

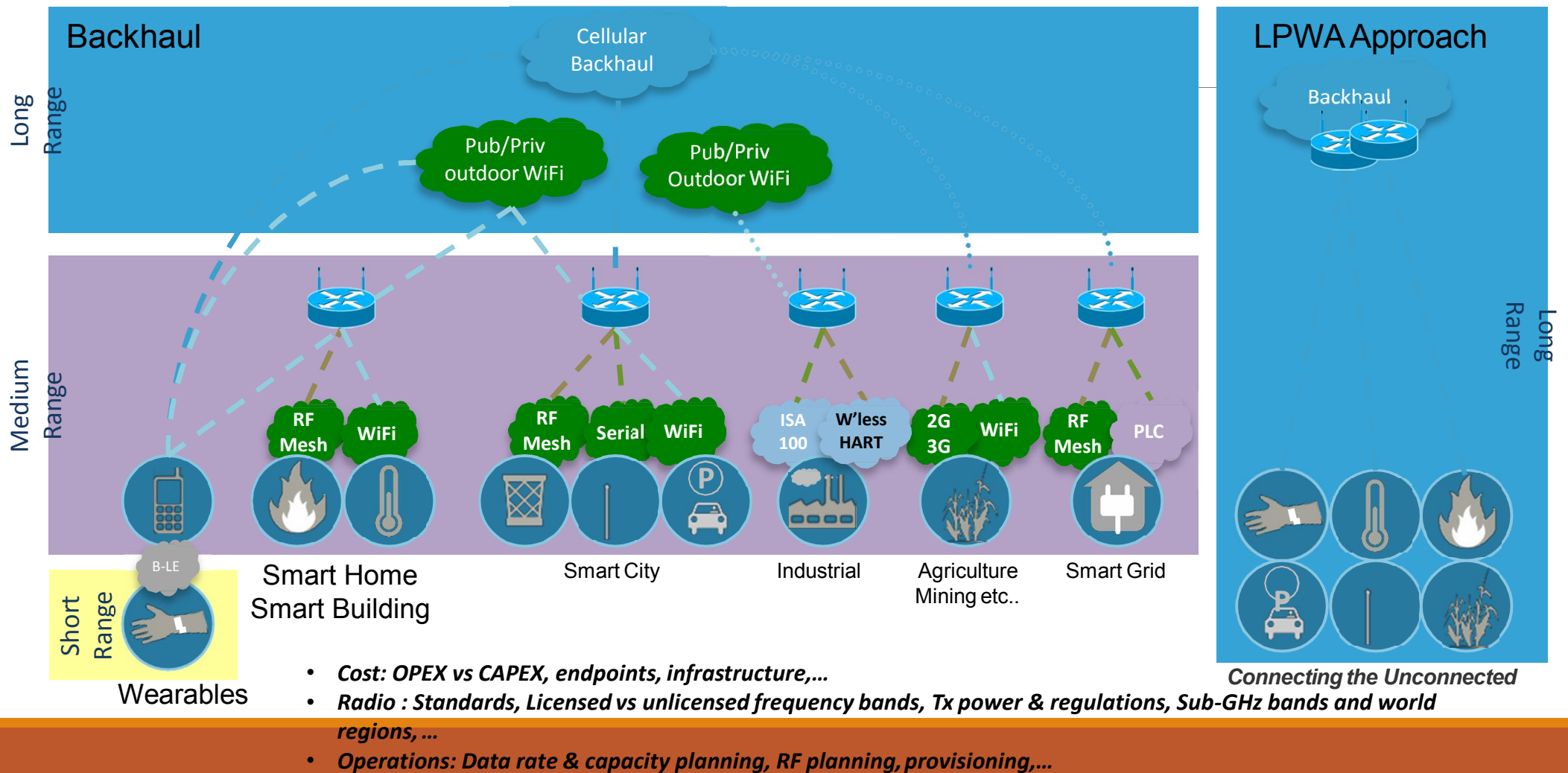


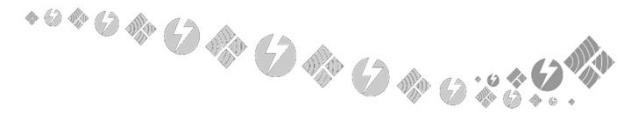
actility
Making Things Smart

ACTILITY OVERVIEW

© Actility 2015 | In Commercial Confidence

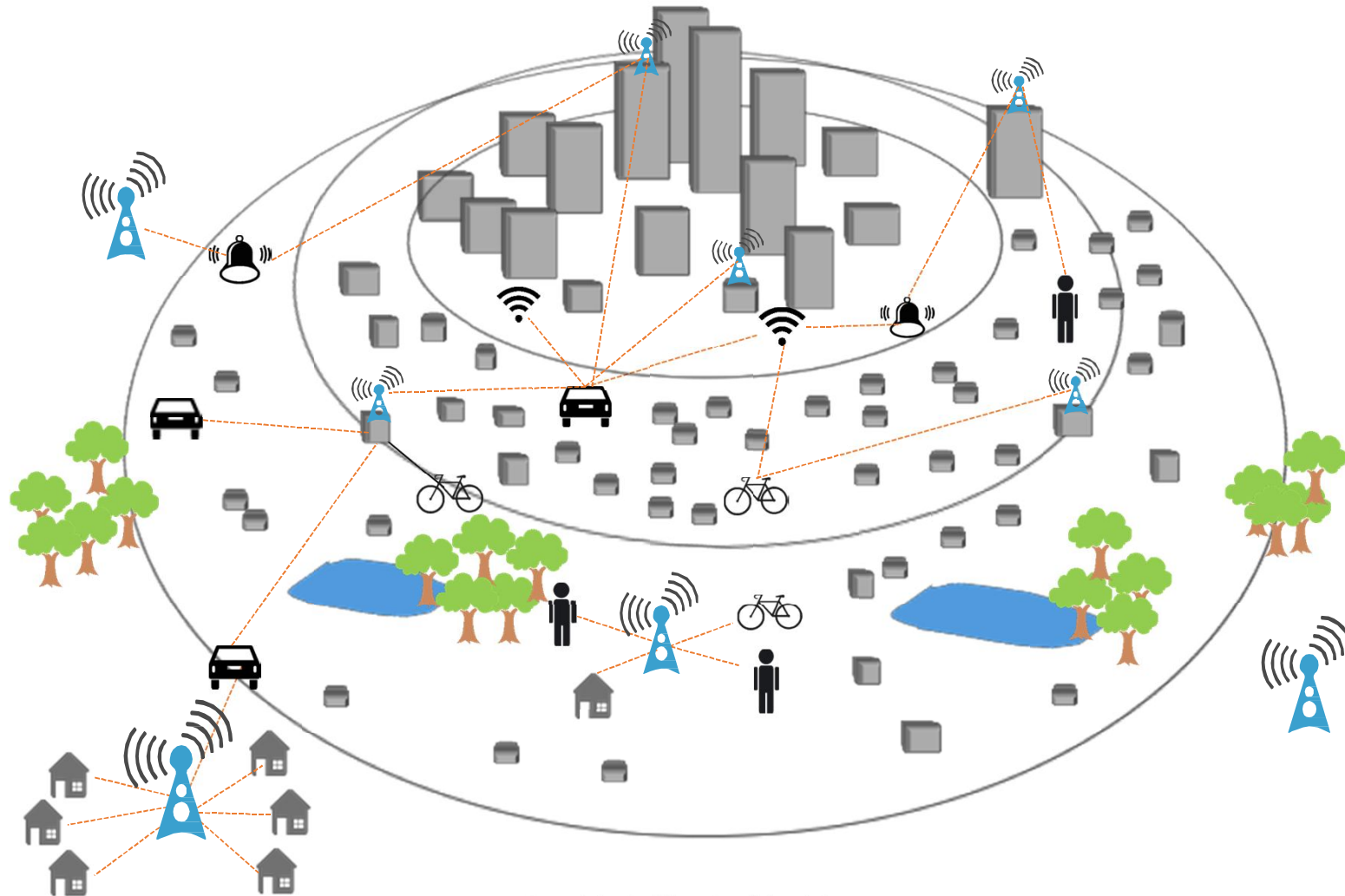
IoT Wireless Technologies Landscape



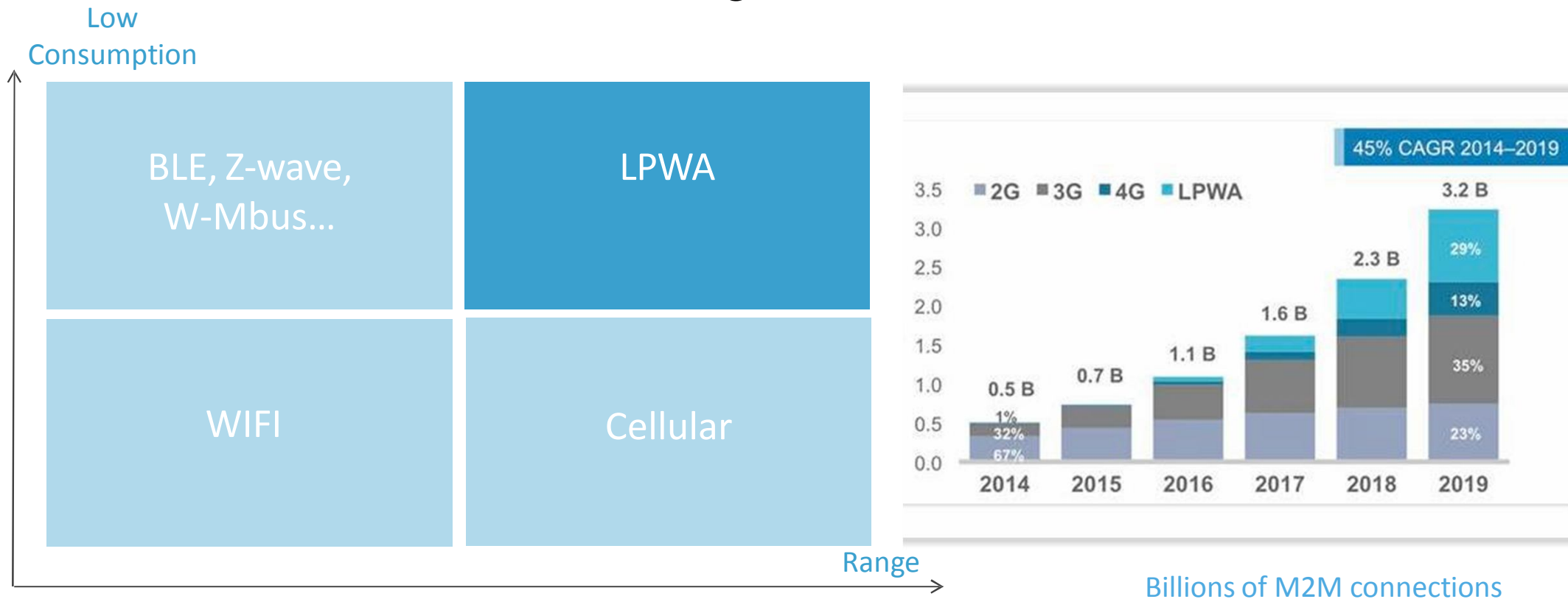


LPWA typical network

2



LPWA : The missing link for IoT



LOW POWER WIDE AREA Networks

4

Power source

Making a service that can operate for years on the same batteries opens many possible markets (gas and water meters in particular)

Range & penetration

Ability to reach deep indoor applications such as connecting meters located in basements and sensors monitoring sewer condition.

Cost

Modems under \$5 & annual connectivity costing less than \$1, LPWA will be more competitive than traditional cellular solutions

10 Billion USD

Revenues from connectivity services alone*

3 Billion

LPWA Connections by 2023*



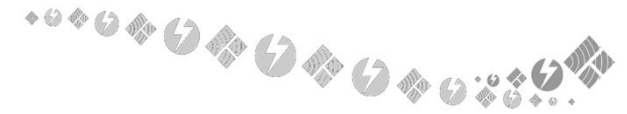
Source: Analysys Mason 2014
Summary of forecast of consumer connections 2023



LoRaWAN



Coverage	Lifetime	Cost	Usage
<ul style="list-style-type: none">✓ 5-15 km range✓ Deep indoor penetration✓ Star network✓ Bidirectionnality	<ul style="list-style-type: none">✓ Up to 10 years battery life✓ Low power consumption✓ Adaptative Data Rate✓ Connectivity profiles	<ul style="list-style-type: none">✓ Low deployment costs✓ Licence-free spectrum (ISM band)✓ Open standard	<ul style="list-style-type: none">✓ Public & private networks✓ Network scalability✓ Location without GPS✓ Data Rate: 300 bps to 5 kbps



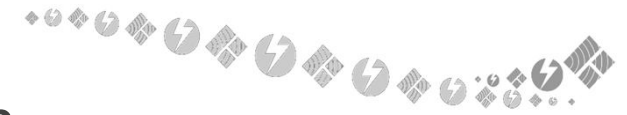
LoRa reach examples

Cell range at 125 kHz / SF12			
Area type	Outdoor (m)	Light indoor (m)	Deep indoor (m)
Rural	10 000	4 600	3 300
Suburban	4 000	2 000	1 300
Urban	2 500	1 000	700
Dense Urban	2 000	600	500

Warning: please note these values are only indicative values. Real results will depend on radio propagation conditions.

Assumptions:

- SF12 / 125 kHz
- Antenna height : 30m – Gain : 3dBi
- End-device antenna height: 1,5m
- Applicable regulatory rules : EU 868 MHz



LPWA technologies comparison

Feature	LoRaWAN	UNB (Sigfox)	NB-IoT
Modulation type	Spread spectrum chirp	Ultra narrow band / GFSK / BPSK	LTE - OFDMA / SC-FDMA
Bandwidth	125 – 500 kHz	100 Hz	180 kHz
Datarate	300 bps – 11 kbps	100 bps	Up to 250 kbps
Max /message / day (Uplink)	Unlimited*	140 msg/day	Unlimited (lice. Spectrum)
Max /message / day (Downlink)	Unlimited*	4 msg/day	Unlimited (lice. Spectrum)
Link Budget	154 dB	151 dB	165 dB
Network density	+++ (ADR)	+	++
Battery peak power	< 50 mA	< 50 mA	
Average sensor autonomy	+++ (ADR)	+	+
Interference immunity	Very high	Low	High ?
Native payload encryption	Yes	No	Undefined yet but probably
Gateway type	PicoCell / Indoor / Macro	Macro Cell	Macro Cell
Able to create private networks	Yes	No	No
Location (w/o GPS)	Yes	No	No
Commercial availability	Now	Now	2017-2018



Michel Quazza -
CEO



Olivier Hersent -
CTO



Boris Dezier - VP
Sales



Nicolas Jordan - VP
Marketing



Bernard Jannes - VP
R&D

Actility Profile

Founders: a team of seasoned engineers with focus on large scale IT systems & energy management.
Experience of over 80 deployments in 30 countries.

Two Divisions:



ActilityEnergy

Demand Response and Smart Energy
Management for Industrial Sites



ThingPark

ThingPark is Actility's end-to-end Machine-
2-Machine (M2M) and Internet of Things Service

Two investment rounds:

2010: €10m



2015: \$25m

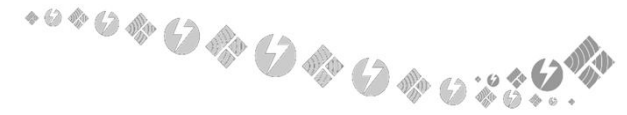


LoRa Key Features

- Long range >2km dense urban, >15km suburban
- Spread spectrum
 - Greater link budget (SNR) demodulates up to -22dB below channel noise/interferer floor
 - Robust to jamming/co-existence with other ISM traffic and increased reliability
- Adaptive Data Rate (ADR)
 - Low power consumption (>3x battery life compared to competing technologies)
 - 300bps-15kps depending on proximity from base station
 - Self scaling, simple capacity growth
- Bi-directional communication
- Security
 - Unique ID
 - Full encryption
 - Authentication
- Low cost/low power gateway and end points
- Location (2016) - TDOA



LoRaWAN device classes



Class name	Intended usage
A (« all »)	Battery powered sensors , or actuators with no latency constraint Most energy efficient communication class. Must be supported by all devices
B (« beacon »)	Battery powered actuators Energy efficient communication class for latency controlled downlink. Based on slotted communication synchronized with a network beacon.
C (« continuous »)	Mains powered actuators Devices which can afford to listen continuously. No latency for downlink communication.



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SPONSOR MEMBERS



Low Power IoT Alliance

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An open, non-profit association of members that believes the internet of things era is now. It was initiated by industry leaders with a mission to standardize Low Power Wide Area Networks (LPWAN) being deployed around the world to enable Internet of Things (IoT), machine-to-machine (M2M), and smart city, and industrial applications.

The ThingPark Wireless LoRaWAN Eco-system

14

Sensor Partners



Base Station Partners



The full ThingPark IoT Framework

15



ThingPark **Wireless**

Connectivity for the Internet of Things with LPWAN networks

LoRaWAN core network infrastructure including network controllers (LRC servers) and multiple hardware options for base stations



ThingPark **Cloud**

Accelerating IoT application development on open APIs

Open data cloud services with standard based REST API. LoRaWAN to ETSI M2M/OneM2M interworking



ThingPark **Store**

Online marketplace engine

The marketplace engine to accelerate the distribution and provisioning of your Internet of Things bundles

Actility helps service providers all the way from [connectivity](#) to [online distribution](#) of their IoT offers

ThingPark Wireless Overview

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A ready-to-go IoT connectivity, SaaS platform plus a full set of ready-to-sell applications in less than a month.



LoRaWAN core network infrastructure including network controllers (LRC servers) and multiple hardware options for base stations



Wide eco-system of certified sensors covering key verticals such as Smart Parking, Energy efficiency, tracking and security.



Full OSS system with user-friendly graphical interfaces for provisioning and monitoring of base stations and end-devices

ThingPark Cloud Overview



ThingPark Cloud

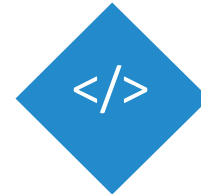
The Open API platform for fast
development of innovative applications
for the Internet of Things



Open data cloud services with standard based REST API. LoRaWAN to ETSI M2M/OneM2M interworking



Uniform big data storage driver for end device data flows with automated quota management. Support for various back-end technologies including MongoDB®, MySQL, Amazon®, DynamoDB.



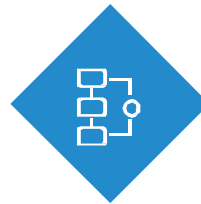
Uniform REST driver support for popular IoT and automation semantics like ModBus, ZigBee ZCL, KNX, MBUS. Support for ETSI TR102966 protocol independent XML syntax.

ThingPark Store Overview



ThingParkStore

The marketplace engine to accelerate the distribution and provisioning of your Internet of Things bundles



Automated marketplace management of IoT device and application suppliers, including delivery and activation workflows

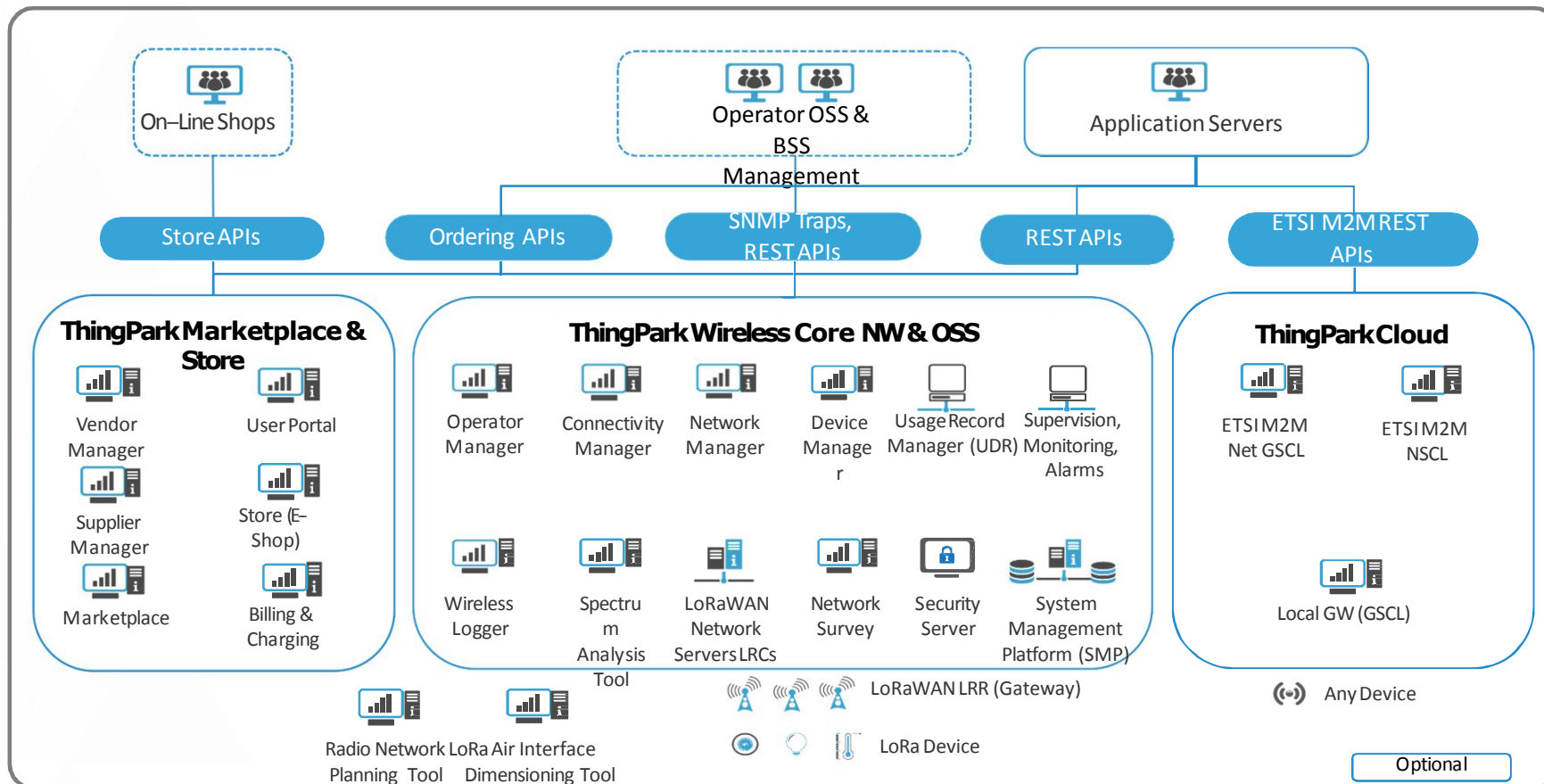


Support for multiple vendors of IoT offers with automated eShop creation and management



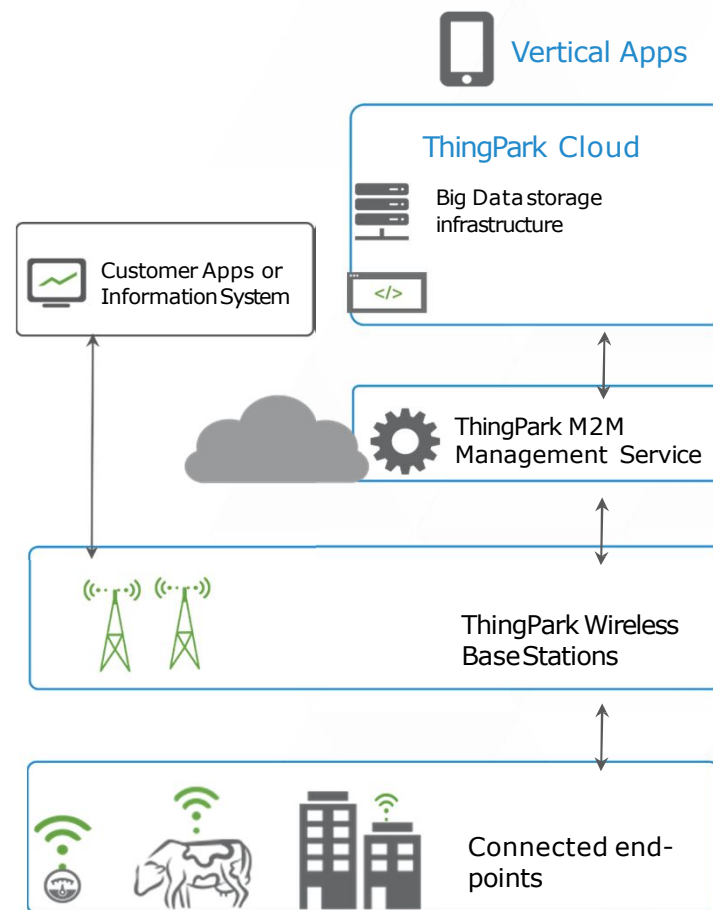
Custom IoT offer bundle creation tool :
pick IoT connectivity plans and any device or application from the ThingPark Store marketplace catalog.

ThingPark High Level Architecture



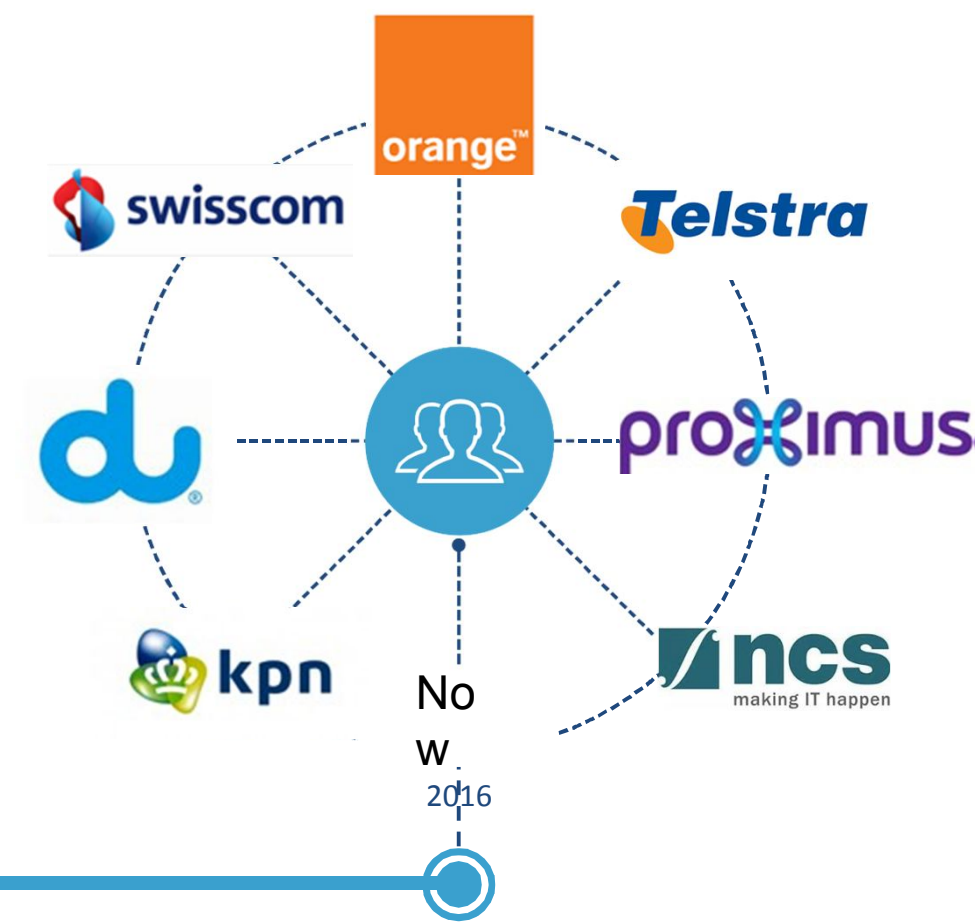
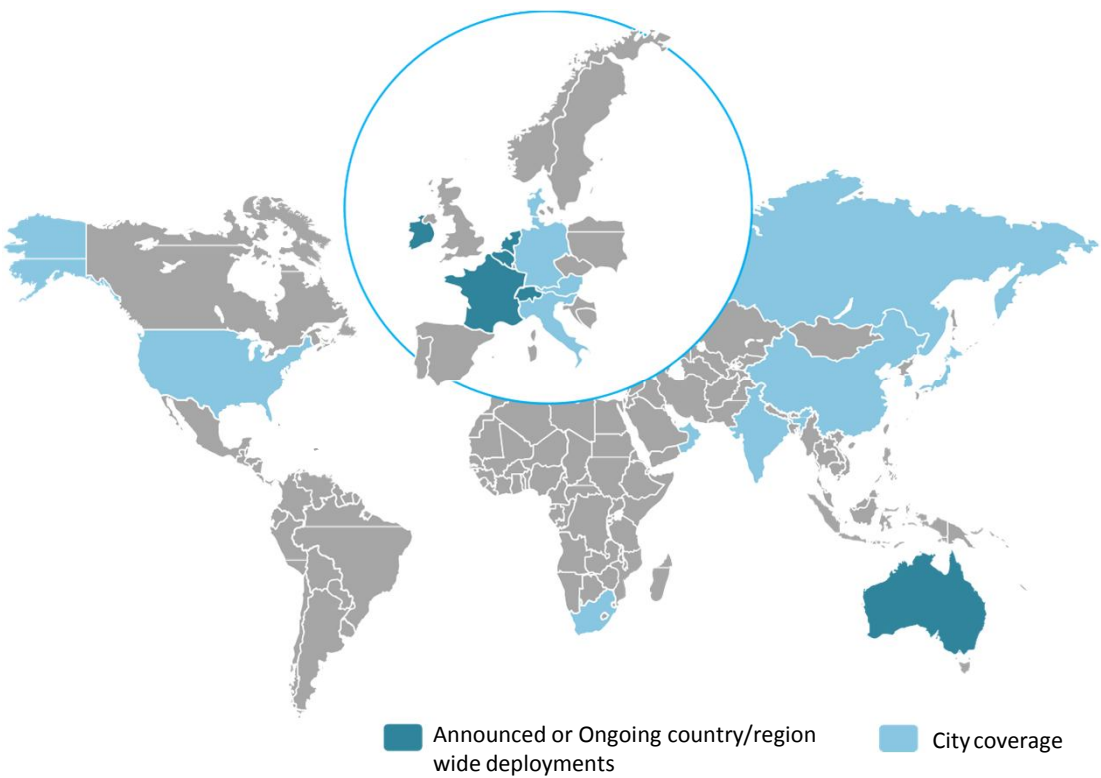
ThingPark Wireless Connectivity Scenarios

- ThingPark Wireless provides connectivity from connected objects which support the LoRa chipset
- ThingPark Wireless supports 2 network connectivity options:
 - Through the ThingParkCloud infrastructure where sensor data is stored
 - Traffic is delivered directly to the client's information system or apps
- ThingPark Wireless is compliant with the ETSI M2M standard which guarantees interoperability





Current deployments



Actility rollouts : Belgium - Proximus

22



National Roll out 2015-2016

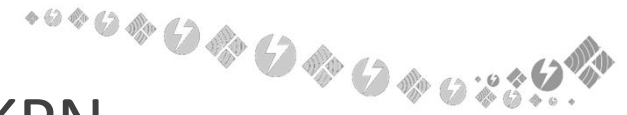


Current coverage map

Objectives: provide national coverage for IoT and energy services

Business case examples: traffic and tracking management, energy consumption, pollution supervision, smart building control / facility management (presence, humidity, geo-localization) and street lighting

Actility Solution: SaaS hosted solution, more than 140 base stations covering major cities and highways in Belgium. Service commercialization in Oct/15

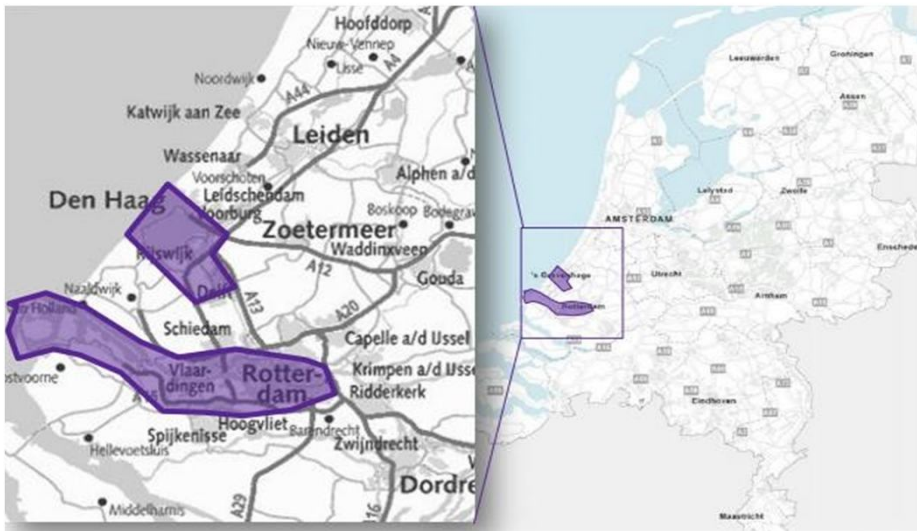


Activity rollouts : Netherlands - KPN

23



National Roll out 2015-2016

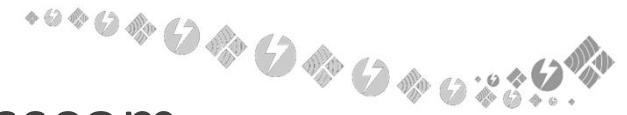


Current coverage map

Objectives : provide national NW coverage for tracking and intelligent IoT services, GPS-free location committed end Q2 2016

Business case example: tracking services e.g. location for anti bicycle theft, street signage, smart agriculture...

Activity Solution: private hosted solution (KPN), number of base stations 20 in 2015, >200 in 2016. Quick launch - service commercialization in Nov/15

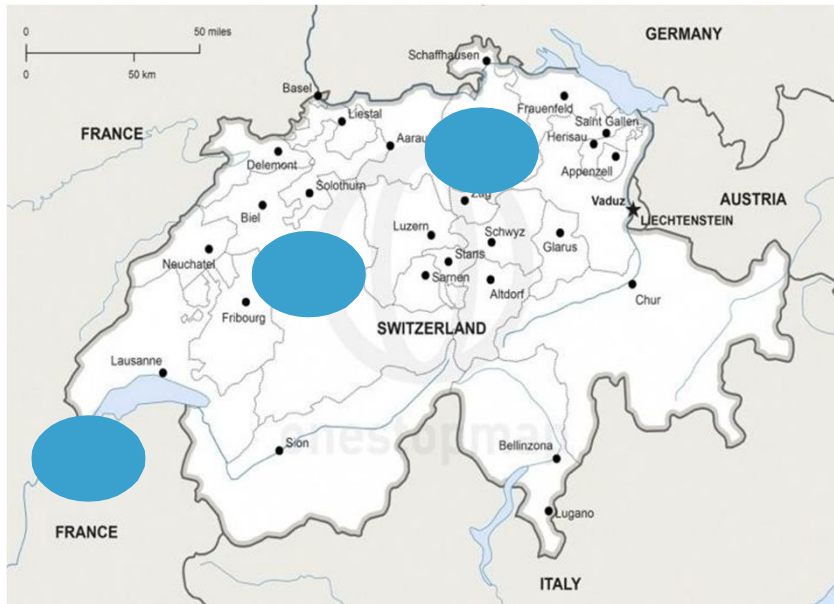


Actility rollouts : Switzerland - Swisscom

24



Regional Roll out 2015



Current coverage map

Objectives : provide energy and tracking (IoT) services

Business case examples: smart parking services, provide energy monitoring services to the Zurich municipality. Tracking services – battery monitoring & control, GPS and temperature

Actility Solution: SaaS hosted solution, more than 50 base stations have been installed covering Zurich and Geneva

<http://lpn.swisscom.ch/E/>

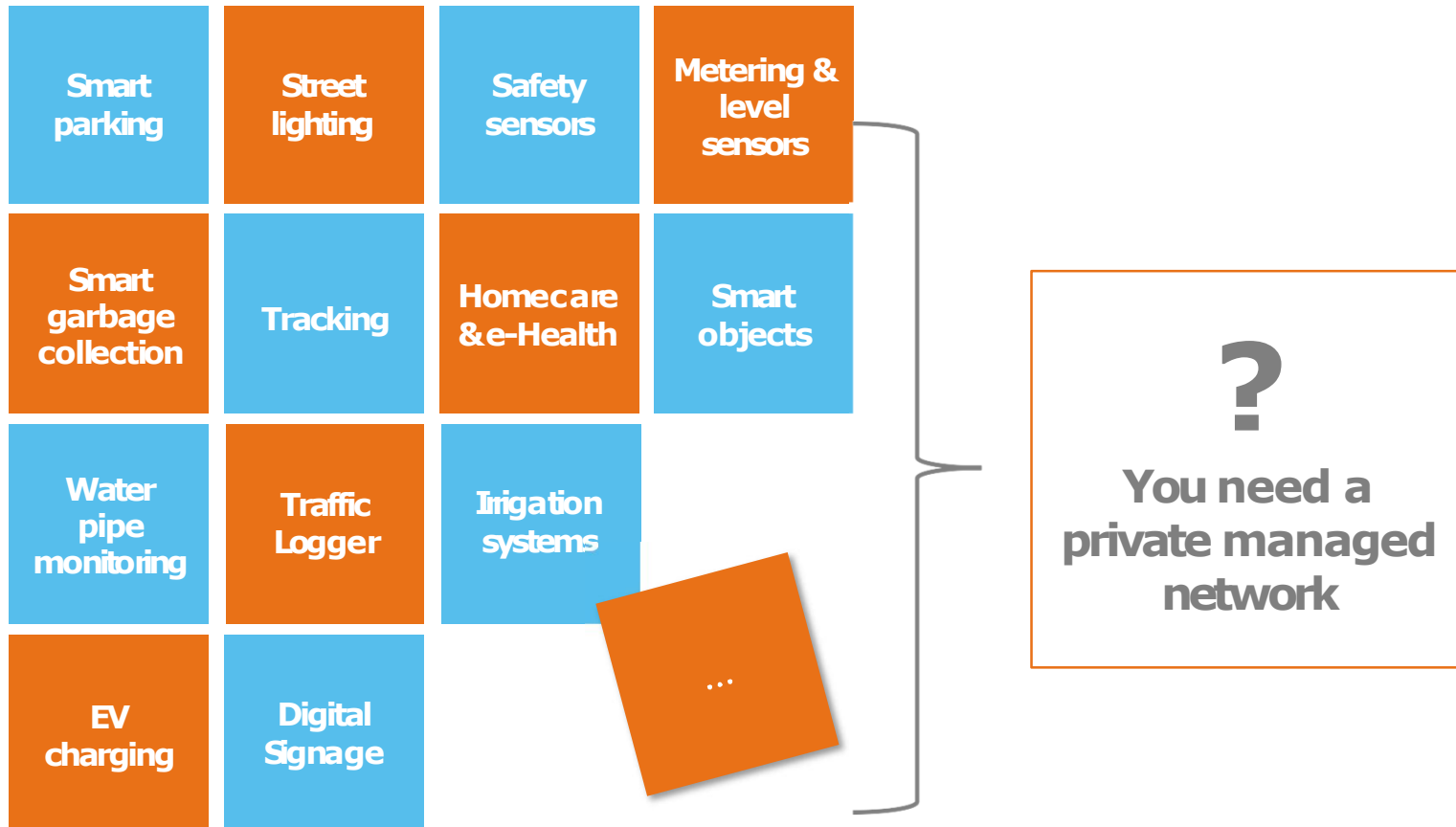
Operator Roof-top roll-out

Points to consider

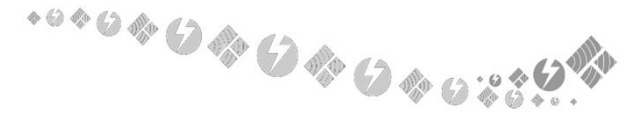
- High point availability
- Weather resistance
- Power availability
- Network connectivity



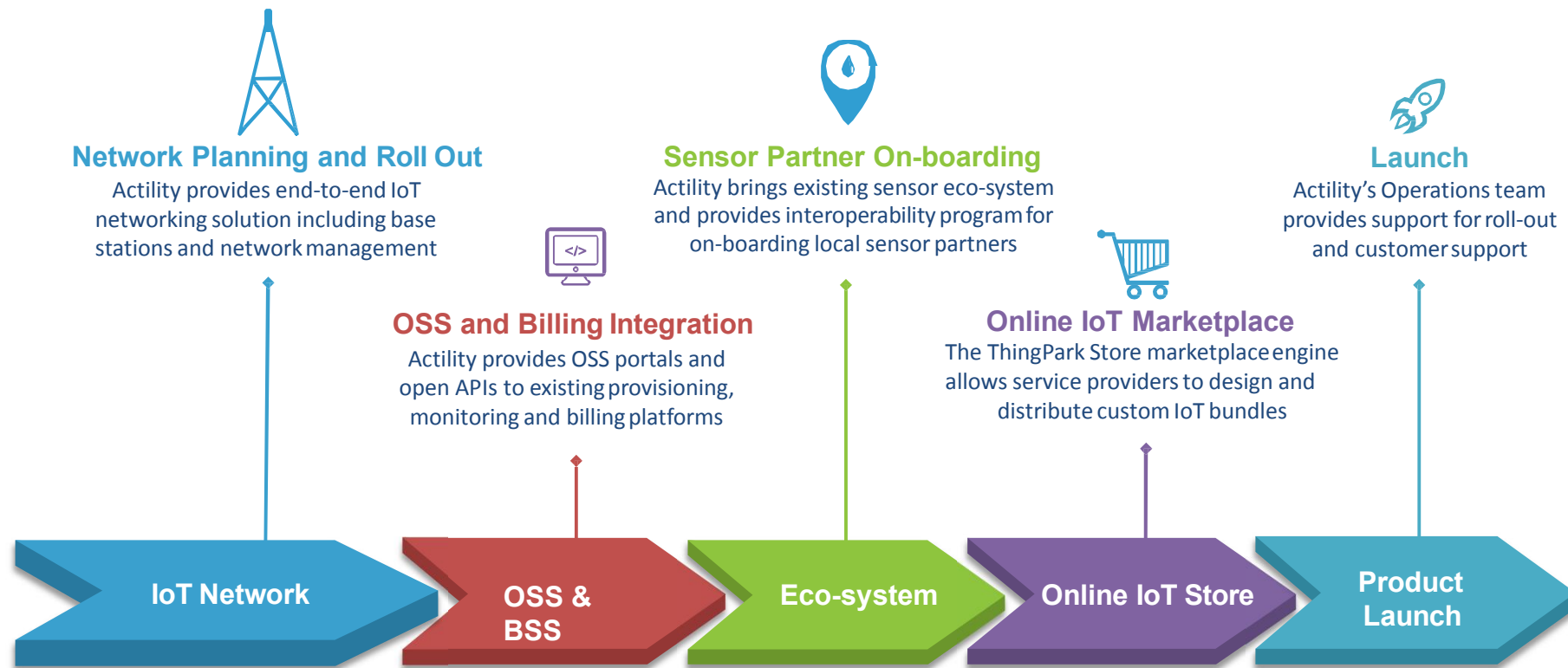
Interested to deploy wireless sensors?...



Jumpstart your IoT roll-out



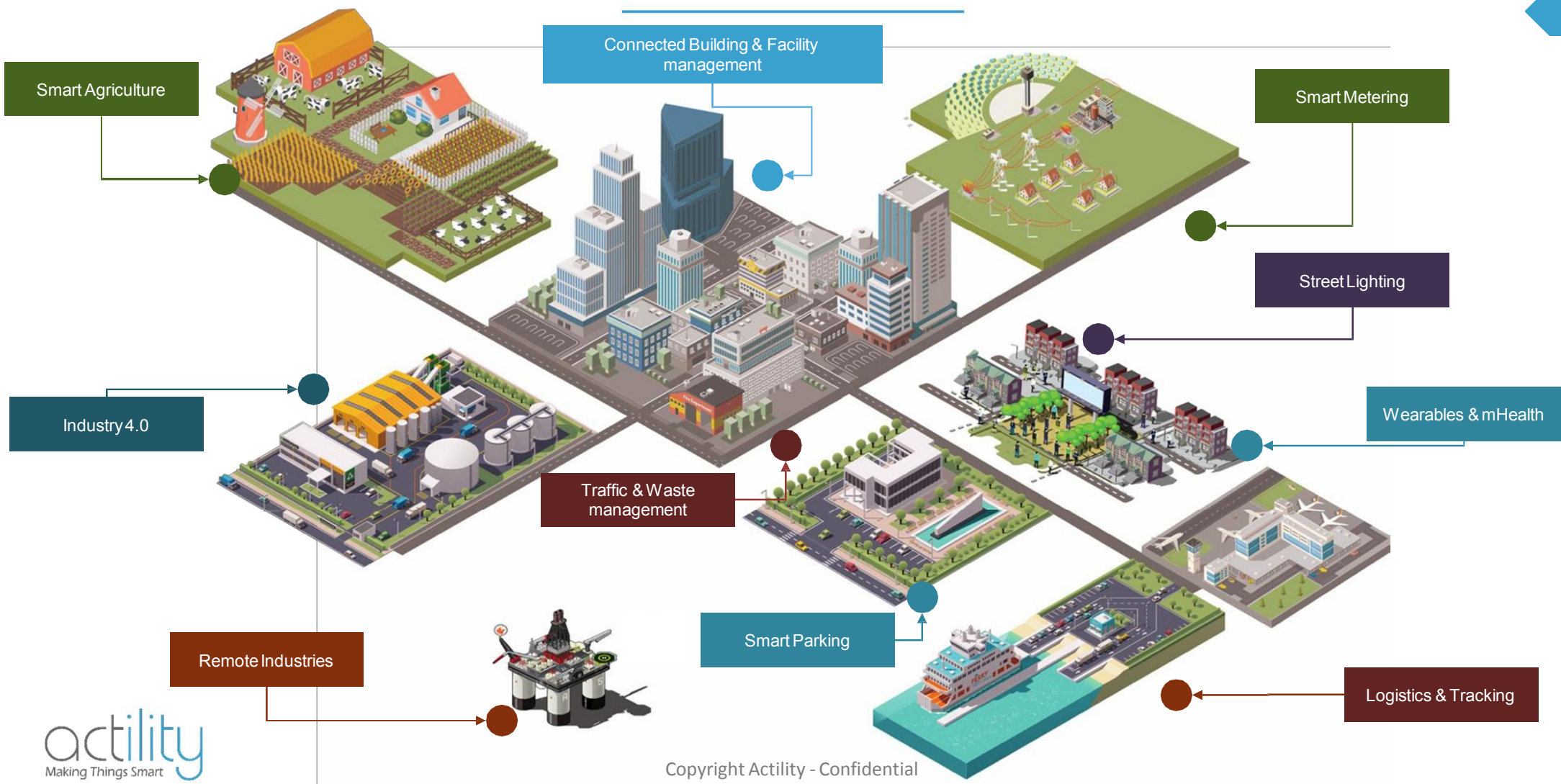
27



VERTICAL USE CASES



LoRaWAN use cases : the connected world



Key LoRaWAN Verticals



Smart metering



Street lighting



Smart building



Smart parking



Tracking



Leak detection & irrigation



Water level & flood management



Fault management



Smoke detectors



Smart energy & fast demand response

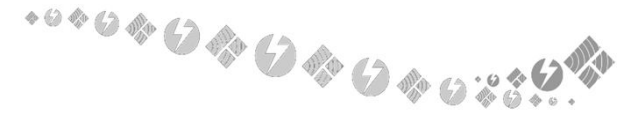


Waste management



Traffic management

USE CASE – SMART AGRICULTURE



Smart agriculture



Key benefits :

- ✓ Temperature monitoring
- ✓ Remote irrigation
- ✓ Humidity monitoring
- ✓ Elec/Gas/water metering
- ✓ Animale GPS tracking
- ✓ Geo fencing
- ✓ Energy consumption optimisation
- ✓ Human tracker

USE CASE – UNIVERSAL TRACKING

Addressing different tracking requirements



Asset tracking in airports



Assisted living and motion detection of elderly persons



Pet tracking



Harbour management



Child tracking



Safety or Panic button



Container management
Theft detection



Managing small container deposits



Managing rentals



Urban planning and optimization(cycling, pedestrians,...)



Battery

Casing

GPS

Accelerometer

LoRa

Tracking

- French automotive security company Traqueur has invested in a LoRa module for its anti-theft module
- ThingPark Wireless can be used as primary or back-up network



625 € including:

1 Year of tracking service (24/7 Customer service)

Anti-theft device

Installation

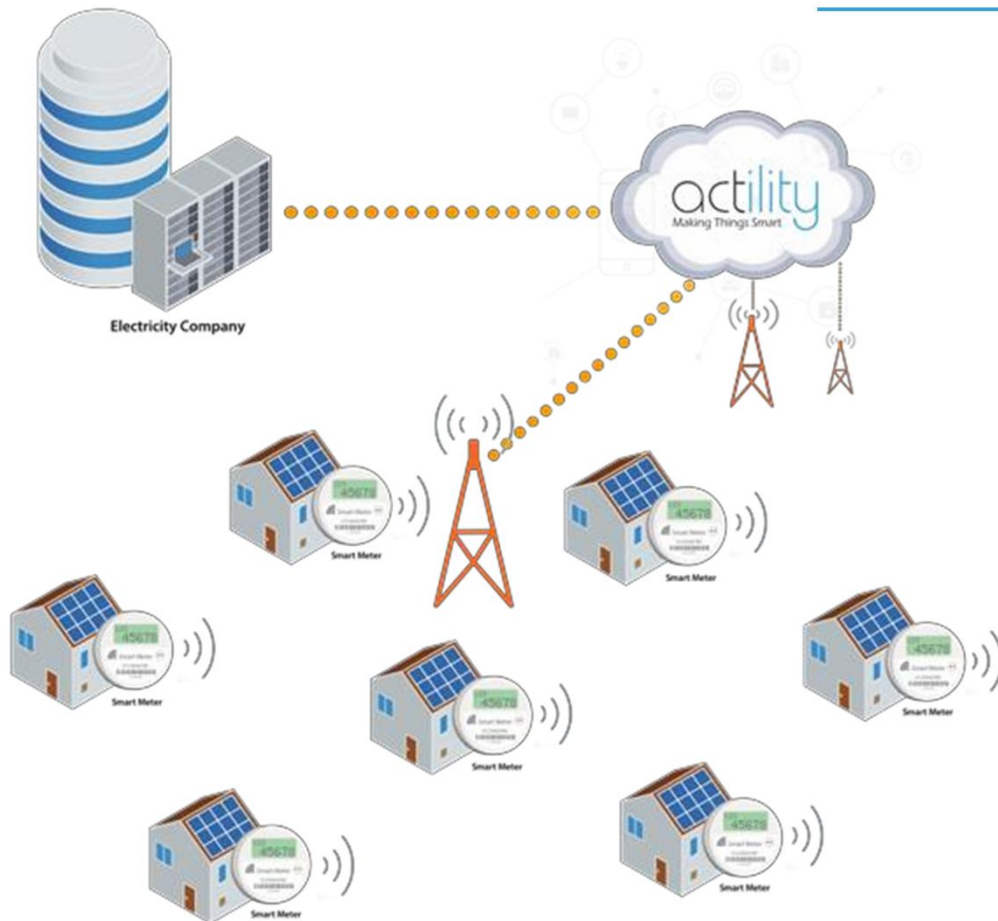
Connectivity

USE CASE – UTILITIES



Utilities : Smart metering

37



Key challenge :

Deploy an easy-to-install network of smart meters with bidirectional capabilities

Actility solution :

- LoRaWAN technology enabled smart meters with

Key benefits :

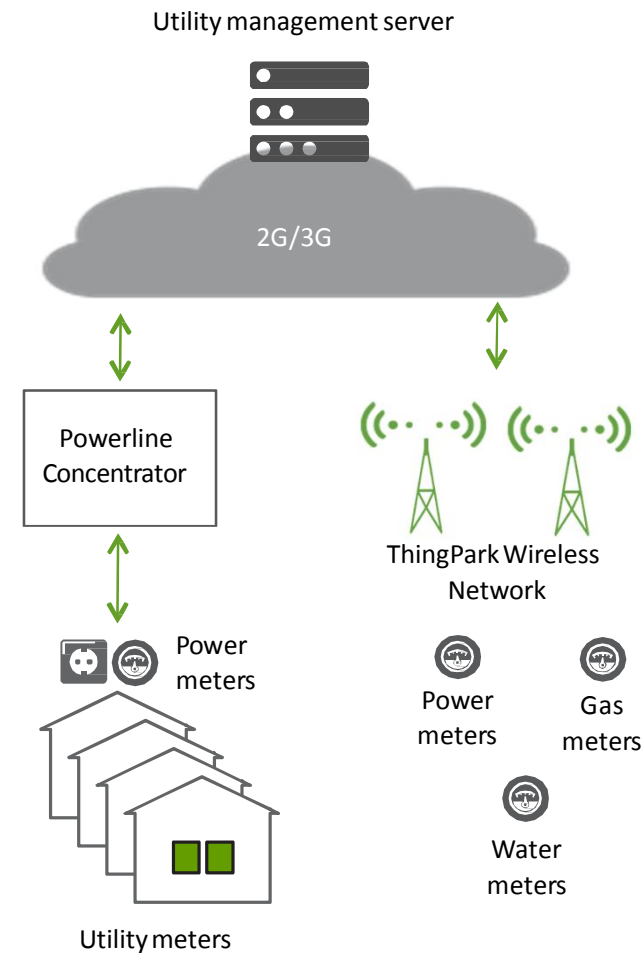
- ✓ Long distance coverage up to 15 km without local gateways
- ✓ Meter battery life up to 10 years
- ✓ Utility dedicated tools to manage, operate and visualise data
- ✓ Billing management
- ✓ Leak detection
- ✓ Easy to interface with application layers
- ✓ Can use public LoRa networks

Device partners :



Utility requirements for remote metering

- LPWA networks represent a better alternative to Powerline:
 - One common network for all utility meters
 - Lower cost structure
 - Lower latency for upstream and downstream
- Lower cost related to high range of LPWA networks such as ThingPark Wireless
- Based on Utility high points, 15 km range reachable in rural areas
- Pricing based on number of end-points and number of transactions per day (Power metering represents more transactions than water meters)



Remotely controlled fault management modules

- Retrieving fault messages from the ErDF (French power distribution utility) subsidiary in Corsica
- Overhead power lines are equipped with an electronic control equipment (ILD)
- Base stations are rolled out on selected utility poles in the 30km Corsica valley
- The ILD is equipped with a pulse sensor to send fault status to a central control center.



Monitoring energy consumption - Enel

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Wireless sensor for CO2 level monitoring



Wireless temperature sensor



Reading sensor for electric meter



Sensor for gas meter



Humidity sensor

Activity's Energy & Utility sensor instrumentation



ThingPark Wireless Connectivity Network



REST API for Application Development



Big Data storage infrastructure



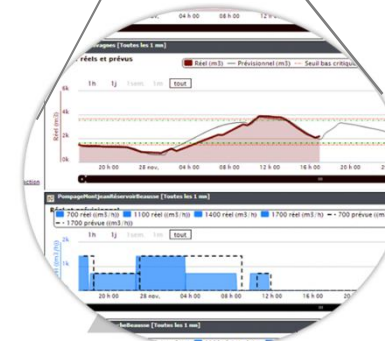
Sensor provisioning & management



Graphical analytic tools

ThingPark Cloud

- ✓ A single solution for all utility meters
- ✓ Plug 'n' play solution on existing meters
- ✓ Support energy harvesting mode
- ✓ Supports long-range connectivity
- ✓ Includes Datalogger real-time analysis tool

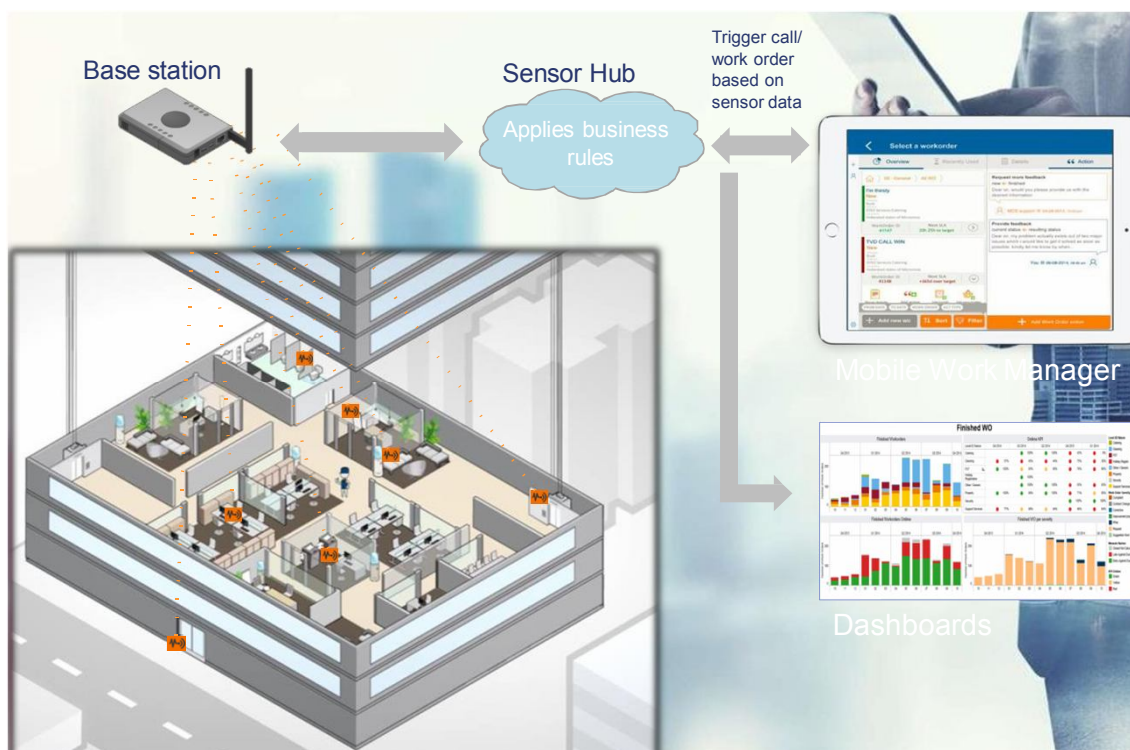


USE CASE – SMART CITIES



Connected building & Facility management

42



Key challenge :

Easy-to-deploy connected building management solution for real estate, workplace and facility management

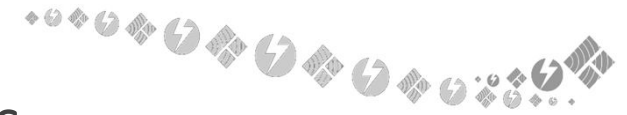
Activity solution :

- LoRaWAN technology enabled devices with easy-to-connect engine to public LoRa networks

Key benefits :

- ✓ Long distance coverage up to 15 km without local gateways
- ✓ Pulse detectors battery life up to 10 years
- ✓ Utility dedicated tools to manage, operate and visualise data
- ✓ Fault detection alerts
- ✓ Easy to interface with application layers
- ✓ Can use LoRa public networks

Device partners :



Home automation & appliances

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Key challenge :

Connect & automate home devices and applications for energy saving and better comfort

Actility solution :

- LoRaWAN technology enabled devices with easy-to-connect engine to public LoRa networks

Key benefits :

- ✓ Comfort monitoring (Temp., humidity, air quality, presence, smoke...)
- ✓ Ability to send orders (switch on lights, heating devices, alarm systems...)
- ✓ Home dashboard for information visualisation – smartphone applications
- ✓ Energy consumption monitoring allows for savings (electricity, water, gaz)
- ✓ Long distance, no need for inhome gateway / repeater

Device partners :

Smart Parking – Driving value for the end-user & local government

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An innovative parking system

- 1 To help drivers find a parking spot



- 2 To help cities manage their parking spaces more efficiently



A dedicated long-range low-power sensor



- Easy to install (10 minutes)
- Anti-vandal
- Easy to maintain (batteries last up to 5 years)
- Supports 60 tons



REDUCES DRIVER FRUSTRATION
Allowing you to save time, fuel and associated costs



REDUCES SEARCHING TIME BY
35%



REDUCES ACCIDENTS

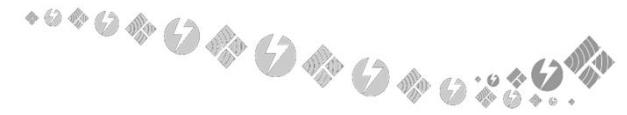


REDUCES CO2 EMISSIONS
Urban traffic is the cause of 40% of CO2,
70% of other pollutants



REDUCES NON-PAYMENT
Increases the number of tickets
purchased





Street Lighting

45



Key challenge :

Connect & automate street lighting infrastructure allowing remote control and energy savings

Actility solution :

- LoRaWAN technology enabled street lights

Key benefits :

- ✓ Monitor and manage lighting levels
- ✓ Automatically adapt luminosity to needed conditions
- ✓ Centralised operations
- ✓ Energy savings

Device partners :

Waste Management

- Using the trashbinsensor to optimize route planning for city services
- Works with any type of container and any type of waste mixed, glass, bio, metals or fluids such as oils and waste water etc.



Optimized route vs. unoptimized route

• Key Features

- Sensor Device
- Access to the ONE Collect Web Portal
- Real Time Fill-Up Measurements
- Collection Forecasts
- Daily Collection Lists
- Alert Service
- Sensor Warranty and Replacement
- All Data Transmissions
- Unlimited Number Of User Accounts
- 24/7 Email Support
- Access to One Collect Server API
- Updates and Service Improvements

ThingPark Wireless Benefits

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- ✓✓ Bidirectional communication solution
- ✓✓ Automatically benefit from growing network
 - ✓✓ More reliable connectivity
 - ✓✓ Longer battery life (lower spreading factors)
 - ✓✓ Wider coverage
 - ✓✓ Increasing network capacity (square of number of base stations !)
- ✓✓ Ready to use Big Data and Open Data standard APIs (ETSI M2M)
- ✓✓ Instant M2M/IoT Market place / App Store creation
- ✓✓ Open specifications
- ✓✓ Collaborative public/ private network
- ✓✓ Growing Ecosystem of partners



Why Activity

- ✓✓Resource, Knowledge and real world experience to support full scale national deployments
- ✓✓Experience of key use cases around the world
- ✓✓World class platform operating over 1500packets/sec per dual core CPU which scales easily in a horizontalmanner with full redundancy as a an option
- ✓✓Superior OSS System that can supervise effectively including the backhaul and station hardware
- ✓✓Open platform providing multivendor hardware and Private Network support
- ✓✓Availability of an end to end system with a One Stop Shop solution if requested
- ✓✓Fully scaleable with the integration of ecosystem offerings
- ✓✓Full support for commissioning and management of the sensors application laver
- ✓✓Option of a off the shelf Network Security Solution



A blue silhouette of a city skyline with various buildings and structures.

Q&A

Thank you



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