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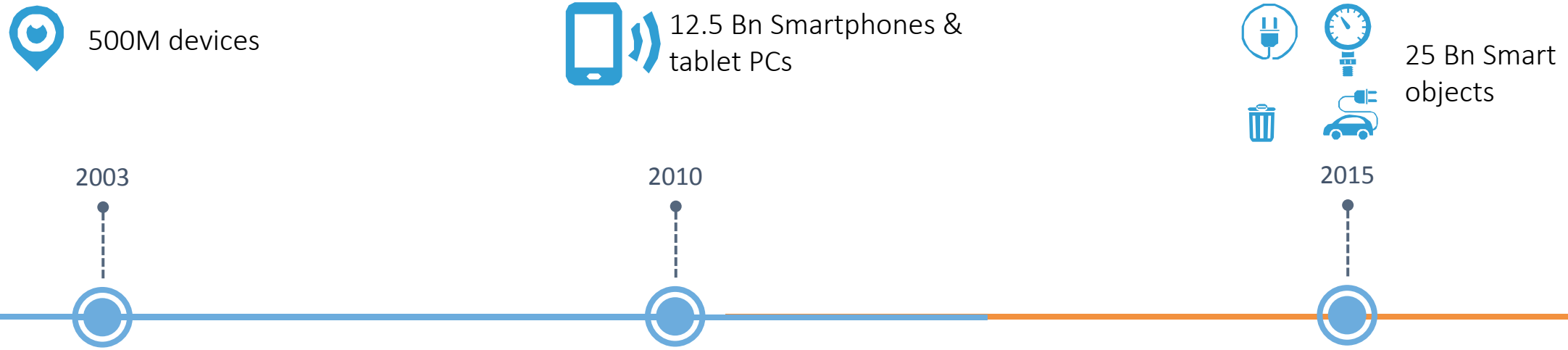
Les Technologies des Objets Connectés Industriels de l'Usine du Futur

Rôle de l'Internet des Objets et du Big Data

Dickel SOORIAH, Marketing & Business Development Director

Internet of Things

Internet of Things will be the next revolution of the Internet. It will gather, analyze, and distribute data turning it into information and knowledge, creating a 7 trillion dollar business.



The digital oil field

Remote area oil field:

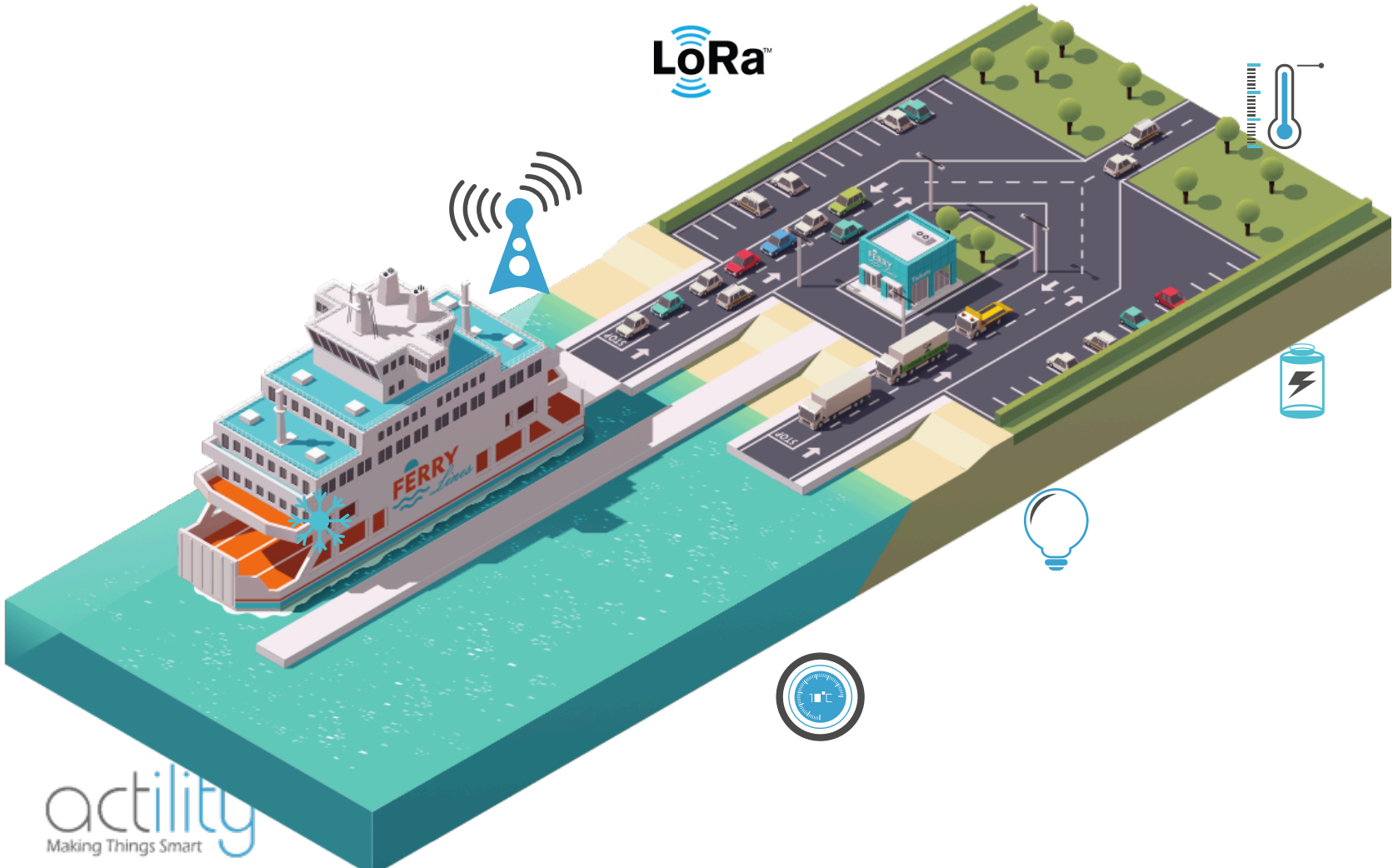
- Temperature monitoring
- Oil/gas tank pressure monit.
- Leakage detection
- Elec/Gas/water metering
- Asset GPS tracking
- Vibration monitoring
- Geo fencing
- Energy consumption optimisation
- Human tracker

Smart agriculture

Smart agriculture:

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

Marine tracking



Smart agriculture:

- Comfort monitoring on the vessels
- Asset tracking
- Fleet management

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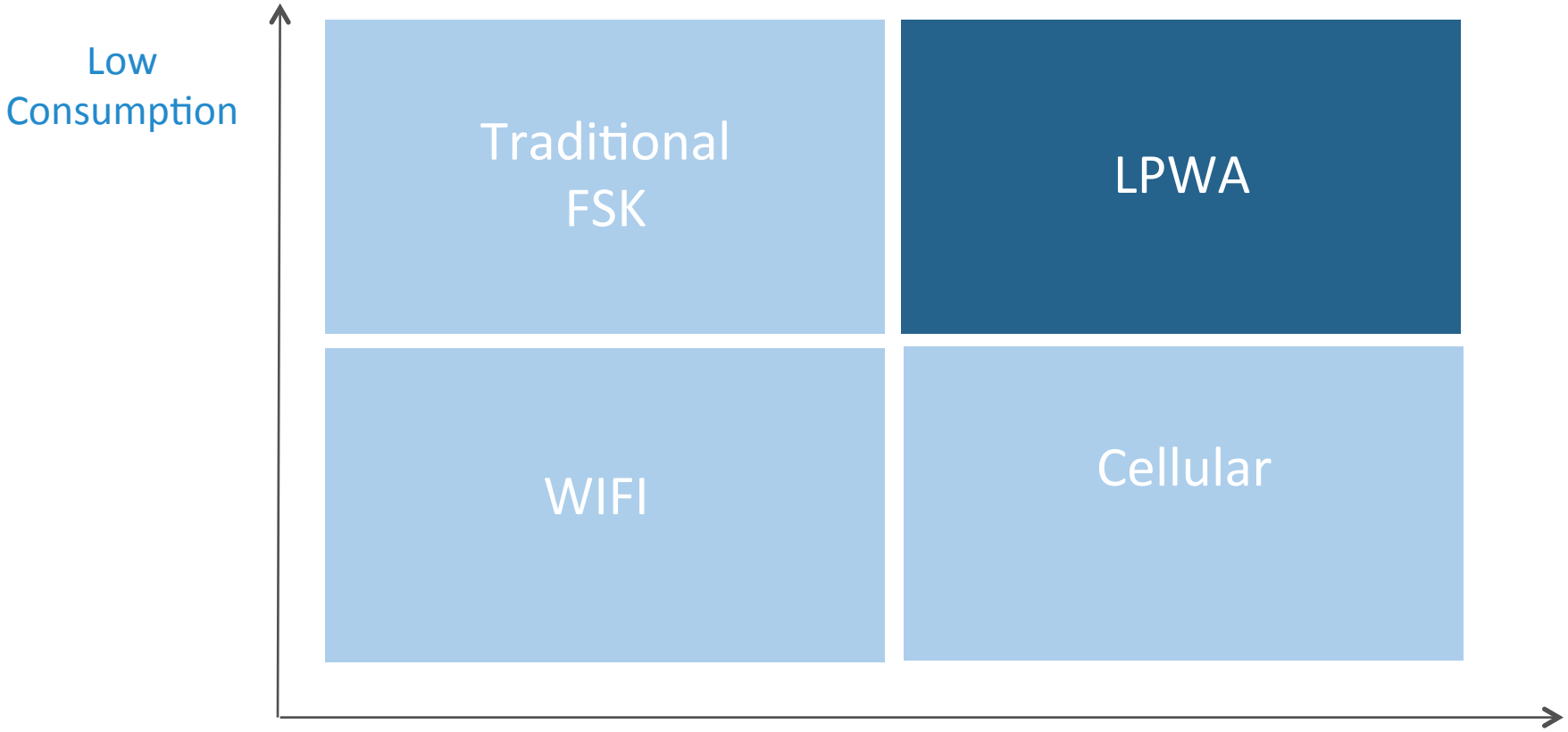
Industrial IoT Challenge #1:
Low battery long range connectivity

Positioning ThingPark Wireless & LoRa



LPWA is not competing with traditional cellular (4% of the LPWA connections are expected to overlap)

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Source:Analysys Mason

Requirements for LPWA Networks

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*

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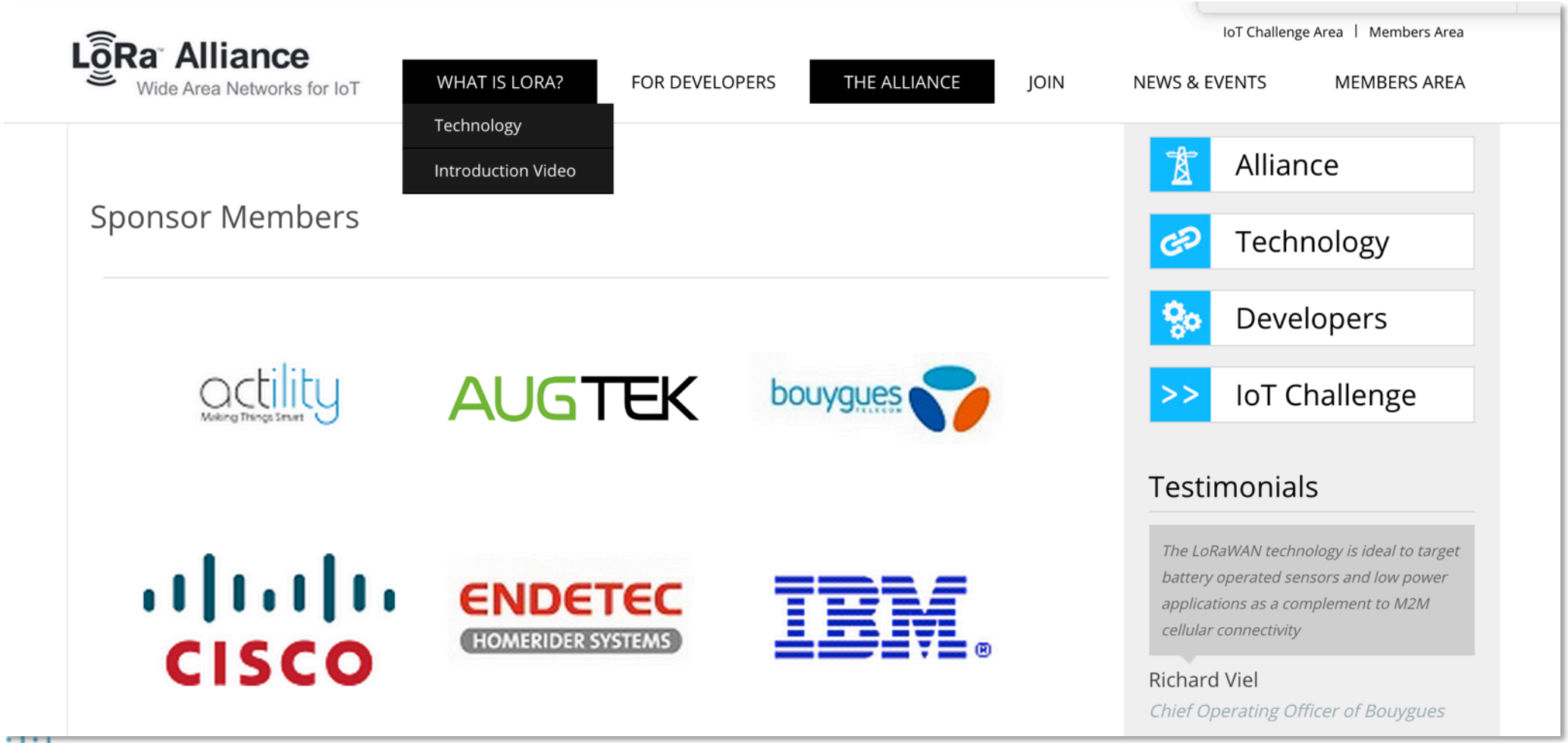
Source: Analysys Mason 2014
Summary of forecast of consumer connections 2023

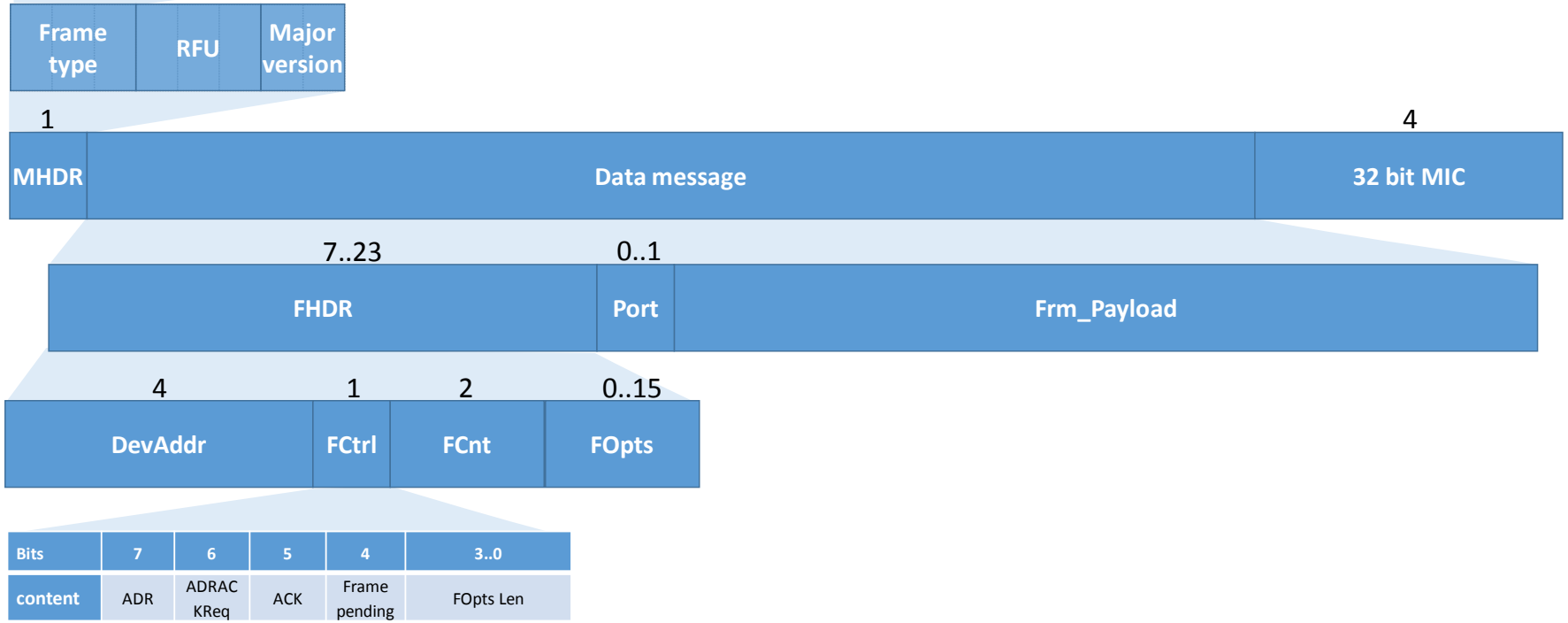
Low Power IoT Alliance

https://www.lora-alliance.org



Introduction – LoRaWAN MAC Header

Frame type value $B_7\ b_6\ b_5$	Description
000	Join Request
001	Join Accept
010	Unconfirmed Data
011	Confirmed Data
011…110	Reserved for future use
111	Proprietary



Bits	7	6	5	4	3..0
content	ADR	ADRAC KReq	ACK	Frame pending	FOpts Len

Key LoRaWAN Verticals

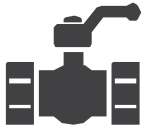
Smart metering

Street lighting

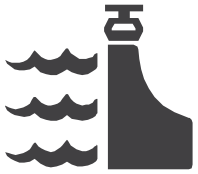
Smart building

Smart parking

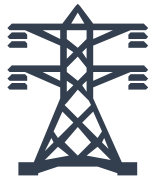
Tracking



Leak detection & irrigation



Water level & flood management



Fault management

Smoke detectors

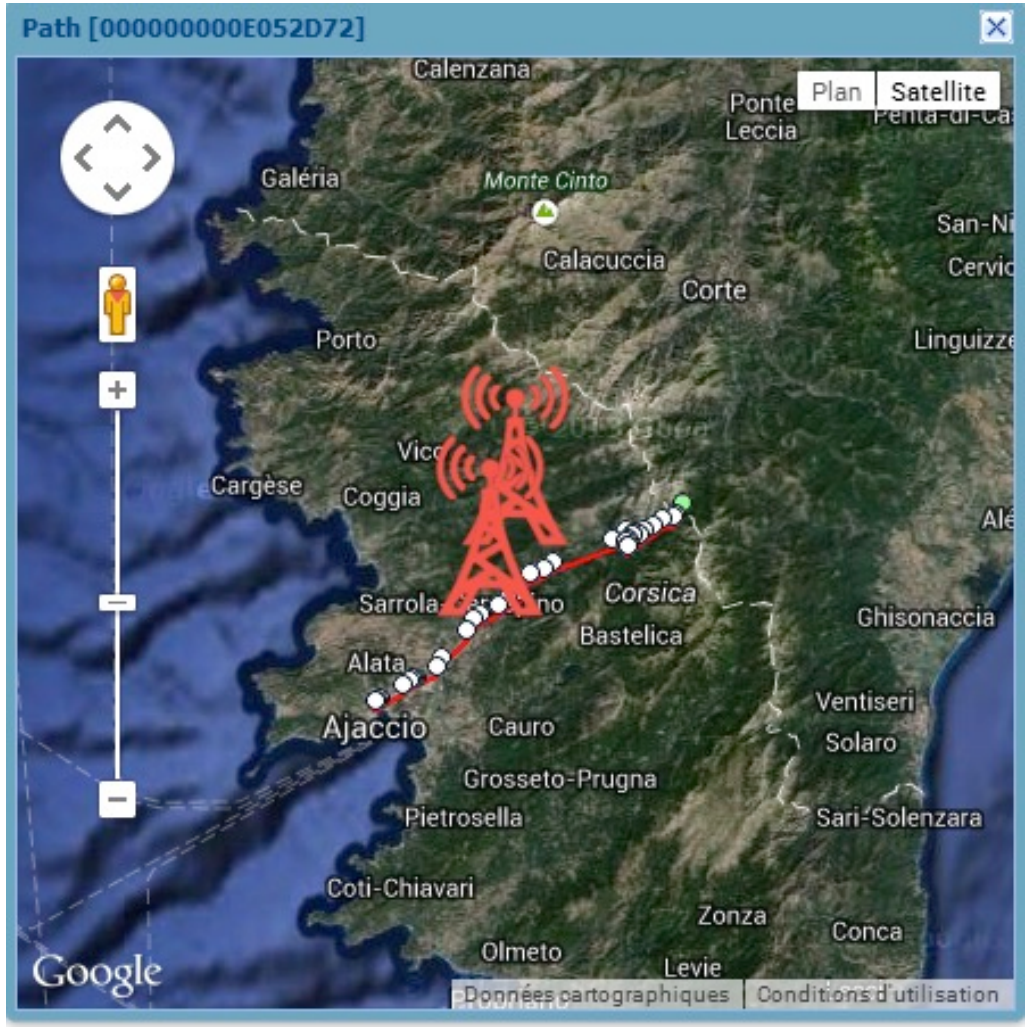
Smart energy & fast demand response

Waste management

Traffic management

Roof-top

Using Utility high points to achieve higher range



- **20m high telecom pole**
- **Omnidirectional antenna 30cm**
  - 14km in directions where antenna is above mean hill level

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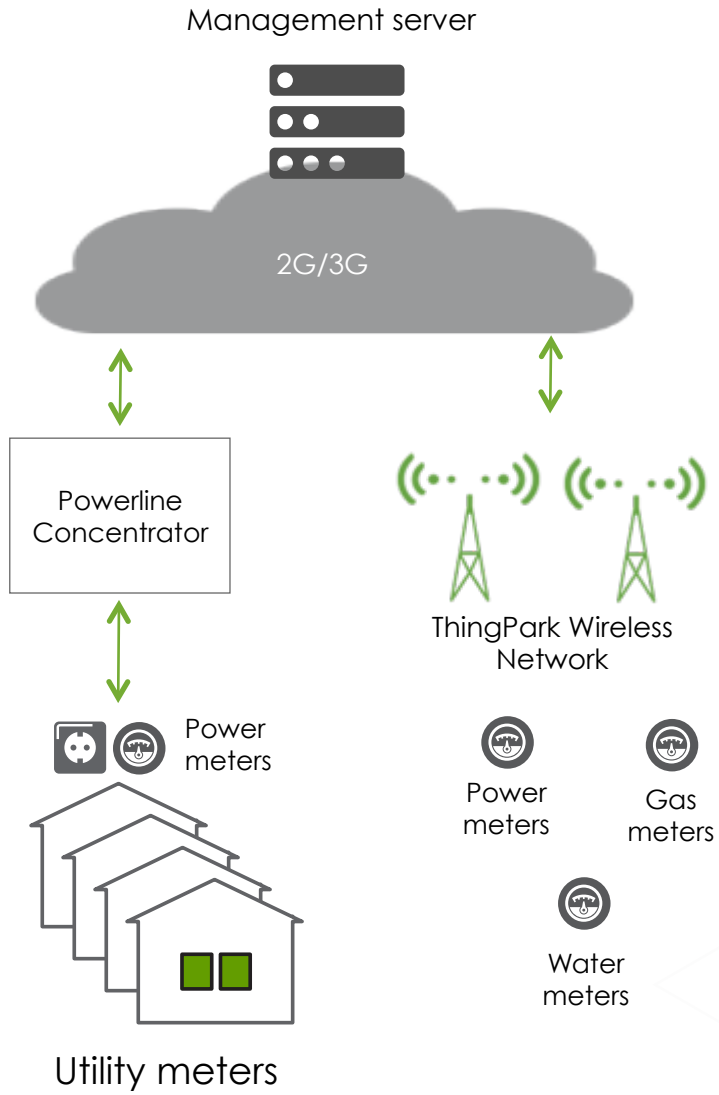
Smart Metering

Supporting multiple utility metering with one network

Low latency network for bidirectional communications

Supporting new innovative pricing models



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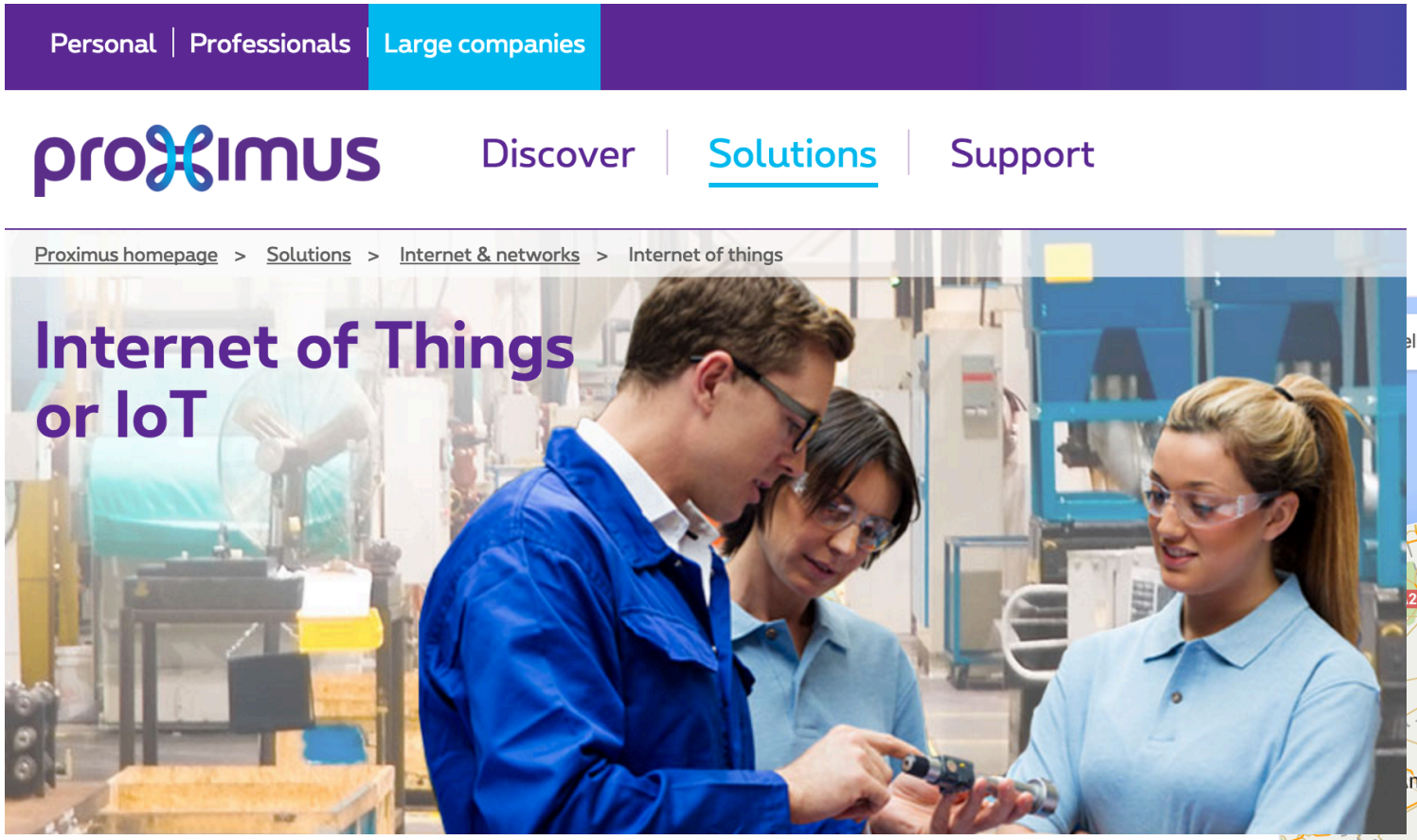
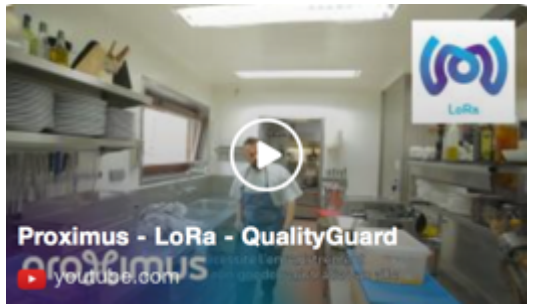
Using Proximus LoRa Network in Belgium for wide area connectivity



Proximus IoT Use Cases

Food Control



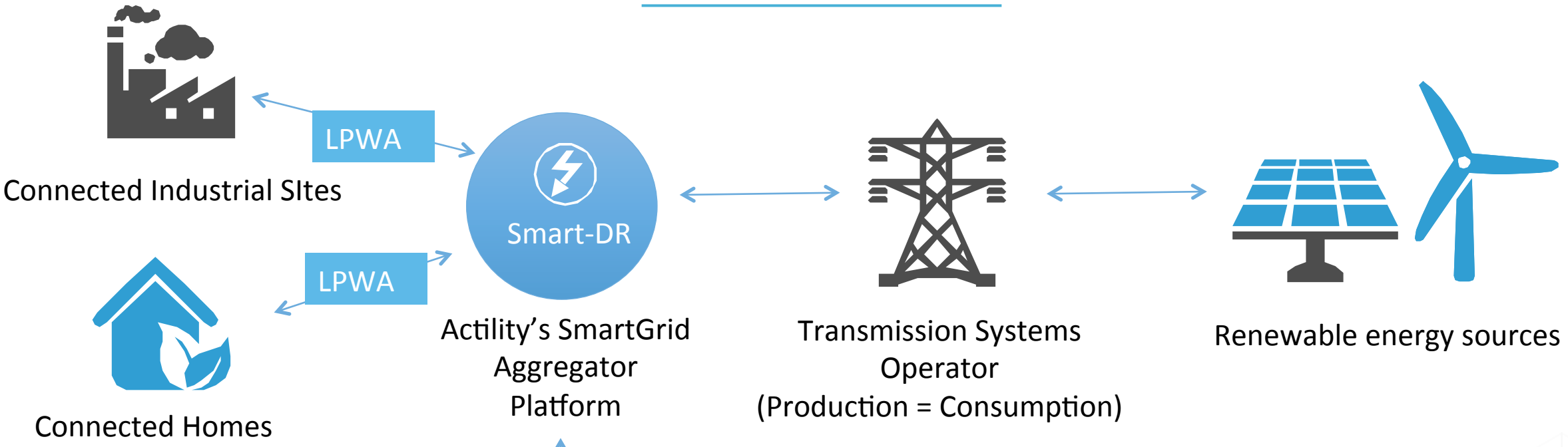
Airport asset tracking

Smart Parking

Facility management

https://www.youtube.com/results?search_query=proximus+lora

Example of IoT application in SmartGrid



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Example of Smart Demand Response in Belgium

- De Watergroep has water storage under pressure *(reservoirs an water towers)*
- Therefore, they can start or stop our high pressure pumps at all times *(within certain boundaries)*
- Using Actility's real-time management and measurement of their system
  - Financial profit
  - Social profit, given the predicted power outages during winter period in Belgium ("*brown outs*")

De Watergroep
WATER. VANDAAG EN MORGEN.

Electrabel
GDF SUEZ

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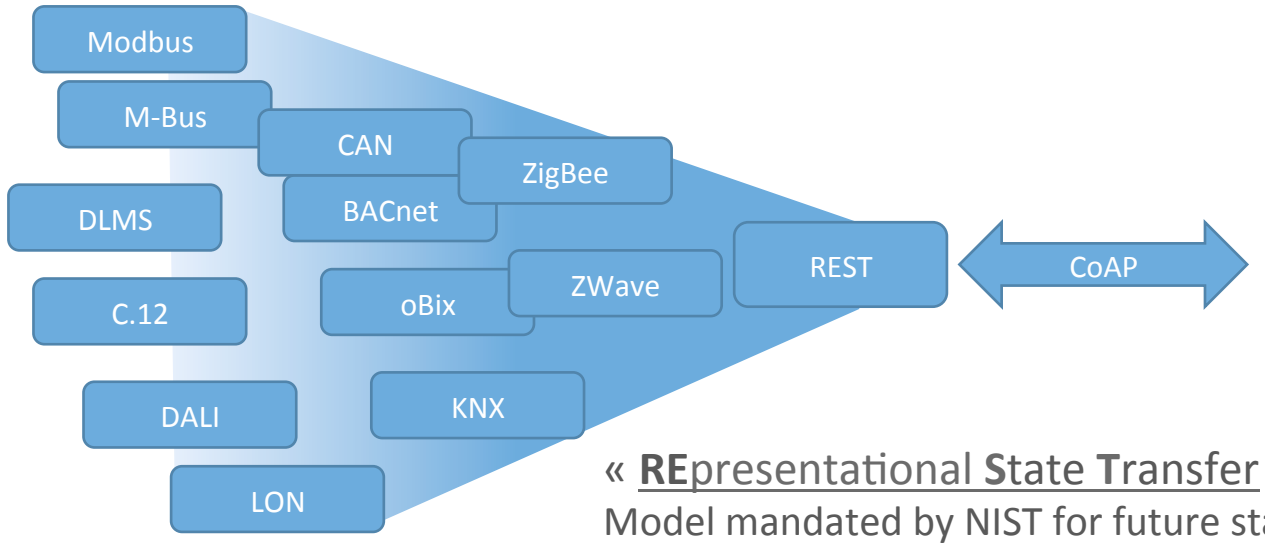
Industrial IoT Challenge #2
Data & Application Later Mediation

The value of unified exposure of Industrial Protocols

First level of syntax standardization:

- REST : do everything with 4 verbs and ‘documents’
- Documents use XML and MIME types




```
<GET http Application>
climatisation
<POST http…>
<PUT http…>
<DELETE http…>
…
```

« **RE**presentational **S**tate **T**ransfer »
Model mandated by NIST for future standard ‘smartgrid’ applications. REST may be carried by CoAP defined in IETF

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Semantic level: Generic concepts

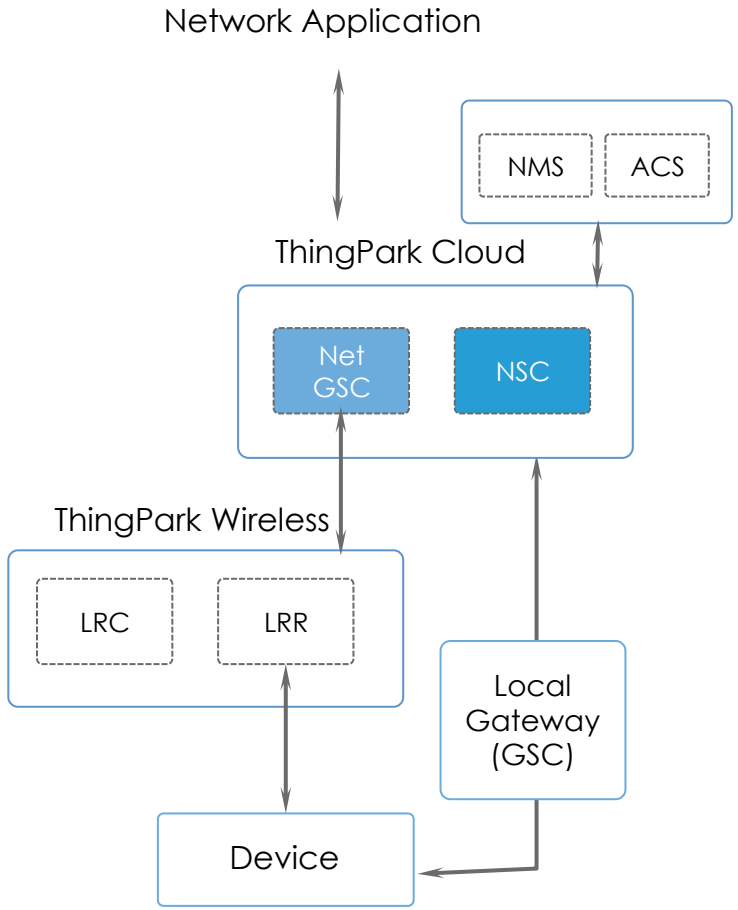
	ZigBee	BACnet	KNX	Zwave	DLMS/COSEM
Network	yes	yes	yes	yes	yes
Object	ZB node	BACnet device	KNX device	Zwave node	Cosem server
Object App.	endpoint	Not native use Structured view	No (just 1)	Device class	Logical device
Interface	cluster	Structured View	Functional block	Command class	Interface object
Basic elements (incl. Point)	Simple types	Objects	Datapoints	Types attributes	Attributes

Le modèle générique TR 102 966

- Chaque **technologie** gère des réseaux
- Chaque **réseau** contient des nœuds
- Chaque **nœud** contient des applications
- Chaque **application** contient des interfaces
- Chaque **interface** contient des **points**…

ThingPark ETSI M2M – ONE M2M API

- ETSI M2M defines a service capability layer on top of connectivity layers
- It presents an API for application development based on REST principles
- ETSI M2M key assets include:
  - Standard API for messaging, FIFO storage, Access Control
  - Standard Access to any REST interface
  - Standard interface to local M2M gateways
  - Standard and uniform resource designs for major automation protocols: ZigBee, WMBUS, KNX, ModBus



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Q&A

Thank you

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