MY IOT with mioty®

low-power wide-area network for the internet of things…

mioty®

a low-power wide-area network (LPWAN)

Fraunhofer IIS

Fraunhofer Institute for Integrated Circuits IIS

- Mioty® is a IoT-protocol developed by Fraunhofer IIS (Erlangen Germany)
- HKA cooperates with Prof. Dr. Jörg Robert who was one of the developer at Fraunhofer IIS
- It uses wireless low-power wide-area network
- Video on mioty: https://youtu.be/8cpSM6CvXtA

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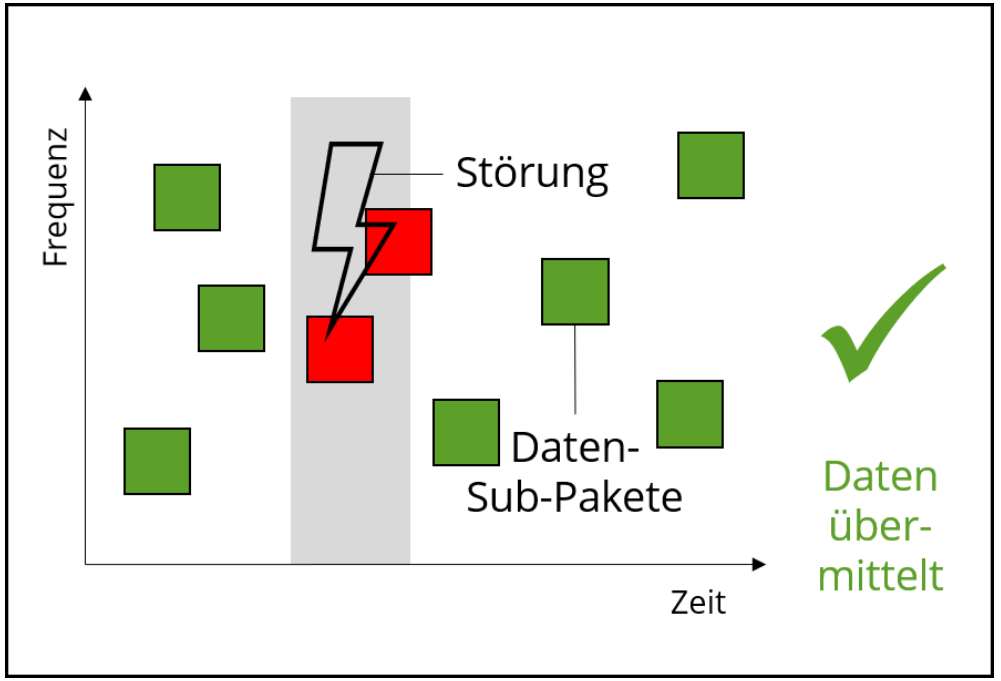
a low-power wide-area network (LPWAN)

Key Features:

- Low Power
- Long range up to 5 to 15 km
- Moving clients (sensors) possible (up to 120 km/h)
- License-free spectrum (868 MHz band Europe, 916 MHz band North America)
- Special Feature: robust to interferences and packet collisions due to telegram splitting - sends data in small sub packets in predefined time and frequency pattern



Picture: https://www.stackforce.de/de/portfolio/technologien/mioty

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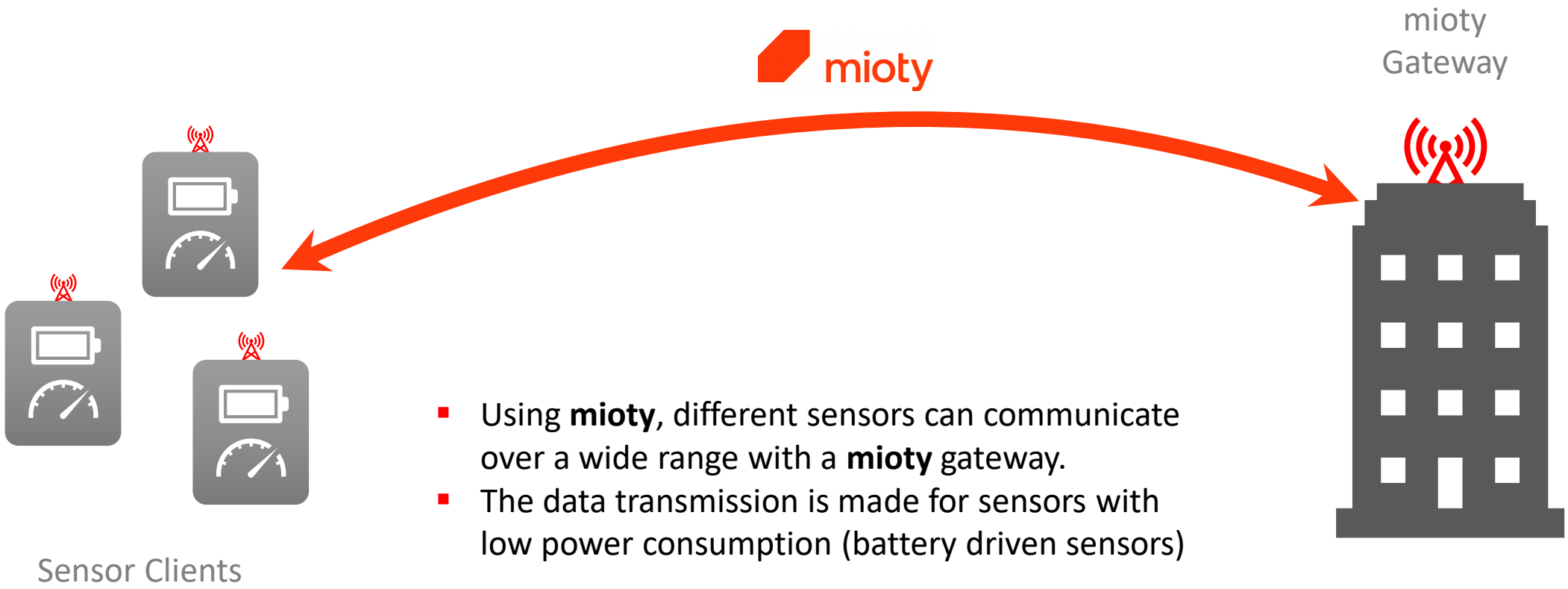
a low-power wide-area network (LPWAN)

- Schematic overview



- Using **mioty**, different sensors can communicate over a wide range with a **mioty** gateway.
- The data transmission is made for sensors with low power consumption (battery driven sensors)

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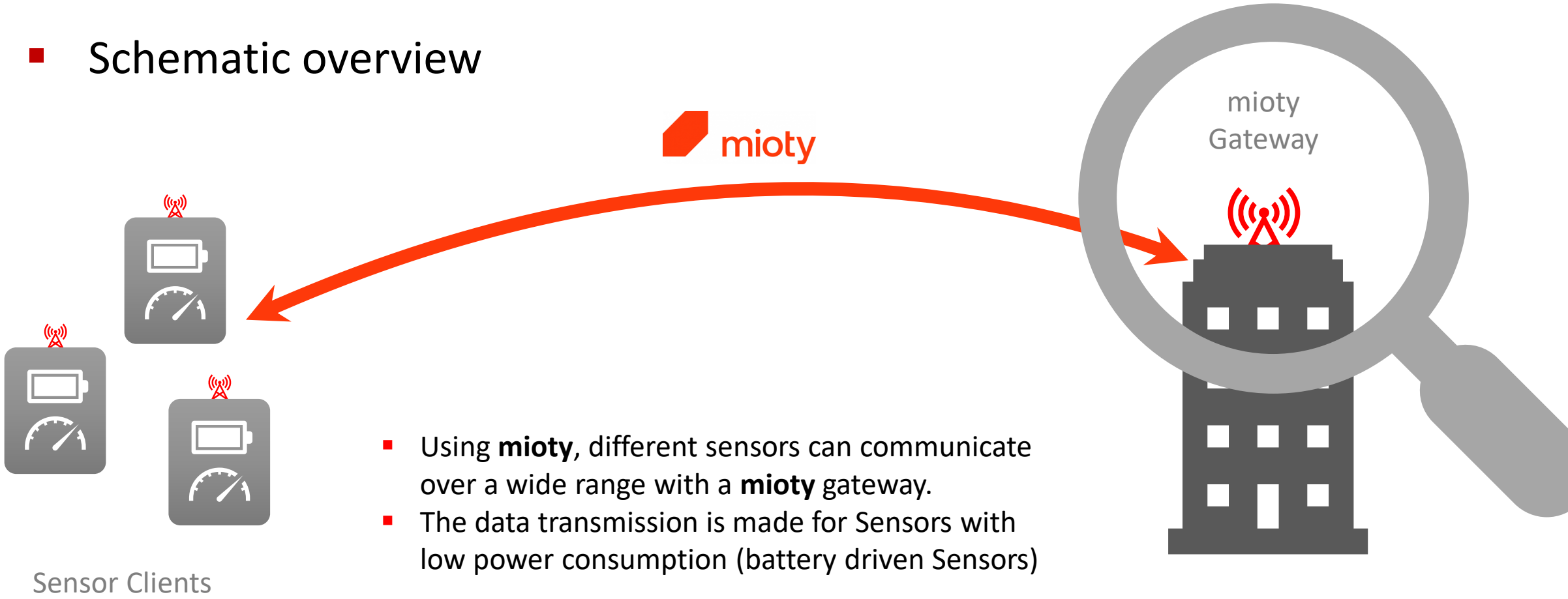
- Schematic overview



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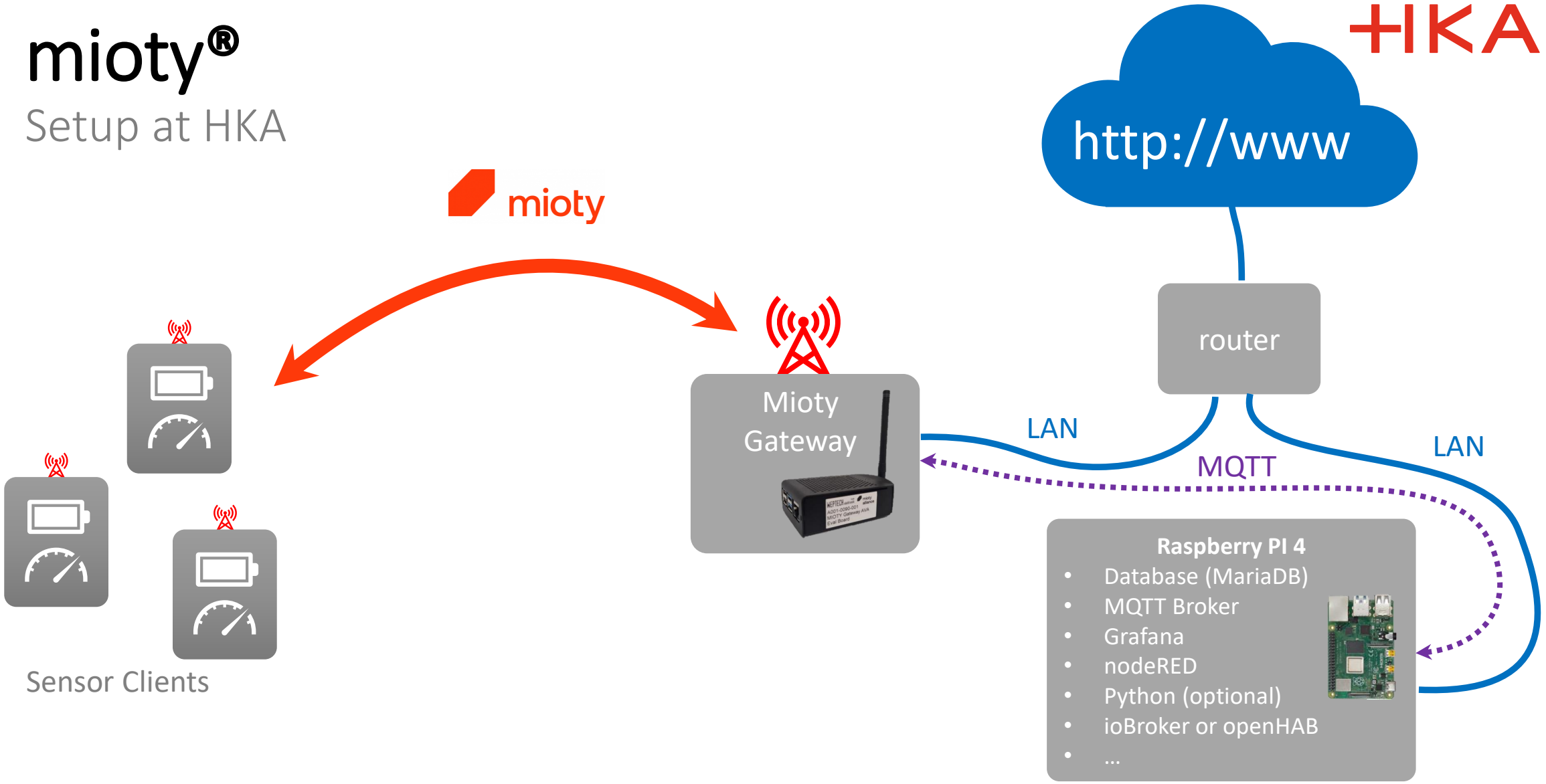
Setup at HKA



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Setup Example

Picture Source:
https://www.stackforce.de/de/produkte/hardware/wireless-m-bus-lpwan-bridge

- Sensors can communicate uni- and bidirectional using mioty
- Mioty gateway and transmitter can be purchased (i.e. at Webtech)
- Both are suitable for Europe (868 MHz band) and Noth America (916 MHz band) without hardware change

MCU (UART / API)→

Transmitter

unidirectional →

mioty

← *bidirectional*

mioty-Gateway

TCP / IP ↔

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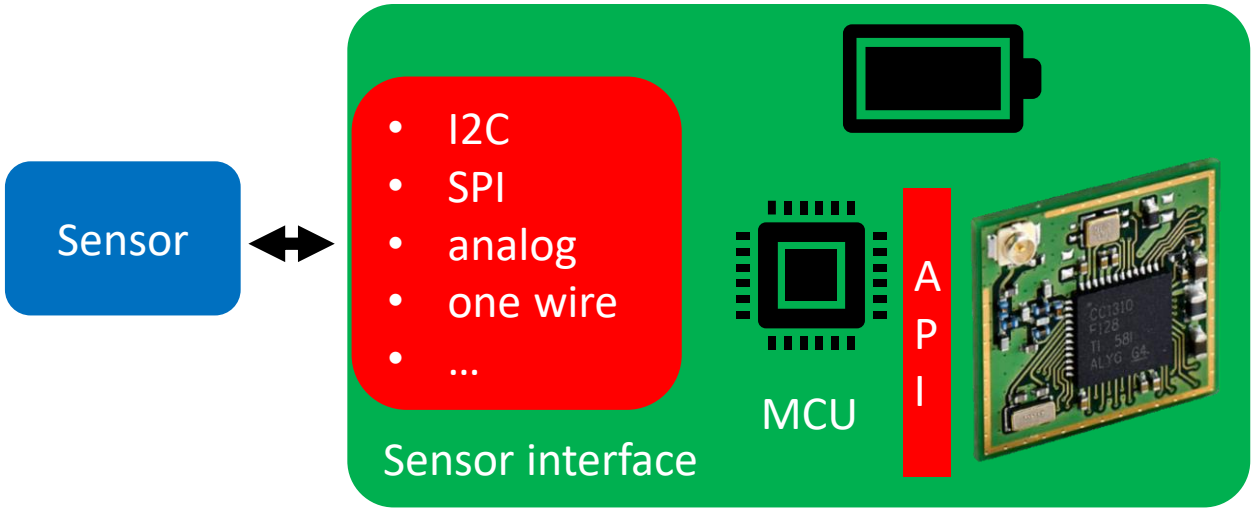
Unversal Sensor Board for bidirectional communication

- The sensor should have less power consumption than the transmitter
- Powered through batteries or harvester
- If there is an actuator, use a different technology



Picture Source: https://www.stackforce.de/de/produkte/hardware/wireless-m-bus-lpwan-bridge

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Thank you!

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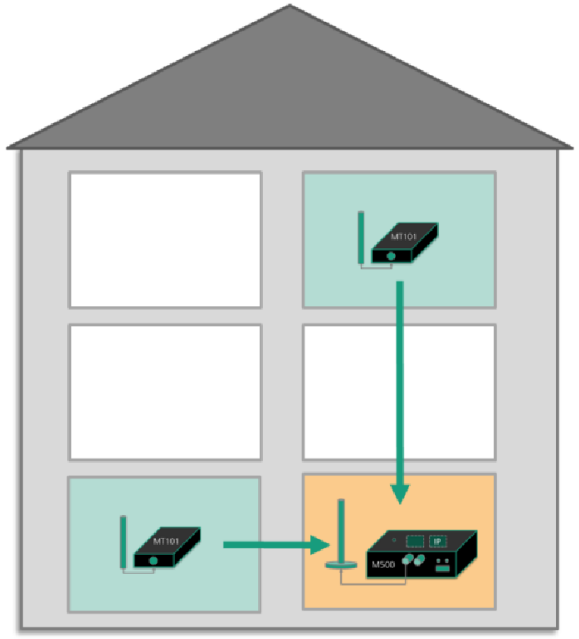
Indoor



Number of floors	same floor	+ 1	+ 2	+ 3	+ 4
Open-plan office building (fig. 1)	>200 m	>200 m	>200 m	>200 m	
Building with small rooms and many heavy walls (fig. 2)	60 m	50 m	40 m	35 m	32 m

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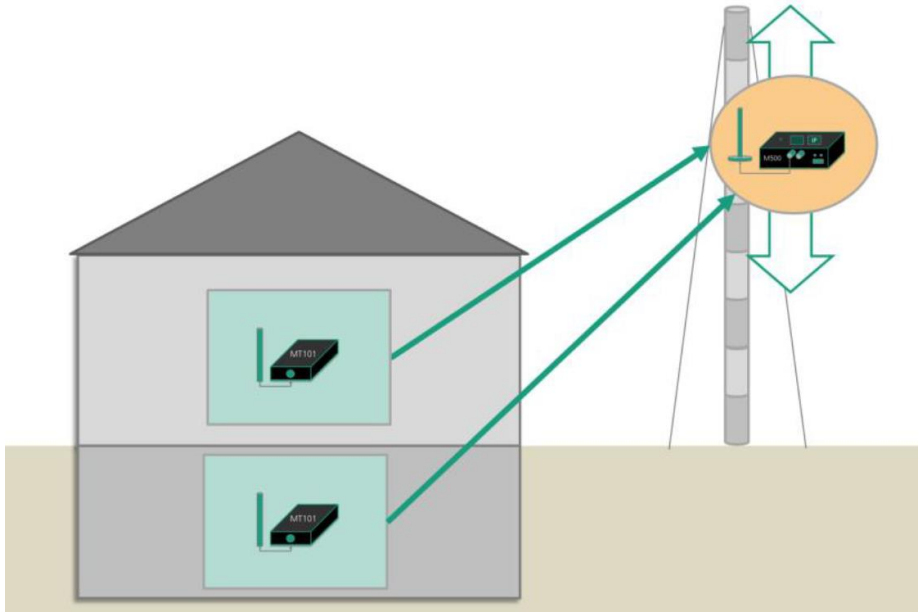
Indoor/outdoor



Receiver position	on rooftop (13 m) (fig. 3)	on tower (25 m) non-line-of-sight to building (fig. 4)	on tower (25 m) line-of-sight to building (fig. 4)
Transmitter at or above ground floor	> 200 m	400 m	1800 m
Transmitter in cellar room (below street level)	130 m	150 m	250 m

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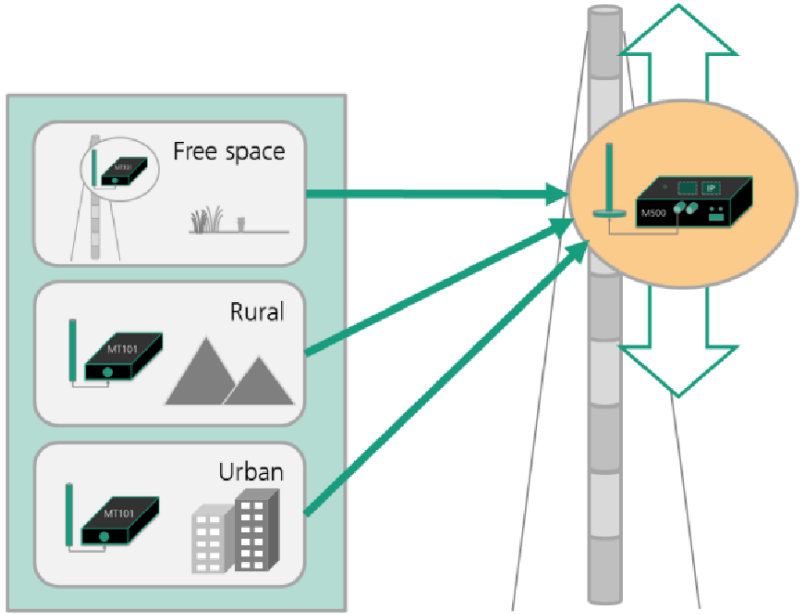
Outdoor



Receiver position	on rooftop (13 m) (fig. 6)	on tower (30 m) (fig. 7)	on tower (50 m) (fig. 8)
Free space		> 25 km	> 30 km
Rural		> 10 km	> 15 km
Urban	1.8 km	6.8 km	9.0 km

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Data

Uplink transmission rate for end point duty cycle of 1%		
Message size	**On-air time**	**No. of messages per hour**
10 Byte	363 ms	99
50 Byte	968 ms	37
200 Byte	3236 ms	11
Downlink transmission rate for base station duty cycle of 10%		
Message size	**On-air time**	**No. of messages per hour**
ACK only	106 ms	> 80.000
ACK + 10 Byte Data	398 ms	> 20.000
ACK + 50 Byte Data	1059 ms	> 8.000

Message size	**On-Air-time**	**Charge**	**Reporting rate***
10 Byte	363 ms	5 µAh	1 Message every 15 min
50 Byte	968 ms	13,5 µAh	1 Message every hour
200 Byte	3236 ms	45 µAh	1 Message every 2 hour
*Assumptions: TX current: 45 mA; Sleep current: 2µA; Battery Self Discharge: <1% per year			