



DIFFERENT CITY-SMART CITY National Debate 2017-2020

**Smart City means lots of connected devices,
but how and why to connect**



Adri Wischmann

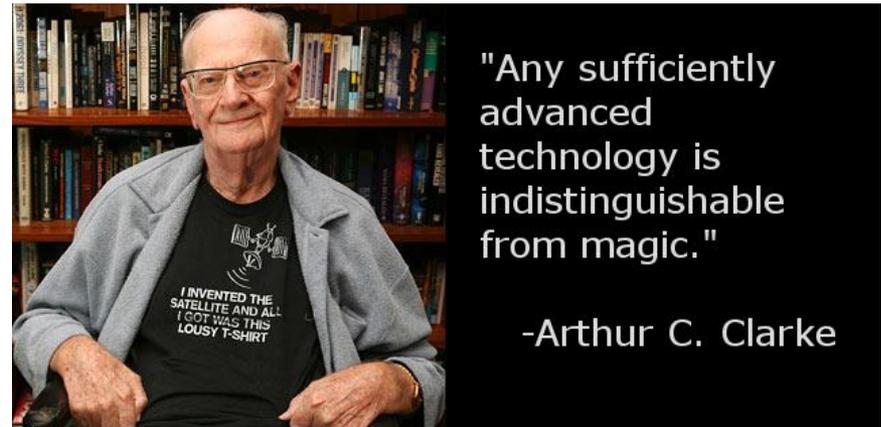
Owner/Founder of: **IOT NEDERLAND**

(www.iotnederland.nl developers of Internet-of-Things-solutions)

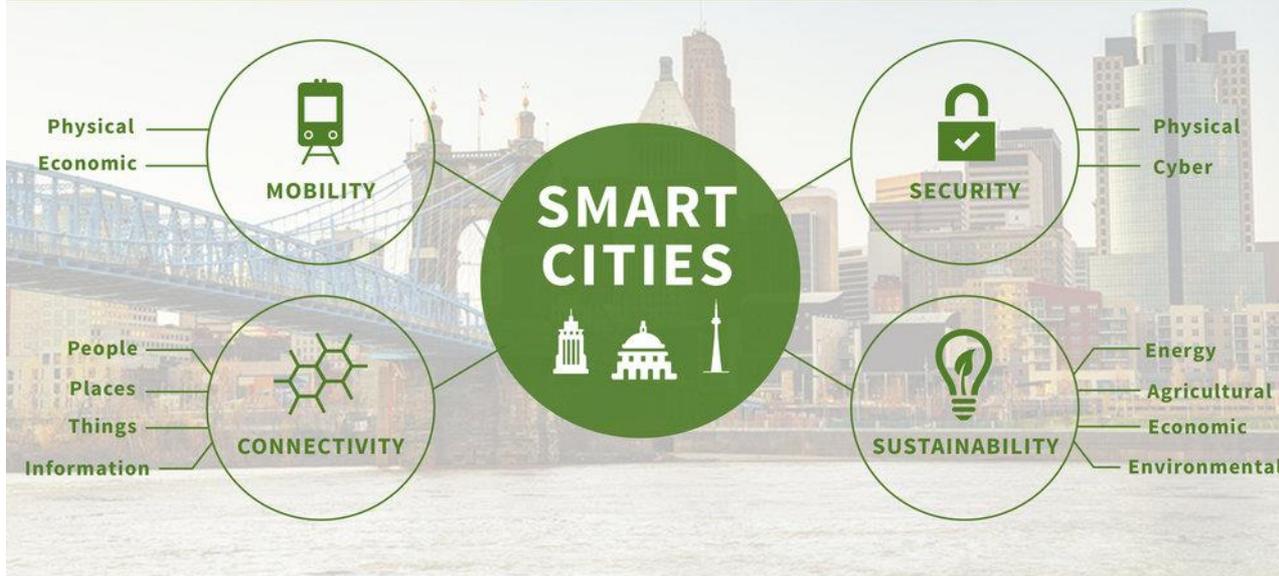
Lives in:

Emmen, The Netherlands

(where Bluetooth was invented -in the east, 10km from the German border-)



4 PILLARS OF A SMART CITY

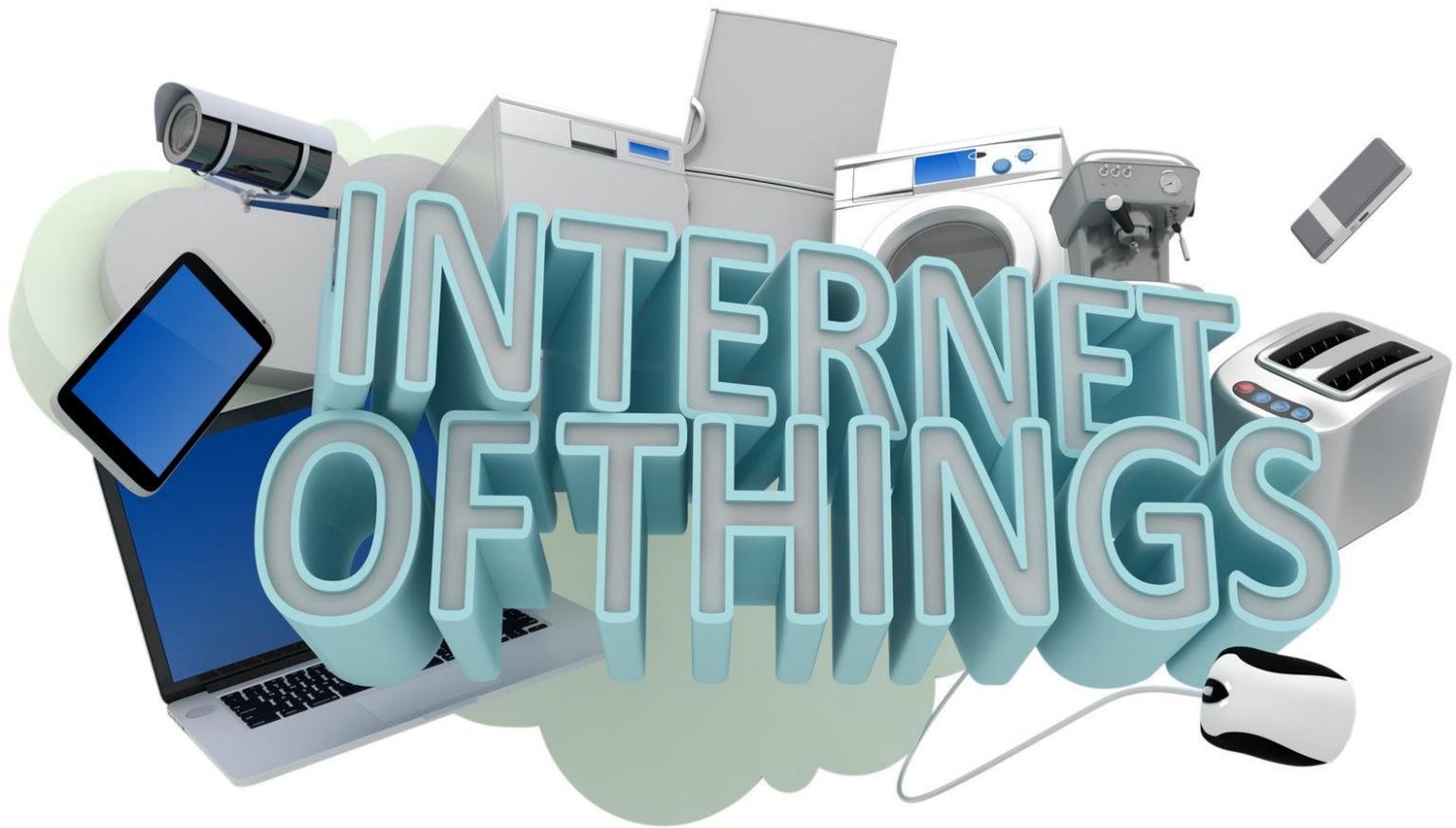


Connectivity is one of the important pillars on which Smart Cities are built.

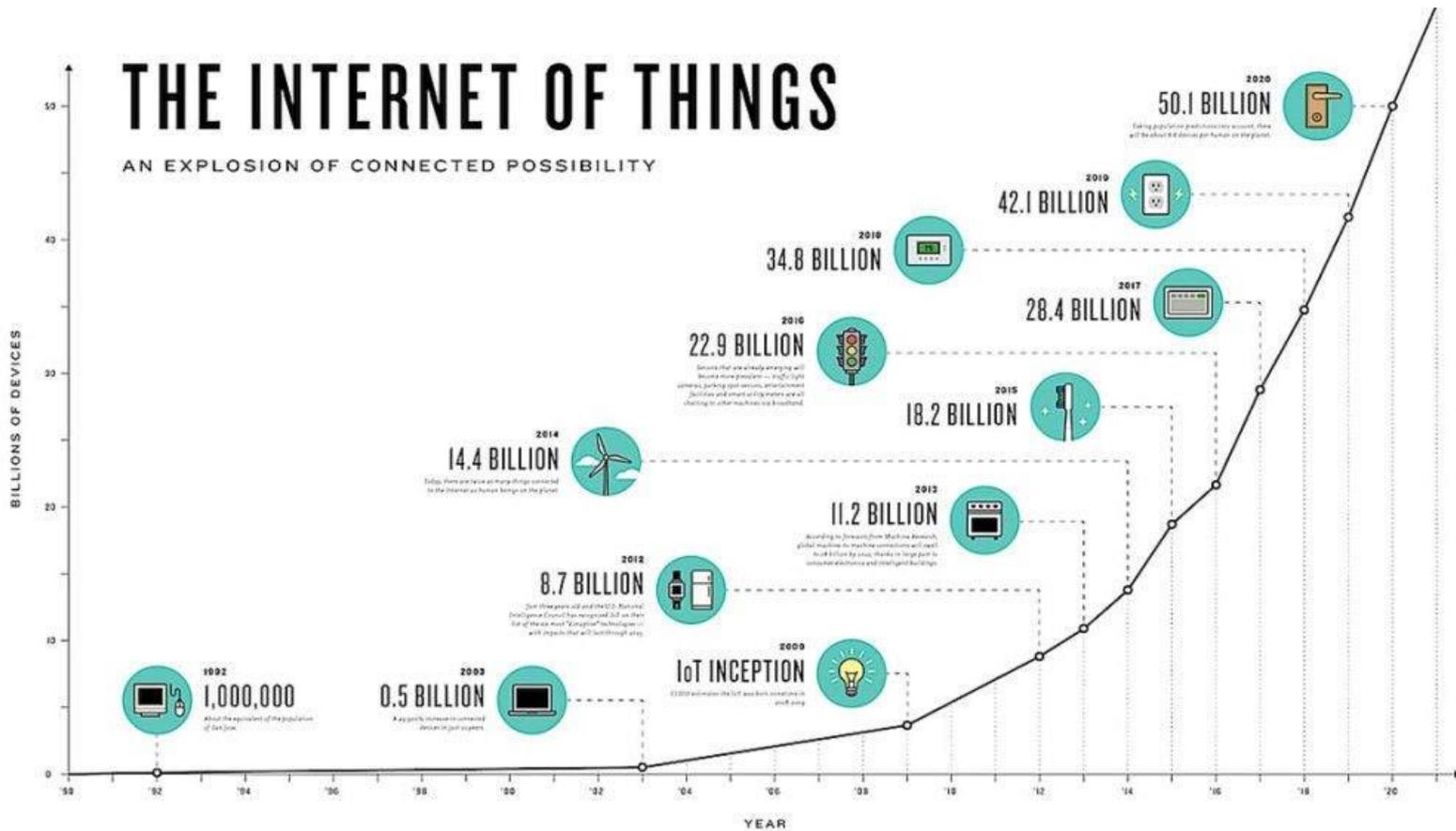
3 Topics:

- Why we need connected devices
- How we are going to connect them
- Why we are going to connect them in that way





IoT is exploding.. It is everywhere..
In your pockets.. in your home.. and in your City!

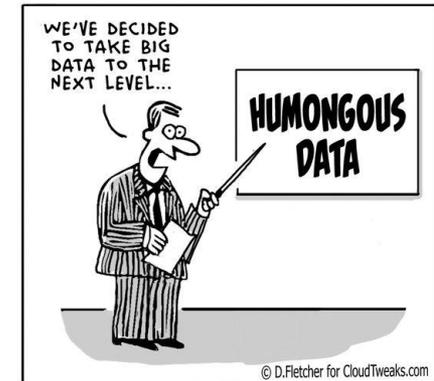


Number of connected devices will increase exponentially
(some expect >100 Billion by 2050)

Sensors generate data and are the eyes and ears of a Smart City

Only when you measure something you can improve it

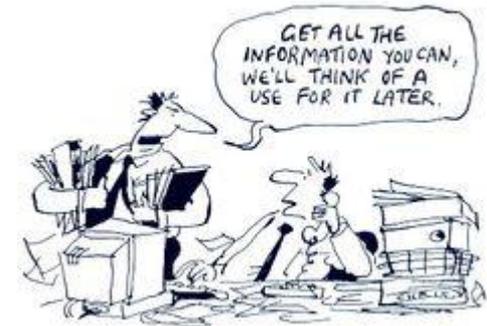
To analyse things and people we need LOTS of data..



BIG DATA

(trafficdata, public transportdata, wastedata, parkingdata, lightingdata, air-qualitydata, ALL kinds of data...)

In order to achieve higher efficiency of resources and.. a higher standard of livingcomfort in the (Smart) City



One of the biggest and most profitable applications of sensordata is:

Predictive maintenance

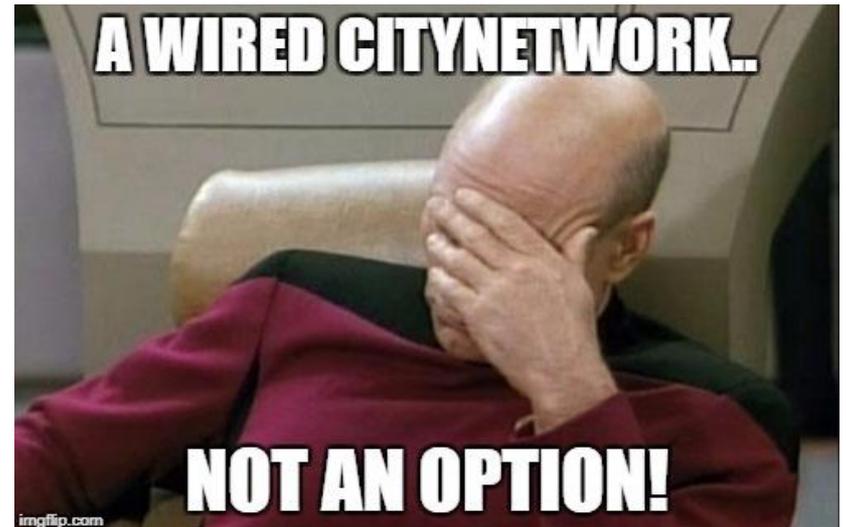
From Wikipedia, the free encyclopedia

Predictive maintenance (PdM) techniques are designed to help determine the condition of in-service equipment in order to predict when maintenance should be performed. This approach promises cost savings over routine or time-based preventive maintenance, because tasks are performed only when warranted.

The main promise of predictive maintenance is to allow convenient scheduling of corrective maintenance, and to prevent unexpected equipment failures. The key is "the right information in the right time". By knowing which equipment needs maintenance, maintenance work can be better planned (spare parts, people, etc.) and what would have been "unplanned stops" are transformed to shorter and fewer "planned stops", thus increasing plant availability. Other potential advantages include increased equipment lifetime, increased plant safety, fewer accidents with negative impact on environment, and optimized spare parts handling.



Bangkok 2017



But first.. what are we talking about..

Network	Range
PAN - Personal Area Network	1cm – 20m
LAN - Local Area Network	Up to 100m
WAN - Wide Area Network	Up to 10km
GAN - Global Area Network	the whole planet

In a Smart City environment we use them all except GAN

Personal Area Network (PAN)

Mostly wearables

Connect via:

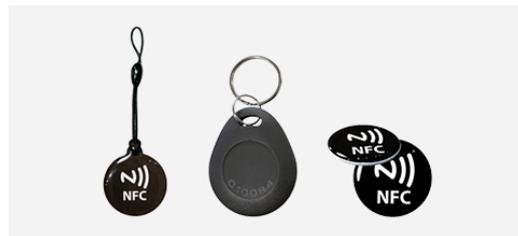
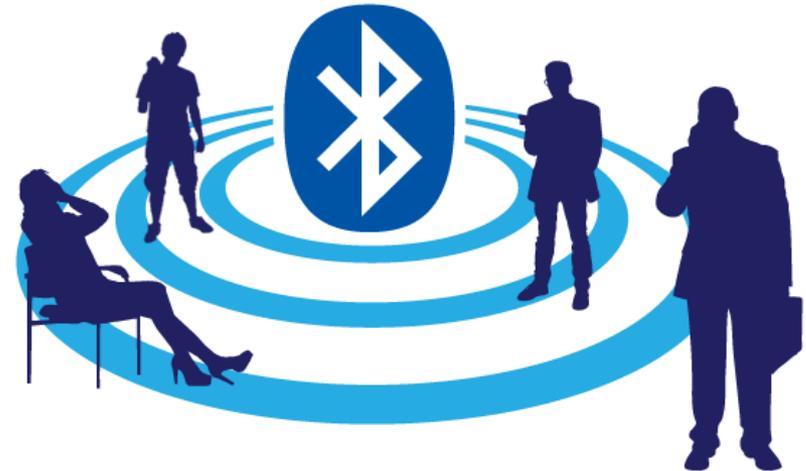
Bluetooth (BLE)

Near Field Communication (NFC)

VERY low power

Short Range (up to 50 meter, line of sight)

Mostly connected via/to Smartphone

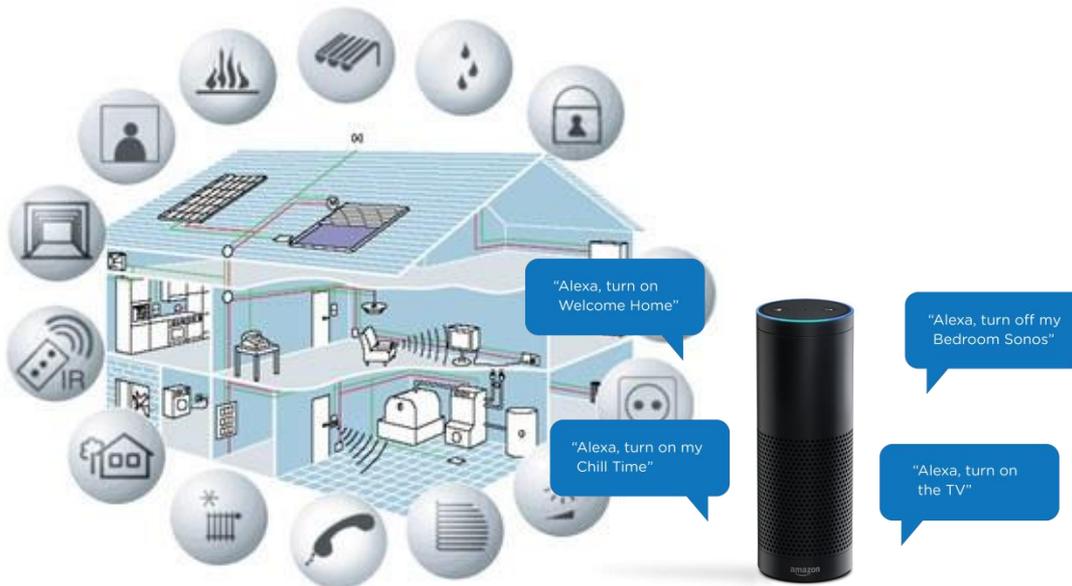


Local Area Network (LAN)

Mostly indoor

Connected to mains
Smart home appliances

Range (up to 100 meter, line of sight)

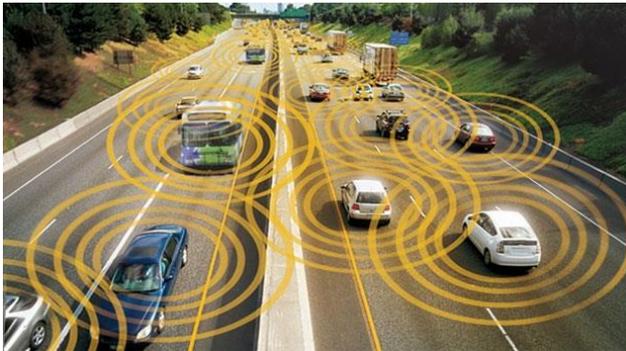


Wide Area Network (WAN)

2 Categories:

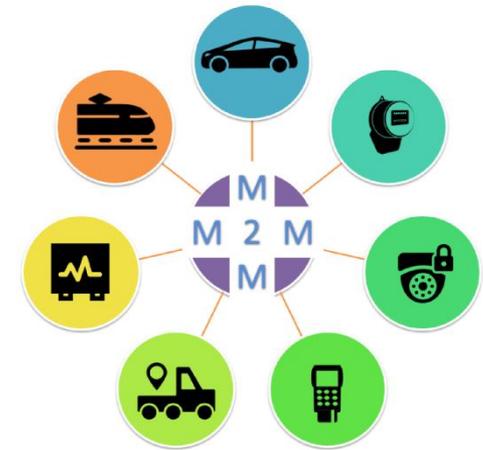
High power demand

- 2G/3G/4G mobile telephone network (also called M2M-network)
(not really the right choice for battery power)



Low power demand

- Sigfox
- LoRa
- NarrowBand-IoT



Global Area Network (LAN)

ANY place on the planet

Satellite-telephony

2 Categories:

Geostationary

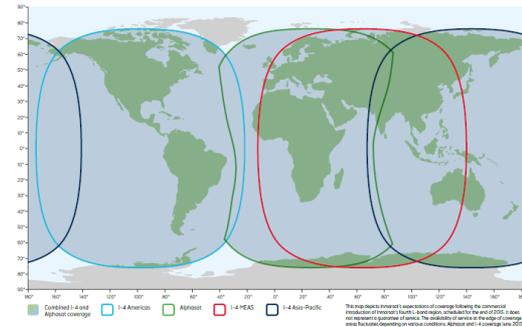
Inmarsat (higher orbit, more power, bigger antenna –dish-)

Low Orbit

Iridium (low power, moving satellite.. Coverage?)



I-4 and Alphasat coverage



To deploy all kind of sensors in an easy and flexible way we need to be independent of power.. this means batterypower or solarpower.

LPWAN-solutions a capable of operating on a battery for 5-10 years if the informationpackets are small and messages are not to frequent.

For example: Smart Streetlights, Smart Parking, Smart wastebins, etc. (they don't have to update the information every 5 seconds and it is not a real problem is sometimes a message does not get delivered)

Lets look at the "playingfield".....



Type: LPWAN

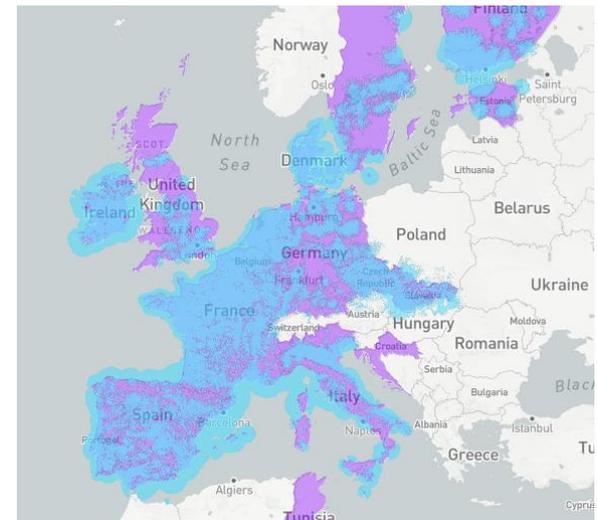
The very first LPWAN

Use 868MHz in EU

(free regulated frequency, max output power 25mW, 1% duty cycle)

- Uses its own antennas (gateways)
- Small datapackages = 12 bytes
- Limited amount of messages = 140 per day
- Only one way messaging

Low Module cost, you pay a monthly fee





Type: LPWAN

Use 868MHz in EU

(free regulated frequency, max output power 25mW, 1% duty cycle)

- Uses its own antennas (gateways connected to the internet)
- Datapackages = 51 bytes
- Amount of messages = 300 per day
- Two way messaging
- Telephone companies adopt standard
- Community Networks (The Things Network)
- Private Network

Medium Module cost, no monthly fee (for private & community network)

NB-IoT

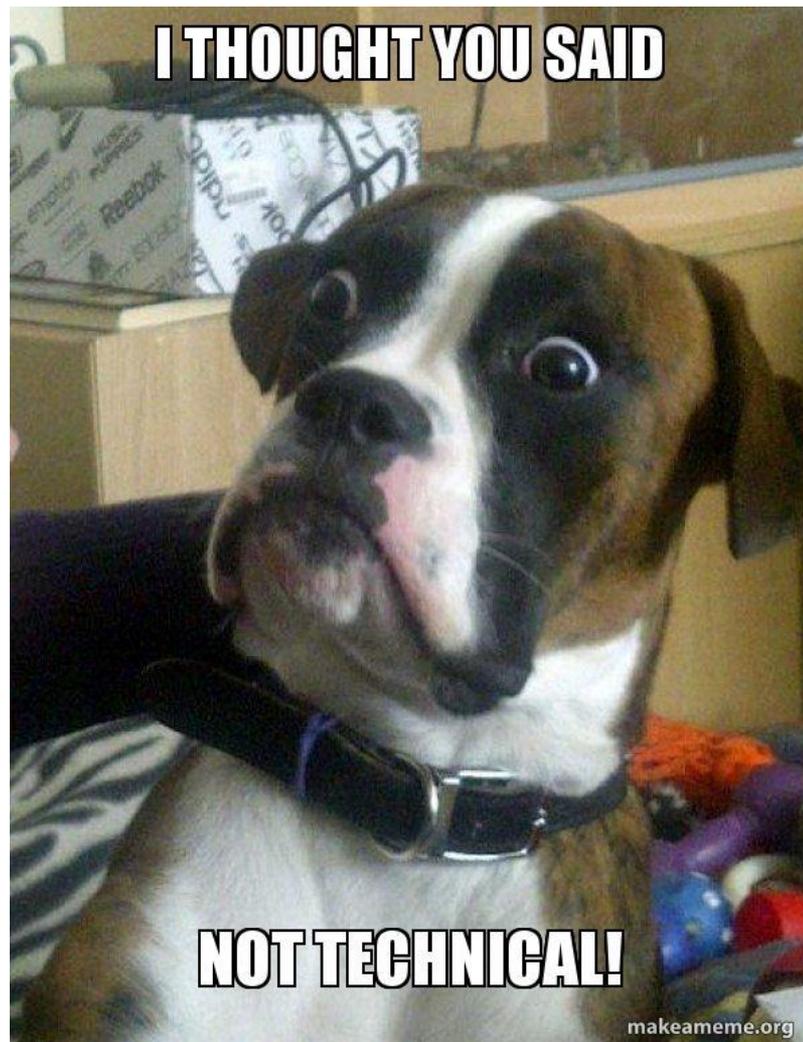
Type: LPWAN

Operates in licensed spectrum payed for by telephone companies

Same coverage as Smartphone (uses the same antenna/tower)
Less range than Sigfox and LoRa but in cities more antennas.

- Datapackages = 500 bytes
- Amount of messages = unlimited (because pay per message)
- Two way messaging
- Over 4G hardware

Medium High Module cost, pay per message to Telecom
(very young but implementation CAN be fast)



To make it a bit simpler:

If you need really **low power**: LoRaWAN
(battery-life 5-10 years)

If you need **low cost**: LoRaWAN
(build a private network or use a community network)

If you need to be **absolutely sure the message arrives**: NB-IoT
(mission critical messages like: *FIRE!*)



The Things Network (TTN)

LoraWAN-Network can be used without Wifi-password,
no subscription, zero setupcosts



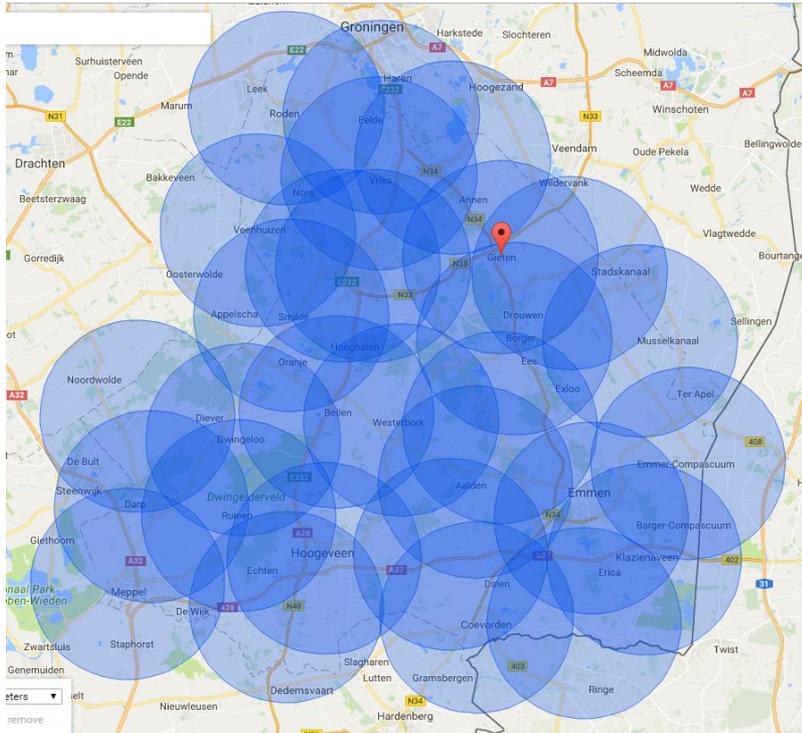
Low costs

Because the reach is very high and the cost of the equipment is low, covering an entire city can be done with a small investment.

The city of Amsterdam was covered with only 10 gateways at the cost of 1200 dollars each. (today 250€ per gateway which an service up to 10.000 devices)

Community driven

Crowdsourced in 400+ Cities in 80+ countries HQ Amsterdam



In Holland the whole province of Drenthe is covered with LoraWAN in the next 2 months.



More than 500.000 citizens and 10.000's companies (2700km²) get free acces to The Things Network. Stimulating innovation and improving competetivenes for a TOTAL cost of less than 100K€ !!



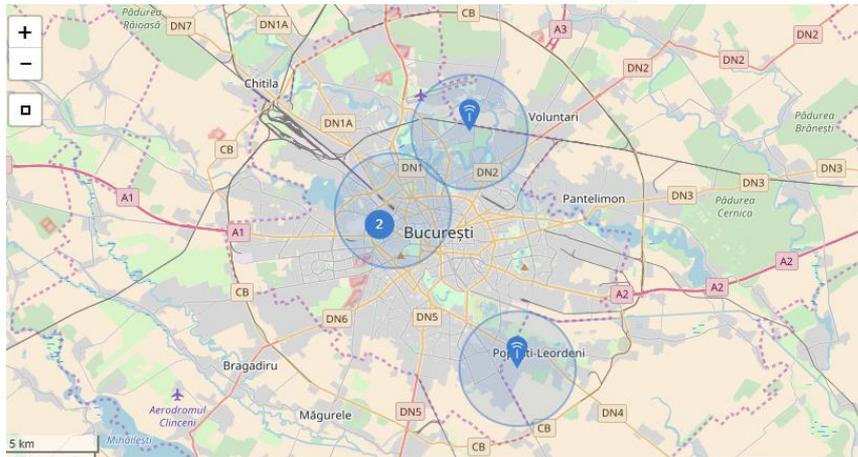
Because citizens in Bucharest already made a start!

Bucharest!

OUR STORY

Building an IoT data network and creating the infrastructure for the soon-to-be smart city of Bucharest!

1. Create a core community.
2. Start the coverage - at least one gateway per core community member.
3. Create awareness for the project while enlarging the community.
4. Raise the issue in front of the Mayor of Bucharest.
5. Update the action plan while getting support.
6. Make things happen!



to build a global open
net of Things data network.

and creating the infrastructure for the soon-
t!

mainly consisting of promoters.

A project while enlarging the community.

CONTRIBUTORS

The Core Team of
Bucharest consists of:



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RULER



Adrian Lita

HARDWARE
GURU



Mihai
MICULESCU
INITIATOR

<https://www.thethingsnetwork.org/community/bucharest/>



IOT NEDERLAND

“Don't tell me
the sky's
the limit
when there are
footprints on the moon.”



In developing the smart cities of the future
the only boundary we will encounter is our lack of imagination.

Mulțumesc mult

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