

Operational traffic modeling for Sydney CBD

Construction is already underway on Sydney's CBD and South East Light Rail (CSELR) network, which will reshape Sydney's transportation system and reduce the city's reliance on buses.

Operational modeling

In the early stages of the project, which started four years ago, the pre-existing Roads and Maritime Services (RMS) microsimulation model represented best practice at a microsimulation level, but did not take into account traffic effects outside the CBD (central business district). As a consequence, the model was likely to overestimate congestion when traffic capacity was reduced in the CBD and, conversely, to underestimate congestion when capacity was increased.

The operational assessment approach included the development of an area-wide mesoscopic Aimsun model that enables the dynamic simulation of an area large enough to account for regional route diversion, as well as microsimulation modelling of smaller pockets that require the representation of dynamic individual vehicles in the detailed road network. The hybrid platform is proving to be an efficient method for data exchange or model transformation from the macroscopic level (Sydney Strategic Travel Model) (SSTM) and the Public Transport Project Model (PTPM)) to the mesoscopic/microscopic levels in Aimsun.

Model behavior

The Sydney Coordinated Adaptive Traffic System (SCATS) controls all signalized intersections in the modeled



George Street in Sydney, Australia

City of Sydney, George Street at the Town Hall; an artist's impression

Need to know

The Aimsun Sydney CBD model platform is the first of its kind to communicate with SCATS

- SCATS is an ITS developed in Sydney, Australia in the 1970s
- It manages the dynamic timing of signal phases at traffic signals
- The implementation of SCATSIM in the Aimsun mesoscopic model has enabled estimates of the magnitude of traffic issues, inside and around Sydney CBD, to be made

study area and allows adaptive phase times, cycle times and offsets to respond to fluctuating traffic conditions and public transport demands, and improve the efficiency of individual intersections. However, the introduction of light rail within the complex road network environment will require an overhaul of the existing SCATS signal control strategies to cover various new

light rail traffic signal priorities. The implementation of SCATSIM into the Aimsun mesoscopic model has provided an estimate of the magnitude of traffic issues, enabling the development of more appropriate congestion management plans and the evaluation of signal priority levels, as well as their impact on travel time reliability.

There are some distinctive differences in vehicle detection emulation between the microscopic and mesoscopic models: the mesoscopic car-following model is simplified when the acceleration and deceleration constraints are removed. The model estimates the earliest time that a vehicle can enter and exit the section, and uses this information to calculate the arrival time of a vehicle at a particular detector. The first-of-its-kind SCATSIM interface between SCATS and the mesoscopic model enables the exchange of information between SCATS and the simulator. In addition, a recently added microsimulation pocket along the length of the light rail corridor can accurately replicate detailed light rail vehicle characteristics and ultimately

increase confidence levels in forecast travel times.

Operational assessment

In October 2015, during the implementation of the new CBD Bus Plan and the first closures of George Street, the assessment of actual traffic volumes within the CBD cordon after the first closures showed a reduction in trip numbers and peak spreading away from the busiest time periods. This demonstrated the successes of the on-going travel management campaign by the New South Wales (NSW) transport authorities, which aims at reducing vehicle numbers in the Sydney CBD.

The model results showed a 2% overestimation of inbound and a 16% underestimation of outbound vehicle trips in the morning peak period. This relatively high underestimation of outbound volumes was due to the changeable nature of those trips. In morning peak traffic, diversions resulting from the proposed road closures and the new bus plan were likely to occur on alternative north-south routes, which correlated closely with the survey data.

Simulation success

The use of the Aimsun modeling platform, in combination with SCATS, has provided Sydney with a cutting-edge tool that was able to successfully support the development of several demand management and operational transport strategies. ○

Free reader inquiry service

GTA Consultants

inquiry no. 502

To learn more about this advertiser, please visit: www.ukipme.com/info/tfm