

INSTITUTE OF TRANSPORTATION - TECHNISCHE UNIVERSITÄT MÜNCHEN

M.Sc. in Transportation Systems



MASTER'S THESIS

A Framework for Fast Cooperative Traffic Signal Control

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Abstract

This thesis develops and evaluates a framework for fast cooperative traffic signal control. The framework provides an ability to implement adaptive traffic control strategies through real-time communication of traffic information at the intersection level. For the sake of simplicity, the framework is divided into two components: Traffic information exchange mechanism (InfoBroker) and Traffic Information Types (InfoType). The framework is based on a very simple organization structure: a consumer intersection controller or central asking for information and a producer intersection controller providing the information. The role of InfoBroker is to manage both the producers and the consumers depending on the role of the host controller for the framework. The InfoType, on the other hand formulates the basic structure of the information that could be collected and exchanged at an intersection level. The InfoBroker was developed in collaboration with this thesis but it does not form a part of the thesis work.

The framework was implemented in java development platform and tested virtually with the help of two computers. A usability test was also performed in a simulation environment on a Ludwigsburg city arterial road section. In this test, the performance comparison analysis between original traffic actuated planning¹ for the intersections on the arterial and the modified traffic actuated planning² with real-time offset optimization yielded very good savings for the travel times, delay and number of stops on the arterial.

¹ For original traffic actuated planning: refer to Subsection 5.3.2

² For modified traffic actuated planning: refer to Subsection 5.3.3