# SIMULATION OF SPOT/UTOPIA CASES

**Written by**

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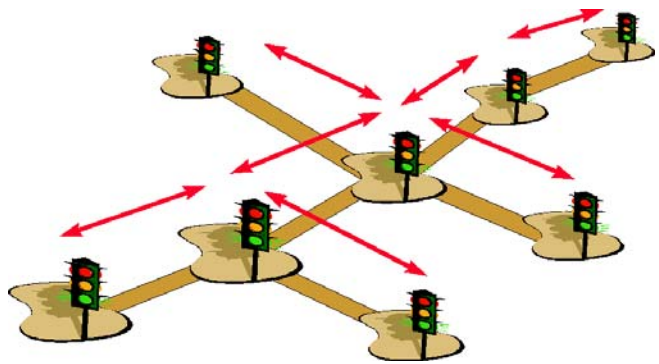
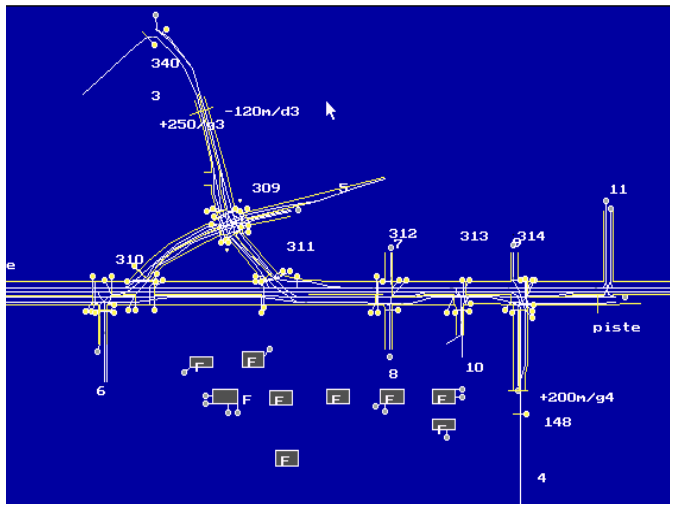


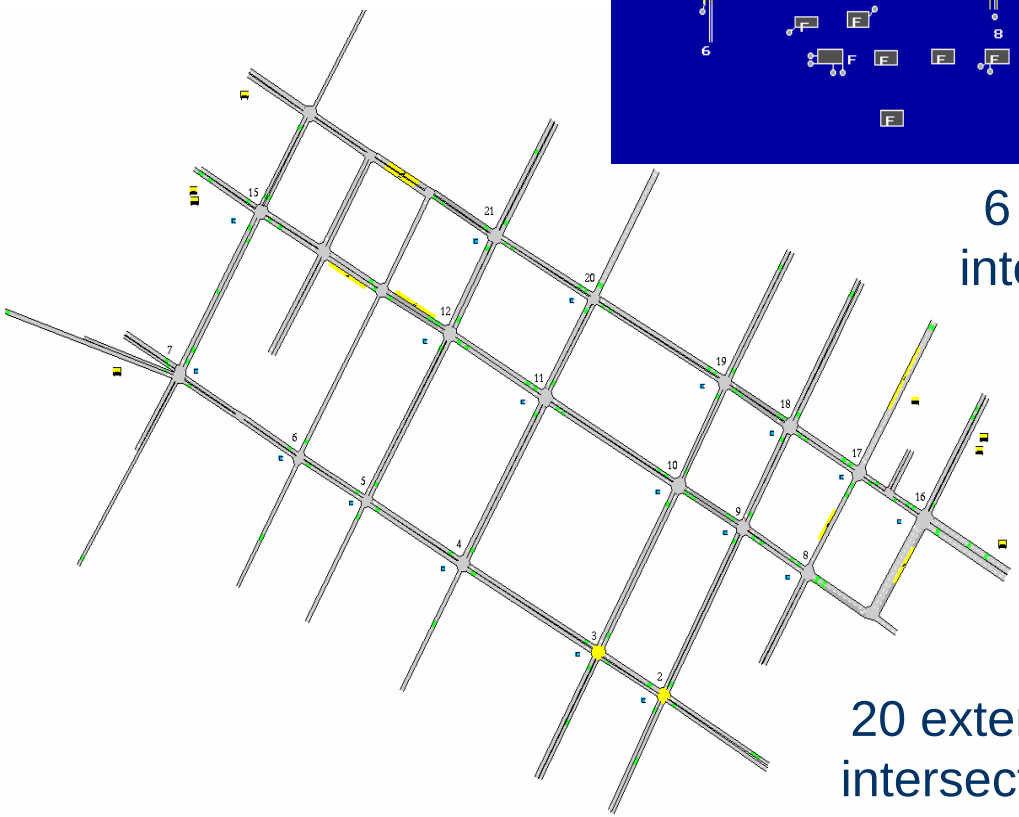
# Simulation experience

SINTEF has simulated several SPOT areas

- HUTSIM
  - Christies gate, Bergen
  - Tampere, Finland
- NETSIM
  - Ila, Trondheim (two laps)
  - Majorstua, Oslo
  - Bystasjonen, Bergen
  - Chicago Avenue, USA
  - Kvadraturen, Oslo
- Aimsun
  - Fredriks gate, Oslo
  - Kvadraturen, Oslo
  - Grünerløkka, Oslo
  - Elgseter gate, Trondheim




6 external intersections



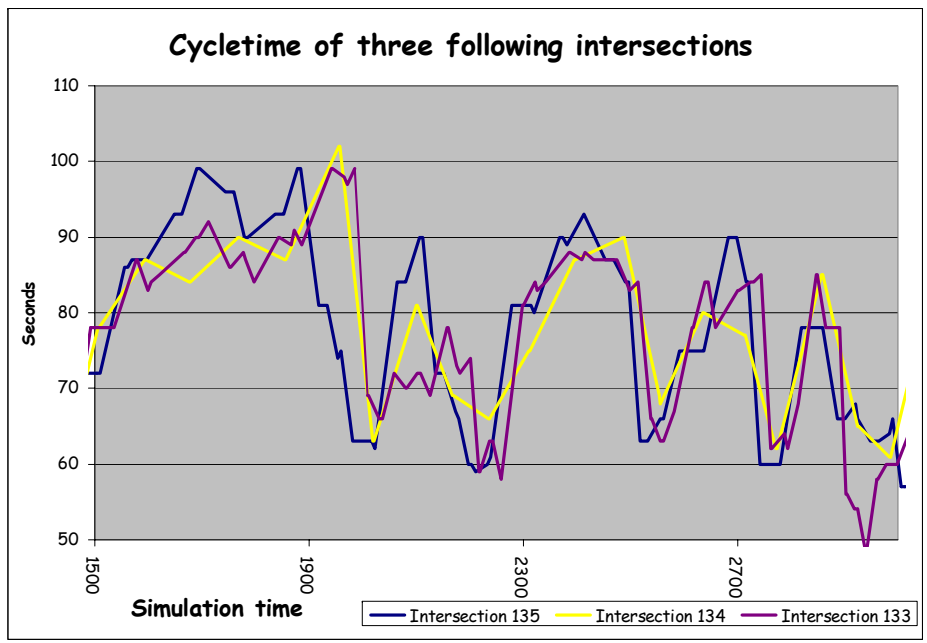
20 external intersections

# Results of simulation cases

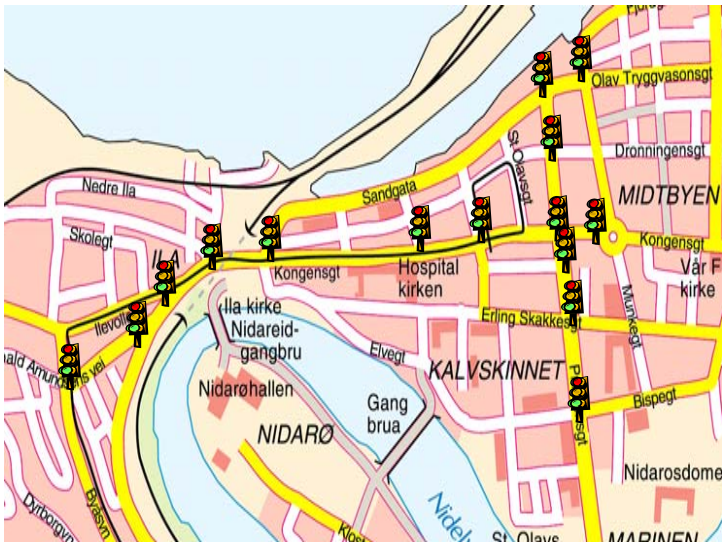
Results of installations is dependent on both previous signaling scheme as well as traffic situation.

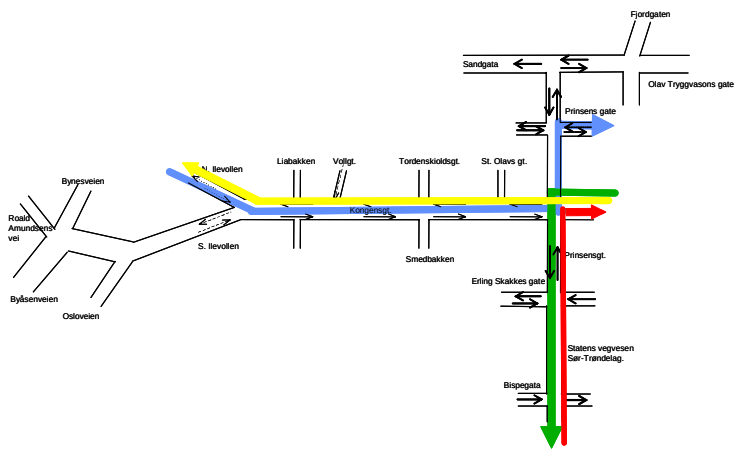
- Optimal setting for fixed timings:
  - Normal traffic : 10 - 15 % reduction
  - Public transport: 15 - 25 % reduction
- Near capacity limit of fixed time system:
  - Normal traffic : 15 - 30 % reduction
  - Public transport: 30 - 50 % reduction

All results is measured in travel time.



# Onsite testing




- 15 intersections in the first SPOT/UTOPIA area in Trondheim.
- In Prinsens gate there are 70-80 buses per hour in the rush hours. The main intersection (Prinsenkrysset) was oversaturated in the rush hours.

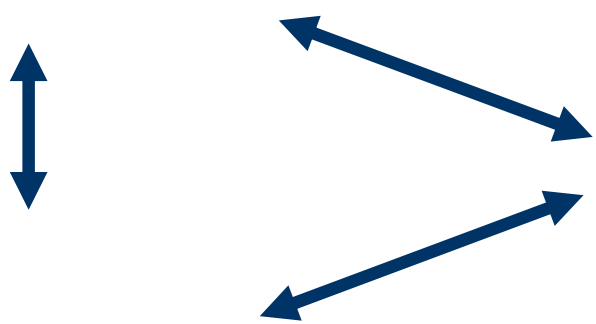
| Changes in morning rush - travel time | | Changes in afternoon rush - travel time | |
|---|---|---|---|
| **Public transport** | **Private traffic** | **Public transport** | **Private traffic** |
| - 10 % | - 1 % | - 10 % | - 9 % |

# Co-operation in Norway

***Public roads administration***

Statens vegvesen

Oslo kommune



***Testing and technical support R&D***

SINTEF

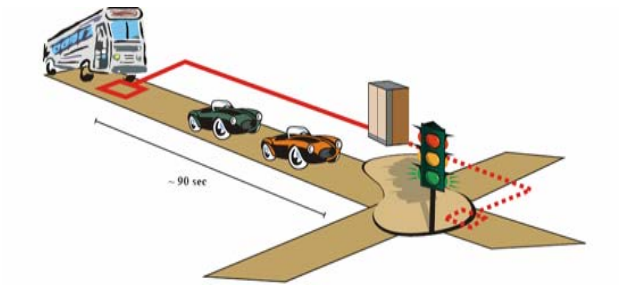
***Suppliers***

PEEK

swarco

# Simulation setup

- The SPOT unit's exchange forecast information with their neighbours about signalling strategy and expected platoons. SPOT/UTOPIA chooses a strategy and shifts it back to the simulation model .



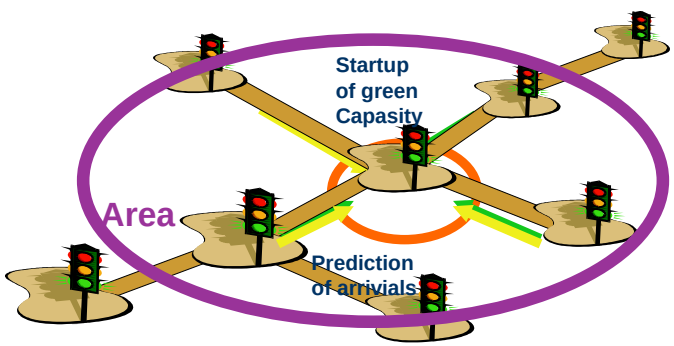

- The SPOT units will thereby make a signalling strategy that should fit the whole area.

Change of signals

Simulation model

Traffic actuated co-ordination

Traffic counts



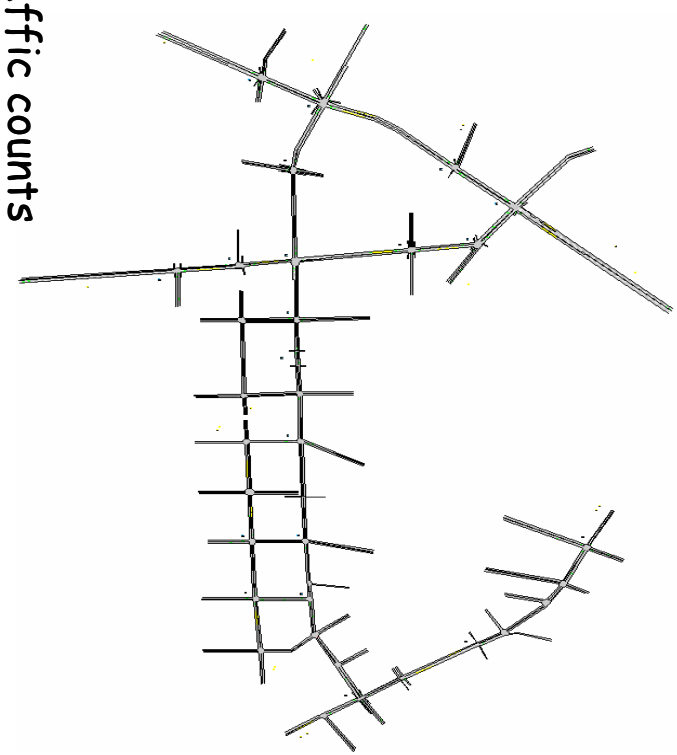

This exchange of information between the simulation model and SPOT/UTOPIA is a continuous process with several message interchanges each second.

Simulation of SPOT/UTOPIA is possible with:

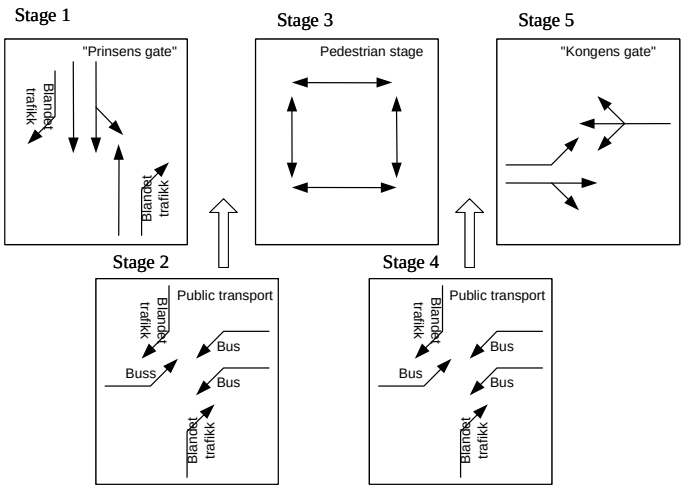
HUTSIM, NEMIS, NETSIM, AIMSUN or VISSIM.

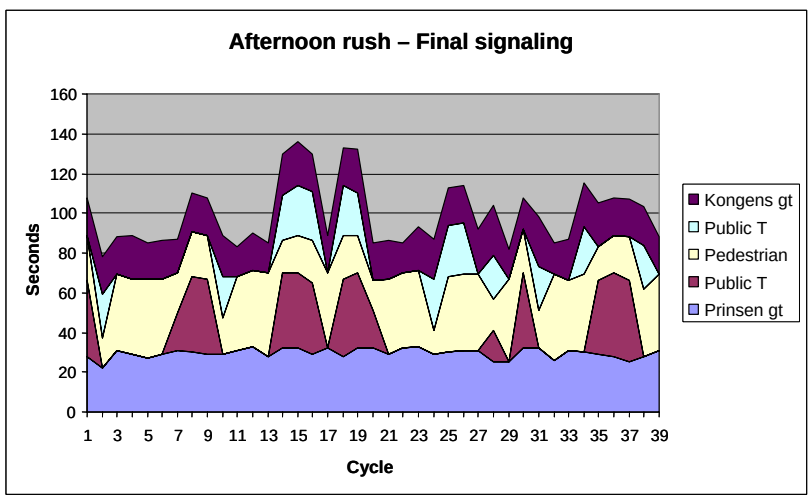
- The vehicles in the simulation network generate a message towards SPOT/UTOPIA when passing a detector.

- SPOT/UTOPIA is utilised in Norway due to priority capabilities for public transport.



# Simulation assistance



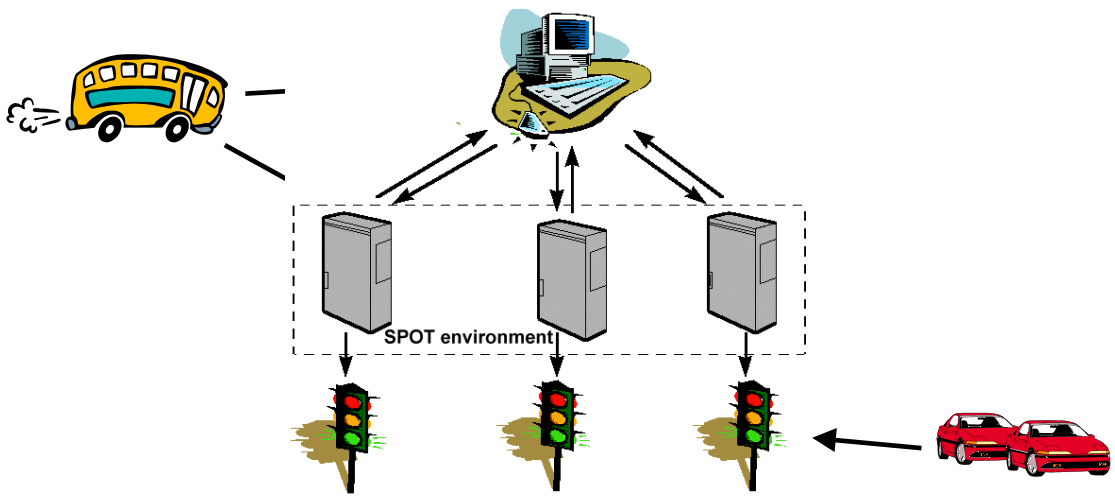

- By redefining the stages in one intersection we get a flexible signalling.
- The stages for public transport are only activated when there is detection of public transport units.

| Changes in morning rush - travel time | | Changes in afternoon rush - travel time | |
|---|---|---|---|
| **Public transport** | **Private traffic** | **Public transport** | **Private traffic** |
| - 40 % | - 20 % | - 40 % | - 25 % |

# SPOT/UTOPIA

SPOT/UTOPIA concept distinguishes three layers;

- A central computer named UTOPIA, primary used for supervising and monitoring
- Industrial computers, SPOT units, that are integrated in the traffic controllers and takes care of the local optimisation.
- Traffic controllers that execute the signalling strategy.




- Unlike most other UTC-systems SPOT/UTOPIA focus on the traffic that are actually approaching each intersection.

# Simulation of SPOT/UTOPIA

- Purpose of simulation cases are to study how we may use priority of public transport to obtain near optimal settings. Focus are on:
  - Level of priority
  - Alternative signalling schemes
  - Effects for other vehicles
  - Effects for pedestrians
  - Environmental effects
- A typical Norwegian SPOT/UTOPIA installation has a 3-6 months payback time.
- In Norway the simulation work is accepted as a scheme to obtain the expected results from SPOT/UTOPIA installations.