



A Low Power WAN IOT  
Cloud Foundry Solution and  
Service



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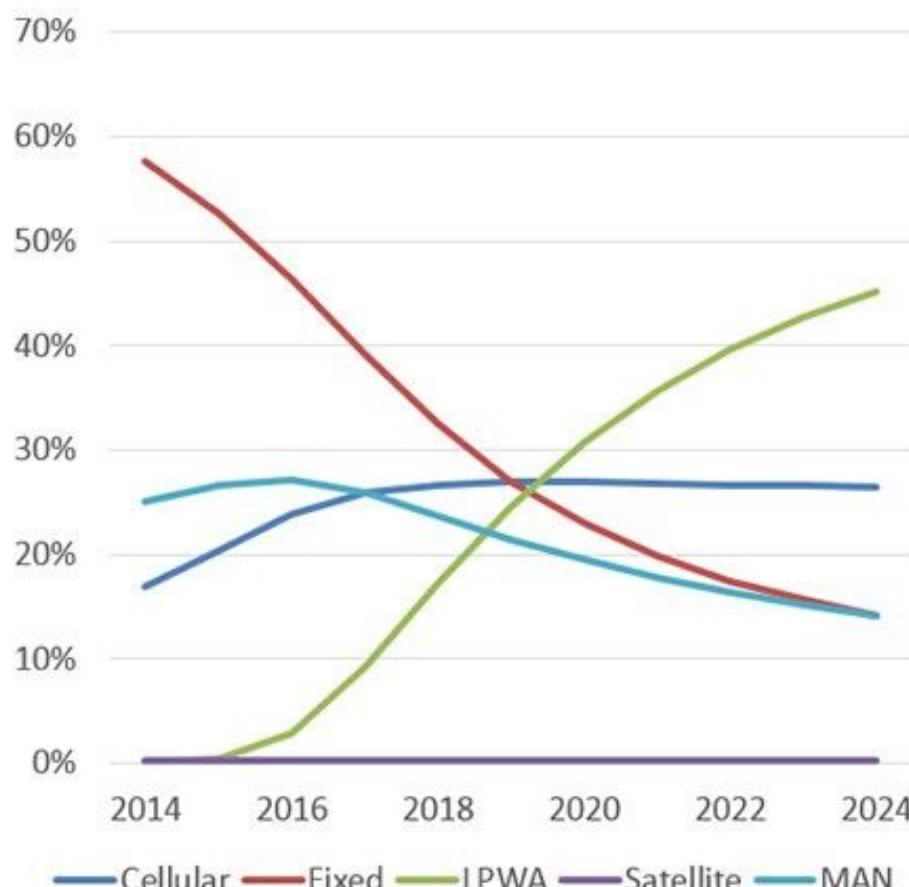
# IoT Market Trend & LPWAN



# Global M2M Connections Market Trend

Wide area M2M connections by technology,  
2014-24

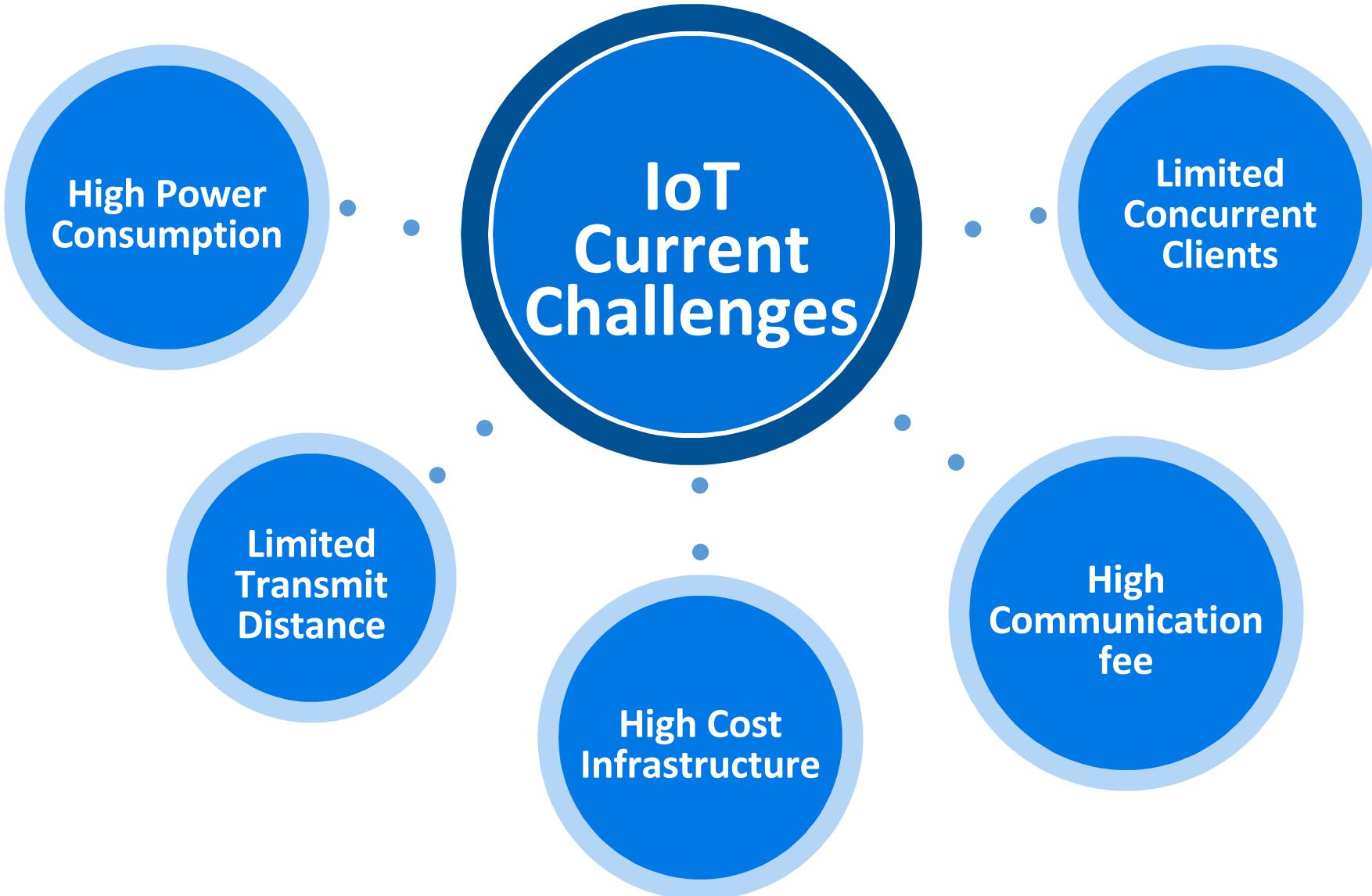
Source: Machina Research 2015



Machina Research



# IoT Current Challenges





# Strength of LPWAN



Low Power



Strength



Long Range



Low Cost

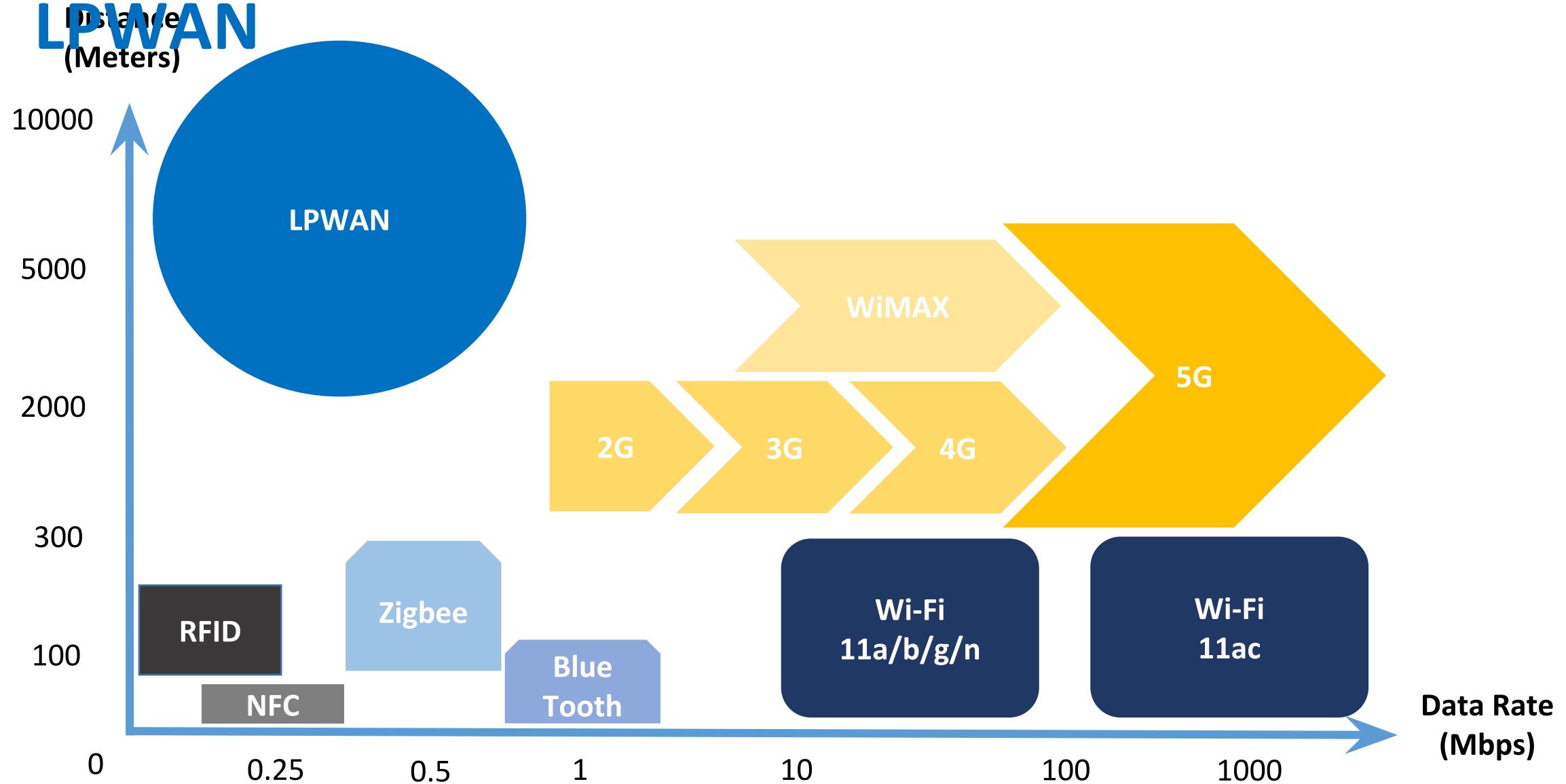


High Sensitivity



# Where's

## LPWAN

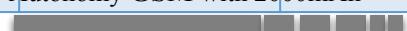




# Advantages of LPWAN

Technology	2G	3G	LAN	ZigBee	SigFox	Lo Ra
Sensitivity	-105dBm	-107dBm	-94dBm	-100 dBm	-126 dBm	-142 dBm
Range (I=Indoor, O=Outdoor)	1 km urban 2 km rural	1 km urban 2 km rural	O: 300m I: 30m	O: 90m I: 30m	2km urban 15km rural	5km urban 15km rural
Tx current consumption	200mA-500mA	500mA – 1000mA	50mA	35mA	45mA	18mA
Standby current	2.3mA	3.5mA	NC	0.003mA	0.001mA	0.001mA
Interference Immunity	Moderate	Bad	Bad	Bad	Bad	Good
Battery 2000mAh (LR6 battery)	4-8 hours (com) 36 days (idle)	2-4 hours (com) X hours(idle)	50 hours (com) X hours (idle)	60hours (com)	45 hours (com) 10 year(idle)	120 hours (com) 10 year(idle)

Autonomy GSM with 2000mAh -



Autonomy LP WAN with 2000mAh -

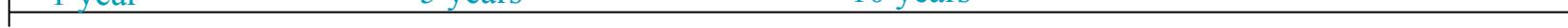


Example for energy meter

1 year

5 years

10 years





# Technology Comparison

## LAN

Short range communication



- Well established standards
- Better for:
  - Mobile devices
  - In-home
  - Short range
- Poor for:
  - Battery life
  - Long range

## LPWAN

Internet of Objects



- Emerging PHY solutions
- Better for:
  - Long range
  - Long battery life
  - Low cost
- Poor for:
  - Low data rate

## Cellular

Traditional M2M

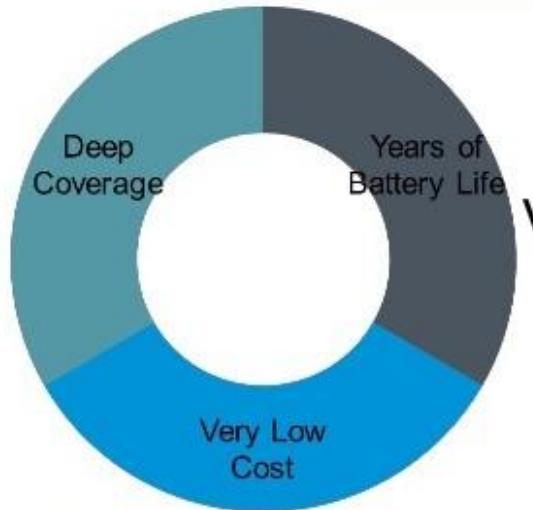


- Well established standards
- Better for:
  - Long range
  - High data rate
  - Coverage
- Poor for:
  - Battery life
  - Cost



# LPWAN Solutions and Standards

'De-facto' standards



Vs



IOT, Multi-Vendors, Certification



Apply for IEEE 802.15.4G



# Global LoRa Deployment





# LPWAN Applications

## Smart Environment & Industrial

- Forest fires
- Air pollution
- Earthquake sensors
- Avalanche and flooding
- Heating and AC
- Equipment status
- Factory control

## Tracking

- Motorcycles, bicycles
- Cars
- Truck trailers
- Shipping containers
- Kids, pets
- Insurance – valuable assets
- Find my stuff

## Smart Metering

- Electric
- Water
- Gas
- Heat
- Infrastructure & production

## Agriculture

- Irrigation control
- Environment sensing
- Animal tracking
- Animal sensing – ovulation, birth

## Smart City

- Smart parking
- Traffic sensors & control
- Street lighting
- Infrastructure monitoring
- Trash and waste containers
- Public events – location services
- Advertising displays

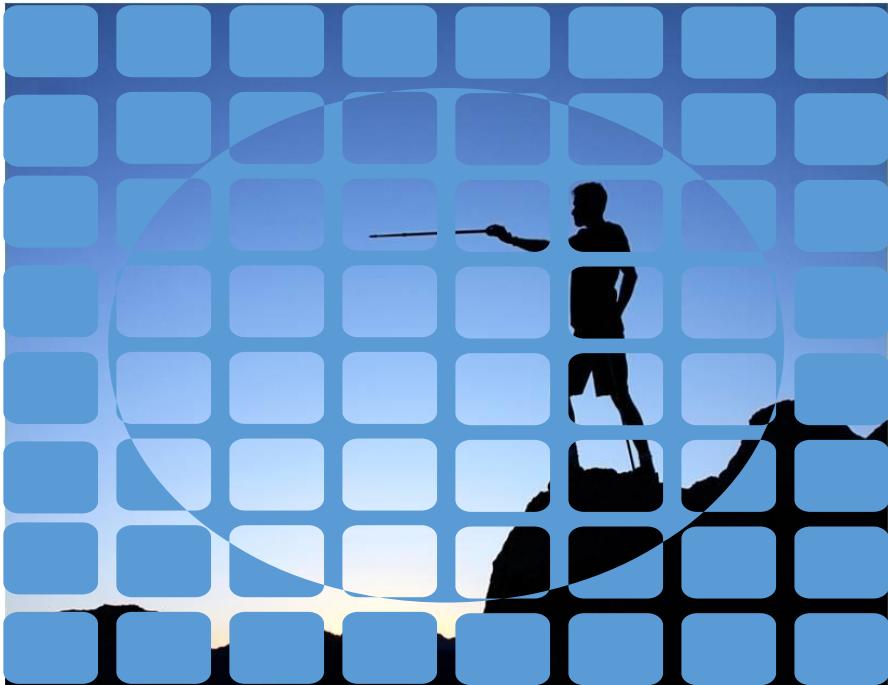
## Security/Smart Home

- Smoke detectors
- Security systems
- Smart applications
- Smart heat
- Control/monitoring

# Gemtek GloT



# What is GloT ?



- GloT: **Green IoT**

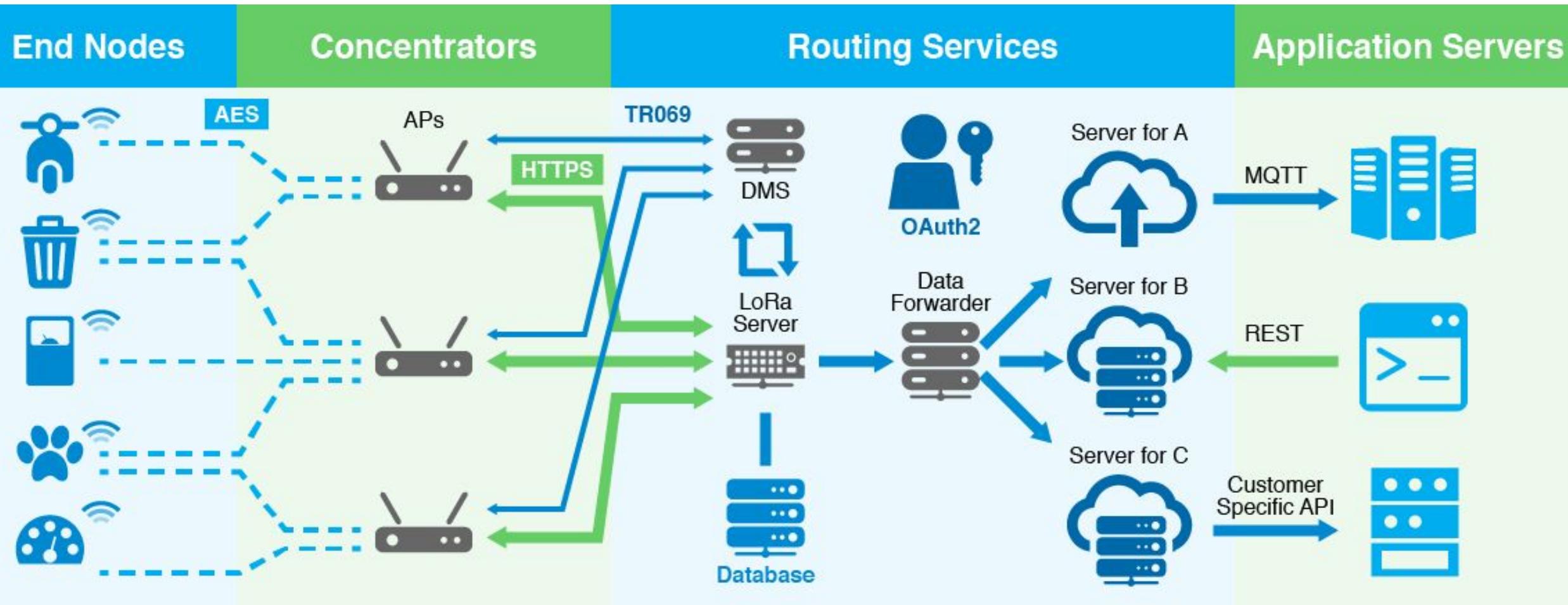
- GloT is an end to end with cost effective IoT (Internet of Things) services/solutions

- GloT is a LPWAN using LoRaWAN standard and solution developed by Gemtek

- GloT Services is a Cloud Foundry model enabling IoT service providers focusing in IoT market with robust infrastructure and operation support

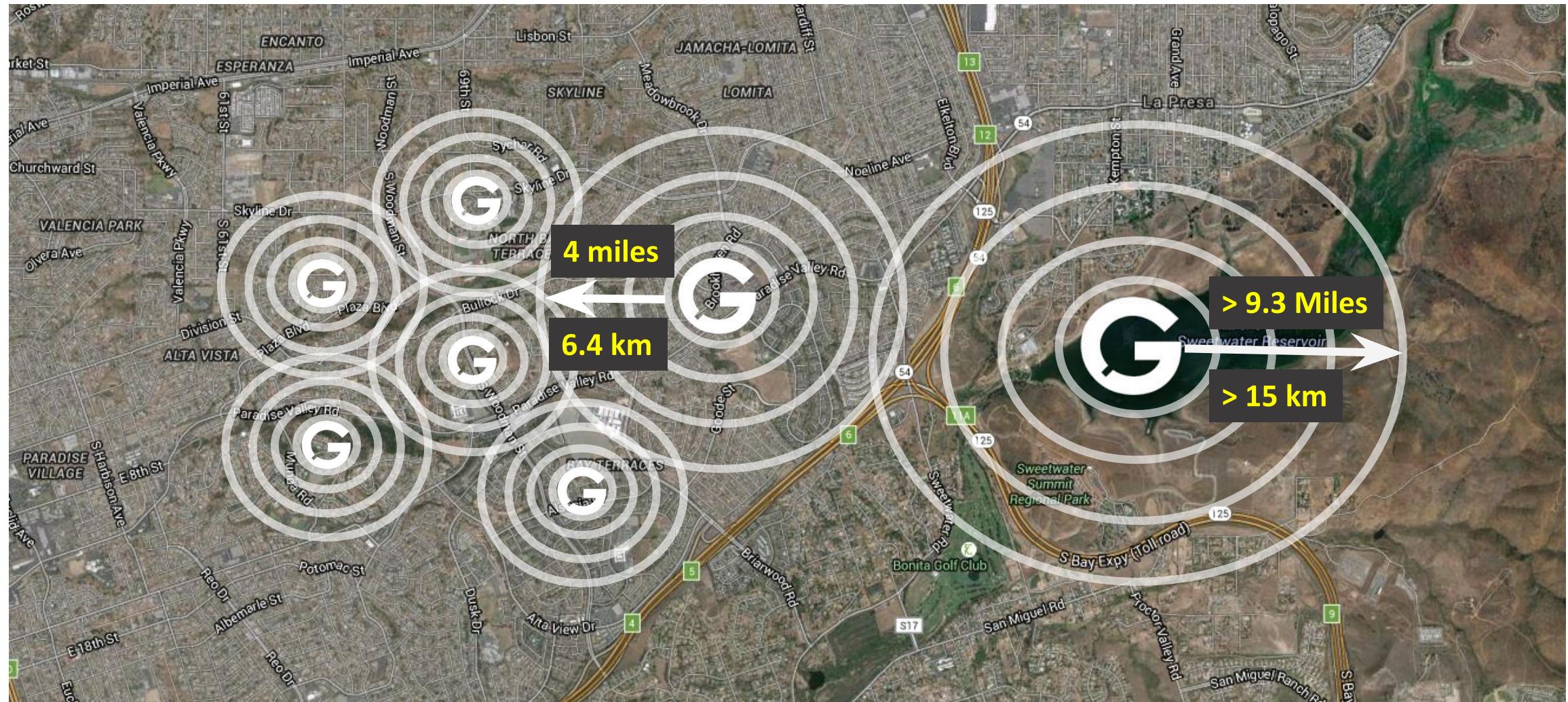


# GloT Network Architecture





# AP Coverage



# Why GloT Services



# What Are We Doing

**GloT, the world first LPWAN IoT total solution provider**

1. Design and manufacture GloT devices and AP/Gateway
2. GloT base station optimization and operation
3. Data forwarding (routing) and AP management services to IoT service providers
4. Application cloud system development professional service



# Gemtek Competitive Advantages

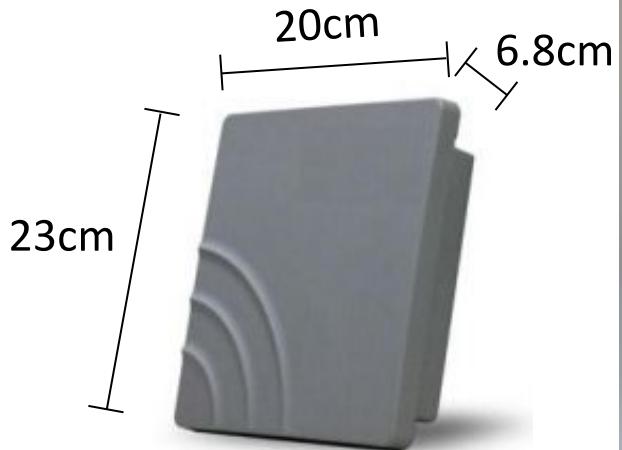
1. Over 17 years of wireless broadband design and mass production, world first to modularize WiFi product
2. World first commercial Wimax product shipment
3. LTE products, outdoor AP (with network management system) and mesh WiFi technology
4. SiP design and manufacture for portable device and embedded system
5. 10+ years of VoIP and multimedia IM platform development and cloud operation
6. Very experienced and proven solution of cloud application development, integration and operation in home automation, home security, CVR and smart AP router
7. Over 5 years in Low Power WAN IoT development and field implementation

# GloT Products



# Outdoor AP

## Features



1. Over 15 kilometers radius
2. Up to 16 concurrent channels
3. Thousands to millions devices depending on data model
4. Repeater mode for last mile coverage
5. Full redundancy coverage
6. Easy deployment
7. Cost effective
8. IP67 water proof
9. NCC, FCC, SRRC, IDA certified



# Outdoor AP





# Indoor AP

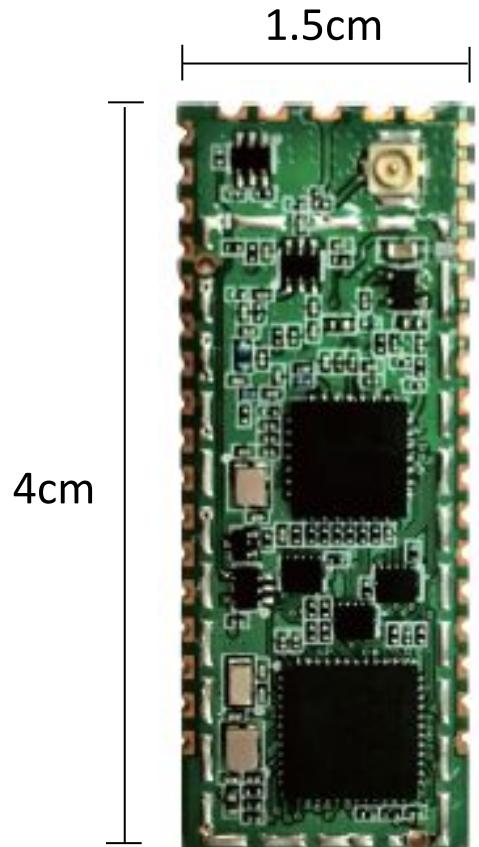


## Features

1. 1 WAN port(10/100) + 2 LAN ports(10/100)
2. Various internet connection: Ethernet, Wireless bridge, 3G/4G dongle
3. Support repeater mode for last mile coverage
4. Cloud service for gateway health monitor and control
5. Web UI for router
6. Support OTA and USB upgrade
7. Support ADR
8. Support class A/B/C end-devices
9. NCC, FCC certified



# GloT Module



## Features

1. General purpose LoRa module
2. High sensitivity: -142 dBm
3. Design to quick integration of sensors to LPWAN
4. Option support for 868MHz & 902-928MHz
5. Industrial Grade
6. SMT module with castellation edge
7. SDK support for AT command interface, Modbus interface and generic GPIO, UART interfaces
8. NCC, FCC, CE certified

# Cooperated Service Providers

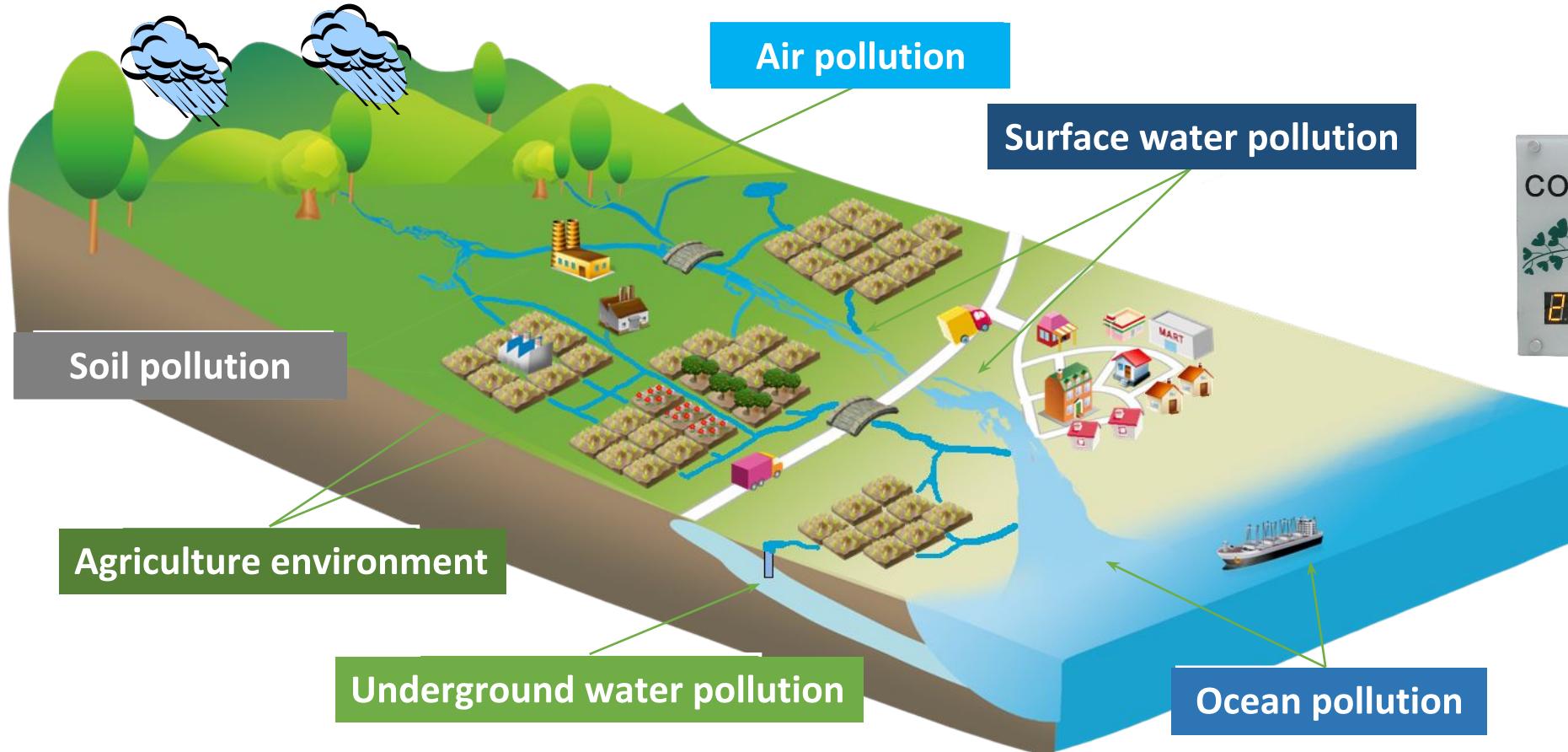


# Environment Monitoring

Temperature, humidity, gas, pressure, gas flow, liquid flow,

CO, CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>2</sub>, ClO<sub>2</sub>, H<sub>2</sub>S, C<sub>2</sub>H<sub>4</sub>O, O<sub>3</sub>, O<sub>2</sub>, Combustible Gas,

Ammonia, Ethylene Oxide, Ethanol, VOC





# Water Quality & Level Monitoring

Dissolved oxygen, chlorine, temperature, PH, conductivity, salinity, total dissolved solids, ORP, depth, turbidity, chlorophyll a, optical dissolved oxygen, blue-green algae, oil in water, dissolved organics ...





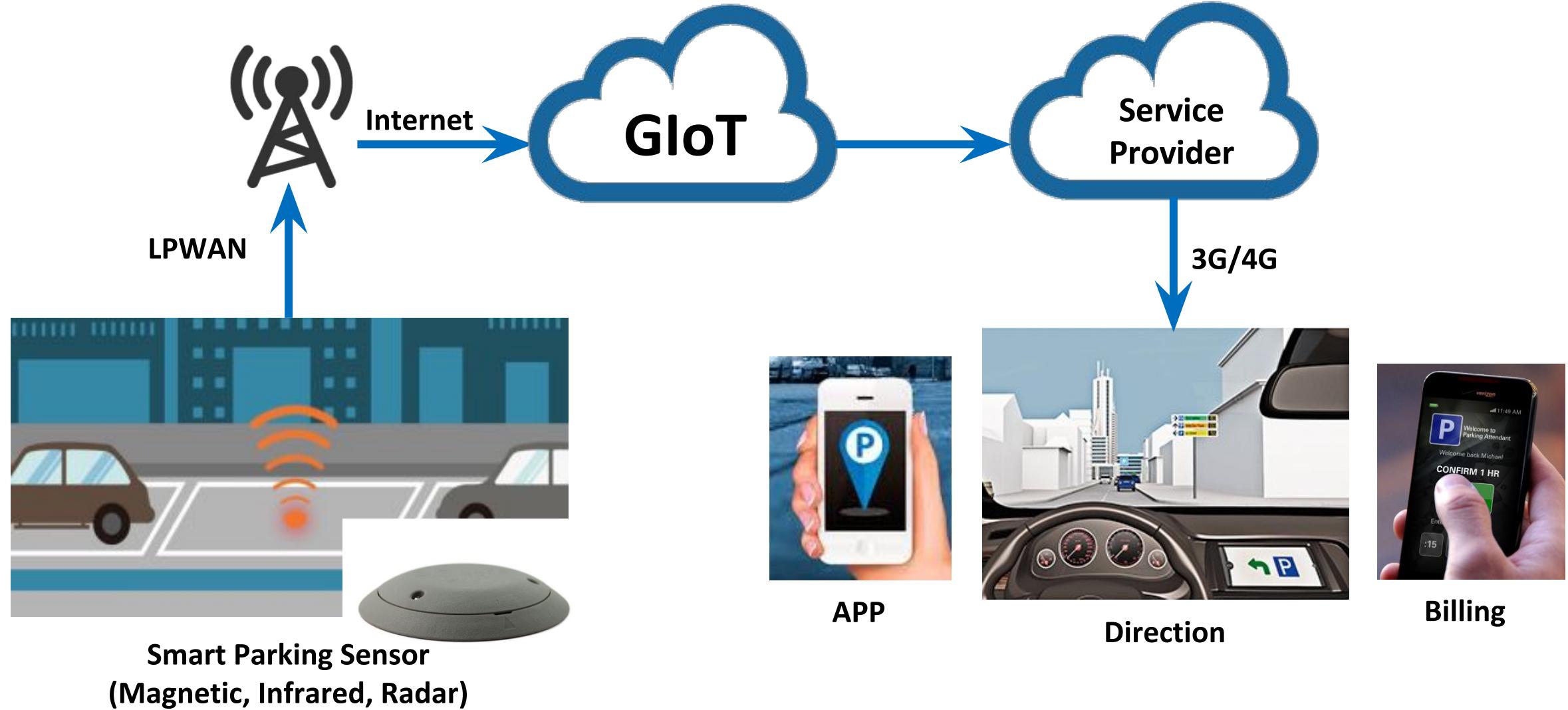
# Agriculture Management

**Sunshine, flow meter, leakage, soil hygrometer, soil PH, soil oxygen, rainfall,  
wind direction/speed, carbon dioxide, water-related sensors ...**





# Smart Parking



# Real Case I

## Taipei IoT Infrastructure



# Taipei IoT Smart City

## ● Location

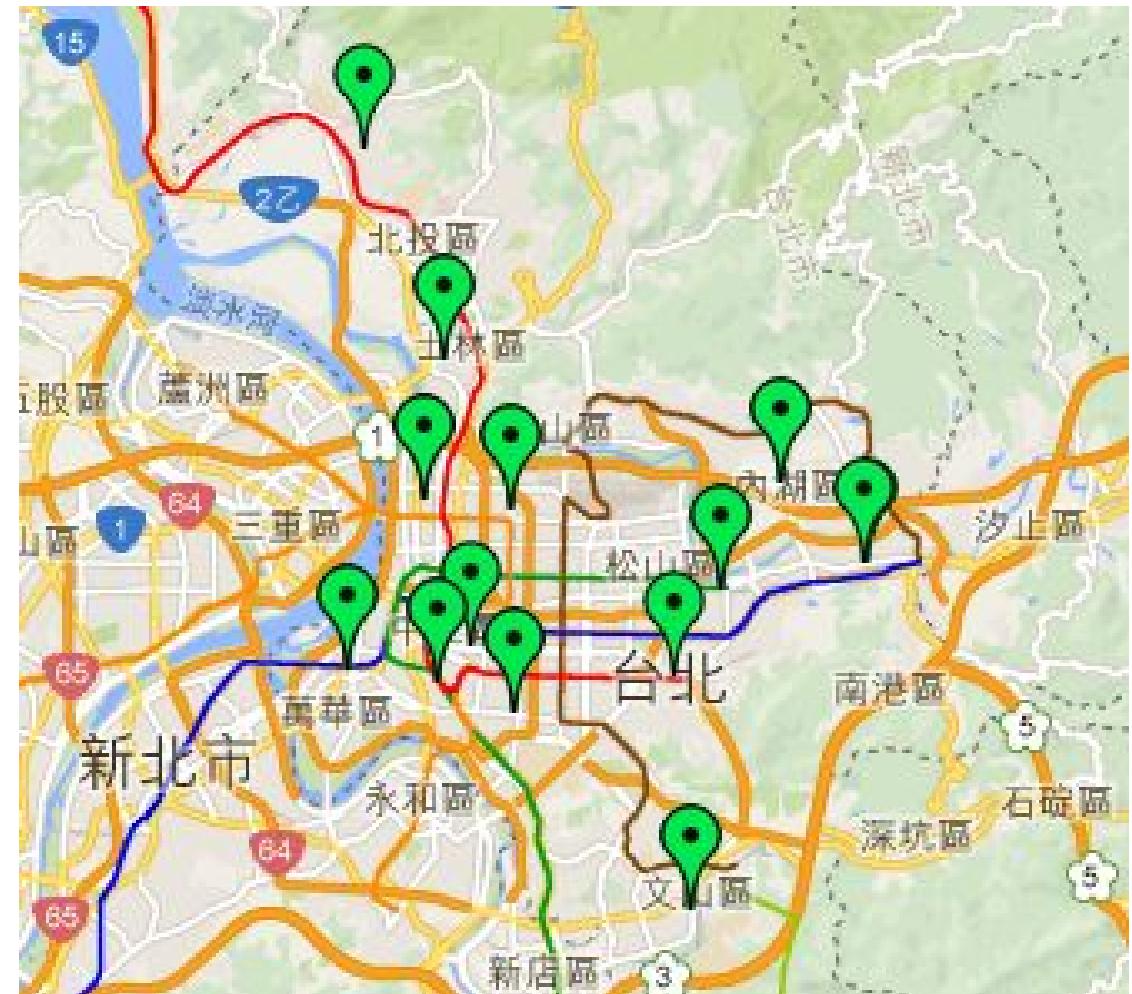
- Taipei, first-tier city in Taiwan

Time

- Infrastructure ready on January, 2016

## ● Launch

- Coverage : 271.8 km<sup>2</sup> (whole city)
  - 12+ outdoor APs
  - Indoor APs for dead space and better coverage after field application deployed.



(Image from DMS)



# Focus Taiwan News Channel

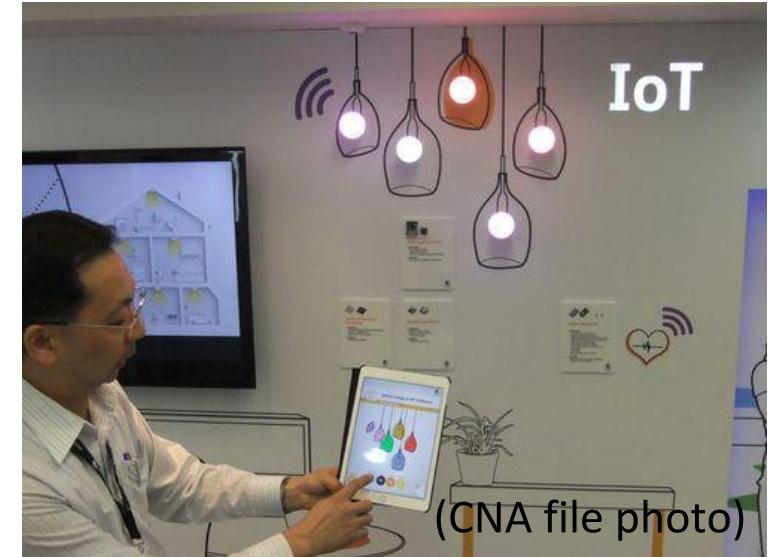
- **2015/11/08 Taipei to set up IoT experimental platform**

Taipei City government is planning to complete an infrastructure network for the Internet of Things (IoT) by the end of this year.

The project will turn Taipei into an experimental field for IoT services and Asia's first city-scale IoT platform promoted by a local government.

After the network is completed, the city government will accept applications from IoT developers to conduct free experiments.

The department has provided the required infrastructure and helped in the coordination with related agencies to establish an experimental platform.





**GiōT**  
Thank  
You!