Posing two problems in city transport optimisation

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Outline of the talk

- Brief introduction of my research activities.
- Brief introduction to my institute IPM.
- Announcing of our international Stat. Phys. Conference in Tehran (Sep. 2016)
- Posing the first problem (city vehicular network)
- Posing the second problem (city subway network)

Collaborators

Chikashi Arita, Uni. Saarbrucken

Ludger Santen, Uni. Saarbrucken

Minura Fukui, Nakanihon Automative Colleage, Tokyo

Philipp Maass, Uni. Osnabrueck

Somayeh Belbasi, Uni. Zanjan

Reza Shaebani, Uni. Duisburg

Mehran Nematollahi, Tehran traffic control company

I invite you to ZNU and IPM!

Azar Goshasb fire temple 220 AD

Tehran Grand Bazar 18 C

Soltaniyeh Dome Zanjan 714 AD

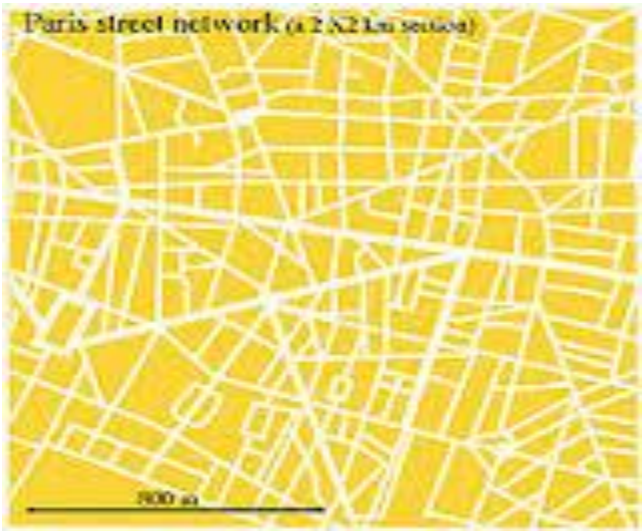
Nature bridge Tehran 2014 AD

International conference on Stochastic Transport in Low Dimensional Systems

- Institute for Research in Fundamental Science

- 27-29 September Tehran

Problem one: Optimisation of vehicular traffic in a city network

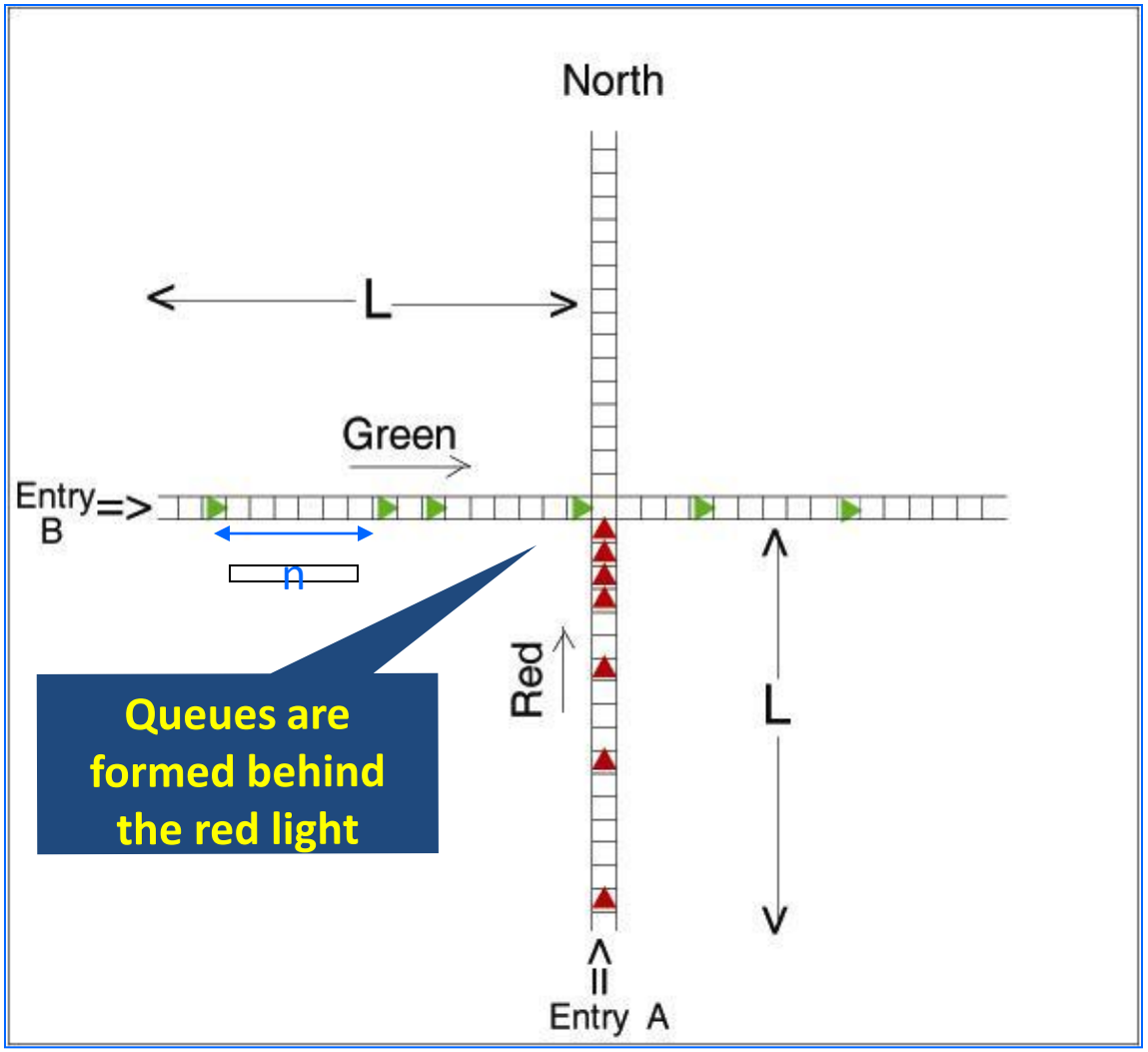


Modelling of an Intersection

We denote the space gap of the entering car by **n**

$$p(n) = \frac{\lambda^n e^{-\lambda}}{n!}$$

Lambda is the average space gap of entering car and is inversely proportional to the traffic volume

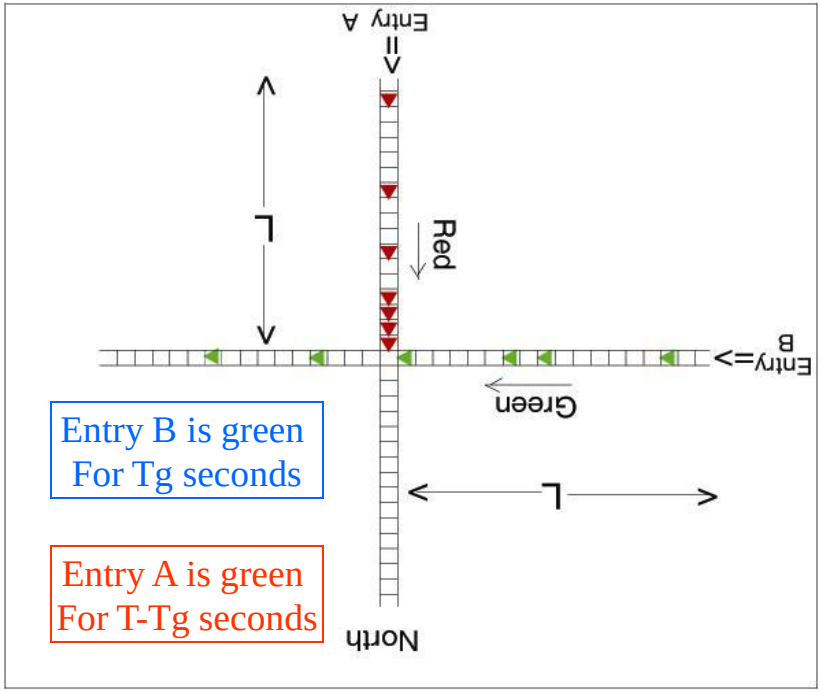


Signalisation of traffic lights

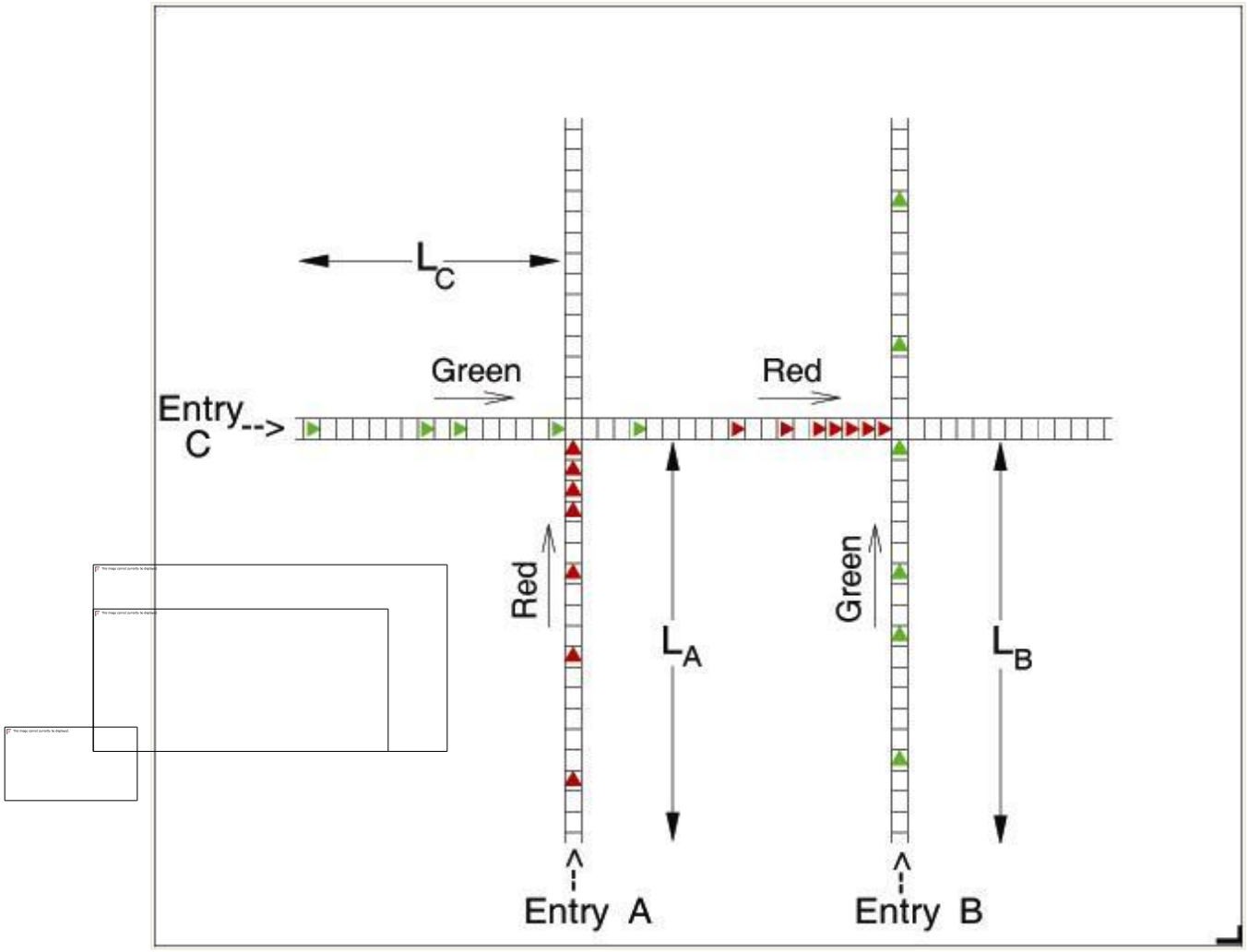
Principally the signalisation schemes are divided into two types : fixed-time and traffic responsive

Fixed-Time Signalization

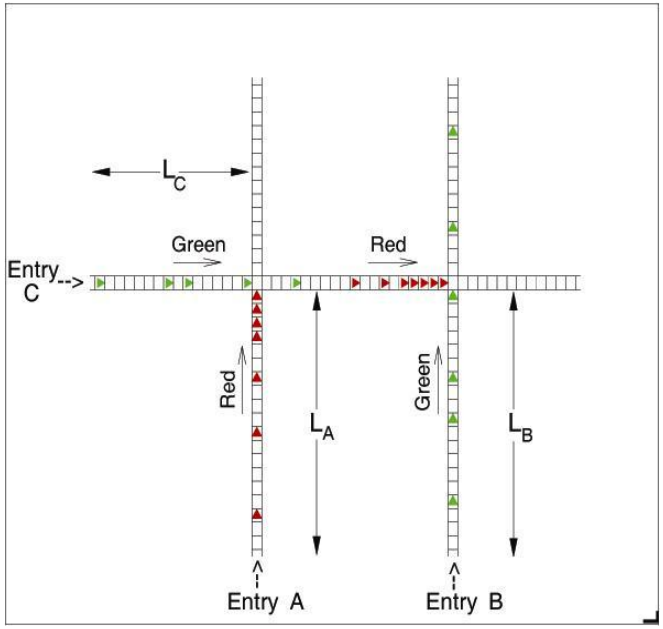
In this method the light cycle length is a constant T

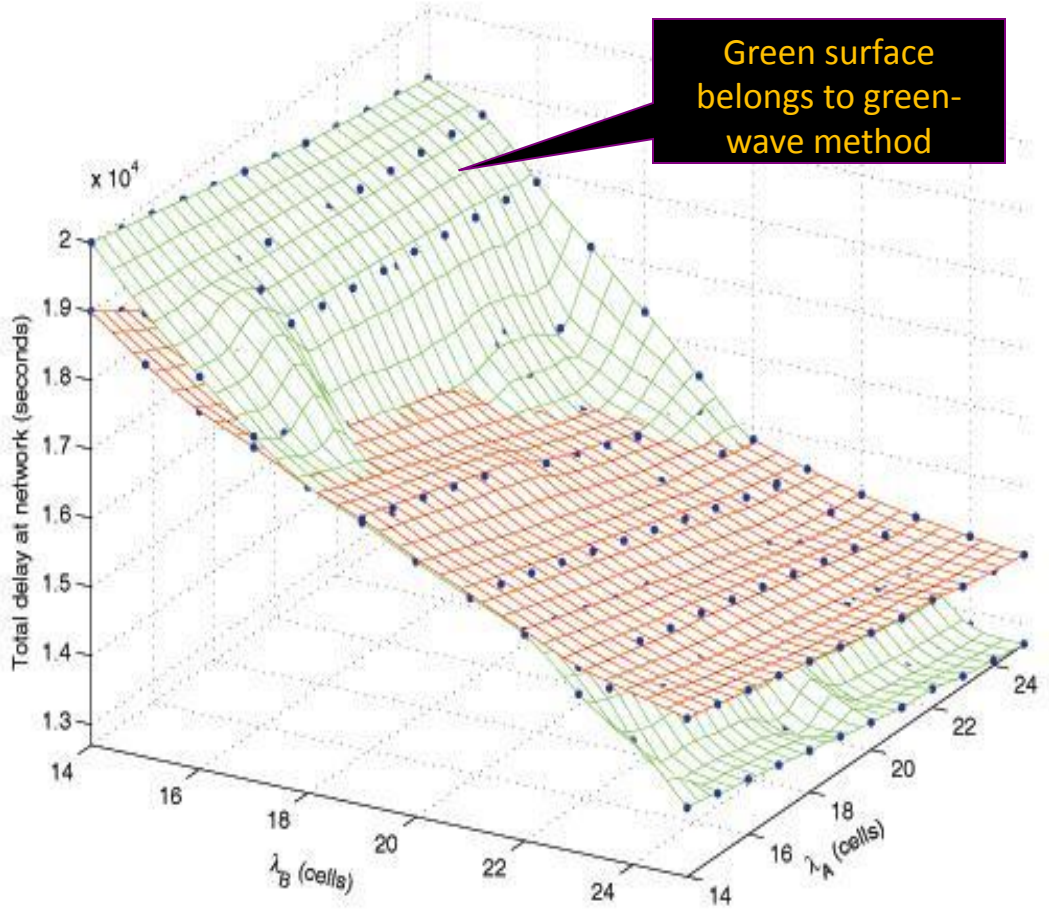


Small City Network



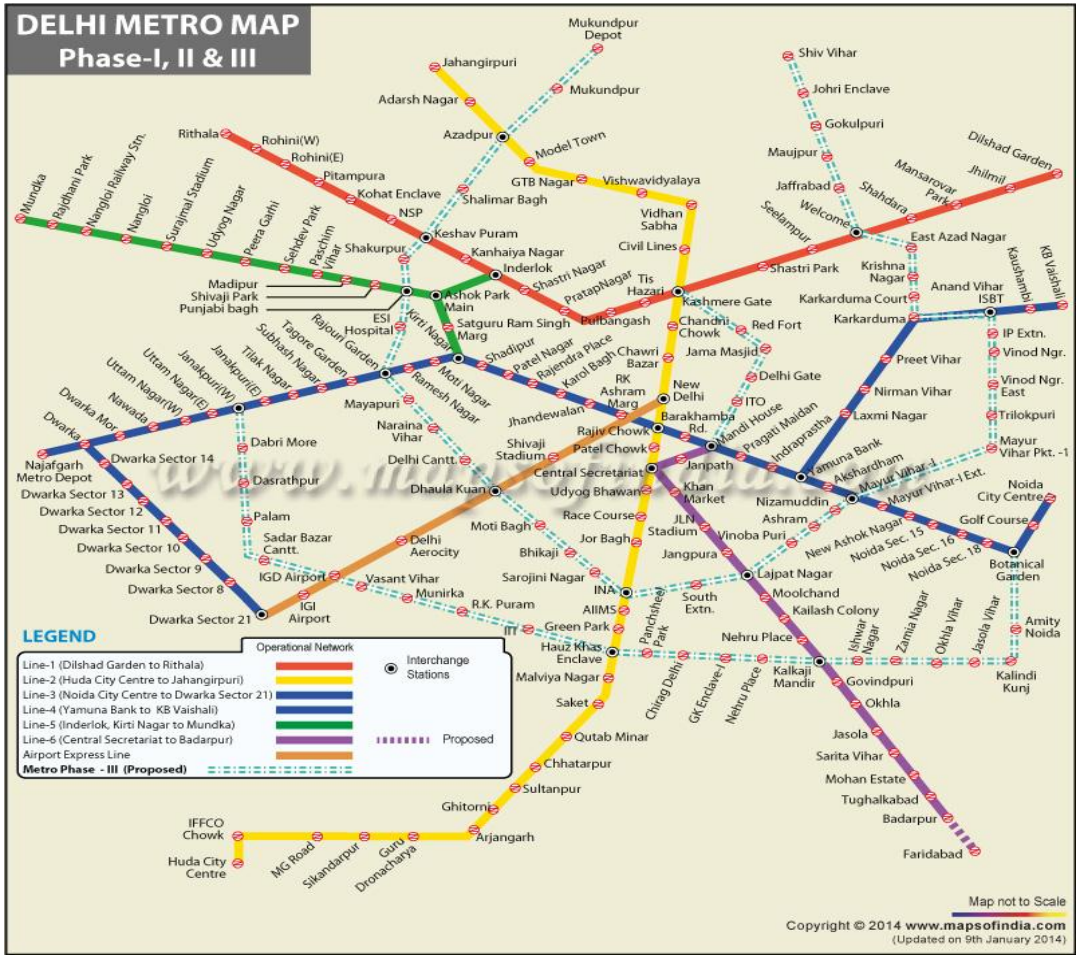
General comparison of decenteralised and green-wave methods



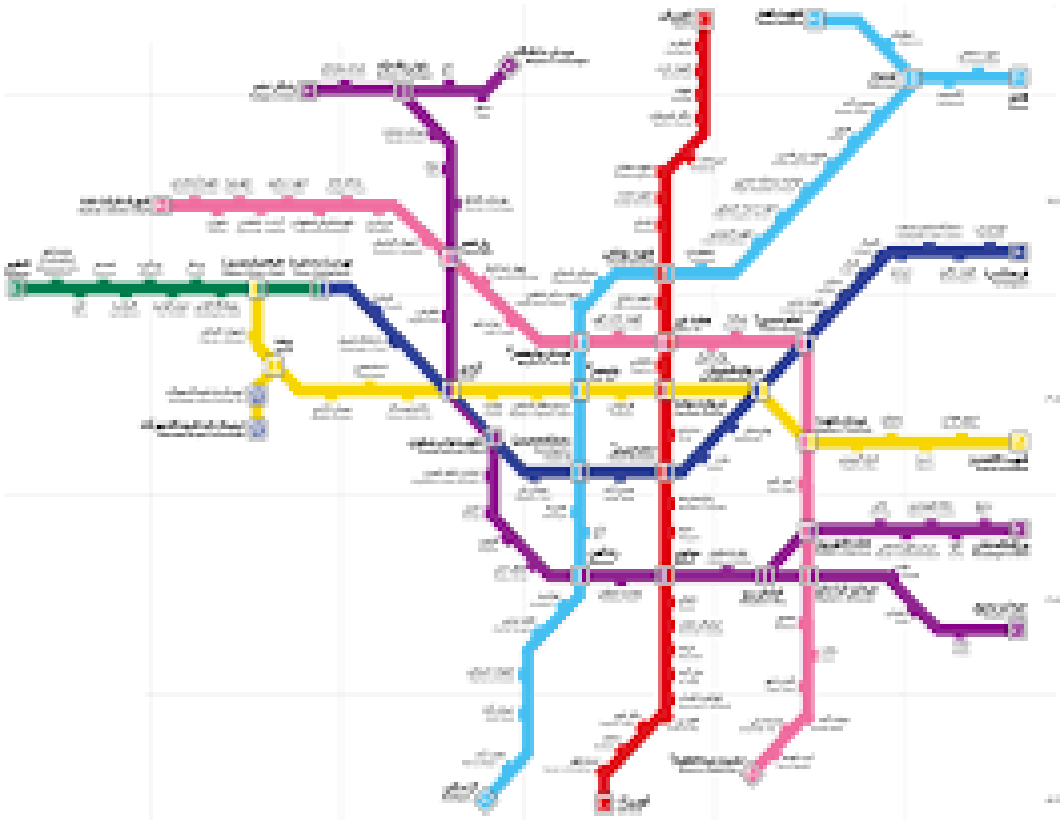


Efficiency of green-wave method strongly depend on The traffic volumes in the Perpendicular streets.

Problem two: Optimisation of train traffic in a metro network



Tehran metro network



A minimal model for metro timetabling optimisation

BASIC ASSUMPTIONS:

Station s has a uniform passenger entrance rate R_s

There are M train in the line

There are N stations

Stations are equidistant

Tij =Average travel time from Si to Sj

No randomness

Wij= rout matrix= fraction of entering Si station who exit at station Sj

T= Aggregate network travel time rate= $\sum_{i,j=1}^{N} R_i W_{ij} T_{ij}$

T depends on timetabling!

Primitive timetabling: every train stops at every station

Our aim: minimisation of T

Other strategies: all-even-odd