Totum Continens Solutions Ltd

IOT – Internet of Things

Totum IoT Connectivity Platform for Elevators & Devices

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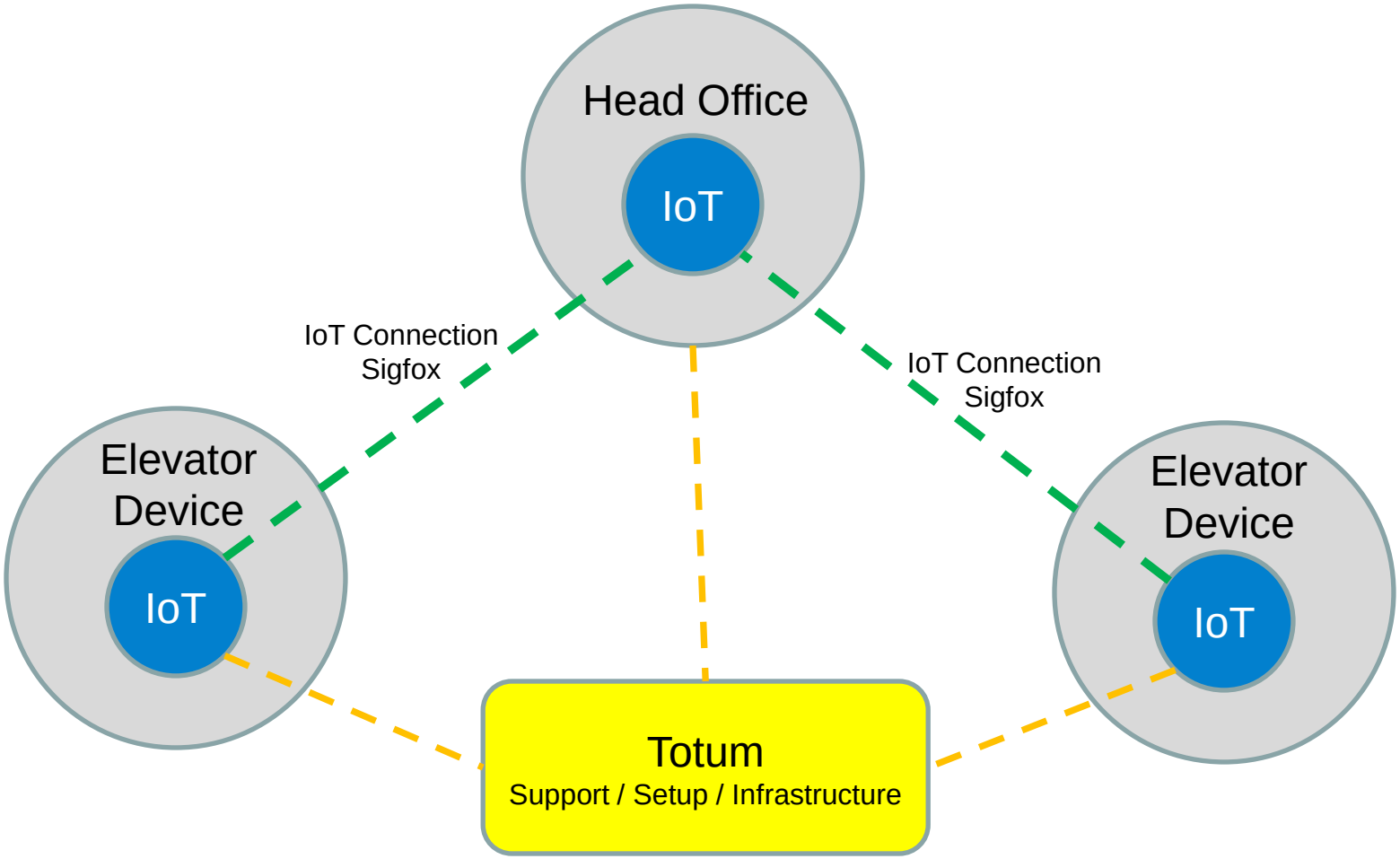
IoT Can Change the Game in Different Ways

- Improve Customer Service & Satisfaction
- Improve service efficiency
- Reduce down time
- Improve margins
- Manage all elevators installed at once from a single point of contact
- Reports & alarms
- Malfunctioning behaviors can be detected early before they generate outage

Add Value While Disrupting

- Increase revenue through different offerings
- Decrease product variability
- Improve margins
- From Corrective/Preventive Maintenance to Predictive/Prescriptive Maintenance.

Totum IoT Connectivity Platform for Elevators



Totum IoT Connectivity Platform for Elevators & Devices

IoT & SIGFOX

- **Internet of Things (IoT)**
  - IoT Market
  - IoT will drive the Next Semiconductor Growth Wave
  - Why the IoT has not yet taken off?
  - IoT: Wireless Access Technologies
- **SIGFOX**
  - **Low Power Wide Area Network for Small Messages dedicated to the IoT**
  - **Radio Technology**
  - **Spread Spectrum Technology**
  - **Up- & Downlink Operation**
  - **Brazil Coverage**
  - **Application Areas**
  - **SoC Solution**
  - **Application Examples**
  - **How to get started ?**
  - **ID and PAC key**
  - **SIGFOX certification ?**

IoT Market

Access Technologies

Cellular

Long Range w/Power

- ✓ Existing coverage
- ✓ Good for:
  - Long range
  - High data rate
- ❖ Not good for:
  - Battery life
  - Cost

LAN

Short Range

- ✓ Well established
- ✓ Good for:
  - Mobile devices
  - Short range
  - In-home
- ❖ Not good for:
  - Long range
  - Battery life

LPWAN

Long Range w/Battery

- ✓ Emerging solutions
- ✓ Good for:
  - Long range
  - Long battery life
  - Low cost
- ❖ Not good for:
  - High data rate

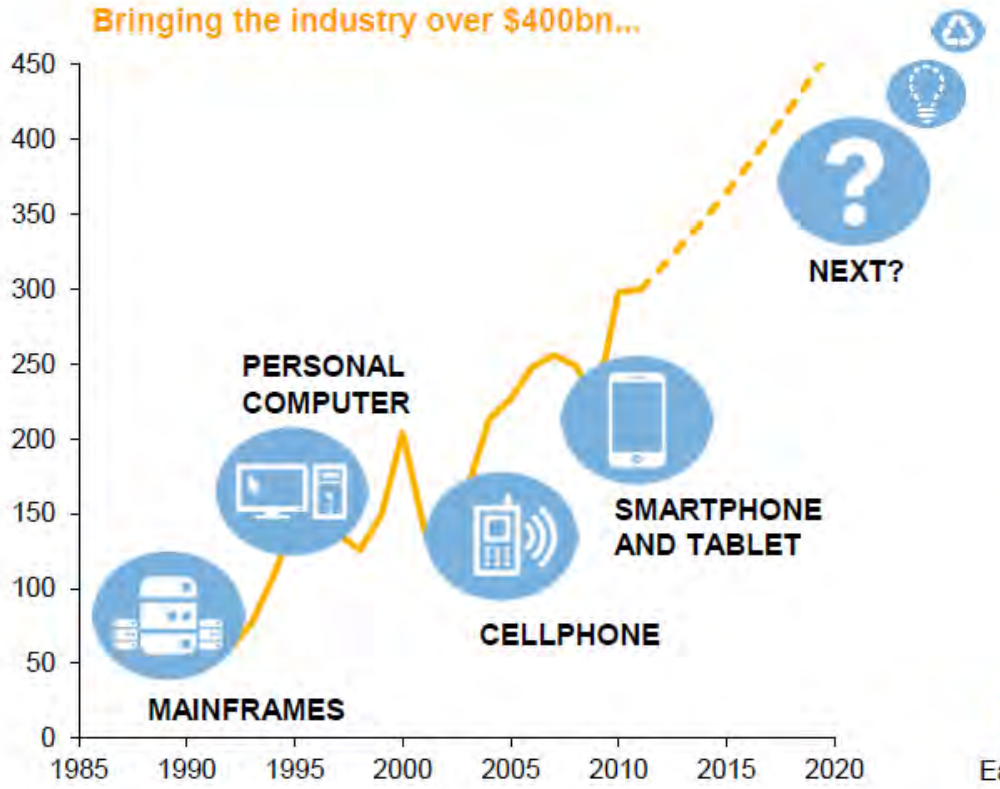
LAN = Local Area Network

LPWAN = Low Power Wide Area Network

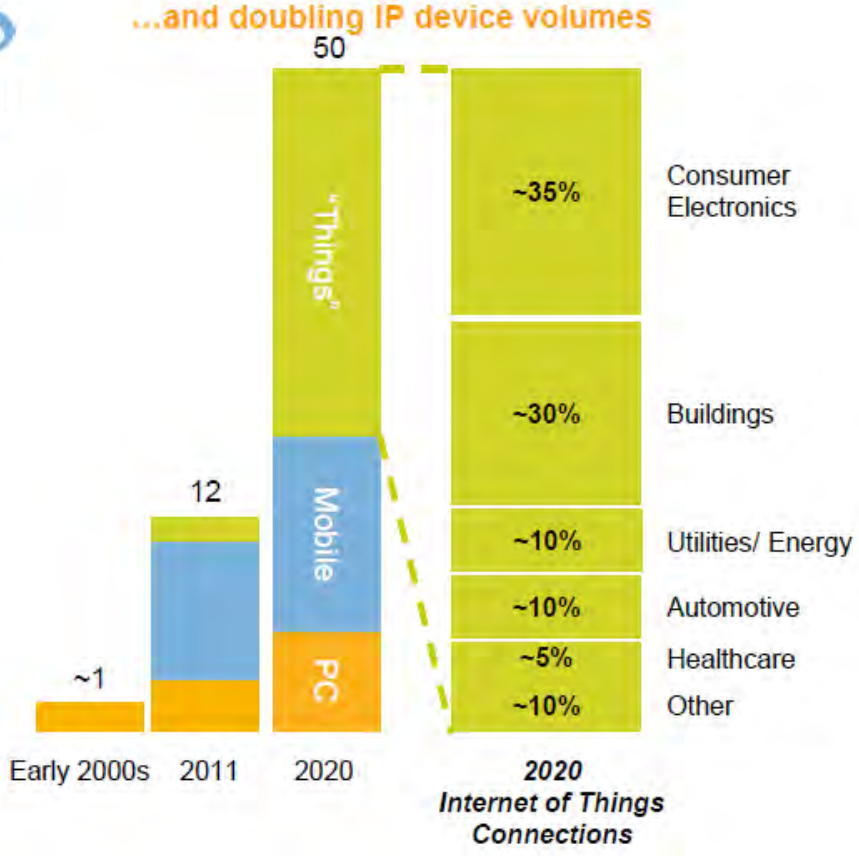
The Internet of Things (IoT)

Will Drive the Next Semiconductor Growth Wave

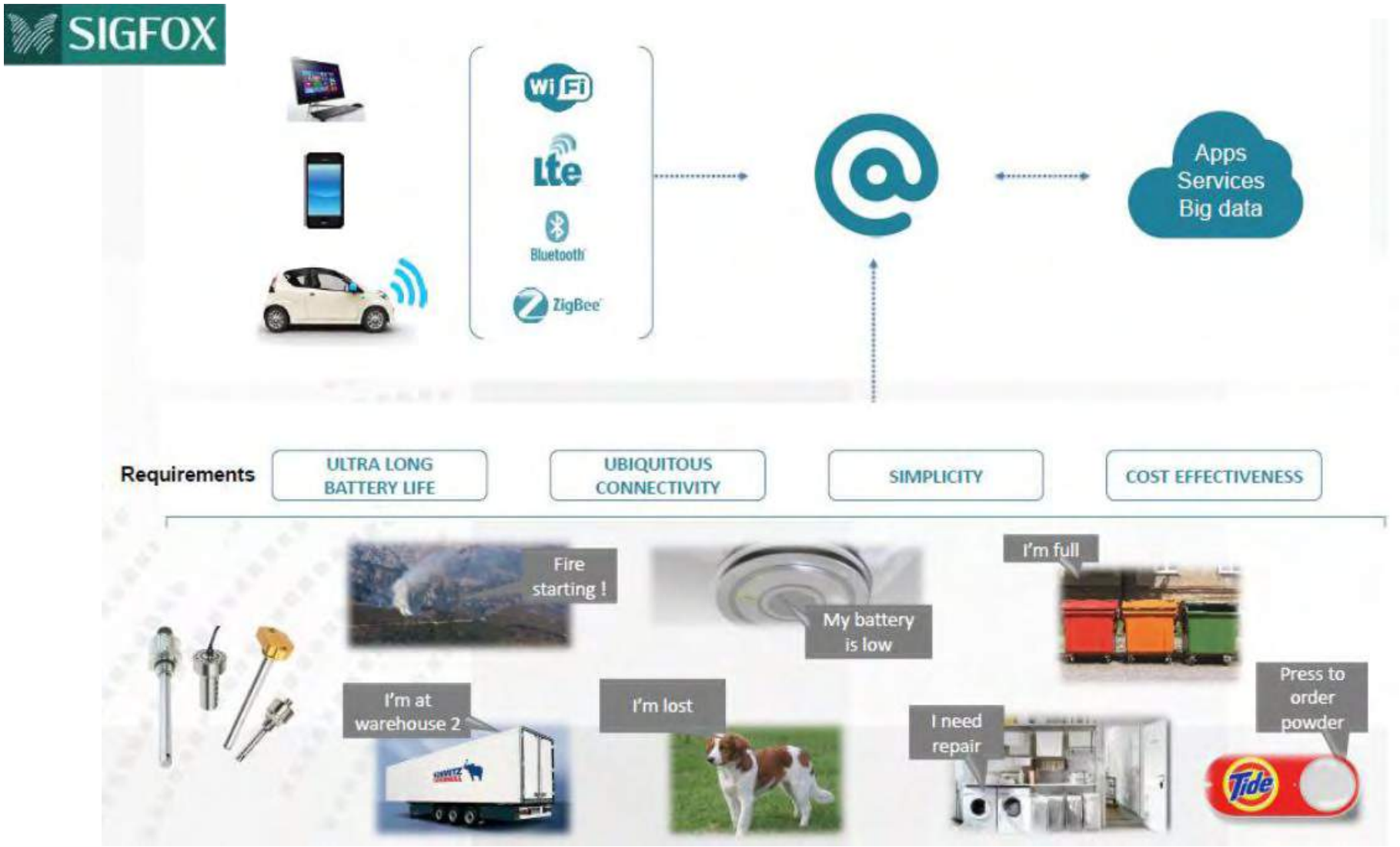
- SEMICONDUCTOR INDUSTRY REVENUE
  (in bn US$)



- CONNECTED DEVICES IN USE
  (in bn units)

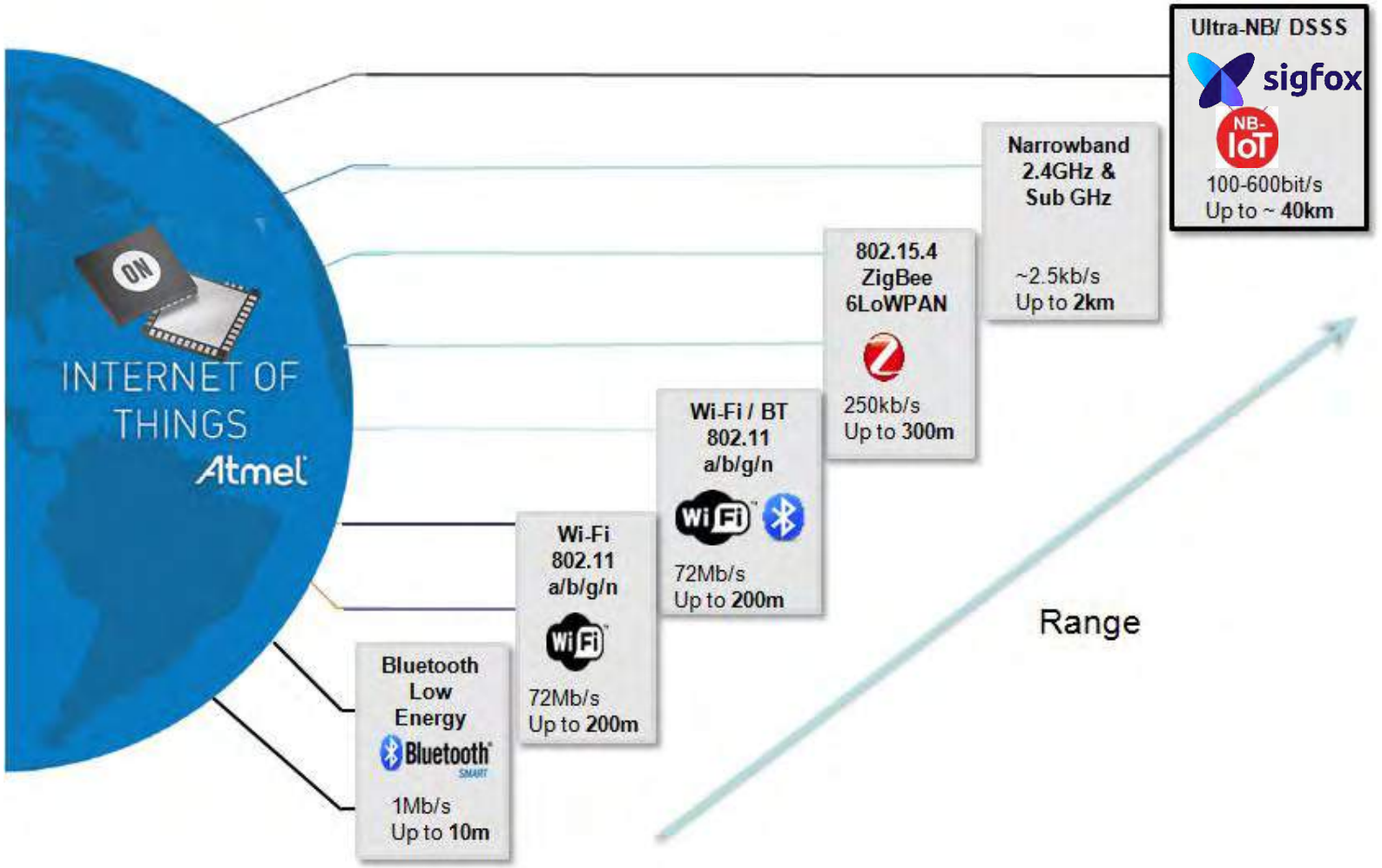


Why the IoT has not yet taken off?



IoT: Wireless Technologies

SIGFOX / NB-IoT adds low power, long range communication

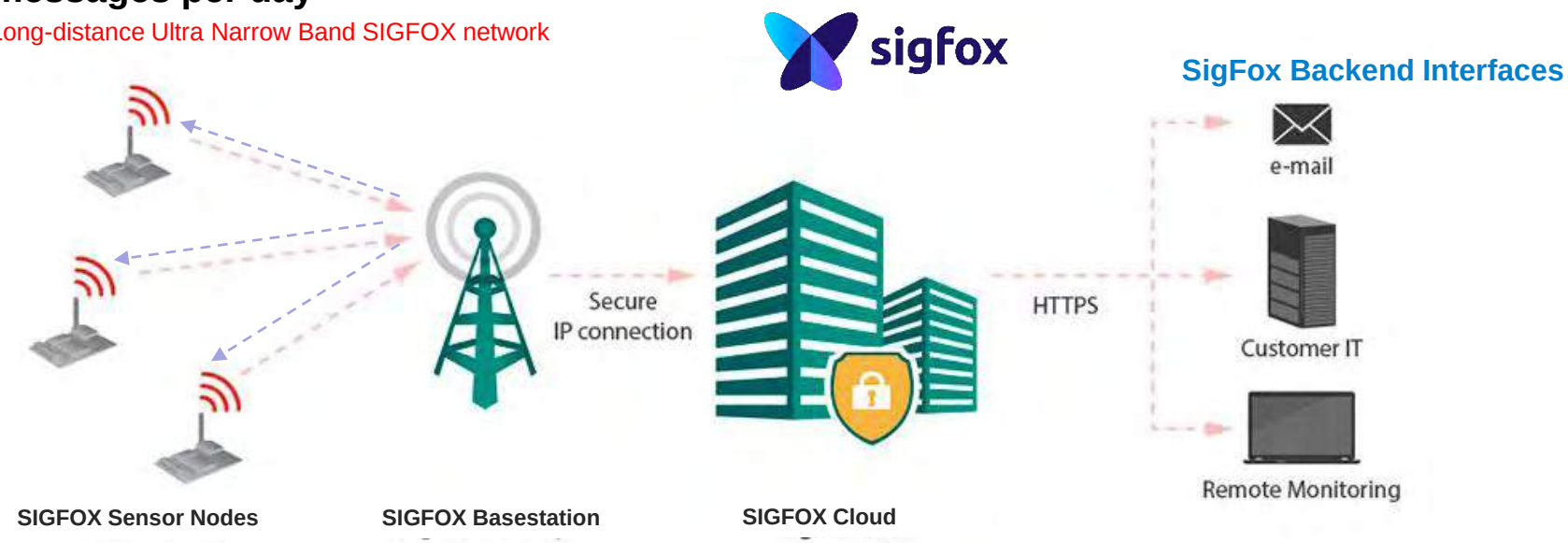


SIGFOX

Low Power Wide Area Network for Small Messages dedicated to the IoT

- **SIGFOX aims to build a worldwide public network especially designed for IoT devices.**
- **The network is cellular, with thousands of base stations deployed in each country.**
- **SIGFOX technology offers very long ranges for low-power, battery-constrained nodes.**
- **SIGFOX is great for very simple and autonomous devices which need to send small amounts of data, taking advantage on the SIGFOX infrastructure.**
- **SIGFOX is more energy-efficient than cellular (GSM-GPRS-3G-4G)**
- **The annual fees are lower: <5US$/year & per device, depend on the number of devices & messages per day**

Long-distance Ultra Narrow Band SIGFOX network



SIGFOX Radio Technology

- **SIGFOX uses a UNB (Ultra Narrow Band) based radio technology to connect devices to its global network. The use of UNB is key to providing a scalable, high-capacity network, with very low energy consumption, while maintaining a simple and easy to rollout star-based cell infrastructure.**

- **The network operates in the globally available ISM bands (license-free frequency bands) and co-exists in these frequencies with other radio technologies, but without any risk of collisions or capacity problems.**

- **SIGFOX Radio technology (key parameters):**

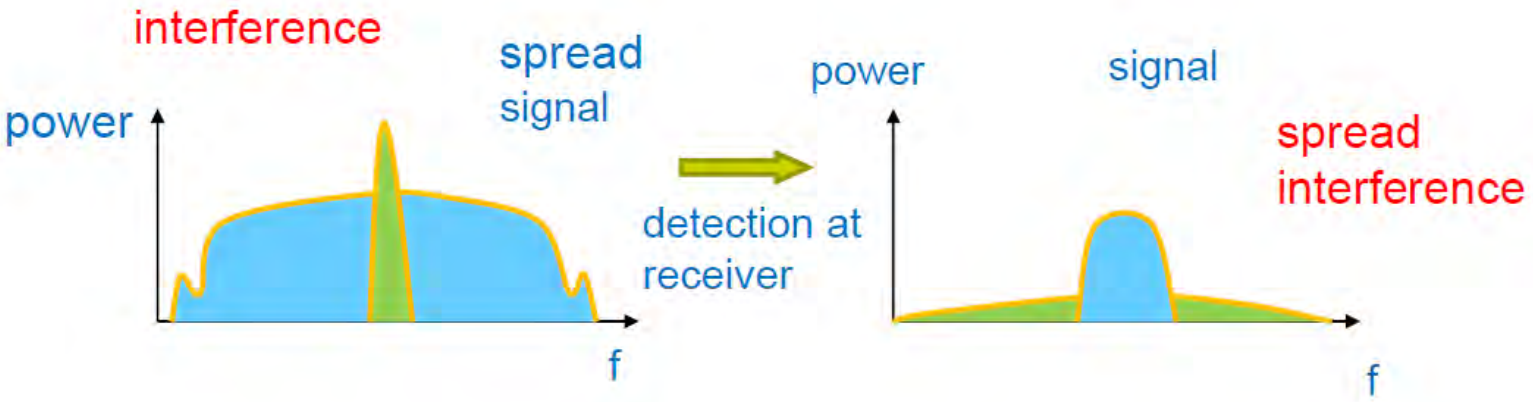
Region	Mode	Frequency	Modulation	Data Rate	RF Power	Sensitivity
Europe (ETSI)	uplink	868.130 MHz	DBPSK	100bps	+14 dBm	
	downlink	869.525 MHz	GFSK	600bps		-126 dBm
Brazil, US, CN, MX (FCC)	uplink	902.200 MHz	DBPSK	600bps	+24 dBm	
	downlink	905.200 MHz	GFSK	600bps		-126 dBm

- **Uplink: Max 140 messages per day (140 x 12 bytes payload data)**
  ISM bands are regulated, and every device must respect a 1% duty cycle use. 1 % means 36 sec transmit time per hour. A SIGFOX message takes up to 6 sec. ~6 *messages per hour max*

- **Downlink: Max 4 downlink communications per day (4 x 8 bytes payload data)**
  When sending a message, you can request a downlink response.

SIGFOX Spread Spectrum Technology

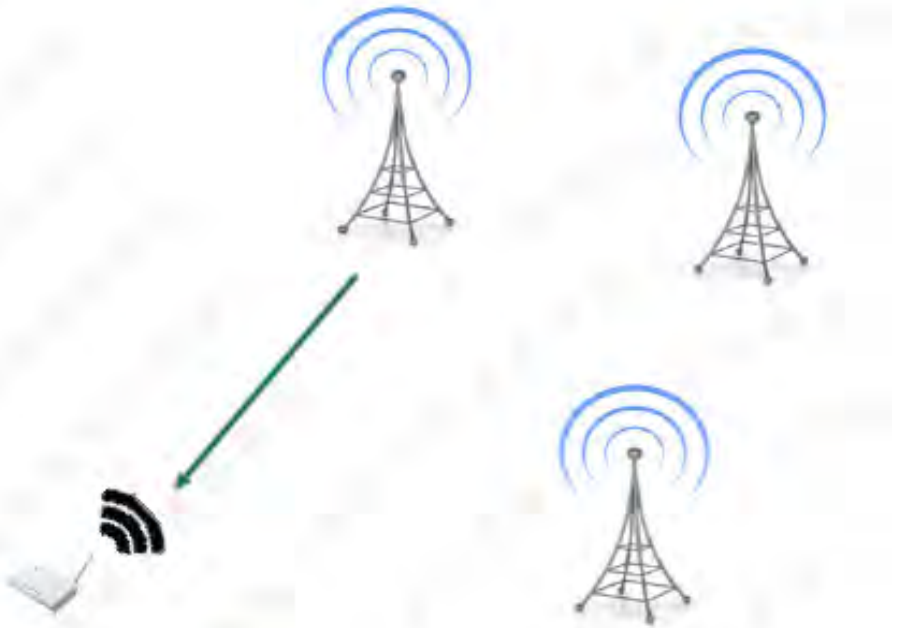
- **Problem of radio transmission:**
  Frequency dependent fading can wipe out narrow band signals for duration of the interference
- **Solution:**
  Spread the narrow band signal into a broad band signal using a special code



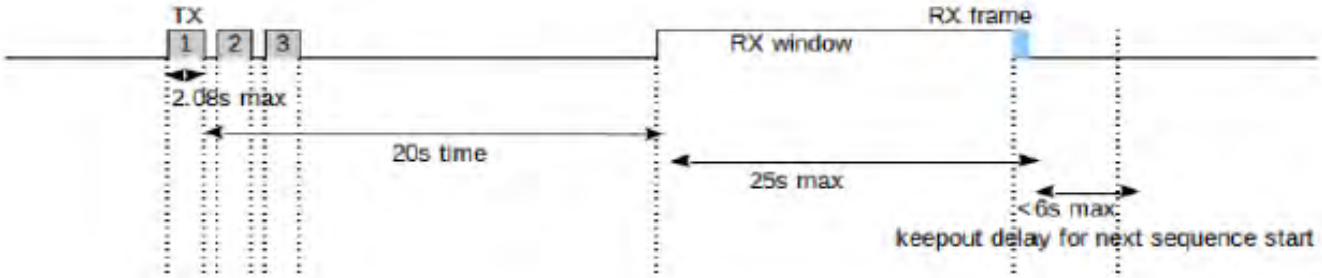
SIGFOX Up- & Downlink Operation

Device triggered downlink

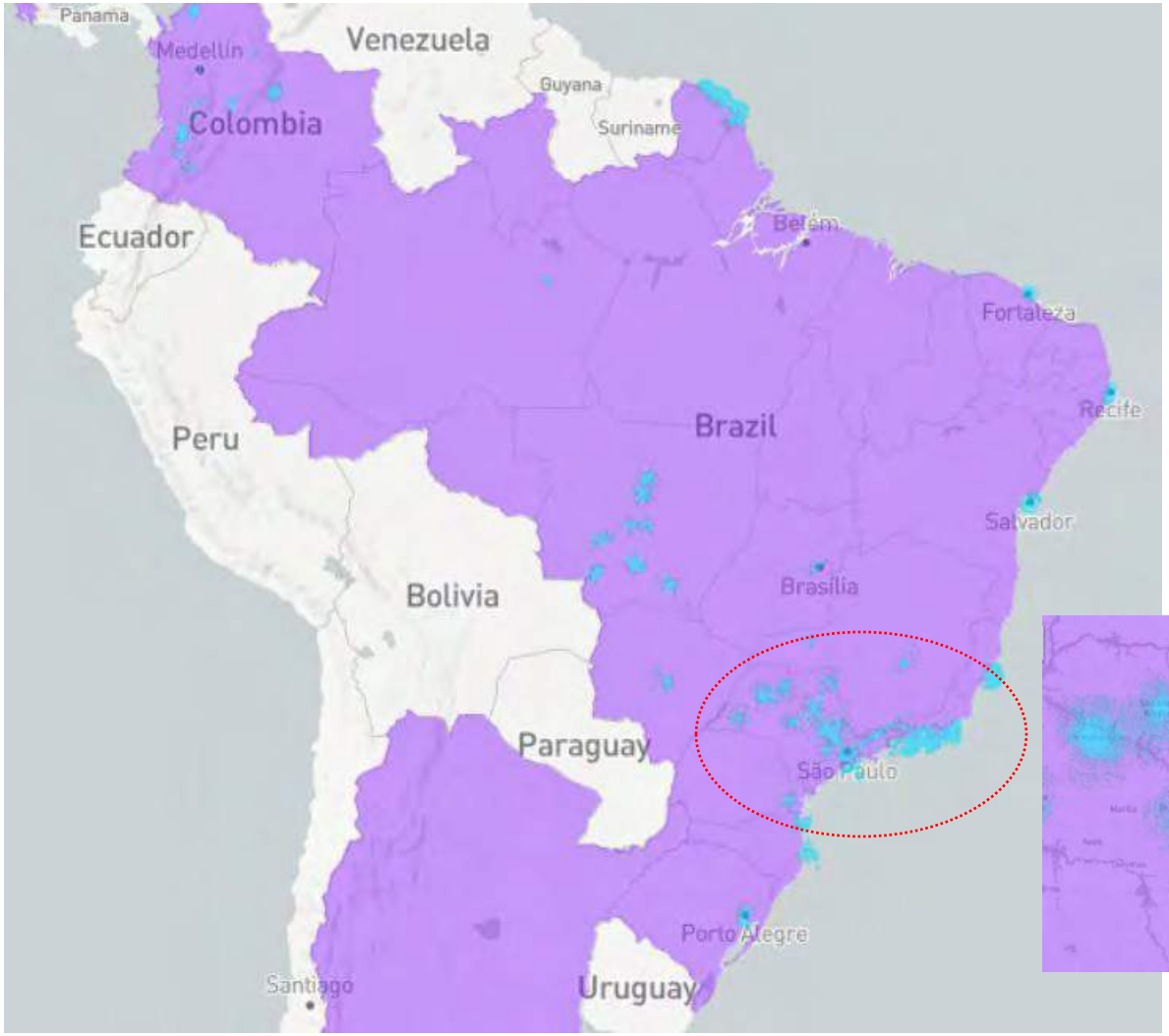
- Event-based transaction
- Lowest energy consumption
- Enable device management, actuators, RTC adjustment …



ETSI



SIGFOX – Brazil Coverage



Connectivity provided by WND Brazil
wndbrasil.com

Expected Population of Brazil coverage until end of 2018 => 180Million

Actual 80M

S.Paulo. 1st of November, 2017
https://www.sigfox.com/en/coverage

SIGFOX Application Areas

- Security Systems
- Logistics & Supply Chain Tracking
- Parking Space Management
- Facility/Building Management
- Environmental Monitoring
- Smart Metering & Leak Detection
- Irrigation Systems
- Assisted Living / Home Care
- Building Automation & Monitoring

SIGFOX SoC Solution

SoC Suppliers

Module Suppliers

PCB Suppliers

sigfox

ON

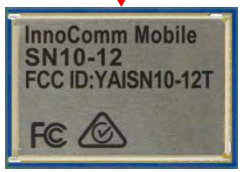
NXP

MICROCHIP

ATMEL

SoC with preinstalled stack
or SoC + stack API (library)

Wisol



InnoComm

Others

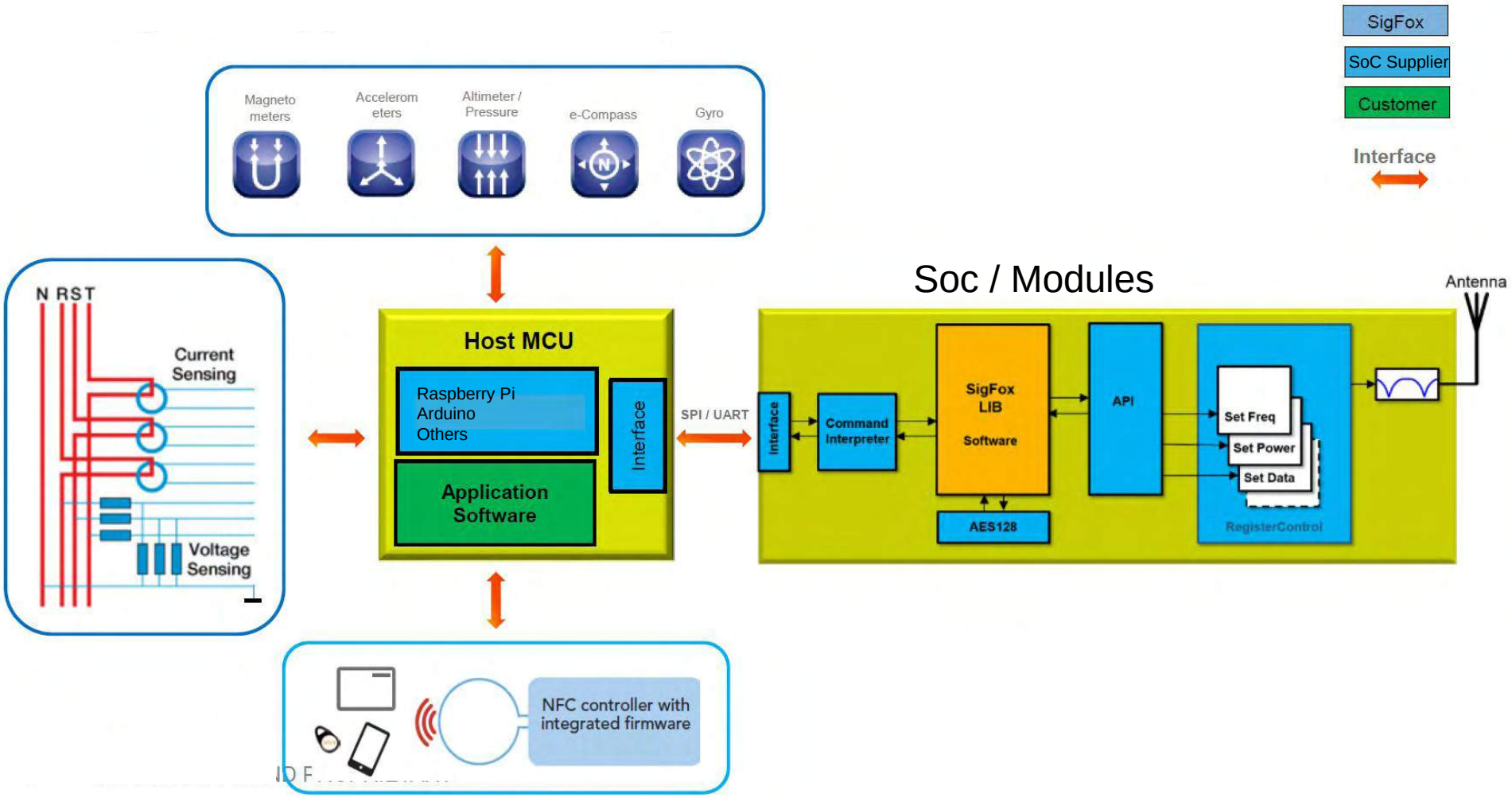
SeaSlugLabs

LPWAN Co.

Others

- **Atmel**
- **902MHz, US/BR**
- Bi-directional
- SIGFOX Class 0

SIGFOX Application Examples



SIGFOX - How to get started ?

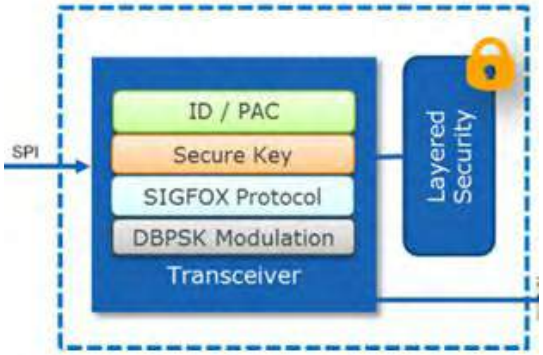
Contact SIGFOX for activation of a subscription via subscribe@sigfox.com

- Go to SIGFOX backend https://backend.sigfox.com
- Sign in with your account
- Register your device with the ID- and PAC code

- Login to SIGFOX backend https://backend.sigfox.com
- Get access to your messages

SIGFOX ID and PAC key

- **Each SoC has SIGFOX ID and PAC key stored in its permanent memory.**



- **SIGFOX ID = Id**entifier (is unique):
  - Each Soc is sold with its SIGFOX ID. This ID is unique and will not change during the device's lifespan.
  - The SPI Command Interface allows to read the ID information. It is very important to keep the ID carefully, as it will be mandatory to register the device on a SIGFOX Network Operator.

- **PAC = P**orting **A**uthorization **C**ode (valid once):
  - The PAC proves device ownership. It is required by SIGFOX Network Operator to validate the device registration request.
  - As opposed to the SIGFOX ID, a PAC key is not transferable and must be re-generated if the device ownership is changed.

SIGFOX certification ?

SIGFOX certification program SIGFOX Ready™

SIGFOX certification cost

RF component choice	SIGFOX Ready certification cost for end product	Certification effort
Certified SoC with reference design	*2,5K€*	• End product certification only
SIGFOX Ready module	*2,5K€*	• End product certification only

Note: PCB suppliers are already certified.

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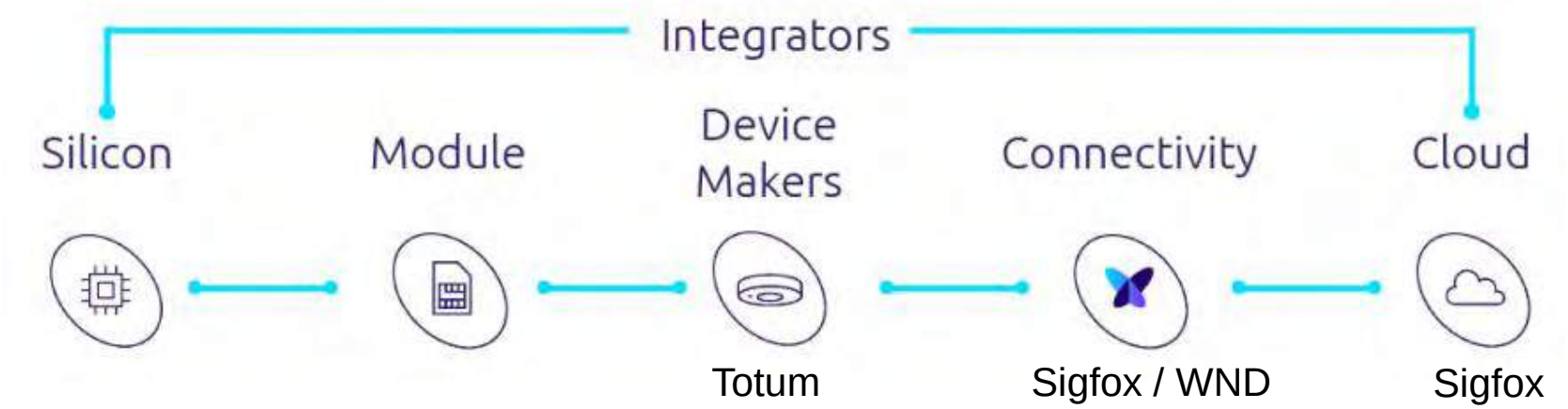

Totum is able to supply as a Device Maker, generic solutions for integrate / interface the elevator to the Sigfox Network.

Please contact us for additional Information:

Totum Continens
www.totumcontinens.com.br
F. +55 11 99318 0274
totum@totumcontinens.com.br

Thank You!