Simulation software gives insights to Lyon's traffic operators

The Opticities project gathers 25 partners from across Europe, including city councils, service providers, car firms and research laboratories to use interoperable ITS solutions to optimize urban logistics operations. The Metropolis of Lyon, France (also known as Grand Lyon), is one of six test beds, and a key aim of this part of the project is to test the integration of traffic prediction tools into the city's traffic control systems.

The Grand Lyon Opticities project is expected to demonstrate that a prediction tool can help traffic operators anticipate and mitigate peak congestion by forecasting future network flow patterns that will result from various traffic management actions, providing accurate strategy comparisons and allowing efficient implementation of the most suitable strategies.

A traffic prediction tool

The traffic prediction tool that SPIE (a provider of multi-technical services in the areas of energy and communications) chose to use for the experiment is Aimsun Online, provided by TSS-Transport Simulation Systems. Aimsun Online's dynamic, high-speed simulation of large areas enables traffic operators in Lyon's traffic management center (called CRITER) to visualize traffic conditions before they unfold, which enables them to anticipate future events. Three to four minutes is all that is needed to produce traffic predictions for the next hour.

Aimsun Online continuously processes live field data, simulating vehicle movements inside the Lyon study area, which covers approximately 870 miles (1,400km) of roads.

Lyon is the second-largest metropolitan area in France after Paris. It has 600,000 inhabitants over 60km²

Need to know

Opticities is a three-year project that tests ITS innovations in urban contexts

- Aimsun Online enables traffic operators to visualize traffic scenarios before they unfold
- The Lyon study area that Aimsun Online simulates comprises 870 miles (1,400km) of roads
- Aimsun Online uses real-time data inputs from the CRITER traffic management center to simulate future traffic scenarios; 3-4 minutes of live data from CRITER is all that is required to produce 30 minutes of traffic predictions

By combining live traffic data feeds and high-speed simulations with the emulation of congestion mitigation strategies, Aimsun Online can accurately forecast future network flow patterns that will result from a particular traffic management strategy.

Taking simulated action

Operators can simulate different scenarios, according to different strategies and travel policies (based on control plan configurations), to assess their relative impact on the network. Scenario results are ranked according to defined indicators. For each simulated scenario, the traffic state is displayed and operators can then apply simulated actions. In order to compare scenarios, four indicators were chosen: global fluidity, dynamic congestion, road level hierarchy and indicators for pedestrian data.

These indicators help traffic operators select the best strategy to apply to recurring congestion and unplanned incidents. This then enables operators to target specific areas where an intervention is necessary in order to minimize personal journey times, to analyze the impact and effectiveness of strategies deployed, and to build and refine a library of intervention strategies for future applications.

To provide precise predictions, the modeling team has to integrate the following data into Aimsun Online's model of Lyon: static model, public transport data; the control plan for all traffic light controllers; traffic demand data, history of traffic data; and definition of events and response scenarios. The historic traffic data is used to generate patterns for real-time simulation. As well as this, definitions of events and response scenarios are used to execute predictive simulations when special events happen.