Technical feasibility and possible business models for the deployment of LPWAN technology

Student

Samuel Markus Helbling

Definition of Task: This master project thesis was carried out in collaboration with a medical technology company that develops and produces mechatronic system components for OEM. The OEM install and use these components in their own systems. No information or data generated by the components flows back to the medical company. However, this data would be very helpful in establishing new services and opening up new business models. In addition, many questions, like how this data could be obtained from the end customer or how it could be monetized, are still unanswered. The aim of this work is to clarify whether and how LPWAN technologies can be used for the components and which new business models this opens up.

Approach: The work was divided into two parts, a technical and an economical part, which were processed in parallel during the work in order to avoid waiting times. In the technical part, different LPWAN technologies and protocols were evaluated through literature research. Prototypes were built and subsequently tested for three of these technologies, LoRa, NB-IoT, and LTE-M. The three technologies were then compared based on the measured signal strength and downtime. For the economic part, literature research was conducted first as well. The purpose of this research was to gain expertise in the field of servitization and to find possible business models. For the service design, two company employees were interviewed and a laboratory was visited. Based on these insights and additional documents received from the company, customer profiles were created. Thereafter, various business models were created, each with its own value map. The value maps were used to test the business models against the customer profiles in the final step.

Conclusion: The literature review and trials with LoRa, LTE-M and NB-IoT prototypes indicated that the cellular-based technologies LTE-M and NB-IoT have great advantages over LoRa. These advantages are characterized by better global coverage and better reception (e.g. in basements). NB-IoT in particular had a very low failure rate. In the economic part, four data-driven business models were created, all of which fundamentally bring advantages for all stakeholders and would therefore be conceivable. However, they are only outlined and the details, as well as some technical questions, must be further examined.

Recommendations: Although the technical feasibility of LPWAN technologies has been proven, based on this work, the company is not advised to use the technology for the existing task. Alternatives such as WiFi or Ethernet offer valid advantages in terms of data volume, real-time capability and less certification effort. Some of the business model outlines offer a promising outlook, are, however, not yet mature enough to be implemented. Further interviews with stakeholders must be conducted to gain more insight and customer needs.

Grouping of network types according to communication range and speed and power
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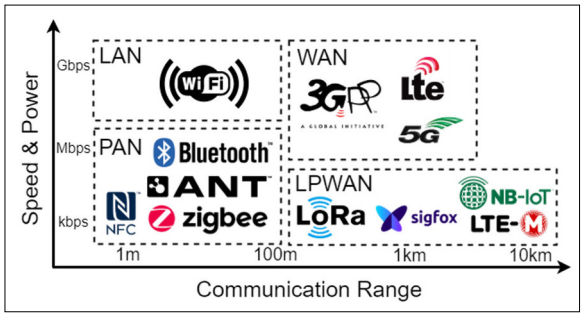
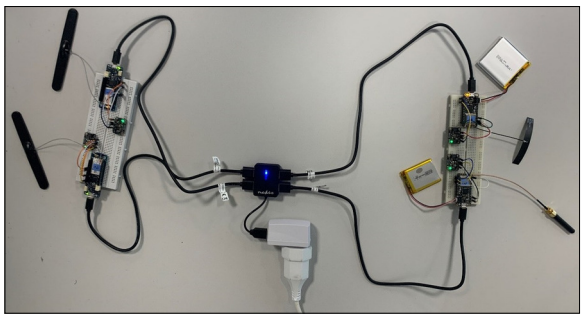
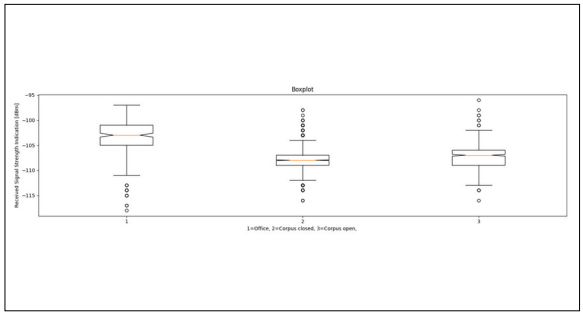


Technical Prototypes
Own presentment



Graphical evaluation of the signal strength at different locations using the LoRa prototype as an example.
Own presentment



Examiner
Prof. Dr. Felix Nyffenegger

Subject Area
Business Engineering