

# “Connected City” Improves Quality of Life, Stimulates Economy



## EXECUTIVE SUMMARY

**Customer Name:** City of Barcelona

**Industry:** Public Sector

**Location:** Spain

**Potential users:** 1.6 million citizens, 8000 employees

### Challenge

- Stimulate local economy and enhance quality of life
- Improve communications among city departments
- Minimize government costs and improve service delivery

### Solution

- Built foundation for mobility with Cisco wireless network
- Captured location of people and things to improve city planning and provide new citizen services
- Connected sensors for parking spaces, environmental monitoring, garbage bin fill levels, and more

### Results

- Revitalized city to attract businesses and events
- Improved access to information about the city for residents and city employees
- Reduced costs by increasing efficiency of parking, waste collection, street lighting, and other processes

City of Barcelona uses Wi-Fi network and location information to increase service levels and create great experiences.

## Challenge

The City of Barcelona has been the capital of Spain’s Catalunya region since the third century A.D. Current city leaders face 21<sup>st</sup>-century challenges. They want to revitalize the city. Stimulate the economy. Provide a great quality of life that attracts businesses, residents, and tourists. Earn a high spot on lists of the world’s most livable cities. Reduce carbon footprint. And deliver government services at lower cost.

The Barcelona City Council knew that technology could help achieve these goals. “We want to use the Internet to improve the daily lives of citizens,” says Manuel Sanroma, chief information officer for Barcelona City Council.

The City Council was inspired by today’s “Internet of Everything.” Their vision: Create new connections between people, process, data, and things.

Imagine being able to connect to your work network from a public park, and then meet a friend for coffee or shopping. Imagine finding everything you need as a tourist, such as bus schedules and nearby restaurants and entertainment, at touchscreen kiosks conveniently located around the city. Imagine finding and reserving a parking space on your smartphone. Imagine if city workers could monitor parking meters, streetlights, and even garbage bins over the network instead of driving around and consuming fuel.

To make the vision real, the city needed three kinds of technology: A reliable, easy-to-manage Wi-Fi network. A way to know the location of people and things connected to the network. And different kinds of sensors.

“Smart bus stops change the typical experience of wasting your time waiting for a bus.”

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**Manuel Sanroma**

Chief Information Officer  
Barcelona City Council

## Solution

All of these things are happening today as part of the city’s Smart City project. “We are using technology to make our social dream possible,” says Tony Vives, deputy mayor for Urban Habitat, Barcelona City Council. “Our goals are economic sustainability, social sustainability, and environmental sustainability.”

The City of Barcelona’s visionary mayor, Xavier Trias, launched the project by creating a new department called Urban Habitat. It combines urban planning, environment, IT, transport, and infrastructure. The first task was to expand existing outdoor Wi-Fi coverage, making it citywide.

The Barcelona Free Wi-Fi Network had to deliver a great user experience, all the time. So the city decided to work with Cisco®. The network is being built in phases. The first phase is complete, in Passeig de Born, the city’s historic Gothic area. Approximately 800 wireless access points mounted on lampposts provide coverage everywhere in the area.

Already, quality of life has improved in four ways. First, residents and tourists can use their mobile devices to browse the web, check email, or work. They can even stay connected on buses.

Second, city services are delivered more efficiently. City employees can make smart decisions by gathering information from wireless sensors over the network. They can see temperature, air quality, pedestrian traffic, open parking spaces, and more. Citizens can view some of the same information from their smartphones.

Third, city planners have a better understanding of where people go and how long they stay. The Cisco Connected Mobile Experiences (CMX) solution counts the number of smartphones and tablets in different areas to create color-coded maps. City planners use the location information to plan development and transportation.

Finally, visitors enjoy new experiences that keep them coming back to the city. They can look up today’s events on touchscreen kiosks at bus stop. They can find and reserve parking spaces from their smartphones. When planning a picnic, they can check out air quality in different parts of the city. Soon they’ll be able to receive personalized shopping offers on their smartphones as they pass by stores.

Based on the enthusiastic response to Barcelona Free Wi-Fi, the City Council is expanding it to more neighborhoods. And more bus stops are being converted to smart bus stops with touchscreen kiosks.

## Results

The City of Barcelona’s Smart City projects have attracted attention around the world. The city received the European Capital of Innovation (iCapital) prize for “introducing the use of new technologies to bring the city closer to citizens<sup>1</sup>.” And CNNMoney named Mayor Xavier Trias one of the world’s 50 greatest leaders<sup>2</sup>.

### Improved Quality of Life

Getting around the city is easier now, and more fun:

- Connected Buses: Residents and visitors can stay connected while riding the bus, for work or entertainment.

<sup>1</sup> [http://europa.eu/rapid/press-release\\_IP-14-239\\_en.htm](http://europa.eu/rapid/press-release_IP-14-239_en.htm).

<sup>2</sup> <http://money.cnn.com/gallery/leadership/2014/03/20/worlds-best-leaders.fortune/46.html>.

“Putting sensors in parking spots results in less traffic. This makes the city more livable, making people happier.”

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**Tony Vives**

Deputy Mayor for Urban Habitat  
Barcelona City Council

- **Connected Bus Stops:** Touchscreen monitors at certain bus stops provide up-to-date bus schedules, maps, locations for borrowing city-owned bikes, and local businesses and entertainment. “Smart bus stops change the typical experience of wasting your time waiting for a bus,” says Sanroma.
- **Connected Parking:** Studies show that 40 percent of traffic in city centers is caused by drivers looking for a place to park. Finding parking is no longer a chore. The first of ten districts now has embedded sensors in parking spaces. Residents can install a free map application on their smartphone or tablet to see an available space, say, one block ahead. Then they just tap to reserve the space until they arrive, and pay the fee with the same application. As they linger over dinner, they can renew without having to walk back to their car. “Putting sensors in parking spots results in less traffic,” Vives says. “This makes the city more livable, and makes people happier.”

### More Efficient Government Services

The City Council is taking advantage of the Wi-Fi network to work more efficiently:

- **Smart Parking:** The sensors in parking spots send an alert to city officials when the meter expires. Parking revenues are expected to increase. Later the city might introduce variable parking fees based on demand.
- **Smart Waste Management:** Sending trucks to empty trash containers before they are full increases costs and carbon emissions. But waiting too long can make neighborhoods unsightly and endanger public health. Now the city is conducting a pilot to make collection routes more efficient. Wireless sensors on trash containers indicate how full they are. The collection company sends the drivers to the fullest containers first. The application also shows the temperature in different areas of the city, valuable information for route planning on hot days. When the program is used citywide, the City Council expects to save 10 percent on waste collection. That will free up tens of thousands of dollars annually for other city services.
- **Smart Street Lighting:** Keeping lights off in daylight hours lowers energy bills. And making sure lights come on when it's dark helps to create a safer environment. The City Council lowered energy bills by installing LED streetlights that employees control over the Barcelona Free Wi-Fi network. Smart street lighting is expected to save US\$47 million over 10 years. The estimate includes lower energy bills, lower costs for LED lighting, and less labor replacing the lights because they last longer.
- **Smart City Planning:** Now city planners understand where people go and how they get there. This insight helps them create smart bus schedules that keep residents happy. They also know where to assign foot patrol officers so that visitors feel safe.

### Boost for Local Merchants, from New Retail Experiences

During the Internet of Things (IoT) World Forum held in Barcelona in October 2013, a Cisco partner demonstrated a smartphone application that creates new retail experiences. As you pass by restaurants and stores, you see “digital graffiti” on your device, such as coupons or specials. To encourage retailers and advertisers to participate, the city plans to share revenues.

### Economic Development

The City Council estimates that smart buses will create \$28 million in value over 10 years. That total includes advertising revenues, increased ridership, and more spending by riders once they arrive at their destination. Similarly, smart parking will generate an expected \$53 million, from better enforcement of parking limits and variable pricing.

Revitalization has made the city more attractive to new businesses. City leaders expect that boosting Barcelona's livability ranking will help to attract 1500 new startup companies, creating an estimated 44,000 new jobs.

## Technical Implementation

**Connected Buses:** In the pilot, Cisco wireless access points on buses connect to ruggedized Cisco switches. The switches provide power over Ethernet. A Cisco router aboard the bus, built to withstand shock and vibration, connects to the LTE cellular network. Passengers can keep their connection even when the vehicle enters a new wireless coverage zone.

**Environmental Monitoring:** If you wanted to catch up on email at the IoT World Forum in 2013, you could open a browser application to view a map showing the lightest, quietest locations. The data, collected by Smart Citizen Kits from Barcelona FabLab, was "crowd sourced." Kits in conference rooms measured applause, showing audience appreciation. People who took tours of Barcelona's Smart City projects wore other kits on necklaces. Cisco CMX noted the location of the kit and superimposed the sensor readings on maps of the venue.

## For More Information

- To learn more about Cisco Mobility Solutions, visit: [www.cisco.com/go/wireless](http://www.cisco.com/go/wireless).
- To learn more about Cisco Connected Mobile Experiences, visit: [www.cisco.com/go/cmz](http://www.cisco.com/go/cmz).
- To learn more about the Internet of Everything, visit: [www.cisco.com/go/ioe](http://www.cisco.com/go/ioe).
- To learn more about Cisco Smart+Connected Communities, visit: [www.cisco.com/web/strategy/smart\\_connected\\_communities.html](http://www.cisco.com/web/strategy/smart_connected_communities.html).

## Product List

### Networking

- Cisco Industrial Ethernet 2000 Switch

### Wireless

- Cisco Aironet® 1552 ruggedized Wireless Access Point
- Cisco Integrated Services Router (ISR) 819
- Cisco Mobility Services Engine
- Cisco Wireless LAN Controller

### Ecosystem Partner Products

- Environmental sensors: Zolertia and Smart Citizen
- Parking sensors: Streetline
- Bus stop advertising: JCDecaux
- Waste Management: Urbiotica
- Digital graffiti: GeekGaps



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