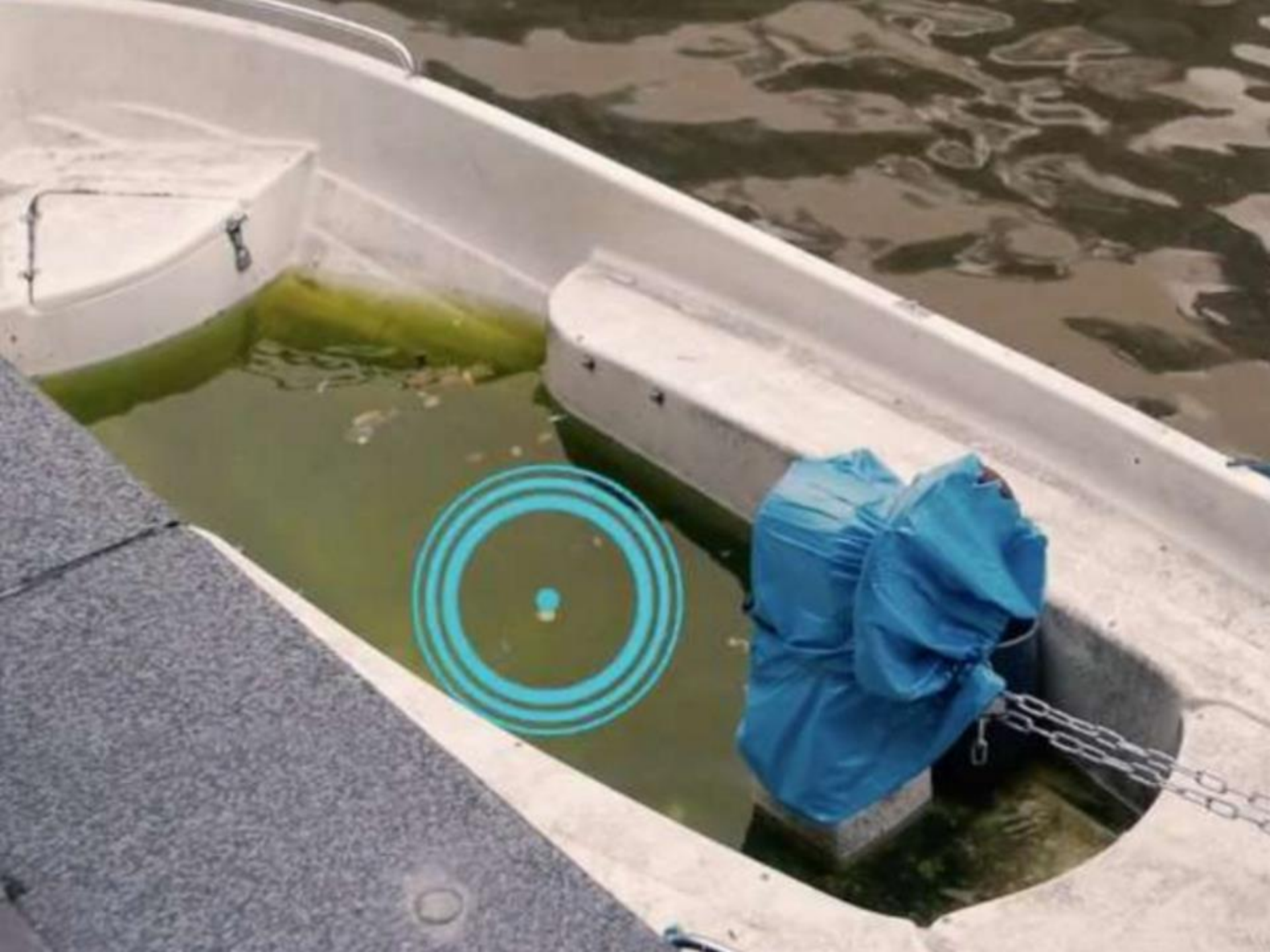
@thethingsntwrk @eclipsepaho @EclipseScout
@ZimMatthias



LoRa™

- Long Range
  1-5 km
- Low Power
  2xAA (Nodes)
- Low Cost
  €1,500

LoRa vs LTE-M vs Sigfox

December 22nd, 2015 | Published in Wireless Connectivity | 23 Comments

provide a technology that lets other companies enable a global Internet of Things

become a global Internet of Things operator

LTE-M

evolve an existing technology to make more money for network operators

The Things Network

The Things Network is a global, crowdsourced, open, free and decentralized internet of things network.

Pre-order

Created by

Wienke Giezeman

934 backers pledged €295,331 to help bring this project to life.

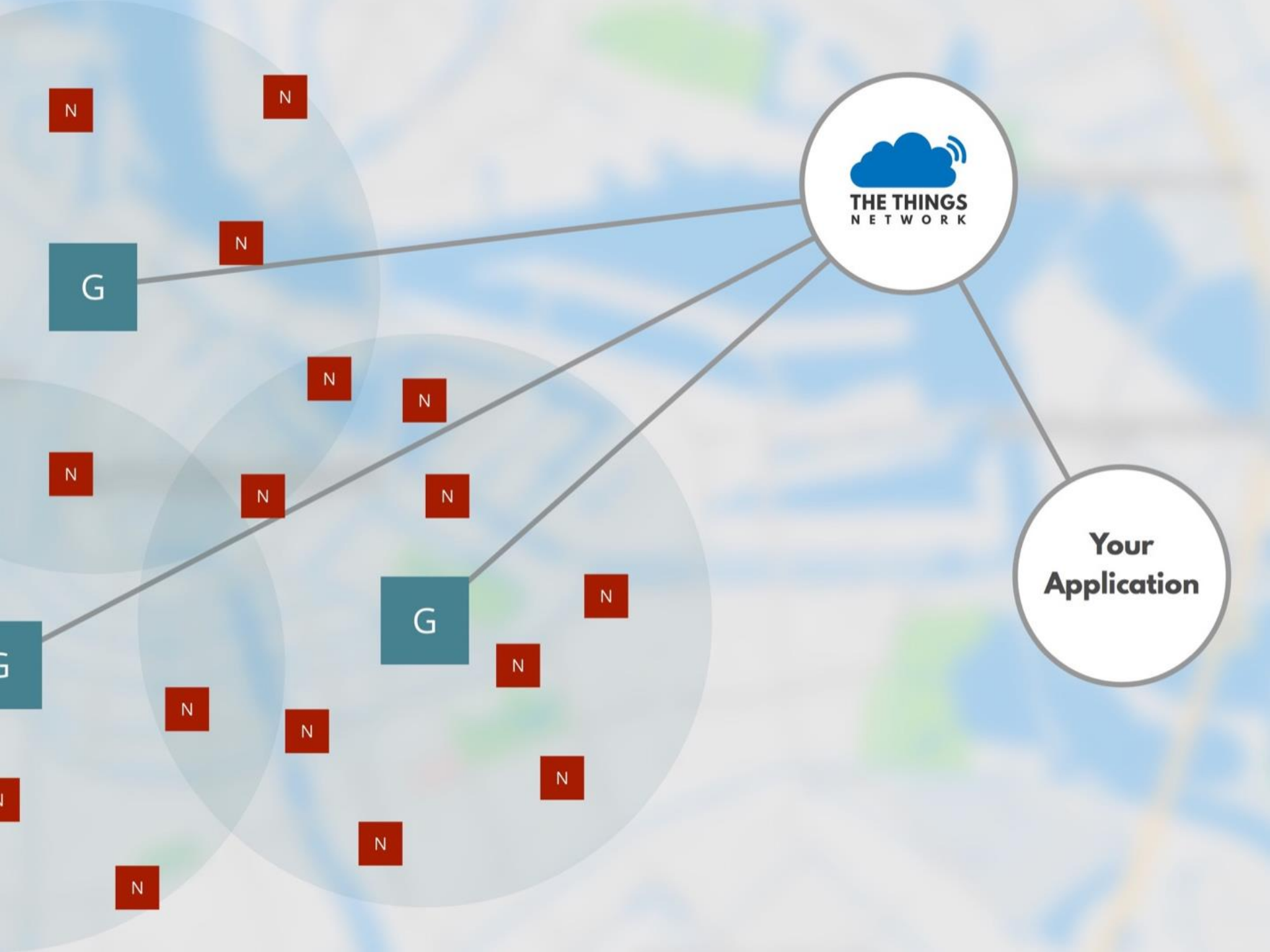
The Things Network Manifesto

- Everything that carries power will be connected to Internet eventually.
- Controlling the network that makes this possible means controlling the world.
- We believe that this power should not be restricted to a few people, companies or nations.
- Instead, this should be distributed over as many people as possible without the possibility to be taken away by anyone. We therefore founded "The Things Network".

Security and Privacy

The Things Network is a highly secure public network that supports true end-to-end encryption, mitigations against various man-in-the-middle attacks and support for different 128-bit encryption keys for every single end device.

LoRaWAN enforces using AES 128-bit message integrity check and payload encryption. Payload is encrypted and decrypted in your domain only: on the end device and in the Handler (see components). You can choose to operate your own Handler to keep your keys private. The Router and Broker route data based on public metadata and cannot decrypt payload.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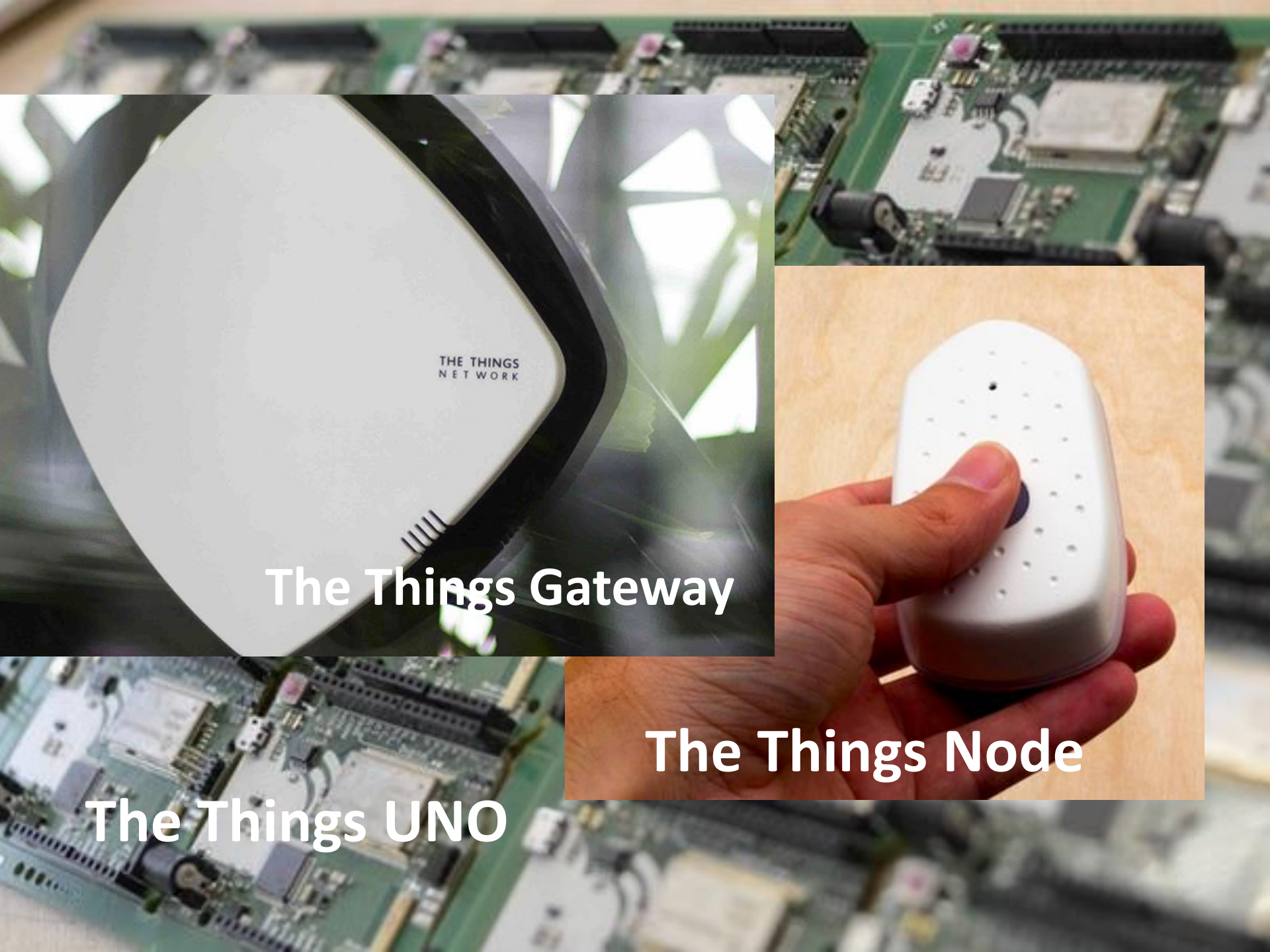
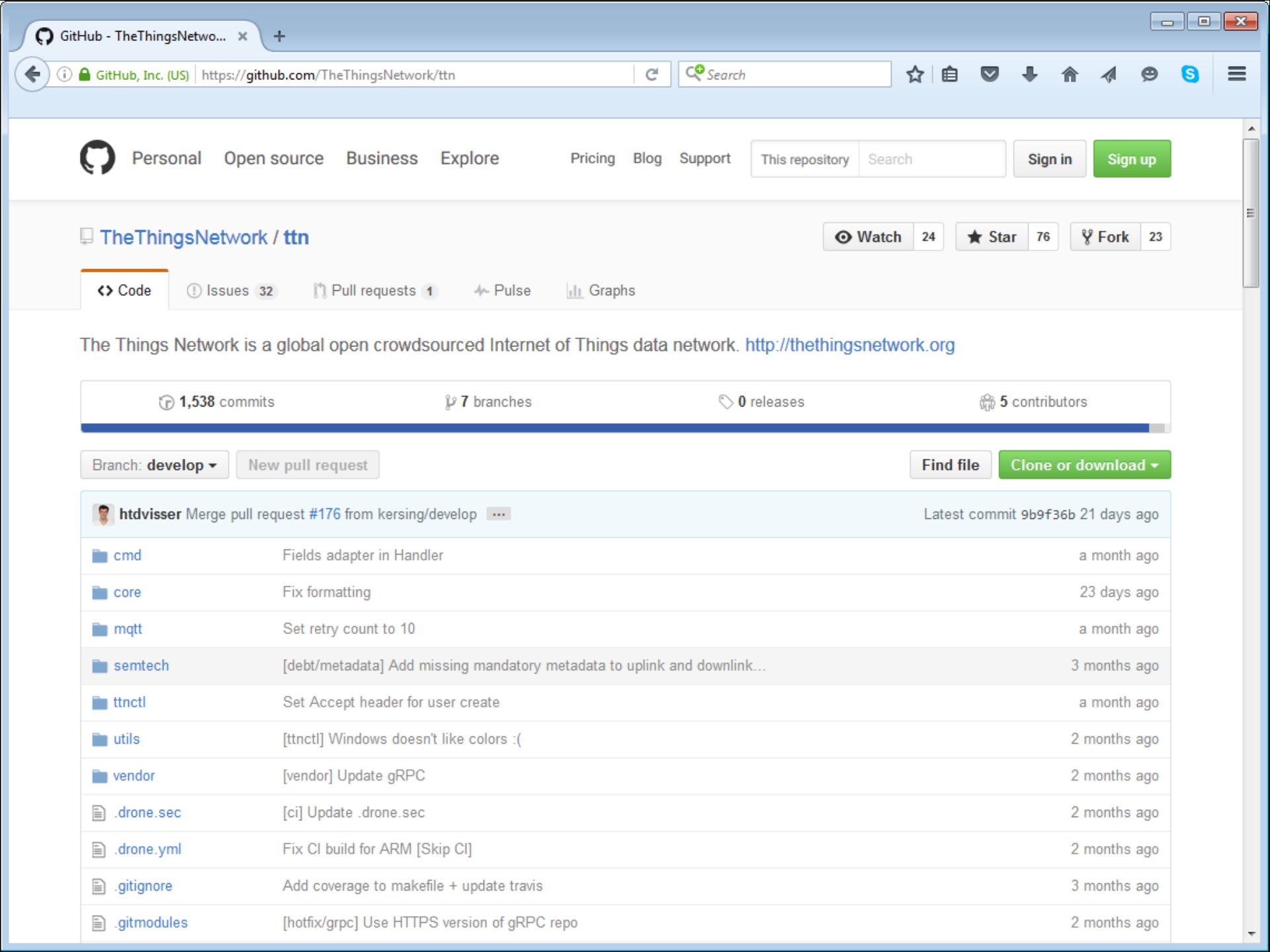
THE THINGS
NETWORK
Your
Application


THE THINGS
NETWORK
The Things Gateway
The Things Node
The Things UNO

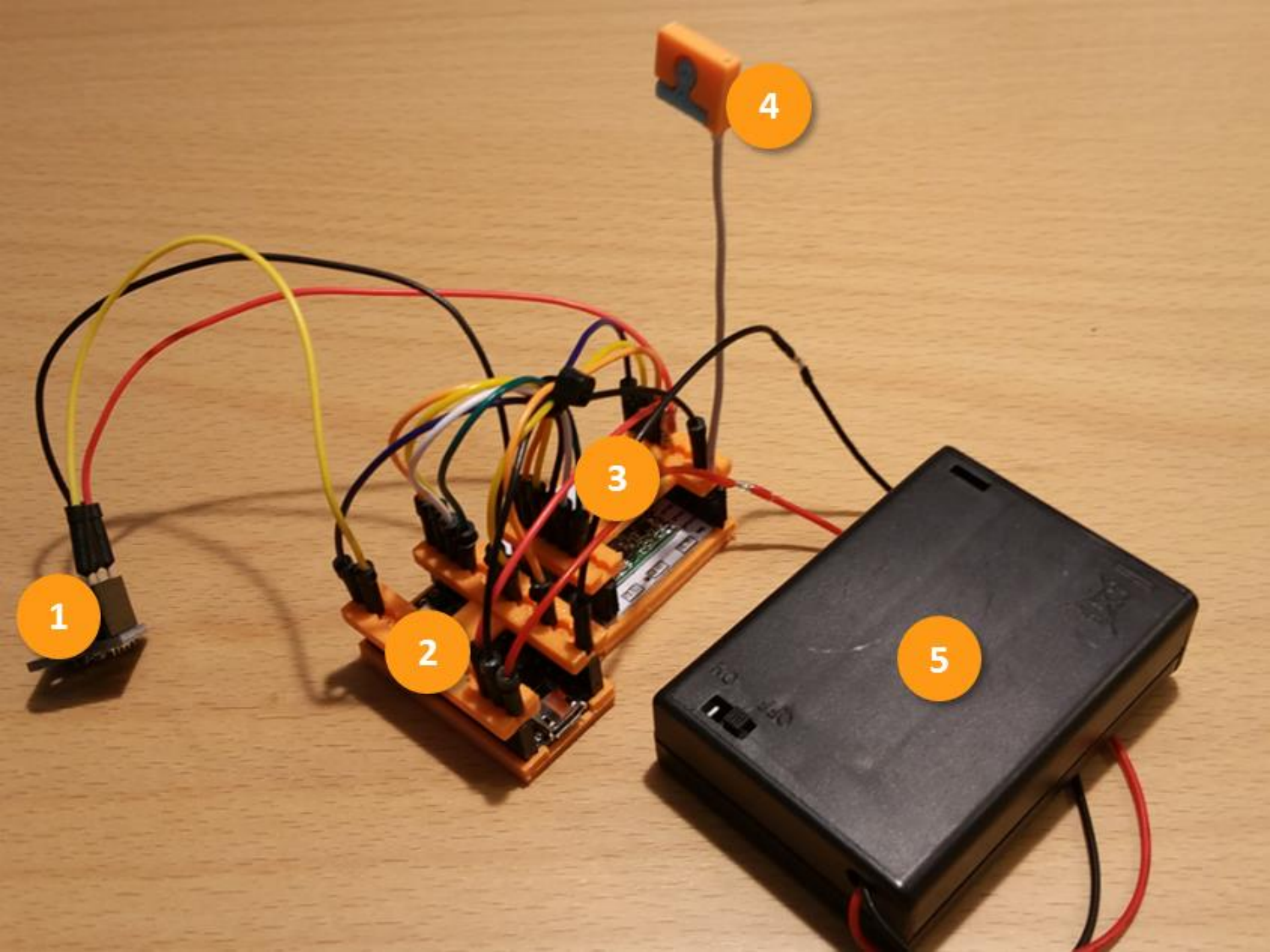

GitHub - TheThingsNetwo...
GitHub, Inc. (US) https://github.com/TheThingsNetwork/ttn
Search
Personal Open source Business Explore Pricing Blog Support This repository Search Sign in Sign up
TheThingsNetwork / ttn
Watch 24 Star 76 Fork 23
Code Issues 32 Pull requests 1 Pulse Graphs
The Things Network is a global open crowdsourced Internet of Things data network. http://thethingsnetwork.org
1,538 commits 7 branches 0 releases 5 contributors
Branch: develop New pull request Find file Clone or download
htdvisser Merge pull request #176 from kersing/develop ... Latest commit 9b9f36b 21 days ago
cmd Fields adapter in Handler a month ago
core Fix formatting 23 days ago
mqtt Set retry count to 10 a month ago
semtech [debt/metadata] Add missing mandatory metadata to uplink and downlink... 3 months ago
ttnctl Set Accept header for user create a month ago
utils [ttnctl] Windows doesn't like colors :(2 months ago
vendor [vendor] Update gRPC 2 months ago
.drone.sec [ci] Update .drone.sec 2 months ago
.drone.yml Fix CI build for ARM [Skip CI] 2 months ago
.gitignore Add coverage to makefile + update travis 3 months ago
.gitmodules [hotfix/grpc] Use HTTPS version of gRPC repo 2 months ago

«Let's build a TTN Use Case»
Real Time Noise Map for Zurich

- ➔ Assemble/Install a Gateway
- ➔ A simple Node

- ➔ Noise sensor
  Lots of tinkering

- ➔ Backend Application
  The simple part (TTN relies on MQTT to stream data)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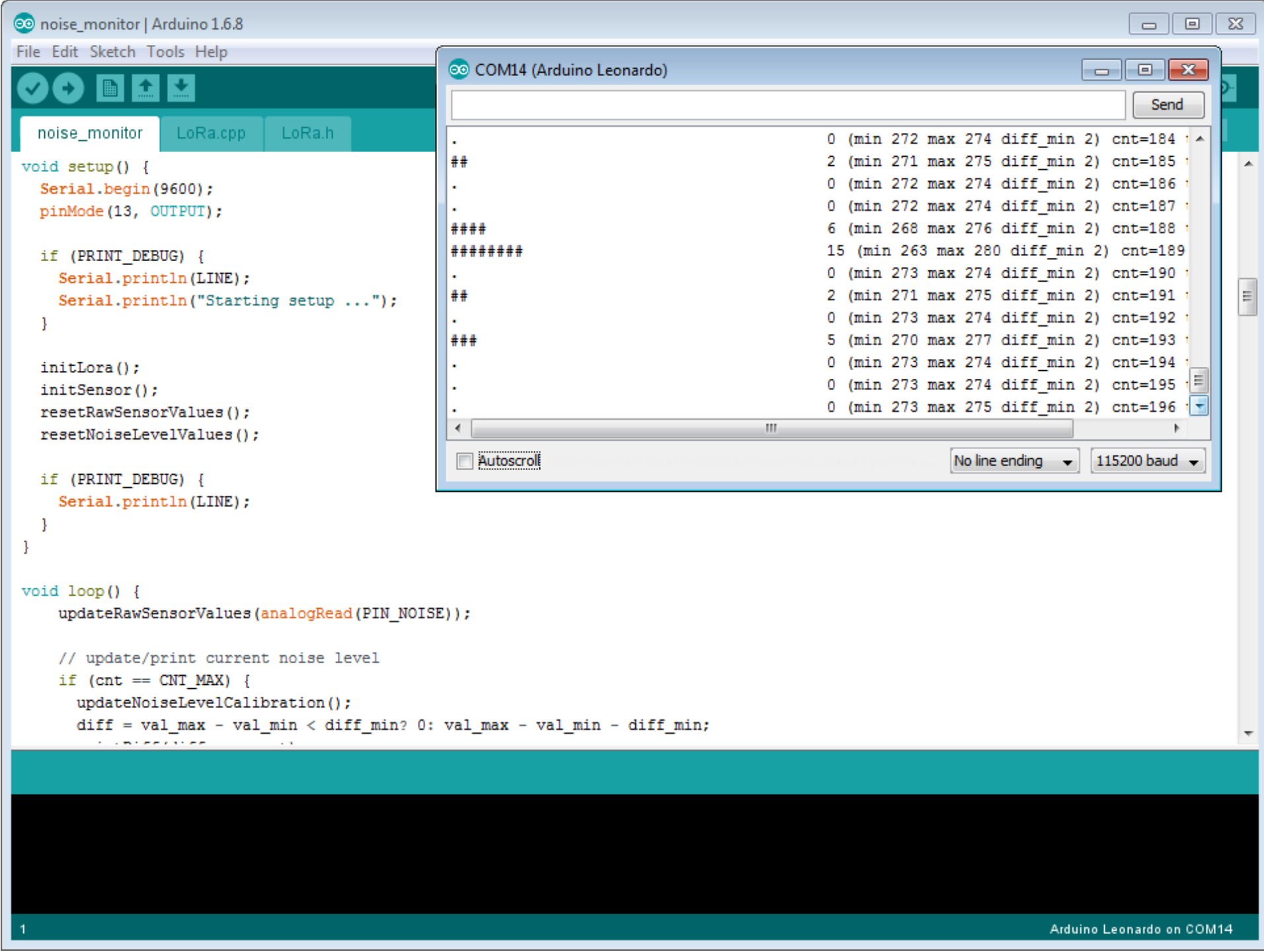
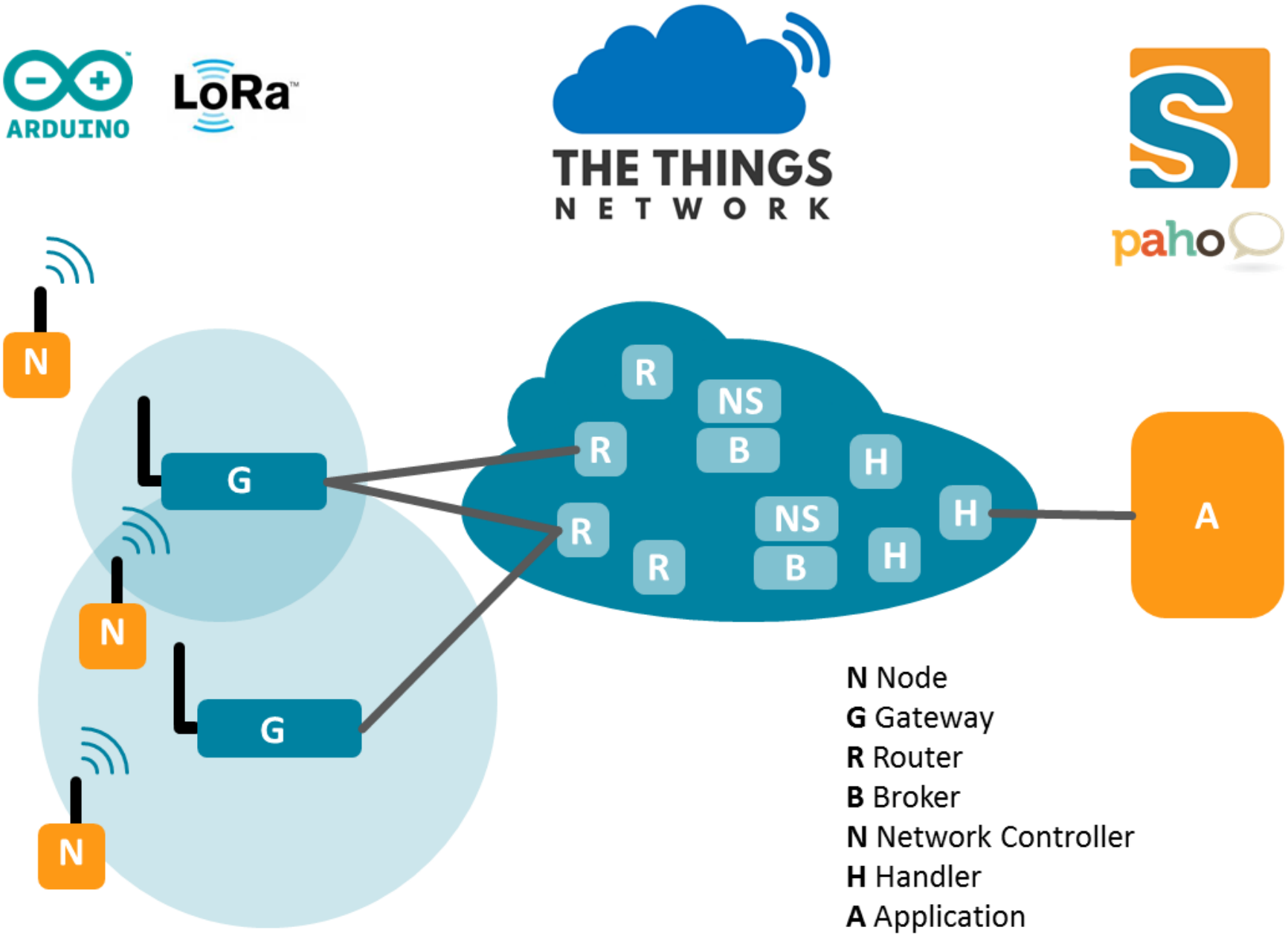

noise_monitor | Arduino 1.6.8
File Edit Sketch Tools Help
noise_monitor
LoRa.cpp
LoRa.h
void setup() {
Serial.begin(9600);
pinMode(13, OUTPUT);
if (PRINT_DEBUG) {
Serial.println(LINE);
Serial.println("Starting setup ...");
}
initLora();
initSensor();
resetRawSensorValues();
resetNoiseLevelValues();
if (PRINT_DEBUG) {
Serial.println(LINE);
}
}
void loop() {
updateRawSensorValues(analogRead(PIN_NOISE));
// update/print current noise level
if (cnt == CNT_MAX) {
updateNoiseLevelCalibration();
diff = val_max - val_min < diff_min? 0: val_max - val_min - diff_min;
COM14 (Arduino Leonardo)
Send
. 0 (min 272 max 274 diff_min 2) cnt=184
2 (min 271 max 275 diff_min 2) cnt=185
. 0 (min 272 max 274 diff_min 2) cnt=186
. 0 (min 272 max 274 diff_min 2) cnt=187
6 (min 268 max 276 diff_min 2) cnt=188
######## 15 (min 263 max 280 diff_min 2) cnt=189
. 0 (min 273 max 274 diff_min 2) cnt=190
2 (min 271 max 275 diff_min 2) cnt=191
. 0 (min 273 max 274 diff_min 2) cnt=192
5 (min 270 max 277 diff_min 2) cnt=193
. 0 (min 273 max 274 diff_min 2) cnt=194
. 0 (min 273 max 274 diff_min 2) cnt=195
. 0 (min 273 max 275 diff_min 2) cnt=196
Autoscroll
No line ending
115200 baud
1
Arduino Leonardo on COM14


ARDUINO
LoRa
THE THINGS NETWORK
paho
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NS
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H
R
NS
H
R
B
H
A
N Node
G Gateway
R Router
B Broker
N Network Controller
H Handler
A Application

TheThingsNetwork Monit

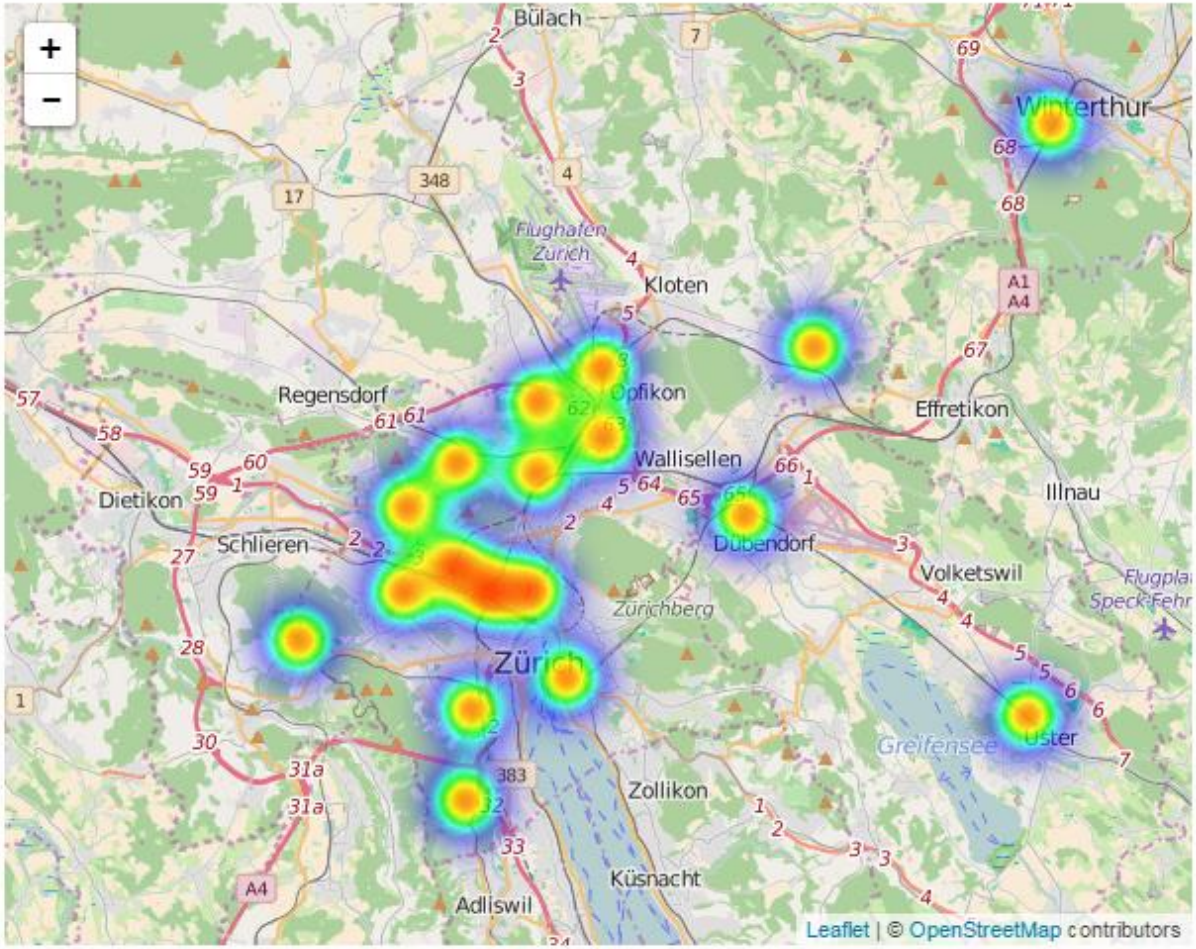
localhost:8082

The Things Network

- Live Map
- Gateways
- Nodes
- Messages

File

Reset



Center longitude 4 Center latitude 8.5 Zoom level 11 Time 06/28 8:


Förrlibuckstrasse
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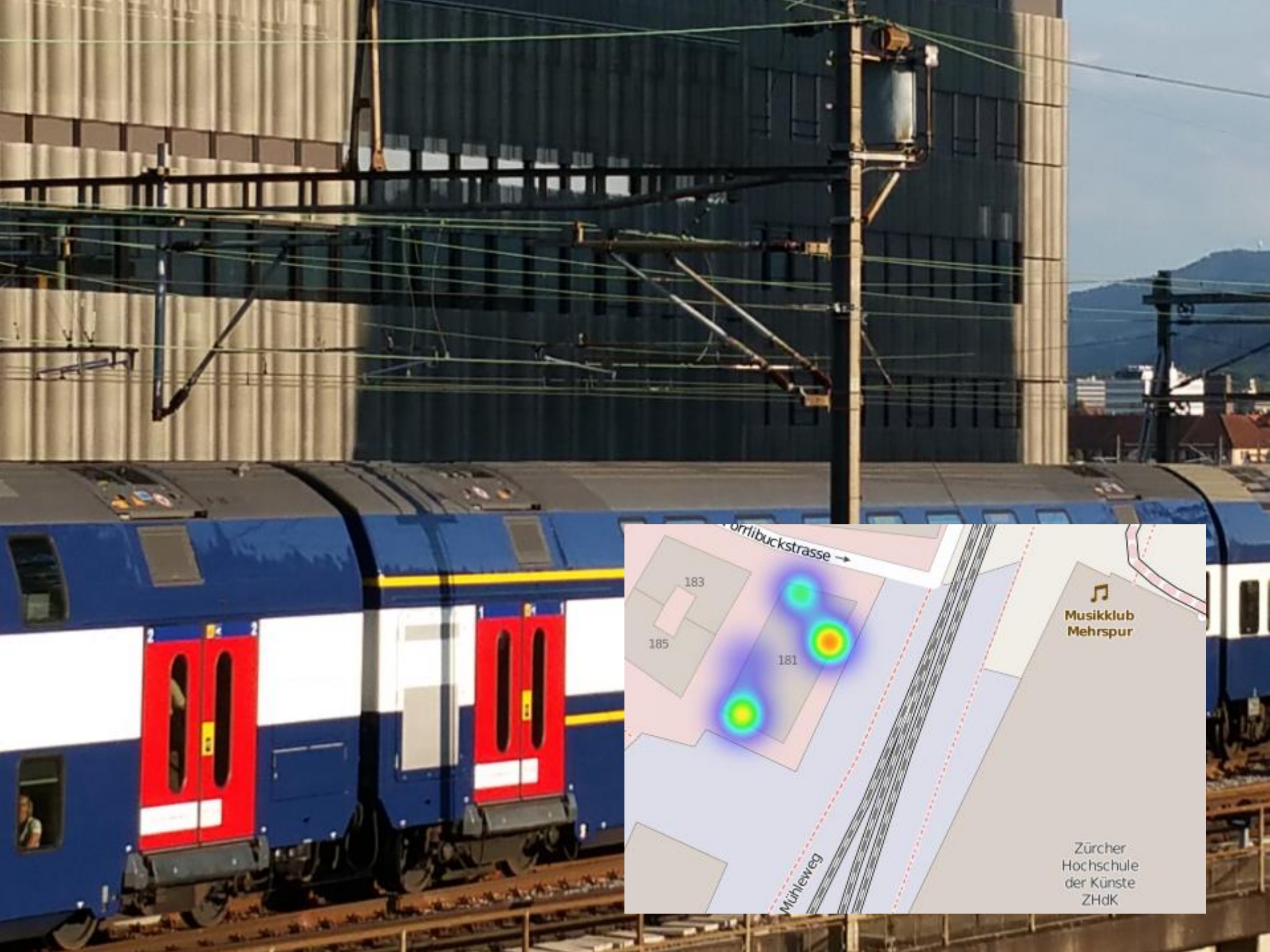
181
Musikklub
Mehrspur
Mühleweg
Zürcher
Hochschule
der Künste
ZHdK
96


örrlibuckstrasse
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Musikklub
Mehrspur
Mühleweg
Zürcher
Hochschule
der Künste
ZHdK

Wrap Up

- The Things Network is an IoT Platform
  - Low Cost, Low Power, Long Range
  - Open Source + Open Hardware
  - Global Community

- Noise Monitoring App
  - Connect via MQTT (TTN uses **Eclipse Mosquitto**)
  - **Eclipse Paho** for the MQTT Java Client
  - **Eclipse Scout** for the Application (Java + HTML5)

What's Missing?

- The Things Network
  - Prototype Setup vs. «Final» Platform
  - Device Activation
  - Security
- Noise Node
  - Teensy vs. Arduino
  - RN2483 vs. RFM95
- Backend Application
  - Application Architecture
  - Heatmap Widget (Leaflet Framework)

Links

TTN Community Zurich
thethingsnetwork.org/c/zurich

HOWTO Build your own gateway
github.com/ttn-zh/ic880a-gateway/wiki

Noise Monitor Use Case
dzone.com/articles/the-things-network-and-eclipse-scout

Twitter
@thethingsntwrk @EclipseScout @ZimMatthias

TX! Qs?