

Bachelor Thesis / Internship Project / Student Assistant Drone Based Mapping of 5G Networks

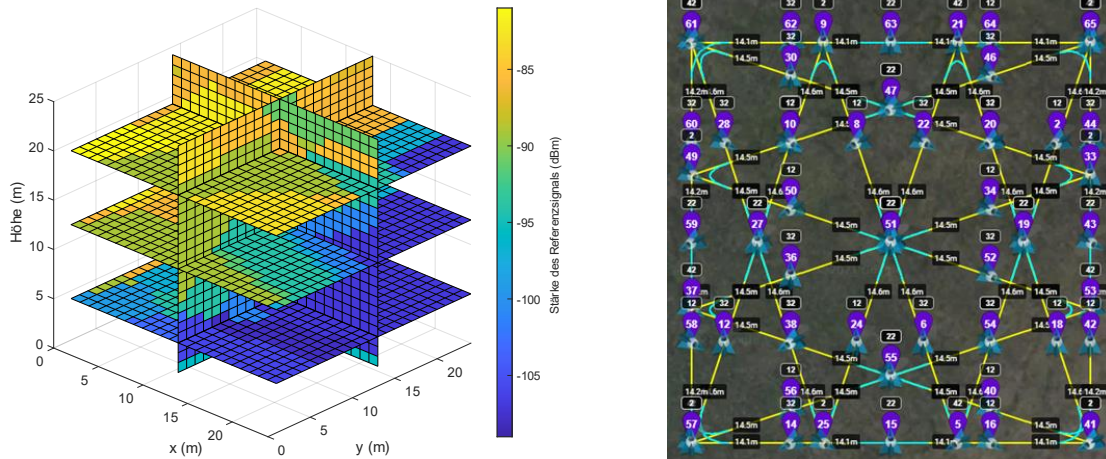


Fig.: Hight dependent LTE signal streghth measeremts in Lübeck

Project Background

In the first aid of patients at the scene of an emergency, the first responders are cut off from the flow of information, which means that at present, assistance can often only be provided by telephone via the central office and is hardly ever used due to time constraints. Simultaneously, the shock room specialists often lack the information they need to prepare themselves for the emergency. Thanks to mobile integrated medical technology, which is connected to the mobile phone network, resources, technologies, and information of the hospital can already be accessed at the point of care. In addition, up-to-date information can be transmitted to the hospital.

Within the MOMENTUM project's scope, an autonomous repeater infrastructure is to be implemented [1]. Especially in areas with insufficient network coverage during a rescue service operation, this infrastructure should enable a connection to the public mobile network for portable medical devices. For this purpose, drones can autonomously find an optimal location for receiving the radio signal.

Project Description

A drone equipped with a mobile modem is used to measure various mobile network parameters. A distinction can be made between metrics measured by the receiver and parameters specified by the radio cell [2]. The latter can only be determined using cost-intensive hardware. Receiver-side metrics can be measured with commercially available mobile devices. Based on the measured data, models can determine the next measuring point to be approached [3]. For this purpose, the measurement data and a priori information are integrated into probabilistic models to predict the parameters for unknown locations. As a training data source, extensive measurements are needed. The available hardware can be used to program waypoint based flight tasks. Within the internship or thesis scope, measurements in the 5G network need to be planned, executed and analyzed. The MAVLink drone



communication protocol (see [4]) is used to receive telemetry data from the drone and send position commands for the waypoints.

Possible Tasks

- Literature research on the measurement metrics
- Development of a mapping concept
- Measurement flights with preprogrammed missions
- Data analysis

References

- [1] <https://momentum-5g.net/>
- [2] Sae J, Wiren R, Kauppi J, Maattanen H, Torsner J, Valkama M, editors. Public LTE Network Measurements with Drones in Rural Environment. In: 2019 IEEE 89th Vehicular Technology Conference (VTC2019-Spring). 2019.
- [3] Taranto R Di, Muppirisetty S, Raulefs R, Slock D, Svensson T, Wymeersch H. Location-Aware Communications for 5G Networks: How location information can improve scalability, latency, and robustness of 5G. IEEE Signal Process Mag 2014;31(6):102–12. Available from: http://publications.lib.chalmers.se/records/fulltext/208857/local_208857.pdf
- [4] <https://mavlink.io/en/>

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