NB-IoT (Narrow Band Internet of Things)

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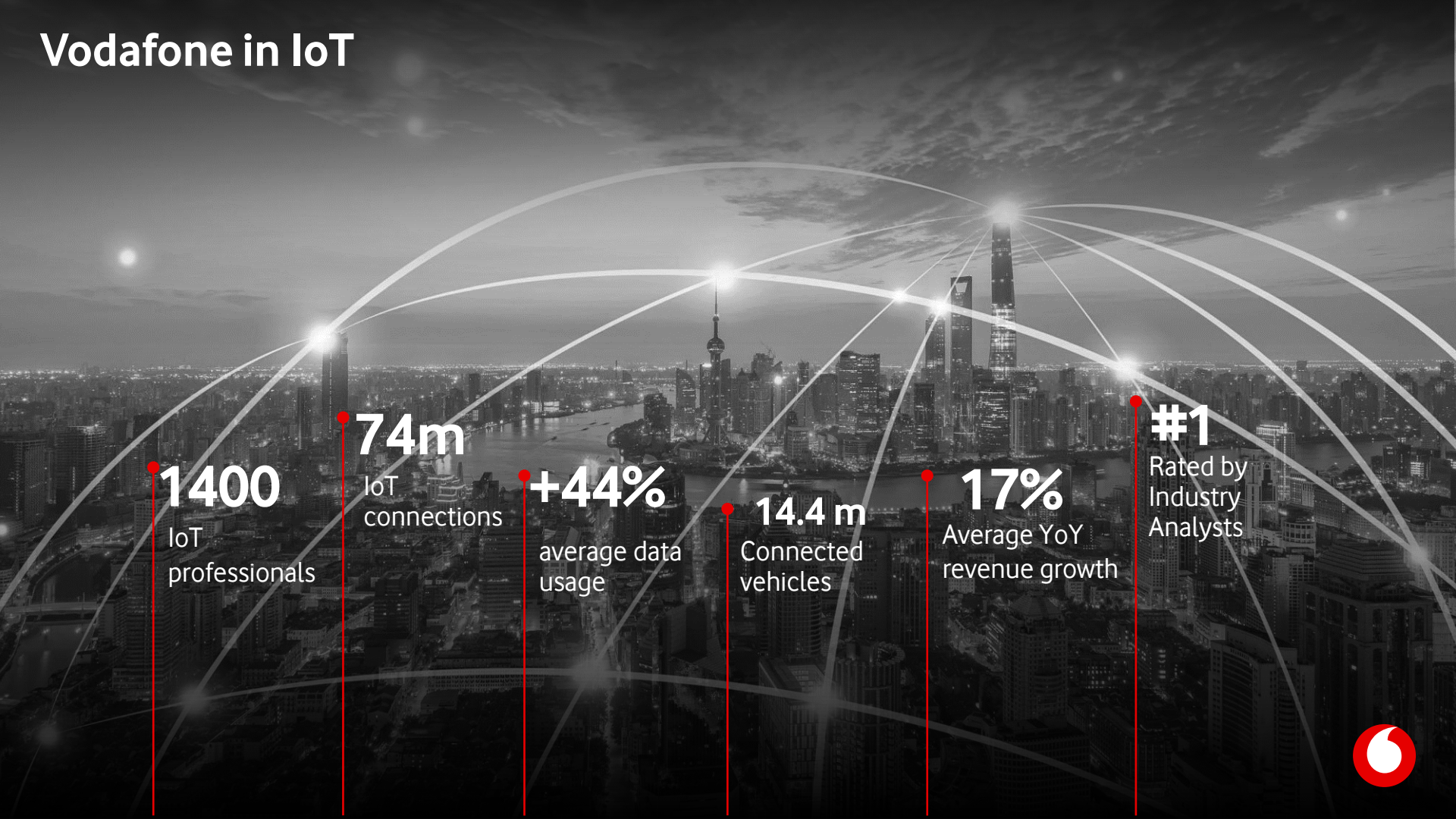
1
Vodafone
in IoT

Vodafone in IoT



We offer the right connectivity to suit customer requirements

Vodafone’s end-to-end IoT solution

Vodafone combines technical hardware expertise, managed connectivity and software applications to offer an end-to-end, single point of contact solution for IoT capacity

Hardware/device

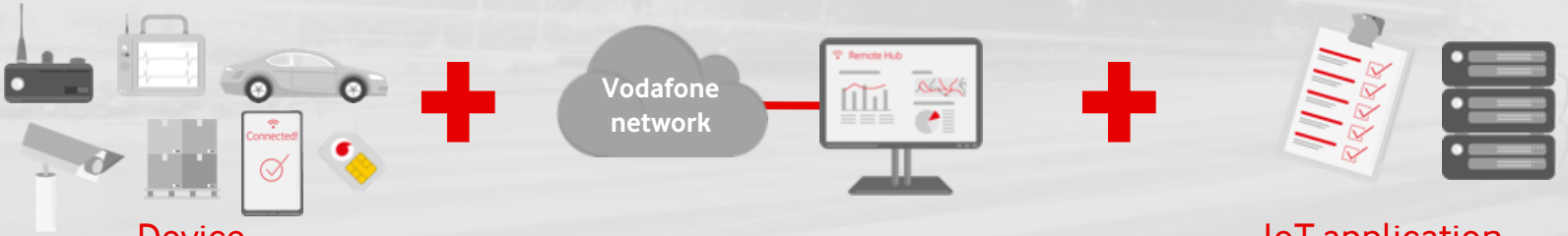
- Device and connectivity – bundled offering
- Partnerships with device vendors

Managed IoT connectivity service

- Network
- Global SIM
- Logistics
- Global IoT platform
- SLAs
- Customer support

Applications

- Asset tracking
- Smart metering
- Telematics
- Fleet management
- Remote monitoring

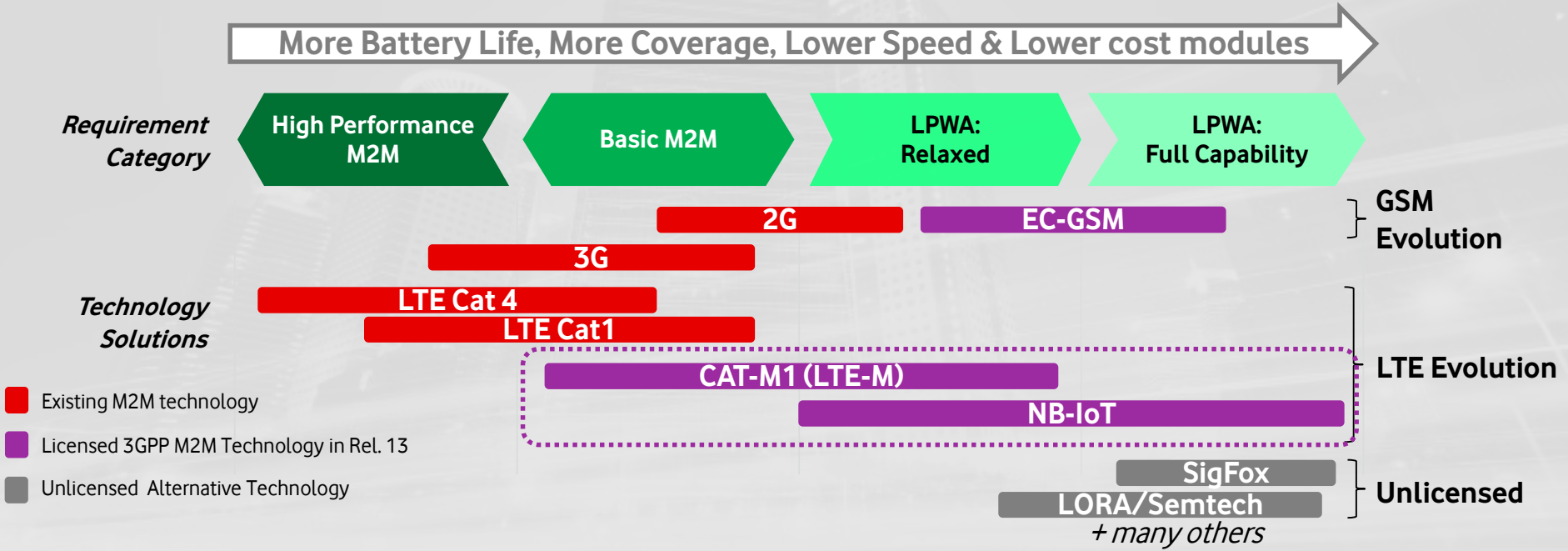


Device

IoT application

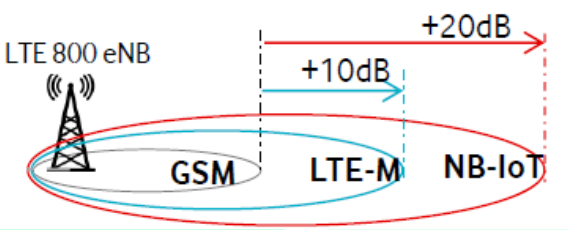
2 NB-IoT

NB-IoT is one of the M2M/IoT technologies providing full LPWA (Low Power Wide Area (LPWA) network capabilities



2G will stay in service longer (at least 2025) – EC-GSM not favoured as requires very long term maintenance of 2G

Different M2M/IoT technologies including NB-IoT fulfill different requirements in terms of data rates, cost, battery life and coverage

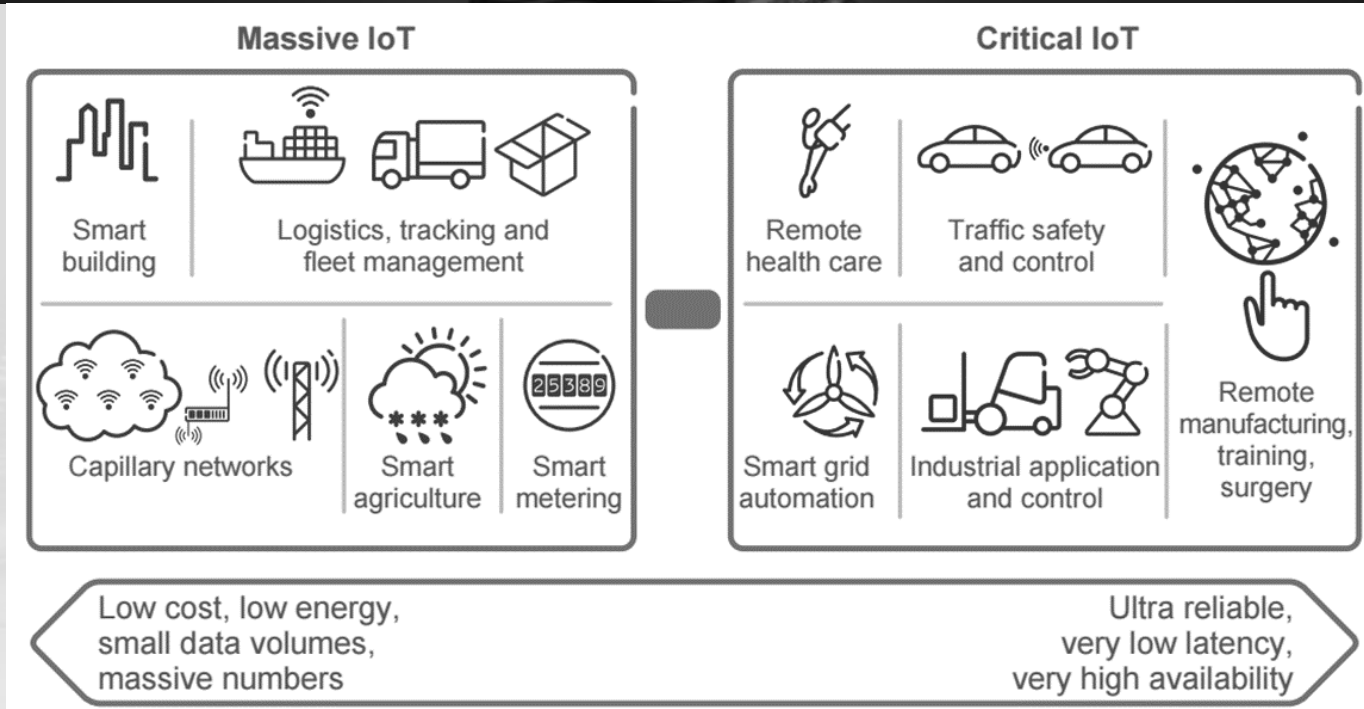


	High Perform. M2M	Basic M2M	LPWA: Relaxed	LPWA: Full Capability
	Cat 3/4	Cat 1	Cat M	NB-IoT
E2E Support	TODAY	TODAY	H1/2017	H1/2017
DL/UL Rates	150Mbps/50Mbps	10Mbps/ 5Mbps	75kbps	3 to 100kbps
Sector Capacity	>200k	>200k	>50k	>200k
Coverage	-4dB GSM	-4dB GSM	+11dB GSM	+20dB GSM
Battery	1 years today > 10 years from H2/2016*	1 years today > 10 years from H2/2016*	> 10 years	> 15 years
Module Cost	$30-$80 (today) < $20-$40 (2017)	~$30 (today) $15-$20 (2017)	$10-$15 (2017)	$6-$10 (2017)
Network Upgrade	Supported Today	Supported Today	SW upgrade	SW upgrade
Security	High	High	High	High

7x larger area coverage

10x larger area coverage

Massive IoT and critical IoT have different requirements – NB-IoT (and CAT-M) enable massive IoT applications



Today's M2M technologies only partially address some key verticals limiting new IoT business opportunities

Gas metering

Large homogenous market measured in millions

Battery life and propogation is critical

Large number of potential meter manufacturers

Water metering

Large homogenous market measured in millions

Battery life and propagation is critical

Large number of potential meter manufacturers

Liquid and pressurised fuels

Large homogenous market measured in millions

Asset is currently un-monitored & losses are high

Battery life is critical

Smart Bins

Growing market with good business case

Battery life and network coverage is critical

Complements our high end connected bins

Environmental Monitoring

Latent market waiting for a low power solution

Battery life and network coverage is critical

Fragmented channel to market in low volumes

Smoke and fire alarms

Massive market measured in hundreds of millions

Battery life and ability to test device is critical

High volume B2C play

Parking monitoring

Market measured in hundreds of thousands

Battery life and low install cost are critical

Low data throughput

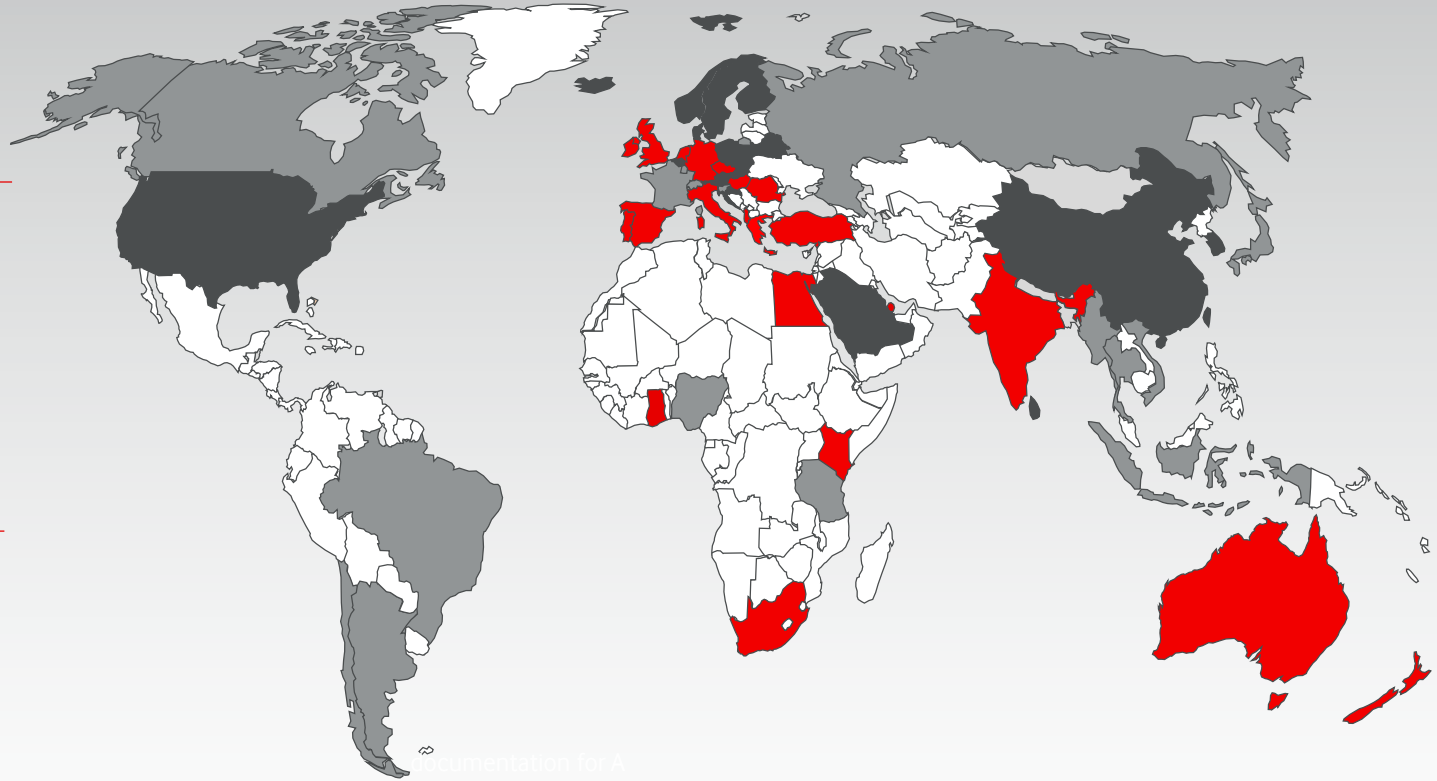
Alarms and event detectors

Market measured in hundreds of thousands

Battery life is ultra critical

Very low data throughput on check and trigger

NB-IoT: A Global Network



Launched

Spain	Turkey*
Ireland	Czech Republic
Italy	South Africa*
Australia	Germany
Netherlands	Greece

2018

Romania	United Kingdom
Portugal	Hungary
New Zealand	India*

* Local SIM only

NB-IoT support continues to grow

3
Projects

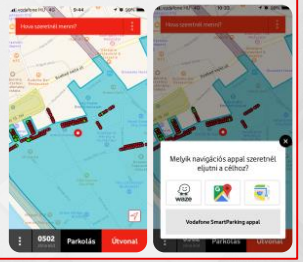
NB-IoT Smart Parking - Proof of Concept - Hungary

NB-IoT Parking in the 5th district, **Budapest**

205 on-street, flush-mounted **parking sensors**

End-user **application**

Functions:
- Shows free/occupied parking spots
- Navigates to destination
- Starts parking transaction



Identifies whether parking spot is free or not

Each contains:
- SIM
- NB-IoT module
- battery
- magnetometer
- antenna
- microcontroller

Lives up to 5+ years

IoT **platform**

Functions:
- Operations & maintenance
- Preset dashboards
- Unique reports

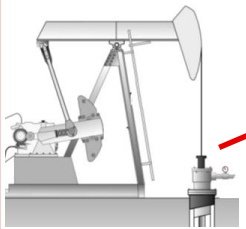
NB IoT Oil Well Monitoring - Proof of Concept – Romania

Remote monitor oil extraction for pumping stations located in hard-to-reach areas

- Manufactured end device using NB-IoT chipsets
- Perform end2end NB-IoT connectivity tests
- Device management dashboards
- Integrate with existing customer interface (Nagios) for monitoring
- Next steps: Analysis of covering 500 extraction wells

Vodafone Solution: Remote monitor oil extraction over NB-IoT technology

Oil Company premise



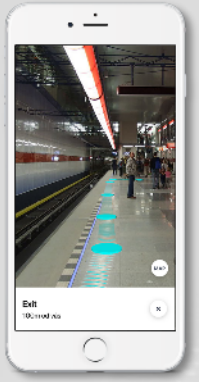
NB IoT Device (Topex)

NB-IoT Network upgrade

Vodafone NB-IoT Core

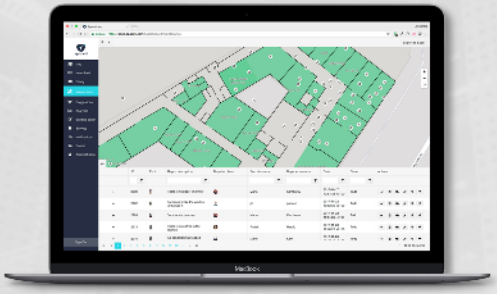
XSPOQ portal

NB IoT Smart Building - Proof of Concept – Czech Republic



Mobile app

Sensor (smart stone)



Cloud and dashboards

WHO THEY ARE ?

- Partner is a technology start-up in mature phase which is taking care about well-being of people inside buildings.

WHAT THEY DO ?

- Offers simple solution for building owners and landlords.
- Solution consist of 3 simple areas : HW (smart stone with NB-IoT SIM card), mobile app and web dashboard.
- This ecosystem can measure/monitor a complex buildings incl. indoor parking places which transform building into "living organism".

Room and parking reservation

Analysis of building occupancy

Danger and emergency alerts

Localization and navigation inside the buildings

NB IoT Smart Building - Proof of Concept – Czech Republic

Sensors / Smart meters

Cloud and dashboards

Mobile app

WHO THEY ARE ?

- Partner is manufacturer of electronic equipment for residential and industrial automation. Branches in 16 countries, production and development in CZ.

WHAT THEY DO ?

- Offers various solutions od smart meters and smart detectors and alarms:
  - Flood detector
  - Smoke detector
  - Air quality sensor
  - Temperature monitoring etc.
- Complex solution consist of 3 simple areas : HW (sensor or smart meter with NB-IoT SIM card), mobile app and web dashboard.

Remote reading of meters without visiting the place

On-going overview of consumption and control of energy expenditure

Online water and smoke detection, air quality monitoring

Danger and emergency alerts