Integrating Road Pricing Schemes and Mass Transit Systems

Sittha Jaensirisak

Assistant Professor, Ubon Ratchathani University, Thailand

Agachai Sumalee

Assistant Professor, Hong Kong Polytechnic University, Hong Kong

Sumet Ongkittikul

Research fellow, Thailand Development Research Institute (TDRI)

Outline

- Background
- Example of Singapore
- The case of Bangkok

Why Road Pricing and Mass Transit?

- Experiences from all cities have been proved that public transport improvement alone cannot cope with transport problems.

- A package of instruments is likely to be more effective than selecting any one instrument on its own.

"Road pricing encourages greater use of light rail and generates revenue to pay for the light rail. Conversely the use of revenue to invest in light rail which makes road pricing more acceptable and provides an alternative for those no longer able to drive." (May et al., 2003).

Road map of road pricing implementation

Source: ATRANS research project "Road Map for Road Pricing Implementation in Thailand: Decision Making Context" (Jaensirisak, Sumalee, Ongkittikul, 2008)

1. The national government has a responsibility to develop a clear transport strategy and legislation to support the local government.
2. **Road pricing should be considered as a part of the effective transport strategy.**
3. An independent expert study group should be set to formulate the effective strategy.
4. Effective communication should be done continuously through a two-way dialogue to raise public awareness and knowledge.
5. Road pricing revenue allocation plan is a critical issue.
6. Implementation plan of improvement of alternative transport modes needs to be clear and convincible to the public in the early stage of planning process.
7. Political will and leadership to commit the scheme is a key success of the scheme.

Equity in transportation in Singapore

Acknowledgement to

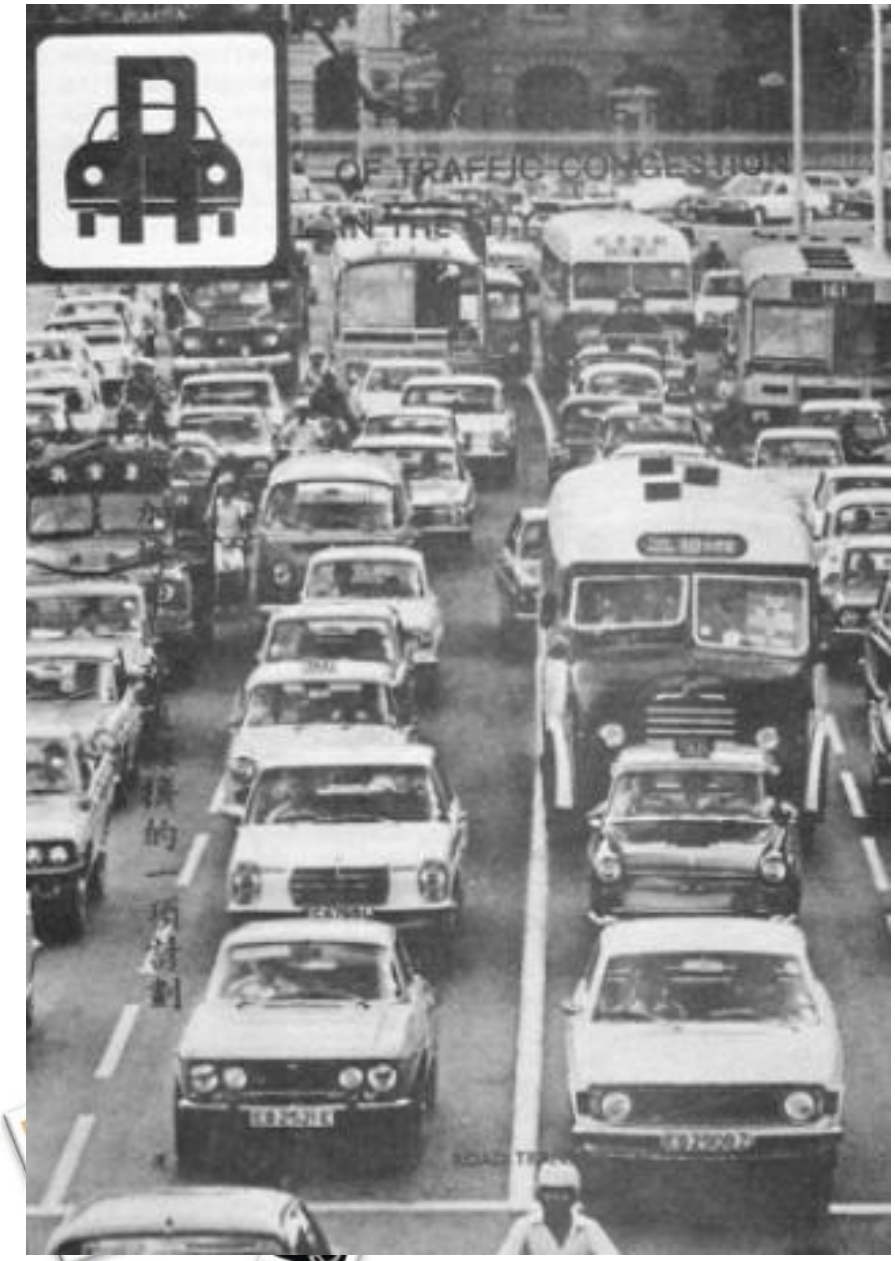
Associate Professor Gopinath Menon

Nanyang Technological University, Singapore

For more information visit

www.onemotoring.com.sg and www.ptc.gov.sg

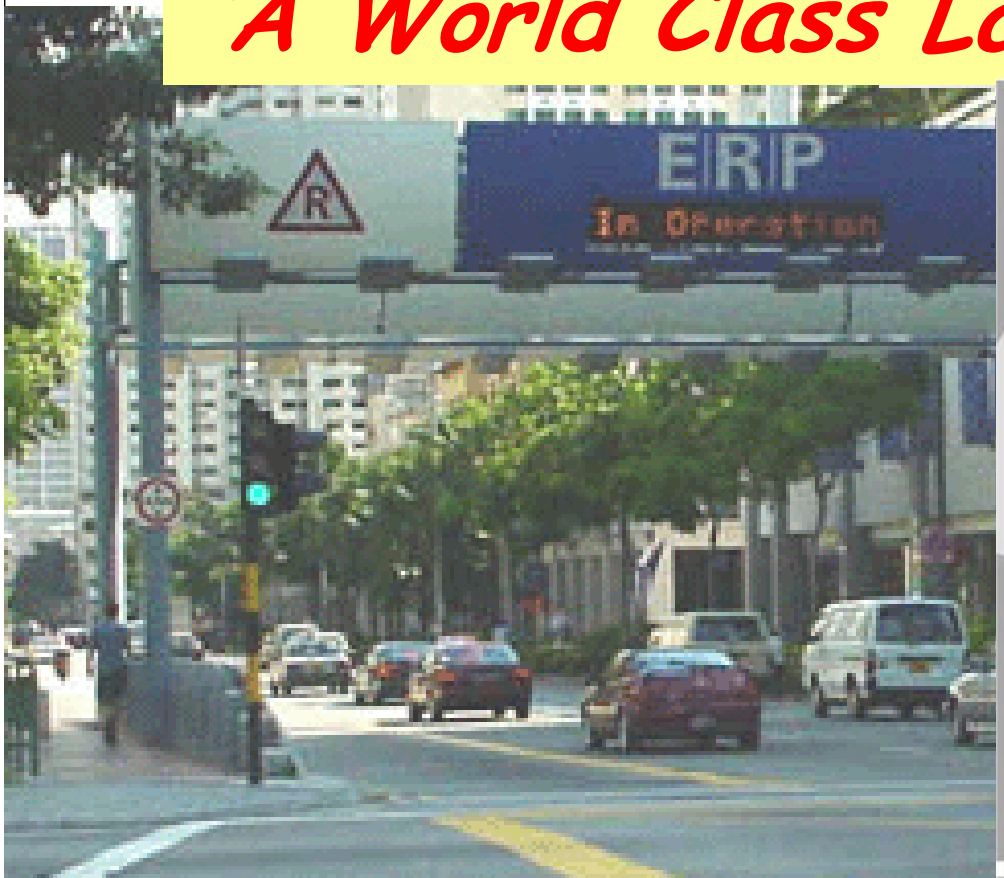
Singapore in 1970

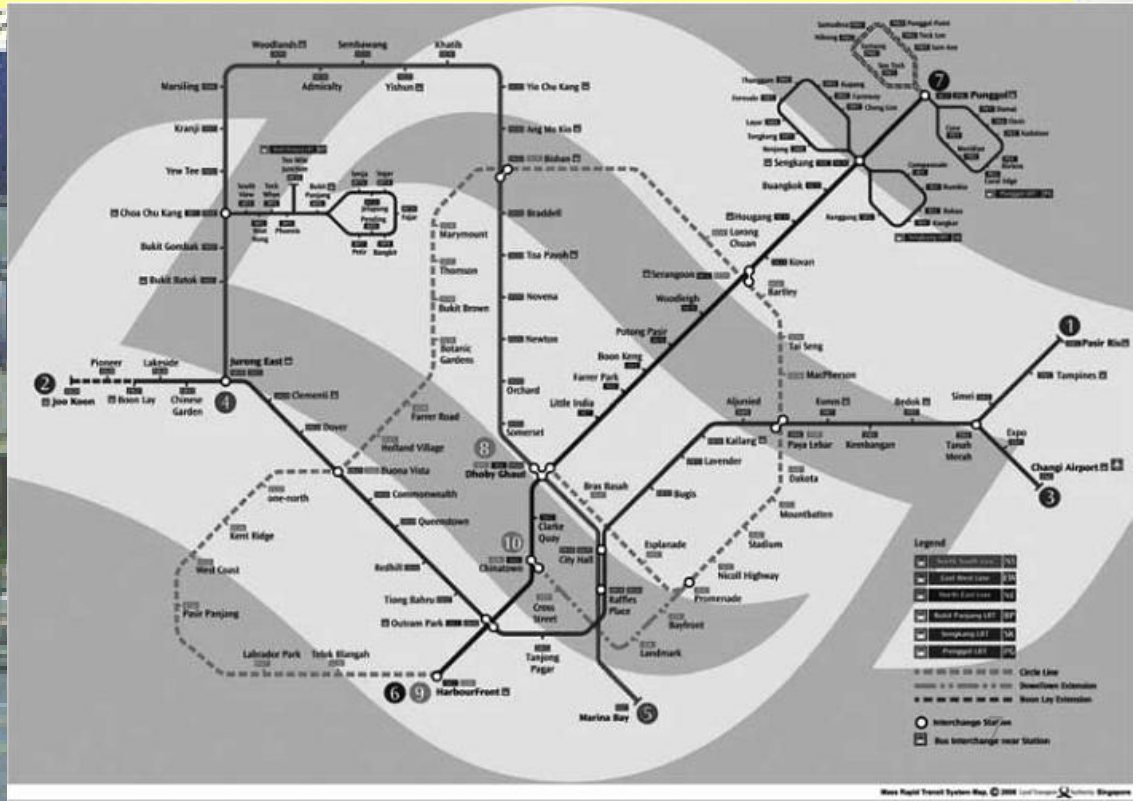


Source: LTA, Singapore

Singapore at present

"A World Class Land Transport System"

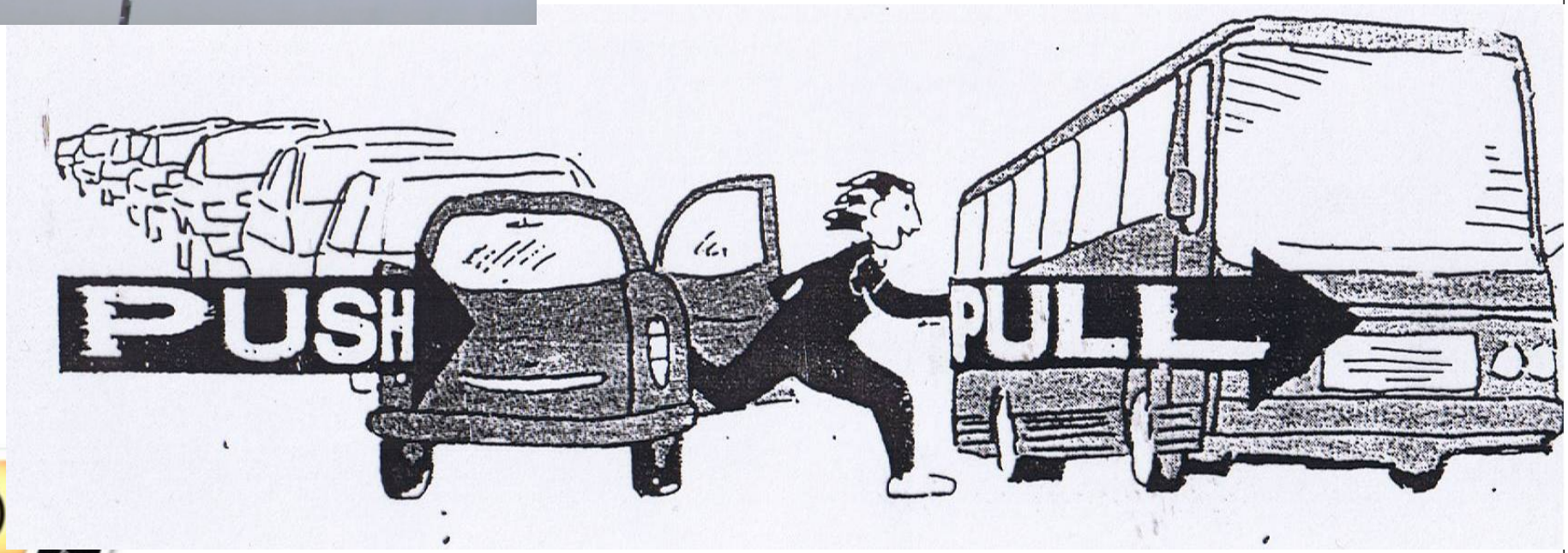




Singapore's Strategy since mid-1970's

- Integrated land use-transport planning
- Road building
- Traffic management
- Public Transport
- Demand management

Push-Pull



PULL - Main players in public transport provision (1)

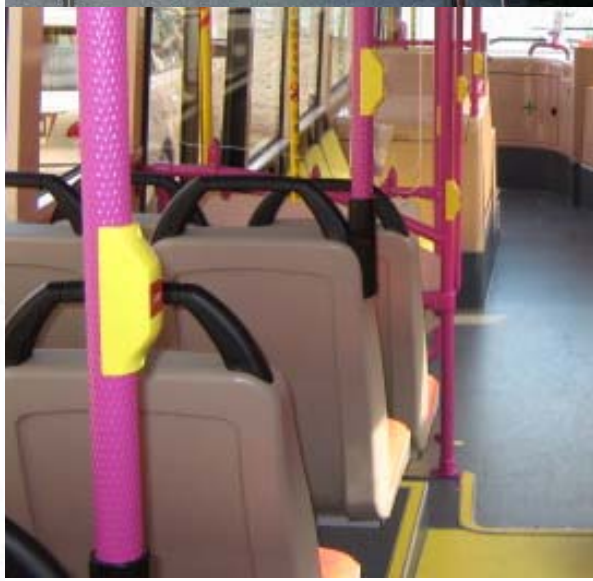
- Government builds basic infrastructure (e.g. train stations, tracks, ticketing equipment, first set of trains (but not buses), bus interchanges, bus shelters, bus lanes) and leases to PTOs
- The Public Transport Council (PTC) approves bus routes, regulates all train and bus fares and sets quality of service standards
- The 2 Public Transport Operators (PTOs) operate efficiently within fares approved by PTC

Main players (2)

- Passengers pay for public transport usage
- 2 PTOs do not get an operating subsidy from Government. The revenue from the fares, advertisements etc. have to cover operating costs
- Both PTOs are private companies, listed on the stock exchange and are profitable entities

Public Transport modes (bus and train)

Comfortable trains and buses



Comfortable bus shelter and train stations

Bus lane & B signals

Good bus lane observance

Good bus and rail travel information

Integrated Ticketing System

Common farecard (stored value) for travel on bus and train with discounts when transfers are made within 45 mins

Integration of passenger facilities

to minimise time and hassle for making transfers

PT Passenger Satisfaction survey 2010

- Security & safety 91%
- Accessibility 90%
- Comfort 80%
- Travel time 85%
- Waiting time 68%

- Overall satisfaction, 96% were satisfied with train services compared to 92.5% for bus services

PUSH - Road (congestion) pricing

Road pricing works on the principle that vehicles pay for the use of the road in proportion to the congestion they are causing.

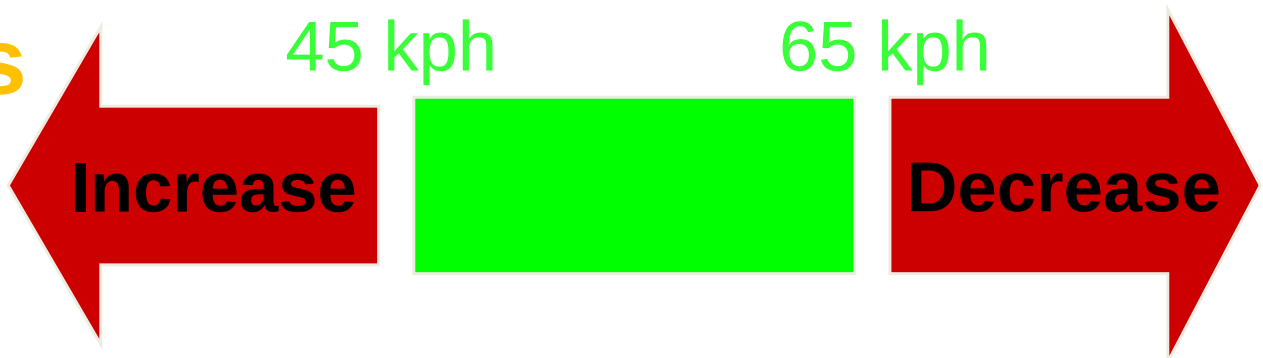
The ERP Gantry-charging per entry

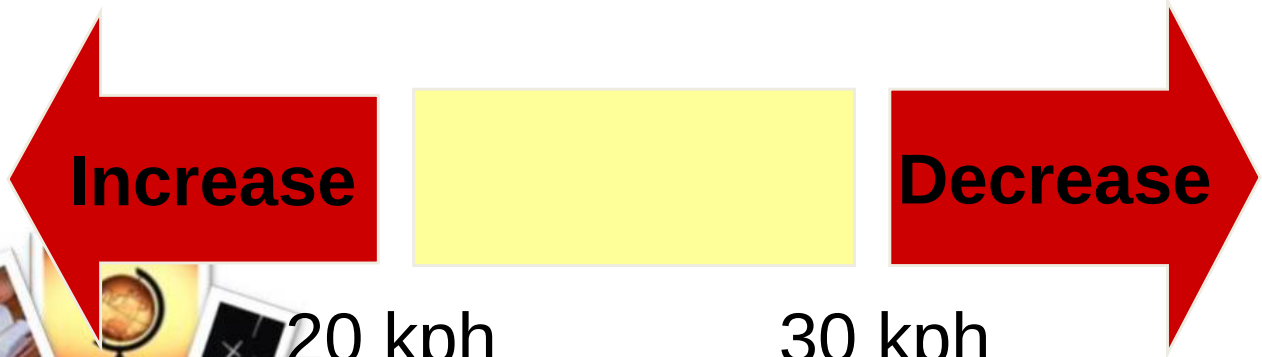
CashCard and in-vehicle unit (IU)

Variable charging level

- To ensure use of road space is optimised
- Review 85percentile speeds at 3-monthly intervals

Expressways





City and Other Roads

Effect of ERP on driving behaviour

The choices for motorists are

- pay and enjoy good traffic conditions
- change the time of travel to pay less or nothing
- change the route to avoid paying
- **change to public transport**
- change destination
- group trips for economy
- abandon trip

Results of ERP

a) Significant reduction on traffic volumes entering CBD

b) Reduction of sharp peak traffic volumes on other priced roads

c) Increase in usage of public transport

Singapore's Conclusion

- Greater use of public transport is obtained through the use of "pull" and "push"methods
- Current modal split during peak hours is 60%
- The aim is to reach 70% by 2020 by extending the trains to more areas and providing more choices of buses.

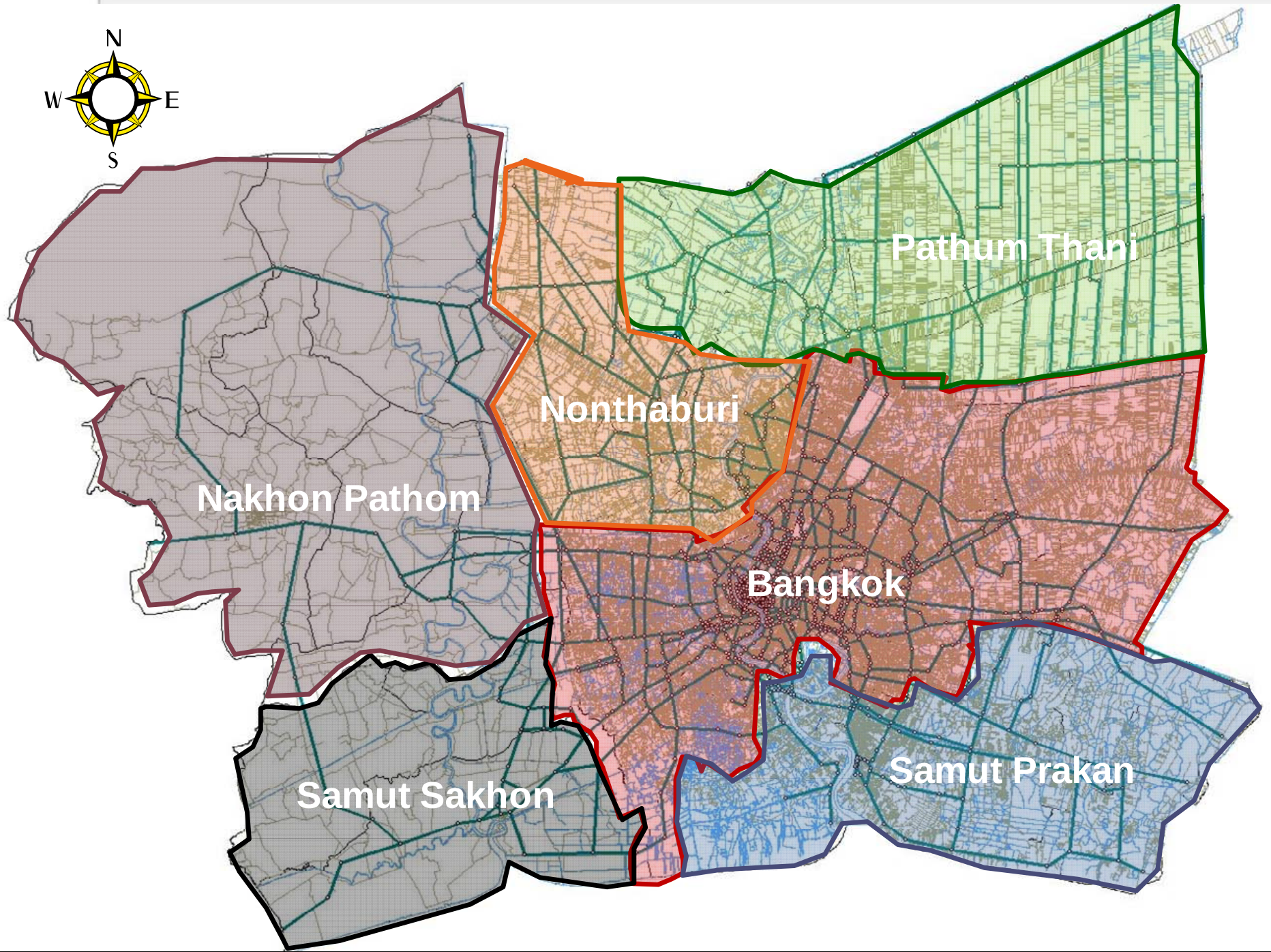
Integrating Congestion Charging Schemes and Mass Transit Systems:

The case of BANGKOK

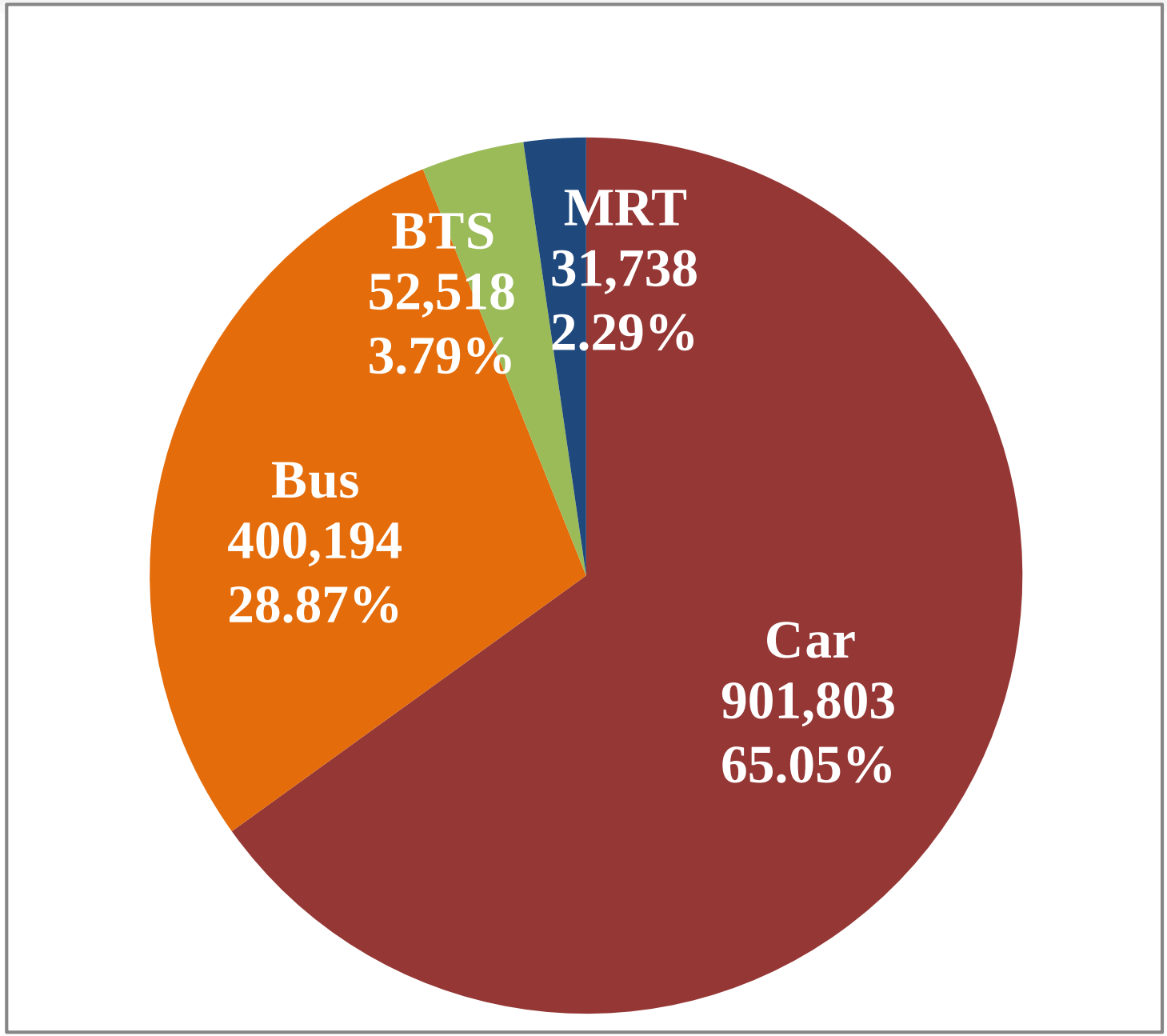
Results from

ATRANS research project 2009-2010

Bangkok metropolitan area



Peak Hour Modal split in 2010

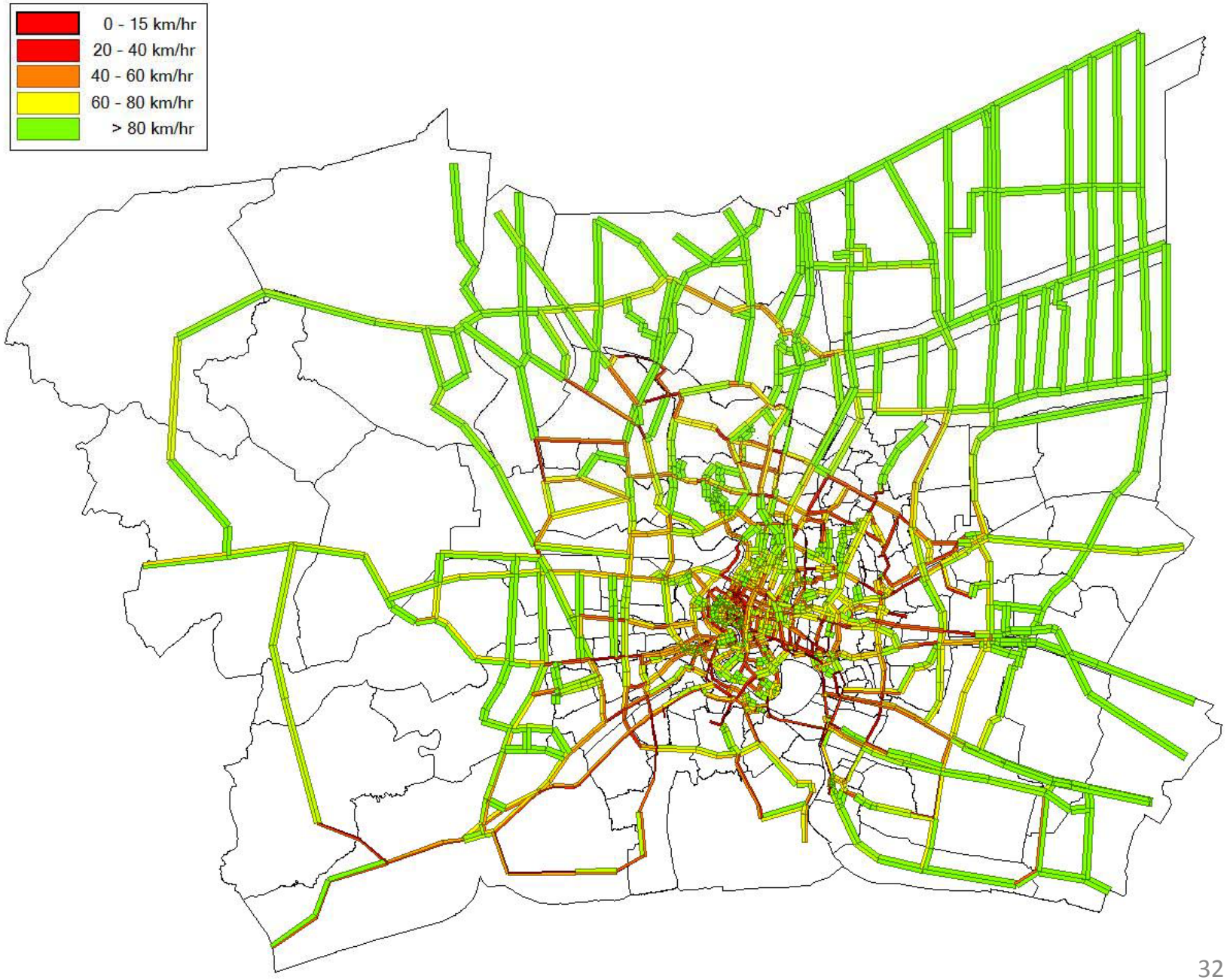


Source: from model calibration

Current car flow

Current transit flow

Current car speed



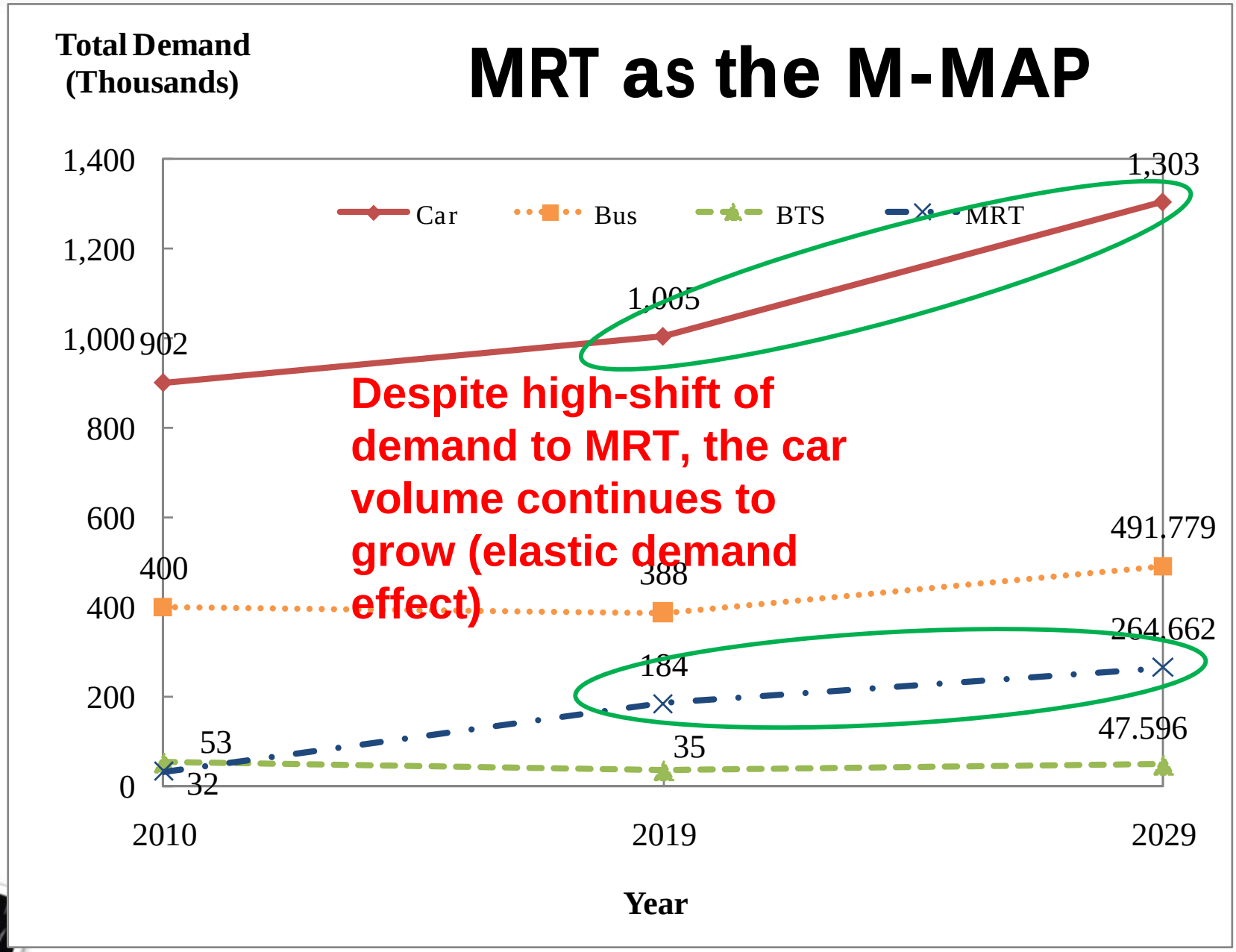
Related studies on MRT in Bangkok

- **1975 Bangkok Transportation Study (BTS)**
- 1996 Mass Rapid Transit Implementation
- 1996 Conceptual Mass Rapid Transit Implementation Master Plan Project (CMIP)
- 1998 Mass Transit Feeder System
- 2001 A Feasibility Study of the Bangkok Railroad Improvement
- **2001 Urban Rail Transportation Master Plan (URMAP)**
- 2005 The Intermodal Services Integration for the improvement of Mobility, Accessibility, Sustainability and Livelihood for Bangkok Metropolitan Region (BMR) and Surrounding Area (IMAC)
- 2004 Bangkok Mass Transit (BMT)
- **2010 Mass Rapid Transit Master Plan in Bangkok Metropolitan (M-MAP)**

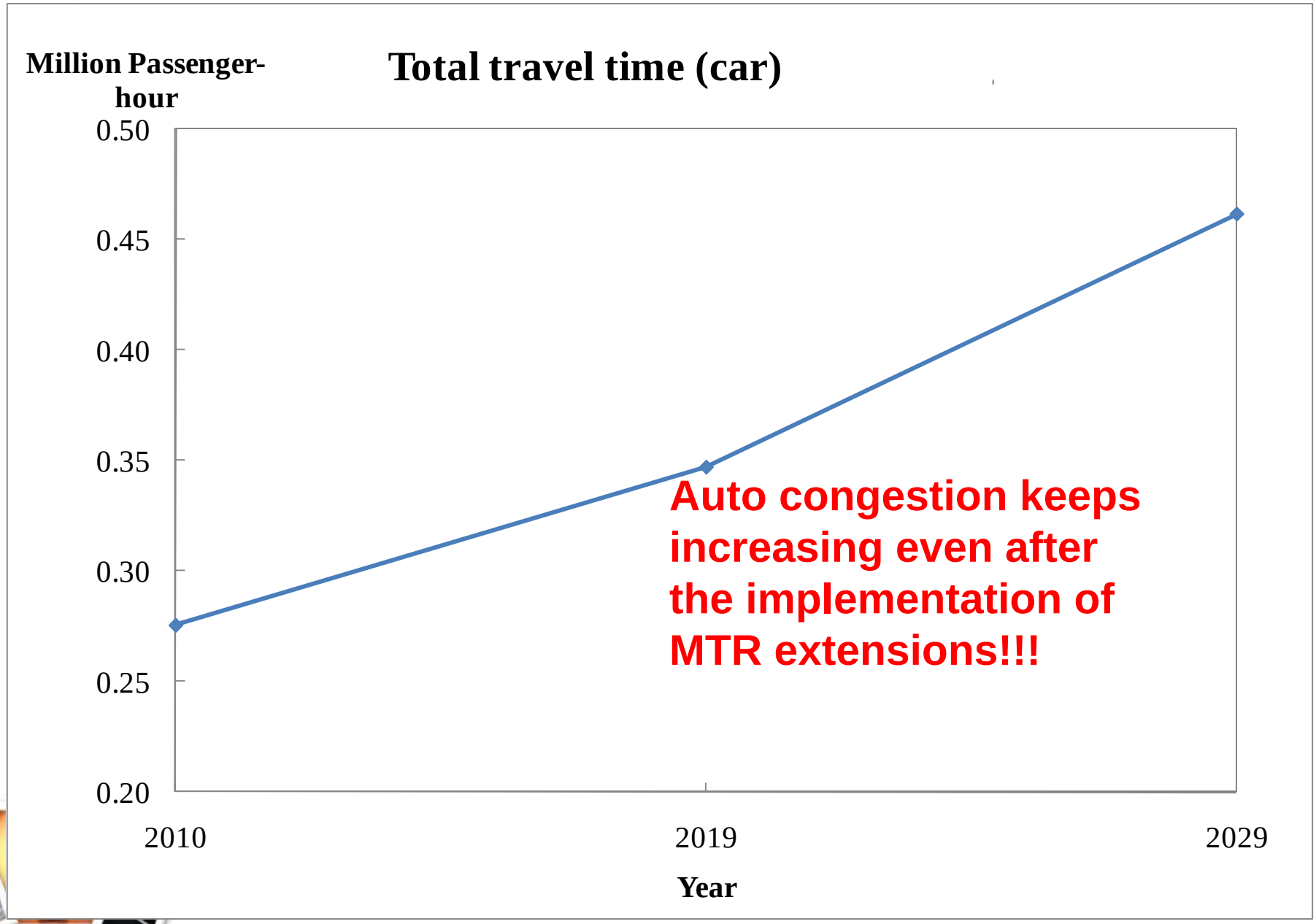
The M-MAP
12 routes 509 km. Mass transit in 2029

- **45.7 km. currently**
- **39.1 km. under construction**
- **151 km. in 2016**
- **155 km. in 2019**
- **118 km. in 2029**

Travel demand comparison



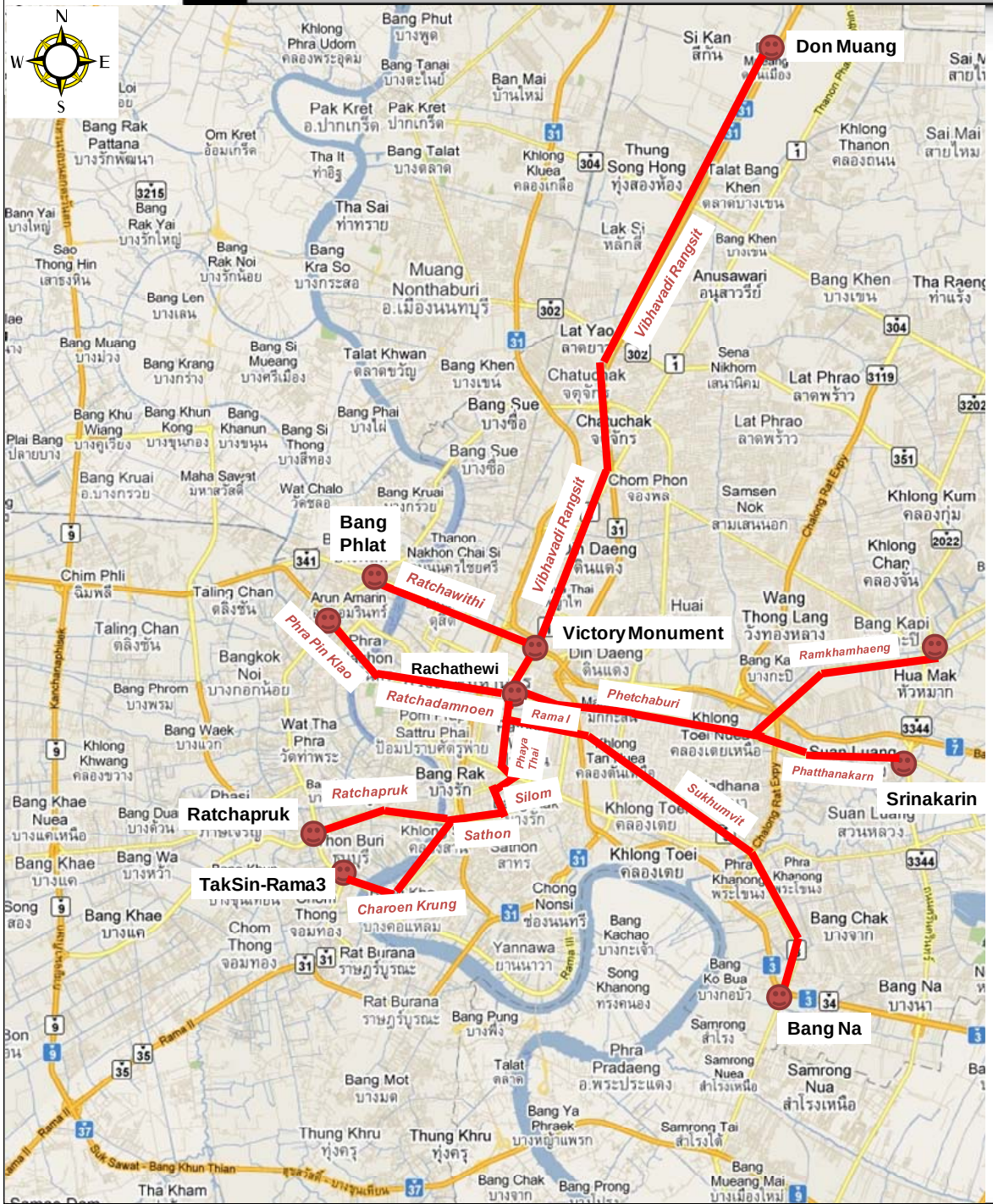
Auto-Total travel time

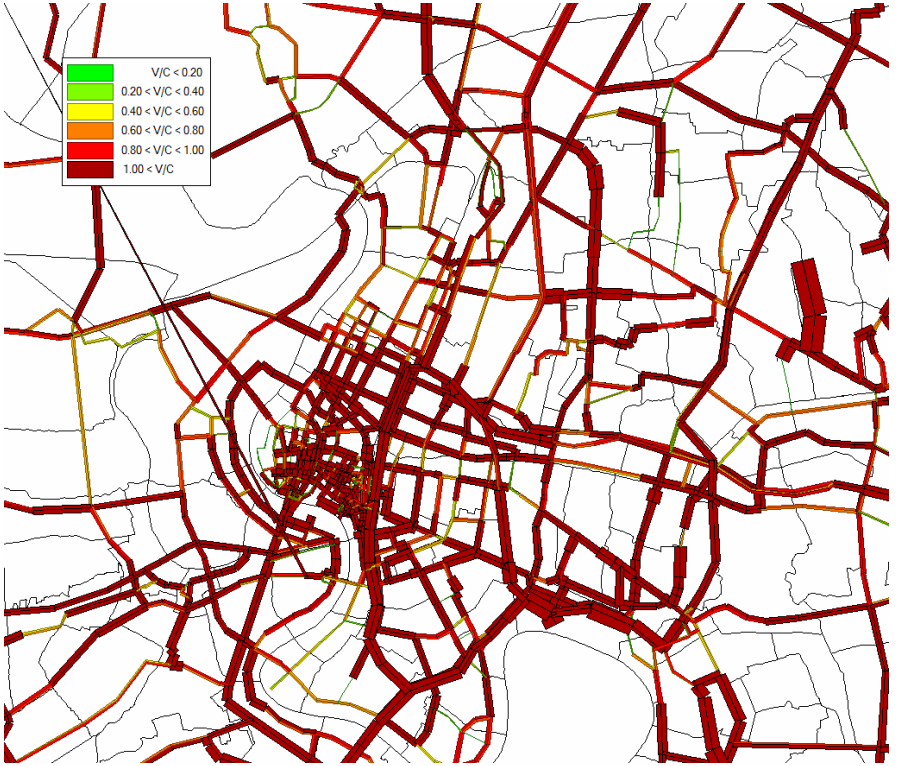


Testing road pricing schemes

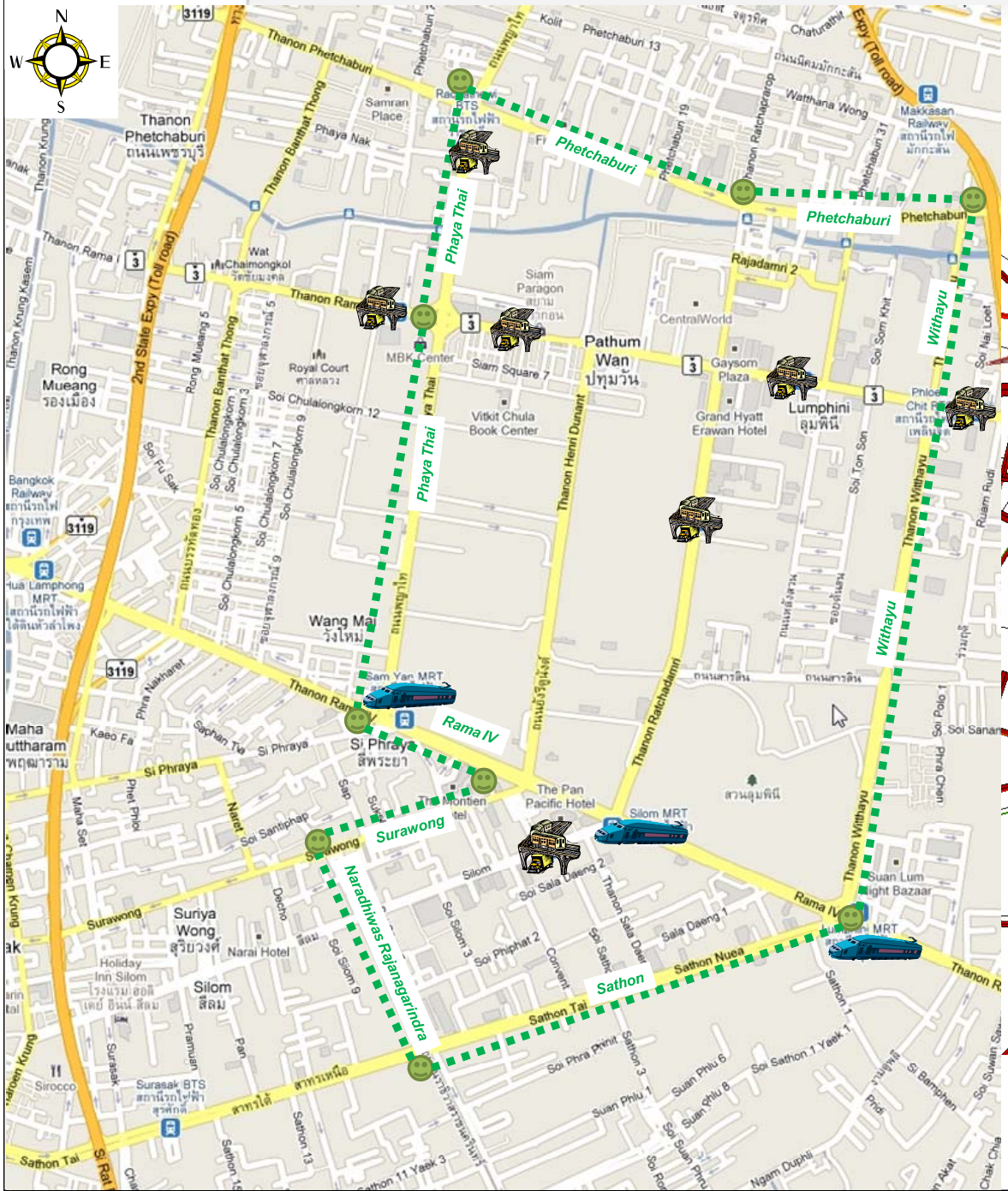
- Radial toll scheme
- Inner cordon toll scheme
- Outer cordon toll scheme

Radial toll scheme

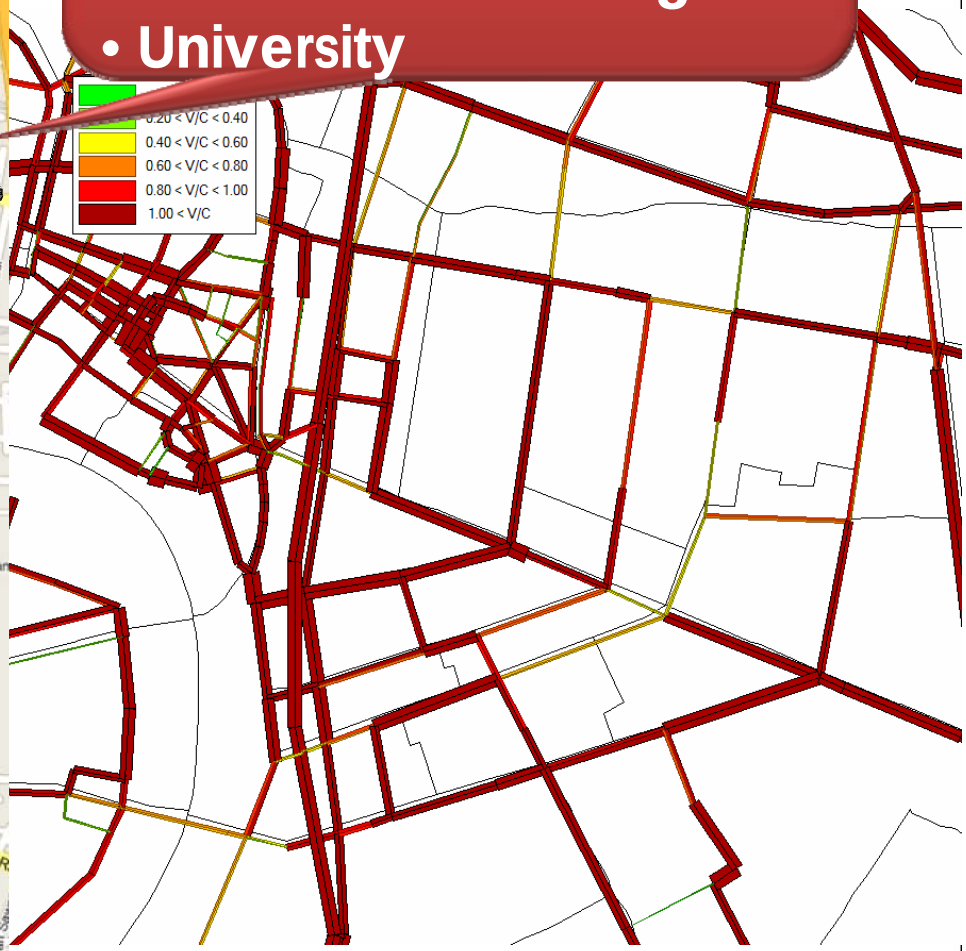




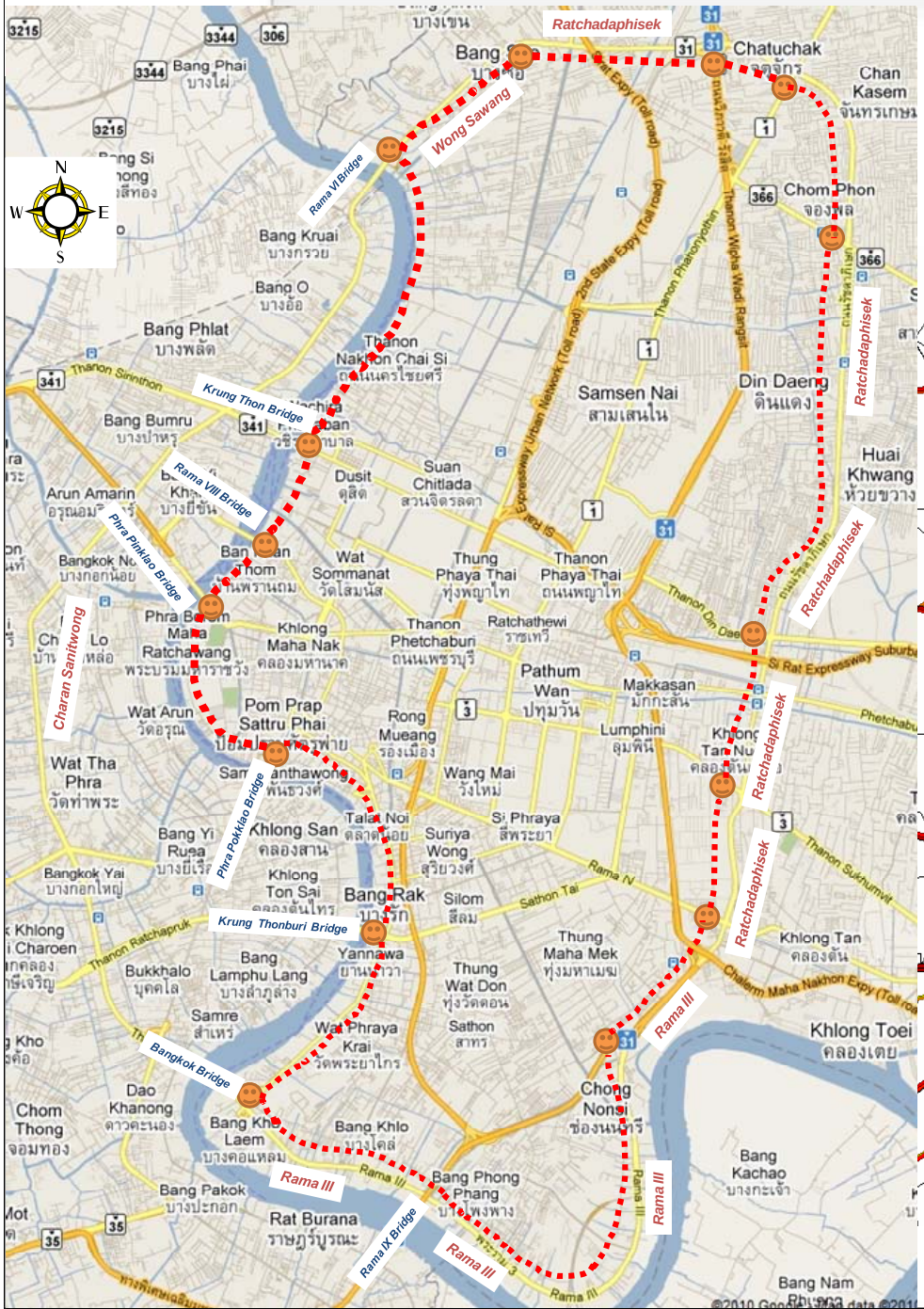
Inner-cordon toll scheme

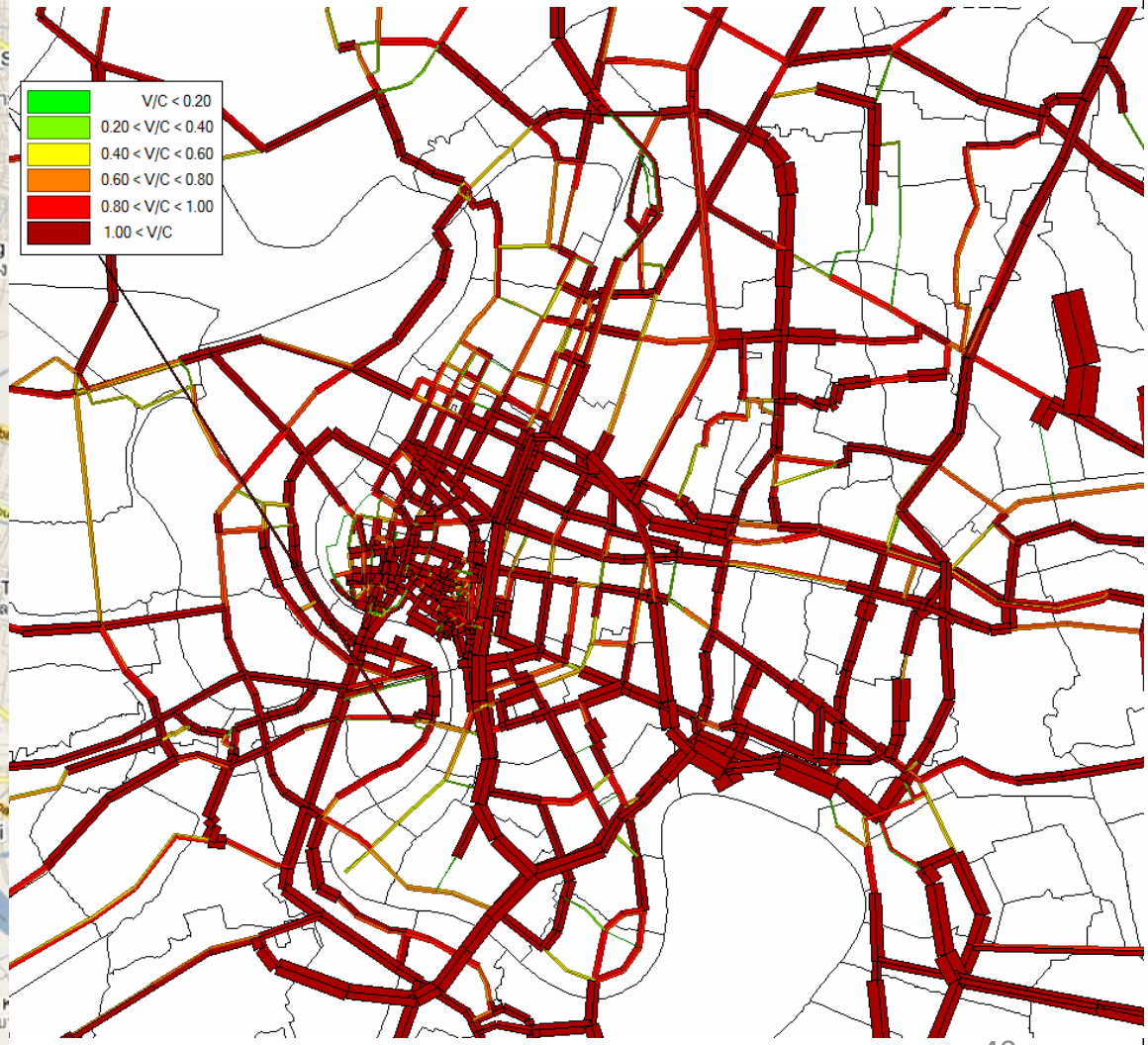


- 7 BTS stations
- 3 MRT stations
- shopping malls, commercial buildings
- University



Outer-cordon toll scheme



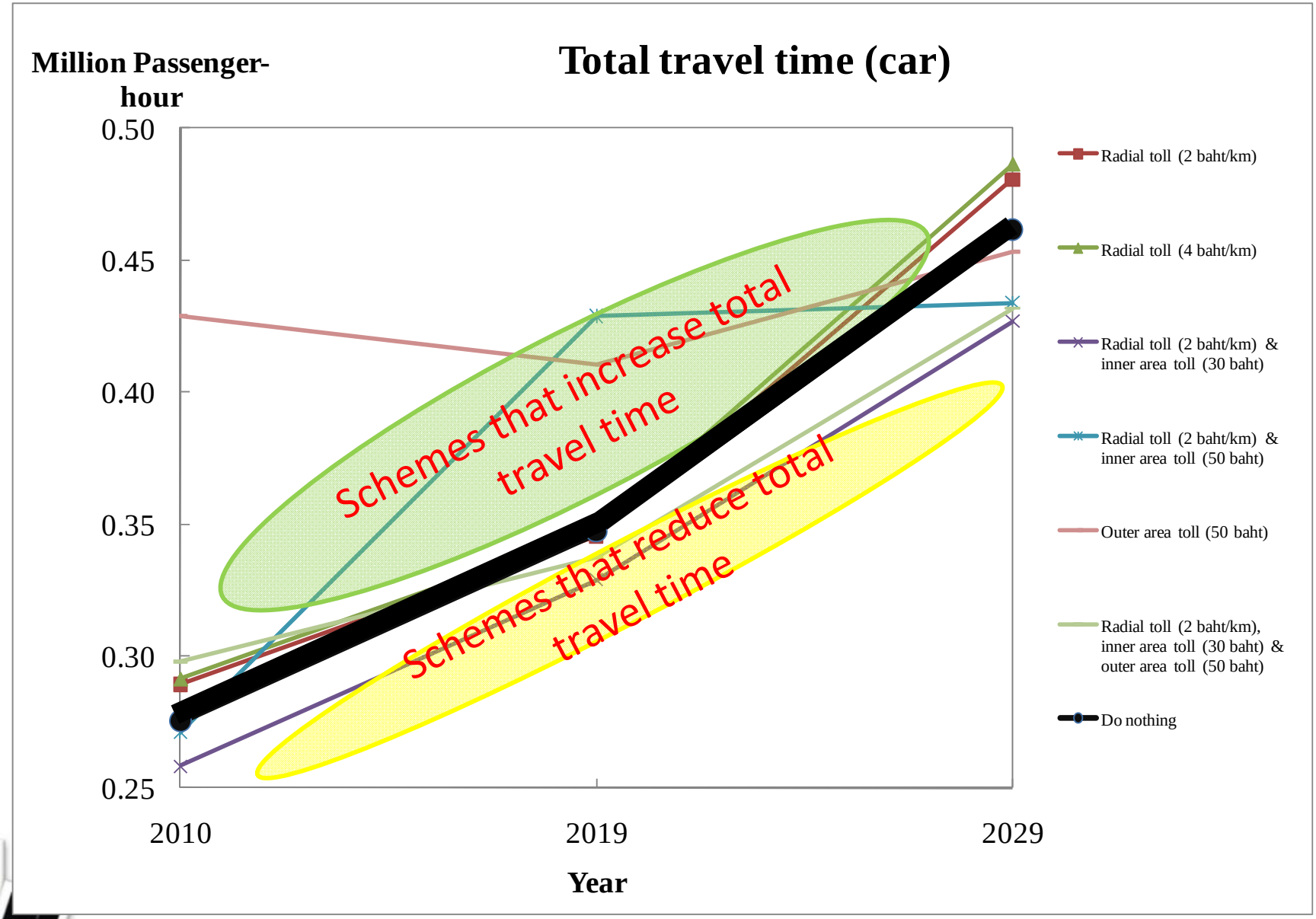


6 schemes with 18 test scenarios

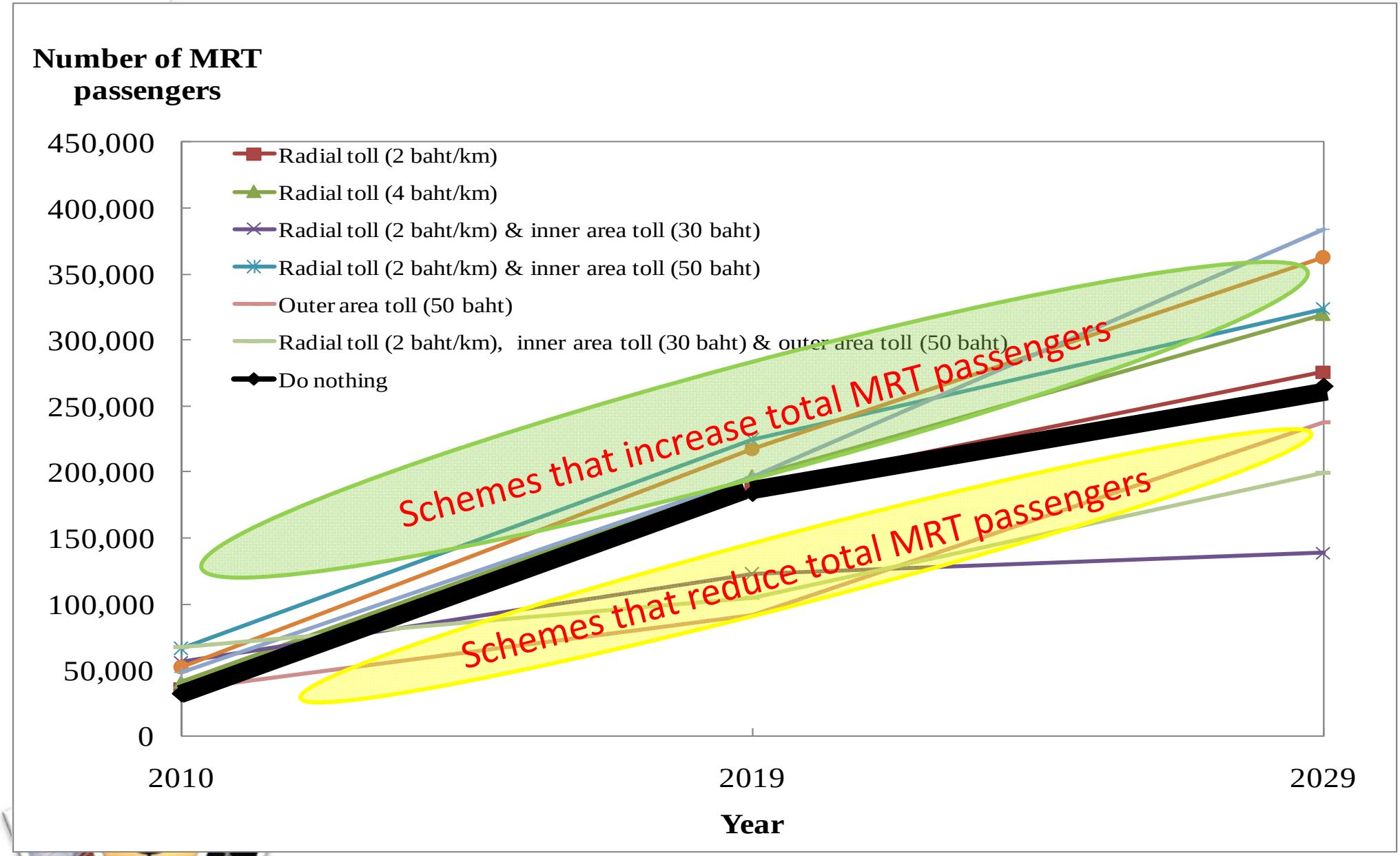
Radial toll		Radial + inner cordon		Outer cordon	Radial + inner + outer
2 baht/ km	4 baht/ km	2 baht radial + 30 baht inner	2 baht radial + 50 baht inner	50 baht	2 baht/km 30 baht inner 50 baht outer

Notes: 1. the first stage of MRT extensions will be completed in 2019
2. the second stage of MRT extensions will be completed in 2029

Effects of different pricing schemes

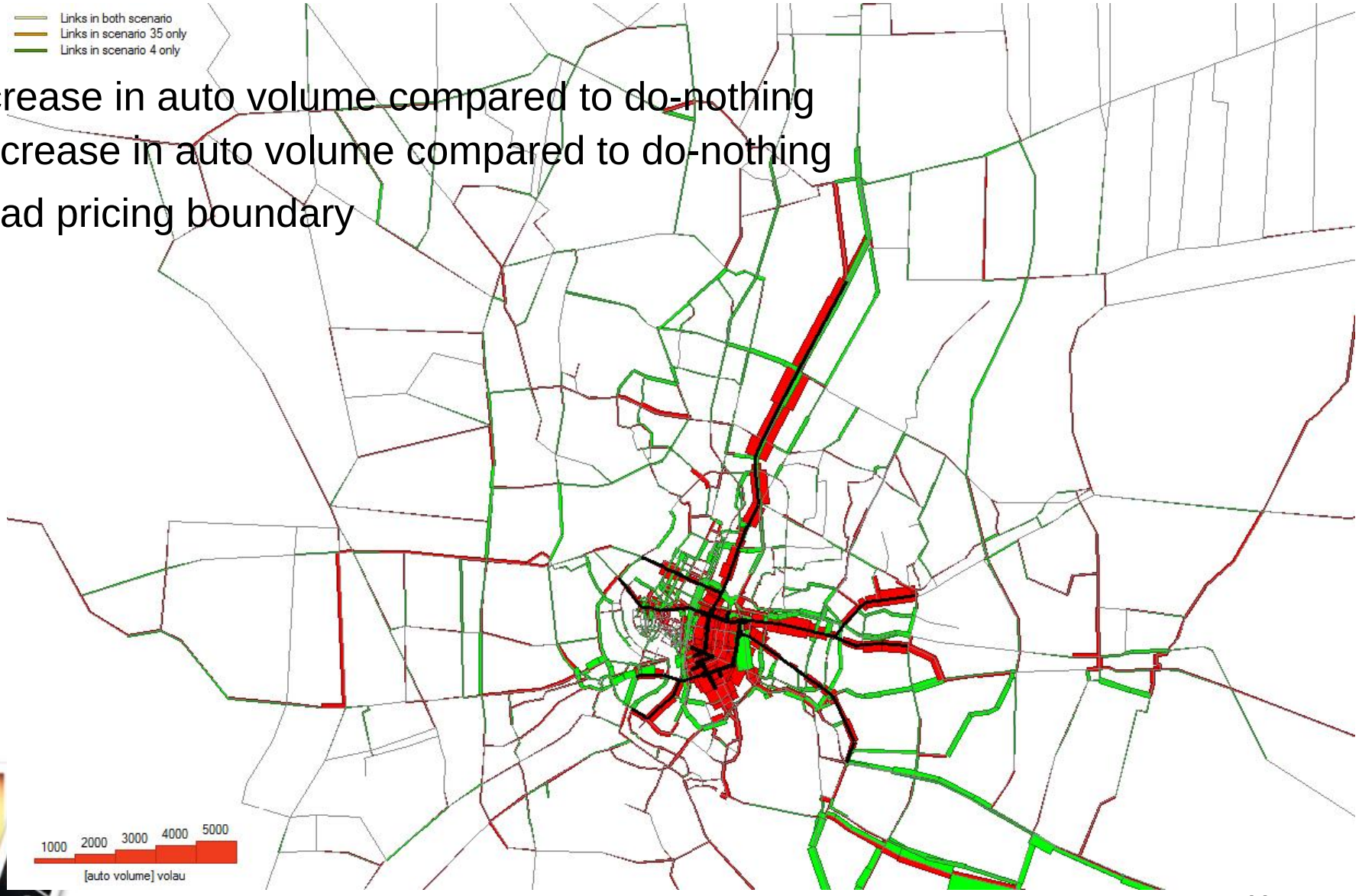


MRT demand comparison



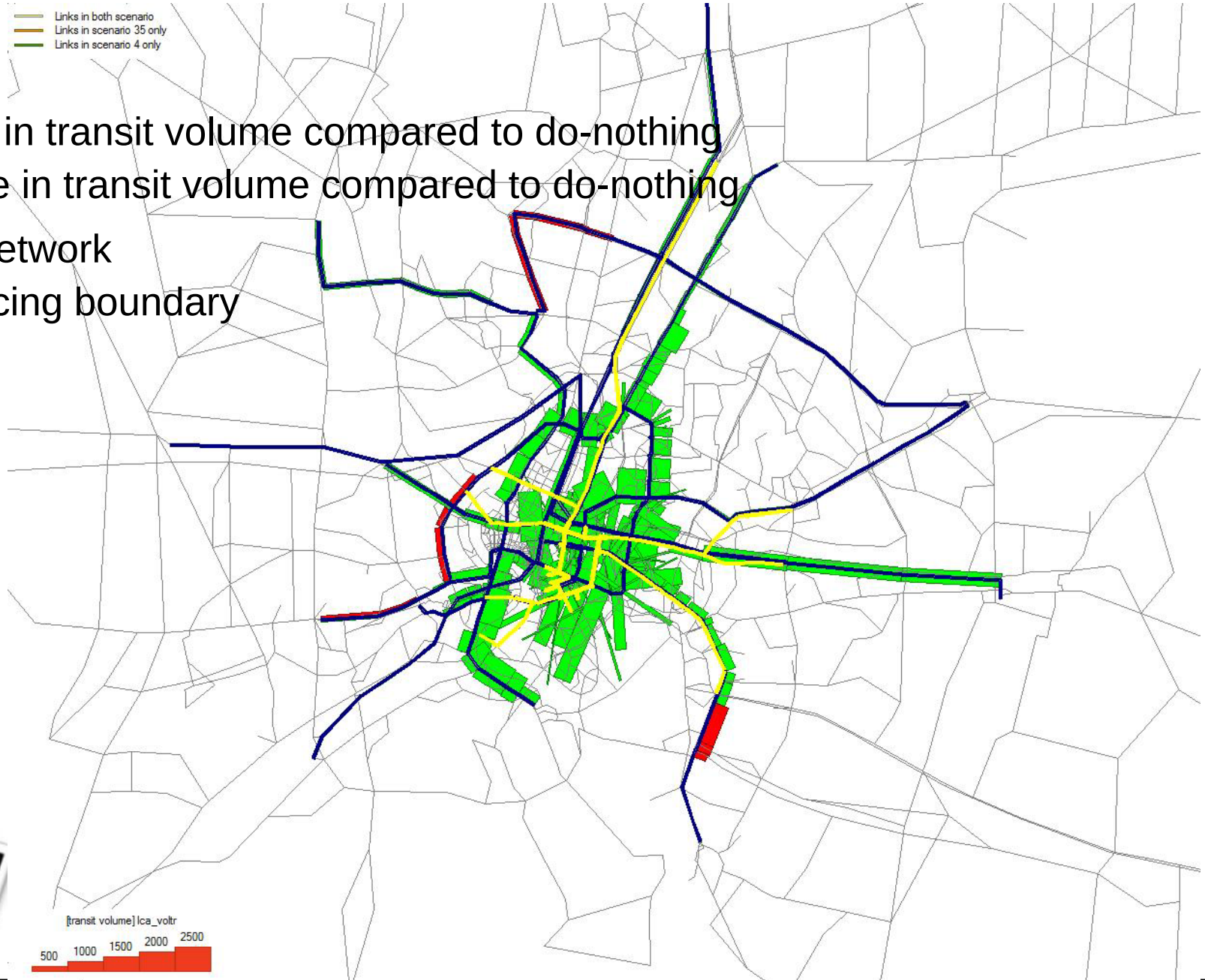
Car-volume comparison (year 2019)

Road pricing scheme Radial toll 2 baht/km + Inner cordon 50 Baht



MTR&BTS flow comparisons (year 2019)

Road pricing scheme Radial toll 2 Baht/km + Inner cordon 50 Baht



Conclusions

- Development of MRT network alone cannot tackle traffic congestion problem
- Good design (in this case, Radial toll 2 baht/km + Inner cordon of 50 baht) can reduce the total travel time of car and increase transit volume
- Different design of pricing schemes can influence the performances of the network (not necessary improve the situation), **so careful design is needed**

Conclusions

- More details of investigation are needed e.g.
  - Change of land-use
  - Combination of travel demand management (TDM)
  - Transit oriented development (TOD)

- Further research:

  Strategic Modelling for Sustainable Urban Transportation and Land Use Development