



IoT for Smarter Health Care

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Digital Disruption on an Exponential Scale



Hotel



Taxi



PANDORA
internet radio

Music

Google
facebook

Print
Advertising



Car



Point-
of-Sale

Better Life with Smart & Connected Health Care



Sustainable Application Economics



Smart Home Wifi



6 x AA Lithium
Batteries



Street Lights with Wifi



110/220VAC

Cellular & WiFi not Suitable for Constrained Devices

Many sensors are **low cost, low power, constrained** devices

Battery/solar/scavenger energy

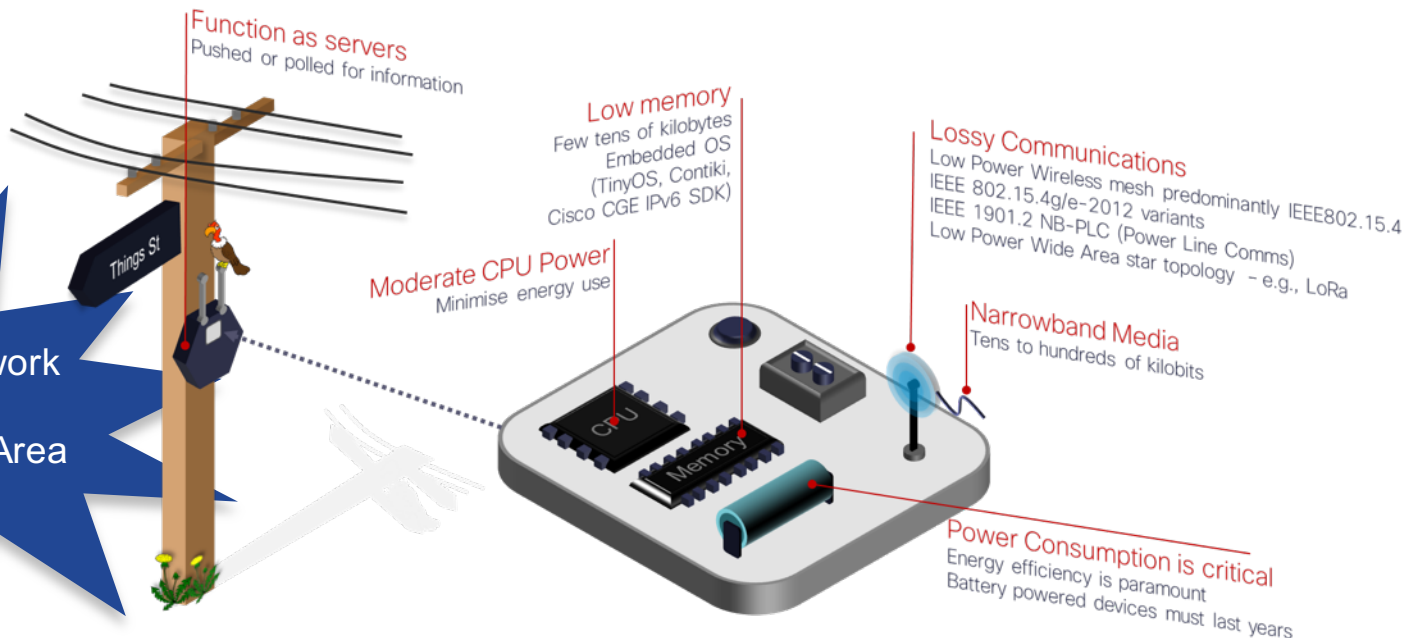
Wireless

Low CPU

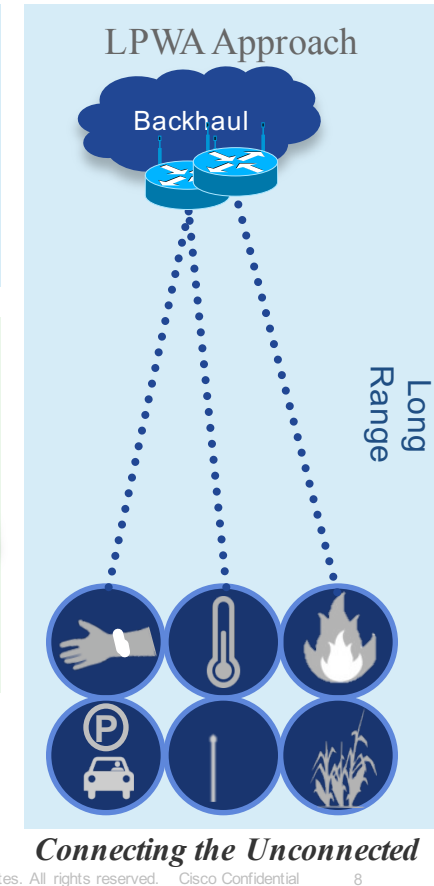
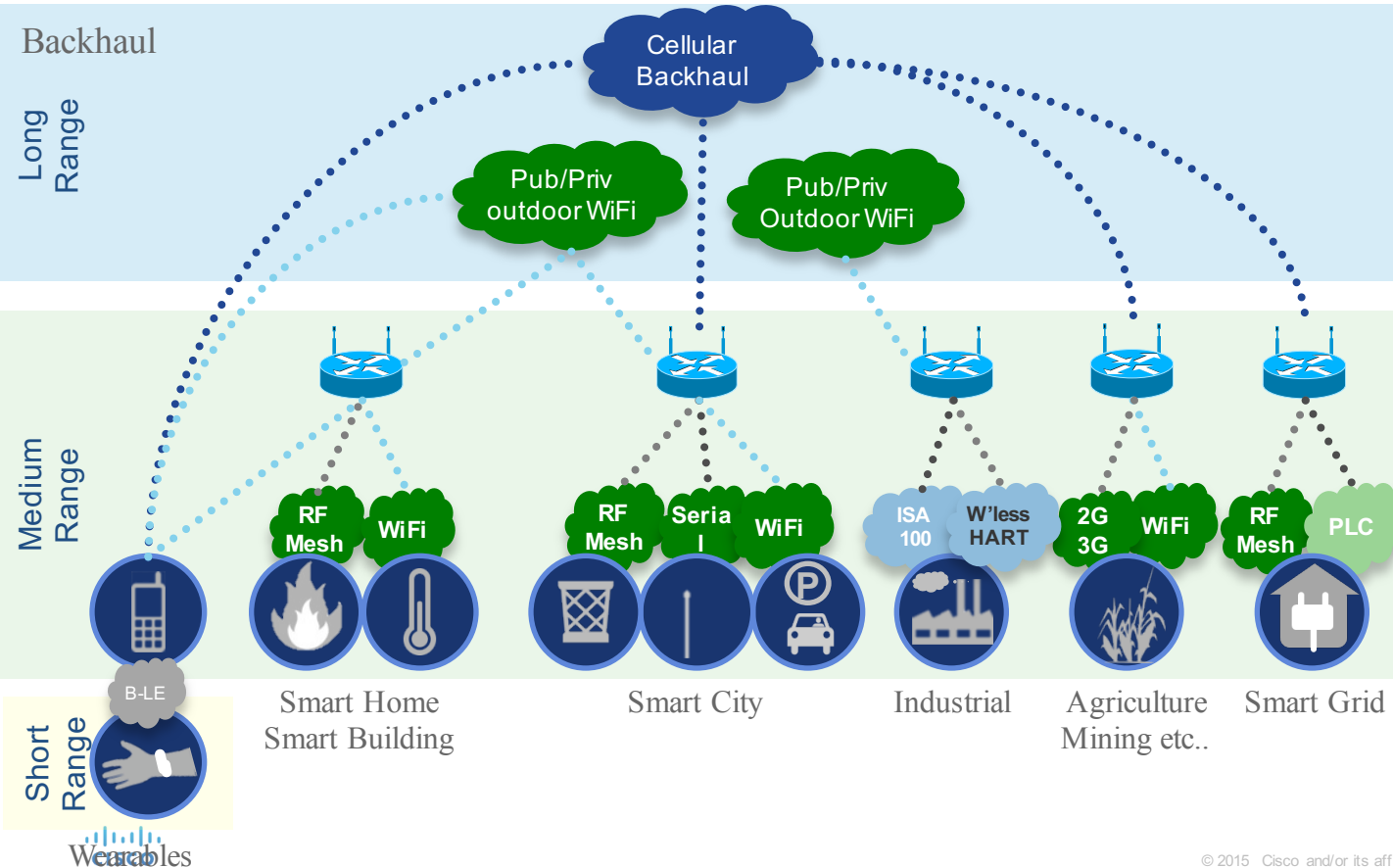
Autonomous

Huge scale

New type of network
is required
Low Power Wide Area
(LPWA)



IoT – Wireless Technologies Landscape



Connecting the Unconnected

Wireless IOT Connectivity Options

Existing SP Network

Private Network

Emerging

Technology	2G	3G	LTE	WiFi	Zigbee	Wireless Hart	802.15.4g	LPWA (LoRa, SigFox, etc.)
Range	Yes	Yes	Yes	No	No	No	Limited (<1 km)	>10 km (rural) >1 km (urban)
Topology	P2P	P2P	P2P	P2P/Mesh	Mesh	Mesh	Mesh	P2P
Tx Current Consumption (3V)	30mA to 400mA	500 to 1000mA	600 to 1100 mA	19 to 400 mA	34mA	28mA	~ 35mA	<20 mA
Standby Current Consumption (3V)	0.35 mA	1.2 to 3.5mA	1.5 to 5.5mA	1.1 mA	0.003mA	0.008mA	~.005mA	<0.005mA
Energy Harvesting	No	No	No	No	Possible	Possible	Possible	Possible
Operating Life on battery (2000mAh) h=hours; d=days A=active; I=Idle	4-8 h (A) 36 d (I)	2-4 h (A) 20 d (I)	2-3 h (A) 12 d (I)	4-8 h (A) 50 h (I)	60 h (A)	8-10 years	Variable	10-20 years
Estimated Module Cost	\$12	\$35-\$50	\$40-\$80	\$5-\$8	\$6-\$12	NC	\$3	\$2-\$5
Spectrum Costs	Yes	Yes	Yes	No (Unlicensed)	No (Unlicensed)	No (Unlicensed)	No (Unlicensed)	Typically unlicensed

LPWA Characteristics

Characteristic	Order of magnitude	Typical value
Spectrum	Licensed (3GPP) vs Unlicensed	Sub-GHz, 2.4GHz
Range	Long in star topology	From 1 to +10 kms (urban/rural)
Objects	Many	Many thousands
Data volume	Small (upstream vs downstream)	Few kBytes per day (mostly upstream)
Data rate	Low (upstream vs downstream)	From 60bs to few 100kbs
Data payload	Small	From 10 to few 100 bytes
Latency	Low to high	Up to minutes
Battery life	Long	From months to +20 years
Module cost	Low	<\$5
Service cost	Low	<\$10 per year

Connecting the Millions of Sensors with Low Power Wide Area Networks

Connected Hospital – Tracking of Medical Gas Bottles



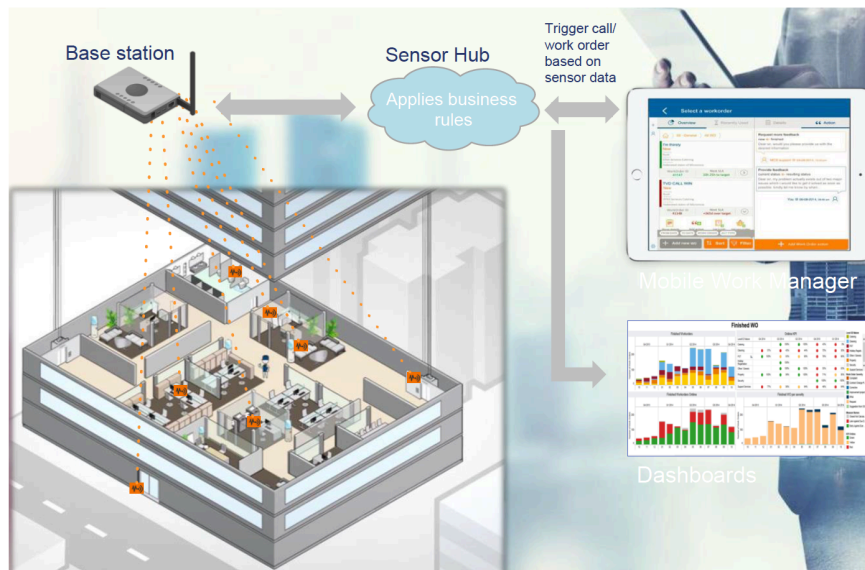
Key challenge :

Track & monitor medical gas bottles in hospitals

Key benefits :

- ✓ Be able to locate indoor & in real-time all the gas cylinders in the hospital
- ✓ Monitor pressure & level on all cylinders to avoid potential malfunctions & accidents
- ✓ Automate purchase orders & supply chain and provisioning when quantities run low
- ✓ Global overview of operations on hospitals network

Smart & Connected Facility Management



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 :



Smart & Connected Health Wearables



Key challenge :

Track & monitor elder people location and condition (fall)

Activity solution :

- LoRaWAN technology enabled smart watch with GPS tracker, fall detector and condition monitoring

Key benefits :

- ✓ Long distance coverage up to 15 km without local gateways
- ✓ GPS low power consumption
- ✓ Geofencing
- ✓ Alerts in case of fall or unnormal condition detected

Device partners :



Smart & Connected Glass



Key challenge :

Track & monitor people hydration level

Activity solution :

- LoRaWAN technology enabled smart glass that monitors liquid consumption

Key benefits :

- ✓ Long distance coverage up to 15 km without local gateways
- ✓ Low power consumption – no need to recharge
- ✓ Alerts in case of low consumption level

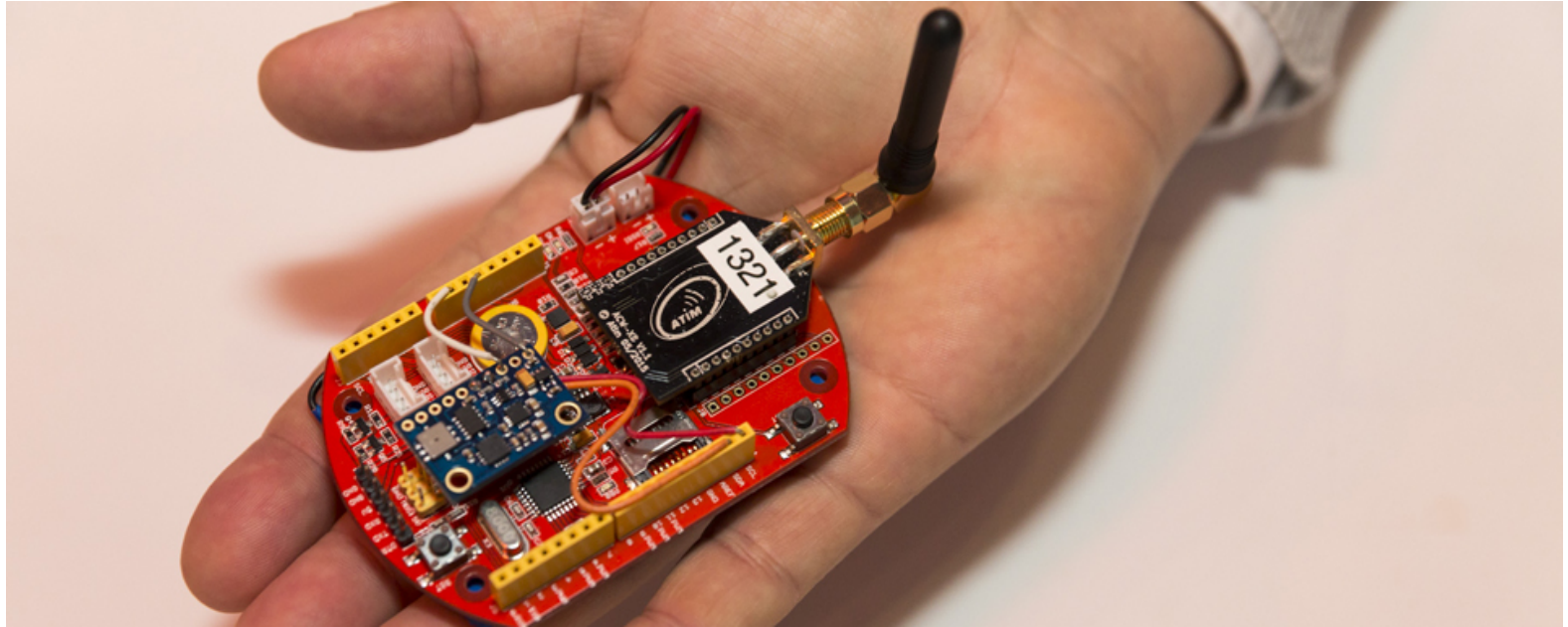
Device partners :

SWAF

LA SOLUTION POUR UNE BONNE HYDRATATION

LPWAN Adoption

SP to build Platform for providing LoRA Services to 17 French Cities



<http://www.orange.com/en/Responsibility/Environment/COP21/LoRa>

LoRa Alliance - <http://lora-alliance.org>
245+ member by Jun 2016

Sponsor Member



Contributor Member

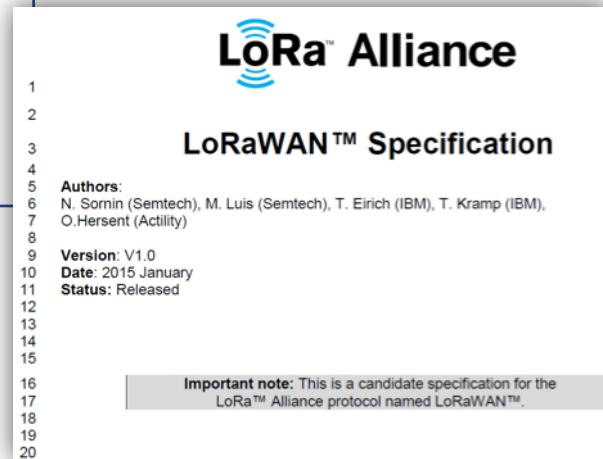


Adopter Member



Four activity tracks

- Strategy
- Technical
- Certification
- Marketing



Summary

To be successful from IoT solutions for health care...

- Deploy sensors network, not networks of Sensors
- Technologies will always have constraints
- Adopt new innovation by driving pilots
- Near Real Time responses builds better process
- Must be scalable for better business justification

Thank you.

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