

Master's Thesis

# 5G ultra-reliable low-latency communications

It is expected that soon after autonomous driving is on its way to mainstream technology in the next years, the next level is to expand the autonomous transportation to the third dimension. This Master thesis shall investigate boundary constraints of such autonomous airborne transportation systems.

One starting point can be the autonomous driving levels 4 and 5 (no human driver/pilot required):

- level 4: only supported in certain scenarios ("air roads")
- level 5: full automation

The thesis shall cover the following aspects:

- constraints: weather, regulations, traffic density, bird swarms, wireless spectrum, privacy, ...
- requirements: sensing, data processing, communications, infrastructure assistance, ...

A main part of the thesis shall cover the required communications technology aspects, based on 5G NR (new radio) URLLC (ultra-reliable low-latency communications): identify gaps and challenges in 5G URLLC and its deployments, including

- latency requirements
- reliability requirements
- data rate requirements

Special use cases can include: sensor data sharing and remote driving/flying.

Topics of the masters thesis can include:

- investigate the common use of URLLC-based communications and radar between two aircrafts; develop a basic radar receiver for an URLLC-based system
- heterogeneous networks: analyze tradeoffs between ground-assistance (high amount of context information, limited capacity per aircraft) and autonomous peer-to-peer communications (low latency, limited context) based on 5G NR communication links incl. URLLC.

## Contact

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