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Kiel University
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Faculty of Engineering

Emergent Green Waves in Organic Traffic Control

Synchronised traffic lights or *green waves* are the result of coordinating phases between neighbouring intersections in urban road networks. The goal is to reduce the mean waiting times for major traffic flows and to minimise stops when traversing the network. An already existing approach for establishing green waves is based upon a well-defined protocol: In a synchronised, three-phase process the partners for a green wave are determined, the actual phase coordination is negotiated and then implemented. In an additional variant, centralised knowledge is used to manage this process to obtain an optimal constellation.

The goal of this work is to examine an alternative approach and to evaluate it using various scenarios. This is to be achieved without explicit negotiation of partnerships. Also, the assumption of synchronicity is revoked. The idea is that each intersection controller only synchronises locally with its *best* neighbour. For the selection of this partner solely the current local states and those of the neighbouring controller can be accessed and taken into account. Different decision strategies can be investigated in this context.

The work is based on the existing Organic Traffic Control (OTC) system and the traffic simulation software AIMSUN Live. The actual programming and interacting with the simulator API is supposed to be done in Java.
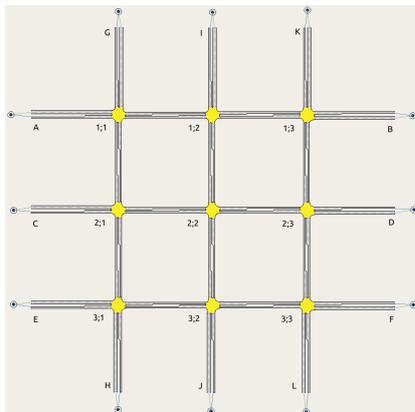

Figure 1: A regular traffic network (*Manhattan Grid*), modelled in AIMSUN Next, to simulate signalisation and traffic flows (e. g. between **A** and **B**).
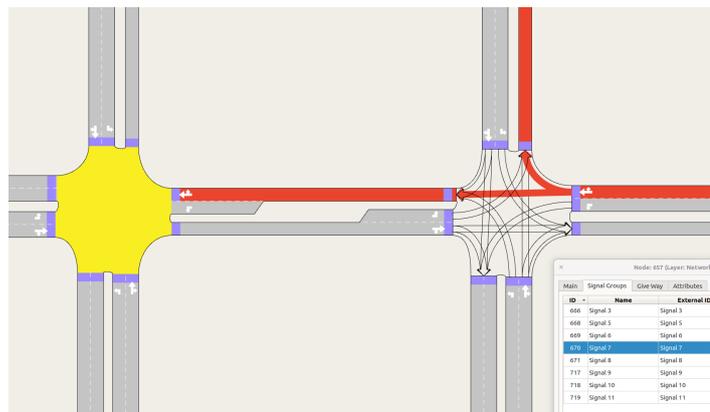

Figure 2: Traffic signals for different directions are grouped together (example in red), and non-conflicted groups are switched according to the phases of a control plan. These phases can be coordinated with other intersections to establish *green waves*.

- Assignment: Bachelor

- Begin: Subject to negotiation

- Interested? Contact Ingo Thomsen via email: `int@informatik.uni-kiel.de`