Czech Technical University in Prague
Faculty of Transporation Sciences

SMARTER TRAFFIC CONTROL FOR MIDDLE-SIZED CITIES USING ADAPTIVE ALGORITHM

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Content

New traffic control for middle-sized cities using adaptive algorithm

Work supported by the Technology Agency of the Czech Republic under project “New methods for urban traffic control in congested areas”

Project goal:

- Design and application of higher control algorithm module
- Verification in simulation environment and in real traffic

Motivation

Today traffic control usually handles well common situations in common traffic

Difficulties usually caused by irregular situations

Focuse on situations when most of existing systems do not provide optimal results

- Traffic states close to saturation
- Irregular events influencing whole network
- Modification of conditions

Model principles

Basic parts

- Model of the queue
- Model of delay
- Model of traffic flow and occupancy

Modification of

- Stages
- Green time of TLC
- Offsets
- Traffic cycle duration

If possible, the cycle duration and offset not changed (rare in real traffic)

Model principles

Offset determination prerequisities

- System works with variable signal plans, any change of the length of a phase needs to be taken in the account for the offset calculation,
- Intersections use local dynamics
- Change of offset at one intersection influences the offset for all the following intersections

Algorithm based on principles from the:

- Czech Technical Specification
- Highway Capacity Manual 2000

Simulation

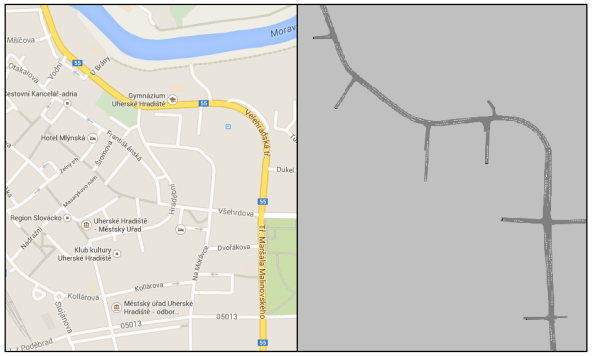
In two traffic simulation software

- AIMSUN
- VISSIM

Traffic surveys had been conducted to gain the real traffic data used as the simulation input

Model

- Reflected real traffic situation
- For the calibration used the real traffic data



Traffic Dependent Control module

Solution for smaller cities using traffic system ElsArea®

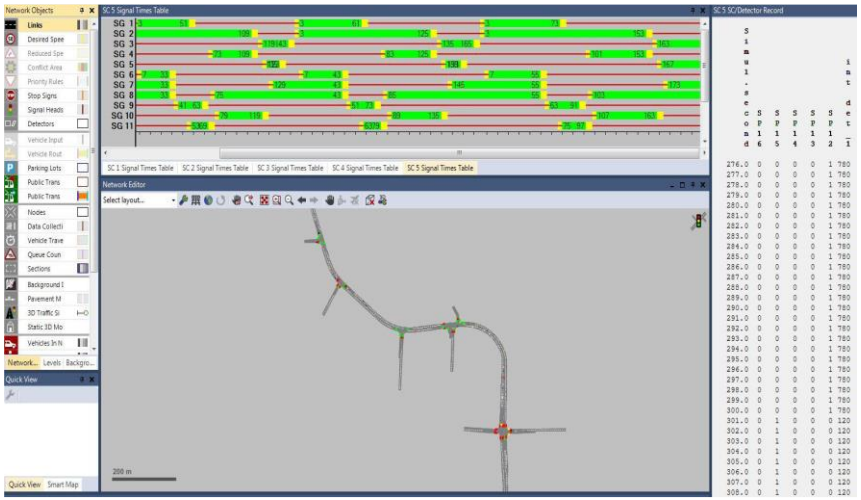
Module

- Connected to a traffic centre
- Enables to control an intersection or group of intersections
- Enables the fully automatic traffic dependent control
- Enables implementation of traffic scenarios from traffic operator
- Uses rules and thresholds, described by logical conditions or parameters, to adjust the signal plans of the intersections

Traffic Dependent Control module

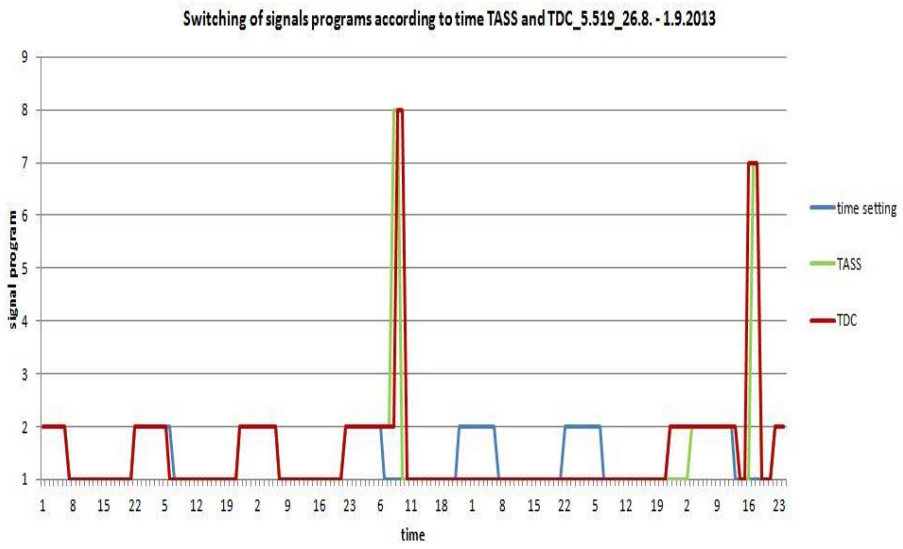
Two parts

- Configuration part – graphical user interface (GUI)
- Executive part – TDC service as a module of the traffic centre



TDC module simulation and testing

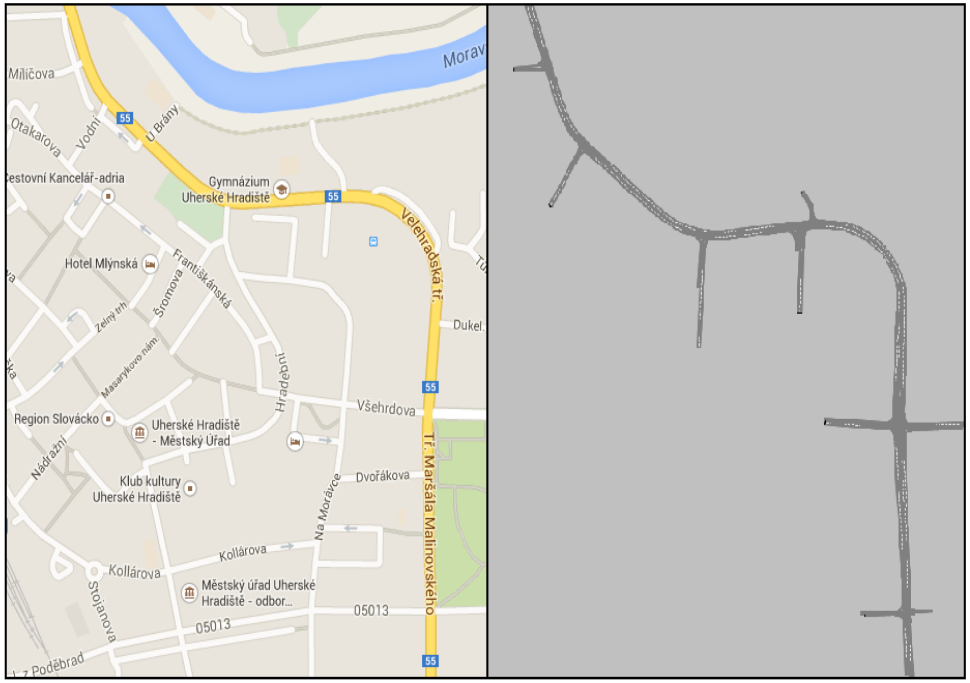
Reaction of the TDC in blind control compared with an intersection using the TASS system



TDC module real-world testing

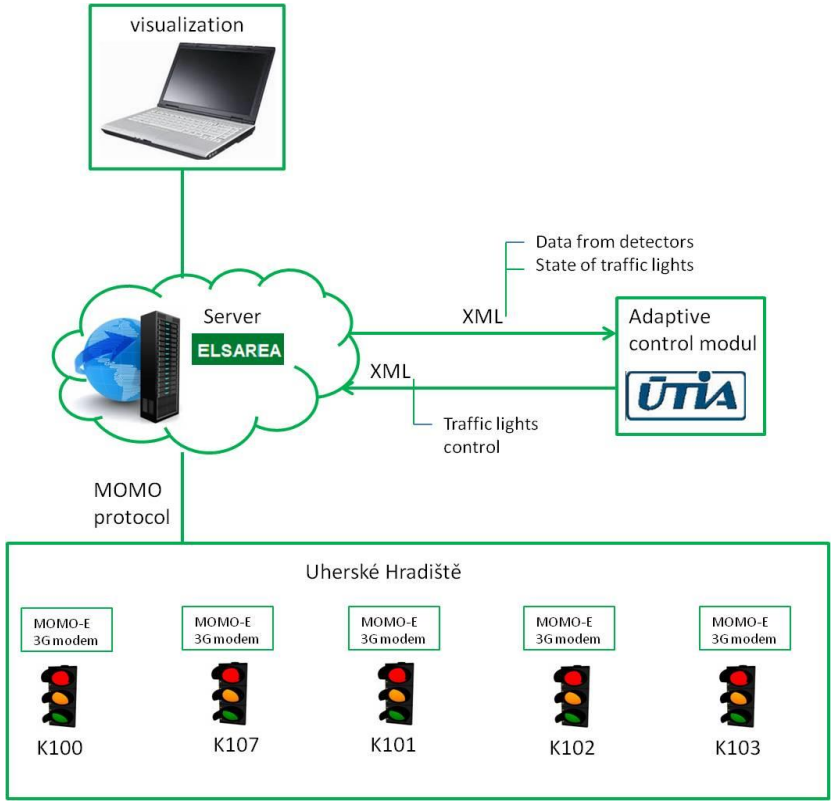
Taken place in the city Uherské Hradiště

Five intersections with traffic signalization

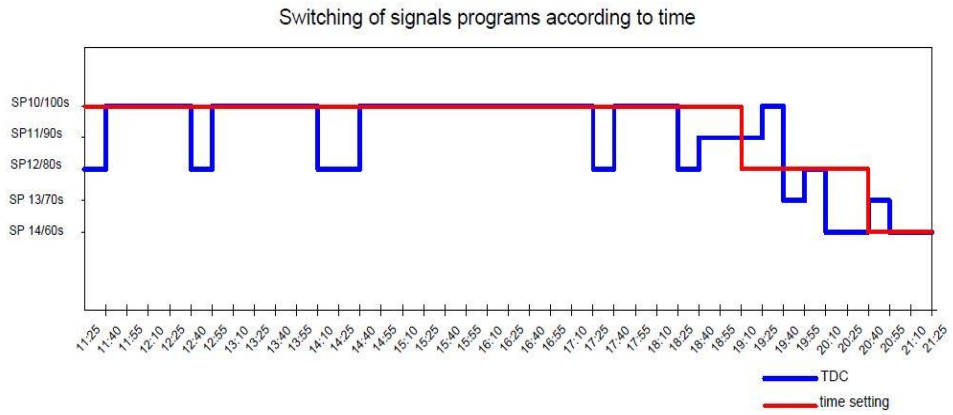


TDC module real-world testing

Schema of traffic control ElsArea®
for testing of TDC



TDC module real-world testing results



Main evaluated parameter – travel time

Results:

- Stabilization of the side directions
- Significant improvement of their traffic parameters (approximately by 11%)

Summary

We have developed TDC control module for city control with the system ElsArea®

TDC:

- Enables to control an intersection (or group of intersections) by a simple input depending on the traffic situation in traffic dependent or in adaptive modification of parameters from higher level to intersection points

- Has proven its benefits

- Ready for additional functions like guidance to parking places, informing the drivers

Conclusion

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Smart cities

- → Smart citizenship
- → Smart commerce
- → Smart economy
- → Smart energy and water management
- → Smart environment
- → Smart security and emergencies
- → Smart entertainment
- → Smart governance
- → **Smart mobility**
  - → **ITS projects**
  - → …
  - → …
  - → …
- → Smart health
- → Smart infrastructure
- → Smart living
- → Smart people

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Thank you for your attention

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