Bachelor’s/Master’s Thesis

Centralized Cluster Coordination in Heterogeneous Networks

In recent years a new trend of vehicular networking emerged: heterogeneous networks. For many applications neither ad-hoc wireless communication (namely WiFi, IEEE 802.11p, or WAVE) nor cellular networks (3G or 4G) seem to be the best way to transmit messages. By assuming a vehicle has multiple network interfaces first ideas how this can be exploited have been published: A cluster based architecture for intersection collision avoidance using heterogeneous networks or LTE4V2X: LTE for a Centralized VANET Organization.

These works have in common that vehicles try to distribute the network load between LTE and WiFi by forming clusters.

We extended our simulation framework Veins to support both LTE and IEEE 802.11p. Using this framework we evaluate such heterogeneous algorithms and further investigate their strong points as well as open issues.

Goals of the thesis:

In 2011 Remy et al. introduced a centralized way to cluster vehicles: All vehicles inform a central server via LTE of their current position and the server is in charge of combining the vehicles into different clusters. The result of this clustering is then transmitted to so called cluster heads. Afterwards only the cluster heads communicate with the server and collect position information from other vehicles via 802.11p before transmitting the data to the server. The goal of this thesis is to implement the algorithm in Veins. The feasibility of the approach and the performance of the implementation should be evaluated in a range of scenarios. These scenarios should show if the algorithm is capable of coping with a high number of vehicles while still providing good performance.

Keywords:

Heterogeneous Networks, Vehicular Networks, Network Simulation

Literature:


Contact:

Florian Hagenauer: hagenauer@ccs-labs.org (http://www.ccs-labs.org/~hagenauer/)
Christoph Sommer: sommer@ccs-labs.org (http://www.ccs-labs.org/~sommer/)