DIEHL
Metering

mioty: The technical details behind the upcoming success

LPWAN Days 2025

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Rennes, 04.07.2025

Agenda

01 | mioty: more than a physical layer

02 | mioty: flexibility and adaptability

03 | Use-case Smart-Metering

04 | Use-case Smart-Industry

05 | What next?

01 | mioty: more than a physical layer

mioty® physical layer: the Massive IoT enabler

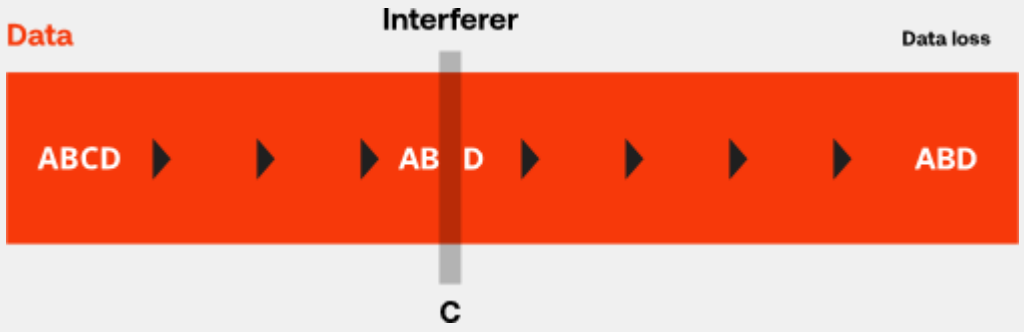
Connectivity rethought – Future-proof IoT

mioty

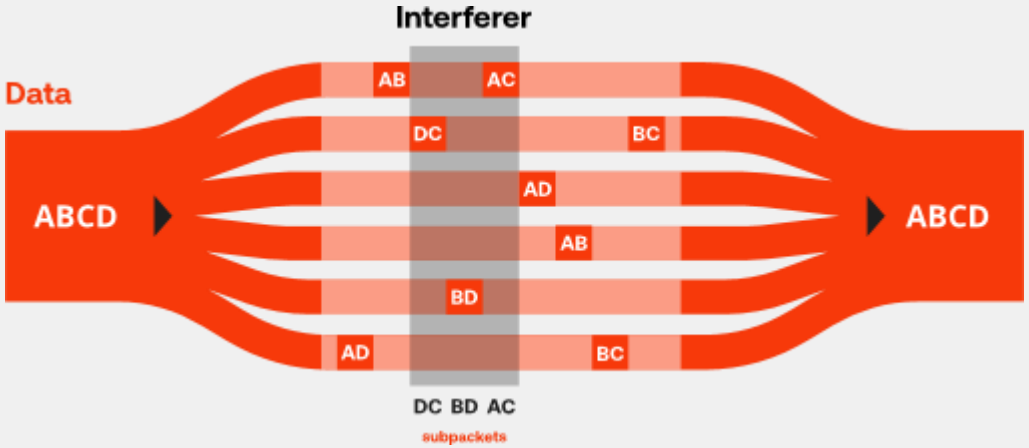
Connectivity technology for low power wide area networks (LPWAN) with significant advantages compared to competing solutions

- **Extremely high range:** up to 15km
- **Extremely energy efficient:** up to 20 year battery lifetime
- **Extremely scalable:** >3.5 million messages per day and base station
- **Extremely robust:** 99% transmission reliability in non-exclusive frequency bands
- **Extremely flexible**: vendor-independent open international standard (ETSI)
- **Extremely cost efficient:** up to 50% less network total cost of ownership (TCO)

Legacy LPWAN technology



mioty® with patented „telegram splitting"



mioty: the MAC layer

mioty fixed MAC

On top of the physical layer, the mioty standard specifies a MAC layer:

- EUI64 or short ID (2 bytes with collisions)

  ⇨ **Confidentiality**

- AES encryption with network key and (optional) application key

  ⇨ **Privacy**

- CMAC for content signature

  ⇨ **Authentication & Integrity**

- Payload from 1 to 254 bytes

  ⇨ **Scalability**

mioty: the MAC layer

mioty fixed MAC

- OTAA with dynamic key handling
  - Message acknowledgement (Uplink and downlink)
    - On edge processing for easy filtering and bandwidth optimization
      - Link adaption messages

02 | mioty: flexibility and adaptability

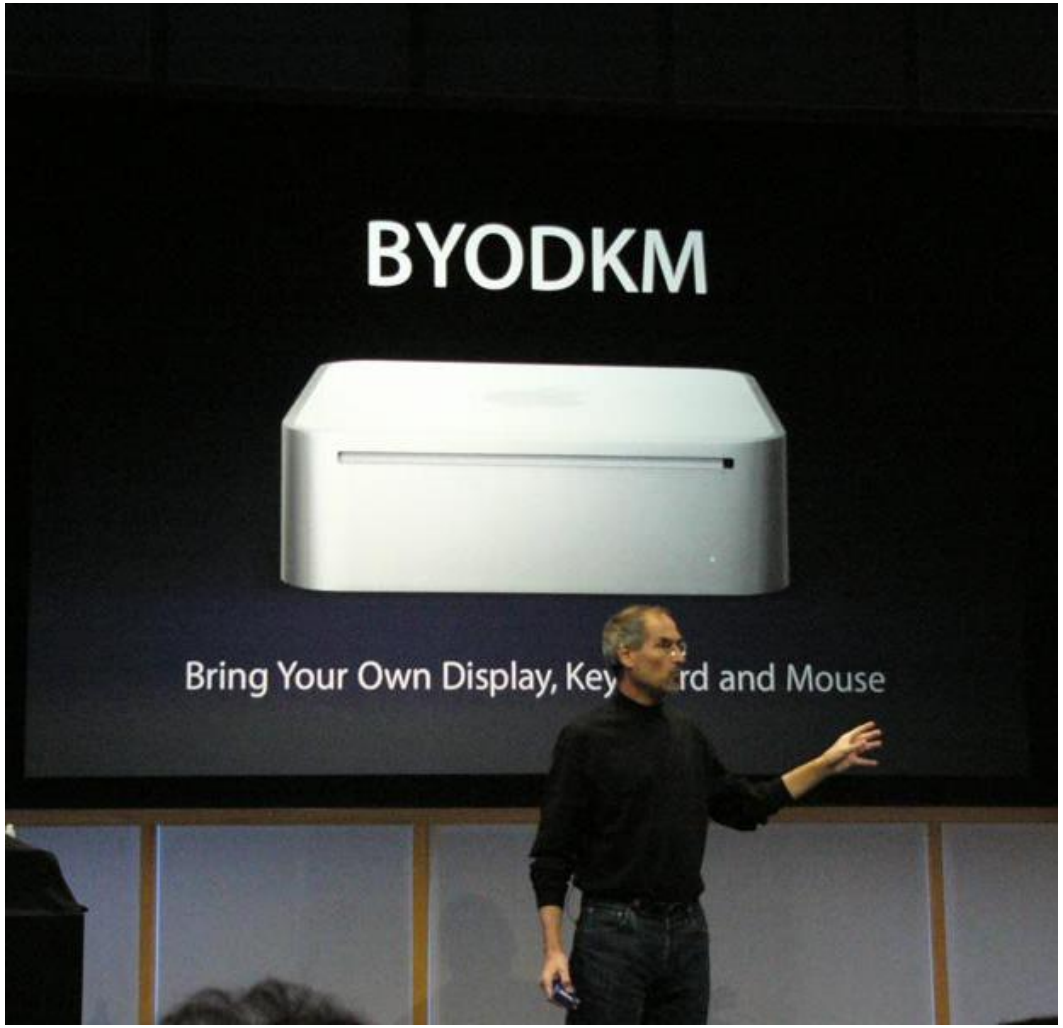
mioty: flexibility

mioty fixed MAC

- Unidirectional device with pre-attachment
  - Unidirectional device with OTAA
    - Bidirectional device
      - Unicast, multicast or broadcast downlink operations (E.g.: for Timesync, FUOTA…)
        - Optional MPF byte (MAC Payload Format)
          - Optional Application layer encryption (E.g.: to reuse the application encryption of the payload type used

Steve Jobs shows the Mac mini

Bring Your Own Display, Keyboard and Mouse…



We don’t start from 0!

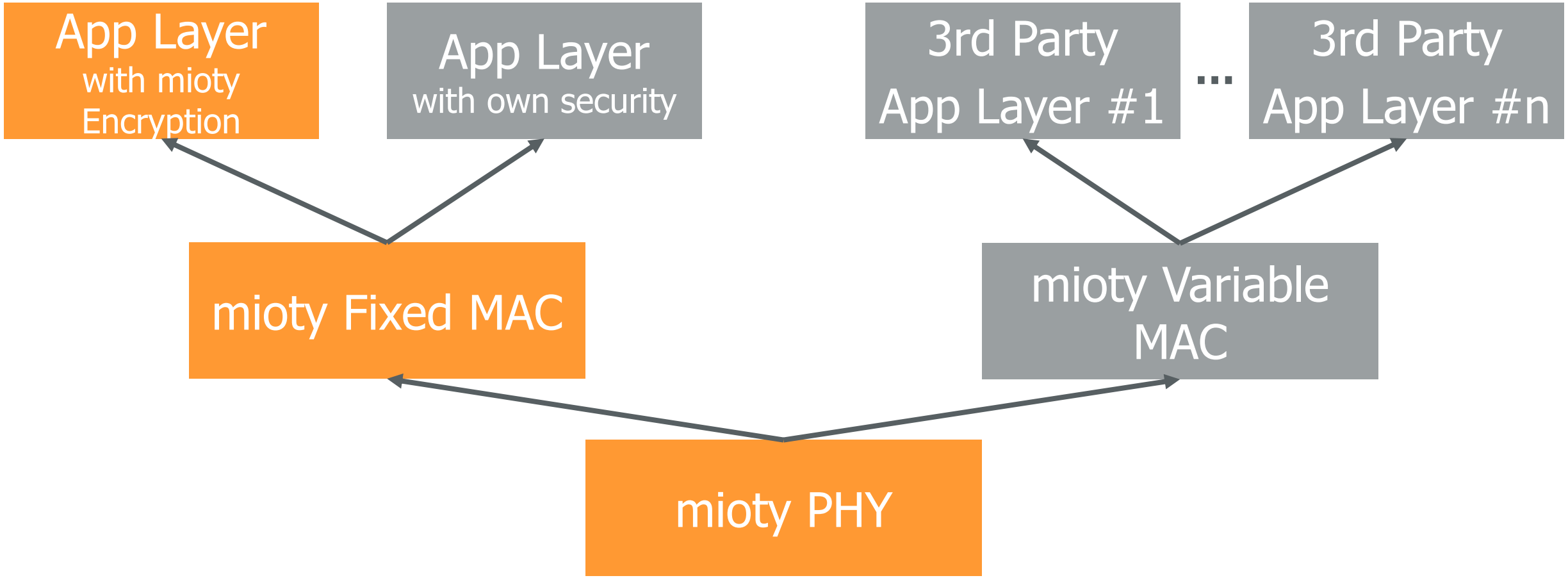
There are already standard used in the field…

If you need / use it:

Bring Your Own Standard!

mioty: adaptability

mioty variable MAC



03 | Use-case Smart-Metering

Use-case Smart-Metering

Existing standard

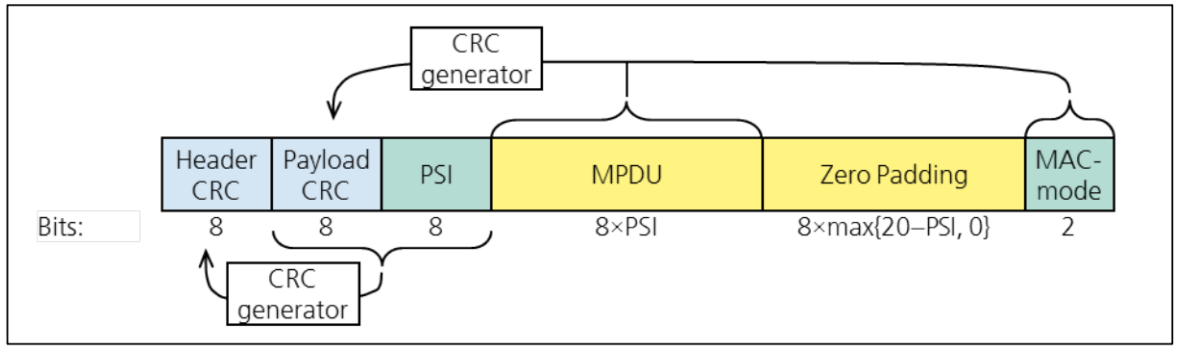
- There is already a standard for Smart-Metering defined by the OMS group:
  - Key handling with role management
  - Key exchange / registration process
  - Data encoding / encryption
  - Alarming
  - Standard downlink commands (E.g.: Timesync)
- Utility already have infrastructure compliant with the OMS standard
- If you comply to the OMS standard, your system is considered as compliant with security standards (E.g.: German BSI compliancy)

OPEN METERING SYSTEM GROUP

⇨ JUST REUSE IT!

Use-case Smart-Metering

mioty4OMS



Uplink payload structure on the physical layer

MAC-mode bits:

- 00 indicates the fixed MAC-mode (fixed by the TS-UNB specification)
- 01 indicates any other MAC-protocol. This mode is called the variable MAC-mode.

Example of mioty4OMS MPDU (MAC Packet Data Unit)

MAC-Type 0x02: OMS Frame Format C

OMS Address

OMS encrypted payload

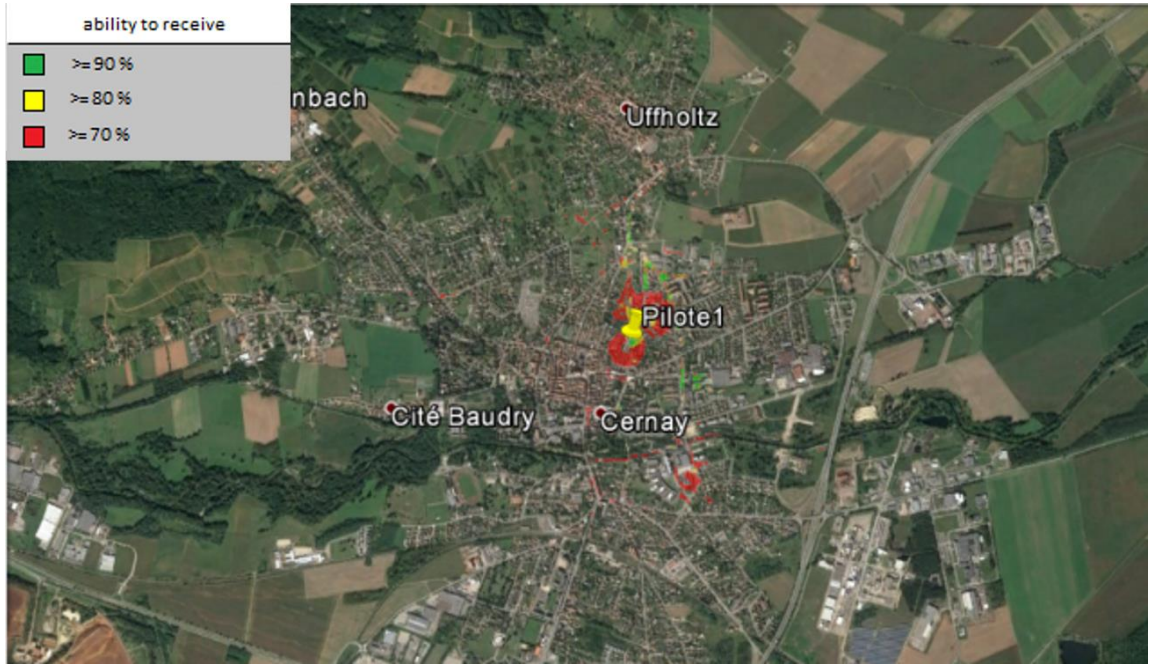
OMS CRC

OMS Frame Format C Header

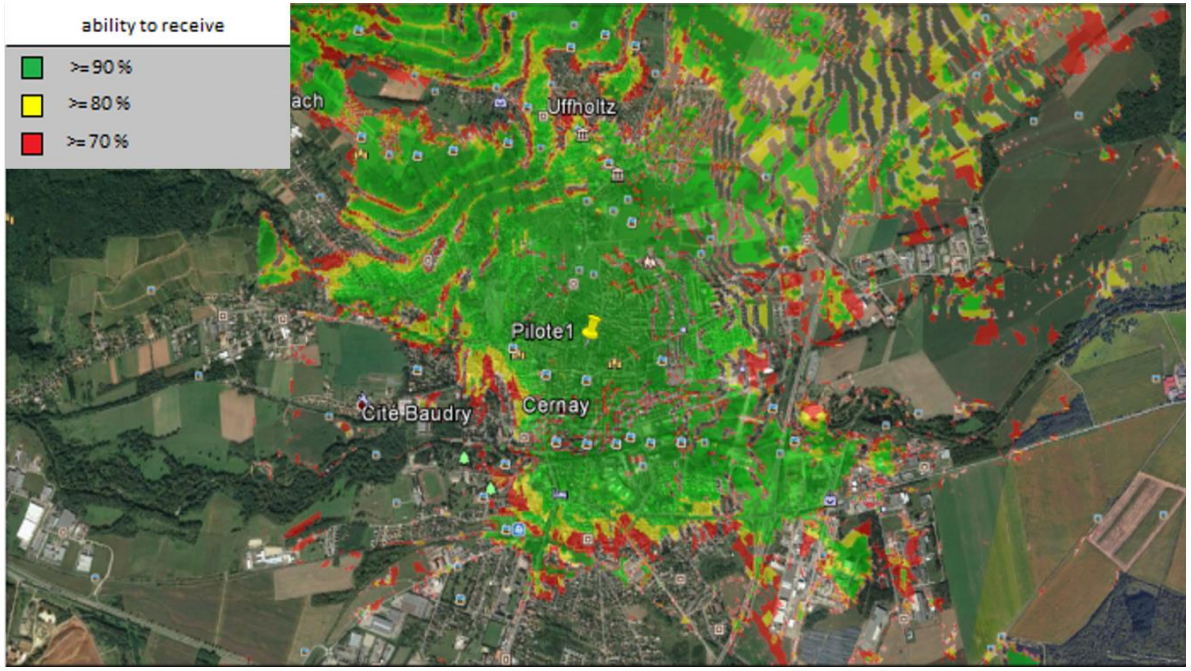
```
02 00 4B 44 A5 11 01 22 22 22 12 07 E0 90 0F 00 2C 25 39 BD 45 00 A8 C1 56 AC
76 AF CF 64 7A 55 2B 42 07 10 5F 81 8D 17 18 42 09 36 DA 67 80 FA 9B E9 14 9E
30 1D 8A 8C 33 5C FF 26 07 34 59 31 7D 5B AF F1 54 B7 CD CD C5 FB 8D AF E1 C4
B9 1C 8C 59 CC BE 83 32 B7 86 8C 94 C1 F6 7D 96 BF 39 03 99 DD C2 37 3B 0F CE
```

Use-case Smart-Metering

Range consideration



OMS v4 range



OMS v5 Split Mode range

OMS v4 + high range = new OMS v5 Split Mode = mioty PHY + OMS MAC

Use-case Smart-Metering

Product and possibilities

➢ mioty® offers the best ratio “Watt / bit” on the market for LPWAN technology

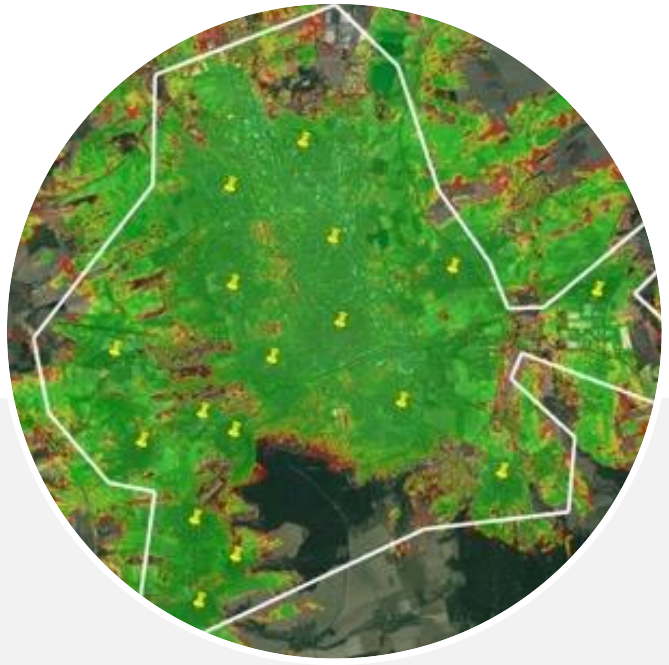
Example: a meter radio clip-on can provide :

- OMSv4 (T-mode) frames every 12s for mobile reading (walk by / drive by)
- mioty® based fixed network (with up to 11km range!) hourly reading
- 12 years lifetime

And all of this, with only 1x AA cell!

Real World Example: Smart Metering in Erfurt

OMS v5 / mioty



- High scalability
- High service level
- Low maintenance cost

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Gateways

with up to 22,000 nodes / gateway

30,000
Meters

deployed with mioty4OMS

60,000
Sensors

in deployment…

without impact on the infrastructure!

04 | Use-case Smart-Industry

Use-case Smart-Industry

IO-Link and Smart industry

IO-Link

IO-Link, as industry standard, is now available over mioty physical layer

05 What next?

LoRaWAN & Migration scenario

Other well-known application layer

LoRaWAN is also an existing technology… ☺

Why not **LoRaWAN over mioty**?


THANK YOU

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