

Enabling the IoT: Sensors, Communications & Cloud

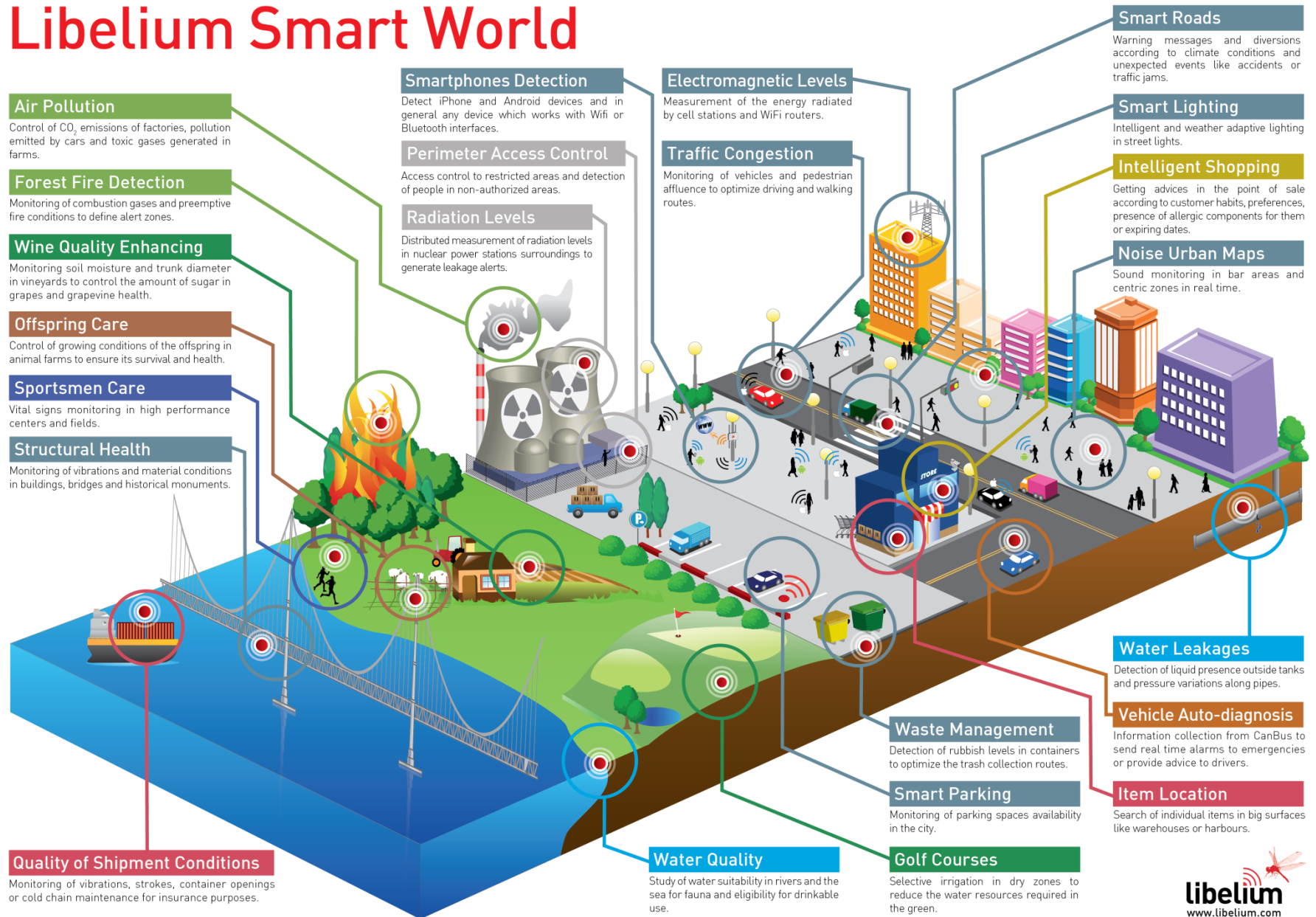
Alex Mateo – Industry Manager Smart Cities

Smart Systems Summit 2014 London at the IoD

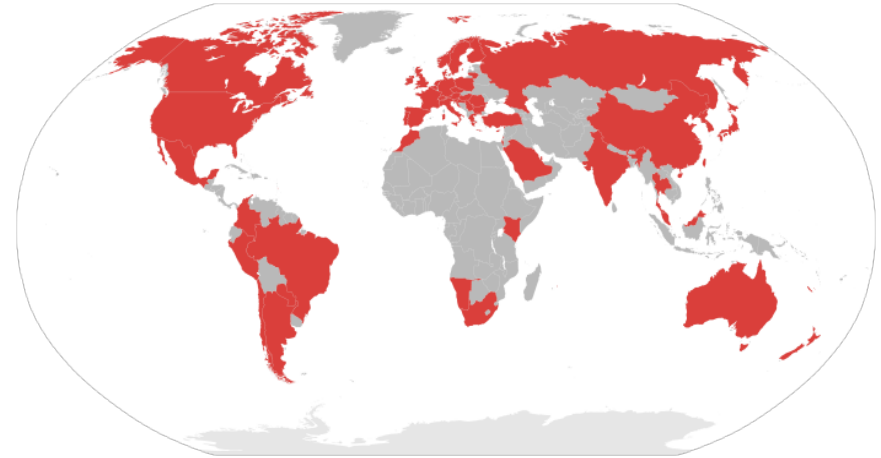
Oct 1-2, London

www.hvm-uk.com

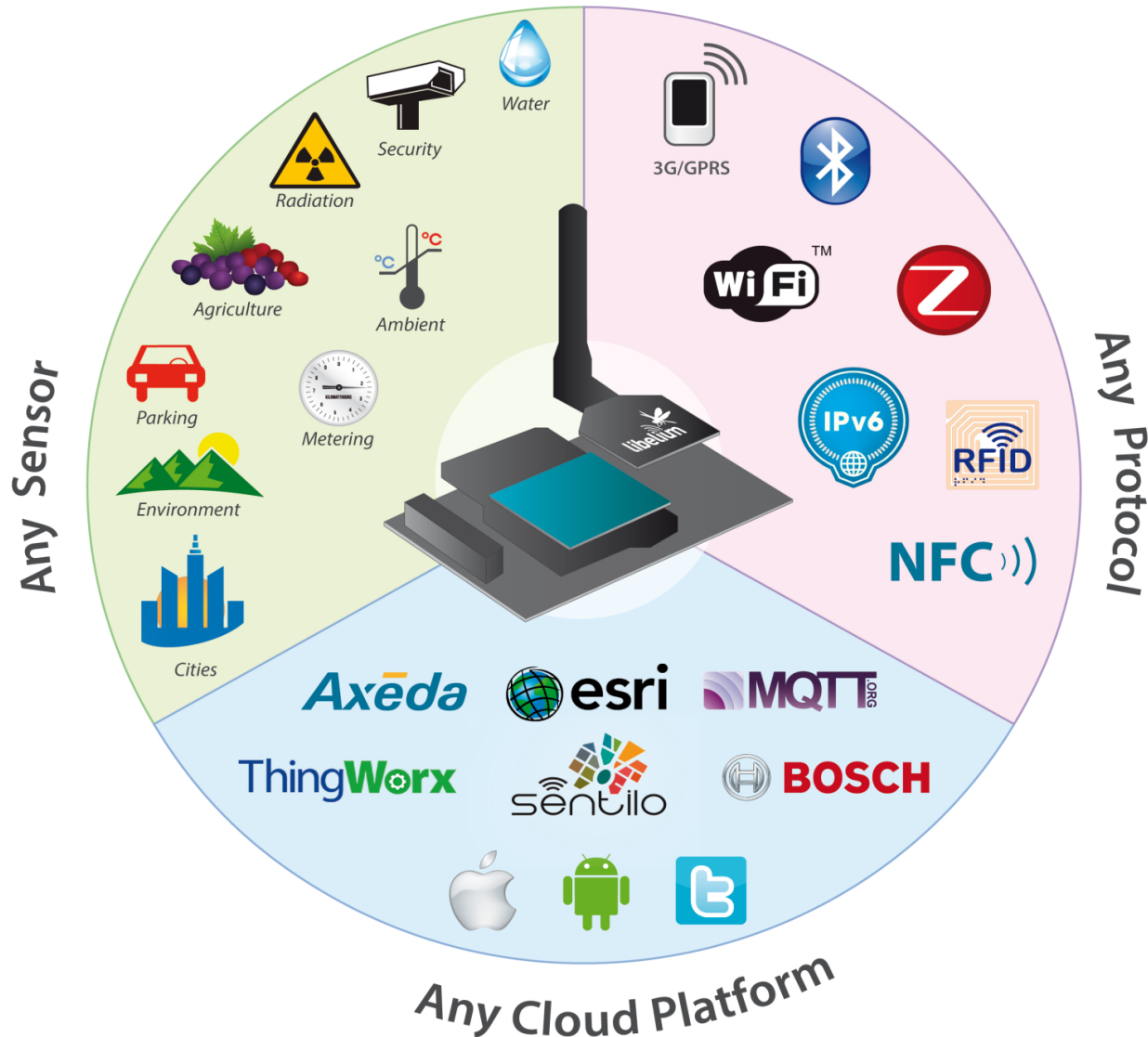
Libelium Smart World

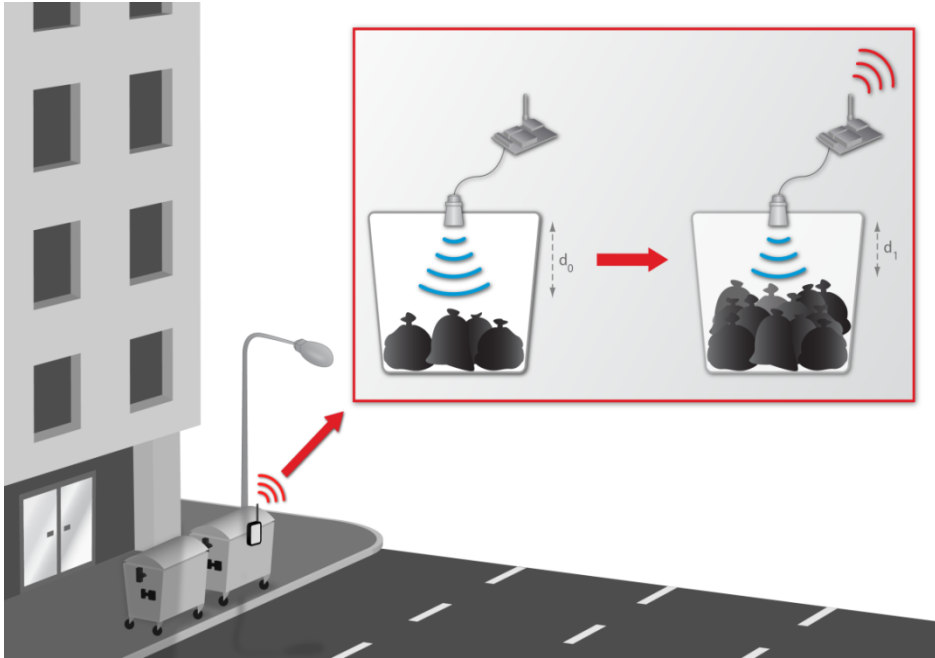


- Founded 2006.
- Spain & United States.
- Customers in +80 countries.
- 80% of TO is international.
- VARs in N. America, Europe, LATAM, Asia, Pacific (12 VARs in 12 countries).



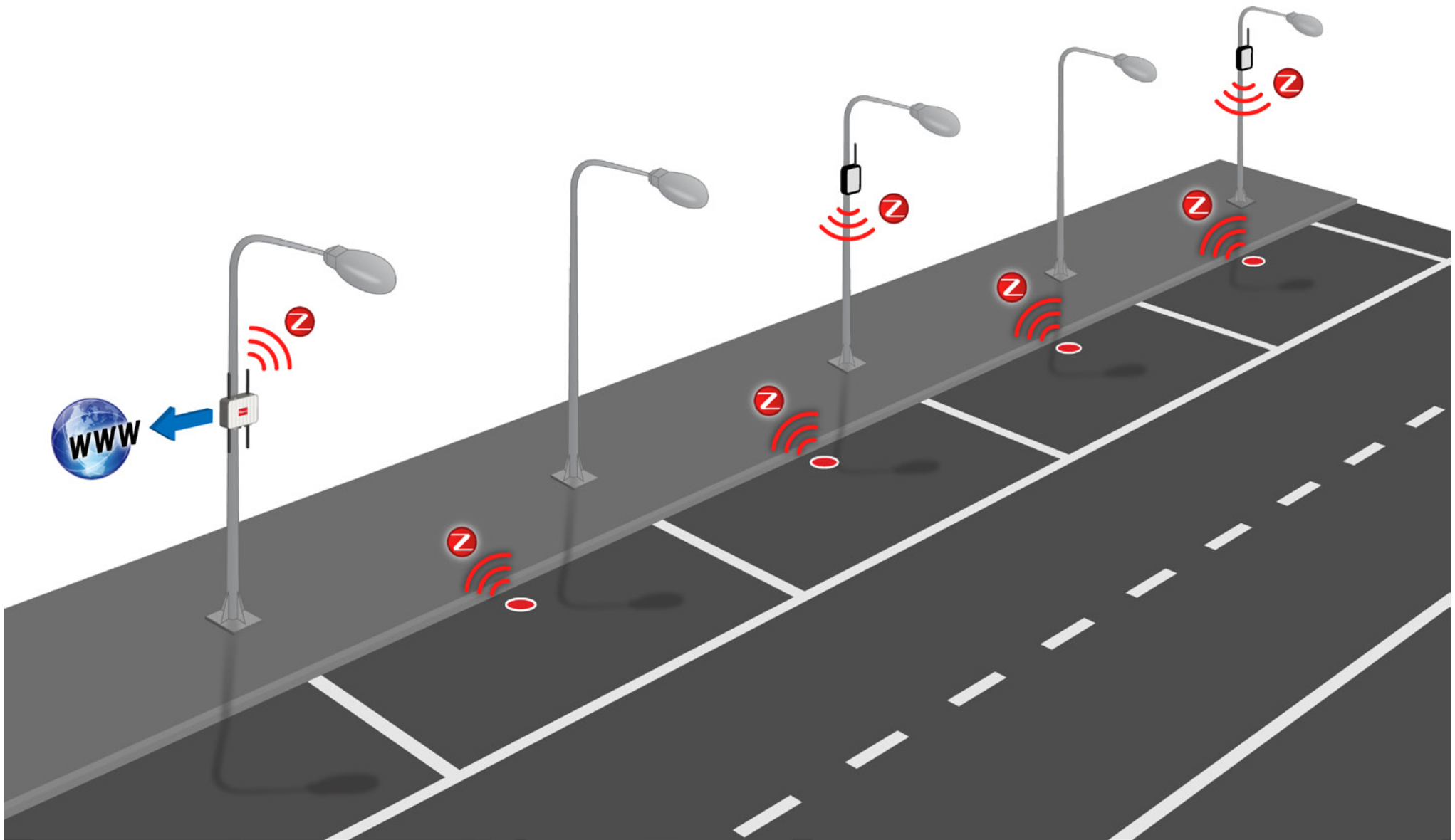
3 common elements in all IoT projects:



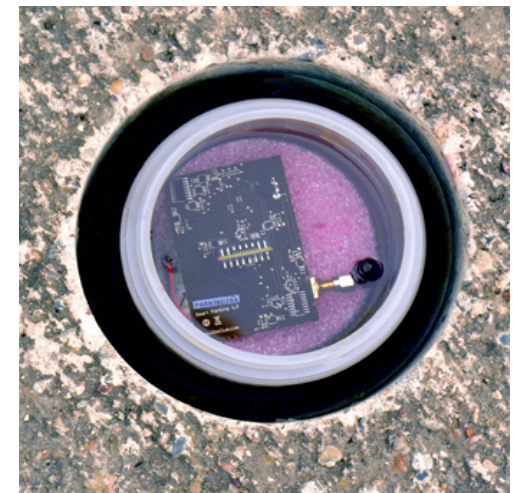
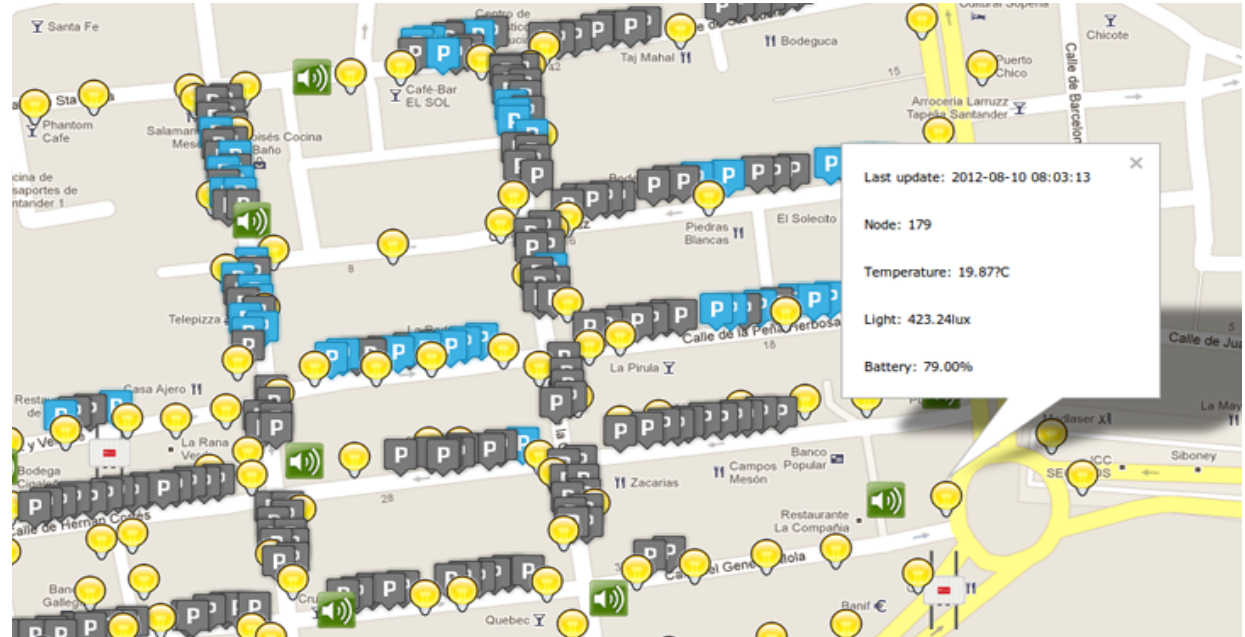


- **City services:**
 - Smart Parking
 - CO, CO2, NO2, Temperature
 - Smart lighting
 - Noise monitoring
 - Efficient irrigation system
- **Dimension → +1,200 nodes**
- **5 different smart city solutions on 1 single platform**

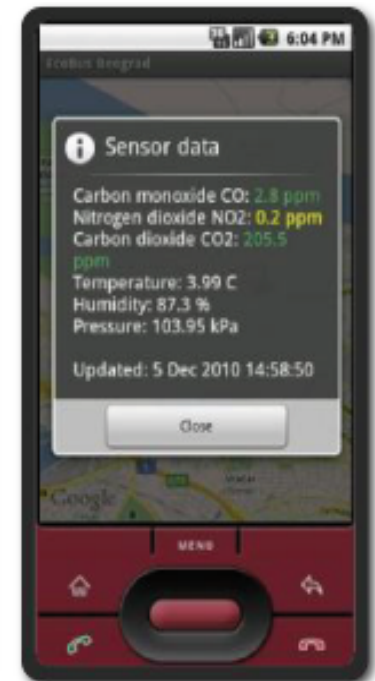
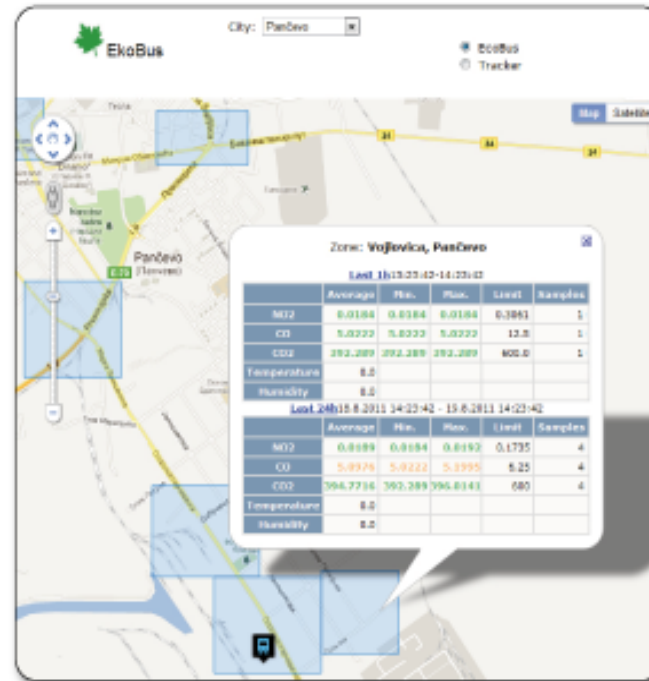




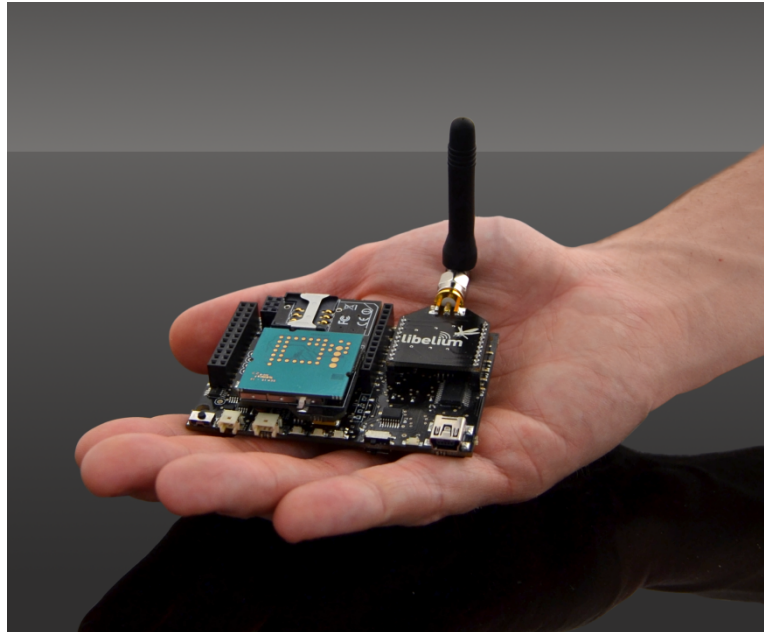
Smart City Services: Smart Parking



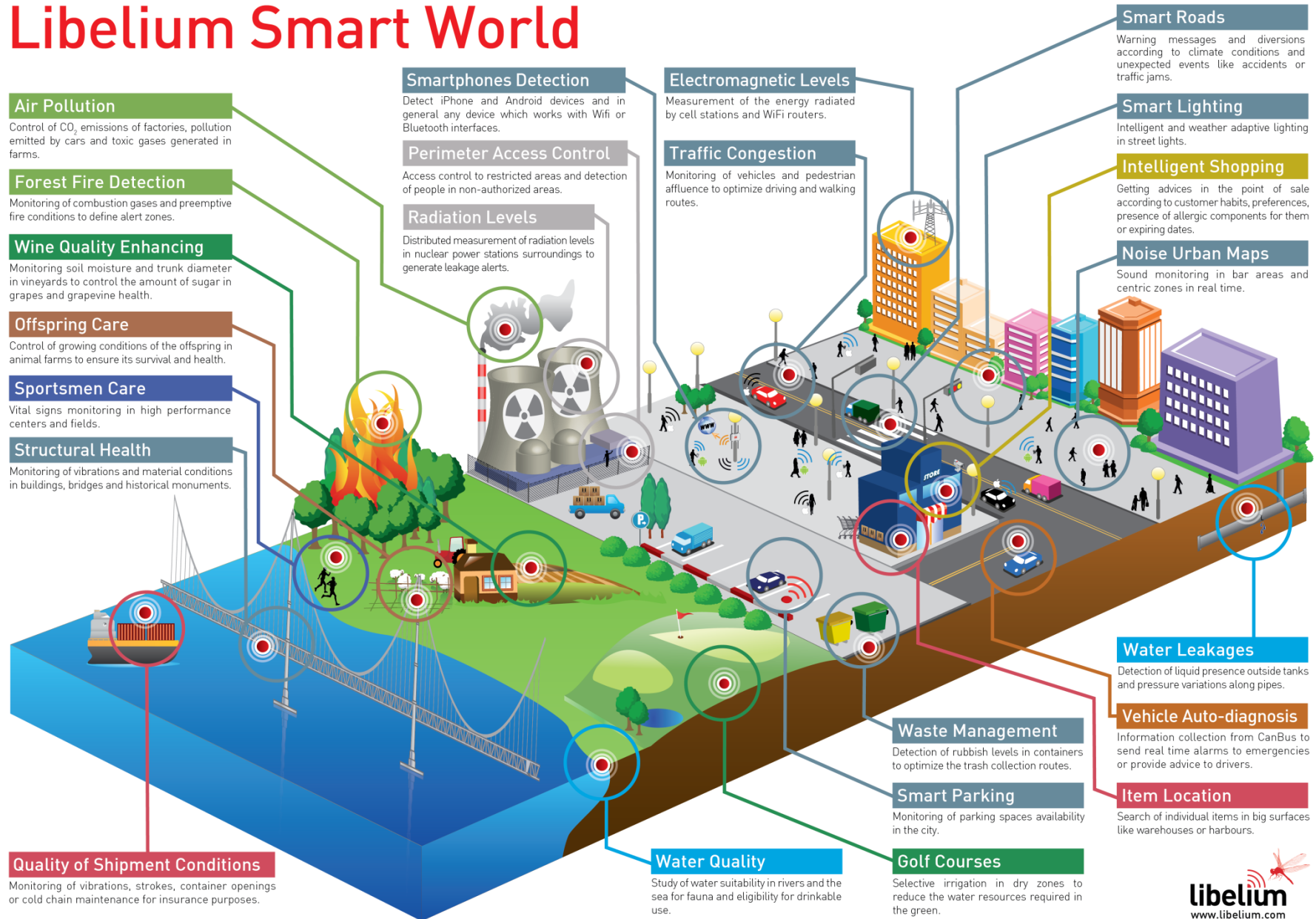
- **Parameters: temperature, humidity, CO, CO2, NO2**
- **GPS - > request time to arrival of buses**



- **Challenges:**
 - Mobile & “Moving” Network
 - Independent nodes



Libelium Smart World





Let's build a smarter world together
Come and see us at the Smart City Expo World Congress in
Barcelona, November 2014

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Models

Smart Environment



- Sensors**
- Carbon Monoxide (CO)
 - Carbon Dioxide (CO₂)
 - Oxygen (O₂)
 - Methane (CH₄)
 - Hydrogen (H₂)
 - Ammonia (NH₃)
 - Hydrogen Sulfide (H₂S)
 - Nitrogen Dioxide (NO₂)
 - Ozone (O₃)
 - Hydrocarbons (VOC)
 - Isobutane
 - Ethanol
 - Toluene
 - Temperature
 - Humidity
 - Atmospheric pressure

Smart Cities



- Sensors**
- Dust concentration
 - Ultrasound
 - Noise
 - Linear displacement (crack measurement)
 - Temperature
 - Humidity
 - Luminosity (LDR)

Smart Metering



- Sensors**
- Current
 - Ultrasound
 - Liquid level
 - Liquid flow
 - Temperature
 - Humidity
 - Luminosity (LDR)

Smart Agriculture



- Sensors**
- Soil moisture
 - Soil temperature
 - Leaf wetness
 - Solar radiation
 - Atmospheric pressure
 - Stem diameter
 - Anemometer
 - Wind vane
 - Pluviometer
 - Temperature
 - Humidity

Smart Security



- Sensors**
- Presence
 - Hall effect
 - Water presence
 - Liquid level
 - Liquid flow
 - Temperature
 - Humidity
 - Luminosity (LDR)

Ambient Control



- Sensors**
- Temperature
 - Humidity
 - Luminosity (LDR)
 - Luminosity (Luxes accuracy)

Radiation Control



- Sensors**
- Geiger tube [β, γ] (Beta and Gamma)

Smart Water



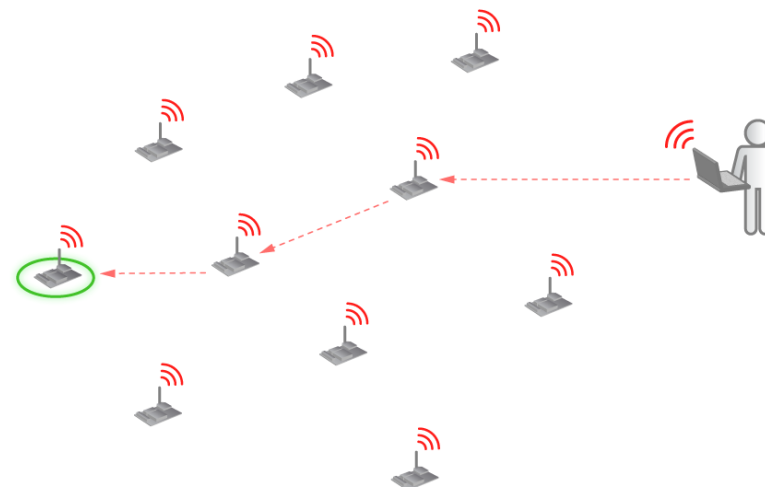
Smart Parking



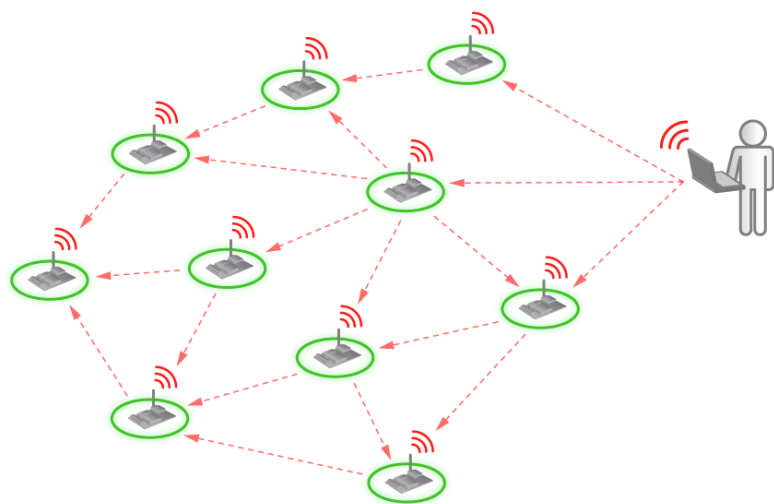
- Sensors**
- Magnetic field (3 axis)

- **Technical challenges (2)**
- **Over the Air Programming**
 - **Unicast, Multicast, Broadcast**

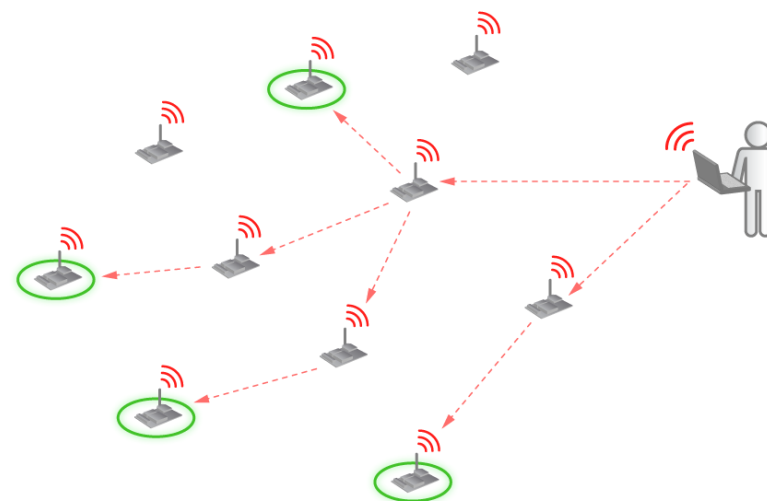
Multihop Access - UNICAST - ZigBee & DigiMesh (2.4GHz)



Multihop Access - BROADCAST - ZigBee & DigiMesh (2.4GHz)



Multihop Access - MULTICAST - ZigBee & DigiMesh (2.4GHz)



- **Technology is the “easy” part**
- **COORDINATION inside municipalities**
- **CITIZENS**
 - **What are you doing with MY taxes?**
 - **Is it safe?**
 - **How will I benefit from this?**