

# Technical Overview - Activity Tracking

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# Outlines

- Radio transmission
- Relay stations
- Gateway computers
- Protocols
- Serverside operations



# Radio transmission

- Wavebands subject to regional regulation
- Most common ones
  - 3-30 MHz (VHF)
  - 30-300 MHz (UHF)
  - 500 MHz (SHF)
- <https://de.wikipedia.org/wiki/Frequenzband>
- [https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen\\_Institutionen/Frequenzen/Frequenzplan.pdf;jsessionid=5D01D75A4F2F08BB13198FEA1C1E1871?\\_\\_blob=publicationFile&v=11](https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Frequenzen/Frequenzplan.pdf;jsessionid=5D01D75A4F2F08BB13198FEA1C1E1871?__blob=publicationFile&v=11)
- Information ~ Frequency
- Frequency ~ Range
- Frequency ~ Reflection

# Other companies' solutions

- smaXtec
  - Proprietary solution in the 400-800 MHz band
  - New sensor with LoRaWAN
- Ranges:
  - SCR → 200 – 500 m
  - smaXtec → ~100 m
- SCR
  - No information available
  - Range indicates similar band as smaXtec

# Relay stations

- Serve as amplifier for the signal
- Two setup modes possible:
  - Mesh network → everyone's talking to everyone
  - Master-slave → relay stations communicate directly with gateway
- Solutions:
  - SCR → unknown
  - smaXtec → BeagleBoard running Debian OS

# Gateway computer

- Connect the sensor setup with the servers on the internet
- Radio and internet network interfacing devices
- Setup similar to relay stations → same hardware might be possible
- Complete on farm calculation requires more advanced computers, e.g. SmartBow

# Protocols - Transmission

- Required fields:
  - (Animal ID)
  - Sensor ID
  - Timestamp (Format? Timezone?)
  - Acceleration values
  - Preprocessed results:
    - Lying/standing
    - Ruminating
    - Etc.
- Possible protocols:
  - REST/JSON
  - REST/XML
  - MQTT → Broadcasting with hierarchy flags

# Protocols – data definition

- Different approaches possible:
  - DLQ/BRS:
    - Data dictionary based on ADIS-ADED + REST/JSON-ADED
  - ICAR
    - Own data dictionary
    - SOAP/XML + REST/JSON
  - Own?
- Possible synergies with data organization?

# Serverside configuration

- In depth data processing
- Uses standard software tools
- Depends on knowledge already available in organization
- Other players:
  - SCR → changing servers with unknown setup
  - smaXtec → Dockerized setup in Google Cloud

# Thank you for your attention

