Zeche Friedrich-Heinrich: Kamp-Lintfort wide Open LoRaWAN deployed!

(Jan Sonntag, Shreya Gupta, Rolf Becker, 2023-06-28)

Kamp-Lintfort is now covered by the community-driven **open LoRaWAN** network of **The Things Network (TTN)!**

Anyone in the area can now deploy their own LoRaWAN devices and use the new gateways for free to transmit data to their own TTN applications. Our **first application** is the data collection of our own **groundwater gauges** developed with and for **LINEG.**

It's all coming together

The installation consists of two RAK Wis Gate Edge Pro LoRaWAN Gateways, which both have 16 channels in total. Each gateway is equipped with two rod antennas which are installed at the platform of the Friedrich-Heinrich coal mine tower. The antenna pairs are located at the south-west as well as the north-east corner of the tower, respectively.

This allows for many devices to communicate with them at the same time. The gateways are placed on the northern corner and on the southern corner of the tower with antennas facing in all directions then.

Fig.: The two white rod antennas at the southwest corner of the tower of the Friedrich-Heinrich colliery.

Because of the metal cage encompassing the upper platform of the tower, the antennas had to be placed at a distance, otherwise, their range might be impacted. With the help of the former miner **Jörg Kamps** from the HSRW FabLab Team, we together designed a simple holder and he could

manufacture multiple ones made from stainless steel. These enabled us to specifically tune the distance from the metal cage for each individual antenna. Therefore we used our Network Analyzer which enables us to see the frequency at which the antennas are able to receive data. Thanks to **RF Frontend GmbH** to support us with antenna tuning!

Fig.: Using a vector network analyzer to tune the antenna performance.

In the end, we were able to tune them just right. The first insight into the coverage we are able to achieve is shown by TTN Mapper. This also is a community-driven project, where everyone is able to test the coverage of the TTN.

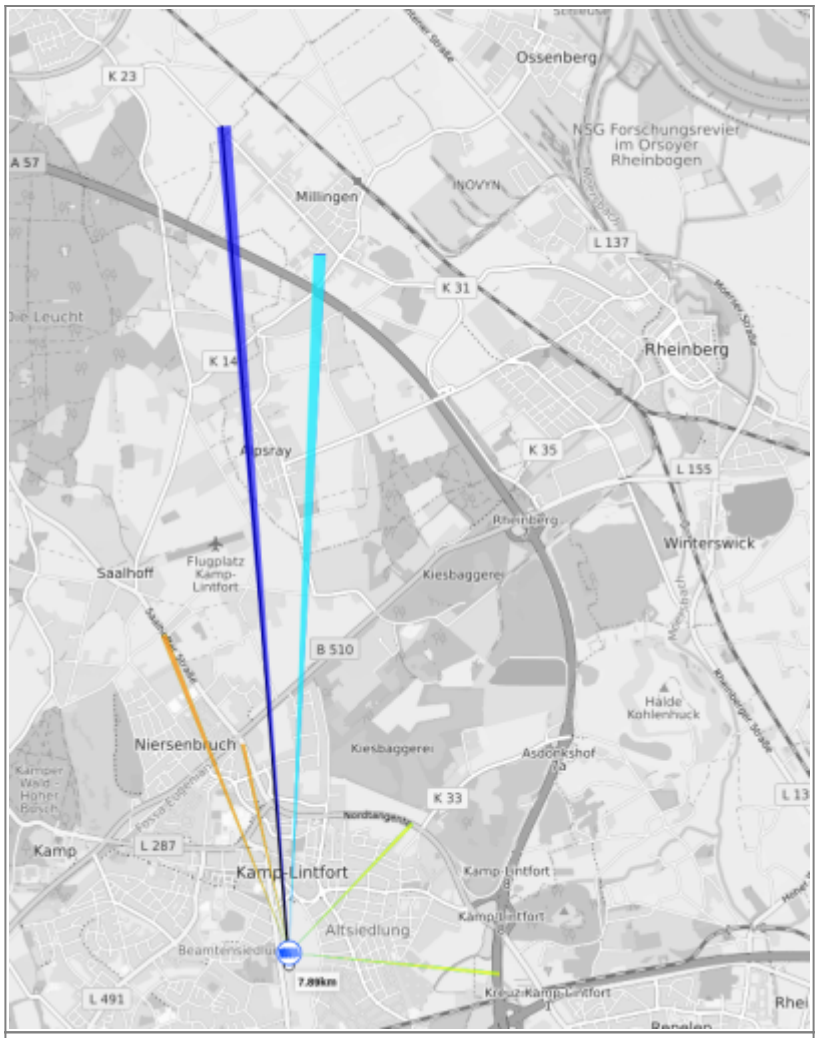

Fig.: First range test. Latest range data at TTN Mapper.

The longest distance (*as of right now*) that was achieved was almost 8 kilometers long, which is far beyond the general Kamp-Lintfort Area. For us, this is a major success! You can check the current coverage with our north-facing gateway and its antennas here: TTN Mapper

As of writing this there where no test done yet on the southern gateway.

Network Activity

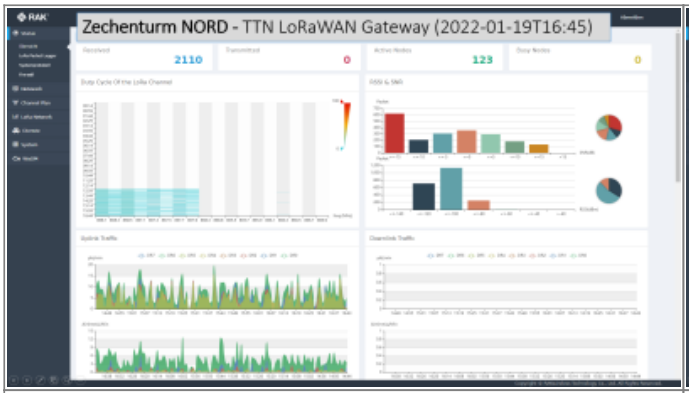

Fig.: Activity of north-east gateway (2022-10-19T16:45)

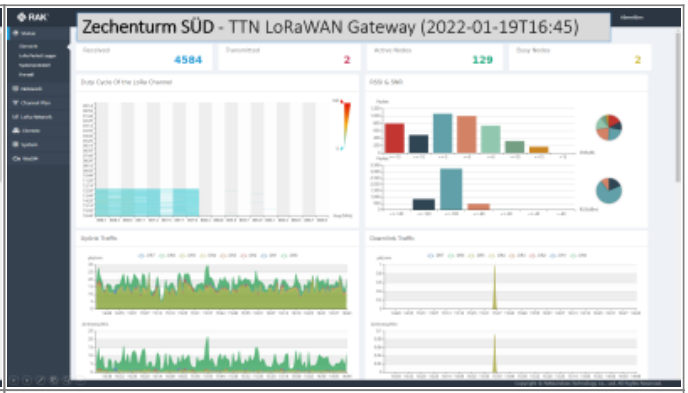

Fig.: Activity of south-west gateway (2022-10-19T16:45)

The system is all powered through mains power provided by the tower itself. On the northern side, an electrical box is located where all the network and power distribution over PoE (Power over Ethernet) is done. The idea is to later add a redundant internet connection as well.

More tests with the system will be done in the near future.

We would like to thank the **Municipality Kamp-Lintfort** as well as the former **Elektrosteiger Jörg Hunsmann** representing the **Fördergemeinschaft für Bergmannstradition - Linker Niederrhein - e.V.** for making it possible and for their fantastic support!