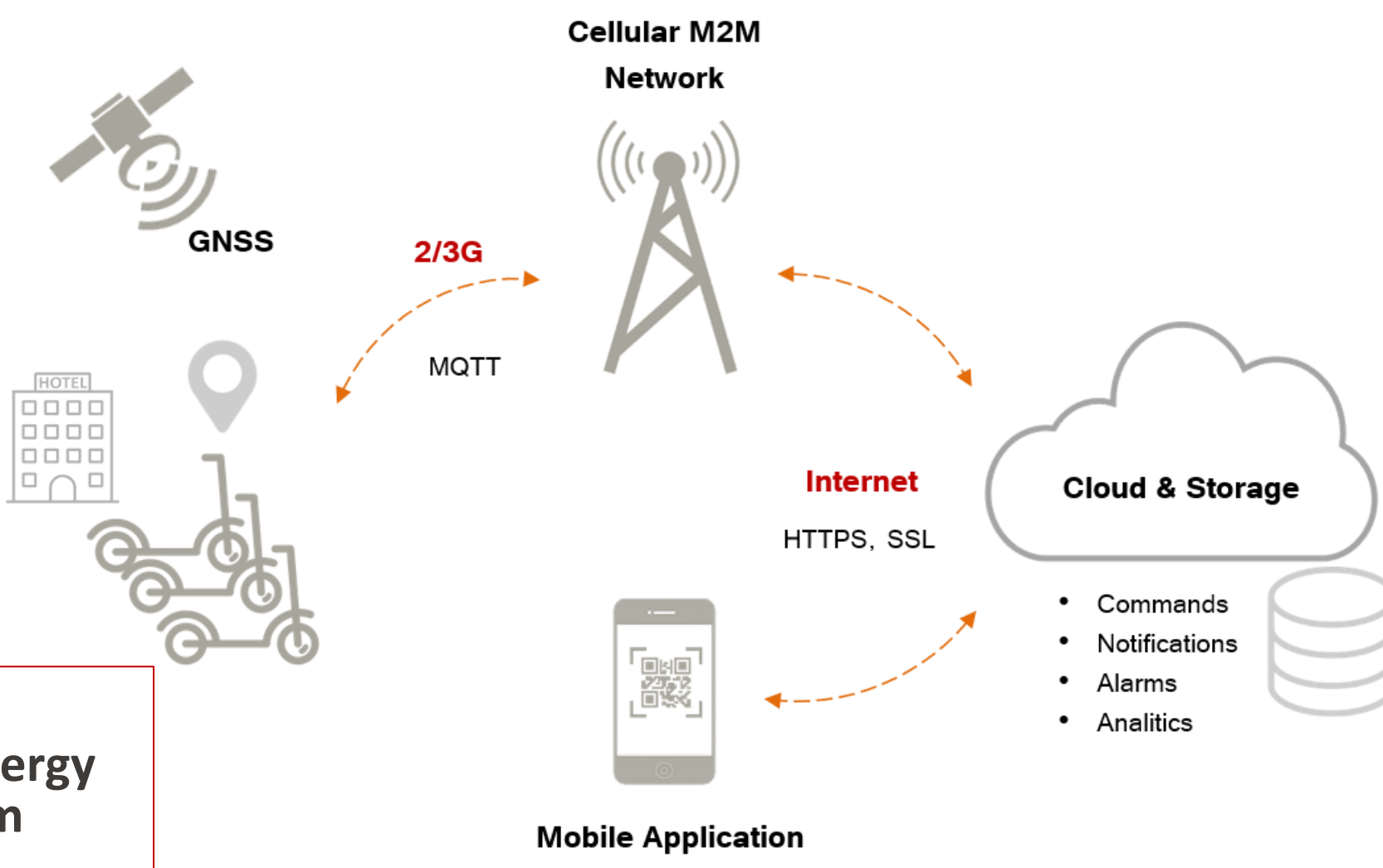


## GOALS

BOOST is a new B2B renting service for hospitality operators inc. Hotels, B&B. We offer fleets of connected vehicles for a post-sales revenue stream for the property holders and the best transportation for tourists.

The goal is to measure and to optimise energy consumption of embedded IoT system



## CHALLENGES

### Energy efficiency is important design stage:

- Cell module is a major consumer,
- Not easy to measure,
- Depends on various params inc. location, weather, antenna load.

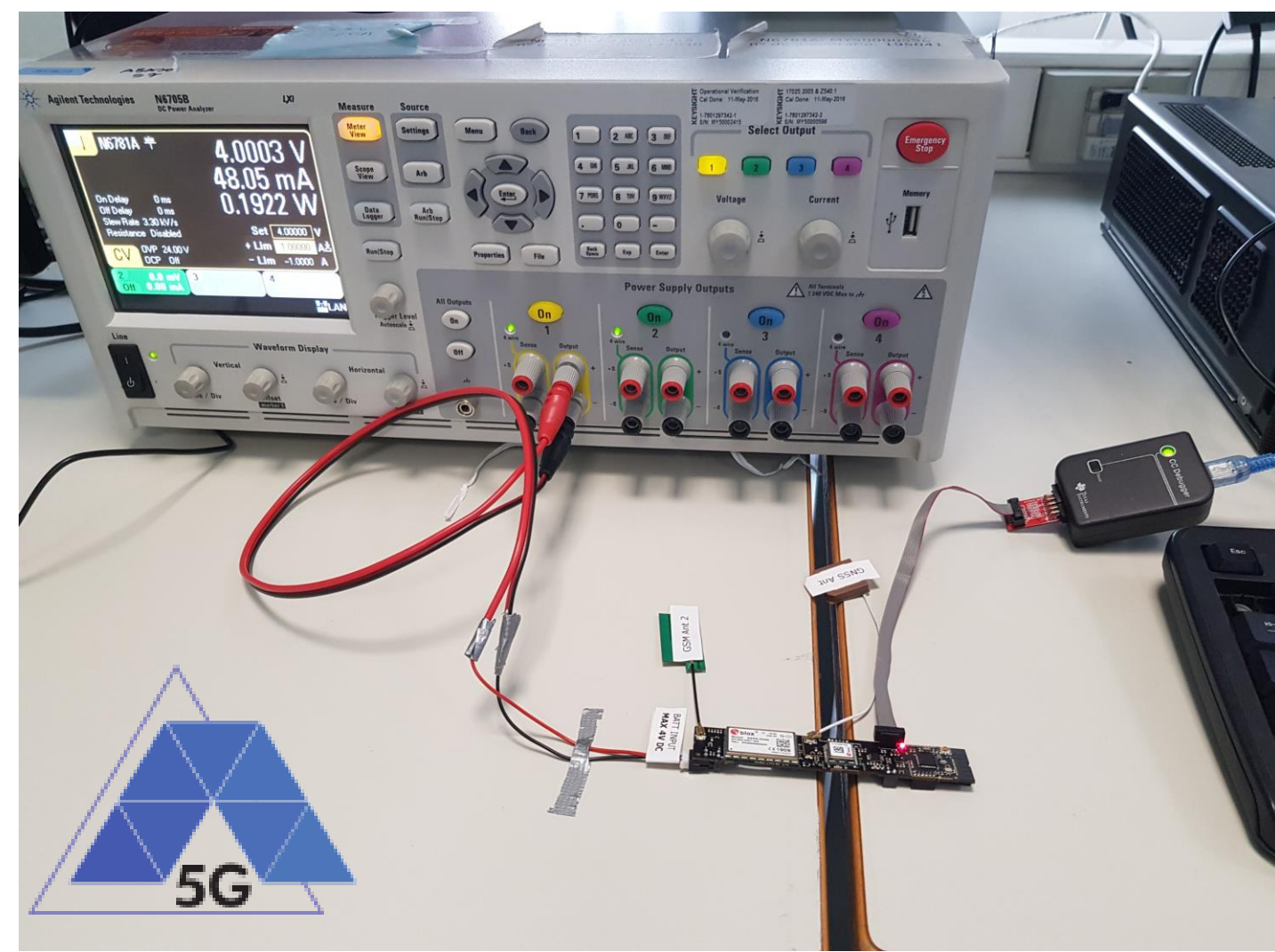
### Challenges:

- Dynamic and complex current profile,
- High dynamic range of pulses - 3 orders of magnitude,
- Requirements for utilization of high-end equipment.

## DEMO SETUP

### Test Setup:

- Keysight N6705C Power Analyser
- Boost IoT device
- 3 Antennas under test



### Metrics:

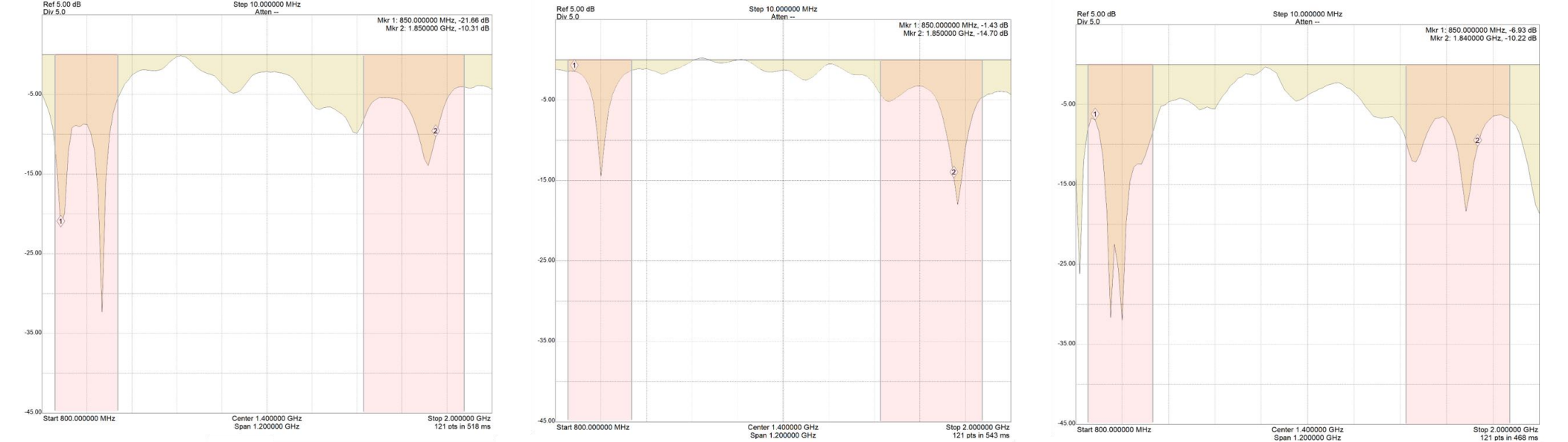
- Current profile
- CCDF, Average
- Latency, RSSI

### Test network scenarios

Attachment	Standby	Traffic
Initial connection to the cell network	Energy-saving DRX network connected state	Active up/down-link data exchange with server

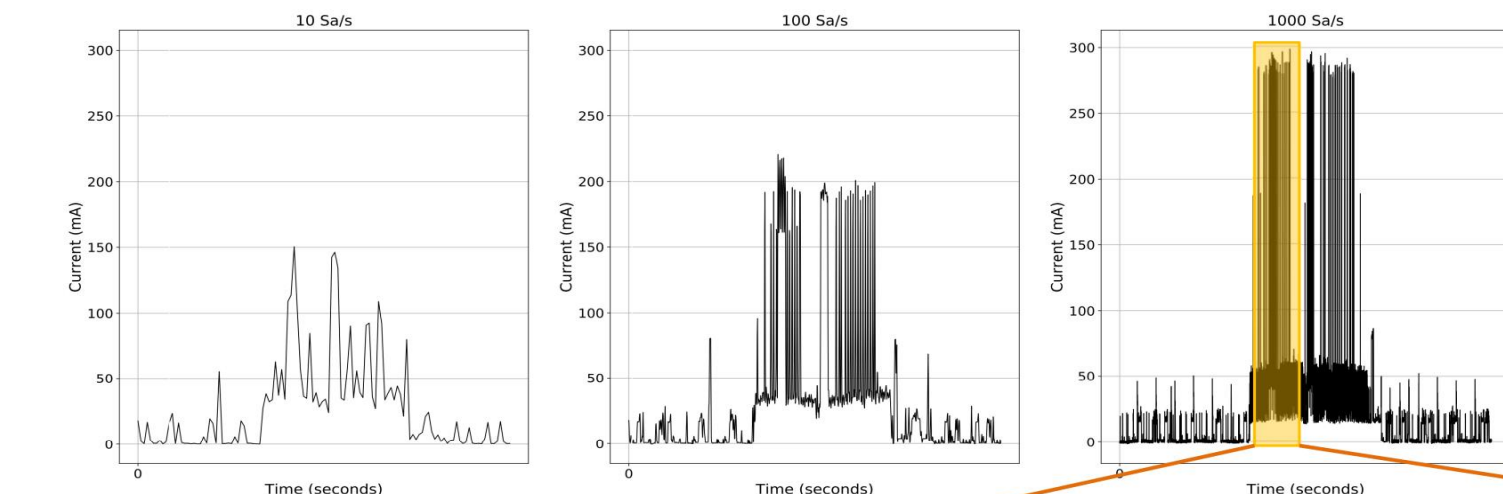
## RESULTS

### 3 Antennas under test

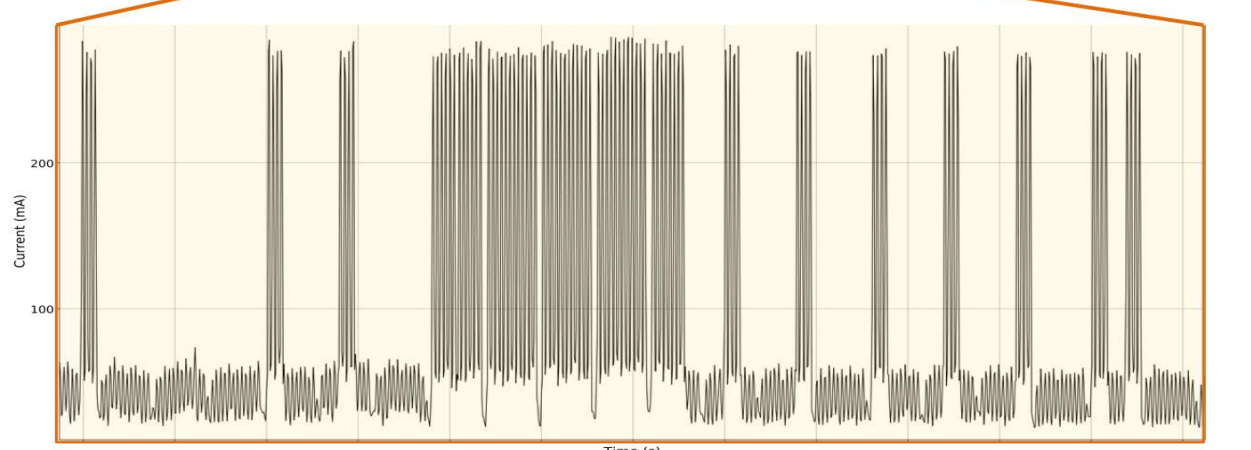


We selected 3 GSM-band antennas for tests with similar characteristics inc. gain, polarisation, return loss

### Sample rate setting

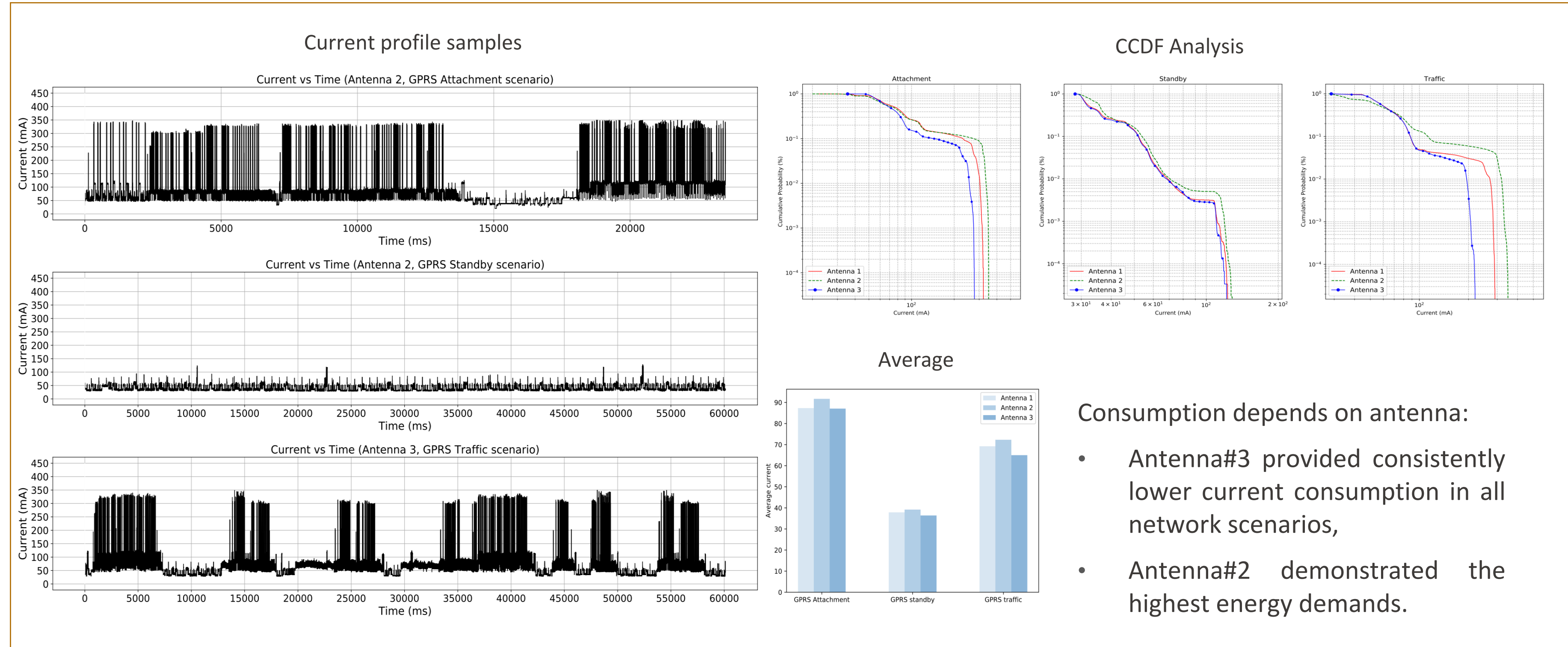


We tested different sampling rate settings. Selected 1ms sampling rate that provides most detailed resolution and allows to profile every single current burst.

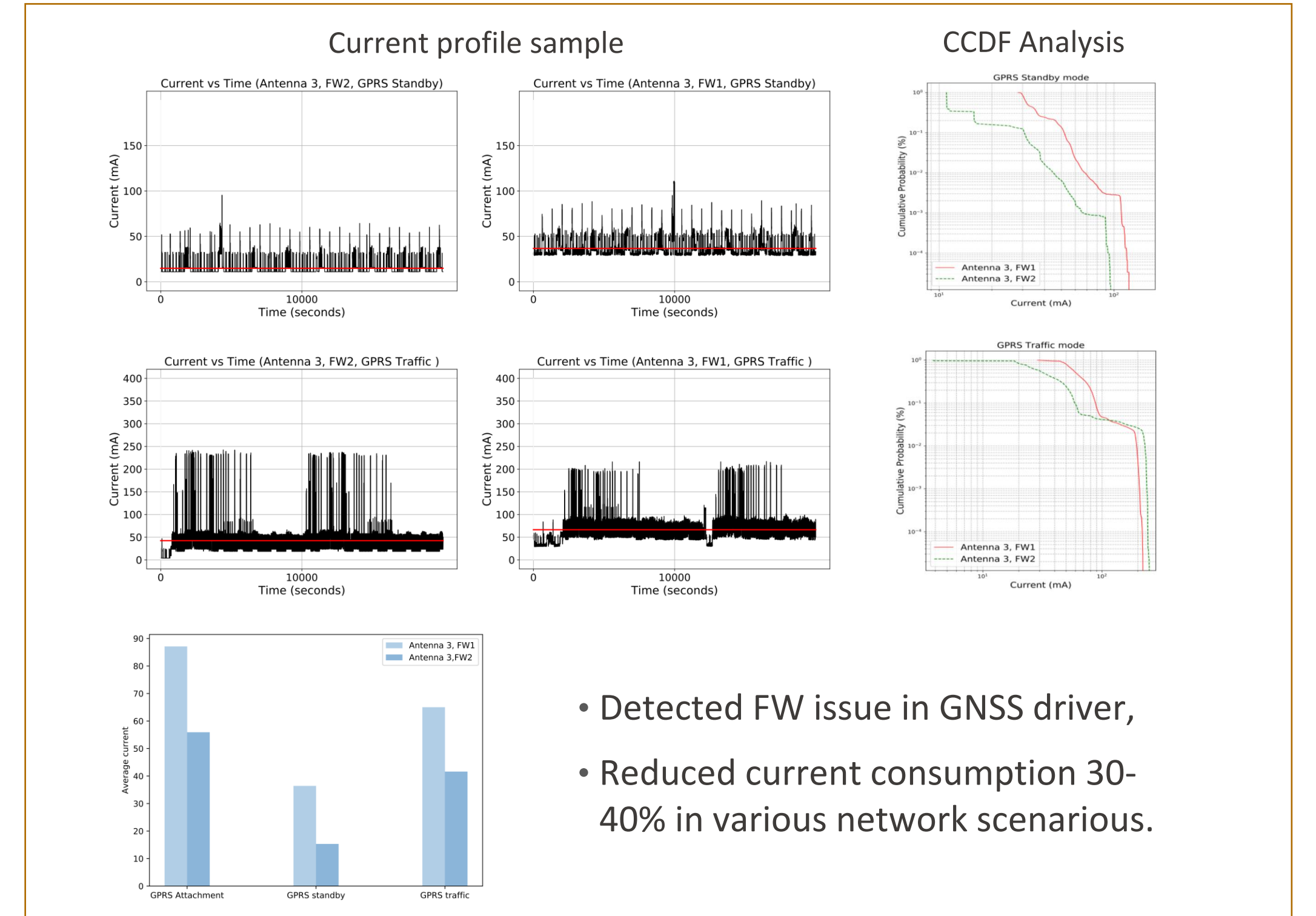


## MORE RESULTS

### Measurements



### Optimisation



## CONCLUSIONS

- Accurate measurements are important at any design stage,
- FW code review is necessary to meet system energy-performance requirements,
- Proper instrument can provide insight into system operations,
- Antenna's characteristics influence energy consumption,
- GPRS power profile varies with various external parameters,
- Latency is not a function of antenna performance.

## POST MORTEM

- Finalize a market-ready BOOST solution,
- Pilots & Real feedback,
- Explore 5G IoT-cell technologies inc. Nb-IoT, LTE-M.