Ubiquitous IoT LoRa Networks in Practice Domenico Arpaia CEO, OrbiWise



ABOUT ORBIWISE

- Headquartered in Geneva, Switzerland
- Extensive experience in wireless industry
- Main product: Network Server Software (OrbiWAN™) for networks based on LoRaWAN™ Standard
- Customers in all Regions
 - Telecom operators incumbent or new entrants
 - Any company deploying its own LPWA public or private network (e.g. utilities, system integrators, etc.)



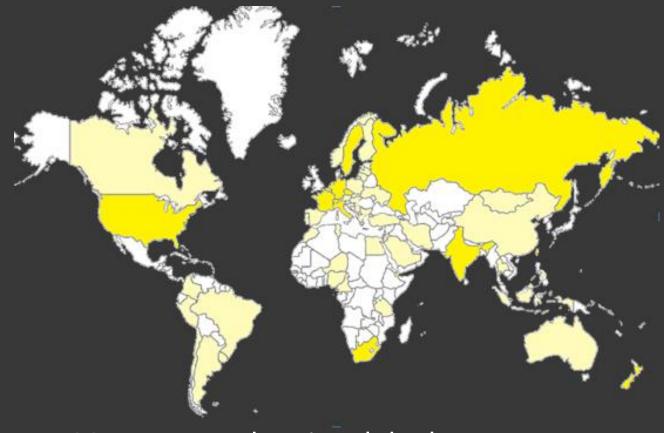






LoRaWAN - Global Coverage Overview

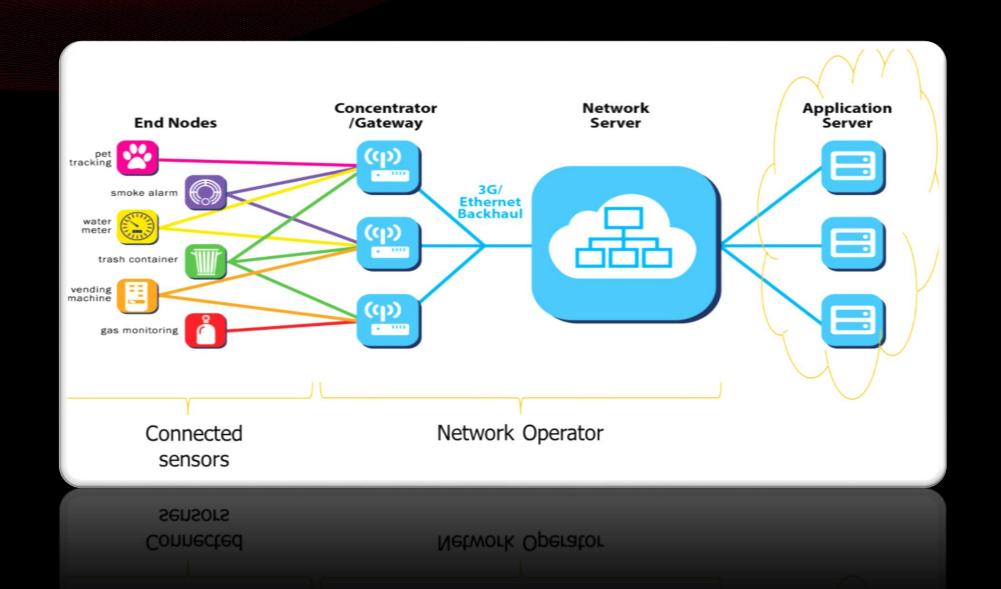




- 39 Announced national deployments
- 100 regional or city deployments
- LoRa Alliance has > 450 members



Simplified Ecosystem







LoRaWANTM Network Features



Long Range

- □Greater than cellular
- □Deep indoor coverage
- □Star topology



Max Lifetime

- □Low-power
- □>10yr on AA cell
- □>10x vs cellular M2M



Low Cost

- □Minimal infrastructure
- □Low-cost end-node



Advanced Radio

- □ Adaptive Radio
- ☐ Multiple Device Classes
- □ Roaming
- □ Geolocation
- □ Broadcast



Cost Structure Advantage

- Industry objective is to deploy billions of devices.
- Each part of the value chain needs to be cost-optimized to reach this goal.
- Challenging for traditional wireless technologies.
- The LoRa ecosystem is there already.





Alternative Deployment Strategies

- In some markets, site acquisition and installation costs dominate initial CapEx investment.
- Alternative approaches can be pursued in those markets.
- Small indoor gateways, set-top boxes, consumer's objects, utility poles.... Many alternatives can be pursued case-bycase

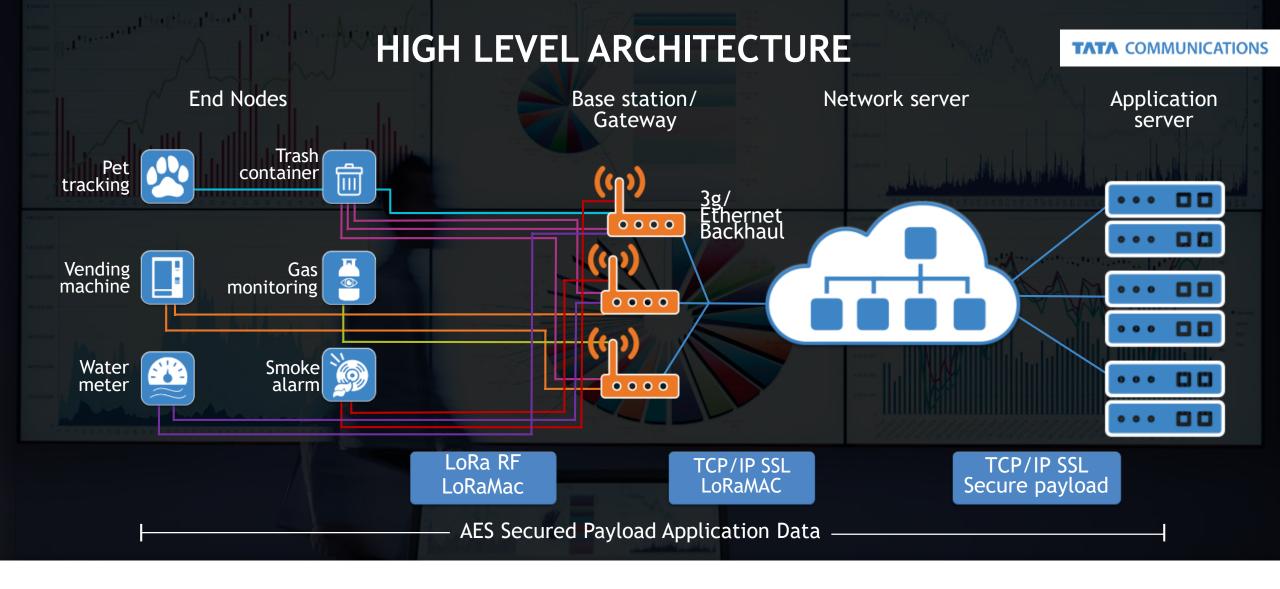




Tata Deployment: Largest IoT NW in the world

- Initial deployment in LoRa network in Mumbai, Delhi, Bengaluru and Jamshedpur.
- 60 largest cities in India by end of 2017. All country by 2018.
- Planning >15,000 outdoor gateways, >50M devices
- Already qualified over 35 verticals. Public network with most diverse use cases.
- 70% of end devices will be battery operated
- 80% will have mainly uplink traffic





LoRa network is designed for low power consumption and high availability

JUSCO Jamshedpur Smart City End to End Digitalization of Utilities Services

E-Governance and Citizen Services

- Public Information, Grievance Redressal
- Electronic Service Delivery
- Citizen Engagement
- Citizens City's Eyes and Ears
- 5 Video Crime Monitoring

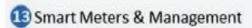
Waste Management

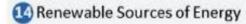
- 6 Waste to Energy & fuel
- Waste to Compost
- Waste Water to be Treated
- Recycling and Reduction of C&D Waste

Water Management

- 10 Smart Meters & Management
- 1 Leakage Identification, Preventive Maint.
- 12 Water Quality Monitoring

Energy Management





Energy Efficient & Green Buildings

Urban Mobility

- **10** Smart Parking
- 1 Intelligent Traffic Management
- 18 Integrated Multi-Modal Transport

Others

- 19 Tele-Medicine & Tele Education
- 20 Incubation/Trade Facilitation Centers
- 21 Skill Development Centers











Tata Steel Work Force Tracking & EHS Management System at Tubes Mills & Noa Mondi Mines



Site prone to dust, heavy rains, extreme temperatures touching 5° Celsius to 70° Celsius.

Hundreds of contractors working in different zones of 20*40 meters

Indoor plant area surrounded by Steel walls & roof having low sun light Some Zones require height measurement as regular safety concern

Clean Water Monitoring in Geneva

SIG Project with HEPIA and OrbiWise (providing all communication technology)

Real-time Monitoring of water quality parameters

- **►** Turbidity
- ► Residual Chlorine
- **▶** Conductivity
- **▶** Temperature
- ► Flow Velocity
- **▶** Pressure

Optimization of the operation of water facilities





Devices communicate from under the asphalt





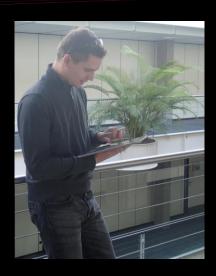


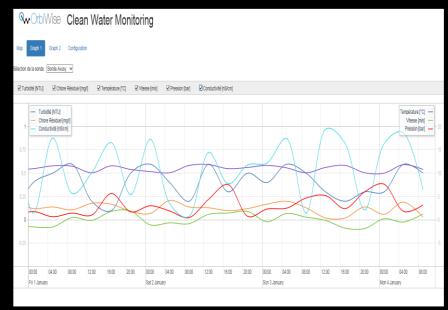
Standard User Interface



Anywhere

At any time





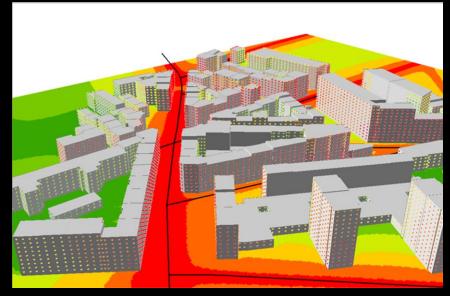




Noise Pollution Monitoring in Carouge / Geneva

- Acoustic noise pollution in cities regulated in EU (Directive 2002/49/EC) and Switzerland
- Compliance normally with sample measurements with expensive equipment and 3D modeling.
- There is a better way.... Have developed batterypowered sensors, with LoRa radio connectivity
- Based on inexpensive MEMS microphones.
- Over 1000 devices being deployed in Carouge/Geneva
- More cities will deploy solution...

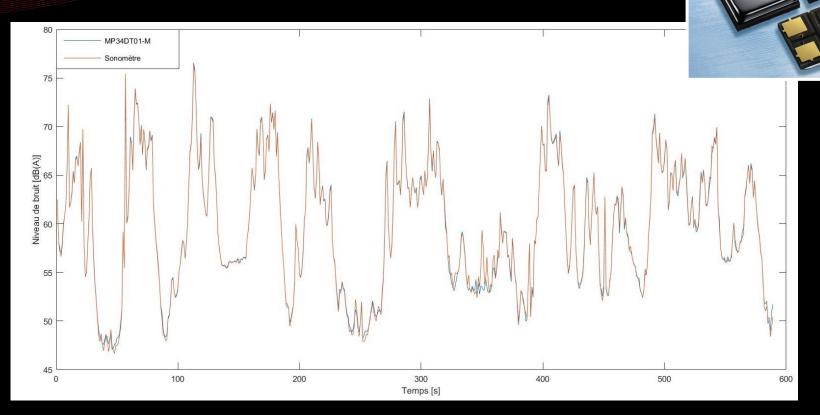






Sensor: MEMs comparison with sonometer







PARTNER WITH

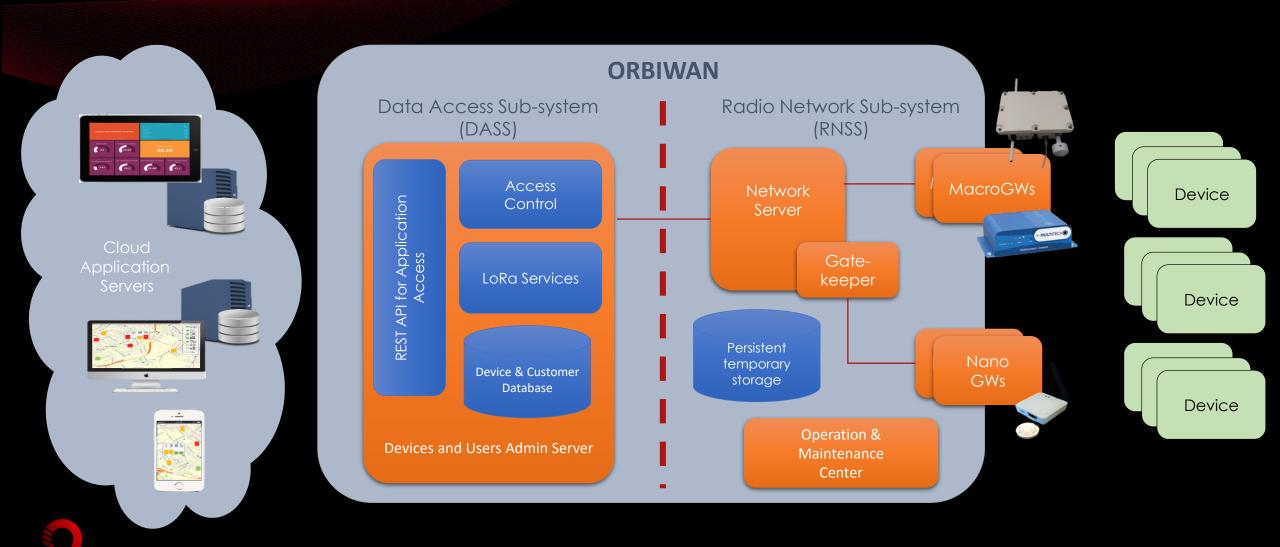


FOR A SMARTER FUTURE



OrbiWAN Simplified SW Architecture

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OrbiWAN Highlights (1/3)

- Carrier-grade Network Server for LoRa-based networks.
- Compliant to LoRaWAN 1.0.2 standard
 - Support for all features and devices classes (A, B and C). Class B and the Beacon is implemented in accordance with the (yet- to-be-released LoraWAN 1.1 specification.
- QoS based dynamic link adaptation
 - Support for QoS (Quality of Service)-based control scheme to optimize radio link for each device according to assigned QoS profile. Essential to secure reliable communication between network & devices while maximizing overall network capacity.
- Support for all major regions

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 Highly configurable allows operators to configure MAC according to local regulatory requirements. Standard region configuration profiles available "out-of-the-box" for all major regions.

