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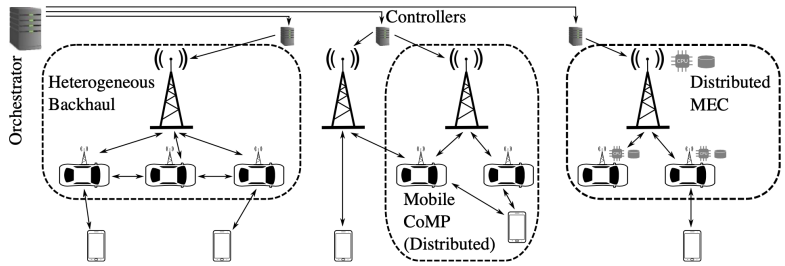
## Bachelor/Master's Thesis

# Feasibility Study of the DyMoNet Approach in Various European Cities

## Abstract

The evolution of current wireless access networks towards 5G and beyond is characterized, among others, by the provisioning of high-bandwidth services and by the capability of serving traffic from a large number of heterogeneous devices. Among the key approaches for provisioning high capacity in such networks, a prominent role is played by network densification. The main goal of the DyMoNet project is to enable a moving network paradigm, by addressing some of the key open research challenges which stand in the way of its practical feasibility. Specifically, the project will aim at: (1) identifying those scenarios and use cases in which the moving network paradigm holds the highest potential to increase networking performance and resource efficiency with respect to traditional static deployments; (2) developing mechanisms for reliable wireless mobile backhaul, for the interconnection of moving base stations to the core of the network; (3) elaborating QoS-aware mechanisms for dynamic interference management, enabling an efficient provisioning of connectivity under tight QoS constraints; and (4) investigating dynamically resource allocation and slicing in order to satisfy specific QoS constraints, while accounting for the dynamics of service demand as well as of the moving network infrastructure.




## Content

The goal of this thesis is to perform a feasibility study of how well the small cell base station approach on cars may work in typical European cities. For this, existing mobility models for different cities (e.g., Luxemburg, Monaco, Cologne, Paderborn, Turin) will be used in the Veins simulation framework (SUMO for mobility simulation and OMNeT++ for vehicular networking simulation) to study the connectivity of users to our mobile small cell base stations. The simulation model will be the basis for further studies, then integrating more sophisticated communication protocols.

Possible milestones are as follows:

- Literature research on small cell base stations and vehicular edge computing.
- Getting familiar with the Veins simulation framework.
- Integrating mobility models of selected European cities (e.g., Luxemburg, Monaco, Cologne, Paderborn, Turin).
- Performing simulations to assess the general feasibility of the DyMoNet approach.
- Evaluating and discussing the obtained results.

## Collaboration

This thesis is in collaboration with HES-SO in Switzerland and co-advised by Dr. Gianluca Rizzo.

## Requirements

It will be helpful to have a basic understanding of *Telecommunication Networks*, *Vehicular Networking*, *Network Simulation*, and *C++*. In case you are not familiar with these requirements, you will need to familiarize yourself during the thesis.

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