



## Traffic Modeling and Simulation

*By running multiple computers in parallel, TRACC is making the USDOT-developed TRANSIMS (Traffic Analysis and Simulation System) more effective. This will significantly reduce simulation time, allow for higher fidelity of scenarios, and result in much faster turnaround times for existing models.*

### Background

Argonne National Laboratory's Transportation Research and Analysis Computing Center (TRACC) has been tasked by the U.S. Department of Transportation (USDOT) to deploy a new paradigm in transportation simulation that holds the promise of providing answers to many pressing transportation problems at a level of detail never before possible. A recently developed simulation code, the Transportation Analysis and Simulation System (TRANSIMS), can model each individual traveler's second-by-second movements in a large metropolitan transportation system, including all possible modes of ground transportation, such as the traveler's use of automobiles, buses, trains, streetcars, and even walking.

### TRACC's Software

TRANSIMS was designed to meet the needs of state departments of transportation and metropolitan planning organizations for more accurate and more sensitive travel forecasts for transportation planning. The Federal Highway Administration, Federal Transit Administration, Office of the Secretary of Transportation, and the Environmental Protection Agency funded the development of TRANSIMS. It is available at no charge through the TRANSIMS open-source project at SourceForge (<http://transims-open-source.net>).



*TRACC, Northern Illinois University, and the Chicago Metropolitan Agency for Planning are updating the road network in the Chicago Business District based on aerial photography and other public and commercial resources to provide the high-fidelity input required by the microsimulation code TRANSIMS.*

### For Users

TRACC actively promotes the use of TRANSIMS on its high-performance cluster through direct support for modelers working on USDOT-related projects. TRACC's experts have developed extensive training materials for use of TRANSIMS, including a 3-day training course with lectures spanning the entire scope of the application. The training course is held several times a year with participation over the internet, allowing access to a user community as large as possible. The materials are also online for the modeling community.

## Traffic Modeling and Simulation

TRACC staff are also working to make the TRANSIMS application more effective and user-friendly. Regular interaction with potential users of TRANSIMS has been established to find appropriate solutions to their simulation needs. Collaborative code modifications are made in an open-source community. TRACC staff is working to enhance TRANSIMS' compatibility with Linux computing platforms and to deploy TRANSIMS through such efforts as the preparation of installable modules and source code packages.

One of the key missions of the transportation modeling group at TRACC is the support of users of the TRACC computing facility. The number of TRANSIMS-related projects on the cluster is steadily increasing, with dozens of registered users from about ten different organizations and projects. TRACC provides full user support and provides assistance with model building, parallelization to improve performance, and general advice on available methodologies. Extensive visualization software is under development at TRACC to enable users to rapidly evaluate the results from their simulations and to present results to sponsors and decision makers.

### Current Projects

The sheer amount of computing power necessary to simulate the movement and the interactions of all travelers continuously over a 24-hour period on metropolitan networks that can span 10,000 square miles or more is daunting, but has been proven on somewhat smaller scales by USDOT using data from Washington DC and other cities. Using its high-performance computing resources and its experience in transportation system analysis and parallelization of large-scale applications, TRACC is applying TRANSIMS on a much broader scale to an area that covers the entire Chicago metropolitan area, from Rockford on the west, to Milwaukee on the north, and Kankakee and Gary on the south.

The team at TRACC is also actively developing simulation tools for emergency response planning, and in particular emergency evacuation planning. The TRANSIMS application, being able to model not only



*TRANSIMS derives the congestion on the street network from the detailed interaction between all individual vehicles (color-coded by current speed), traffic signals, and transit vehicles (shown in blue). The figure shows a typical snapshot of the location of all vehicles around Grant Park in the City of Chicago.*

individual vehicles but also all other modes of ground transportation, forms the basis for this methodology. These tools will allow emergency responders to create better evacuation plans through testing of various strategies. Examples of these strategies include establishment of evacuation routes, the choice of destinations for evacuees and the use of buses and trains for mass evacuations.

#### For further information, contact

Hubert Ley

TRACC Traffic Simulation Project Leader

630-578-4250

[transims@anl.gov](mailto:transims@anl.gov)

[www.tracc.anl.gov](http://www.tracc.anl.gov)