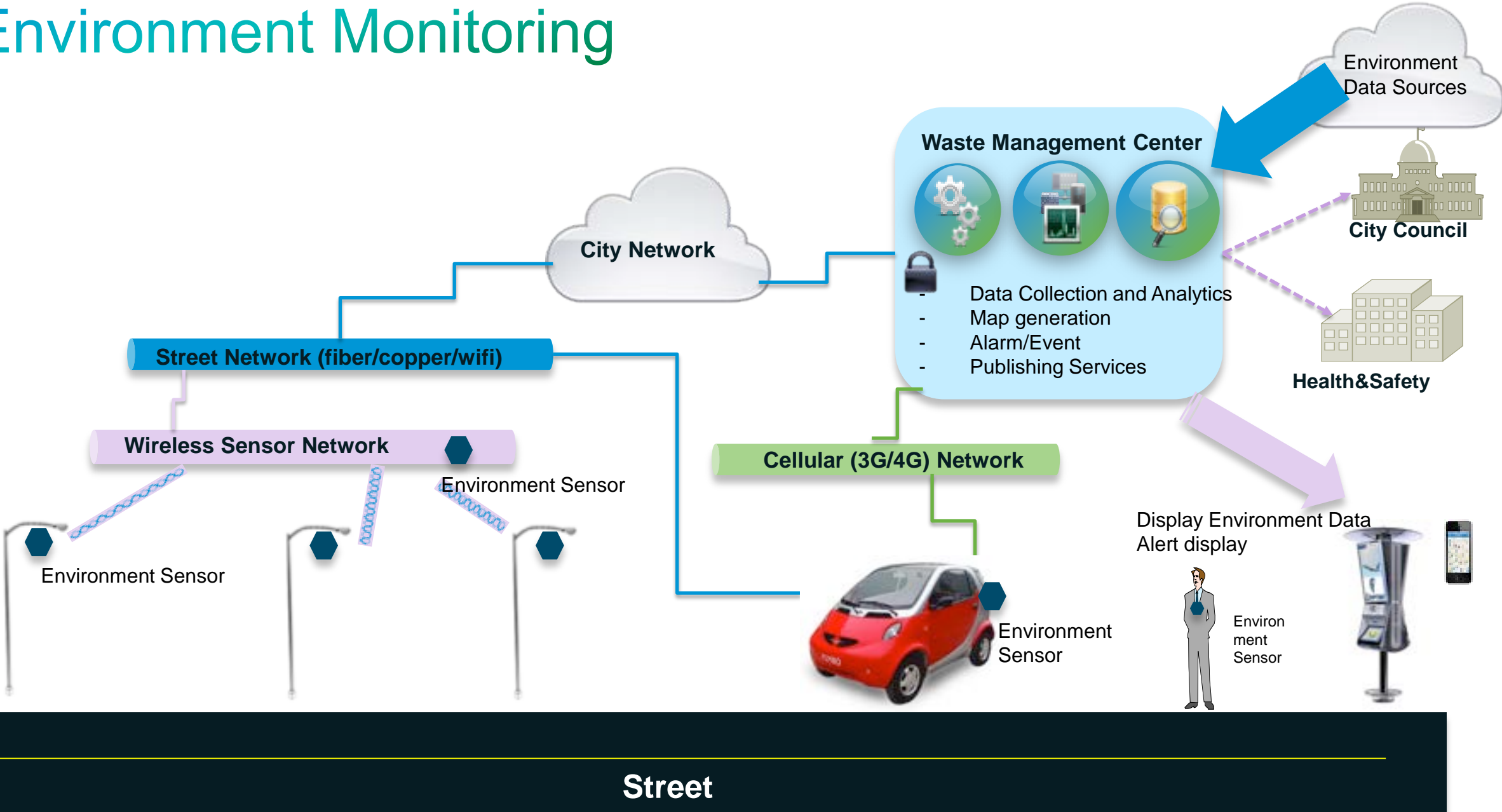
Installation of environment sensors:  
air, light, humidity, noise, etc.

## Benefits include:

- Leverages parking sensor infrastructure
- Provides valuable data for improving analytics applications and forecasting

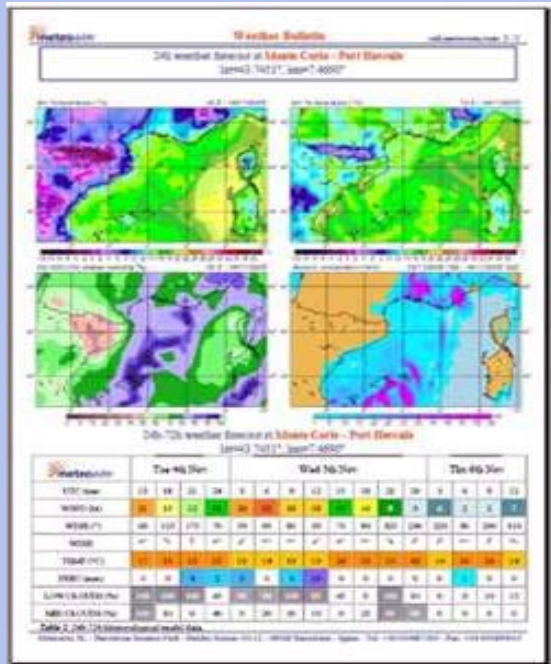
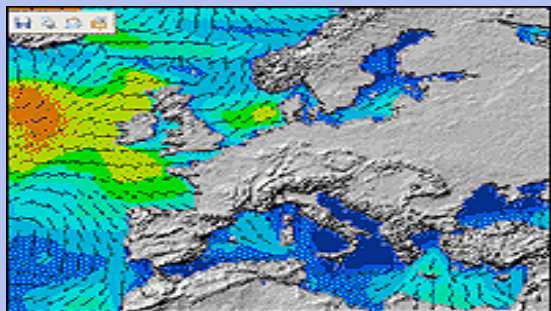


# Environment Monitoring



# Environment Monitoring\*

\* Based on Nice Connected Boulevard Case, Courtesy of Think Global



## Monitoring

### Environment Scoreboard

- Exhaustive data series as requested by European authorities → meet the legal “obligation of means” (no obligation of result in Europe at this stage)

### Environment Supervisor

- Inform municipal services and users of the risks of pollution and make appropriate decisions
- Display alert on City diverse displays (multimedia kiosks, City communication screens, city portal, apps...)

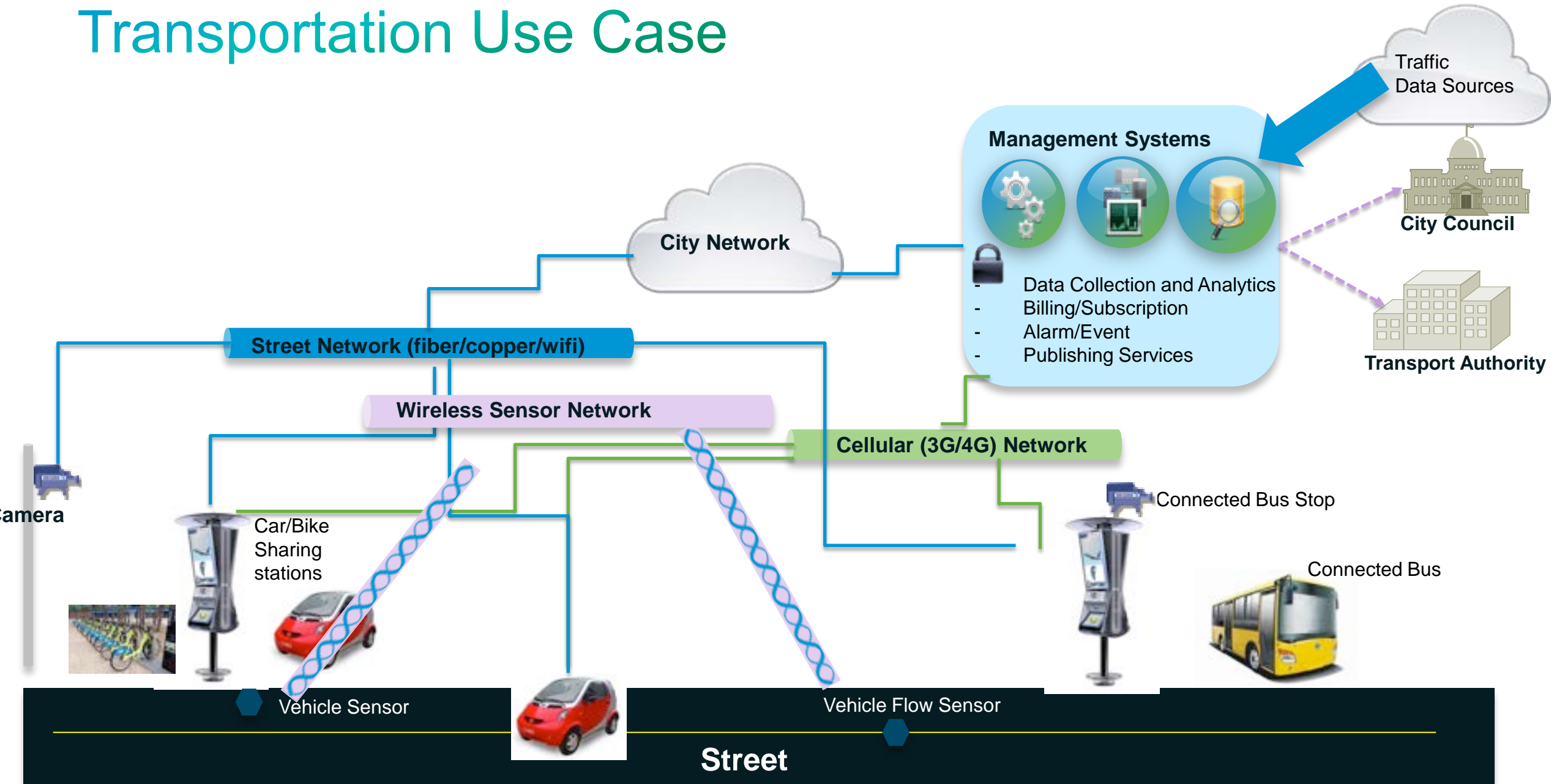
### Predictive modeling

- Store, treat and analyze historic set of data, allowing anticipation

## Impact

- ✓ Meet European legal duties at a very competitive cost (same quality of reports, based on a cheaper network of sensors)
- ✓ As opposed to mere statistics, deliver “intelligent messages” translated into real actions (speed reduction, automatic alerts sent to the population)
- ✓ Impact on the environment

# Transportation Use Case



# Smart Bus Stop - BCN

- The City of Barcelona has decided to deploy Smart Bus Stop across the city
- Smart Bus Stop project is done in collaboration with JC Decaux (global leader in street furniture)
- Services provided:
  - Large touchscreen with: transport, entertainment, tourist, city information
  - Wi-Fi hotspot (Barcelona Wi-Fi)
  - Advertisement via a separate LCD screen
- Use case for Bus stop is not only to provide a new service to citizens, through the usage of the city of Barcelona wifi hotspot, touch screen panel but also with location analytics, the City/bus company can be aware of the flow of citizens in specific times of the day to deploy extra buses, providing a better flow and a better service to citizens



# Connected Bus Stop

**Air, Temp, Rain Sensor**  
Rain tracking  
Temp tracking

**IP Camera**  
Security  
Analytics

**Smart Lighting**  
Dynamically adjust  
lux scenes for  
advertising  
seasonal scenes

**Wi-Fi Hotspot**  
Internet access  
Advertising  
People counting

**Interactive Touch screen + Camera**  
City information  
Remote Expert  
Public transport  
status  
Advertising

**Noise Sensor**  
Vandalism tracking  
Ambience tracking



# Smart+Connected Communities Worldwide

## Smart Solutions



Hamburg: Hamburg Port Authority, Smart Parking



Nice: Connected Blvd & Spot Mairie (REGS)



Seoul: Centios, Personal Travel Assistant



Amsterdam: Smart Work Center



Barcelona: Born District & REGS



San Francisco: Urban EcoMap, Connected Bus



San Mateo and San Carlos: Smart Parking

## New Development



FIFA 2014 & Rio Olympics 2016



Songdo



DMIC & Mantri Developers



Iskandar



Qatar Foundation



Skolkovo



King Abdullah Financial District & Saudi Economic Cities



FIFA 2010 World Cup



London 2012 Olympics



Lake Nona, Orlando, Florida – Medical City

## Revitalization & Growth



Sao Paolo



Waterfront Toronto



Chengdu



Copenhagen – CPH 2025



Hamburg



Smart City Amsterdam



St. Petersburg & Moscow



Barcelona



Stockholm



Abu Dhabi



Chicago



# Successfully Followed this Methodology



Tianfu – Chengdu  
China



Thank you.

