Getting started with
TTN Mapper

Meetkoppel'20
Amersfoort, 25 January 2020

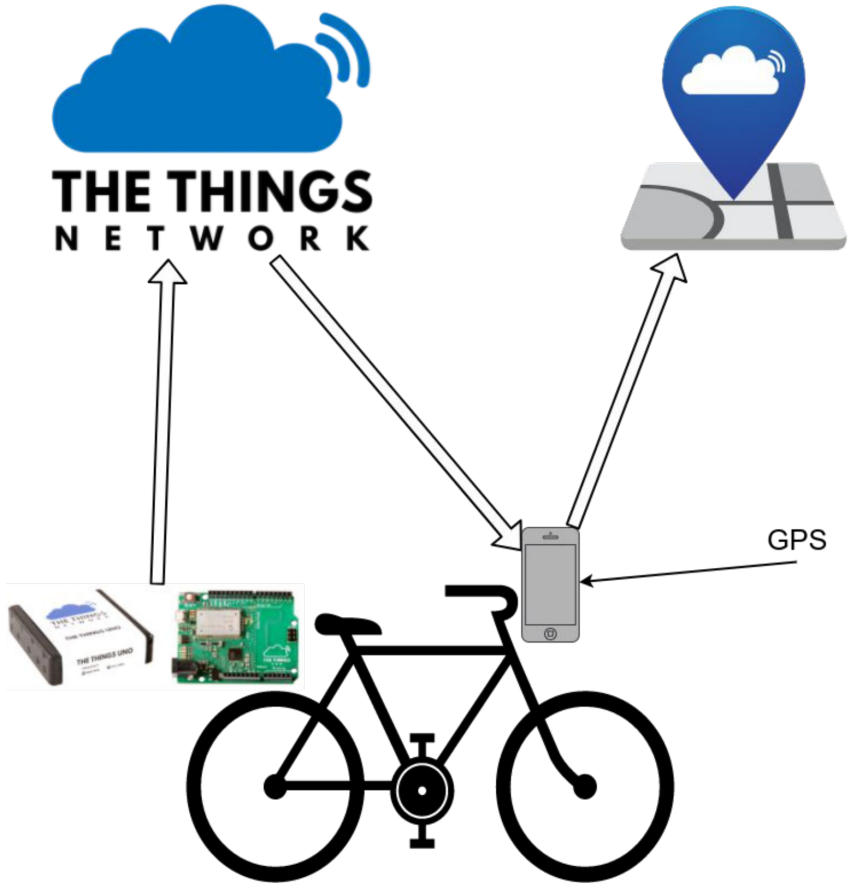
Photo: JP Meijers

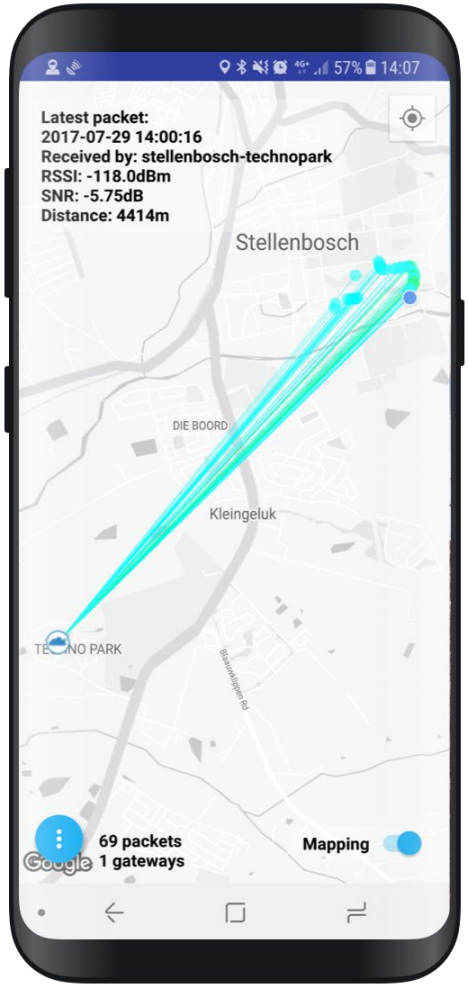

N Telenor 4G
17:44
60 %
Viewer
TTN Mapper
Configure
Bergen
Coverage
Autoscale
Mapping
Num datapoints: 95
Num gateways: 8
Connected: Production
Rockford Fosgate
VOL
PUSH PWR

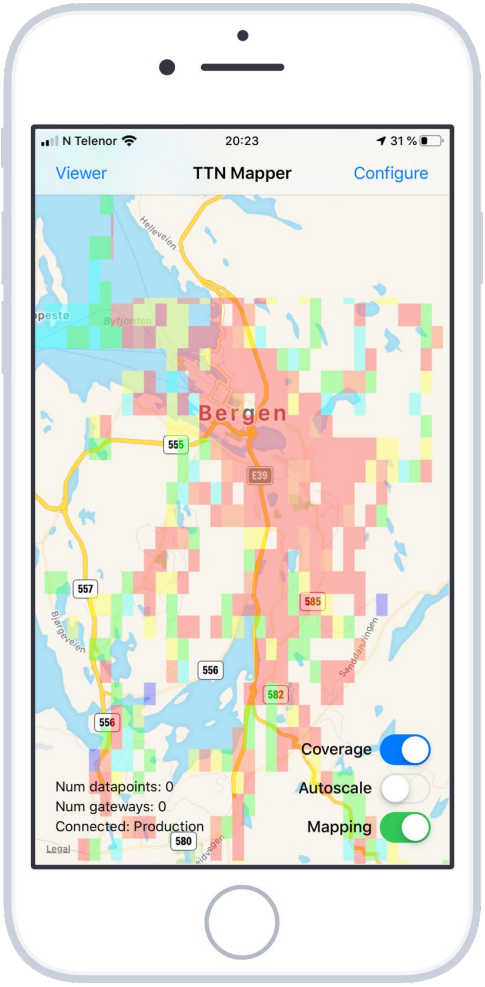
Method 1: Mobile App

A LoRaWAN packet is sent from an end device, via TTN and received by a smartphone app. It's geotagged and uploaded to TTN Mapper.

- Easiest
- Works with any device
- Real time feedback of coverage



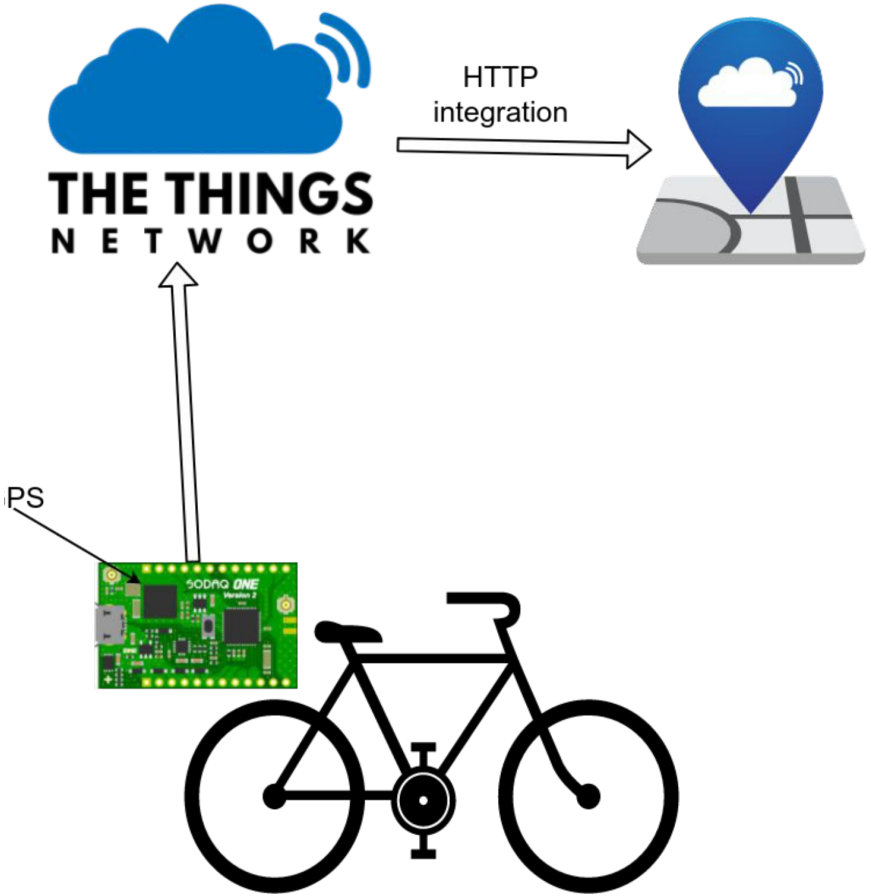

57% 14:07
Latest packet:
2017-07-29 14:00:16
Received by: stellenbosch-technopark
RSSI: -118.0dBm
SNR: -5.75dB
Distance: 4414m
Stellenbosch
DIE BOORD
Kleingeluk
TECHNO PARK
69 packets
1 gateways
Mapping
Google

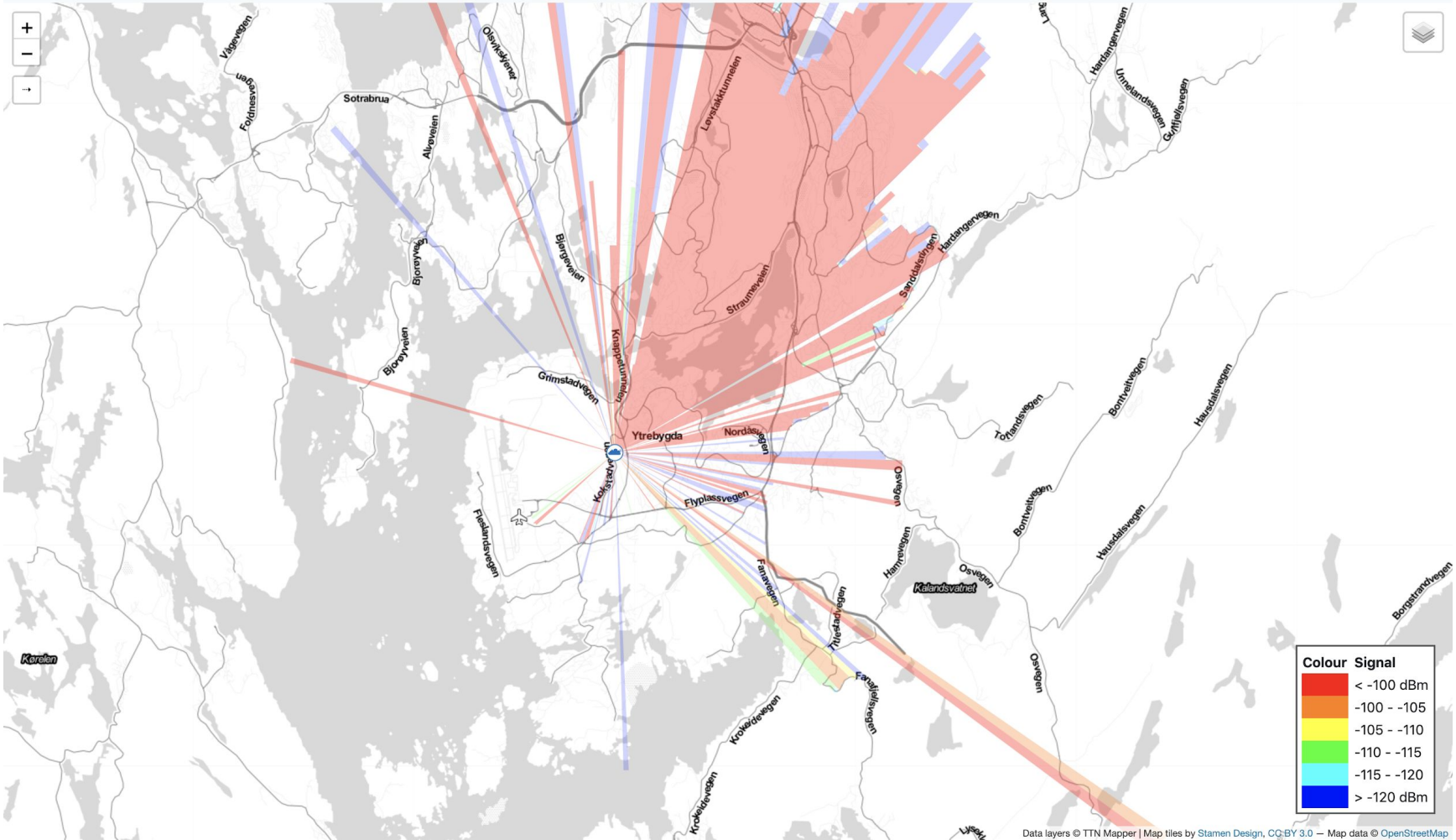

N Telenor
20:23
31 %
Viewer
TTN Mapper
Configure
Bergen
555
E39
557
585
556
582
556
580
Coverage
Autoscale
Mapping
Num datapoints: 0
Num gateways: 0
Connected: Production
Legal

Method 2: GPS Tracker

An end device with a GPS sends coordinates via TTN. The coordinates in the payload is received by TTN Mapper, where the metadata is geotagged.

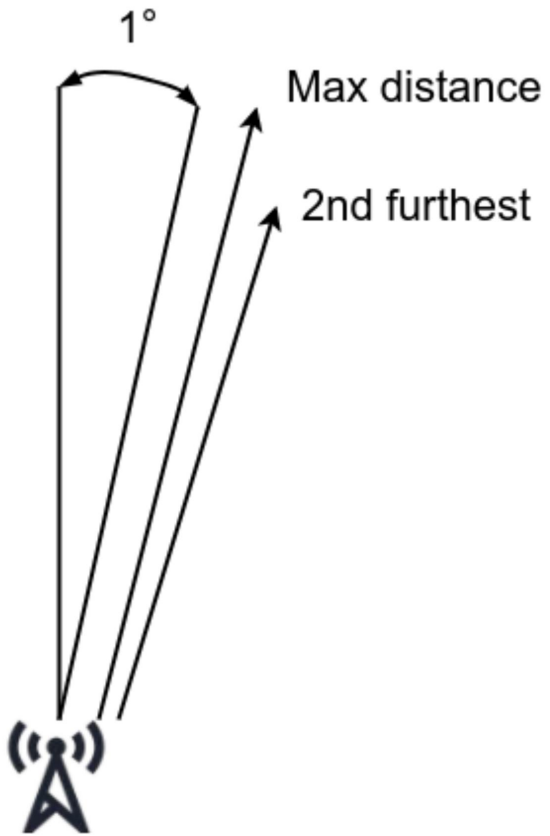
- Sending out your own location
- Metadata (signal, gateways) added by network
- Install and forget for continuous coverage mapping

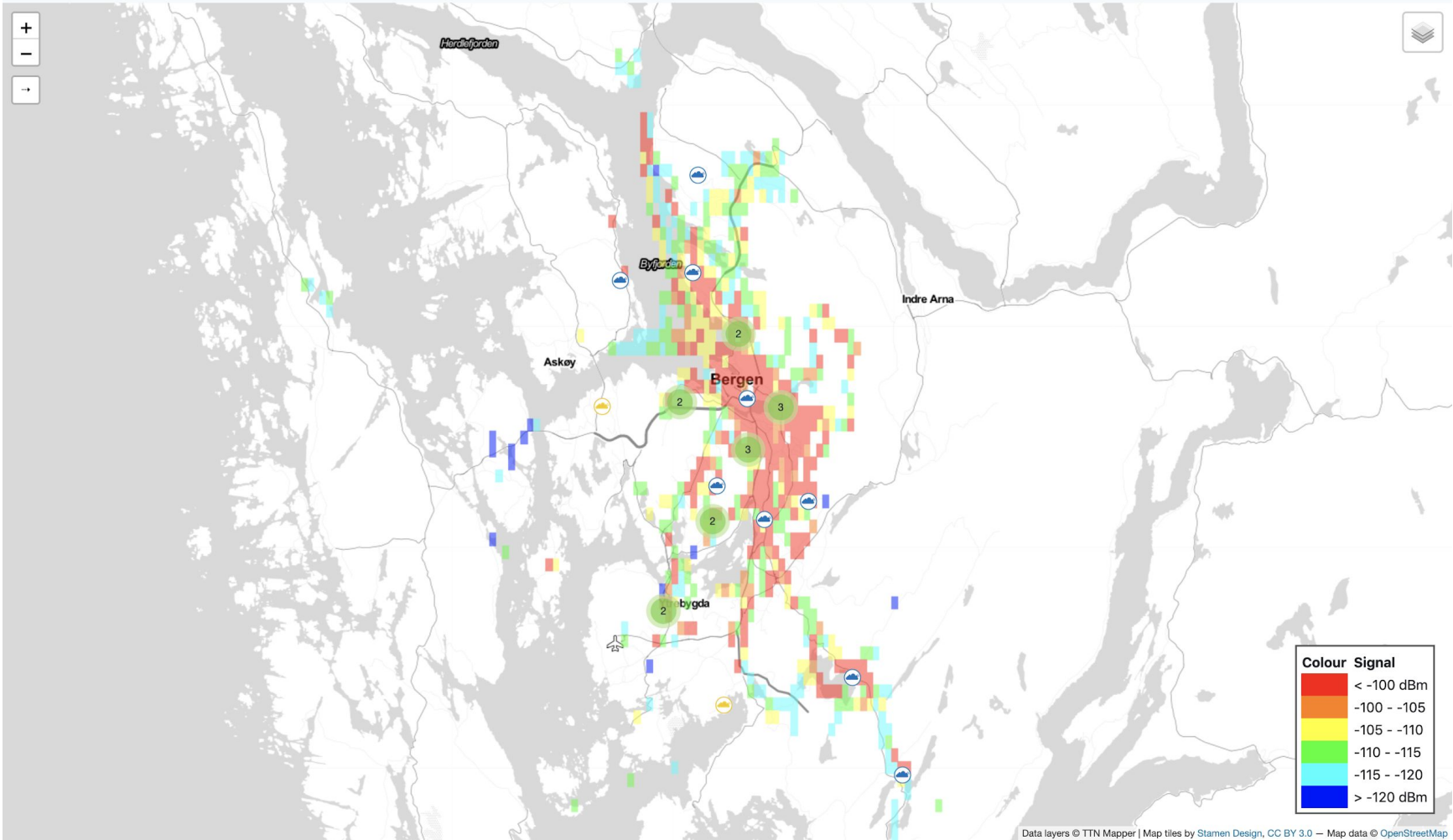



Colour Signal
< -100 dBm
-100 - -105
-105 - -110
-110 - -115
-115 - -120
> -120 dBm
Ytrebygda
Sotrabrua
Grimstadvegen
Flyplassvegen
Nordåsvegen
Kalandsvatnet
Karelen
Data layers © TTN Mapper | Map tiles by Stamen Design, CC BY 3.0 — Map data © OpenStreetMap

Radar plot: Bearing and distance

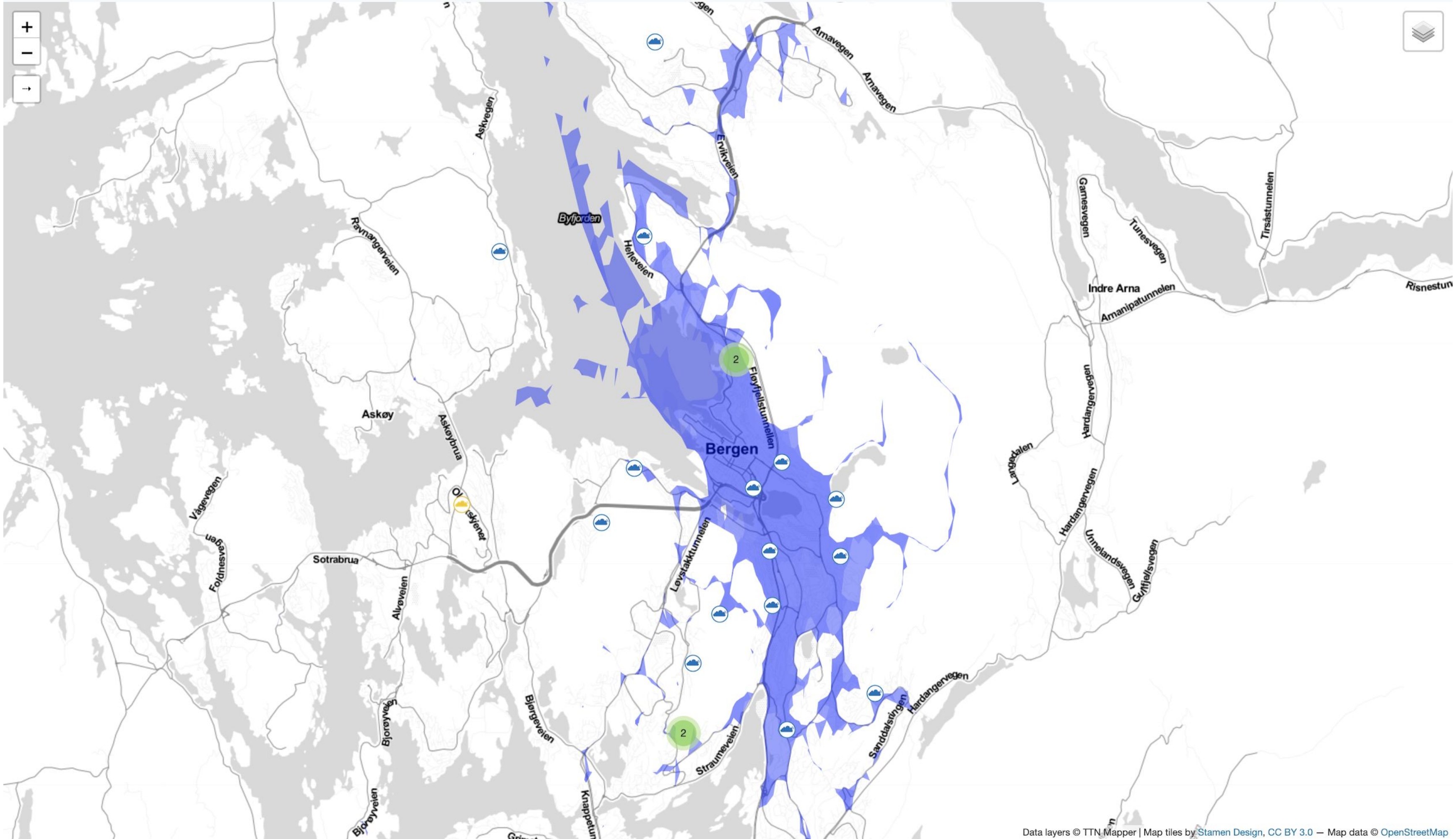
- Radio signals travel in straight lines unless reflected.
- Coverage can be visualised as a radar plot.
- Max distance considered outlier.
- Calculated per RSSI colour range.





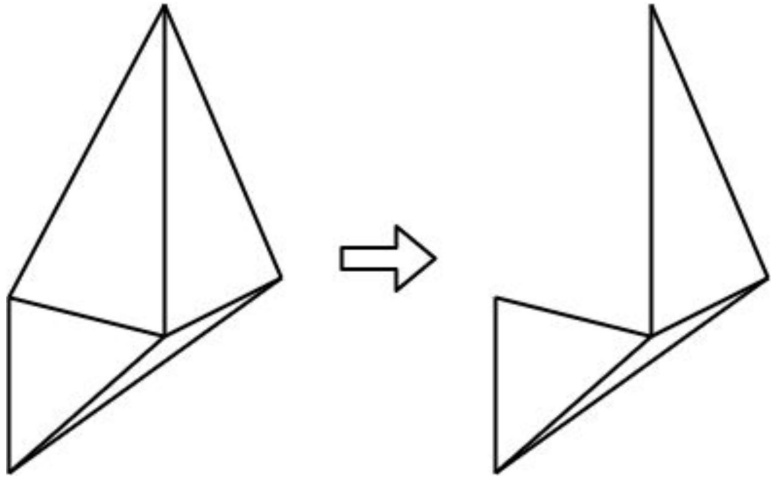
TTN Mapper Advanced maps Heatmap (beta) Colour Radar Area Plot Leader board Acknowledgements FAQ

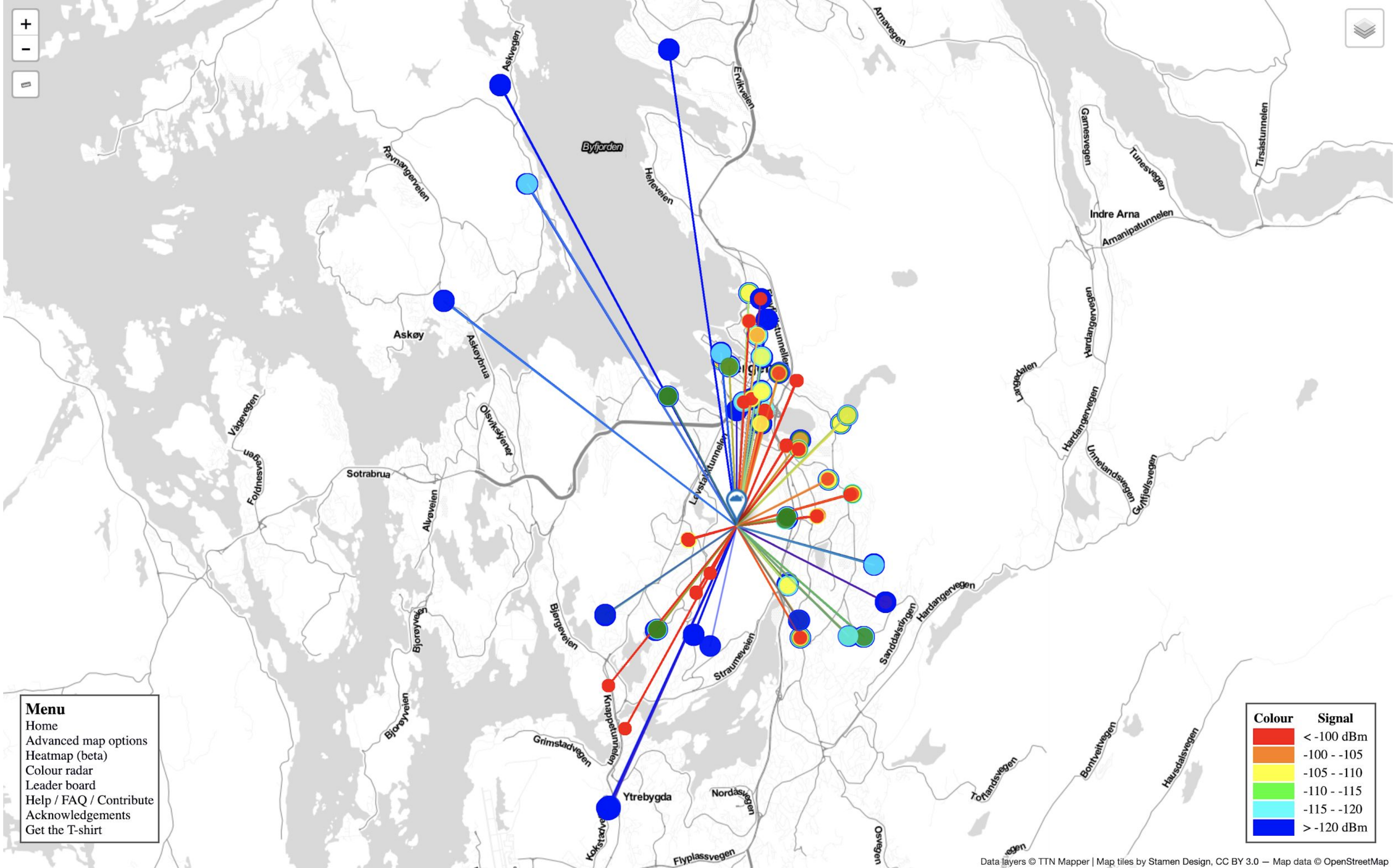
Get the T-Shirt BECOME A PATRON



Alpha shapes (concave hulls)

- All points connected together to form triangles.
- If a triangle's surface area is bigger than alpha, delete the triangle.
- What remains is a polygon of the coverage area.




Askvegen
Ervikveien
Arnavegen
Byfjorden
Helleveien
Ravnangerveien
Garnesvegen
Tunesvegen
Tirsåstunnelen
Indre Arna
Arnanipatunnelen
Askøy
Askøybrua
Hardangervegen
Langedalen
Vågevegen
Olsvikskjenet
Foldnesvegen
Sotrabrua
Løvstakktunnelen
Unnelandsvegen
Gullfjellsvegen
Alvøveien
Hardangervegen
Bjergeveien
Bjorøyvegen
Sanddalsringen
Straumeveien
Menu
Home
Advanced map options
Heatmap (beta)
Colour radar
Leader board
Help / FAQ / Contribute
Acknowledgements
Get the T-shirt
Grimstadvegen
Knappetunnelen
Ytrebygda
Nordåsvegen
Toftlandsvegen
Bontveitvegen
Hausdalsvegen
Osvegen
Flyplassvegen
Colour
Signal
< -100 dBm
-100 - -105
-105 - -110
-110 - -115
-115 - -120
> -120 dBm
Data layers © TTN Mapper | Map tiles by Stamen Design, CC BY 3.0 — Map data © OpenStreetMap

Leader board

Top contributing applications by packets

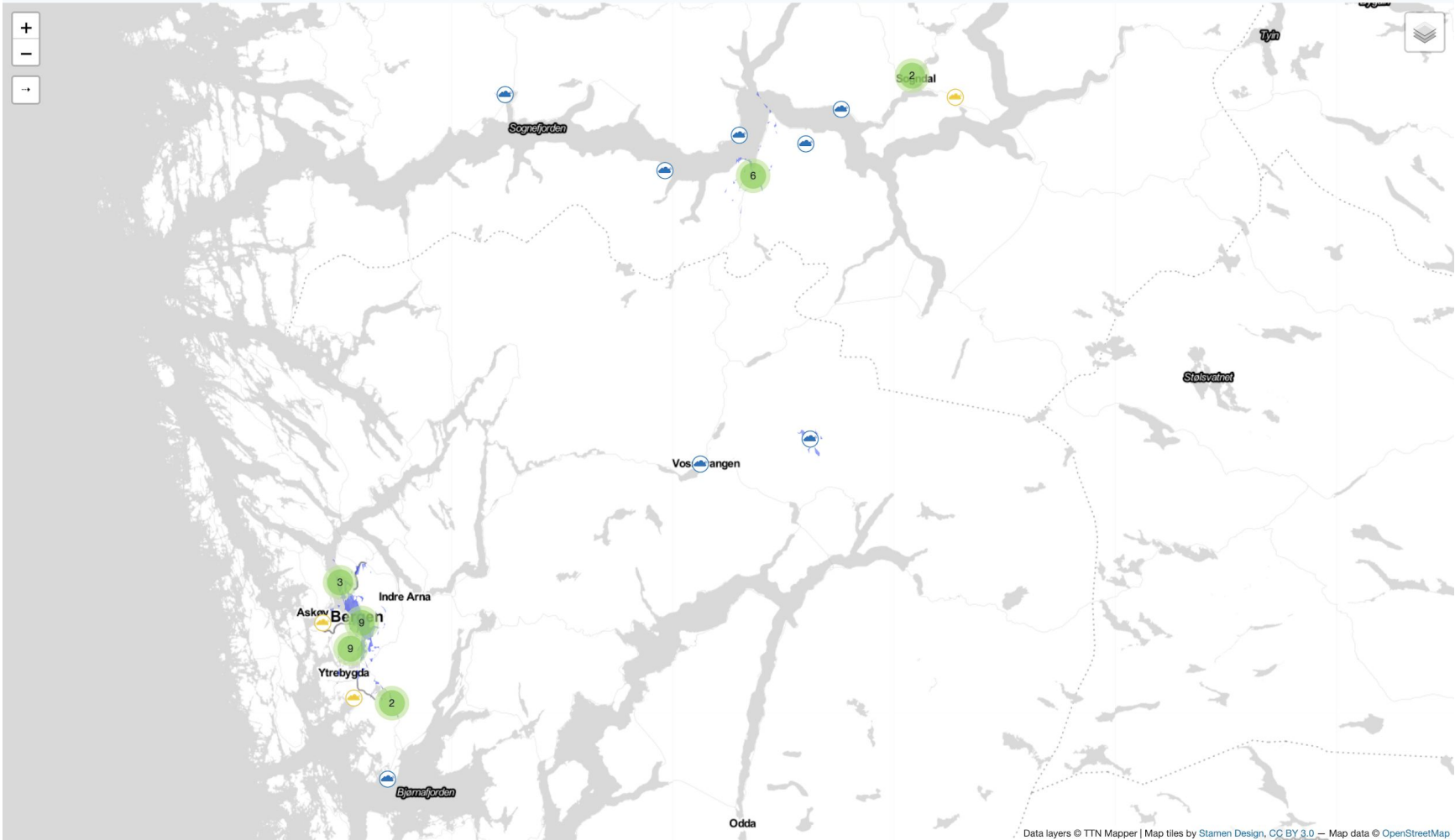
#	Name	App ID	Packets	Gateways	Channels	Devices
1		meet-je-stad	20410155	588	10	383
2		paxcounteraid	12355845	263	8	2
3		oba-data	6510691	169	16	89
4		mapper_gemeente_harderwijk	6413042	78	8	1
5	SkyLab.NL	skylab_ttn	5054088	599	10	8
6		ttntracker-v1_2	4384300	125	8	7
7		maribor-mapper	3625505	416	9	7
8		openiot_to_ttnmapper	1635483	356	8	27
9		gps_tracker_lt-100h	1242295	18	11	5
10		ttn_mapper_wa	1240813	182	8	3

Top contributing applications by gateways

#	Name	App ID	Gateways	Packets	Channels	Devices
1	PE1MEW	rfsee_ttnmapper	1125	745933	8	5
2		pa3dsb_location	721	222368	8	2
3	SkyLab.NL	skylab_ttn	599	5054088	10	8
4		meet-je-stad	588	20410155	10	383
5		franstest2	536	71083	8	1
6	PE1MEW	rfsee_drivetest	515	94125	8	3
7	The Action Truck	blip	510	461291	8	3
8		allorafactory_asgard	445	1739	8	1
9		t-beam	428	736610	11	6
10		maribor-mapper	416	3625505	9	7

Top contributing nodes by packets

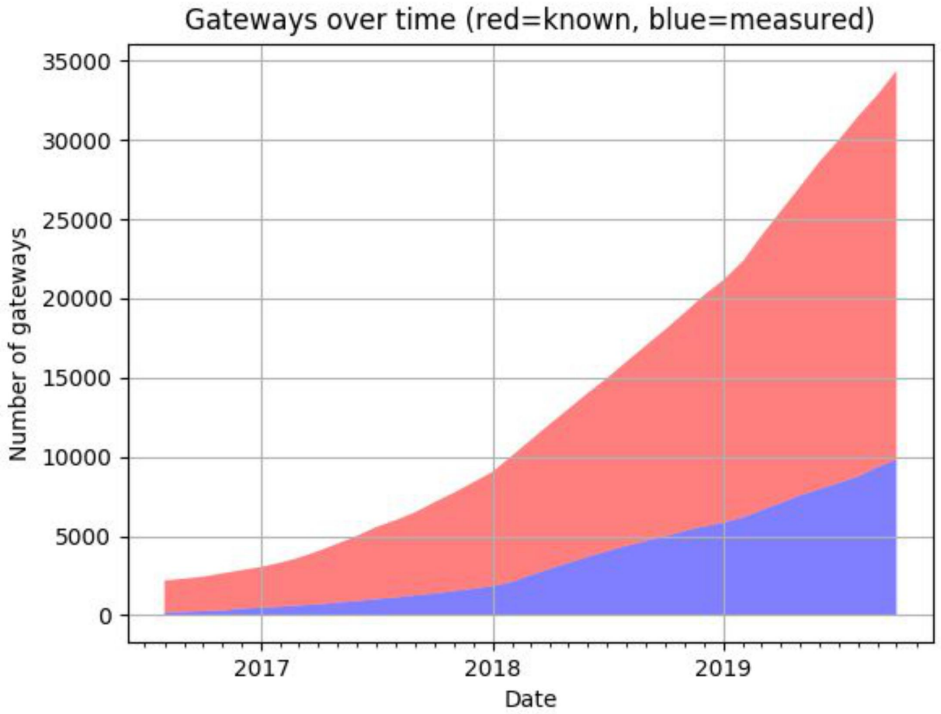
#	Name	App ID	Dev ID	Packets	Gateways	Channels

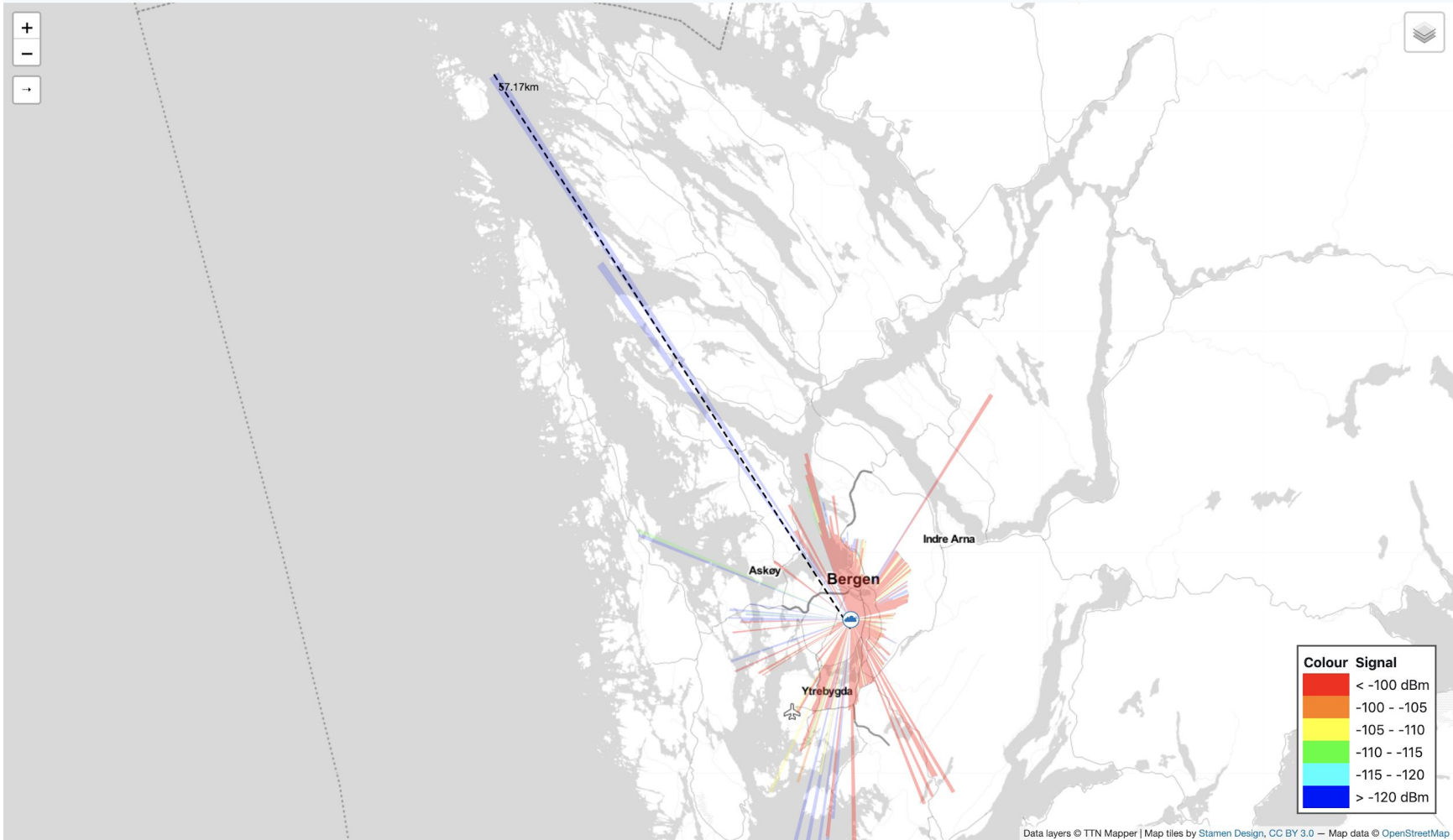


Some interesting stats

Since December 2015:

- 34993 unique gateway IDs seen
- 10004 gateways mapped by 6122 contributors
- 95 454 886 raw data samples



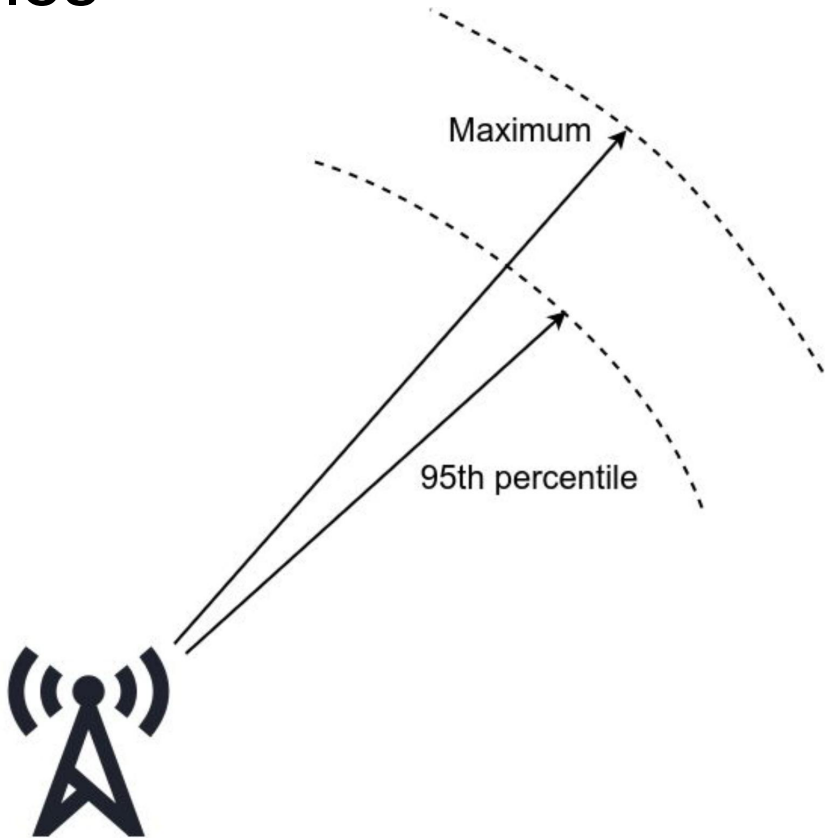



Sognefjorden
Bergen
500.58km
Boknafjorden
Sandnes
Skien
Kristiansand
Skagerrak
North Sea
Colour Signal
< -100 dBm
-100 - -105
-105 - -110
-110 - -115
-115 - -120
> -120 dBm
Data layers © TTN Mapper | Map tiles by Stamen Design, CC BY 3.0 — Map data © OpenStreetMap

Simple naive aggregation: circles

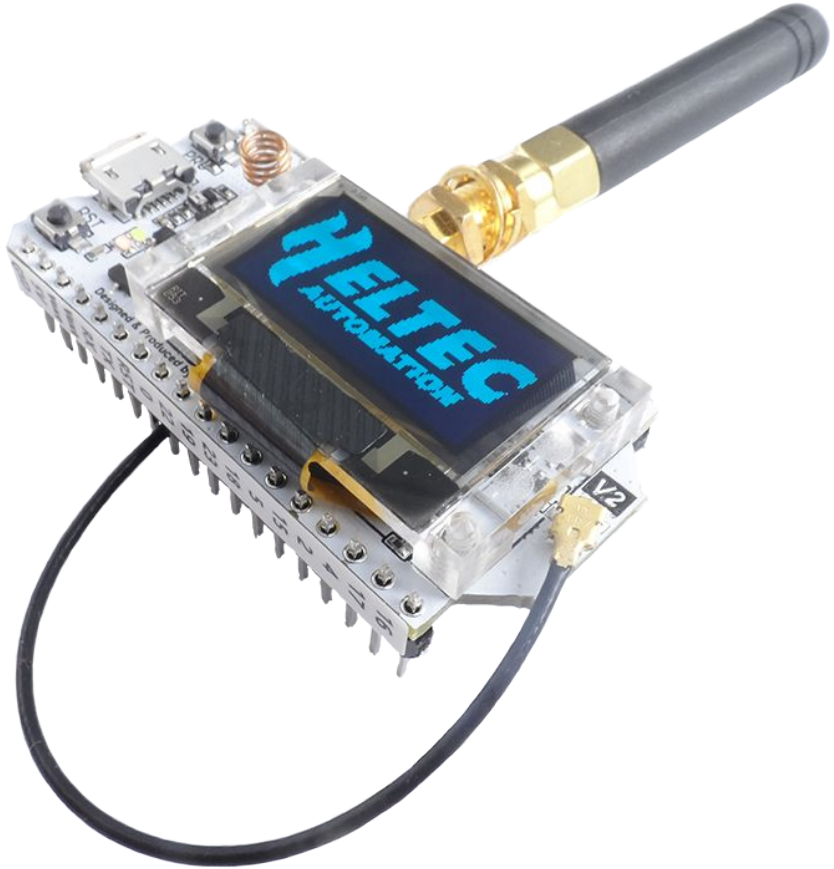
- Maximum distance as radius
  - Too optimistic
  - Outliers

- 95th percentile as radius
  - Filters outliers
  - Better, but still too optimistic
  - Shadows of hills, buildings ignored



Heltec ESP32 Lora

- About 150 kr
- Comes with an OLED screen
- No GPS onboard



TTGO T-Beam

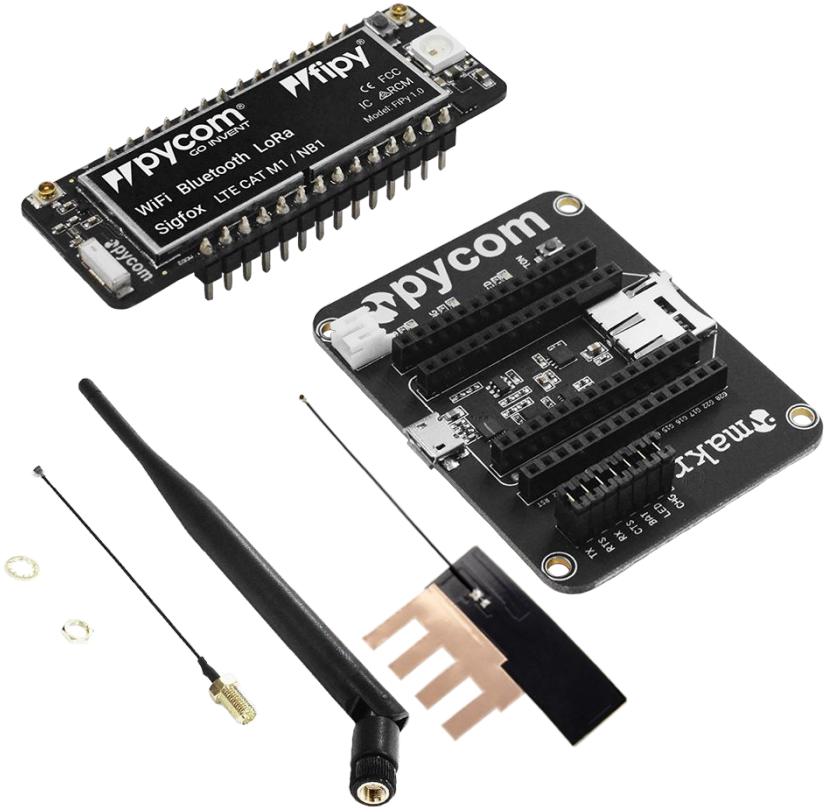
- About 250 kr
- A OLED screen can be soldered on
- Integrated GPS
- Lithium battery mount
- Beware of Monday editions

RAK 5205

- About 500 kr
- Integrated GPS
- Integrated weather sensors
- Integrated accelerometer
- No OLED screen

FiPy + Pytrack Bundle

- About 1000 kr (for the Rolls Royce)
- Comes with Sigfox / NB IoT
- Cheaper combinations available
- Lot of flexibility
- Integrated GPS
- No OLED screen



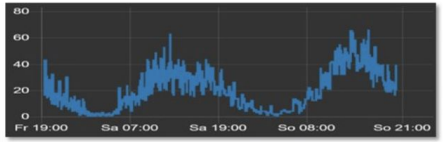
README.md

ESP32-Paxcounter

Wifi & Bluetooth driven, LoRaWAN enabled, battery powered mini Paxcounter built on cheap ESP32 LoRa IoT boards

Tutorial (in german language): https://www.heise.de/select/make/2019/1/1551099236518668

IMPORTANT: MUST USE PLATFORMIO V4 (not v3.x)



Finally – a big thanks to JP Meijers

For providing the TTN Mapper service for free to all of us. And for letting me use some of his slides today. If you like the work, please consider becoming a Patreon. Read more here: https://www.patreon.com/bePatron?u=24672712


THE THINGS
NETWORK
BERGEN
Thanks for your attention!
Ketil Moland Olsen
ketilmo.no
www.thethingsnetwork.org/community/bergen/
@TTN_Bergen