Modeling 101

Dynamic Traffic Assignment (DTA)

Planning, Research, and Development contacts

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Dynamic Traffic Assignment allows for the evaluation of traffic bottlenecks and queuing on both spatial and temporal dimensions.

How does it work?

Traffic assignment methods are situated along a continuum defined by geographic and temporal scale. At one end is macro-scale assignment, with regional extent and a single assignment of aggregate vehicle flows over one or multiple hours; at the other is micro-scale simulation, which operates on a small area or single facility with continuous assignment of individual vehicles in "real time."

Dynamic Traffic Assignment (DTA) models use roadway networks with highly detailed information on speed, network geometry and intersection control to simulate the trajectories of individual vehicles moving throughout a network. This simulation is carried out in a succession of small time increments, allowing for continuous interaction between changing network characteristics and route choice decisions. Unlike macro-scale assignment, DTA explicitly accounts for the phenomenon of queuing (i.e. traffic jams), simulating the formation of bottlenecks and their subsequent effects as traffic backs up and upstream drivers change their routes.

Since highly precise operational analysis is not its purpose, DTA is capable of handling larger networks than micro-scale simulation. Furthermore, by permitting feedback between network conditions and the behavior of individual drivers, DTA generates more robust information than macro-scale assignment. With respect to the continuum referenced above, then, Metro's use of DTA occupies the meso-scale middle ground, combining the spatial range of the macro-scale assignment with the temporal acuity of micro-scale simulation.

Why does it matter?

As the potential for congestion in future-year networks grows, the questions being asked of transportation models continue to shift in nature and the limitations of established assignment techniques have become more pronounced.

In accurately representing complex network dynamics and operating in relatively small time increments, DTA constitutes a significant advance in analytical capabilities. This amounts to the availability of more meaningful and expansive information for use in analyzing a wide range of strategies, policies and phenomena. Examples include congestion mitigation, construction and incident management, tolling and dynamic pricing regimes, emissions reduction, travel time reliability and peak spreading.