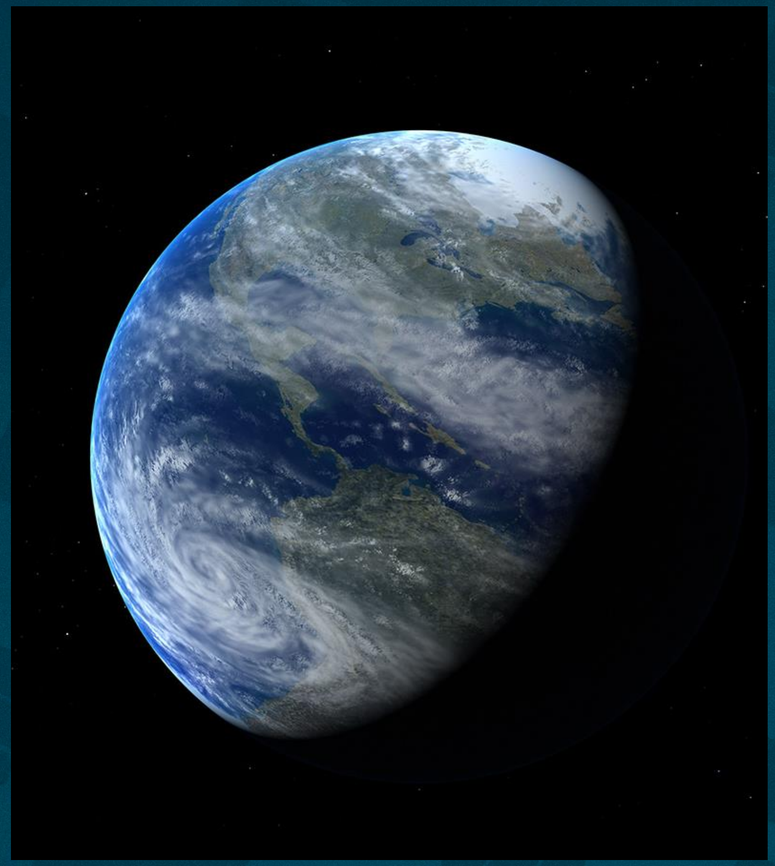
Welcome to the small sat express

Property of Hiber® – October 2018

Imagine you can easily track and monitor your assets, almost anywhere. Deserts, oceans, frozen poles, even mom's backyard.

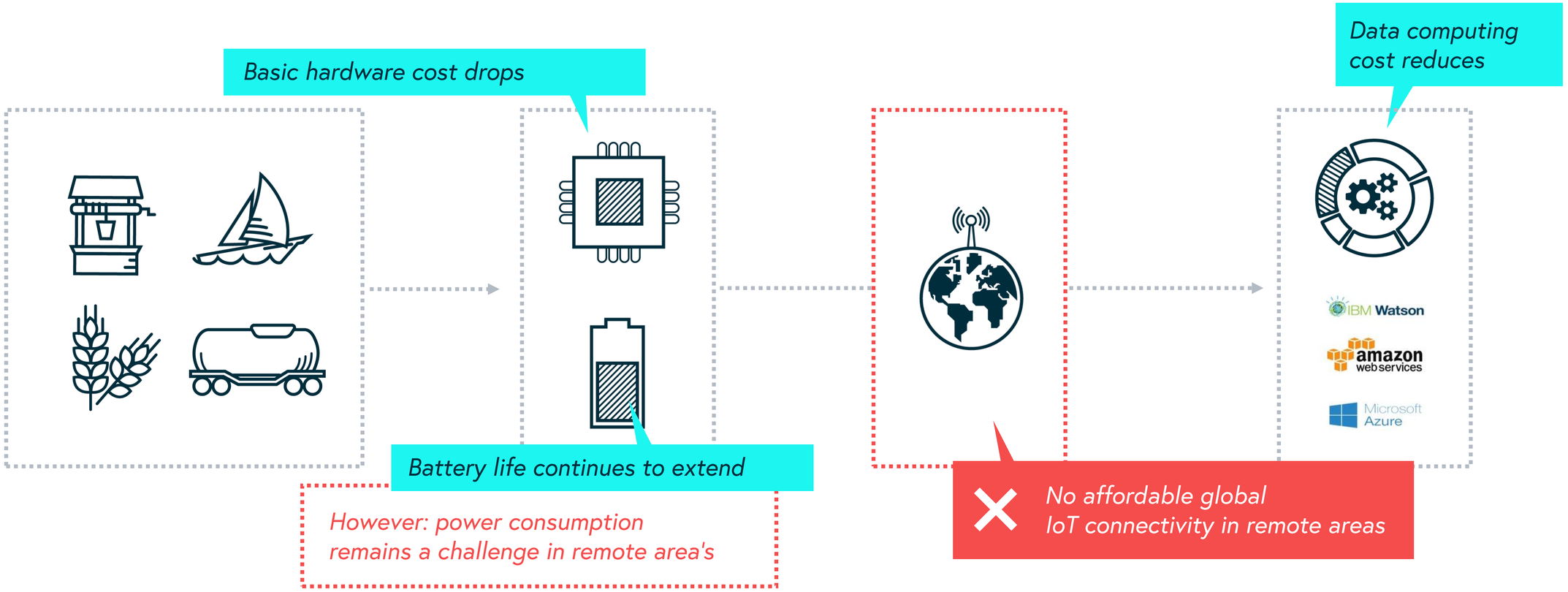
All become open for business with new technology.

A small idea. A big opportunity.



Affordable, low power connectivity

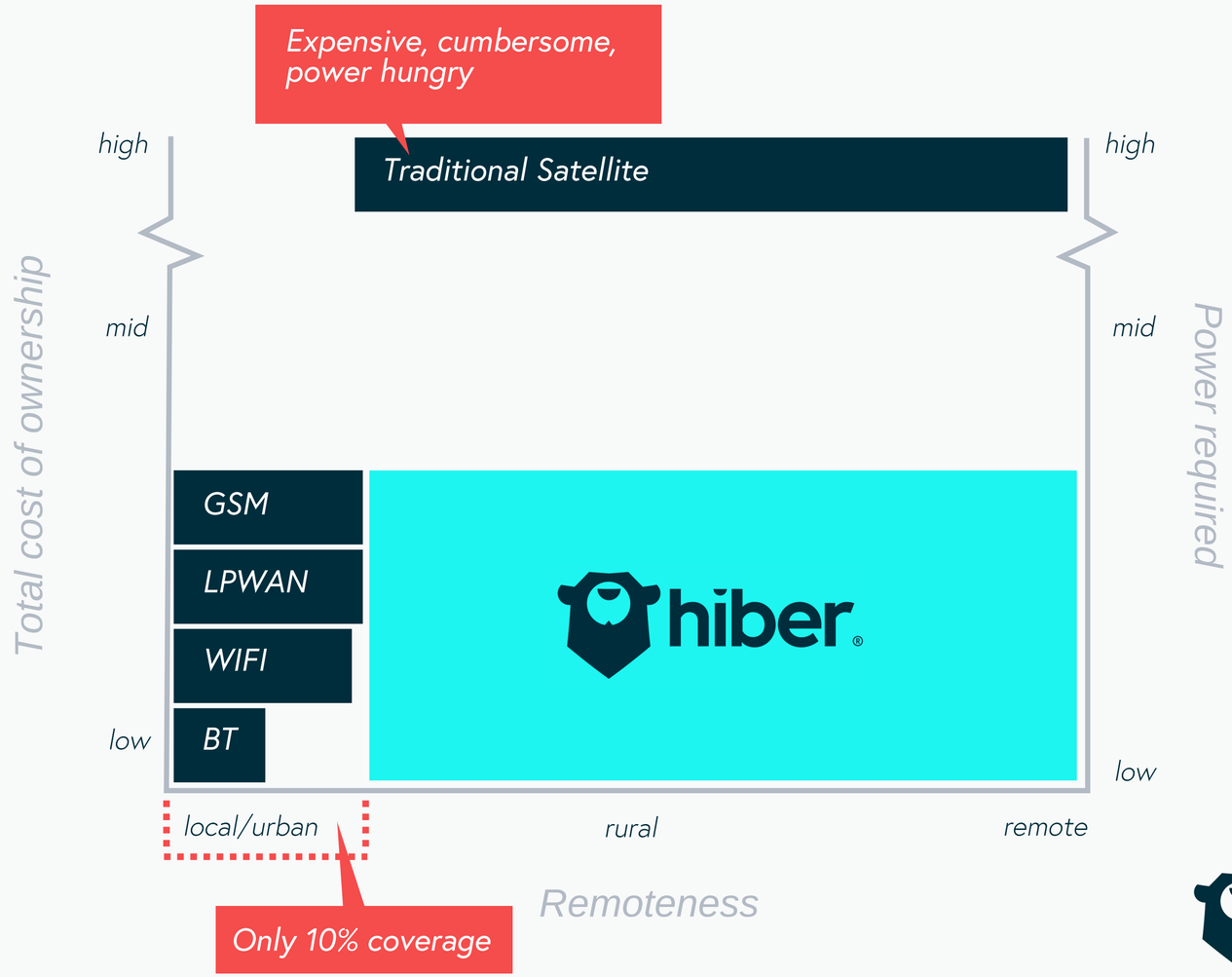
The main barriers for IoT market growth.



Solution: Low Power Global Area Network by Hiber®

Current low power solutions only cover 10% of the globe.

1. Global coverage
2. Up to 20x less expensive compared to existing global solutions
3. Ease of use
   - Direct to satellite
   - Power efficient
   - Easy to integrate



How: Direct-to-satellite

The holy grail of remote IoT connectivity.

Applied for global frequency
(final confirmation Q4 2017)

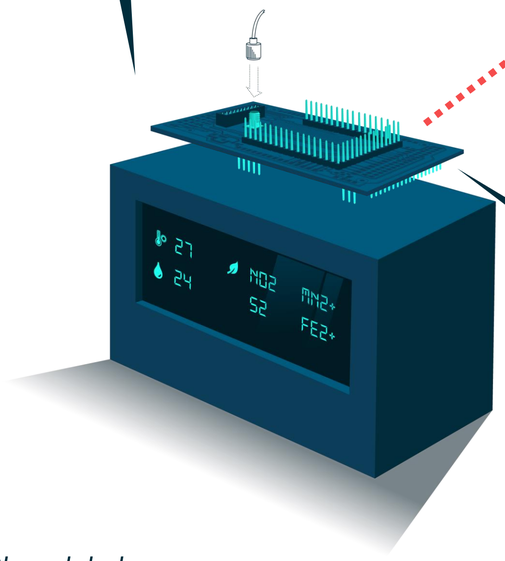
Ground stations around the world to retrieve data.

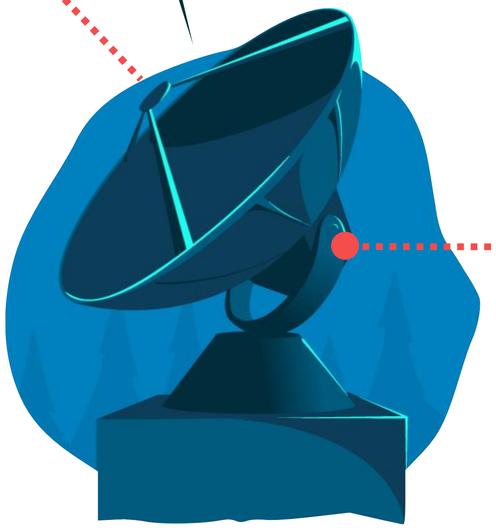
Easy to integrate with cloud services. Easy to build unique applications.

Your sensor, monitor anything, anywhere.

Radio configurable by software and patented payload.

Ultra low power, patented modem and antenna developments.





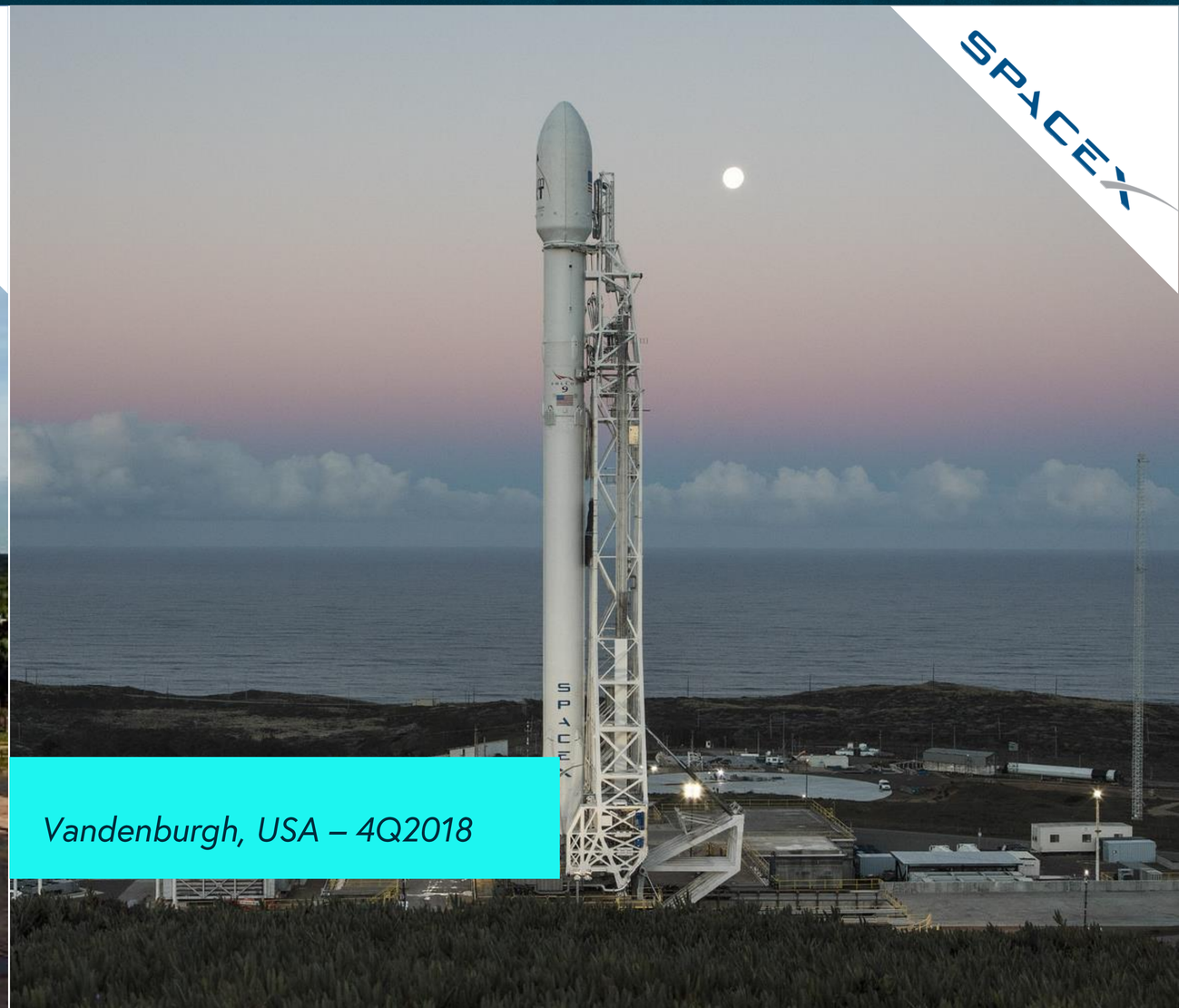
IBM Watson

amazon web services

Microsoft Azure

Welcome to the SmallSat Express

Sriharikota, India – 4q2018



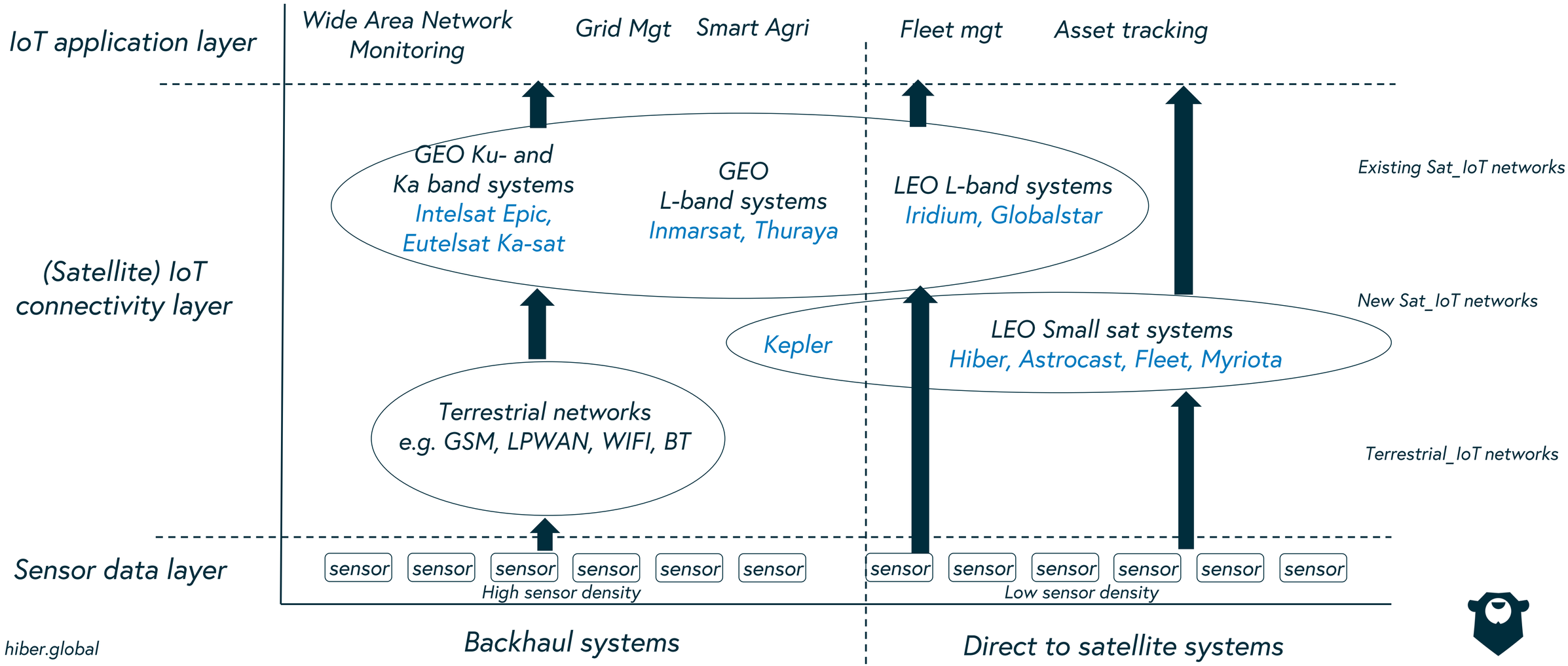
Vandenburgh, USA – 4Q2018

Introduction Hub Urlings

Introduction Hub Urlings

- *One of the pioneers of Satellite M2M as Product Manager Inmarsat-C at the famous KPN Station 12.*
- *The reliability and success of this "small data" satellite service, its global coverage and reliability made that the service was used for a myriad of applications: from sending messages, to truck fleet management, to pipeline monitoring and bringing back data from all types of sensors.*
- *At that time satellite was the only type of network that was able to offer global IoT coverage. This has not changed. So far.*
- *Working since 25 years in the satellite IoT sector with his company M2sat*
- *The satellite IoT market now offers a lot of different solutions, but is on the verge of a new era*

Overview (Satellite) IoT Networks



Introduction Hub Urlings

- *Now involved in the development of a new generation of SmallSat-IoT services*
- *Innovation Manager for the ESA program at Hiber.*
- *Intruiged by the opportunities of the new small sat technology*

- *What are we going to do today?*
  - *The global IoT market*
  - *Welcome to the smallsat express*
  - *Hiberband*
  - *Opportunities for the Meteo sector*

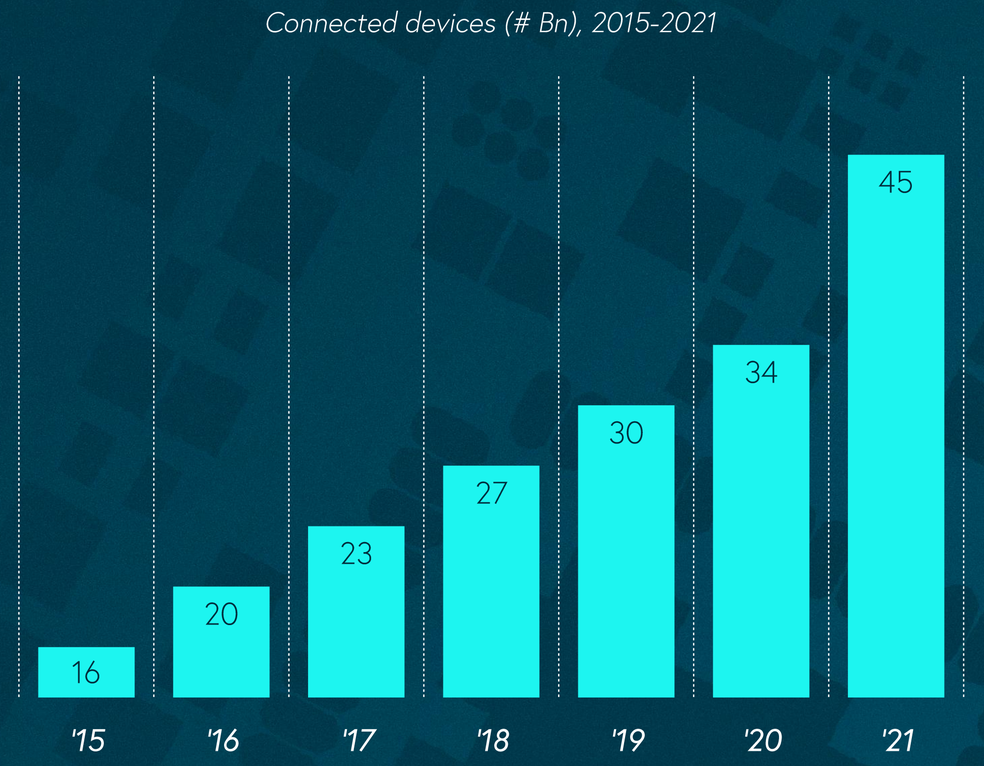
Global IoT market

Internet of Things

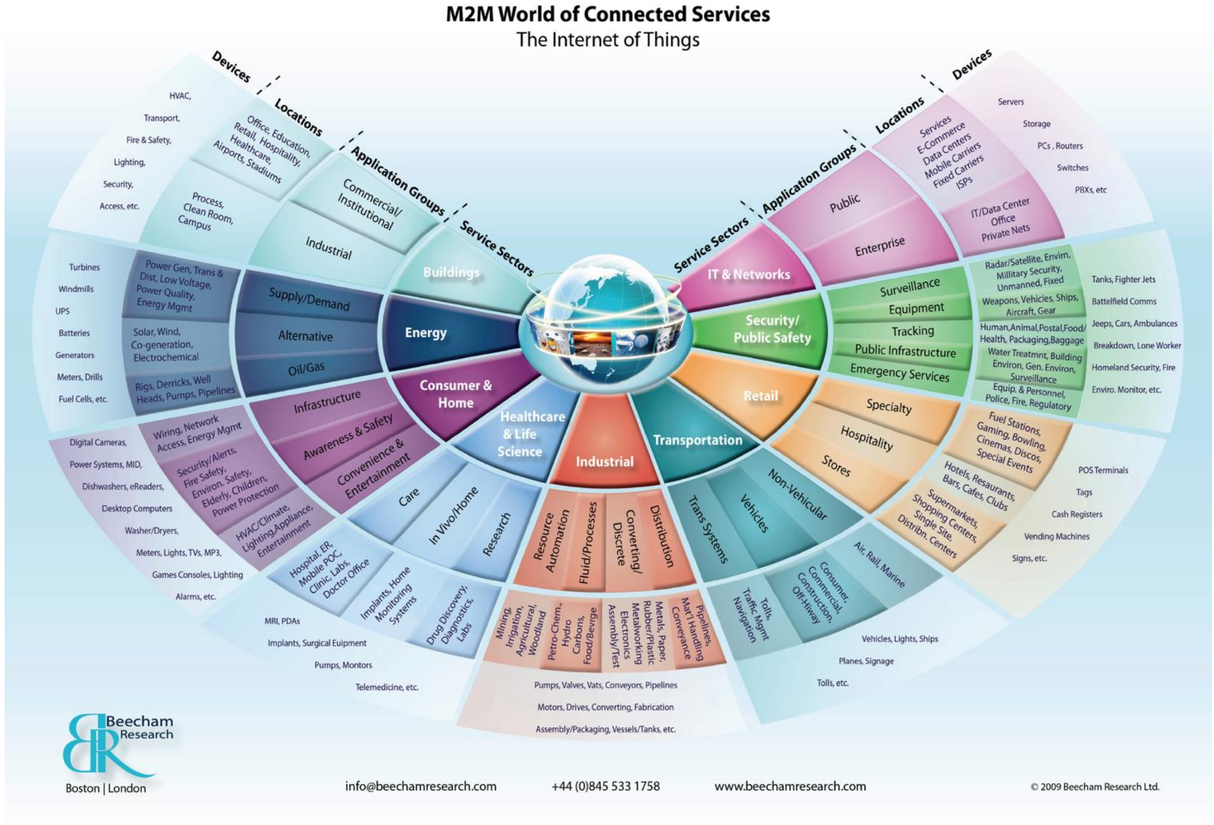
A huge promise.

IoT: autonomous devices sending small data packages.

Things don't watch YouTube, no need to have a broadband connection.



The world of IoT



Worldwide, the IoT market has 9 bn connected devices today, increasing to 50 bn devices by 2025, with an economical impact of $11 Trillion.
LPWAN-connected devices will grow from 50 mln today to 700 mln by 2021.

- *Within smart agriculture 75 mln devices ($4.6bn) will be deployed by 2020, at a 20% CAGR*
- *The IoT market within Energy will grow from $7.6bn today to $ $22.3bn in 2020, at a 24.1% CAGR*
- *The asset tracking segment will be worth $18.9bn by 2020, at a CAGR of 20.5%*
- *Environmental monitoring will grow with a CAGR of 7.5%, reaching $20.5bn in 2020*

Sources:

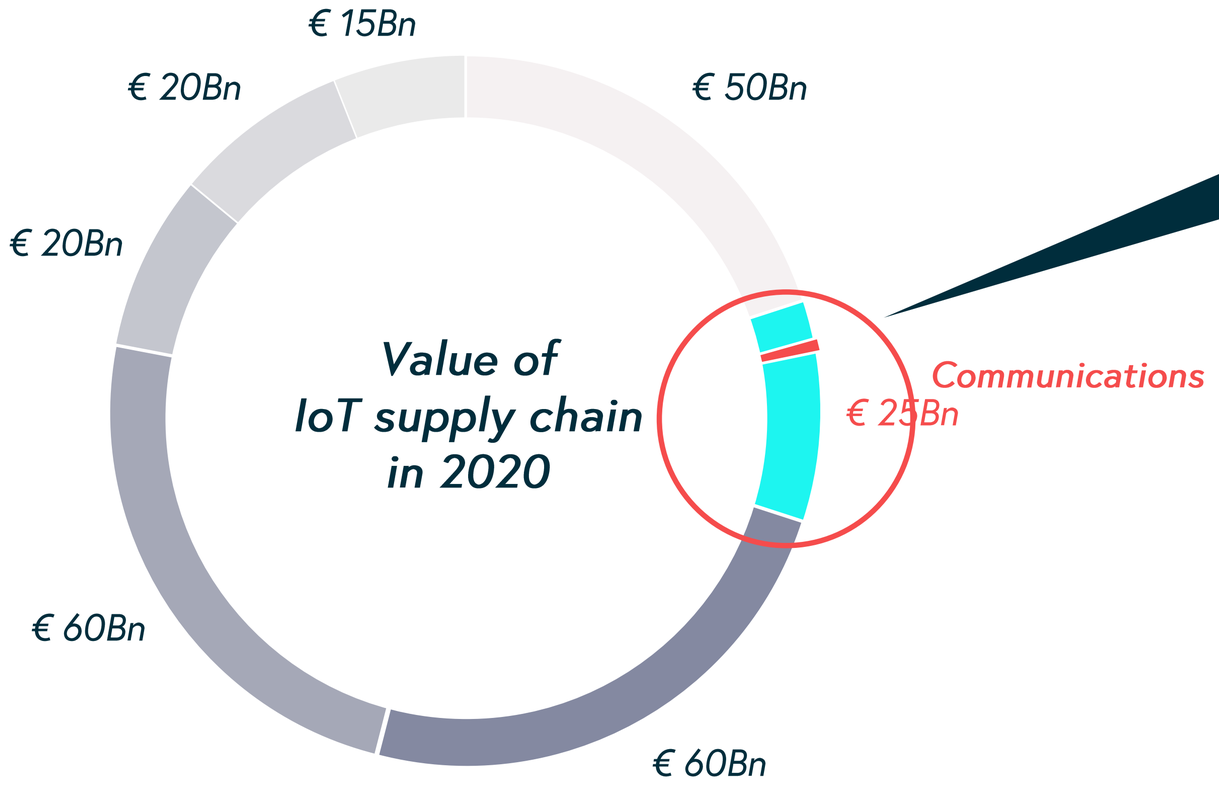
McKinsey: Unlocking the potential of the Internet of Things (2015)

https://machinaresearch.com/news/global-m2m-market-to-grow-to-27-billion-devices-generating-usd16-trillion-revenue-in-2024/

http://www.businessinsider.de/the-low-power-wide-area-networks-report-market-potential-key-players-and-the-emerging-standards-for-low-power-long-range-networks-set-to-open-doors-for-iot-adoption-2016-8?r=US&IR=T

Hiber targets rural & remote areas

A € billion opportunity.



A € 1Bn opportunity with 150M devices, as conservatives estimate.

According to BCG, the market splits as follows:

- *Communication*
- *IoT applications*
- *Services*
- *IoT analytics*
- *Identity and security*
- *IoT backbone*
- *Connected Things*

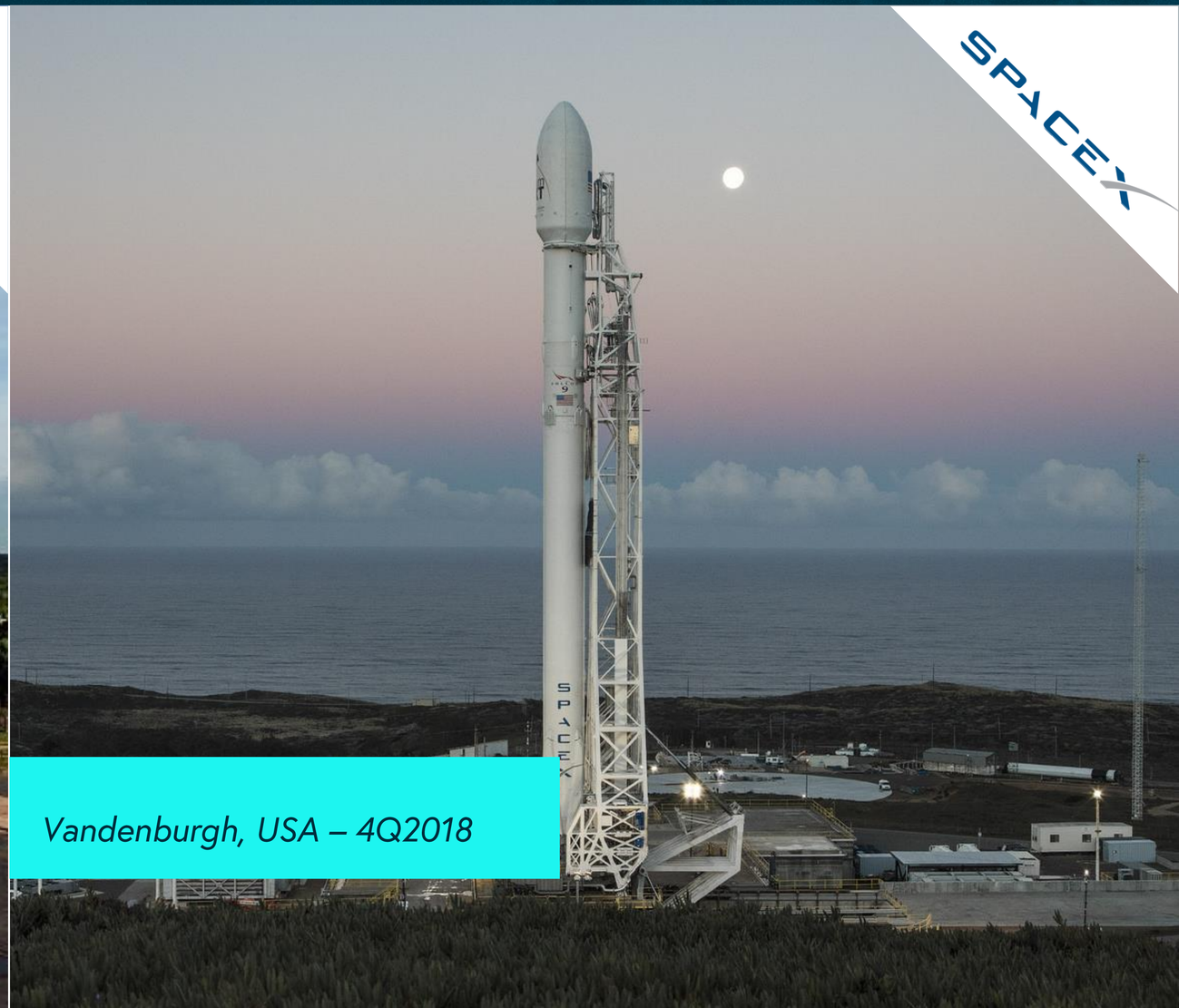
According to McKinsey, the market develops as follows:

40x

Growth in 2025

Welcome to the SmallSat Express

Sriharikota, India – 4q2018



Vandenburgh, USA – 4Q2018

Who is on board the small sat express?

A landmark launch:

- *More than 80 small sats from 30 customers and around 20 countries*
- *Complete range of small sats :*
  - *Universities (even highschool): sceintific mission*
  - *Research institutes: technology demonstrators*
  - *Government / defense missions*
  - *Earth observation companies*
  - *Telecom / IoT missions : new space start ups*

Who is on board for the small sat express?

A new generation of Low Power Global Area Networks (LPGAN):

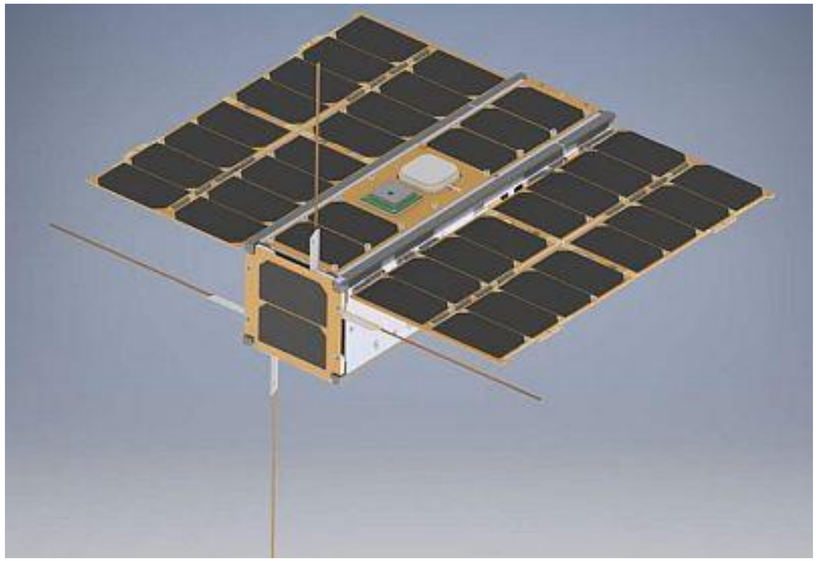
- *The viability of small sats in e.g. the Earth Observation area has already proven this. The low production costs of small sats opens up the NewSpace*
- *75% of the small sats are from the commercial sector*
- *This launch will demonstrate the feasibility of the small sat technology in the telecom sector; and signifies the emergence of LPGAN*
- *Small sats will become a game changer for the IoT sector.*
- *Let's have a look at who is on board.*

LPGAN IoT systems on board the smallsat express

Astrocast

- *The Swiss based company's Astrocast 0.1 and 0.2 identical satellites are an In-Orbit-Demonstration mission for the future constellation (64 sats).*
- *The goal of the mission is to demonstrate all the satellite functionalities and multi satellite operations, and to characterize the radio frequency link between the objects on the ground for the demonstration and the satellites.*
- *After integration of the NanoLink terminal, ground based assets can reliably and securely send any kind of sensor data to the constellation of nano satellites that will acknowledge the reception. Astrocast enables transmission of 1KB/day from any region on the earth.*

LPGAN IoT systems on board the smallsat express



Fleet

- *Australian based Fleet Space Technologies will launch their Centauri 1 and 2 pathfinder satellites to prepare for their planned network for global satellite connectivity to the Internet of things.*
- *The Centauri's are the first of a constellation with more than 100 nano satellites that Fleet is planning to launch, creating a global, free connectivity network that will plug directly into the millions of digital sensors already beginning to transform industries like agriculture, logistics, and the extractive sector like mining and gas.*

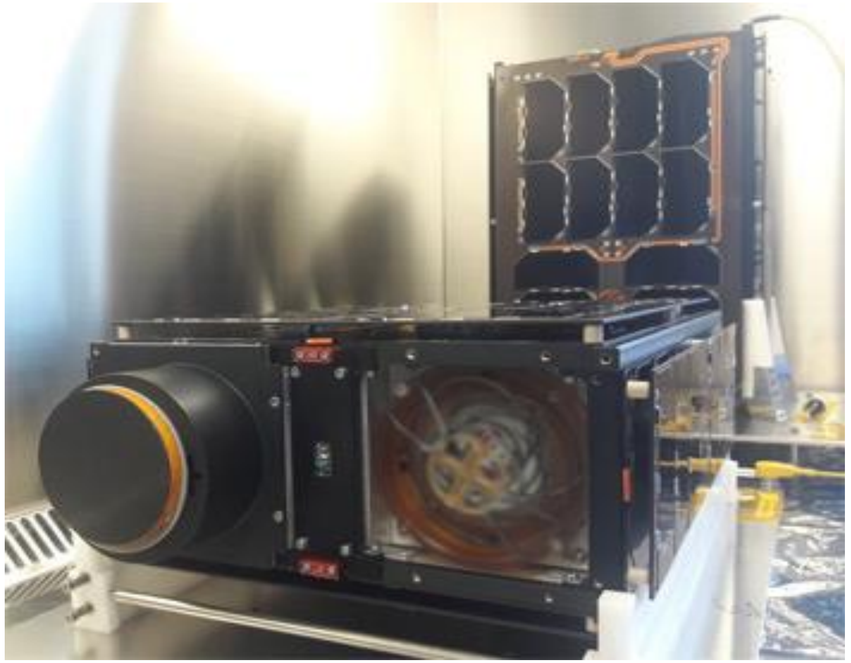
LPGAN IoT systems on board the smallsat express

Myriota

- *Another Australian company, is launching the 3U BRIO, built by SpaceQuest, Ltd. to be launched to test and evaluate an advanced RF Transceiver developed by Myriota.*

- *Myriota wants to evaluate the ability of this advanced radio to function in a space environment.*
- *Myriota aims it's service a wide range of industries including agriculture, defense, utilities, environmental monitoring, asset tracking and logistics. Especially in areas like the less densely populated regions of Australia there's many industries that have remote and mobile operations that are going to benefit from their services*

LPGAN IoT systems on board the smallsat express



Hiber

- *Amsterdam based Hiber (formerly Magnitude Space) is launching the Hiber One and Hiber Two. The name referring to the sleep mode their communication nodes are in during most of the time to save energy and power. The company was only established in 2016 and is regarded as an insider tip*
- *The Hiber system is designed to provide low cost connectivity for IoT (Internet of Things) sensors and devices that run on very limited power and are not latency-sensitive. Core markets are non critical applications in Smart Agriculture, Energy, Logistics/Asset Tracking/Transportation, Environmental Monitoring.*
- *Hiber plans to start their services with the HIBER ONE AND HIBER TWO twin satellites offering a once per day (144 Byte) messaging service end of the year.*
- *In the next stage the Hiber constellation will grow up to 24 cube satellites, later to expanded to 48. The service level will grow along from 1 message per day to 100 messages per day.*

Hiberband®

The worlds first LPGAN.

LPGAN offers a single, affordable and global standard.

LPGAN.

Unique distinguishing capabilities. (1/4)

- *Low power consumption: deploy and forget*

LPGAN.

Unique distinguishing capabilities. (2/4)

- *Low power consumption: deploy and forget*
- *Low cost connectivity: unlocks affordable mass deployment*

LPGAN.

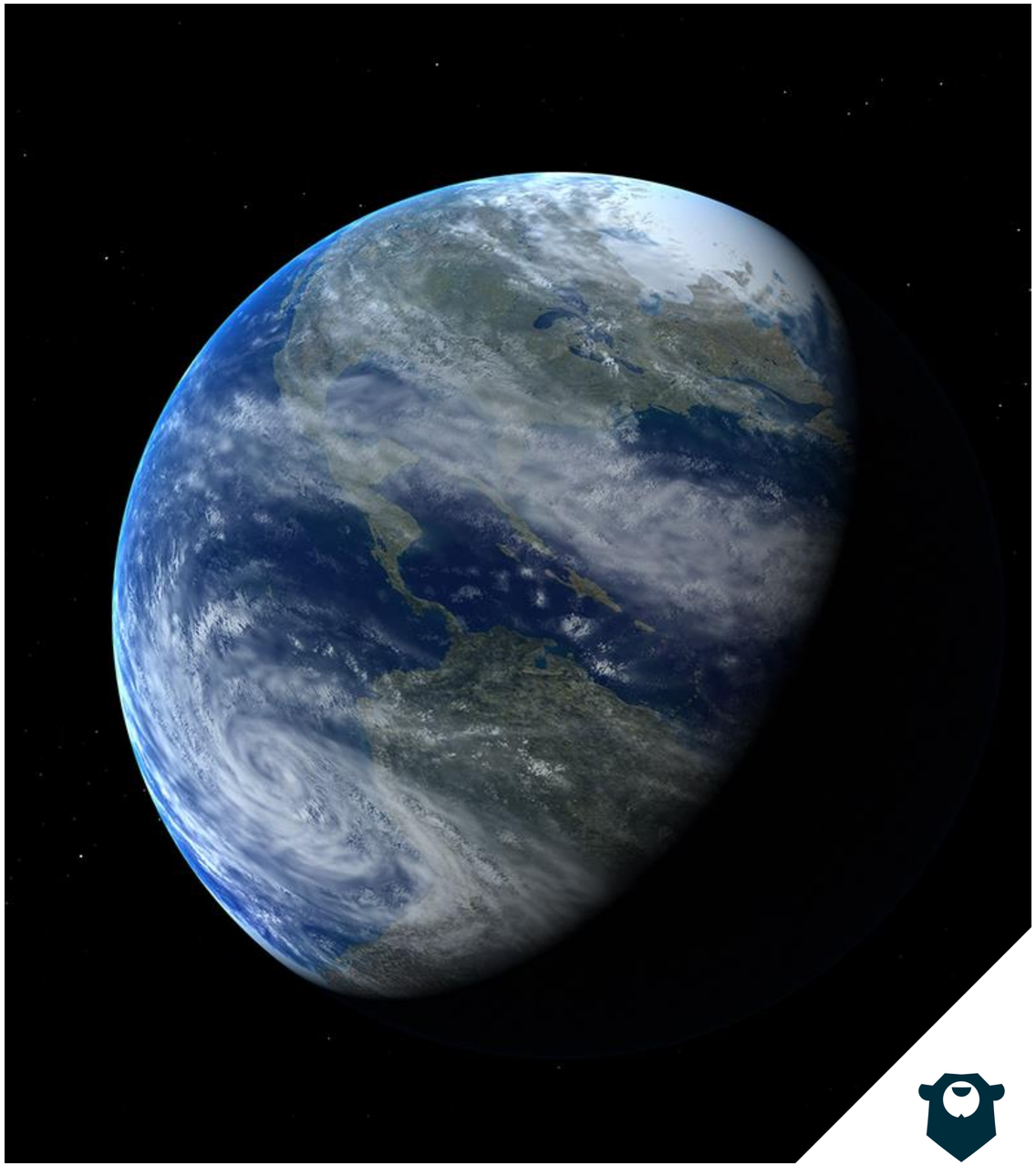
Unique distinguishing capabilities. (3/4)

- *Low power consumption: deploy and forget*
- *Low cost connectivity: unlocks affordable mass deployment*
- *Coverage anywhere on the planet: direct-to-satellite*

LPGAN.

Unique distinguishing capabilities. (4/4)

- *Low power consumption: deploy and forget*
- *Low cost connectivity: unlocks affordable mass deployment*
- *Internet coverage anywhere on the planet: direct-to- satellite*
- *Single global standard: ease of use, easy to scale*

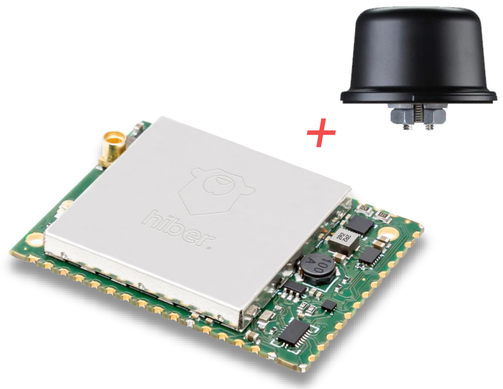


LPGAN.

How it works.

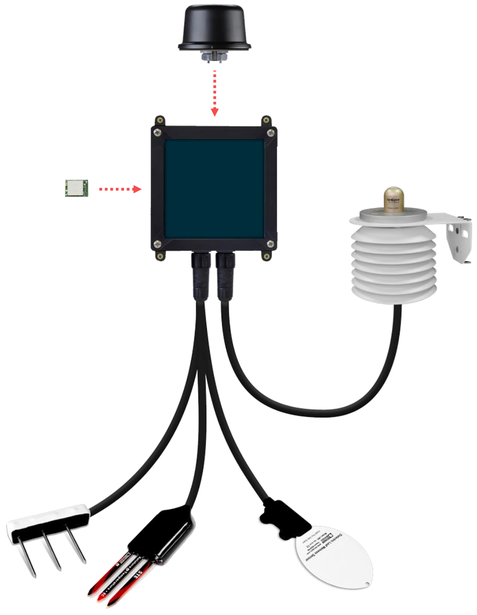
Modem and antennas.

Buy a LPGAN certified satellite modem & antenna via a dealer.



Integration.

Embed or integrate the LPGAN hardware into your IoT device.



Mission control.

Activate a LPGAN annual service plan via our online platform.

Hiber LPGAN

Unique distinguishing capabilities

Global coverage from day one

- Internet coverage anywhere on the planet; direct to satellite
- Superior to LoRA/Sigfox
- Comparable to traditional satellite

Low power

- Deploy and forget
- Comparable power consumption to LoRA/Sigfox
- Significantly lower than traditional satellites

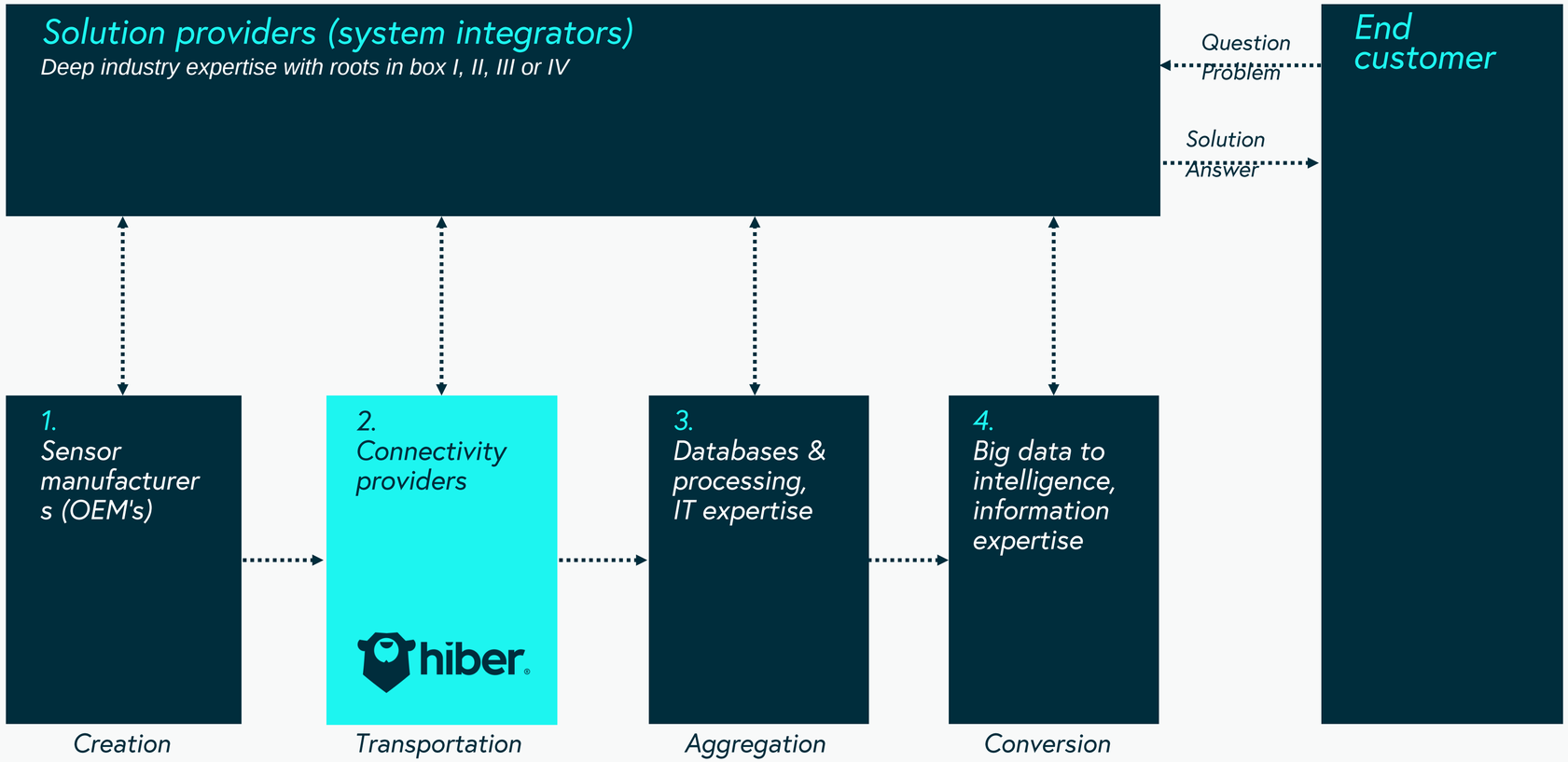
Low cost

- Unlocks affordable mass deployment
- Significantly lower cost compared to traditional satellite

Ease of use

- Easy to use, easy to scale
- Low infrastructure requirements, global standard
- Plug & play, with superior online tools

Hiber's position in the IoT eco-system



Product: Hiber® whole sale packages

The new global IoT network, eliminating last barrier to growth.

hiber.	hiber.	hiber.
Daily Messages	**Hourly Messages**	**Messages every 15 Min**
from day 1	from 2020	from 2023
Daily subscription*	Hourly subscription*	Quarter hourly subscriptions*
Antenna device	Antenna device	Antenna device
Modem device	Modem device	Modem per device

- Global coverage
- Low Cost
- Low power
- Easy to implement
- Fit for purpose
  - SMS size message
  - One way
  - Non real-time

** Ask your solution provider / service provider / system integrator for detailed pricing*

Opportunities for the meteo sector

Weather monitoring systems

Climate tech helps next gen rural farmers.

Client:

Humanitarian organisation improving education

Project:

Humanitarian- Commercial

Goal:

Make kids the smart farmers of tomorrow

How:

We can't predict the weather. But we can help prepare for it. In rural communities, a pilot project of 150 schools is using climate stations to access weather and soil data to improve local agriculture. This non-profit organisation sells the data to commodity traders to finance more climate station, ultimately connecting 1.3 million schools. Helping 10-year- old children become the smart farmers of tomorrow. To produce more crops and healthier livestock. So their families, communities and the region, don't just survive but prosper.

Climate insights

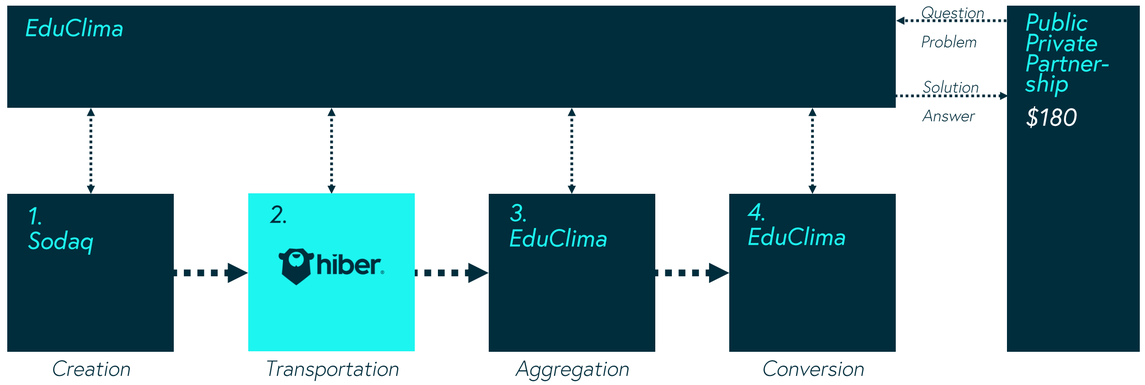
For farmers and meteo insurance in Peru.

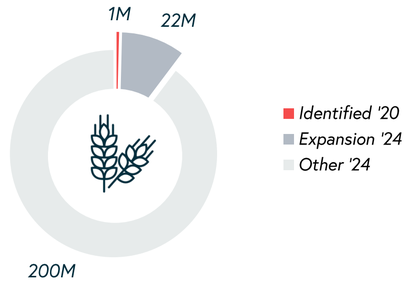
Requirements

- *Climate station educating farmers of the future, collecting data for agro insurance*
- *Out-of-the-box climate station with global standard*
- *Affordable system < $180 per year*
- *Low power*

Technology landscape

- *Terrestrial connectivity out of range*
- *Existing satellite too expensive*





Market size x 1,000 euros

Table 3C-2: Demo/pilot set up

Hiber Application Demonstration Plan

Amongst our Customers already onboard

Opportunity Name	VERTICAL market	APPLICATION area addressed	GEOGRAPHICAL market
Fishery buoys	Fisheries	Environmental monitoring	GLOBAL
Basic environmental data	Agriculture	Environmental monitoring	EUROPE
High profile dredging sector use case	Maritime	Environmental monitoring	West Europe
Groundwater monitoring	Environment	Environmental monitoring	USA/Canada
Demonstration with NIWA	Environment	Environmental monitoring	Australia/Oceania
Water Access Africa	NGOs	Environmental monitoring	AFRICA
Filling the Weather Information Gap	Environment	Environmental monitoring	AFRICA
Save the Planet Use Case	Environment	Environmental monitoring	GLOBAL

Application Demo opportunity for the Meteorologic community

Less talking, more doing : Develop your wide area monitoring application with Hiber

Participate in ESA Demonstrations phase

Develop wide area monitoring applications with in orbit Hiber One and Two satellites.

Evaluate your Hiber application as part of the ESA project.

Project time frame:

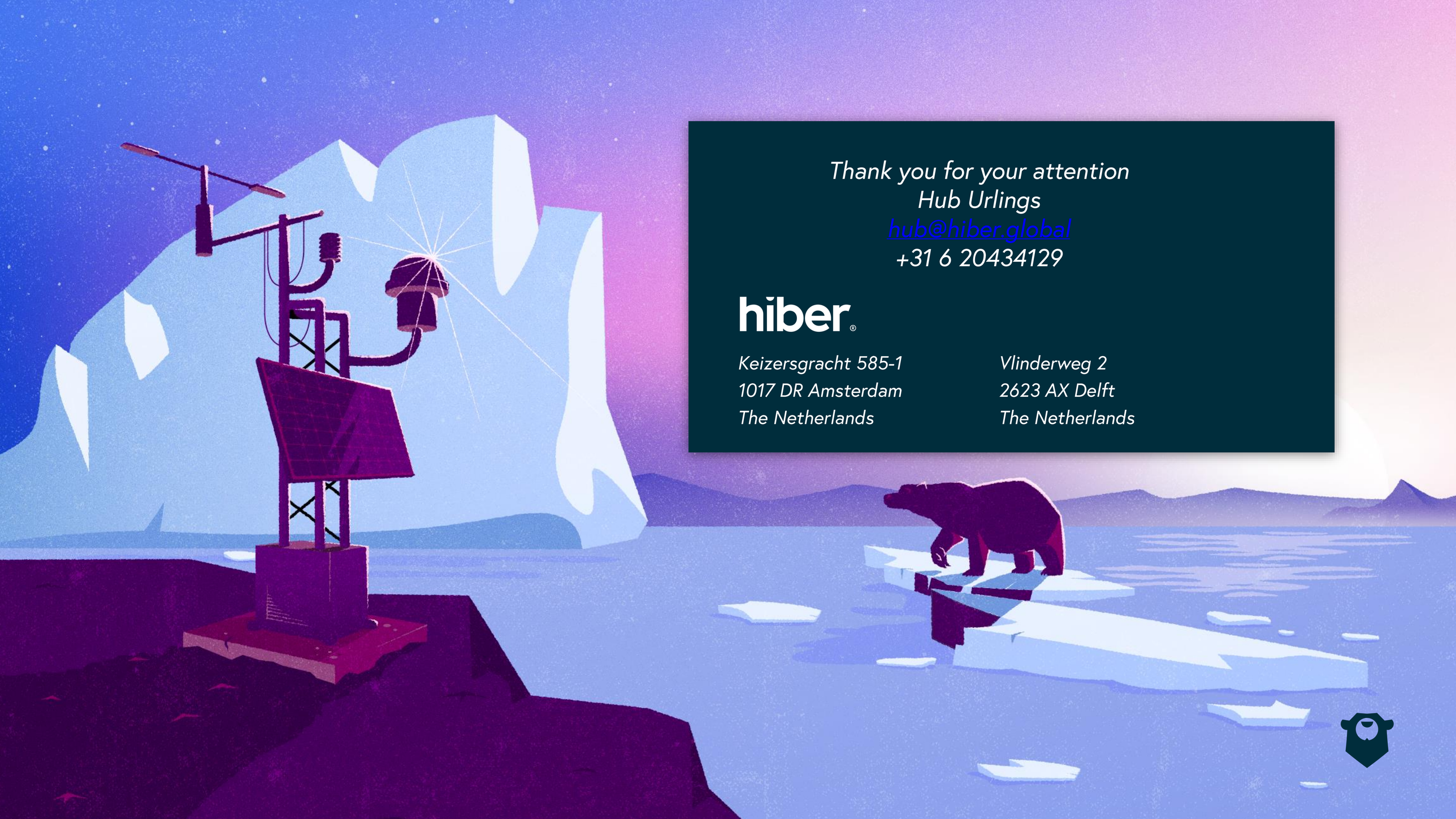
Jan 2019 – Sept 2019

Goal:

Develop working applications including integrated sensor / Hiber CN unit, connectivity and IoT Applications software. Evaluate and fine tune to deployment requirements.

How:

Contact Jean-Remy Lannelongue (remy@hiber.global)



Thank you for your attention

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