Sustainable Communication Networks
Prof. Dr. Anna Förster

Experimental Comparison between LoRa and RF for Underground Environments

Prerequisites:	- Internet of Things background (sensors, embedded programming, LoRa)
Level:	This topic is appropriate for Bachelor and Master Students
Language:	German or English

Introduction

ComNets has been working on the area of agricultural monitoring applications with underground sensor networks for many years. The current version of our MoleNet PCB is available under: `https://github.com/ComNets-Bremen/WUSN`
For the next versions of it, we are evaluating the possibility to exchange the current RF transceiver (RFM69CW) with a LoRa one. This is the main topic of this project: which one is better suited for the underground environment and under which environmental properties.

Work packages

The project consists of following steps or work packages:

- Literature review of the properties of LoRa and RF, especially in terms of modulation, existing experimental experience, etc.
- Prepare and program an Arduino-based prototype with a LoRa transceiver, sending data to a LoRa sender (not a LoRaWAN gateway).
- Design and conduct real-world experiments with the MoleNet and the LoRa prototype, buried next to each other and :
  - With different frequencies (868 MHz and 433 MHz)
  - With different distances between the senders (underground) and the receiver (overground).
  - Over extended periods of time (1 week per experiment)
  - In at least two different locations with different soil qualities
- Evaluate the gathered data in terms of signal strength, number of re-transmissions, and delivery rate in relation to distance, soil moisture and temperature.
- Documentation and presentation of the work.

Contact

If you are interested in this work, please contact us via mail: projects@comnets.uni-bremen.de

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