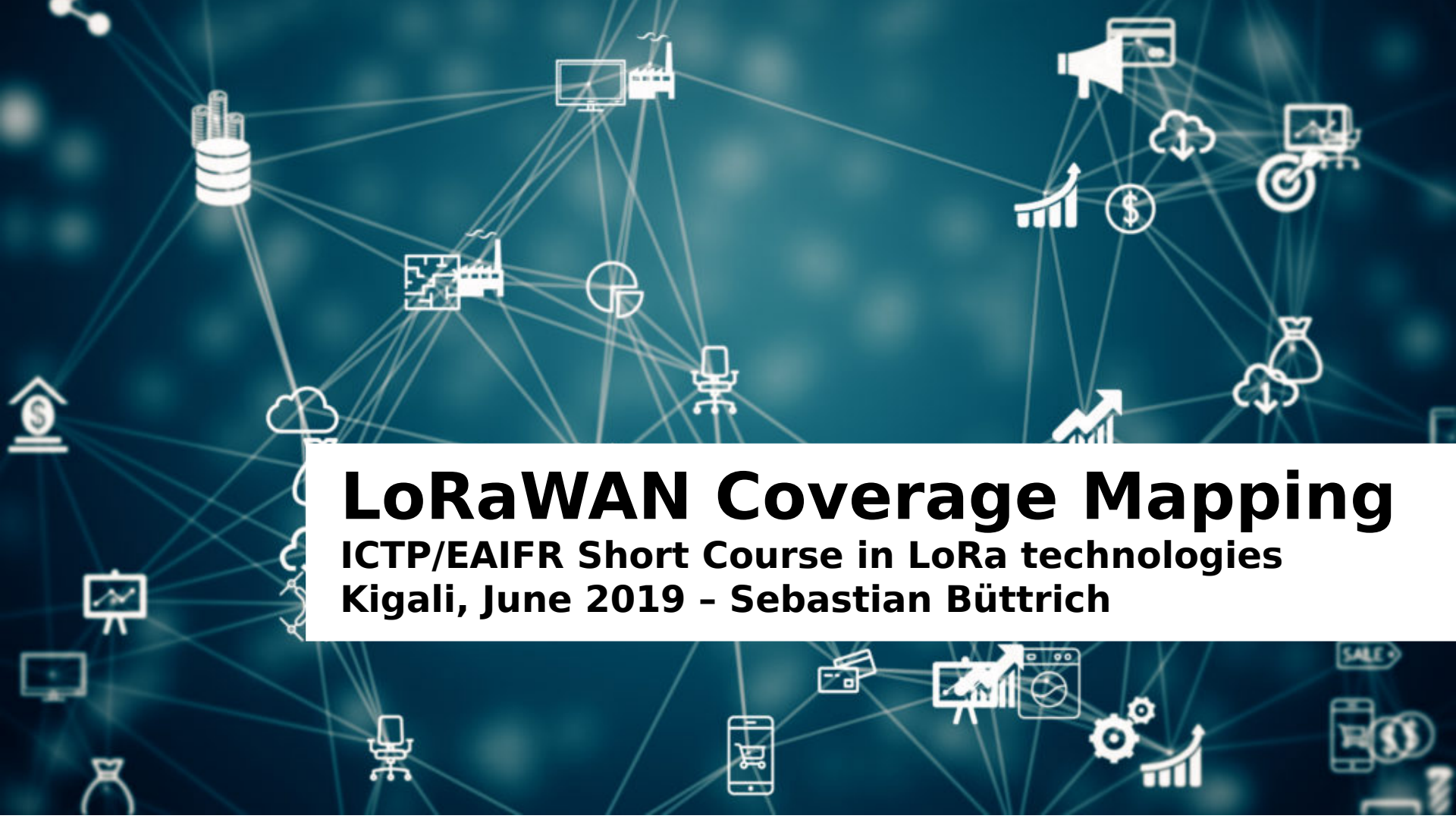


LoRaWAN Coverage Mapping

ICTP/EAIFR Short Course in LoRa technologies

Kigali, June 2019 – Sebastian Büttrich

This talk

- Motivation for mapping
- Quick overview of (some) methods of mapping
- Links to documentation

Motivation

- Visualize coverage
- Put numbers on it – how good is the coverage?

  RSSI, margins, SNR, ...
- Map sensor readings, environmental data, assets, ...

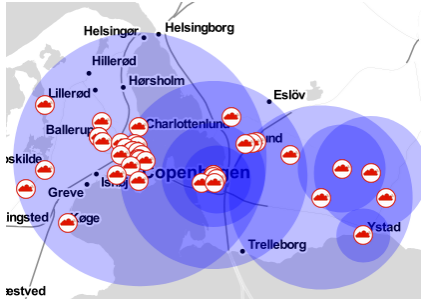
Some Methods

- Using TTNMapper for The Things Network
- Using Grafana for mapping
- Using Leaflet maps
- Writing your own
- Using IoT platforms

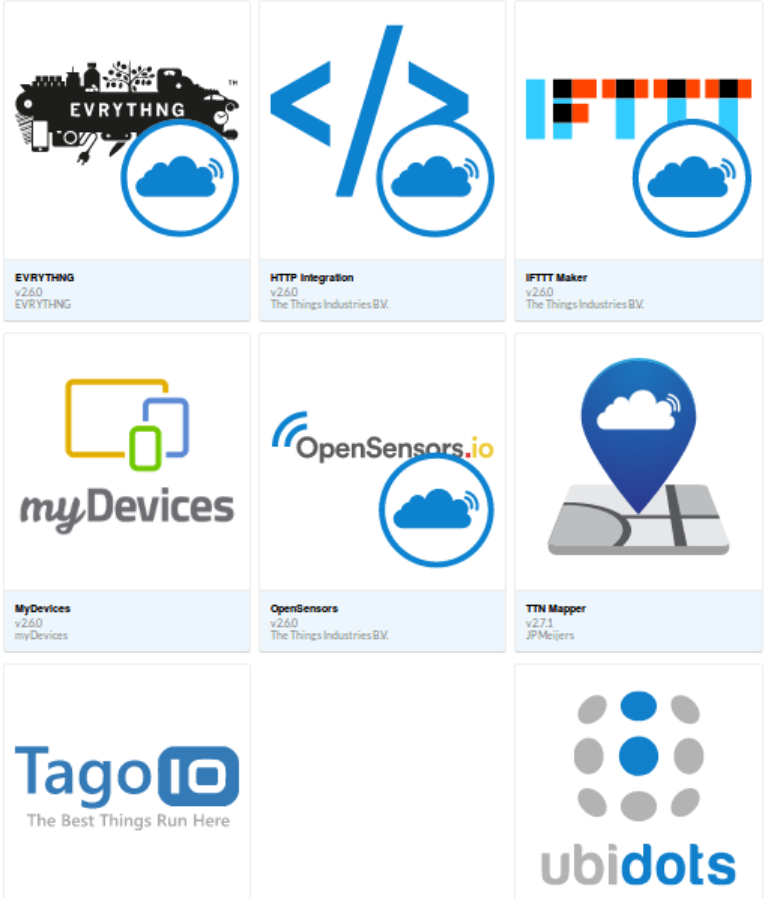
There s more, of course.

TTNMapper

- A free service connected to The Things Network
- Creates a global map (RSSI, SNR) of TTN network
- Advantages: Esay to use, available as integration
- Disadvantages: not always very reliable
- More: https://ttnmapper.org



TTNMapper integration



TTNMapper – how does it work?

- TTNMapper receives device’s packet
- Combines with data from the TTN backend, such as Gateway metadata, location, etc
- Stores in TTNMapper database
- Separates between permanent global map and temporary experiments
- Use with GPS-enabled devices or with mobile app (choosing device to follow, but adding GPS from mobile phone)

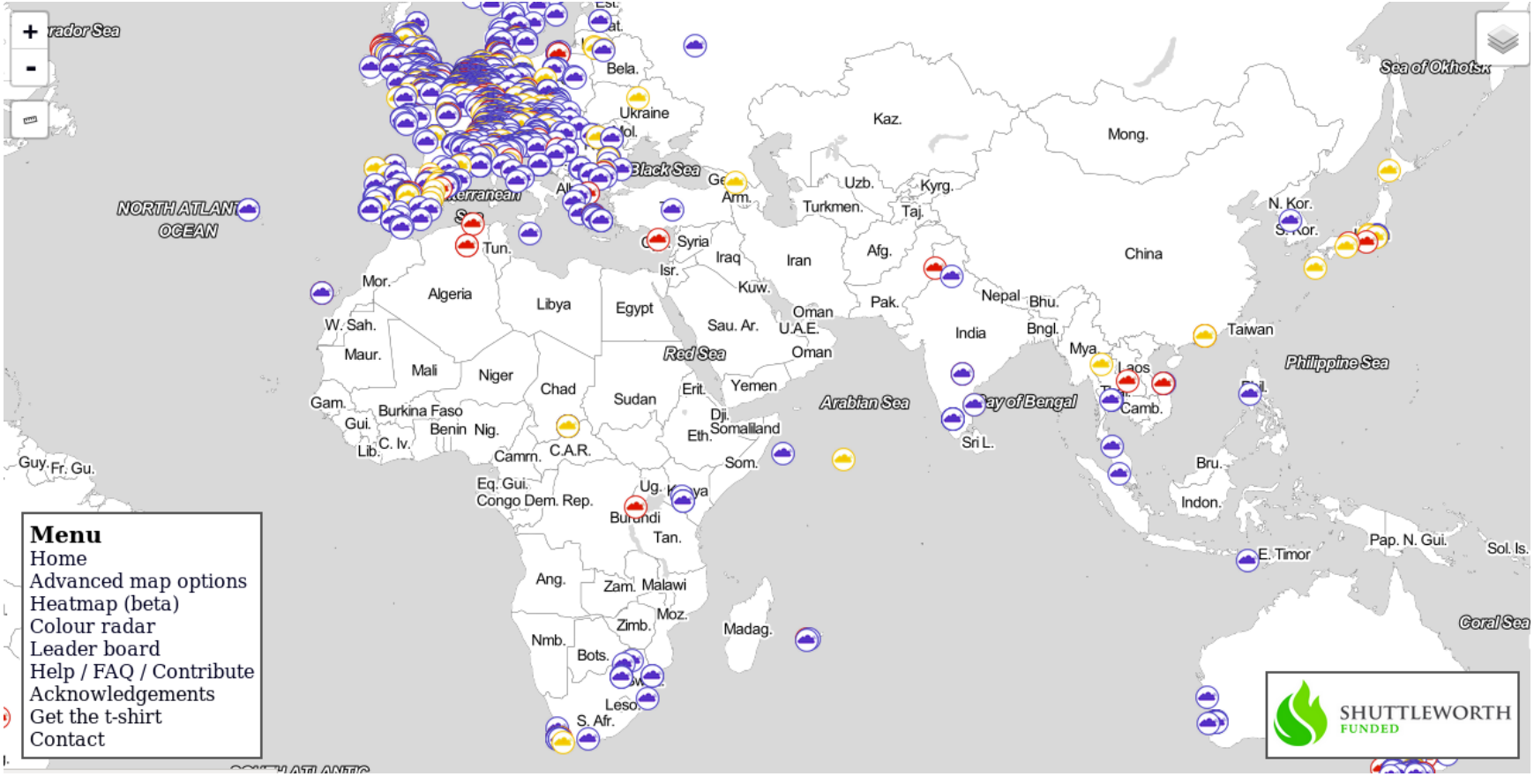
TTNMapper – examples of devices

- Pycom pyTrack
- Zane GPS tracker
- Adeunis Field Tracker
- Adafruit Feather with GPS feather wing
- TTGO T-Beam

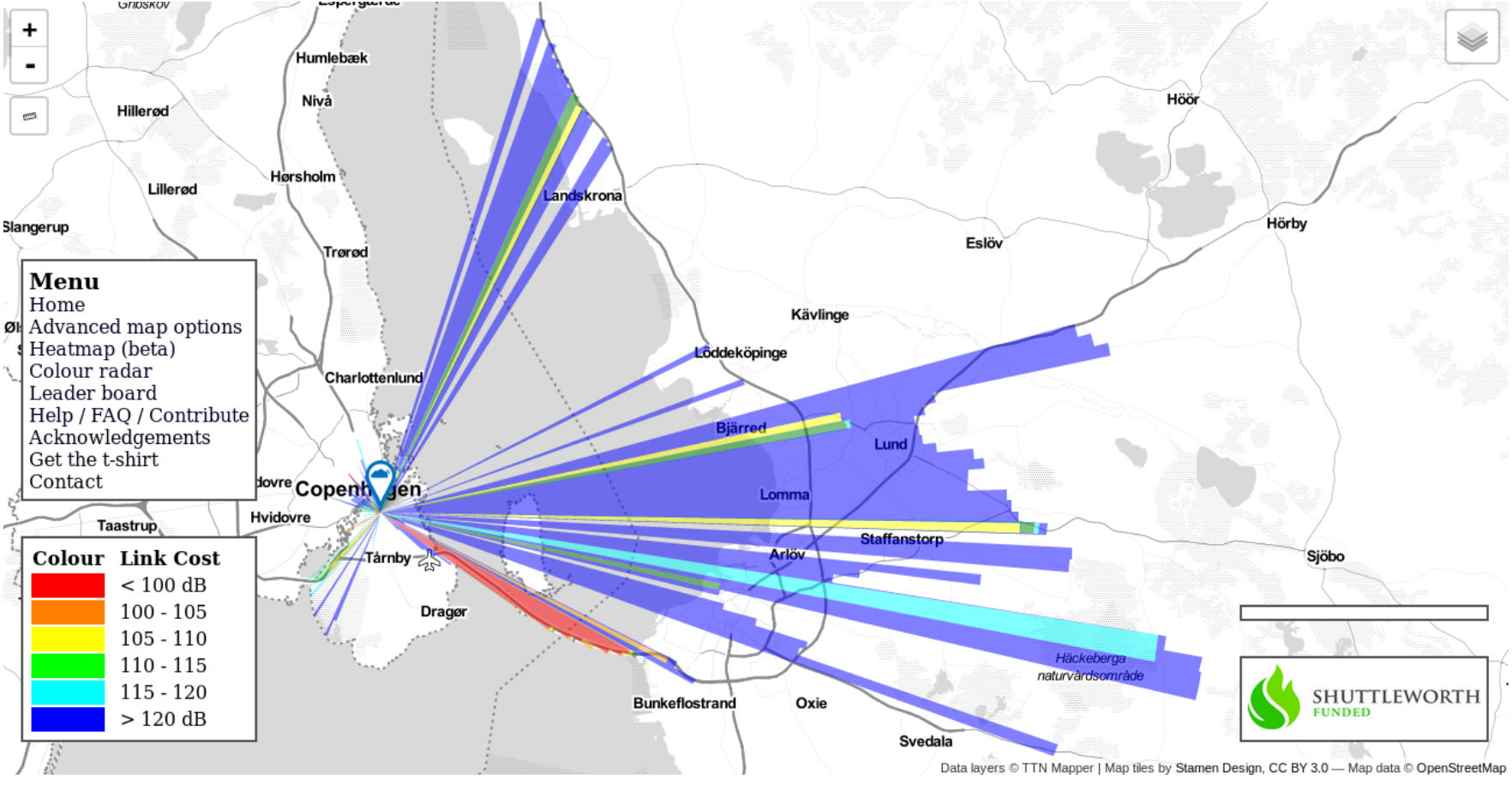
  and

  any LoRa board with GPS

TTNmapper examples



TTNmapper examples

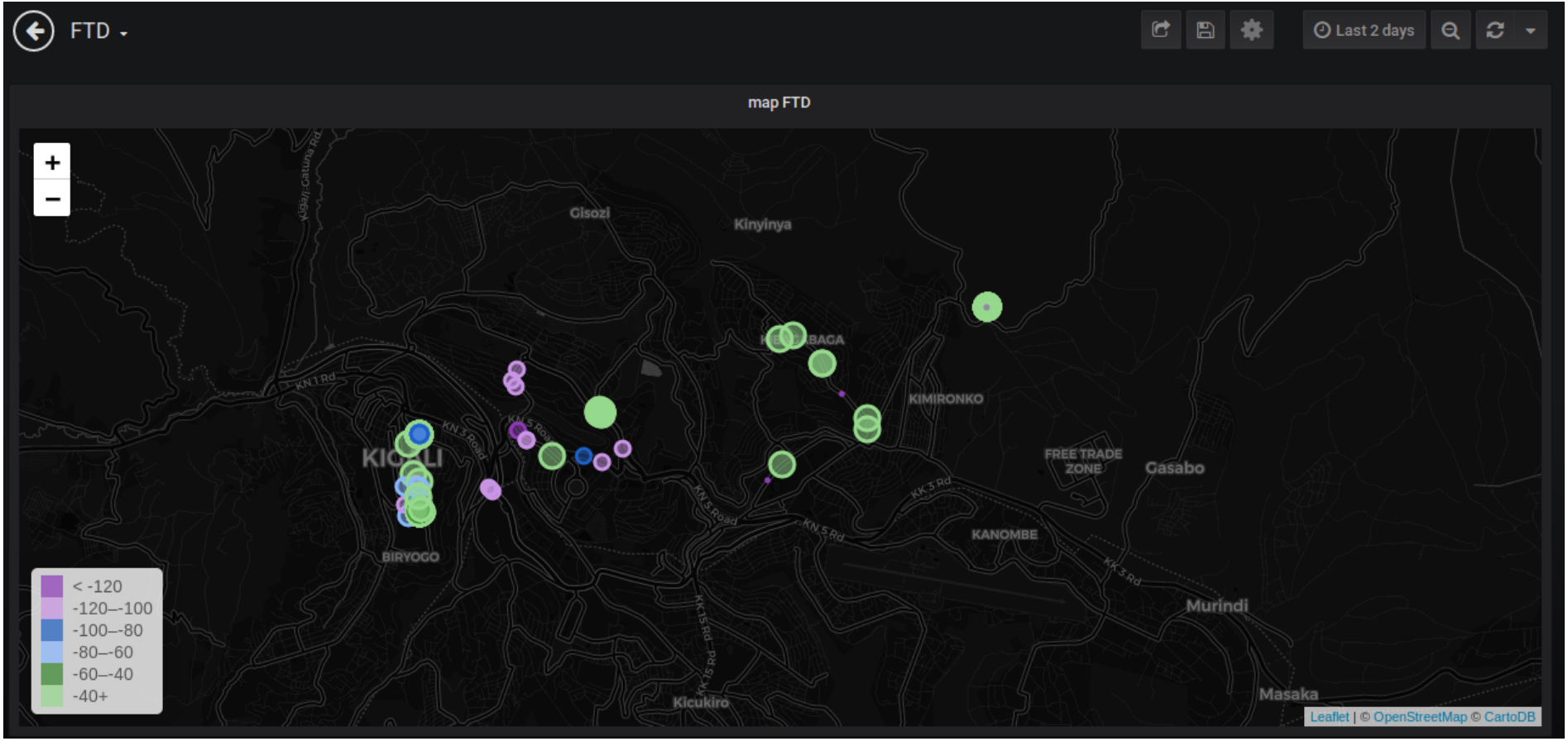


TTNmapper examples

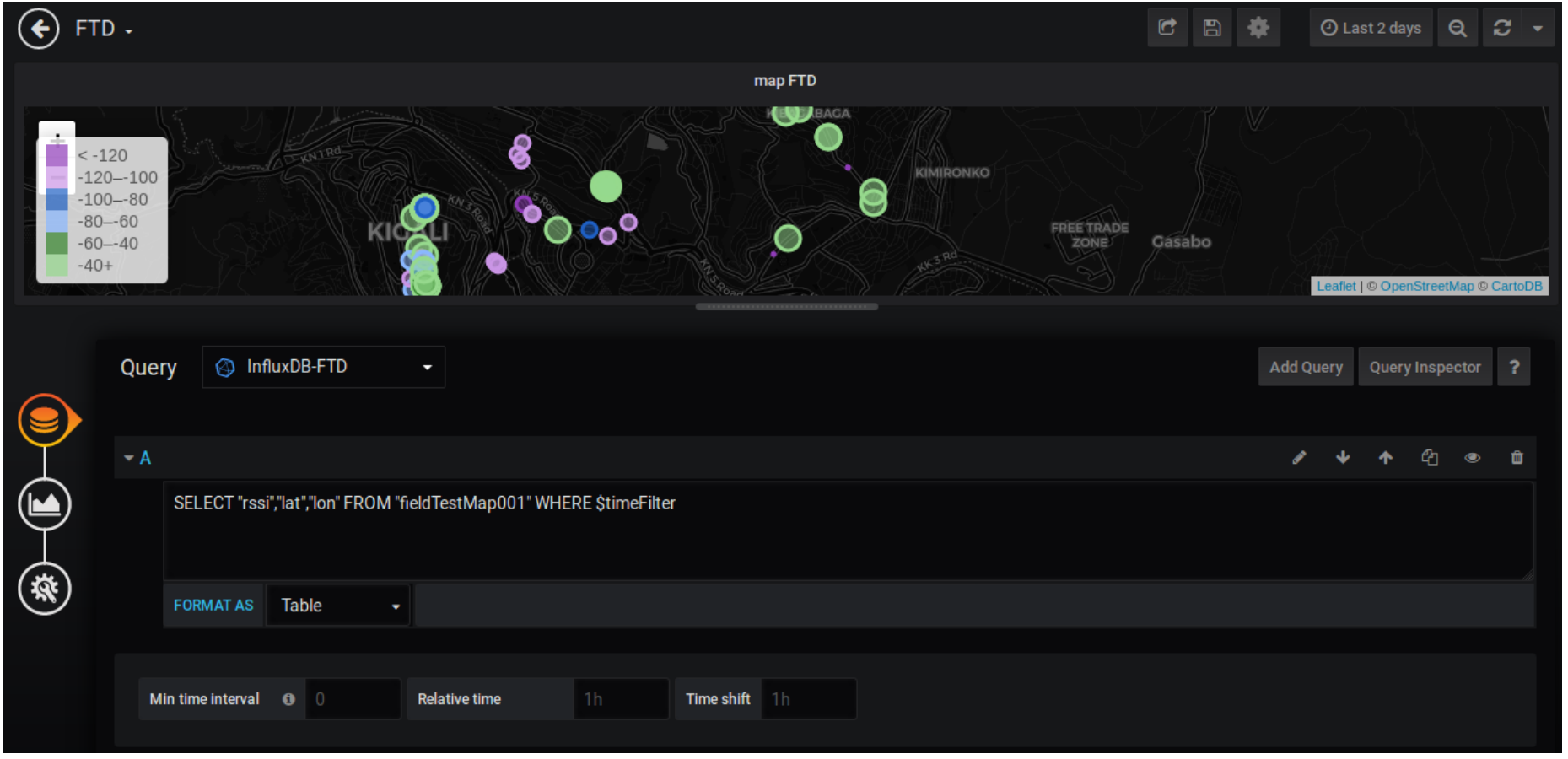
Grafana

- Using plugin *Worldmap panel*
- Can map any type of data source, as long as it provides latitude/longitude or geohash
- Advantages: Strong integration, many data sources, connection to additional data
- Disadvantages: limited to what is preconfigured
- More: https://grafana.com/plugins/grafana-worldmap-panel
- https://github.com/MartinKemper/LoRaWAN-Mapper

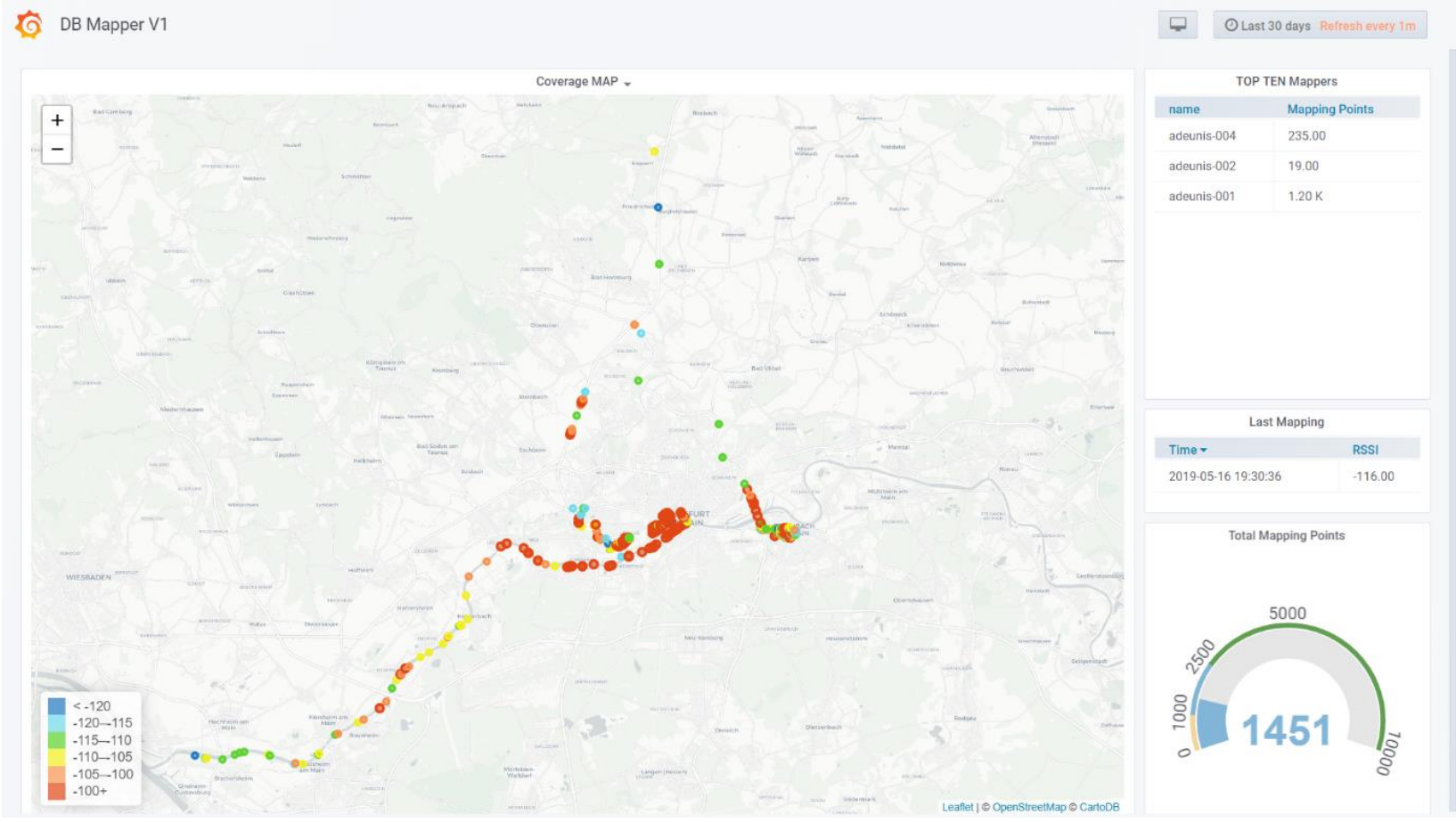
Grafana Worldmap examples



Grafana Worldmap examples



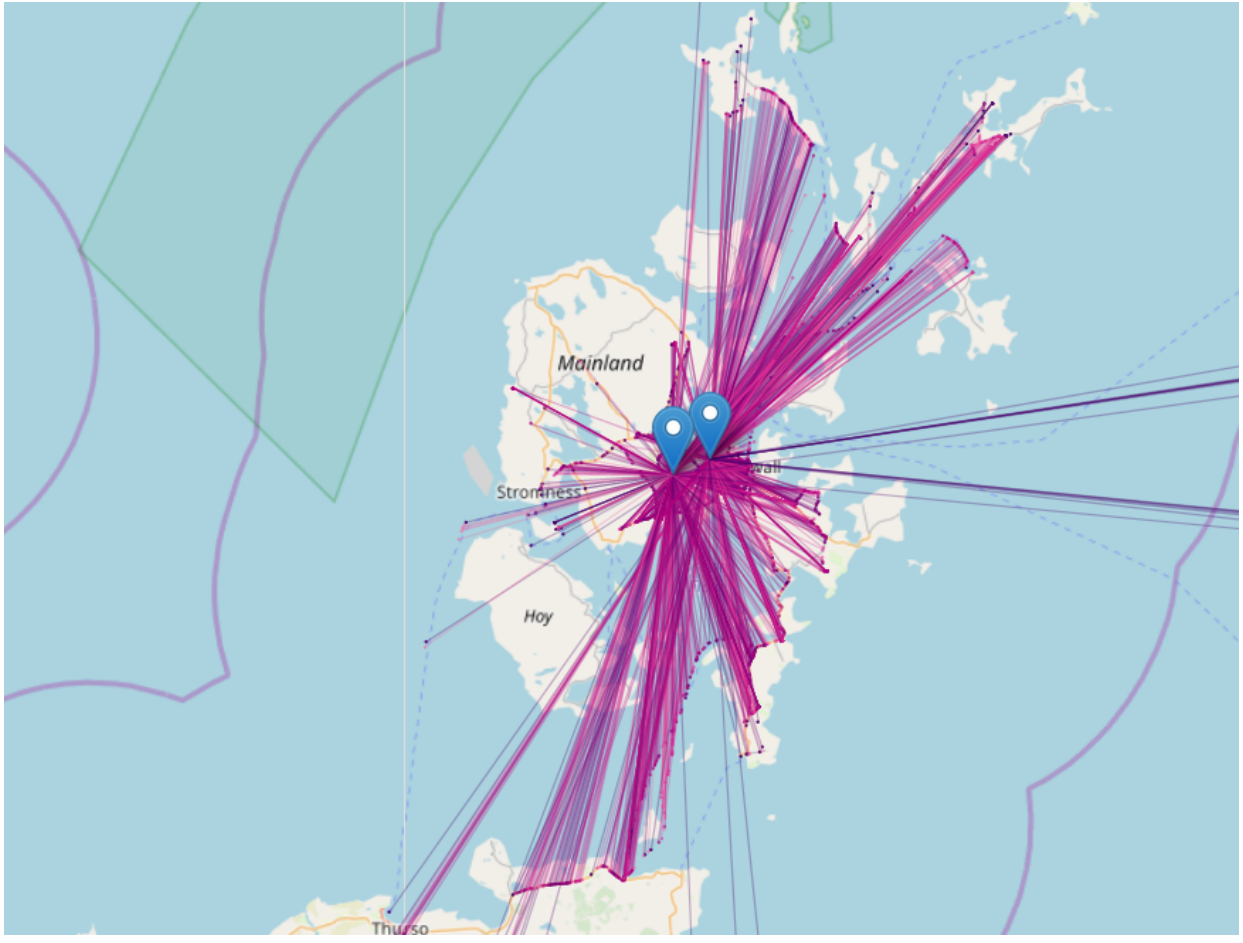
Grafana Worldmap examples



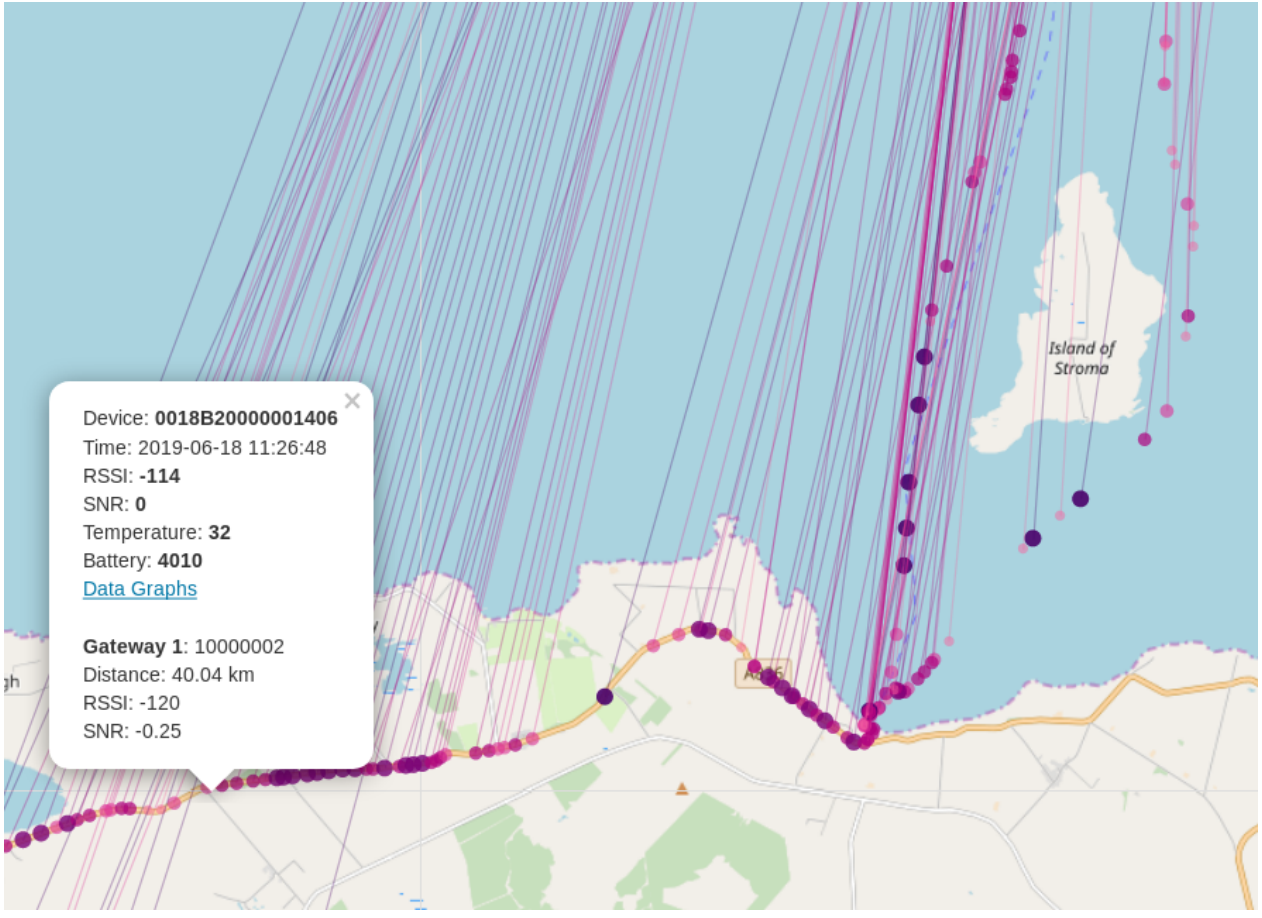
Leaflet maps

- A free open source javascript library for mapping
- Reads or receives e.g. json objects and creates map objects
- Advantages: very flexible – you can do pretty much anything
- Disadvantages: takes longer to learn
- More: https://leafletjs.com/

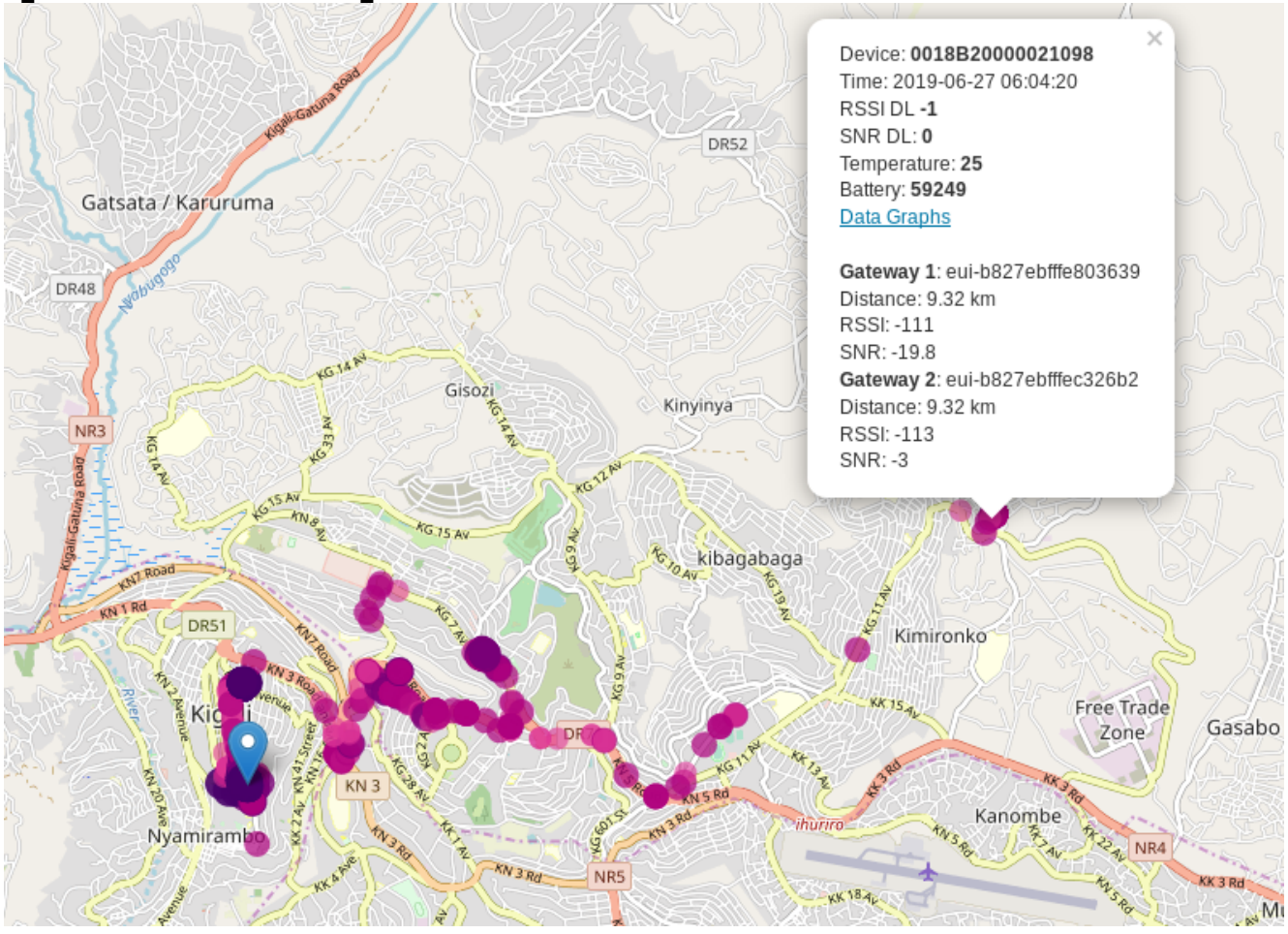
Leaflet maps examples



Leaflet maps examples



Leaflet maps examples



Write your own

- All LoRaWAN network servers offer data streams via e.g. MQTT, http APIs, and many more
- Free map sources, e.g. https://www.openstreetmap.org
- Connect these to your favorite programming language or environment, e.g. python, ruby, go, php, js ...
- Advantages: as strong as your coding skills :)
- Disadvantages: more work for you :)

Using IoT platforms

- All big IoT platforms, such as Azure, AWS, Google, IBM Watson, Cisco, Artik, Bosch, Siemens ... (and 100s more), offer some form of mapping
- Specialized mapping and visualization engines
- Advantages: integration
- Disadvantages: risk of lock-in, loss of real data ownership
- More: search the web!