



UTOPIA Network management and control

The increasing traffic volume requires an integrated and balanced approach to traffic management. The aim is to improve traffic over the whole area by minimizing travel time for private traffic, while giving priority to public transport. In creating a better flow of vehicles, it leads to energy savings, a reduction of emissions and a welcome increase in safety.

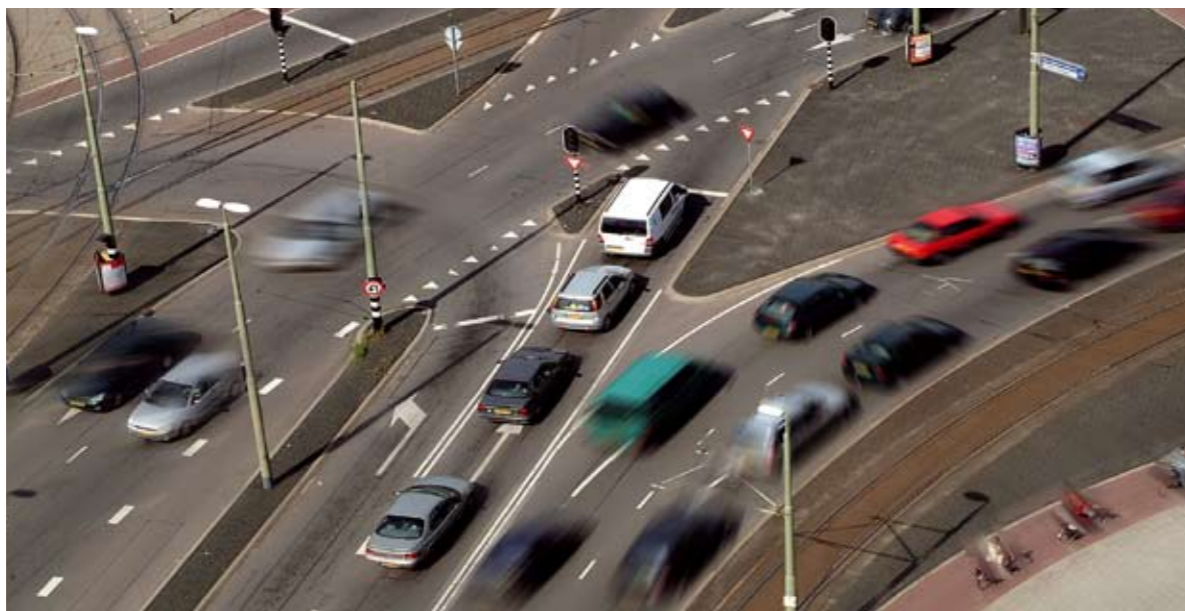
Urban Traffic Optimisation by Integrated Automation (UTOPIA) is widely regarded as one of the most advanced adaptive traffic signal control systems available worldwide that has been successfully deployed in many places in Europe. UTOPIA operates on distributed intelligence. The processing capabilities at intersection level enable a swift response to the traffic volumes at the intersections. This makes UTOPIA ideal for flexible traffic control and priority to specific identified traffic, like public service vehicles.

Peek's extensive traffic know-how, the increasing flexibility in the UTOPIA system and Peek's state of the art EuroController as well as much international experience are combined for optimal results. Hence Peek implements and realizes customers strategic traffic policy objectives.

The environment

Urban traffic has an increasing impact on urban well-being. The importance of traffic control on emission and noise levels are often underestimated.

Preventing accelerating and stop-and-go traffic is a direct environmental gain. Peek keeps the flow going by balancing minimization of delay time and number of



stops using UTOPIA. This ensures improved throughput of the main traffic flows, which leads to energy savings and a reduction of emissions (e.g. HC, NOx and CO).

Public transport priority

Modern traffic management is all about balance. Peek's expertise allows for fully flexible public transport priority as smoothly as possible on all intersections in the network. With UTOPIA the arrival of public transport vehicles at any intersection on it's route is predicted long in advance taking into account any planned delay in between (e.g. bus stop, red light). This means priority can be arranged with minimal interruption of the private traffic.

A public service vehicle can be detected using several of techniques like loops, Wireless LAN and VECOM. Peek has a long history of developing and implementing public transport detection and identification systems allowing for optimal tracking of vehicles through the network. By giving the right priority Peek enables the public transport to perform according to time table.

How does UTOPIA work

The power of UTOPIA is prediction. UTOPIA estimates how the traffic situation will develop and calculates the best possible strategy. The 'best strategy' is based on a so-called 'cost function'. The cost function weighs issues such as delay time, the number of stops and specific priority requirements. Taking into account the effect on adjacent intersections, the distributed control is optimised for each intersection in the network. All intersections communicate the expected traffic flow to neighbouring intersections, allowing for a long prediction horizon.

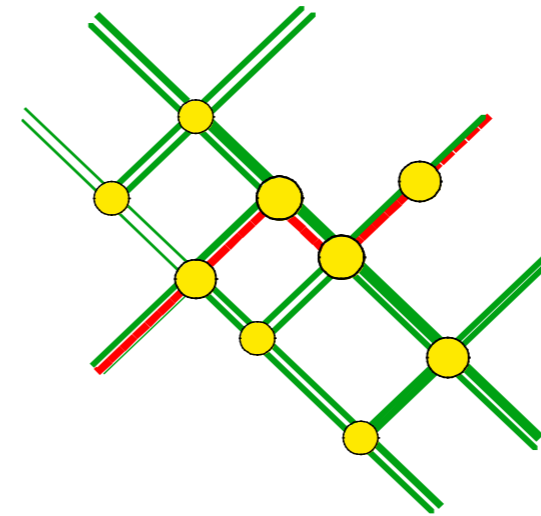


Figure 1 Coordination

UTOPIA also helps to implement specific scenarios by specifying routes through the network as an additional weight factor for the optimization. For example, it is possible to indicate which routes need above-average coordination. The weight can be dynamically changed by the traffic manager or an automated scenario manager.

Requirements for UTOPIA

For UTOPIA, the essential requirements are detectors for observation, a communication infrastructure and computing capacity for optimisation.

In practice, each intersection within an UTOPIA network is equipped with a so-called SPOT unit in order to provide communication and computing capacity. These SPOT units do not require a certain type or brand of traffic light controllers. Obviously Peek's EuroController and MDSL unit fully integrate the SPOT unit for the best performance available, combining broadband communication technology with UTOPIA.

For traffic observation, exit detectors (i.e. placed on the outgoing carriage way) are required at the main directions. More detection will increase the reliability of the measurements. However many algorithms are implemented to calculate and model the traffic based on limited detection. If stop line or other detection is available UTOPIA can use this information to optimize the control. Although not required this will increase flexibility of the control algorithms, especially during non-peak hours.

The distributed logic removes the UTOPIA central computer from the critical system parts. The centre merely operates as a user interface and traffic data collector as well as an interface to external systems. All traffic data is stored for multiple years and available for external usage.



Benefits

UTOPIA offers the network manager the following benefits:

- Keeps the flow going;
- Manages timely public transport;
- Fully adaptive, adjusts to the traffic situation;
- Realizes strategic traffic policy objectives;
- Dynamic priority levels for public transport vehicles;
- Tuned and tested in lab situation before installation on-site;
- Open communication infrastructure.



Simulation

The effect of a UTOPIA network management and control system can be determined in simulation, using the leading edge micro-simulators. It is possible to use VISSIM, AIMSUN or Paramics. See figures 2 through 4.

Peek translates the traffic analyses into UTOPIA configurations which are tested in the simulation environment. The simulation results provide a reliable impression, especially due to Peek's expertise in matching the simulation environment to reality as closely as possible.

Based on the simulation results, the right solution for the network can be chosen. The simulation environment is a powerful tool, also for any changes and future expansion.

Innovation

UTOPIA is deployed in a multitude of situations in a large number of countries both in small and large networks. Some examples are Turin, Milan, Brussels, Warsaw, Eindhoven and Schiphol. Requirements and expectations are different in each country and new systems such as UTOPIA also change expectations. This situation enables Peek to convert the accumulated expertise into continuous product development.

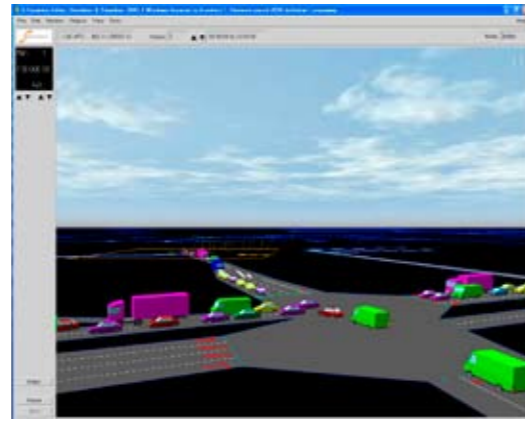


Figure 2 Paramics.



Figure 3 AIMSUN

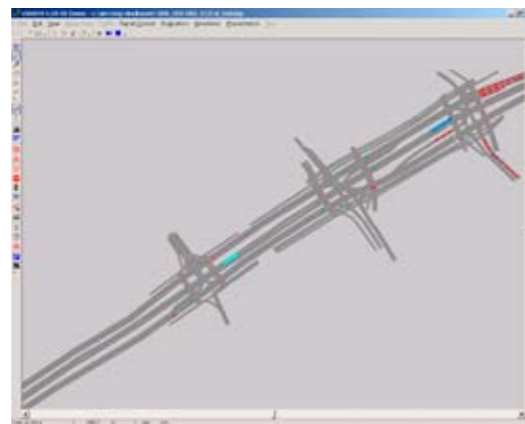


Figure 4 VISSIM

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UTOPIA
Modern Traffic Management