

MOTION - Signal Control for Urban Road Networks

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What is MOTION ?

MOTION means

**Method for the Optimization of Traffic Signals In
On-line controlled Networks**

MOTION is

**a new signal control method for urban road
networks in central systems**

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Motivation

Traffic Situation

- ➡ High network loads
- ➡ Concurring political objectives

Deficits of existing control methods

Functionally fixed systems ↔ Individual solutions

New scientific results

- ➡ Dynamic Network Models
- ➡ Automatic Incident Detection

Objectives

Provision of a

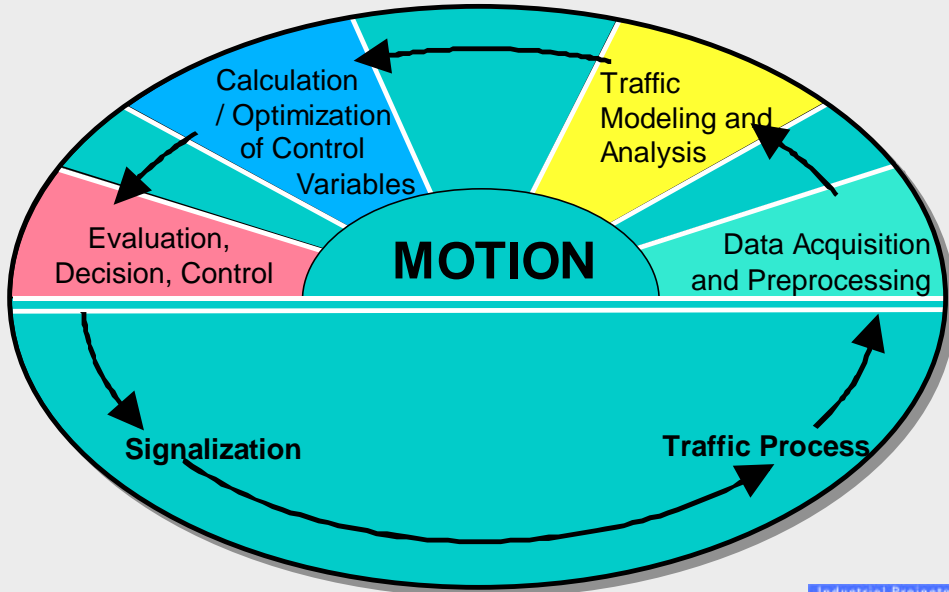
flexible and modular

System concept

- ➡ **Extendability : functional and spatial**
- ➡ **Adjustable traffic engineering features**
- ➡ **Ability of Integration : Local control methods**

Traffic system management

MOTION - Control Sequence

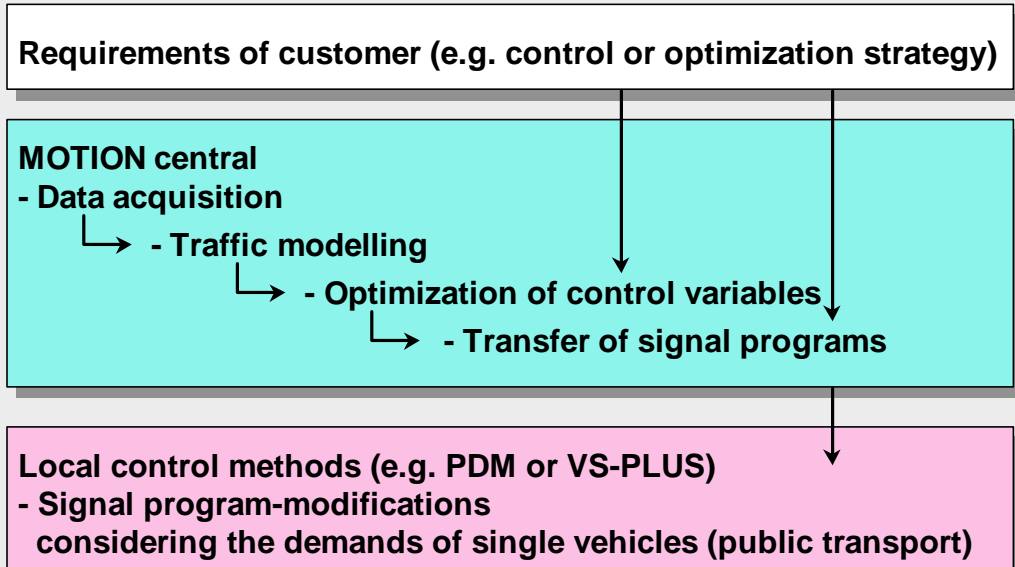


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MOTION - Functional sequence

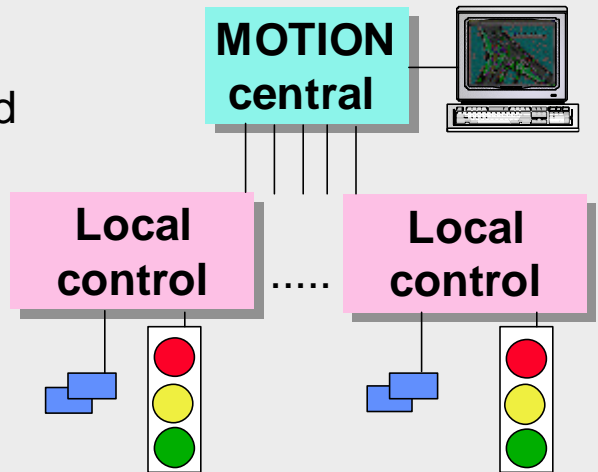


System Components

The MOTION system consists of

a Workstation with the
network control method

and Controllers with
detection equipment
and (optional)
local control methods



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MOTION - Control Strategies

Improvement of Capacity

Incident and Congestion Management

Green Waves for Main Streams

Priority for defined Road Users

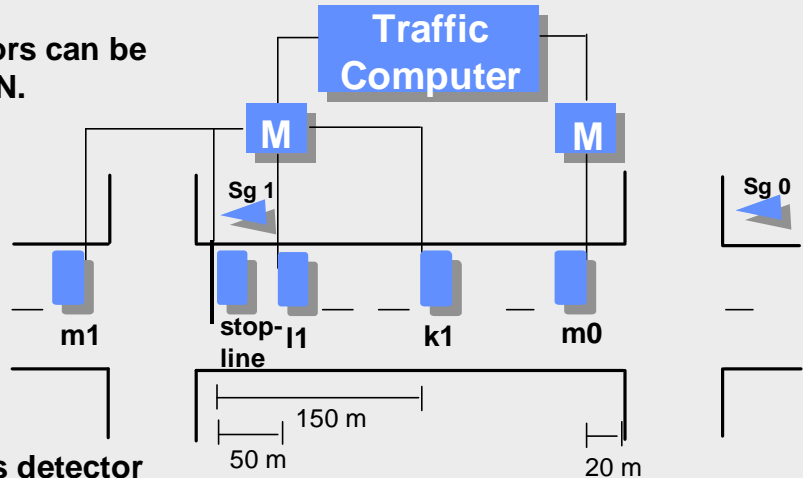
Public Transport Priority

Network Optimum of Delays and Stops

Environmental Control

Detector Configurations for MOTION

Existing detectors can be used by MOTION.



MOTION prefers detector configurations k1 and l1.

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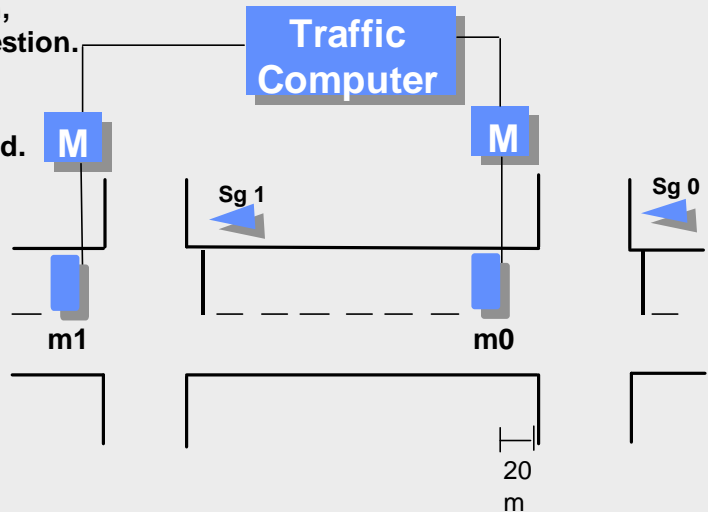
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Automatic Incident Detection

IF traffic volume low
AND occupancy rate high,
THEN incident or congestion.

IF traffic volume high,
THEN imminent overload.

IF traffic volume low
AND occupancy rate low,
THEN no problem.

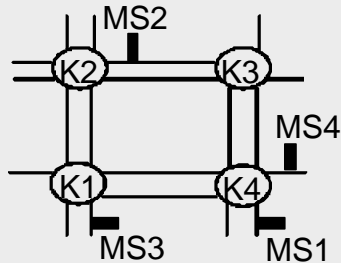


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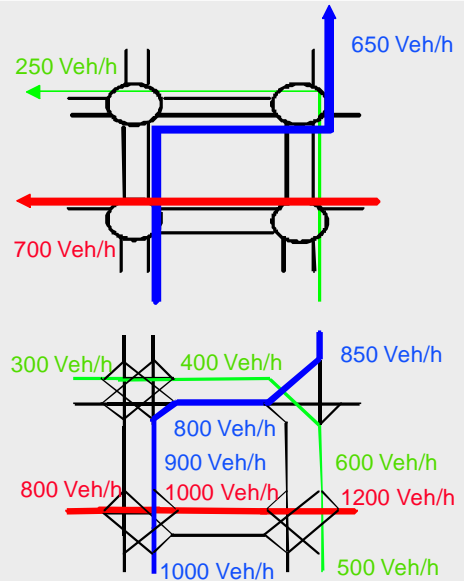
Dynamic Network Models



MS 1: 500 Veh/h
 MS 2: 400 Veh/h
 MS 3: 1000 Veh/h
 MS 4: 1200 Veh/h

Road network

Measurements



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Optimization of Control Variables

Network Cycle Time

necessary for coordination of traffic signals

Green Time Split

adapted to the traffic load of the network, prevents congestion

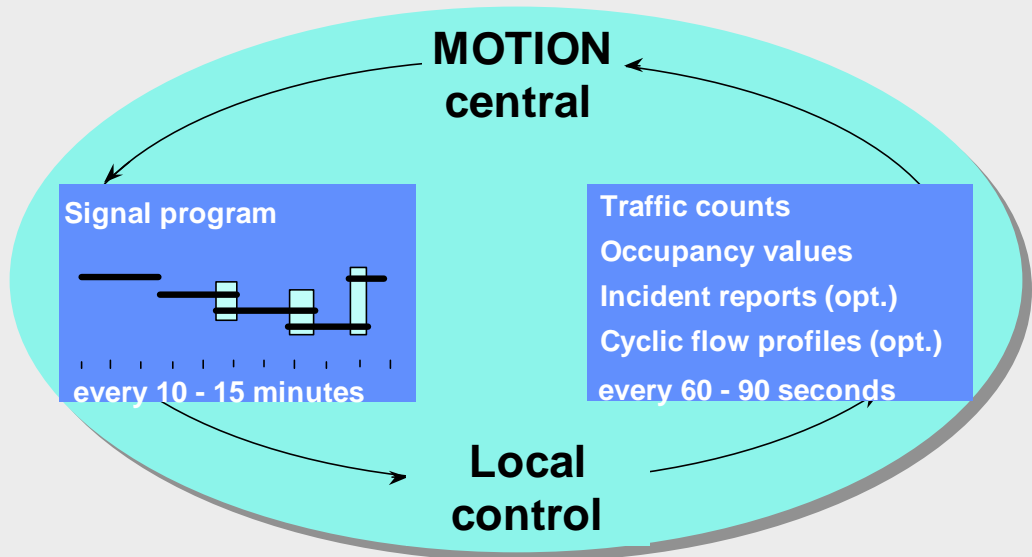
Phase Sequence

relevant for security and optimization aspects

Offset

important for Green Waves and minimization of delays and stops

Interfacing network and intersection level



MOTION Summary

Enhanced Modeling of Traffic

Hierarchical Approach with Optimization of all Control Variables

Distributed Control on Central and Decentral Level

Modular and Extendable System for Adaptation to Control Strategy

Interface of Signal Control to Urban Traffic Management Systems

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