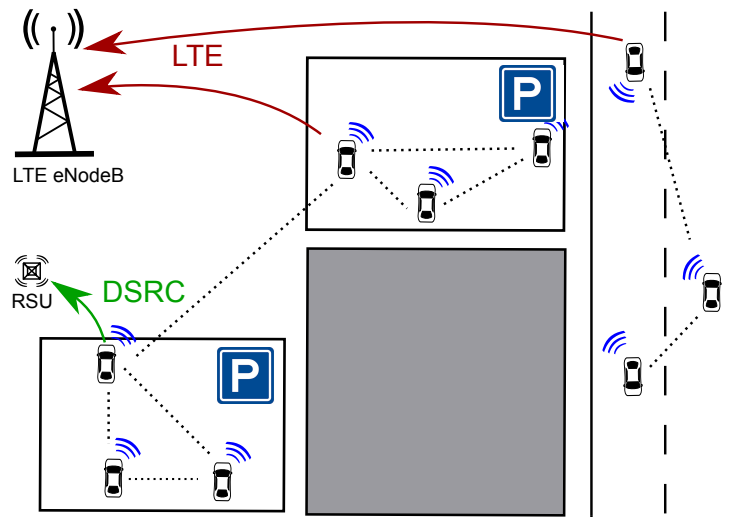


## Bachelor / Master's Thesis

# Optimizing Uplink from Vehicular Micro Clouds to Data Center

Vehicular micro cloud is a small cluster of cars which acts as an edge server and offers storage, computing and network resources to the nearby cars, pedestrians, bicyclists etc. Several applications have been envisioned to run in vehicular micro clouds. One such application is data collection app which aims to collect relevant data (useful for maintaining live maps, etc.) from the onboard sensors of nearby cars, aggregate it and upload to the data centers.

As the amount of data being exchanged between cars increases, the network gets congested very quickly. One possible solution to overcome this problem is *hybrid networking*, i.e., to make use of multiple network interfaces (e.g., DSRC, LTE, etc) present on the onboard units to avoid overloading a specific channel. In this context, the research questions that need to be addressed are: 1) when to use DSRC uplink only? 2) when to use LTE uplink only? 3) when to use both uplinks concurrently?



## ■ Goals of the thesis

The goal of this thesis is to develop an optimized approach for the network interface selection. To successfully finish the thesis, you can follow these possible steps:

- Literature review on hybrid networking.
- Get familiar with simulation frameworks (SimuLTE and Veins).
- Identification of factors affecting interface selection decision.
- Formal definition of the optimization problem; or find a plausible heuristic.
- Performance evaluation via simulations in different scenarios (parked cars and moving cars) and comparison with other approaches in the recently published literature [1], [2].

## ■ Keywords

Vehicular Networking, Network Simulation, C++

- [1] G. S. Pannu, T. Higuchi, O. Altintas, and F. Dressler, "Efficient Uplink from Vehicular Micro Cloud Solutions to Data Centers," in *19th IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM 2018)*, Chania, Greece: IEEE, Jun. 2018. DOI: 10.1109/WoWMoM.2018.8449787.
- [2] T. Higuchi and O. Altintas, "Interface Selection in Hybrid V2V Communications: A Hierarchical Approach," in *9th IEEE Vehicular Networking Conference (VNC 2017)*, Torino, Italy: IEEE, Nov. 2017.