

Midyear Report 2015

TRANSPORTATION RESEARCH BOARD
JOINT TRAFFIC SIMULATION
SUBCOMMITTEE



Chairman's Message

SimSub Chair
Dr. George List
NC State University

SimSub members,

It is always exciting to bring you another SimSub newsletter. My sincere thanks to David Hale for preparing it. I trust your time since TRB has been productive. As you can see from the contents that follow, activity in the simulation area continues to be high.

From a SimSub perspective, I am very pleased to tell you that Tomer Toledo has agreed to begin managing our awards program. He is going to be assisted by Kaan Ozbay and Jorge Laval. We need to express to them our deepest gratitude for taking on this very important task.

On a less positive note, I am sorry to say that William Young has decided that he can no longer manage the safety simulation task force. We wish him all the best in his new endeavors and will strive to find a new person to lead that effort.

A number of conferences focused on simulation topics are occurring this summer. Many of them are listed in the newsletter. Several of them are occurring just as this newsletter is being released. I hope you have an opportunity to attend one or more of them. They are always valuable events.

As you are probably aware, initial materials for the Transportation System Simulation Manual are underway. A draft outline and a draft chapter should be available by September. The long-run intent is to have the manual be managed and published by TRB akin to the HCM, the HSM, and similar documents. My understanding is that a task force is going to be formed to help ensure that the manual is brought to fruition. If you are able to attend one or more of the sponsoring committee mid-year meetings this summer, it is likely that you will get an update about the project's activities. Perhaps this should be the topical focus for the simulation workshop in January. Send us your thoughts.

In closing, we look forward to your continuing involvement and support; and to seeing you at the annual meeting this coming January, if not before.

Sponsor Committees

- AHB45: TRAFFIC FLOW THEORY
- AHB40: HIGHWAY CAPACITY AND QUALITY OF SERVICE
- AHB20: FREEWAY OPERATIONS
- AHB25: TRAFFIC SIGNAL SYSTEMS
- ADB30: TRANSPORTATION NETWORK MODELING
- AHB55: WORK ZONE TRAFFIC CONTROL
- ADC20: TRANSPORTATION AND AIR QUALITY

Contents

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SimSub Web Site

Alex Stevanovic, Webmaster

<http://sites.google.com/site/trbcommitteeahb45>

2015 Recent Events



Workshop: Modern Bottleneck Identification & Practical Mitigation Solutions

FHWA is funding practical research on modernized congestion identification, and cost-effective mitigation strategies that are not dependent on advanced vehicle technology.

BACKGROUND

U.S. traffic congestion is worsening, and the associated economic damages are increasing. States are being asked to manage their transportation problems with minimal funding. When transportation investments are made, it is critical to demonstrate a clear return on those investments, based on methods that are scientific and not anecdotal. Given that a large portion of congestion is caused by bottlenecks, mitigation of bottlenecks is a top priority. New technologies (e.g., real-time data) and ideas (e.g., dynamic lane use) are giving us a new set of possible solutions.

NEW RESEARCH AND PRACTICAL MITIGATION STRATEGIES

This workshop will present a number of new strategies and ideas for congestion identification, diagnosis, and mitigation. Bottleneck intensity and frequency can now be precisely identified, in both space and time, in ways that account for visibility and weather. New software tools can analyze annual trends, and allow states to customize their definition of congestion. Data-driven methods of congestion classification, which determine congestion causalities more accurately, are now being developed.

Regarding the bottleneck mitigation strategies, researchers have developed a comprehensive playbook of solutions for 70 specific bottleneck causes, across seven classification categories. In addition, five of the most promising solutions were selected for detailed micro-simulation studies, and benefit-cost analysis. Further, researchers investigated a newer set of innovative bottleneck treatments, which have not been deployed before.

WHEN & WHERE

Wednesday, May 27th, 2015 | 1:00 PM – 5:00 PM
Florida's Transportation Showcase – i3
Omni Orlando Resort at ChampionsGate
1500 Masters Boulevard
ChampionsGate, FL 33896

To register, visit the event page at <http://goo.gl/nFBdSG>, or scan the QR code below. Click <http://goo.gl/atv0N9> for a detailed agenda.

Note: For those unable to attend the full conference, a one-day registration option is available.

AGENDA

1. Congestion and bottleneck concepts
2. Congestion and bottleneck identification methods
3. Congestion causal pie chart
4. Cost-effective bottleneck mitigation strategies
5. Innovative bottleneck mitigation strategies

EXPECTED OUTCOME

Participants should gain additional knowledge on how to evaluate and improve the performance of their roadways. The modernized causal pie charts may provide new insight into the causes of congestion. Participants will also receive a preview of practical tools, which can provide scientific justification for transportation system investments.

Scan the QR code to register, or visit <http://goo.gl/nFBdSG>





6/8/15

Monitoring and Controlling Urban Transportation Networks *Theory and Applications*

It is well known that urban traffic congestion is a problem that plagues most, if not all, large metropolitan areas in the United States. The numbers are staggering: the 2012 Urban Mobility Report estimates the total financial cost of congestion in the United States at \$121 billion during 2011. And if recent history is any indication, the magnitude of the problem will only continue to increase over time. The purpose of this workshop is to discuss recently developed research methods to both monitor and control urban traffic networks to mitigate these negative impacts. These new approaches focus on the large-scale behavior of the network and how reproducible behavior can be leveraged to improve network productivity, improve travel speeds, reduce delays, mitigate congestion and reduce the network's carbon footprint. Attendees will learn more about this approach and how the monitoring and traffic control techniques might be implemented within their jurisdiction. Feedback from practitioners and traffic management authorities will benefit future research by providing input on ways to enhance the modeling and control methodologies and algorithms.

VT Executive Briefing Center
900 N Glebe Rd
Arlington VA 22203

To RSVP Contact:
Jianhe Du
JDu@vtti.vt.edu

 VirginiaTech®
Transportation Institute

Workshop Agenda / June 8, 2015

7:30 am – 8:30 am

Registration and continental breakfast

8:30 am – 8:45 am

Welcoming remarks – Dr. Hesham Rakha, Virginia Tech

- o Introduction
- o Summary of workshop purpose and goals

8:45 am – 9:45 am

Discussion of state of the art in management of urban traffic networks – Dr. Jason Tao, Senior ITS Engineer, Traffic Operations Administration, Washington D.C. DOT

9:45 am – 10:30 am

Presentation and discussion – Dr. Vikash Gayah, Penn State

- o Introduction of theory behind MFD/NEF
- o Existence, evidence and conditions of MFD/NEF using empirical/simulated data
- o Use of MFD/NEF

10:30 am – 10:45 am

Break

10:45 am – 12:00 am

Presentation and discussion – Dr. Hesham Rakha, Virginia Tech

- o State of the art research
 - Metering/gating strategies
 - Routing strategies
 - Adaptive traffic signal control
 - Partitioning networks into smaller regions
- o Simulation results of these types of strategies

12:00 pm – 1:15 pm

Lunch

1:15 pm – 3:00 pm

Presentation and discussion – Dr. Jianhe Du, Virginia Tech

- o Issues with detector-based estimations
- o Use of mobile probe vehicles in traffic state estimation

3:00 pm – 4:00 pm

Discussion – Dr. Hesham Rakha, Virginia Tech, Dr. Vikash Gayah, Penn State

- o Realistic challenges to implementing large-scale MFD-based traffic control (including real-time estimation of traffic states)
- o Remaining challenges in this area

4:00 pm – 5:00 pm

Open discussion and conclusion

- o Expectations of using MFD/NEF as a managing tool in real life from participants
- o Open discussion on how MFD/NEF can be used to address challenges noted earlier

Monitoring and Controlling Urban Transportation Networks : Theory and Applications
VT Executive Briefing Center . 900 N Glebe Rd . Arlington VA 22203

2015 Upcoming Events



2015 Road Safety & Simulation International Conference

<http://stc.utk.edu/STCevents/rss2015/index.html>

October 6-8, 2015, Orlando, Florida, USA

Co-hosted by University of Central Florida & The University of Tennessee

The University of Central Florida (UCF) and the University of Tennessee, Knoxville (UTK) are pleased to host the 2015 Road Safety & Simulation International Conference.

The RSS series showcases advancements in traffic simulation and driving simulator technologies, introducing new initiatives and concepts that have emerged since the first RSS conference in Rome, Italy in 2007. Under the auspices of the Southeastern Transportation Center, three world-class research centers will support the conference: Center for Advanced Transportation Systems Simulation, and the Institute for Simulation and Training at UCF; and UTK's Center for Transportation Research. These centers conduct sponsored research in driving simulators, traffic simulation, traffic safety, commercial vehicle operations, Intelligent Transportation Systems deployment, and congestion pricing; human factors; and comprehensive transportation safety, including surface modes, rail, and bicycle and pedestrian issues.

The STC is administered through the [Center for Transportation Research](#), part of the [College of Engineering](#) at The University of Tennessee.

Deadlines

- Abstracts due: **January 23, 2015**
- Notification of abstract acceptance or rejection: **March 27 2015**
- Full papers due (for accepted abstracts): **May 29, 2015**
- Full paper notification of acceptance or rejection: **July 31, 2015**
- Confirmation from authors to present: **August 28, 2015**
- Conference: **October 6 - 8, 2015**

Sponsorship

RSS 2015 will soon offer companies the opportunity to gain visibility and showcase their products and services during the conference

Southeastern Transportation Center

309 Conference Center Building
Knoxville, Tennessee 37996-4133
865.974.5255

Media contact: Lissa Gay
lissa@utk.edu | 865.974.8760



2015 Upcoming Events

Summer School in “‘Mobility-Management, Traffic-Safety and Simulations (MTS) 2015 ”

The Transportation Research Institute (IMOB) of Hasselt University organizes the second Summer School on 'Mobility-Management, Traffic-Safety and Simulations (MTS) 2015'.

<http://www.mts-summer-school.eu>

This Summer School will take place at:
Hasselt University, Campus Diepenbeek | Agoralaan
Building D | 3590 Diepenbeek from July 13-16

negotiation, computability issues, scalability, ontologies, how to interpret results, what can be expected?

Big data as source for modeling

Big data repositories, annotation, semantic enrichment of big data, data mining and process mining to extract information from big data, crowd sourcing and publicly available data: pitfalls and challenges, using data from different sources: how to align?



Topics

The School will feature lecturers by renowned researchers in the following topics: Mobility modeling: basic principles and tools. Behavior modeling, activity based models (activity selection, planning, daily schedule generation) Multi-modal trips, modeling cooperation, cooperative scheduling (e.g. carpooling), ontologies, traffic and transportation related models, travel demand prediction models, simulations in practice: what conclusions can be drawn?

Special focus

Agent based modeling (ABM) and simulation for mobility, travel behavior, mobility market, electromobility (including smart grid, etc.) and freight transport, delimiting domain: where can ABM be useful? Models for cooperation, mutual influence,



2015 Upcoming Events

Road Safety

Evaluation studies & risk modelling, conflict observation research, driving simulation to study the effect of infrastructural measures on driving behavior, driving simulation to understand underlying mechanisms of dangerous or distracted driving, driving simulation to assess and train driving behavior



from exhibiting companies will exhibit their solutions and products and will answer visitors questions and inform them about the latest trends in their domains. Exhibitors will cover the following domains: Driving simulator platforms (small and large) for both research and training purposes, mobility and accessibility mobile applications developers, hands-on experience with state-of-the-art activity based models which simulates personal mobility patterns, transport related agencies and establishments.

Target audience

The School is suited for professional researchers, students, practitioners and companies working in transportation sciences, data mining, agent/activity based modeling, road safety and related topics. Participants interested only in applications and industry trends can attend the related events in the Summer School. Academic participants can get feedback on their work during the graduate symposium sessions. Participants can submit a 1 page (A4) abstract motivating the main research challenge they are addressing and stating the approach being taken. All submitted proposals will be presented in a graduate symposium. Abstracts can be submitted during registration (in the registration form). Please email us at: ansar.yasar@uhasselt.be for more information.

Transport applications

Electric vehicles (including smart grid concepts), carpooling (cooperation on trip traveling), multi-modality and car-sharing (cooperation on resource usage), markets based on big data related to traffic, business models for EV, multi-modal trips, car-sharing, carpooling, online support systems (ride sharing advisors), traffic load prediction systems, effect of EV characteristics (range anxiety, charging time, limited range) on household travel behavior

Industry Showcasing

In partnership with a young and innovative company ABEONA bvba, the summer school will provide a unique opportunity for interested attendees to experience and work with real life solution and systems. ABEONA bvba will identify key technologies and stakeholders in transportation modeling, big mobility data analytics and road safety. Representatives



2015 Upcoming Events

Announcement of Summer School in “Advanced Traffic Simulation”

A focused and intensive three day Summer School on Advanced Traffic Simulation will be hosted in the University of Cyprus in **June 10-12, 2015**, building on the COST Action TU0903 – MULTITUDE (Methods and tools for supporting the Use, calibration and validation of Traffic simulation models - www.multitude-project.eu). The selected and invited lecturers are some of the most experienced academics and researchers in the field across Europe (alphabetically, Constantinos Antoniou-NTUA, Mark Brackstone-TSS, Biagio Ciuffo-EC-JRC, Loukas Dimitriou-UCY, Nikolas Geroliminis-EPFL, Serge Hoogendoorn-TU Delft, Vincenzo Punzo-UniNA). The Summer School is balanced between theoretical coverage and training on advanced traffic simulation methods and models, their systematic calibration and validation, the reliability of predictions made by traffic simulation models, and tools and frameworks for the management of realistic systems. Several case studies will be presented and a team-based, hands-on, practicum will guide attendants through the application of the whole process of uncertainty management in traffic simulation.

The school is targeted at graduate students, engineers, researchers, consultants and government employees who wish to improve their understanding and skills in applying traffic simulation to real-world scenarios. The school will follow a 2-day advanced training program on AIMSUN, offered by TSS.



Info and Deadlines

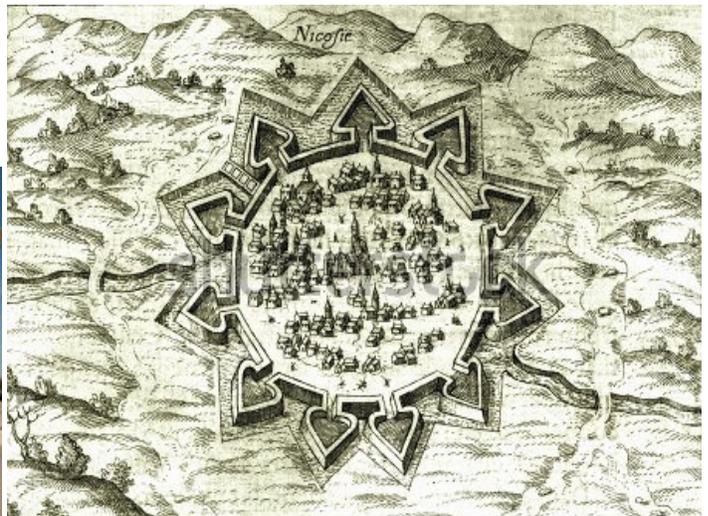
Maximum number of participants: 40
Registration opens: January 30, 2015
Registration deadline: April 15, 2015
Acceptance confirmation: April 25, 2015
Registration fee: 50 Euros (includes coffee-breaks, lunches and a social dinner)

Applications and more information soon at:

www.multitude-project.eu

For information contact:

lucdimit@ucy.ac.cy
antoniou@central.ntua.gr



ANT-2015 - Modeling and Simulation in Transportation Sciences



The 6th International Conference on Ambient Systems, Networks and Technologies (ANT-2015)

Track on Modeling and Simulation in Transportation Science

<http://cs-conferences.acadlaur.ca/ant-15/>

London, UK (2-5 June 2015)

ANT-2015 is a leading international conference for researchers and industry practitioners to share their new ideas, original research results and practical development experiences from all Ambient Systems, Networks and Technologies related areas.

ANT-2015 will be held in conjunction with the International Conference on Sustainable Energy Information Technology [SEIT].

ANT 2015 will be held in London, UK (2-5 June 2015).

Transportation Research Institute
(IMOB)
Hasselt University
Wetenschapspark 5 bus 6
B-3590 Diepenbeek, Belgium



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TRANSPORTATION RESEARCH INSTITUTE

SCOPE

The goal of the **ANT-2015** conference is to provide an international forum for scientists, engineers, and managers in academia, industry, and government to address recent research results and to present and discuss their ideas, theories, technologies, systems, tools, applications, work in progress and experiences on all theoretical and practical issues arising in the ambient systems paradigm, infrastructures, models, and technologies that have significant contributions to the advancement of ambient systems theory, practices and their applications.

At ANT-2015, there is a dedicated track on Modeling and Simulation in Transportation Sciences (MSTS) organized by the Transportation Research Institute (IMOB), Hasselt University, Belgium. The aim of this track is to bring together communities interested in the computation, knowledge discovery and technology policy aspects of transportation systems. Researchers in the domains of transportation sciences and engineering, computer science, urban and regional planning, civil engineering, geography, geo-informatics and related disciplines can submit papers for presentation and for publication in the conference proceedings.

Check-out the website for a detailed overview of the topics of interest!

SUBMISSION AND PROCEEDINGS

All ANT-2015 accepted papers will be printed in the conference proceedings published by Elsevier Science in the open-access *Procedia Computer Science*.

The submitted paper must be formatted according to the guidelines of *Procedia Computer Science*, MS Word Template, Latex, Elsevier.

Submitted technical papers must be no longer than 8 pages for full papers and 5 pages for short papers including all figures, tables and references.

Authors are requested to submit their papers electronically using the online conference management system in PDF format before the deadline (see Important Dates). The submission processes will be

managed by easy-chair.org.

All accepted papers will be scheduled for oral presentations and will be included in the conference proceedings published by Elsevier Science in the open-access *Procedia Computer Science* series on-line. At least one author of each accepted paper is required to register and attend the conference to present the work.

IMPORTANT DATES

Submission date: 10 January, 2015.

Notification of acceptance: 1 March, 2015.

Camera-ready date: 1 April, 2015.

Conference: 2-5 June, 2015.

REGISTRATION

Please visit: <http://cs-conferences.acadiau.ca/ant-15/#registration> for more information.

VENUE, ACCOMMODATION & VISA REQUIREMENTS

Please visit: <http://cs-conferences.acadiau.ca/ant-15/#conferenceVenue> for more information.

PROGRAM VICE-CHAIRS

Prof. dr. Davy Janssens | IMOB - UHasselt | Belgium | davy.janssens@uhasselt.be

You may also visit our website (<http://cs-conferences.acadiau.ca/ant-15/>) for more details.

The 6th International Conference on Ambient Systems, Networks and Technologies (ANT-2015)



The 4th International Workshop on Agent-based Mobility, Traffic and Transportation Models, Methodologies and Applications (ABMTRANS'15)

<http://www.uhasselt.be/UH/dataslm/ABMTRANS.html>

In conjunction with ANT-2015 conference | London, UK (2-5 June 2015)

ABMTRANS 2015 provides an International forum on the latest technologies and research in the field of traffic and transportation modeling using an agent-based approach.

ABMTRANS 2015 will be held in London, UK (2-5 June 2015) in conjunction with The 6th International Conference on Ambient Systems, Networks and Technologies (ANT-2015).

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2015 Upcoming Events

SCOPE

This workshop provides a multidisciplinary collaborative forum for researchers and practitioners to submit papers presenting new research results and novel ideas related to the theory or the practice of agent-based traffic and transportation modeling.

This workshop also invites researchers to submit their work focusing on the data mining, management and configuration for agent-based traffic and transportation modeling.

Check-out the website for a detailed overview of the topics of interest!

SUBMISSION AND PROCEEDINGS

All papers accepted for workshops will be included in the ANT-2015 proceedings, which will be published by Elsevier.

The authors must follow Elsevier guidelines as given in ANT-2015 website (<http://cs-conferences.acadiau.ca/ant-15/>).

The submission processes will be managed by easy-chair.org.

The selective outstanding papers presented at the workshops, after further revision, will be considered for publication in journals special issues.

All workshops accepted papers will be printed in the conference proceedings published by Elsevier Science in the open-access Procedia Computer Science series (on-line).

The selective outstanding papers presented at the workshops, after further revision, will be considered for publication in journals special issues at ANT'15.

IMPORTANT DATES

Submission deadline: 15 January, 2015

Notification of acceptance: 10 March, 2015

Camera-ready deadline: 1 April, 2015

Workshop: 2 - 5 June, 2015

REGISTRATION

Please visit: <http://cs-conferences.acadiau.ca/ant-15/#registration> for more information.

VENUE, ACCOMMODATION & VISA REQUIREMENTS

Please visit: <http://cs-conferences.acadiau.ca/ant-15/#conferenceVenue> for more information.

WORKSHOP ORGANIZERS

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If you have any further questions please contact one of the workshop organizers.

2016 Upcoming Events



Call for Abstracts and Sponsored Sessions

ITE 2016 Annual Meeting and Exhibit - Institute of Transportation Engineers

08/14/2016 - 08/17/2016

Anaheim, CA

Join your peers the ITE 2016 Annual Meeting and Exhibit. The conference is designed to share knowledge, expertise and ideas on multifaceted approaches to addressing transportation issues and to exploring emerging trends in the industry. The meeting content will include sessions in a mix of presentation and training formats focused on state-of-the-practice, advancement of the profession, and emerging issues designed to benefit transportation professionals in the public and private sectors. Transportation engineering students are encouraged to attend. Additionally, networking events provide opportunities to connect with one another outside of the classroom.

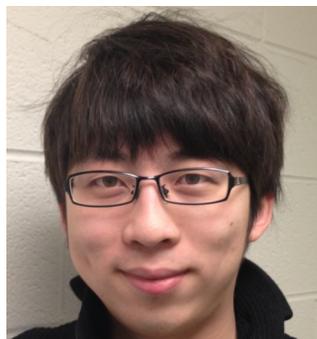
For the ITE 2016 Annual Meeting and Exhibit in Anaheim, the due date for proposed abstracts and sponsored sessions is expected to fall within August or September 2015. Please visit ite.org for more updates and information.



2015 Research Results

by Jiaqi Ma (Leidos Inc.), Xuesong Zhou (Arizona State University), Jeffrey Taylor (University of Utah), and Fang Zhou (Mississippi State University)

Providing Personalized System Optimum Traveler Information: Agent-based Simulation and Optimization



Jiaqi Ma, Ph.D.
Leidos, Inc.

The advancement of information and communication technology allows the use of more sophisticated information provision strategies for real-time traffic management in a congested network. This paper proposed a Personalized System Optimum Traveler Information (PSOI) system under ubiquitous communication, which allows traffic system operators to fully optimize and coordinate individuals' trip plans according to the personal value of time, allowable budgets for congestion tolling, and willingness to taking detours.

The key concept of PSOI strategy includes three key attributes - "Personalization", "Predictability", and "System Optimum (SO)", and the study developed an efficient queue-based evaluation and solution heuristic algorithm using DTA simulation models (DTALite) to solve for near optimal PSOI strategies. The simulation optimization algorithm can account for different information users and provide predictive information that robustly accounts for potential decisions of other travelers in real-time. The comparison between this approach and traditional studies is shown in Table 1. The flow chart of the algorithm is demonstrated in Figure 1. Interested readers can refer to the references [1][2] for more detailed discussions.

Several numerical experiments were performed, including a real-world subarea network of Salt Lake City, Utah, which includes 149 nodes, 387 links, and 41 OD zones. There are a total of 12638 trips/agents for a 2-hour typical evening peak hour period (3PM-5PM). Each iteration of simulation run took about 4.3 seconds of CPU time on a personal PC, which was fast for a network of this size.

Table 1 Comparison of Models from Different Key Aspects for Proposed Approach

	Traditional Studies	Our Approach
Agent/Flow	Traditional flow-based approach tracks vehicle flow using origins, destinations and departure time. However, due to factors like traffic congestion, vehicles in the same flow may reach different locations at the same time. Flow-based models are not able to describe these attributes.	Agent-based models can track the locations of each vehicle (e.g.) and separately consider their characteristics in the modeling in a more targeted way; real-time probe data can be incorporated easily into such models, such as GPS locations.
Predictive Optimization with Mixed Users	Traditional studies consider either one single user class or multiple user classes; these classes are usually modeled together and collective effects are evaluated through simulation.	The algorithm for simulation optimization is able to account for different users (habitual users, pre-trip, en-route, VMS), and provide optimized information. This also requires the algorithm to be predictive, to robustly account for potential decisions of other travelers in real-time.
Computational Challenge (large network and real time deployment)	Many traditional studies (esp. optimization-based) use complex algorithms and cannot be applied in real-time for large problems.	The proposed algorithm uses queue-based flow relationships and analytical results of system-optimal models. Our algorithm has proven efficient with large networks.

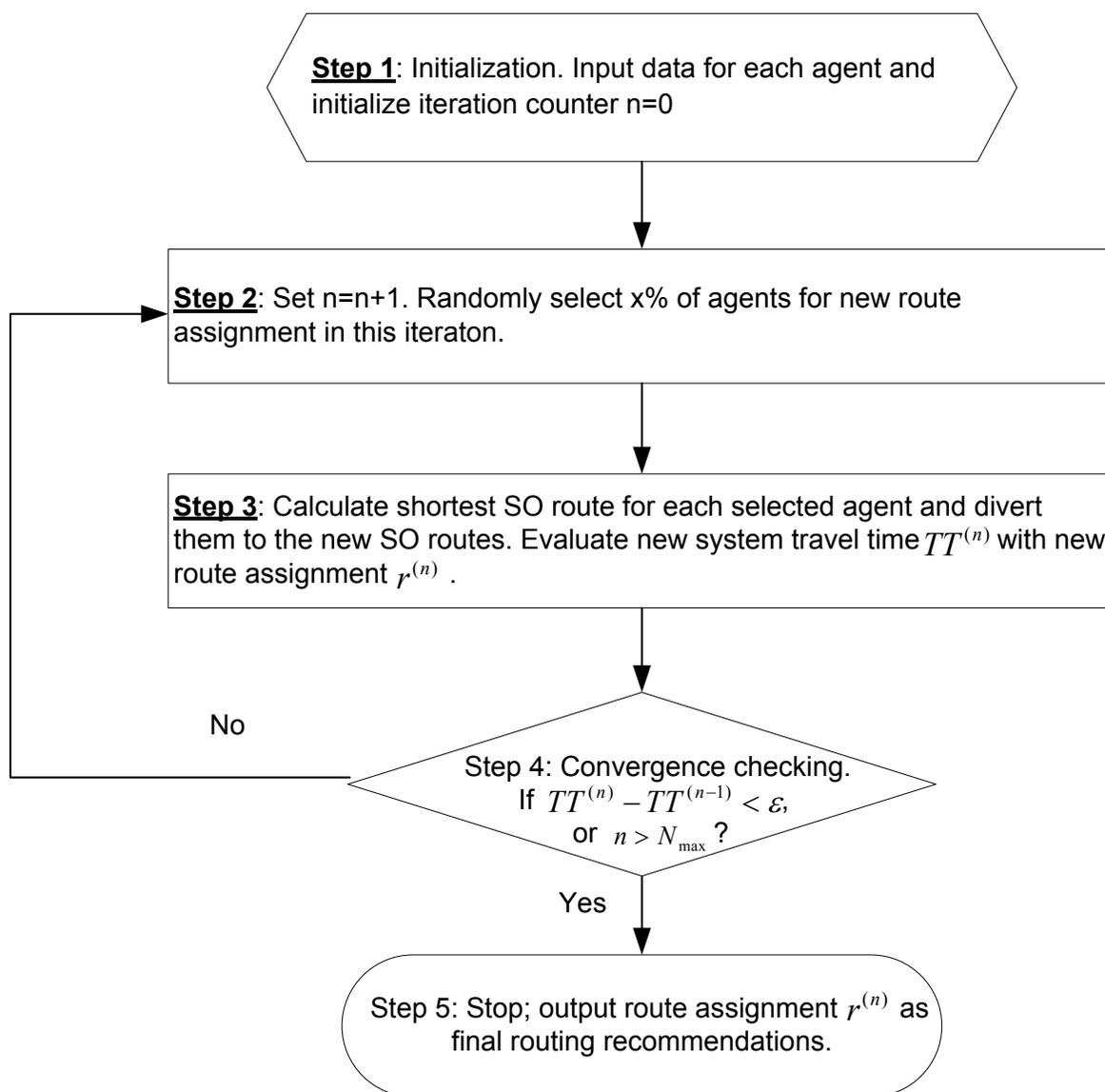


Figure 1 PSOI algorithm for Personalized SO information

A work zone scenario was simulated on Highway 60, causing capacity decrease for that link and lasted for 50 minutes. Sensitivity analyses were conducted to examine the impact of PSOI market penetration for SLC subarea network, as shown in Figure 2. As PSOI penetration increases, the travel time all travelers decrease, and PSOI agent’s travel time is usually better than HI agents. After a large penetration rate (e.g., 75%), the benefit brought by PSOI information is only marginal.

For evaluation of mixed traffic conditions with 20%

PTI (Pre-trip Information) and ERI (En-route Traveler Information), Figure 3 demonstrates how PSOI market penetration increase can reduce travel time of all travelers in the network. More interestingly, PSOI users experience travel time as relatively short compared with other information users, making this strategy acceptable as a personal information tool.

Thus, PSOI is recommended by this paper as an advantageous way for next generation advanced information systems and dynamic traffic management. Traffic Operations Centers of State DOTs and local agencies should give it full consideration when required hardware facilities are in place.

2015 Research Results

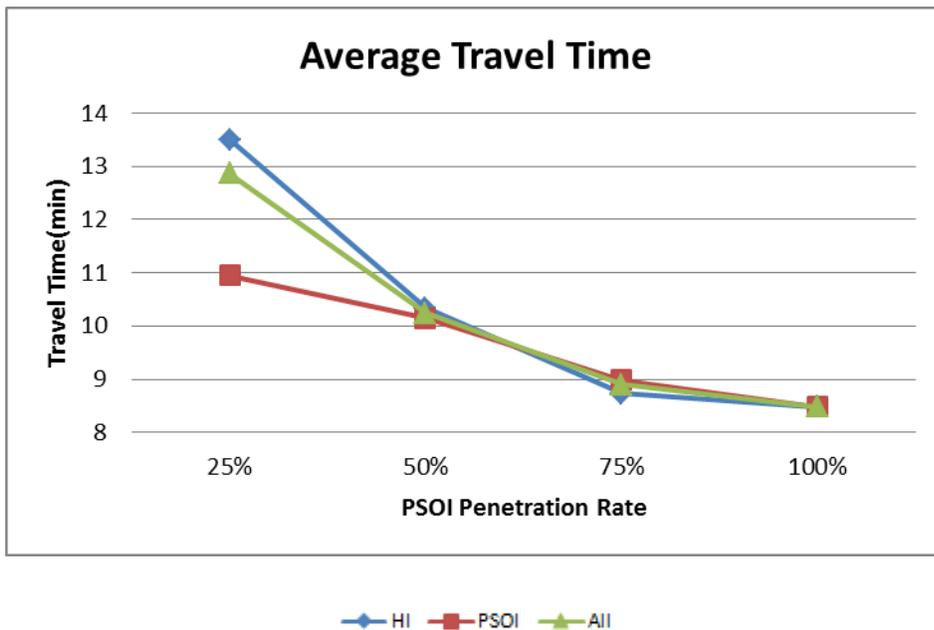


Figure 2 Sensitivity Analysis of PSOI Market Penetration Rate for SLC Subarea Network

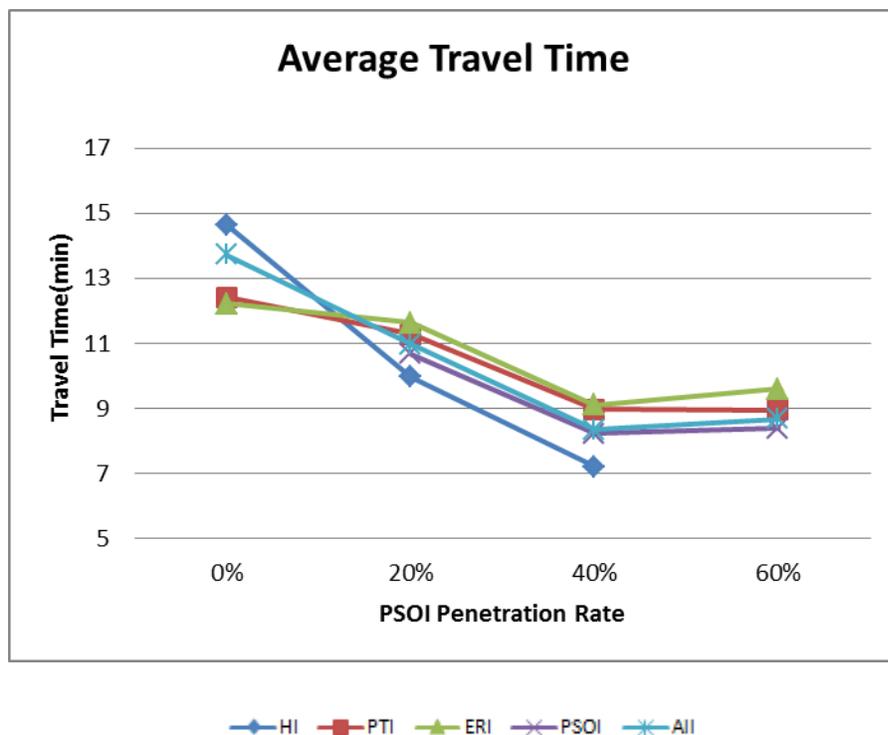


Figure 3 Sensitivity Analysis of PSOI in Mixed Traffic for SLC Subarea Network

References

Ma, Jiaqi, Xuesong Zhou, and Brian Smith. (2015) Personalized Real-time Traffic Information Provision: Agent-based Optimization Model and Solution Framework. Transportation Research Part C, <http://dx.doi.org/10.1016/j.trc.2015.03.004>.

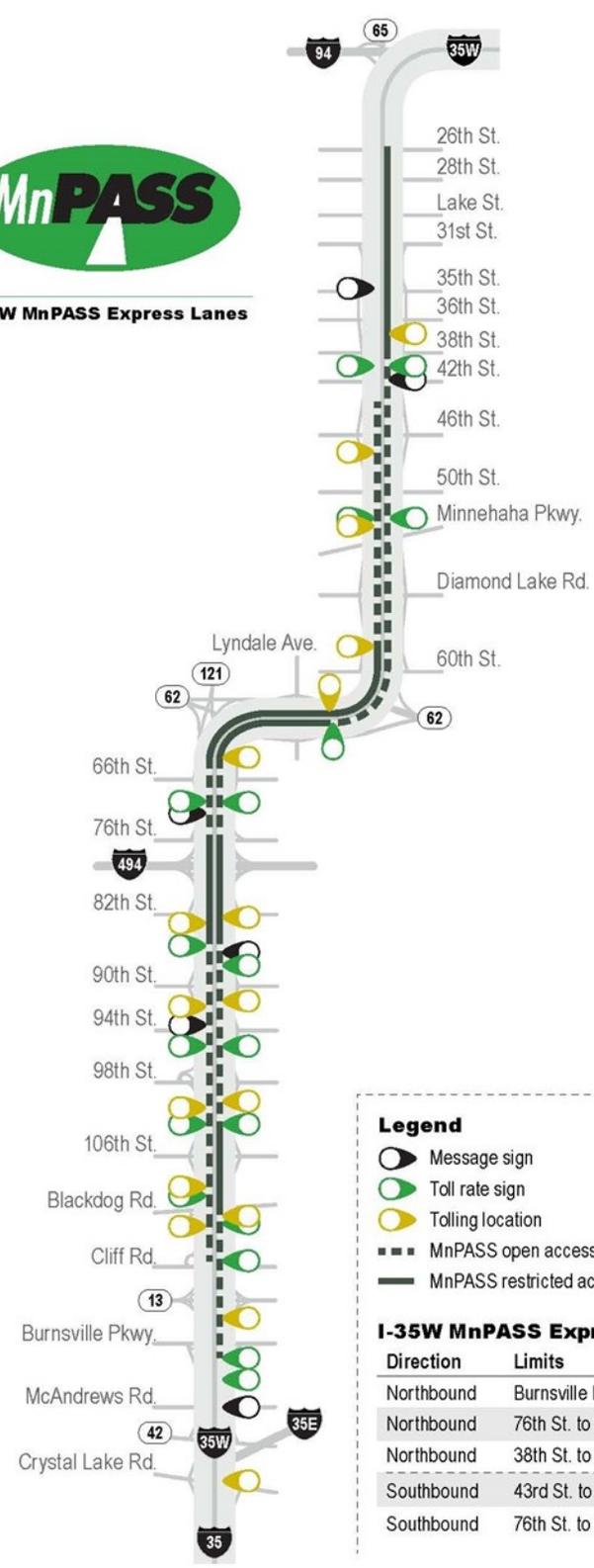
Ma, Jiaqi, Jeffrey Taylor, Xuesong Zhou, and Fang Zhou. (2014) Providing Personalized and System Optimum Traveler Information: Simulation-based Heuristic Algorithm and Evaluation Framework. Accepted to 94th TRB Annual Meeting Compendium.

2015 Research Results

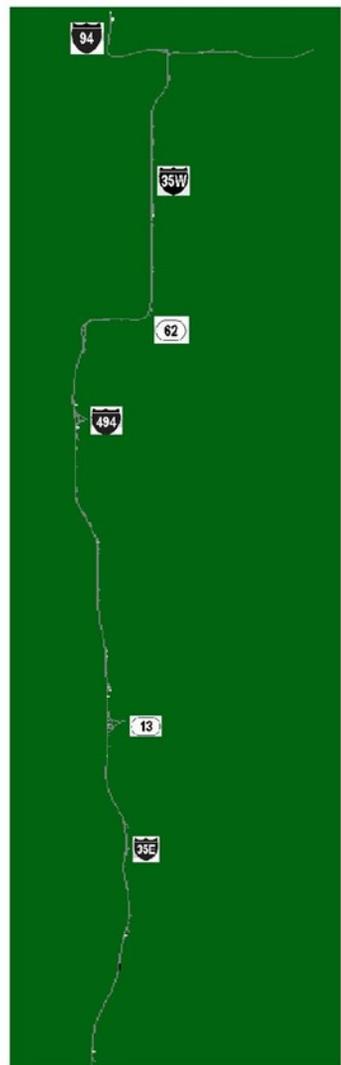
a local travel demand model (or mesoscopic model) produces better demands in MLs and thus revenue forecasts, the calibrated S1 model could be utilized with results from the travel demand model, for future free-way operations analysis.

The calibration of micro-simulation models with tolled MLs is challenging, due to several pricing and lane choice parameters. According to the case study of I-35W in Minneapolis, the MnPASS lanes were successfully calibrated by this method.

The authors wish to thank Mr. Brian Kary at Mn/DOT and Associate Professor John Hourdos from University of Minnesota for providing MnPASS data and their ongoing MnPASS research study reports. The authors also wish to thank Mr. James McCarthy at FHWA for the idea of by-lane MOE evaluation for free-way operations and Mr. Tom Sohrweide at SEH Inc. for his support on this effort.



Northbound I-35W CORSIM Model



Legend

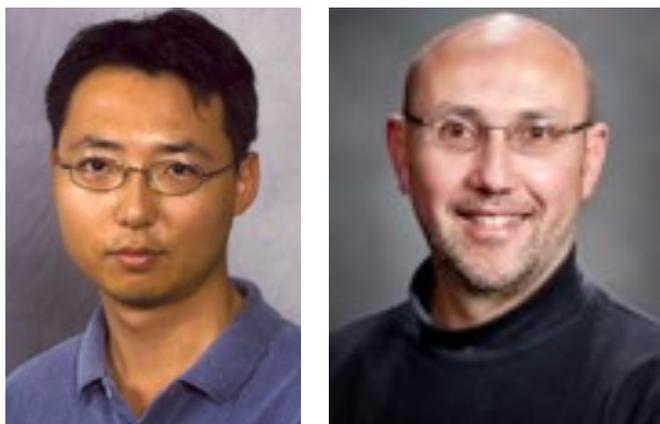
- Message sign
- Toll rate sign
- Tolling location
- MnPASS open access (broken line)
- MnPASS restricted access (double solid line)

I-35W MnPASS Express Lanes Pricing Zones

Direction	Limits	Hours
Northbound	Burnsville Pkwy to 76th St.	6AM - 10AM, Mon - Fri
Northbound	76th St. to 38th St.	6AM - 10AM & 3PM - 7PM, Mon - Fri
Northbound	38th St. to 26th St.	Variable
Southbound	43rd St. to 76th St.	6AM - 10AM & 3PM - 7PM, Mon - Fri
Southbound	76th St. to Cliff Rd.	6AM - 10AM, Mon - Fri

**Eco-Lanes Applications:
Preliminary Testing and Evaluation**

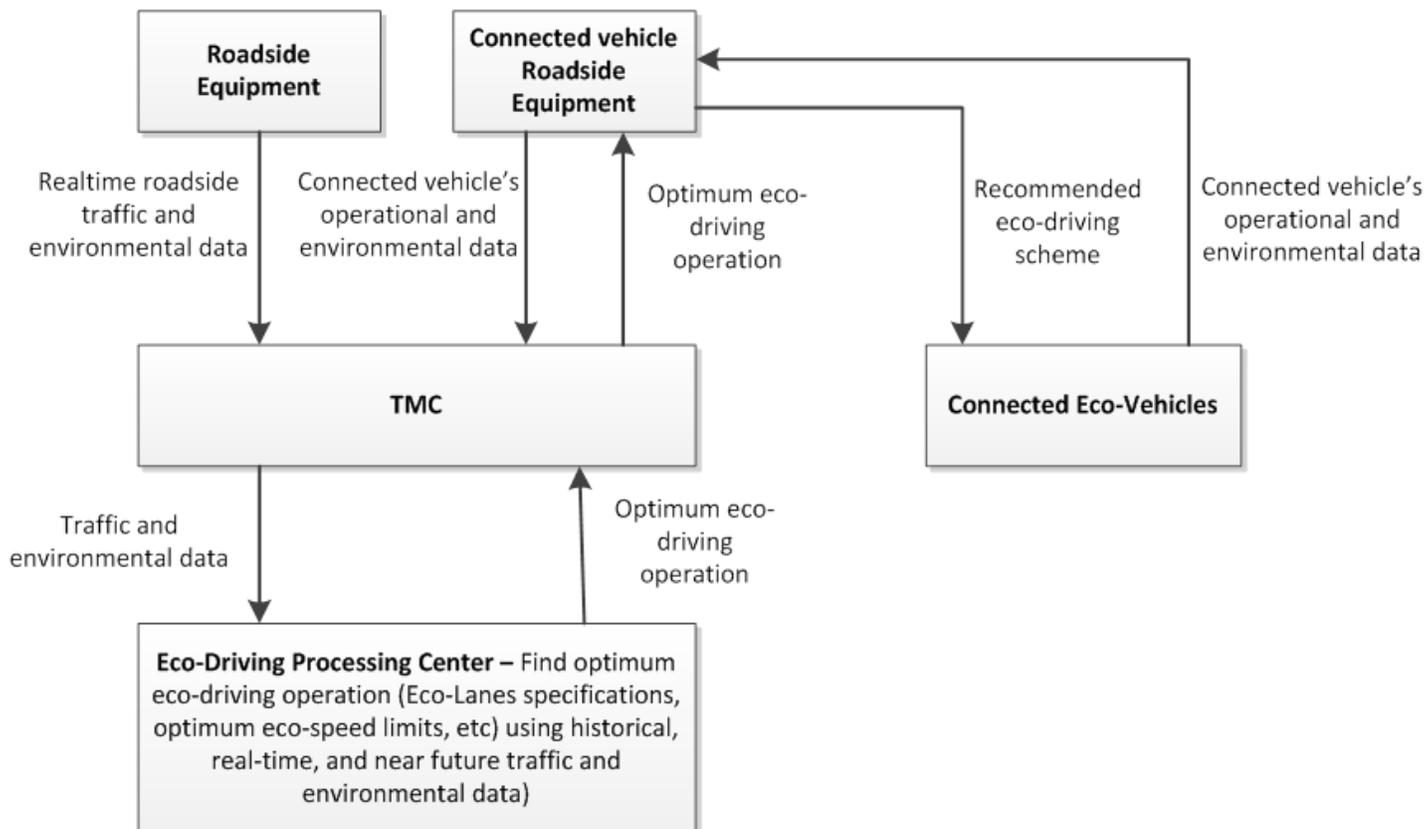
*by Kyounggho Ahn and Hesham Rakha
Virginia Tech Transportation Institute*



This study investigated the feasibility of Eco-Lanes applications that attempt to reduce system-wide fuel consumption and GHG emission levels through lane management strategies. The study focused its efforts on evaluating various Eco-Lanes and SPD-HARM applications using the INTEGRATION microscopic traffic simulation software.

The study demonstrated that the proposed Eco-Lanes system can significantly improve fuel efficiency and air quality while reducing average vehicle travel time and total system delay. For this case study, the proposed system reduced travel time, delay, fuel consumption, HC, CO, and CO₂ emissions by 8.5%, 23%, 4.5%, 3.1%, 3.4%, and 4.6%, respectively, compared with the base case scenario. The study also examined the feasibility of a predictive Eco-Lanes system. This system predicts the onset of congestion and starts the Eco-Lanes system before congestion occurs. The simulation study found that the 30-minute predictive Eco-Lanes system produced greater reductions in fuel consumption and CO₂ emissions compared with the non-predictive Eco-Lanes system. The study also found that the optimum throttle levels and the optimum eco-speed limits can significantly improve the mobility, energy savings, and air quality of such systems.

Furthermore, the study demonstrated that SPD-HARM as an Eco-Lanes application produced reductions in delay, fuel consumption, HC, CO, NO_x, and CO₂ emissions by 7.6%, 6.3%, 23.9%, 26.1%,



17.2%, and 4.4%, respectively, compared with the base case scenario.

ing alternative vehicle emission and fuel consumption technologies. Also, further studies are required

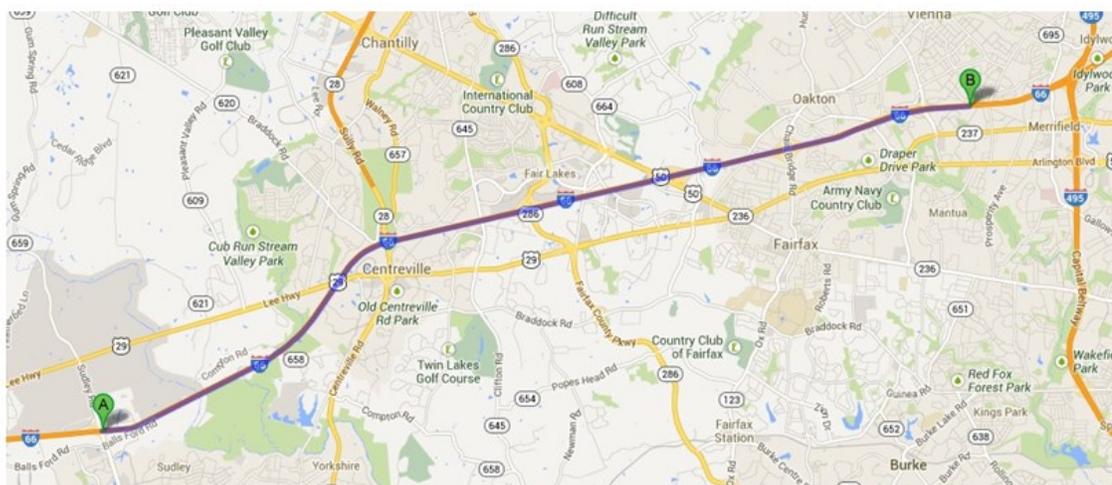


FIGURE 1 Study site (SOURCE: Google map).

to characterize the optimum eco-lanes specifications, such as the spatial and temporal eco-lanes boundaries, and to enhance the optimum eco-speed limit algorithms. Furthermore, the car-following behavior of non-eco-vehicles should be investigated.

Future research should quantify the potential benefits of using the proposed Eco-Lanes systems on different networks with various vehicle types, includ-

Finally, further research is needed to validate the simulation outputs using field tests.

TABLE 1 T-test Results (p-values) Comparing Eco-Lanes Systems

	Travel Time	Total Delay	Fuel	HC	CO	NO _x	CO ₂
Eco-Lanes vs. Pred. Eco-Lanes 15 min.	0.180	0.179	0.016	0.906	0.923	0.016	0.029
Eco-Lanes vs. Pred. Eco-Lanes 30 min.	0.188	0.188	0.000	0.452	0.582	0.000	0.003
Pred. Eco-Lanes 15 min. vs. 30 min.	0.967	0.966	0.238	0.542	0.571	0.119	0.357

TABLE 2 Impact of Different Maximum Throttle Levels on Eco-Lanes Operation

	Travel Time (s)	Total Delay (s)	Fuel (l/veh)	HC (g/veh)	CO (g/veh)	NO _x (g/veh)	CO ₂ (g/veh)
Base Case (No Eco-Lanes)	717.86	270.14	1.51	7.43	188.47	4.62	3237.54
10% Throttle	727.55	279.22	1.46	7.48	188.76	4.84	3135.13
30% Throttle	646.54	198.41	1.43	7.18	181.50	5.07	3072.24
50% Throttle	640.75	192.68	1.43	7.17	181.43	5.05	3060.60
70% Throttle	661.24	213.18	1.43	7.12	180.05	5.00	3072.51
90% Throttle	665.64	217.59	1.43	7.11	179.72	4.99	3072.42

TABLE 3 Impact of Different Maximum Vehicle Speeds for Eco-vehicles on Eco-Lanes Operation

	Travel Time (s)	Total Delay (s)	Fuel (l/veh)	HC (g/veh)	CO (g/veh)	NO _x (g/veh)	CO ₂ (g/veh)
Base Case (No Eco-Lanes)	717.86	270.14	1.51	7.43	188.47	4.62	3237.54
Max. speed 104 km/h	640.75	192.68	1.43	7.17	181.43	5.05	3060.60
Max. speed 93.6 km/h	706.87	258.71	1.44	6.97	175.22	4.92	3100.48
Max. speed 83.2 km/h	700.15	251.87	1.44	7.12	179.55	4.83	3089.69
Max. speed 72.8 km/h	667.49	219.17	1.45	7.65	193.82	4.89	3088.00
Max. speed 62.4 km/h	735.85	287.47	1.49	8.06	202.29	4.93	3181.14
Max. speed 52 km/h	746.20	297.76	1.52	8.64	215.39	5.04	3228.48

NOTE: 1 mi/h = 1.6 km/h.

Parallel Computing in Traffic Simulation and Assignment: Moving from Innovations to Practice

Sunday, January 11, 2015 9:00AM - 12:00PM
Convention Center, 156

Workshop: Data and Information Technology, Planning and Forecasting

Xuesong Zhou, Arizona State University, presiding
George F. List, North Carolina State University, presiding
Michalis Xyntarakis, Cambridge Systematics, Inc., presiding

Sponsored By:

Transportation Network Modeling ([ADB30](#))
Traffic Flow Theory and Characteristics ([AHB45](#))

The emerging multicore processor technique is offering unprecedented available parallel computing power to address the computational challenges in large-scale traffic assignment and simulation. This paradigm change in computing requires new algorithm design and better understandings on different modeling cases. Speakers from practitioners, researchers, and software vendors provide general audiences insights on the efficient use of parallel hardware and technologies.

Domain Decomposition, Parallel Computing and Traffic Assignment

ManWo Ng, Old Dominion University
Duc Thai Nguyen, Old Dominion University

The Benefits of Parallel Computing for Large Scale Network Equilibrium Models

Michael Florian, INRO Consultants Inc., Canada

Large-Scale Traffic Simulation: Using Parallel Computing on High-End Workstations

Kai Nagel, Technical University of Berlin, Germany

Parallel Processing and Agent-Based Representations of Traffic Signal Control

George F. List, North Carolina State University
Mehdi Mashayekhi, North Carolina State University

POLARIS: General Purpose Agent-based Modeling Framework Specialized for High-Performance Transportation Simulations

Joshua Auld, Argonne National Laboratory
Hubert Ley, Argonne National Laboratory
Vadim Sokolov, Argonne National Laboratory

Computational Advances in Traffic Assignment and Simulation: Algorithms in Practice

Qi Yang, Caliper Corporation
Ramachandran Balakrishna, Caliper Corporation

Panel Discussion: Moving Parallel Computing Technologies to Practice

Michalis Xyntarakis, Cambridge Systematics, Inc.
Xuesong Zhou, Arizona State University
George F. List, North Carolina State University
ManWo Ng, Old Dominion University
Michael Florian, INRO Consultants Inc., Canada
Kai Nagel, Technical University of Berlin, Germany
Qi Yang, Caliper Corporation
Hubert Ley, Argonne National Laboratory
Li Zhang, Connected Inc.

Using Simulation for Decision Support Systems: Past, Present, and Future

Sunday, January 11, 2015 1:30PM - 4:30PM
Convention Center, 102A

Workshop: Operations and Traffic Management, Planning and Forecasting

Montasir M. Abbas, Virginia Polytechnic Institute and State University, presiding

Sponsored By:

Transportation Network Modeling ([ADB30](#))
Freeway Operations ([AHB20](#))
Traffic Flow Theory and Characteristics ([AHB45](#))

This workshop focuses on the use of simulation models in conjunction with decision support systems, in the past, presently, and in the future. An increasing need exists for traffic simulation to provide reliable system performance measures for use with proactive dynamic management systems. The active deployment of real-time decision support systems is emerging and spreading. This workshop will address topics related to the use of simulation in conjunction with such decision support systems.

- 1- Calibration of traffic simulation tools utilizing new data sources (e.g., connected vehicles)
- 2- Currently deployment of proactive dynamic management systems and available data
- 3- On-line and off-line learning aspects in transportation, and potential use of intelligent agents techniques
- 4- Simulation and macroscopic models: the unanswered questions
- 5- Emerging simulation challenges for decision support systems: information, control, and travelers "inertia"

Calibration of Traffic Simulation Tools Utilizing New Data Sources

Aleksandar Stevanovic, Florida Atlantic University

Deployment of Proactive Dynamic Management Systems and Available Data—Dallas ICM Implementation

Khaled F. Abdelghany, Southern Methodist University

Deployment of Proactive Dynamic Management Systems and Available Data—San Diego ICM Implementation

Matthew Juckes, TSS-Transport Simulation Systems
Jordi Casas, Transport Simulation Systems, Spain

The European Perspective: ATDM Deployments in the Netherlands

Serge Hoogendoorn, Delft University of Technology, Netherlands
Ramon Leonardus Landman, Delft University of Technology, Netherlands

On-line and Off-line Learning Aspects in Transportation, and Potential use of Intelligent Agents Techniques

Montasir M. Abbas, Virginia Polytechnic Institute and State University

Emerging Simulation Challenges for Decision Support Systems: Information, Control, and Travelers "Inertia"

Hani S. Mahmassani, Northwestern University

Car Following and Microscopic Simulation

Monday, January 12, 2015 1:30PM -
3:15PM *Convention Center, 101*

Lectern Session
Operations and Traffic Management

Soyoung Ahn, University of Wisconsin, Madison,
presiding

Sponsored By:
Traffic Flow Theory and Characteristics ([AHB45](#))

Calibration of Car-following Laws for Traffic Oscillation Prediction

Christine Rhoades, University of Illinois
Xin Wang, University of Illinois
Yanfeng Ouyang, University of Illinois

Vehicle Dynamics Model for Estimating Typical Vehicle Accelerations

Karim Fadhloun, Virginia Polytechnic Institute and State University
Hesham Rakha, Virginia Polytechnic Institute and State University
Amara Loulizi, Ecole Nationale d'Ingenieurs de Tunis, Tunisia
Abdessattar Abdelkefi, New Mexico State University

Fitting Time Headway-vehicle Speed Bivariate Distributions: An Operational Procedure For Two-lane Two-way Roads

Riccardo Rossi, University of Padova, Italy
Massimiliano Gastaldi, University of Padova, Italy
Federico Pascucci, Braunschweig University of Technology, Germany

Agent-Based Cooperative Traffic Modeling and Simulation

Maxime Guériau, IFSTTAR, France
Romain Billot, French Institute of Science and Technology
Julien Monteil, French Institute of Science and Technology
Nour-Eddin El Faouzi, French Institute of Science and Technology
Salima Hassas, Université de Lyon, France

Traffic Relaxation, Anticipation and Hysteresis

Hui Deng, University of California, Davis
H. Michael Zhang, University of California, Davis

Joint Traffic Simulation Subcommittee

Transportation Research Board Annual Meeting
Monday, January 12, 2015, 7:30-9:30PM
Marriott Marquis, Marquis Ballroom Salon 7 (M2)



- A. Introductions - George List
- B. Sponsoring Committee Chair Remarks - attending chairs or liaisons
- C. Task Group Reports
 - a. Annual Workshop Report (brief synopsis) – Monty Abbas
 - b. Research Needs and Resources Task Group - Mohammad Hadi
 - c. Calibration, Verification and Validation Task Group - Ray Benekohal
 - d. Awards – Ed Lieberman
 - e. SimSub Reports – David Hale
 - f. Mesoscopic Task Group – Yi-Chang Chiu
 - g. Safety Simulation Task Group – Amir Sobhani (for Bill Young)
 - h. Agent-Based Simulation Task Group – Monty Abbas
- D. FHWA ATDM-DMA Simulation Testbed Project Update – James Colyar
- E. New Business
 - a. TRB Circular based on 2014 Workshop – Rob Bertini
 - b. ATDM Trajectory Validation Project – Michalis Xyntarakis
 - c. Modeling Intelligent Mobility – Pete Sykes
 - d. 2015 Annual Workshop Planning – George List
- F. MULTITUDE-related activities - Loukas Dimitriou
- G. Transportation System Simulation Manual – John Halkias
- H. Other Business
- I. Closing

