

The LoRa logo features the text "LoRa" in a bold, white, sans-serif font. Above the letter "o" are three curved lines representing a radio signal. The logo is set against a background of a city skyline at dusk or dawn, with a network of white lines and dots overlaid on the scene. Various icons are scattered throughout the network, including a laptop, a smartphone, a car, and a cloud with a Wi-Fi symbol.

LoRa®

The LoRaWAN logo consists of the text "LoRaWAN" in a white, sans-serif font. Above the letter "o" are three curved lines representing a radio signal. The logo is positioned in the upper right corner of the image, against the same city skyline and network background as the LoRa logo.

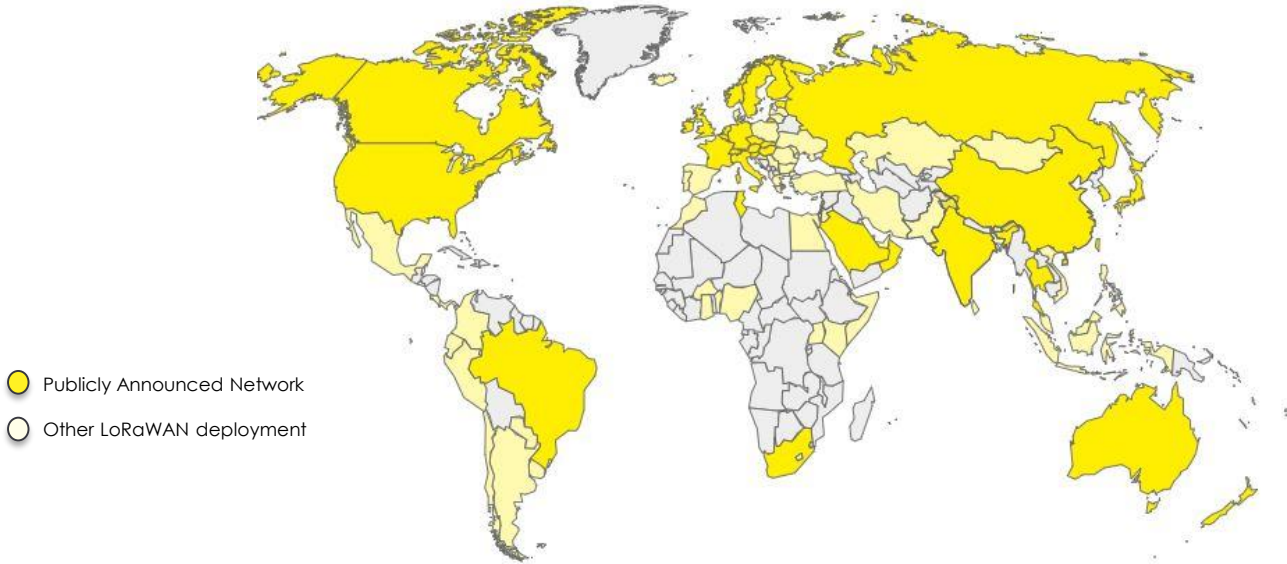
LoRaWAN™

# Satellite: A Real Opportunity for IoT

*Rémi Lorrain, LoRaWAN® Network Director*

# 117 LoRaWAN<sup>®</sup> Operators and Growing

BT, KPN, Proximus, Swisscom, Orange, Objenious (Bouygues), NTT, Charter, Unity Media, Comcast, Cellnex, American Tower, Alibaba, Tata, Teracom, CRA (Czech-republic), ER-Telecom, Ooredoo, ZTE, Tencent, SKT Telecom, KDDI, ... and **satellite players (Lacuna space, Swarm,...)**.

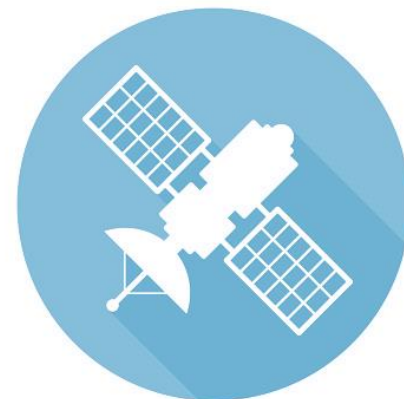


Operator diversity strengthens the LoRaWAN ecosystem : **coverage as an enabler**

- Cellular operators
- Broadband telecom
- TV and satellite Broadcast telecom
- IoT Solution companies
- Utility companies
- System integrators
- Fiber optics telecom
- Tower-companies

# Market Drivers

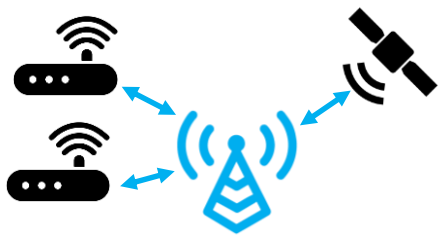
- ❑ Satellite players have been increasingly utilizing IoT over the last 3 years.
- ❑ There is fierce competition in this market: dozens of startups and carriers.
- ❑ The costs of a launch have decreased, and there has been a steady scale-up of cube satellites on low orbit constellations.
- ❑ Space agencies have expressed support for IoT projects.



# Implementation Options

## Gateway Back-haul

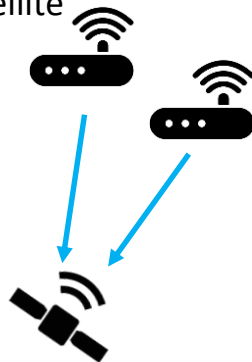
LoRa<sup>®</sup>-based gateway communication with satellite



Commercially Available

## Device Back-haul

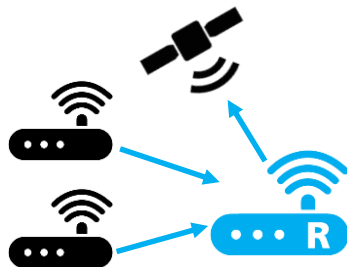
LoRa<sup>®</sup>-based device communication with satellite



Prototype, commercial in 2019

## Relay Back-haul

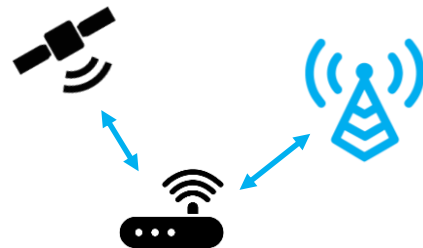
Battery-powered relays act as a gateway



Prototype, commercial in 2019

## Dual Mode Device

LoRa<sup>®</sup> Technology + satellite proprietary device communicate with satellite





# Use Cases

## Market Segments

- Coverage complements public and private networks

## Collocated Devices

- Devices on the same campus or site

## Spread Devices

- Devices spread on large areas

## Mobile Devices

- Devices moving on large areas

## Use Cases

Metering, pipeline monitoring, logistics (tracking, fleet management), irrigation, cattle tracking, environmental monitoring, supply chain, maritime vessels and fishing buoy monitoring, building monitoring (disaster recovery), water kiosk monitoring (remote areas), mining operations, worker/personal security, smart city, livestock monitoring, remote farm management, remote premises monitoring, gas station monitoring, weather station monitoring, green energy monitoring (solar panels, wind farms, oil rigs), military applications

Collocated devices mostly managed by gateway back-haul or relay back-haul. Spread devices and possibly mobile devices managed by device back-haul

# 2019: Between Prototype and Commercial Launch

- ❑ **Maturity** and fast development of **gateway back-haul** (Inmarsat, Fleet,...).
- ❑ 2 **LoRa device back-haul** projects at **early stage** (Lacuna, Swarm).
- ❑ **10+ (Device back-haul / Dual mode) IoT** projects begin commercial phase in 2019, : Hiber, Kineis, Orbicomm, Globalstar. Irridium. Astrocast, Eutelsat, Satellogic...
- ❑ Roaming between terrestrial and satellite networks  
- key factor of success.

Satellite complements terrestrial networks

