

# Digital Twin based coverage analysis of different satellite constellations for critical search and rescue missions

Satellite-based connectivity is on the rise. Companies from all over the world like Starlink [1] and OneWeb [2] announce their own development of satellite constellation for commercial and private internet access. Hence, these orbital platforms are emerging as considerable alternatives to terrestrial internet access. Besides the straightforward use as broadband alternative for private users, particularly in remote locations, satellite networks offer considerable potential for providing fast and ubiquitous connectivity during disaster response as well as critical search and rescue missions. Especially in the latter category of scenarios, the use of autonomous systems becomes increasingly important. These systems not only allow a more resilient and faster rescue of the missing person but also ensures the safety of the rescue forces. To enable the reliable tele-operation of these systems, robust connectivity is critical for which digital twins are increasingly used as a way of pre-prediction.

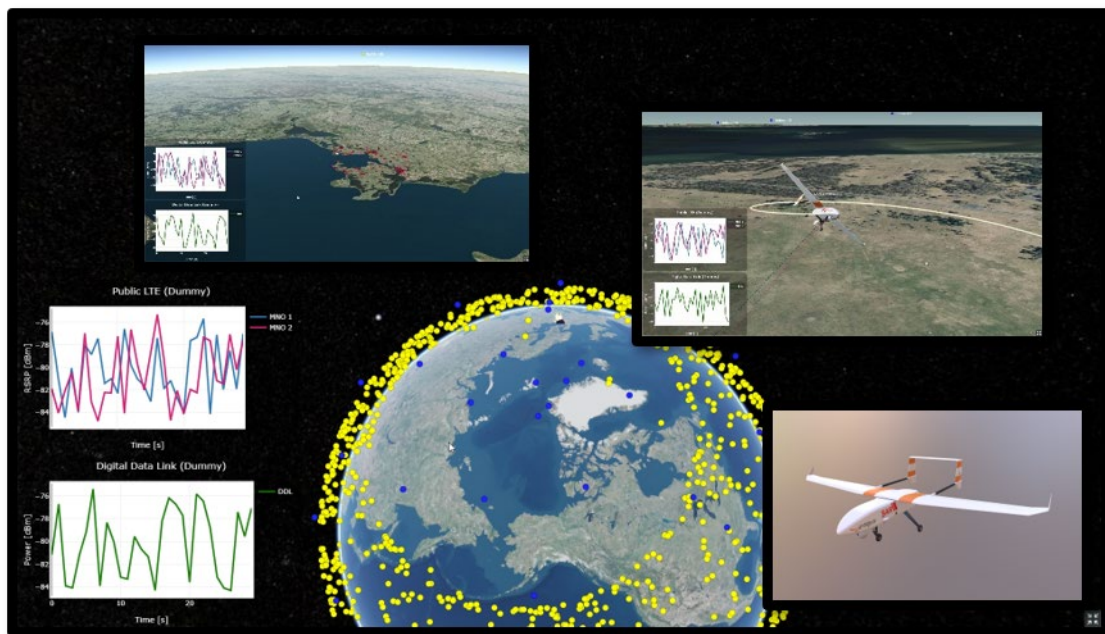


Figure 1: Digital twin for UAV based communication

The main task of this thesis is the implementation and analysis of different satellite constellations using a web based digital twin. The first step would be the prediction of the coverage based on geometric conditions. Further, a consideration by simple channel models would also be conceivable. Both stationary and basic UAV mobility should be considered and recommendation for action for the various rescue scenarios should be derived.

The thesis can be conducted in German or English.

## Requirements

- Knowledge of Communication Networks in General
- Interest in satellite constellations
- Basic Javascript and Python Knowledge

## Supervisor

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**References**

[1] <https://www.starlink.com/>

[2] <https://oneweb.net/>