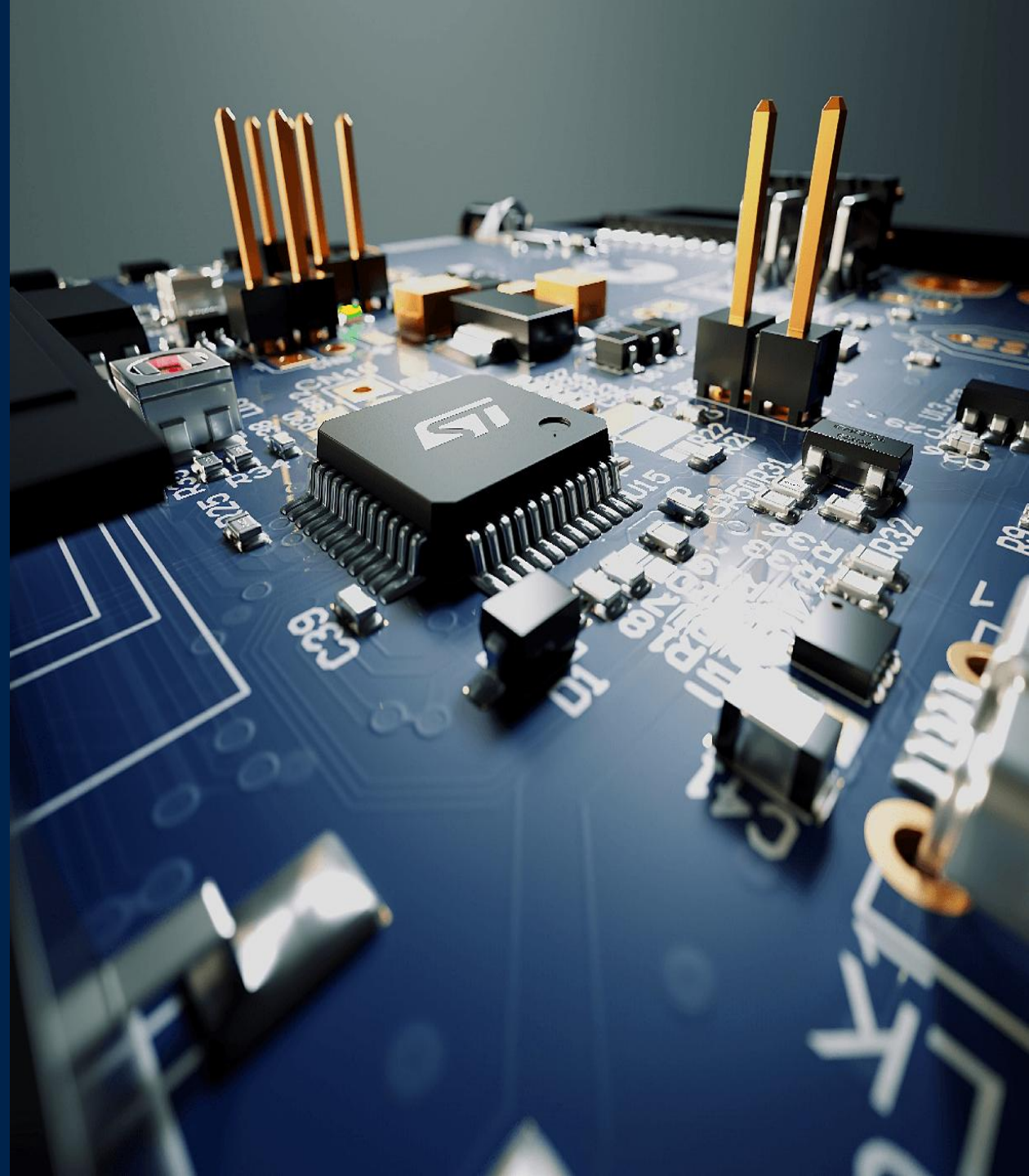


How to evaluate mioty with STMicroelectronics solutions

Philippe Simonnet
Wireless application engineer



mioty : ease evaluation

What are key LPWAN parameters I want to evaluate ?

Range tests



Power consumption profiles



Traffic load check



What do I need when evaluating LPWAN?



Software framework

Application layer

Sw stack

PHY layer



*Evaluation kit
Modules Radio
sensors*



Commercial gateways



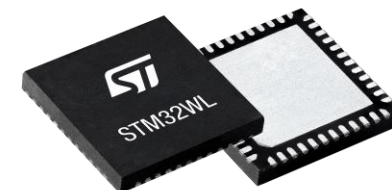
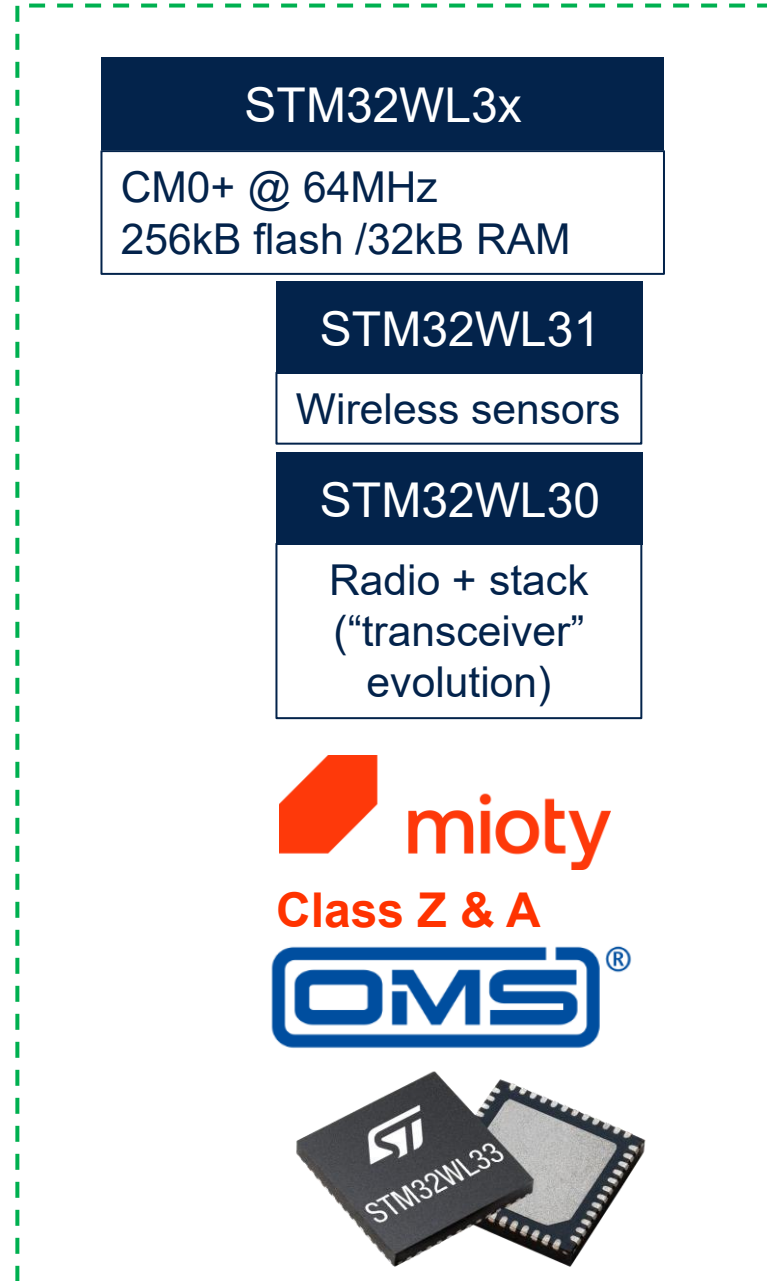
Server / dashboards

STMicroelectronics Solutions (end-node)

STMicroelectronics solutions and mioty support



Transceiver & transmitters



Mioty evaluation stack & ST Nucleo kit

mioty alliance – download page

- Evaluation stack running on Nucleo-WL33CC1 kit
 - Mioty-alliance download page :
 - Enhance IoT with LZE mioty® Evaluation Stack for STM32WL3x



Mioty evaluation with ST kit

complete setup summary



KEY FEATURES



- MIOTY PHY libraries by **Fraunhofer**
- **MIOTY Class Z & Class A support**
- **STM32WL33** Sub-1Ghz RF SoC



- Ultra Low Power LPWAN Cortex-M0+
- **22mA Tx @ +14dBm / 5.6mA Rx**
- 1.4µA Deepstop mode with RTC



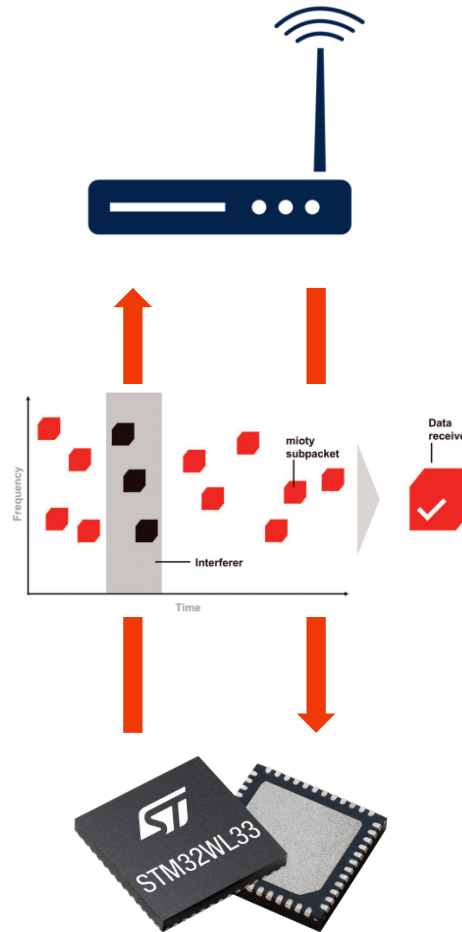
- Up to 256kB flash / up to 32kB SRAM
- QFN32 & QFN48 package

KEY APPLICATIONS

- MIOTY end-node applications
- Wireless sensors
- Smart Metering & IoT



NUCLEO-WL33CC1

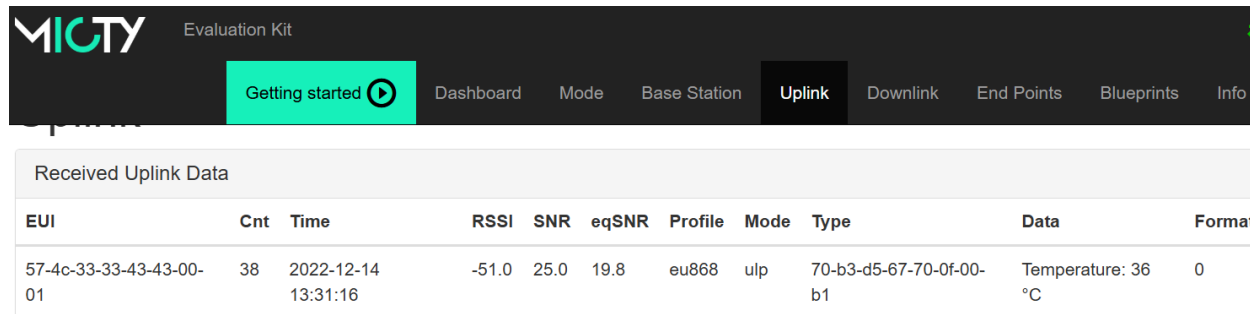


Mioty evaluation with ST kit

mioty Weptech gateway with local dashboard

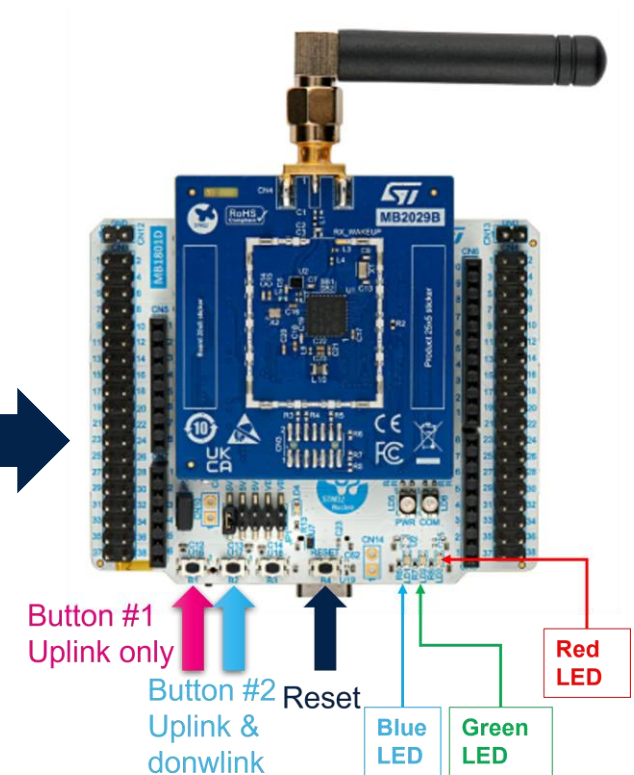
- Evaluation setup :
 - Nucleo kit STM32WL3x + evaluation binary file available on mioty-alliance webpage
 - Weptech gateway + embedded dashboard
 - Class Z (Tx-only) + class A (Tx & Rx)

Connections with mioty gateway (+ local dashboard)



Received Uplink Data										
EUI	Cnt	Time	RSSI	SNR	eqSNR	Profile	Mode	Type	Data	Format
57-4c-33-33-43-43-00-01	38	2022-12-14 13:31:16	-51.0	25.0	19.8	eu868	ulp	70-b3-d5-67-70-0f-00-b1	Temperature: 36 °C	0

mioty® Gateway AVA - WEPTech elektronik GmbH



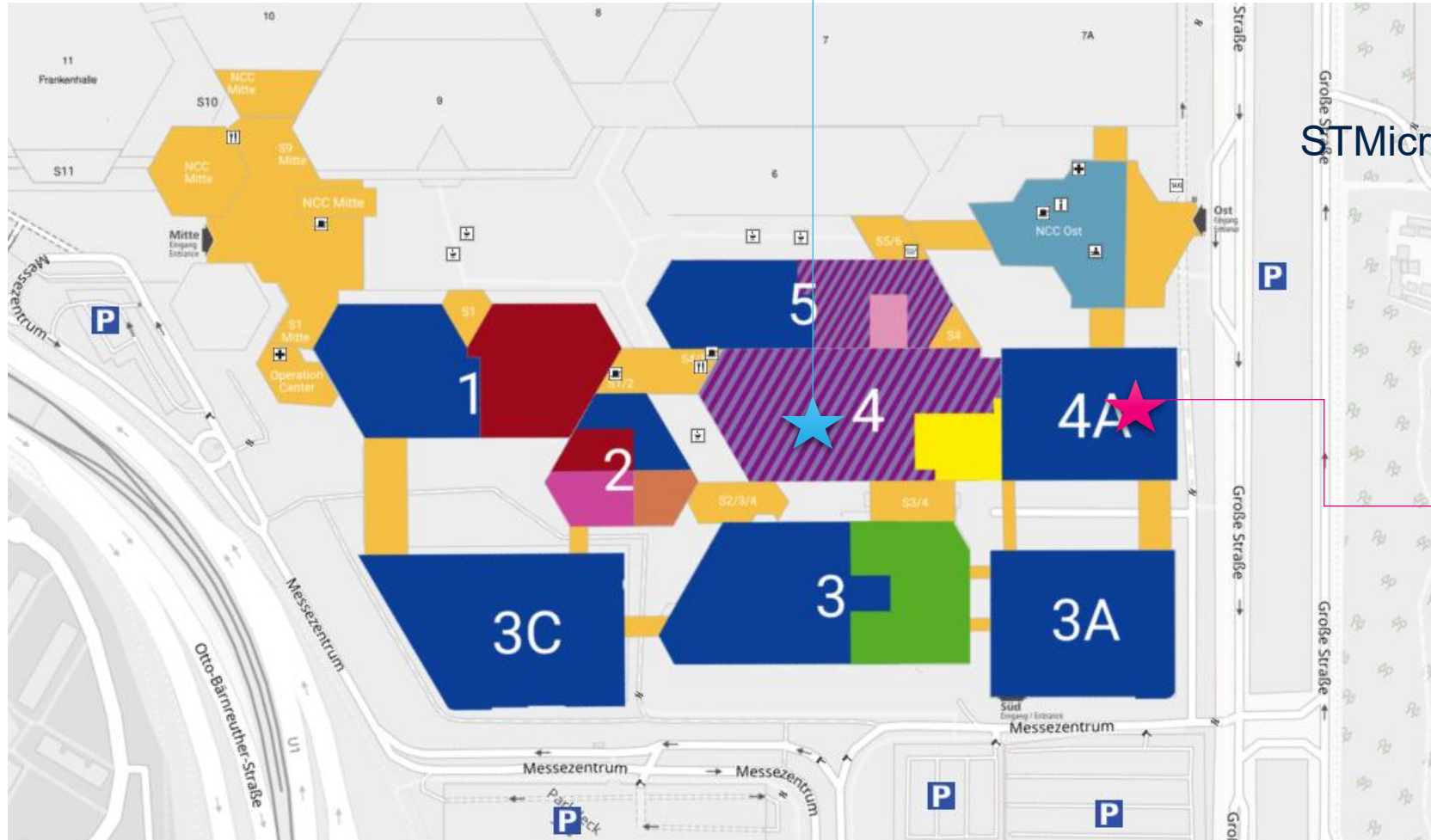
Technical evaluation – what can I do ?

Fraunhofer booth

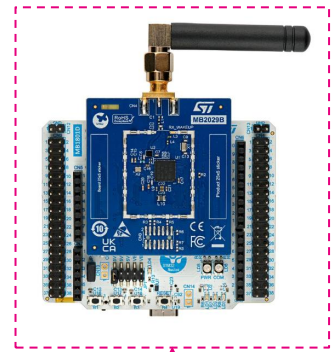


Demo Embedded Word #25

mioty connections between halls / range possibilities



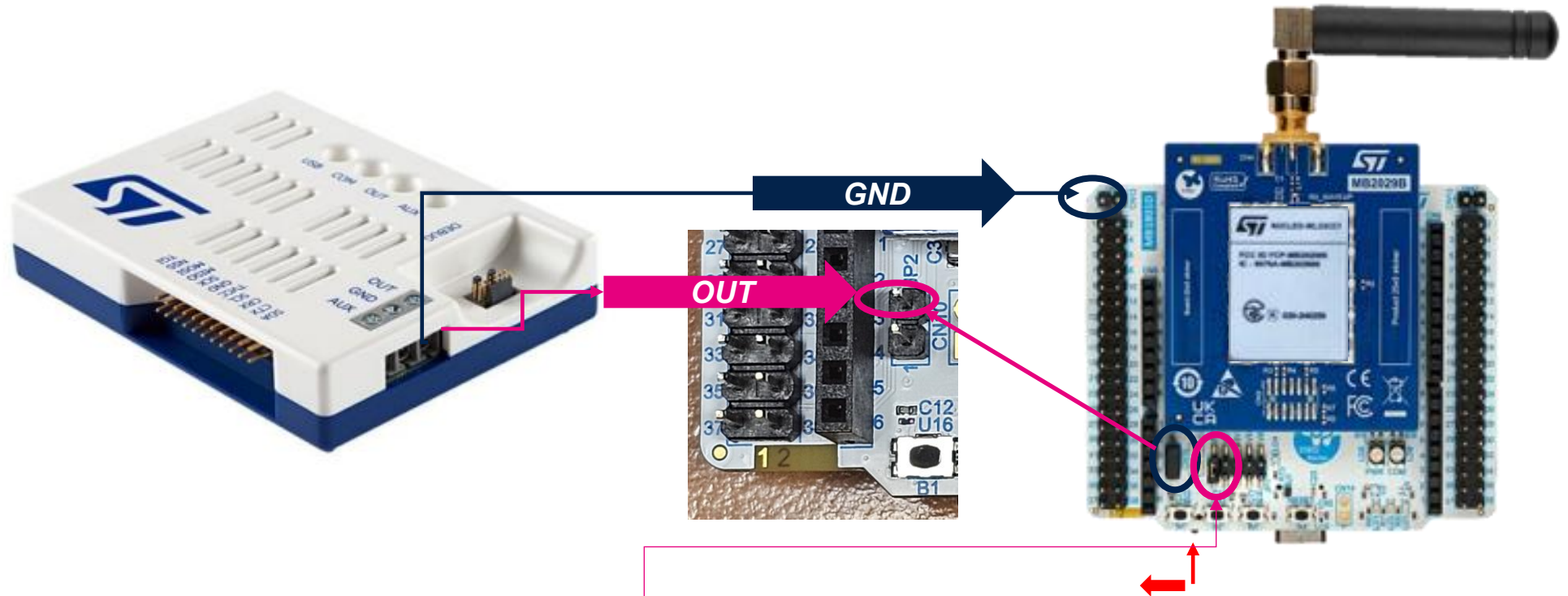
STMicroelectronics booth



Power consumption check (mioty end-node)

ST device for power consumption measurements

- STLINK-V3PWR :
 - [STLINK-V3PWR | Tool - STMicroelectronics](#)



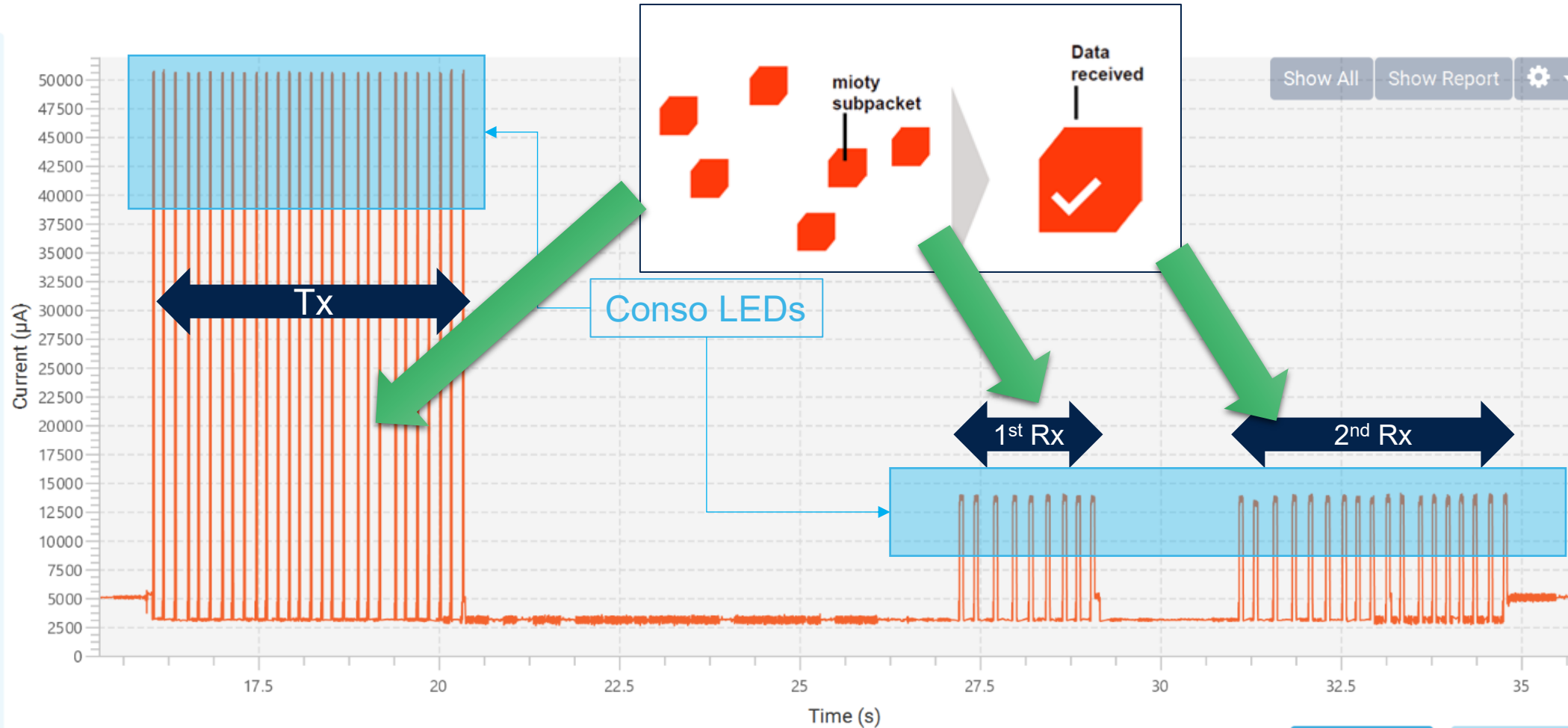
JP2 & JP1 removed, GND from CN12 connector.

5. Change SW1 to left (not the default position)

Power consumption check (mioty end-node)

class A (Tx & Rx)

- mioty Class A – Transmission & Reception



Power consumption check (mioty end-node)

peak & average current of mioty connection

- Summary of measurements

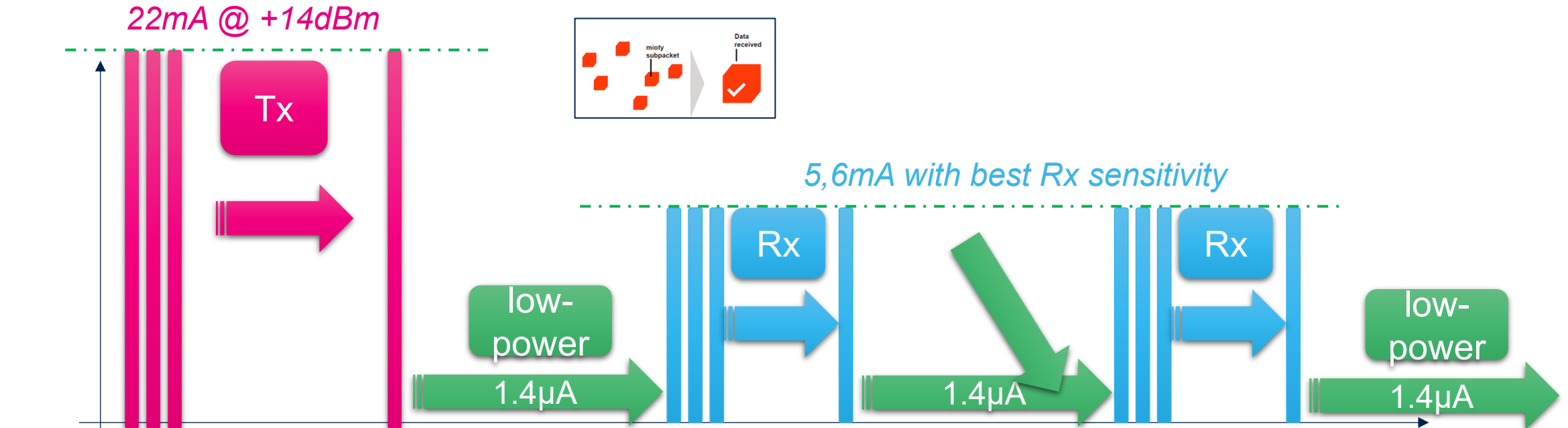
Connection part	Number of Tx burst	Burst duration	Burst Active current	“idle” current (between bursts)	complete duration	Average current
Tx	28	20ms	50mA	3mA	4,34 seconds	8,9mA
1 st Rx	9	56ms	13.5mA	3mA	1,96 seconds	5.8mA
2 nd Rx	18	56ms	13.5mA	3mA	3.73 seconds	5.7mA
overall					18.8 seconds	5.2mA

Connection	RF chip active time
1 st Tx	560 ms
1 st Rx	504 ms
2 nd Rx	1008 ms

Power consumption check (mioty end-node)

what we can expect from silicon technology

- Using system-On-Chip ST silicon implementation – deterministic figures



Connection part	Number of Tx burst	Burst duration	Burst Active current	“idle” current (between bursts)	complete duration	Average current
Tx	28	20ms	22mA	1.4µA	4,34 seconds	2.84mA
1 st Rx	9	56ms	5.6mA		1,96 seconds	1.44mA
2 nd Rx	18				3.73 seconds	1.51mA
overall					18.8 seconds	1.1mA

Rx sensitivity evaluation of mioty Rx @ end-node

RF link budget based

- RF link budget
 - Symetric Link budget
 - +14dBm
- Using downlink dashboard

MiOTY Evaluation Kit

Getting started  Dashboard Mode Base Station **Uplink** Downlink End Points Blueprints Info

Received Uplink Data

EUI	Cnt	Time	RSSI	SNR	eqSNR	Profile	Mode	Type	Data	Format
57-4c-33-33-43-43-00-01	38	2022-12-14 13:31:16	-51.0	25.0	19.8	eu868	ulp	70-b3-d5-67-70-0f-00-b1	Temperature: 36 °C	0

Getting started  Dashboard Mode Base Station Uplink **Downlink** End Points

Auto Acknowledgment Off

Demo Application

End Point EUI	LED Color
42-42-42-42-42-42-00	Red Green Blue
57-4c-33-33-43-43-00-01	Red Green Blue

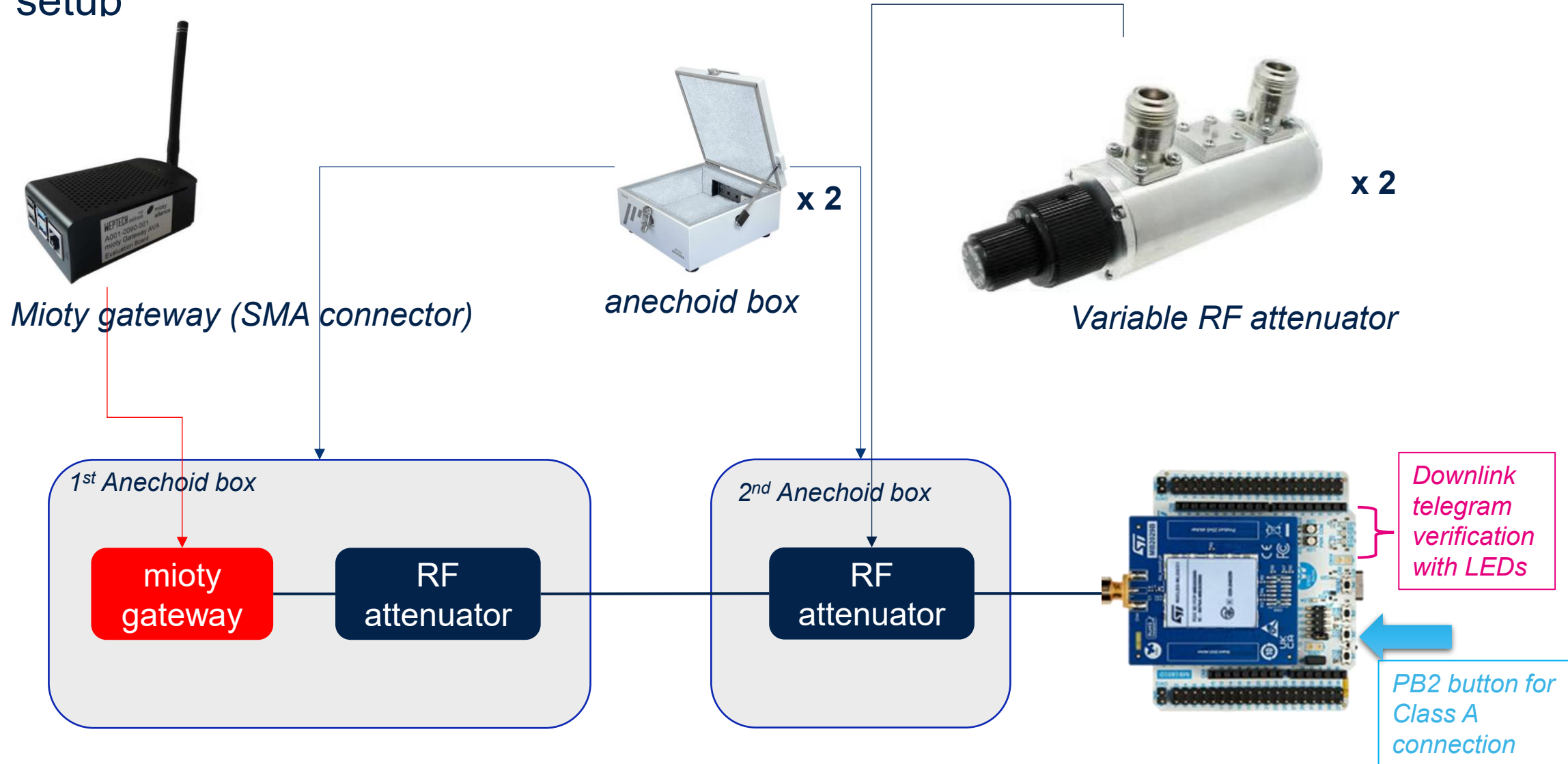
For downlink select right buttons →

✔ Downlink data scheduled.

Rx sensitivity evaluation of mioty Rx @ end-node

Hardware setup based on RF attenuators and anechooid chambers

- HW setup

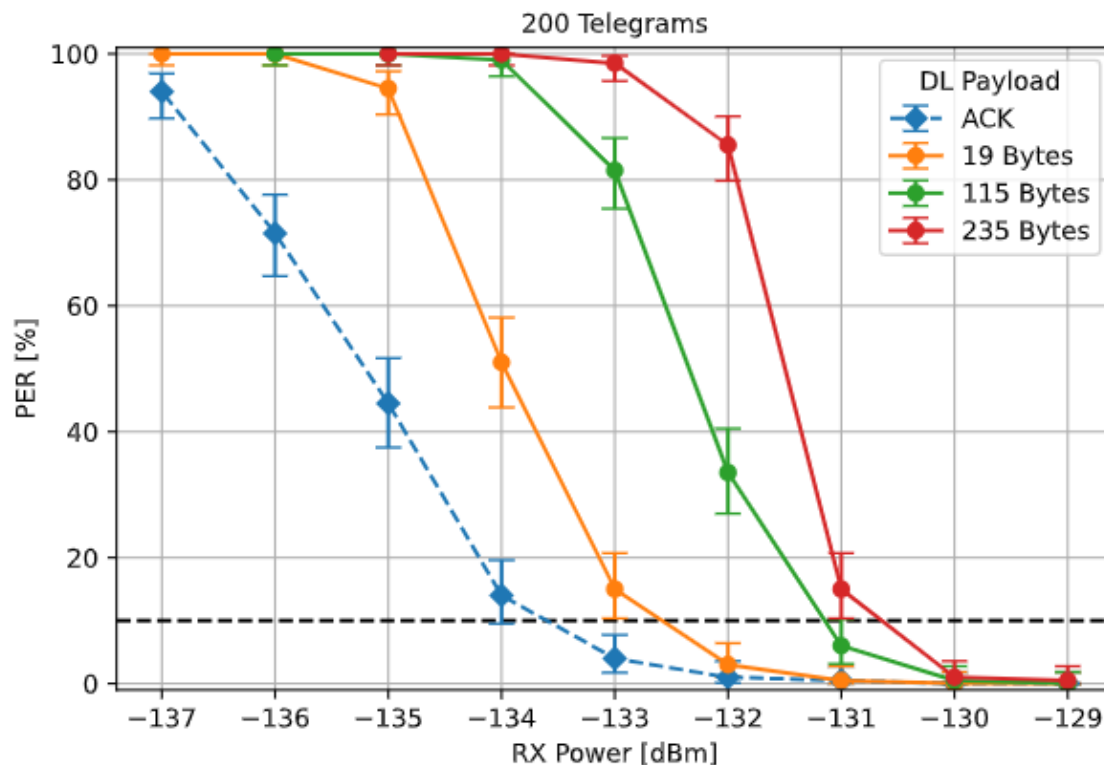


Rx sensitivity evaluation of mioty Rx @ end-node

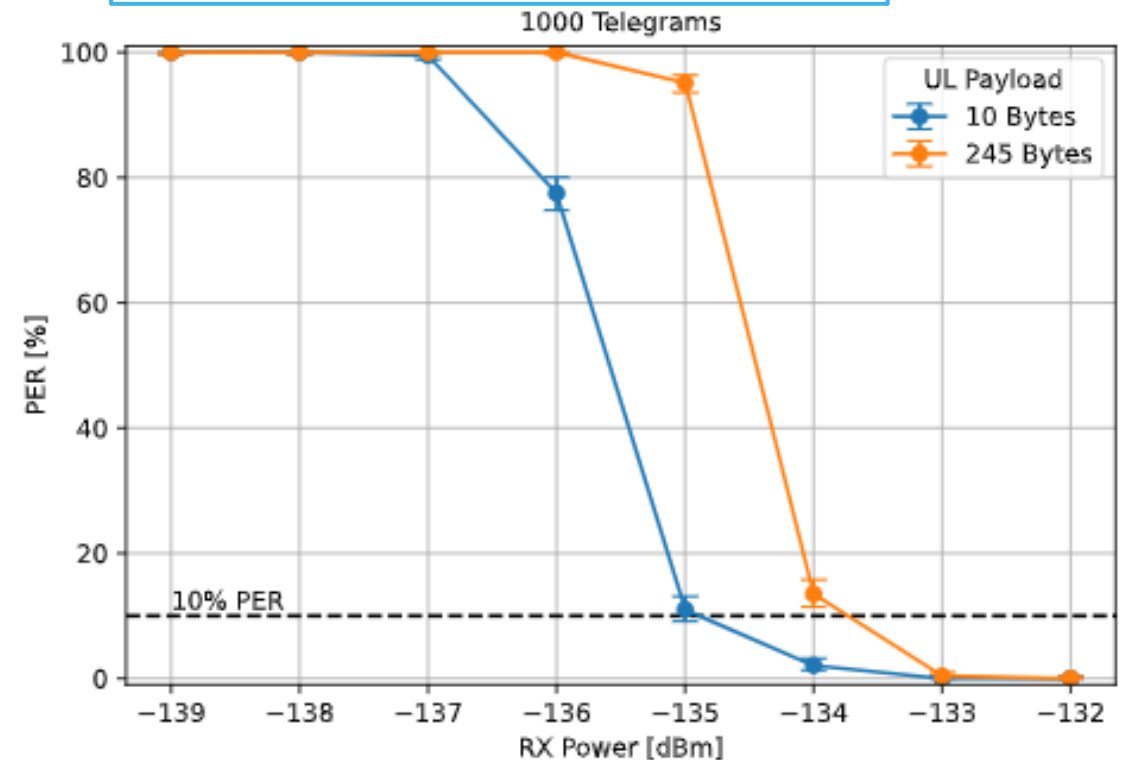
verifications of Fraunhofer lab results

- Rx performance summary :

Rx sensitivity @ end-node (Nucleo-WL33CC1)



Rx sensitivity @ Gateway
using Nucleo-WL33CC1 end-node

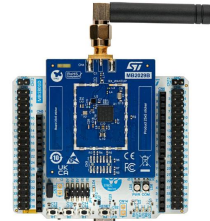


conclusions

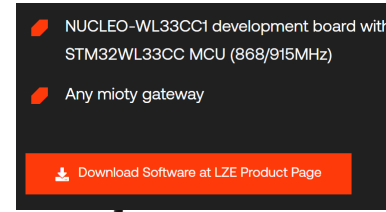
Mioty ecosystem for technology evaluation – with ST kit

checklist

- Mioty end-node ✓
- Mioty evaluation stack ✓
- mioty Gateways solutions ✓



+

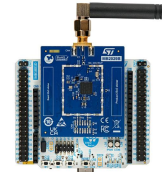


Ava by Weptech



Miro Edge by Miromico

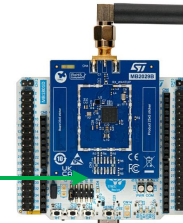
- Range & traffic verifications ✓



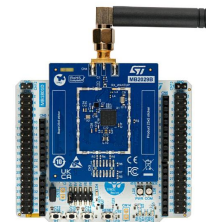
- Mioty end-node power consumption ✓



STLINK-V3PWR



- Tx & Rx performances ✓



Atténuateurs RF



Shielded box



life.augmented

Thank you