



BOOST: Energy-efficient IoT solution for e-scooters fleet management

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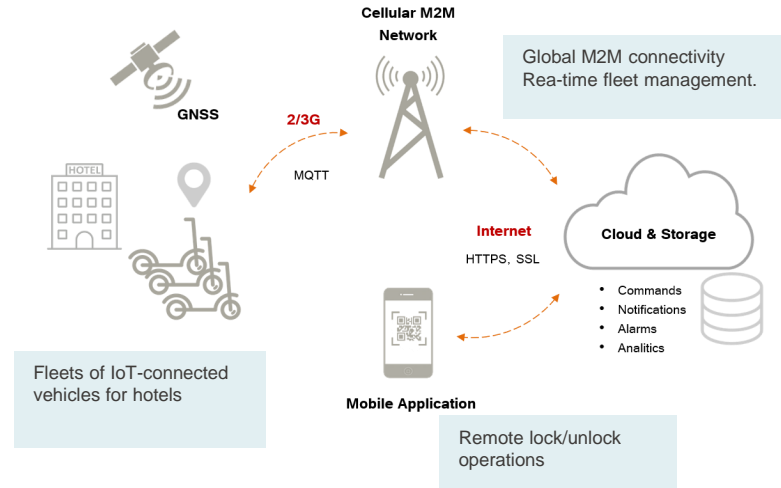
BOOST: energy-efficient IoT solution for e-scooters fleet management

STAGE 1 EXPERIMENT

BOOST service

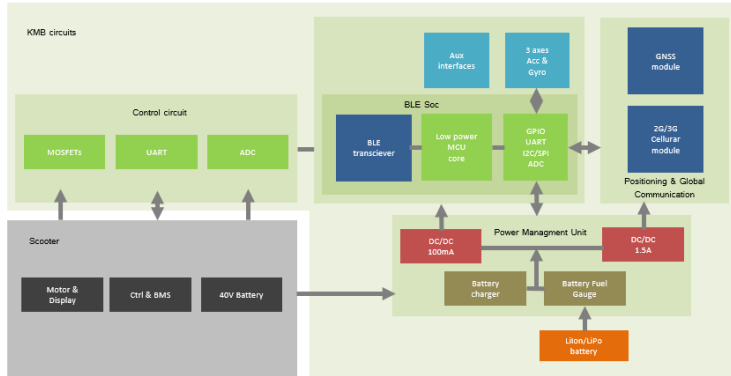
BOOST is a new B2B renting service for hospitality operators inc. Hotels, B&B.
We provide **fleets of connected vehicles** for post-sales revenue stream of the property

	Guests <ul style="list-style-type: none">• Covid-free solution• Full-stay availability of personal e-mobility
	Hospitality operators <ul style="list-style-type: none">• New revenue streams• Offering of value-added services
	Local authorities <ul style="list-style-type: none">• Personal responsibility for vehicles parking• Data availability for infrastructure analysis.



BOOST IoT solution

Boost IoT system is a core of the solution that manages and controls all the internal operations and executes remote commands over MQTT



Objectives & Challenges

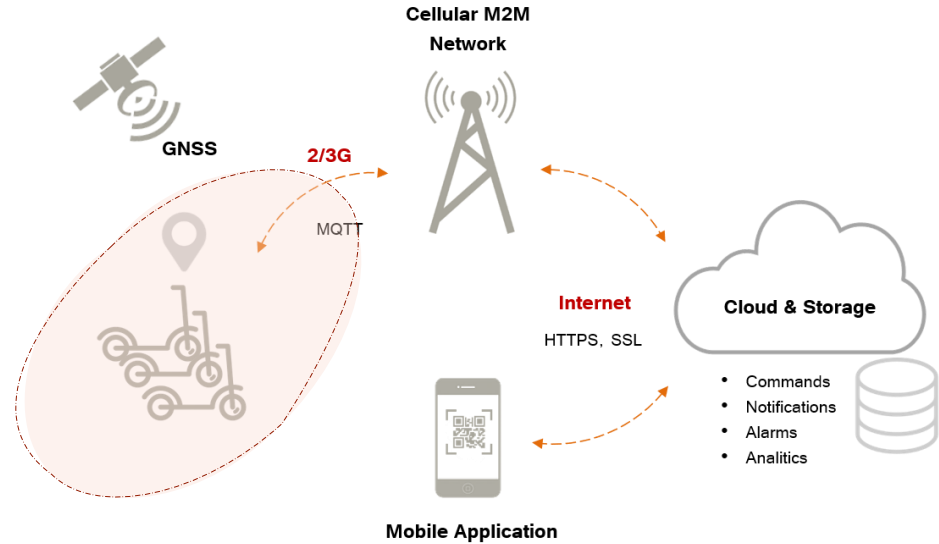
Energy efficiency is important:

- Cell module is a major consumer
- Not easy to measure
- Depends on various params

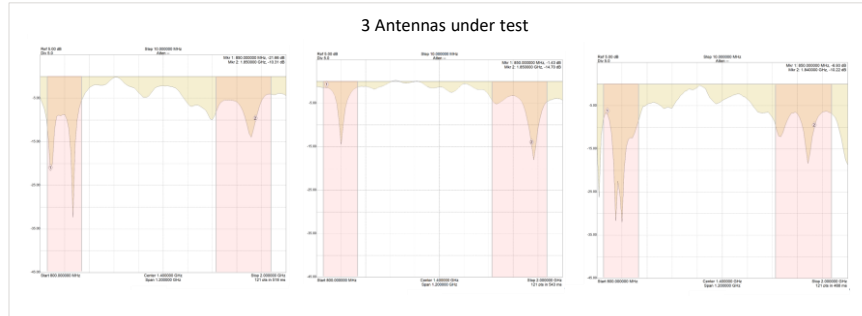
Challenges:

- Dynamic and complex current profile
- High dynamic range of pulses
- Requirements for equipment

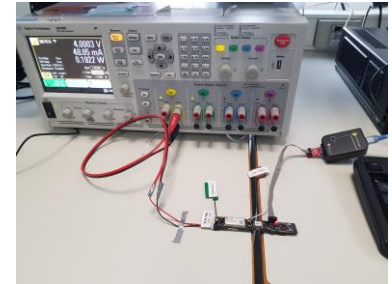
The goal is to measure and to optimise energy consumption



Experiment Setup



TRIANGLE testbed



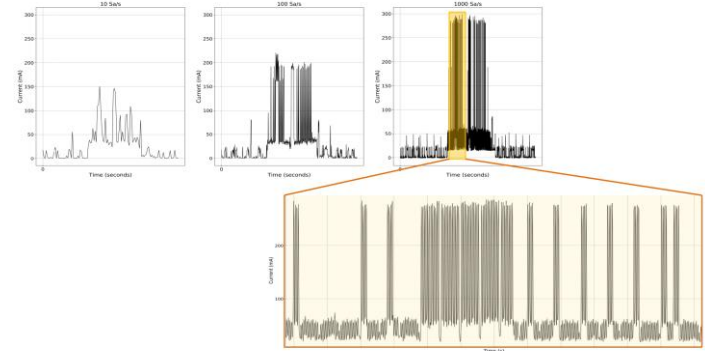
Test Setup

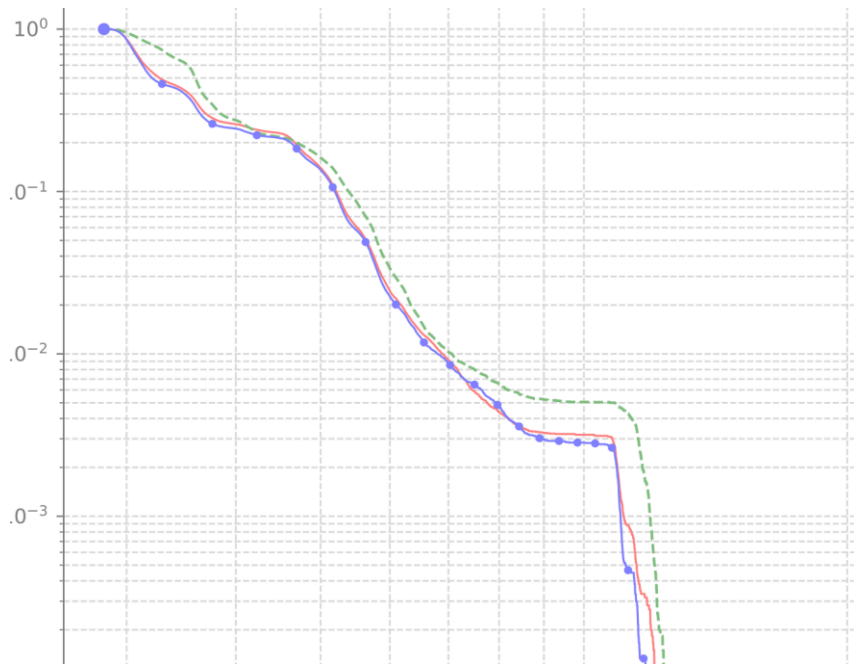
- TRIANGLE Keysight N6705C Power Analyser
- Boost IoT device
- 3 Antennas under test

Metrics:

- Current profile
- CCDF, Average
- Latency, RSSI

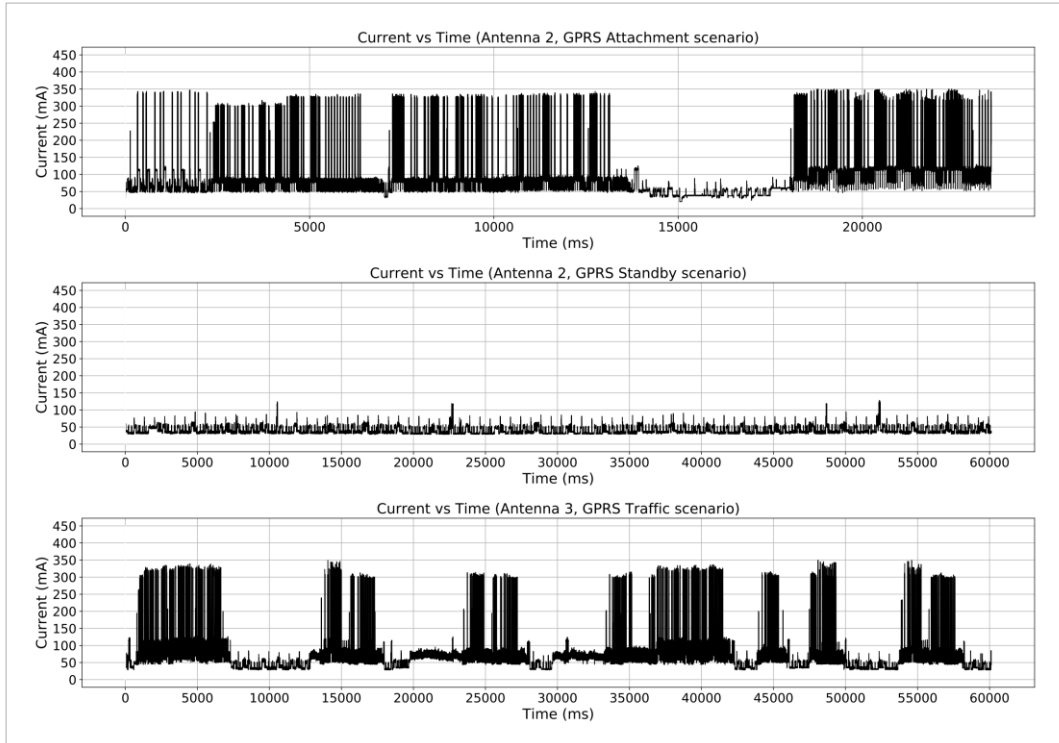
Sampling rate setting





Experiment Results

Measurements



Network Scenarios

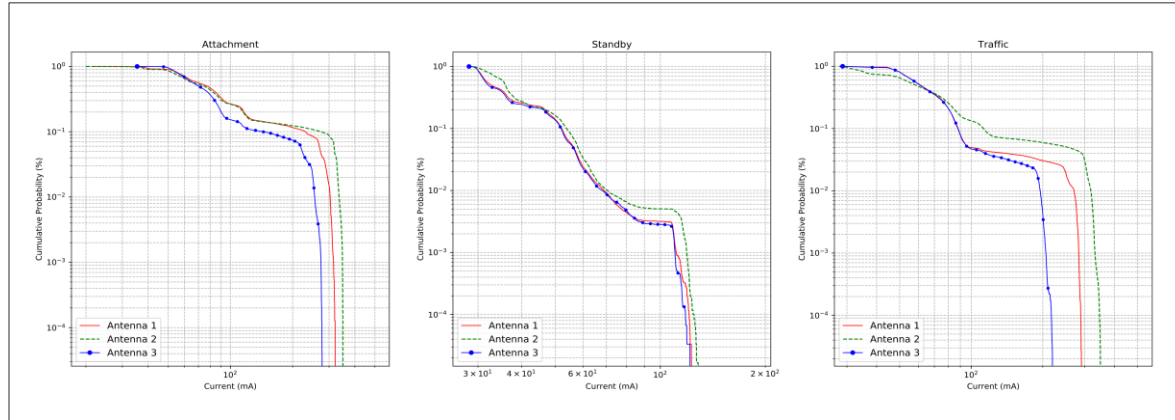
- **GPRS Attachment**
Initial connection and registration in cell network.
- **GPRS Standby**
Low-power state cycle between incoming messages
- **GPRS Traffic**
Active data traffic

Measured

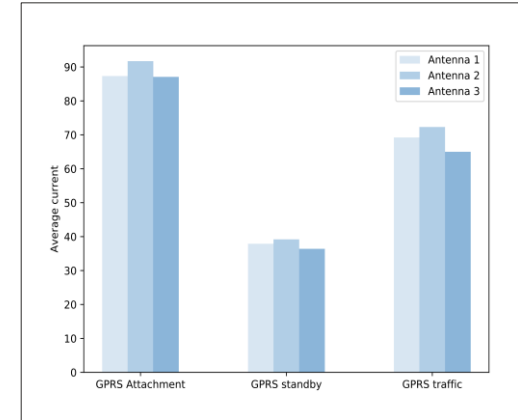
- Current profile
- Latency
- RSSI

Measurements Analysis

CCDF



Average values

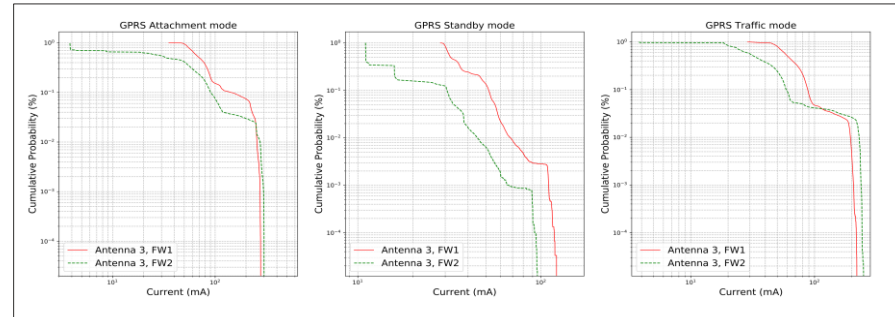
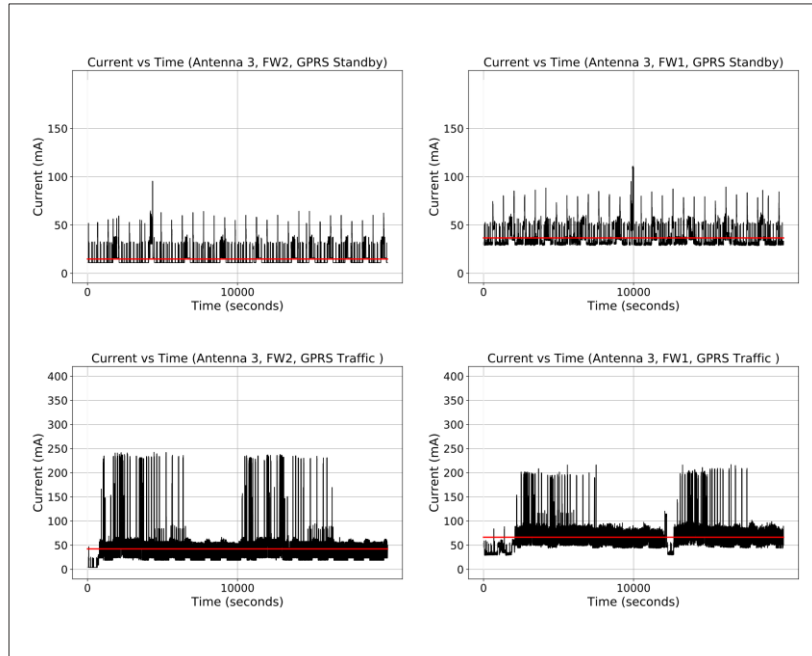


Outcome:

- Proper instrument can provide a great insight into system operations
- Antenna with better return loss provides better energy-efficiency
- GPRS power profile varies with various external parameters
- Latency is not a function of antenna performance

Optimization

Updated FW



Outcome:

- Overall optimization in 30-40%
- FW review is necessary to meet requirements
- Accurate measurements are important at any design stage



Business Impact

Impact



- Valuable insights into the system and communication functionality
- Practical knowledge on various design (antenna) choices
- Energy optimization



Value



HOW DID FED4FIRE HELP US?

- Time and resources reduction to run experiment
- Practical Research outputs for dissemination
- New experience with high-end equipment

Value



WHY DID WE COME TO FED4FIRE?

- Fed4Fire offers versatile environment and set of tools that perfectly matches to our R&D requirements
- Fed4Fire enables us to test our IoT design in various realistic environments
- Overall positive and smooth experience



Feedback

Used resources and tools



Fed4FIRE Testbed used:

- TRIANGLE testbed - Keysight N6705C Power Analyser

Other tools were provided by KMB Lab inc. BOOST IoT device, antennas

Added value of Fed4FIRE



The most important added value of Fed4Fire:

- Support to get started and to perform experiments
- Ease of experiments setup
- Diversity of resources



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