



Mioty vs LoRaWAN – On Site Field Test

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Grenoble SubGhz potential Users



Per'Gras

Orange
Labs

Semtech

STMicro

C.E.A

Wirepas

Campus
(Didier Donsez)

Schneider

Welcome to electropole (EQI)

The building



Aerial view



External view

Welcome to electropole (EQI)

Inside the building

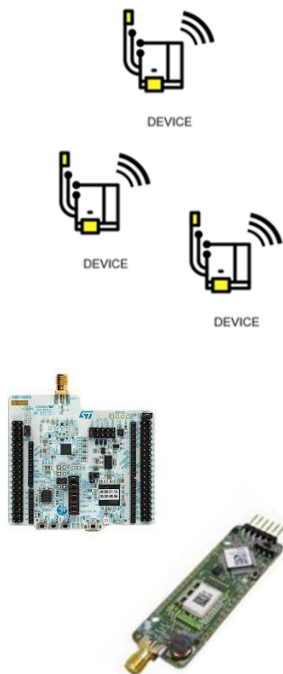


The Avenue

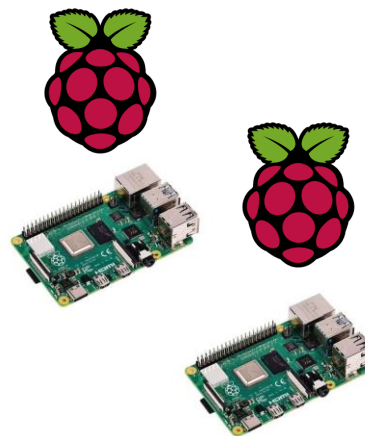


Open space

EQI Test Architecture



Network Servers



- Data storage



Grafana

- Data visualization

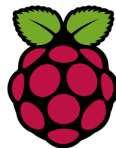


python

- Data analysis

EQI Test Setup

Gateways + servers



Mioty servers



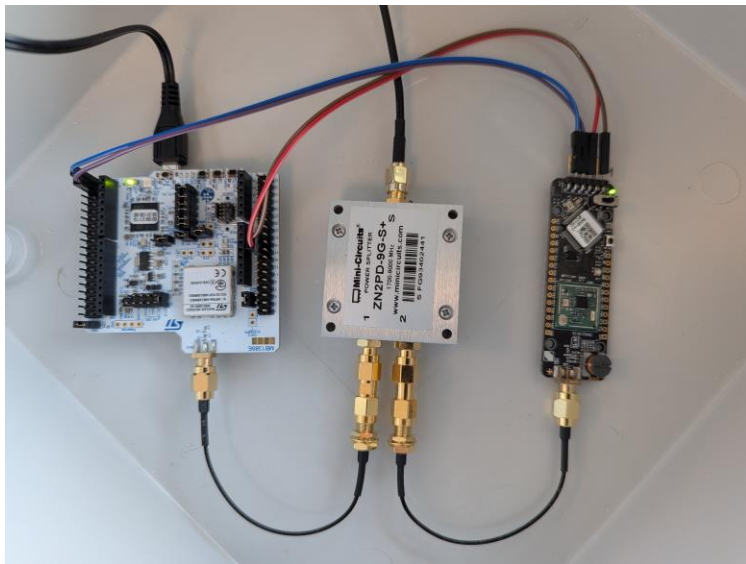
LoRaWAN servers



- LoRaWAN
 - Multitech MTCAP (-137dB to -140dB)
 - Chirpstack LNS (4.0) on Raspi #1
- Mioty
 - Swissphone gateway (-137dB)
 - Swissphone Network Server on Raspi #2
- Same antenna after a Power Splitter
 - Same propagation path

EQI Test Setup

End devices



- Same antenna → same propagation path
- Same Tx Power after the splitter (~8dBm)
- Transmission every 30s alternately
- Transmission triggered by the STM32 board to avoid simultaneous transmission
- LoRaWAN
 - STM32 WL55
 - No repetition
 - ADR ON (SF only)
 - LoRa Node V1.0.4 / regional 1.0.2revB
 - Unconfirmed frames / No ACK
- Mioty
 - LZC board with TI CC1310 chipset
 - Stack Fraunhofer BIDI v2.4.0
 - Unconfirmed frames / No ACK

Gateways / Devices boxes



Gateways box



Devices Box

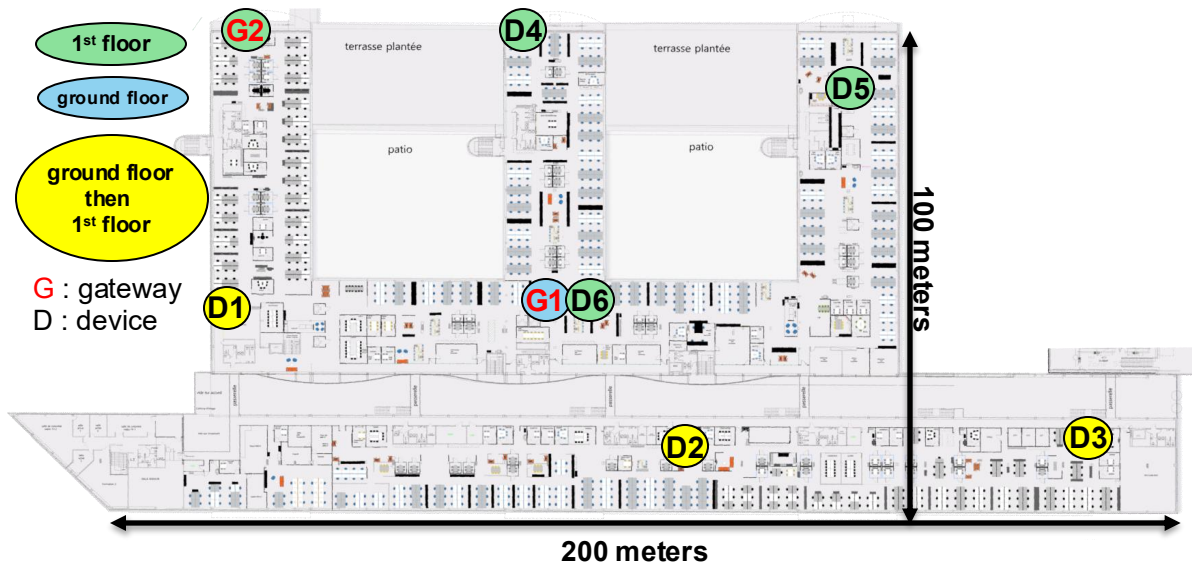
Setup #1 – Dual Gateway

Mioty

LoRa

	Box	1		2		3		4		5		6	
1 st floor	PER	0%	0,70%	0,01%	1,28%	1,31%	10,73%	0,01%	0,66%	0,01%	2,51%	0%	1,15%
	PER 3 retries*	0%	0%	0,001%	0,01%	0,11%	0,86%	0%	0%	0,001%	0,05%	0%	0%
Ground floor	PER	0%	10,98%	1,19%	29,54%	0,04%	14,92%						
	PER 3 retries*	0%	0,73%	0,10%	3,27%	0%	1,67%						

* by derivation



- 10 bytes payload
- Between 50k et 100k frames
- Transmission every 30 seconds
- LoRaWAN devices in SF7 (ADR only SF)
 - Box 3 : 25% SF8, 75% SF7
 - Box 2 : 50% SF8, 50% SF7
- Mioty almost perfect without repetitions
- LoRaWAN almost perfect with repetitions

Setup #2 – Single Gateway

Mioty
LoRa

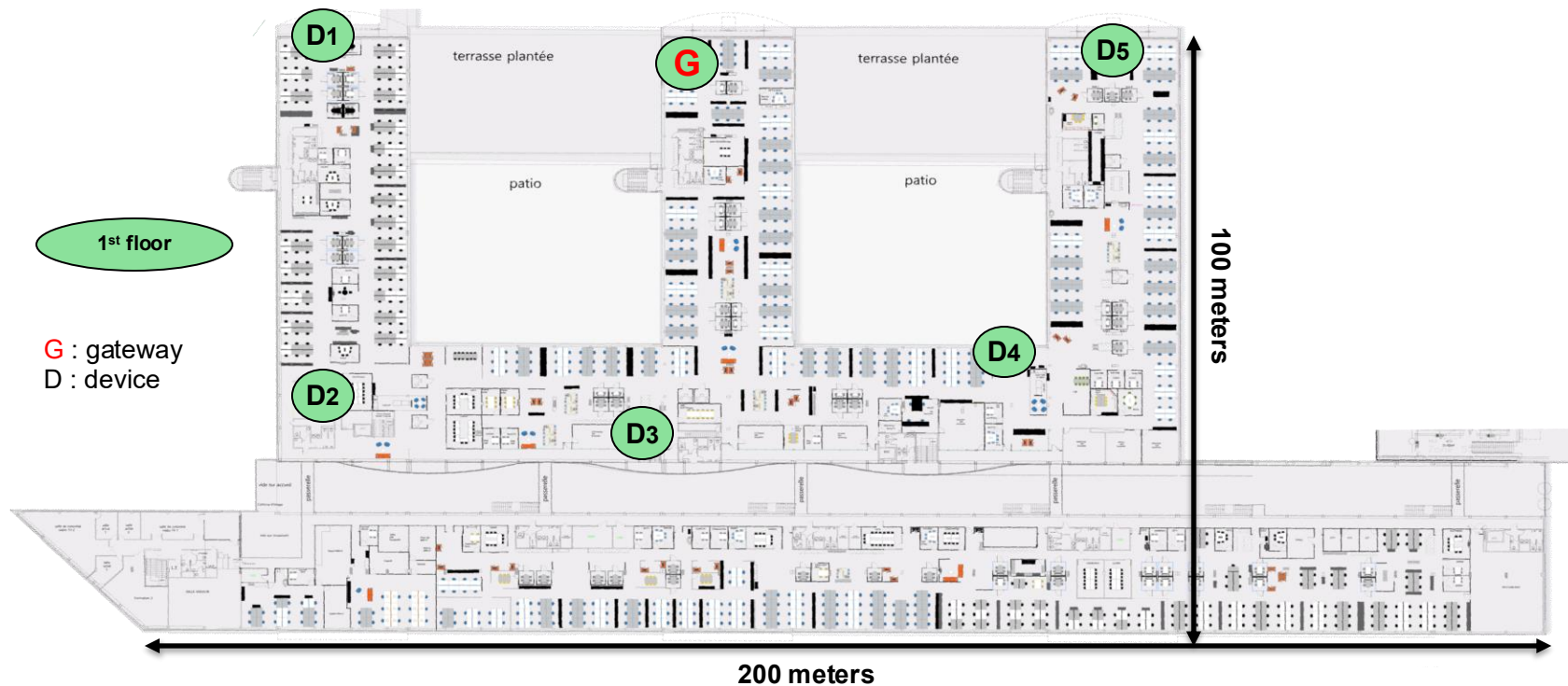
Box	1		2		3		4		5	
PER	0,12%	19,80%	0%	4,18%	0%	36,58%	0%	6,26%	0,02%	4,95%
PER 3 retries*	0,007%	5,05%	0%	1,16%	0%	13,46%	0%	1,41%	0%	1,43%

* by derivation



- 10 bytes payload
- ~ 15 000 frames
- Mioty almost perfect
- LoRaWAN PER drops with repetitions
- Single gateway :
 - LoRaWAN important impact
 - Mioty no difference

Setup #3 – LoRaWAN SF diversity



Setup #3 – LoRaWAN SF diversity

- LoRaWAN :
 - 10 uplinks on each SF (SF12 to SF7)
 - ~ 1 500 uplinks on each SF
 - nb transmission = 3
- Mioty unique uplink
- 10 bytes payload

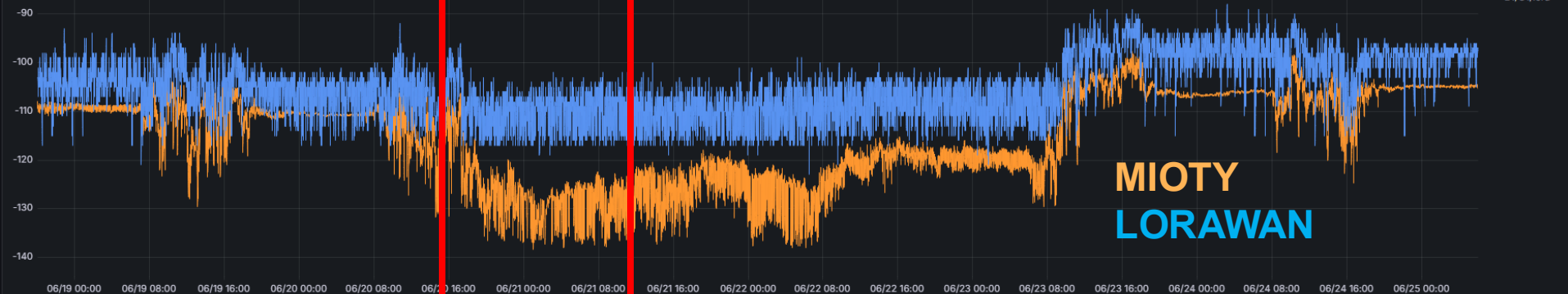
Mioty
LoRa

	Box 1	Box 2	Box 3	Box 4	Box 5
SF12	0,15%	3,86%	0,99%	2,42%	0,23%
SF11	0,15%	2,95%	1,06%	2,20%	0,30%
SF10	0,45%	4,92%	1,06%	2,95%	0,53%
SF9	0,15%	4,17%	1,36%	3,56%	0,76%
SF8	0,83%	3,72%	1,29%	3,51%	0,53%
SF7	0,08%	5,95%	1,37%	5,92%	0,53%
Mioty	1,67% *	0,06%	0,00%	0,15%	0,01%

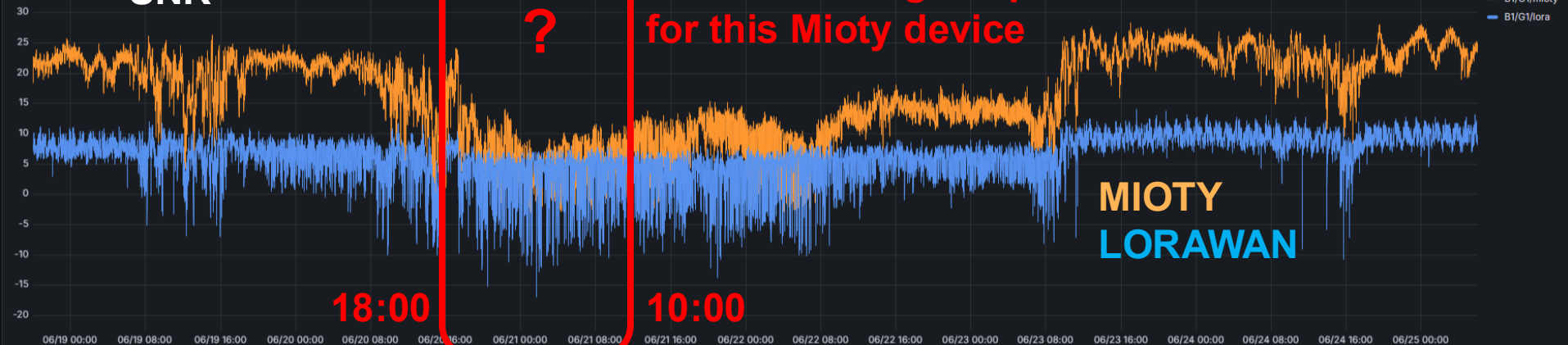
* 97% of the frames lost occurs in the same 8 hours window
If we remove this window we drop the PER to 0,25%



RSSI



SNR

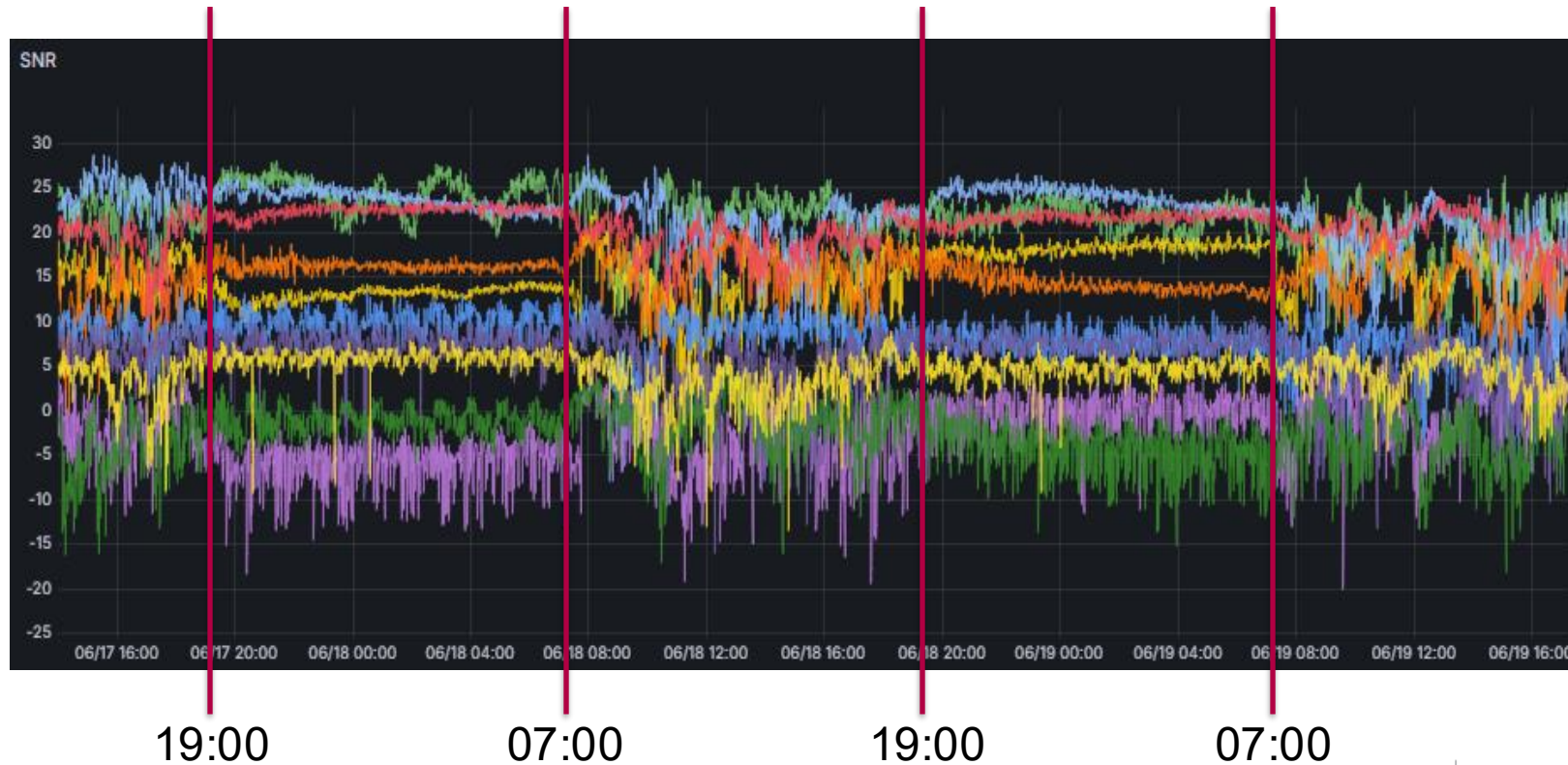


LoRa RSSI & SNR per SF

Box #3 RSSI & SNR remain stable over Spreading Factor



SNR trend for 2 days (Mioty & LoRaWAN)



SNR trend for 2 days (Mioty & LoRaWAN)

Box	Period	PER	PER diff	PER	PER diff
Box 1	day	0,34	0,09	0,05	-2,88
Box 1	night	0,25		2,93 *	
Box 2	day	4,51	0,66	0,03	0,03
Box 2	night	3,85		0,00	
Box 3	day	1,46	0,62	0,00	0,00
Box 3	night	0,84		0,00	
Box 4	day	3,70	0,81	0,00	-0,10
Box 4	night	2,89		0,10	
Box 5	day	0,55	0,28	0,00	0,00
Box 5	night	0,27		0,00	

* Mioty bad night

Technical Conclusion

	LoRaWAN	MIOTY
PER (Packet Error Rate)	Higher but repetitions can significantly reduce it	Very low No built-in repetition mechanisms
Spreading Factor	Allow decoding in the noise ADR algorithm / network diversity	---
Telegram Splitting	---	Very resistant to interference Allow very high scalability
Time on Air	Equal to radio time Depends on SF	Total transmission time is high
Power consumption	Better at SF10 and lower ADR algorithm	Telegram Splitting bursts are very effective for Energy Harvesting

Protocol features

	LoRaWAN	Mioty
Device addressing	X	X
Message encryption	X	X
Adaptive Data Rate (ADR)	X	
Uplink/downlink scheduling	X	X
Network management	X	X
FUOTA	X	X
Time synchronization	X	X
Multicast	X	X
Fragmented data block transport	X	
Roaming	X	
Public / Private networks	X	Only private

Ecosystem

	LoRaWAN	Mioty
Base Stations	€200 to €1,500 Wide variety of models + installation cost Nb devices per gateway : +	€1,000 to €3,000 fewer suppliers, complex frame decoding + installation cost Nb devices per gateway : ++++
End Devices	Very large marketplace Many companies	Small marketplace Only few suppliers
Ecosystem	Large and very mature	Not mature, restricted Smart water meter driving
Software stack	Free and accessible New Semtech LBM is very modular	Proprietary firmware stack Harder to start/test
Alliance	Large and active	Very small but active

To go further

- Increase the number of devices (multiplexed emulators)
- Larger payload – 51 bytes – 240 bytes
- Use a lower cost Mioty gateways (matching Smart Building business)
- Try the Mioty “Low Latency Pattern”
- Compare Mioty to LR-FHSS
- Position star topology (LoRa / Mioty) vs Mesh network (DECT NR+)
 - Technical performances / User Experience



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