

Planning, Policy  
and  
Programming

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Project Title:  
Coping with the Rise of  
E-Commerce Generated Home  
Deliveries Through Innovative Last-  
Mile Technologies and Strategies

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## Coping with the Rise of E-Commerce Generated Home Deliveries Through Innovative Last-Mile Technologies and Strategies

Developing a Time-Dependent Stochastic Capacitated Vehicle Routing and Facility Location (TD-S-CVRP-FL) model to evaluate various last-mile strategies/technologies.

### WHAT IS THE NEED?

During the COVID-19 pandemic, e-commerce has grown to record levels by providing individuals with much-needed goods and supplies under stay-in-place orders, retail closures, and other pandemic impacts on consumer behaviors. However, this rise and the increased adoption of e-commerce by consumers likely exacerbates the already identified issues of congestion and emissions with residential deliveries.

To keep pace with the growing demands of e-commerce, last-mile operators and academics have developed, evaluated, tested, or implemented various last-mile strategies around the globe. These include the use of consolidation (e.g., urban consolidation centers, staging areas, delivery hubs) facilities and/or collection strategies (e.g., lockers, pick-up and drop-off centers) coupled with use of alternate fuel delivery vehicles, such as electric trucks, cargo bikes, autonomous delivery robots (ADRs) and unmanned aerial vehicles (UAVs or drones), or the use of new delivery services (e.g., crowd shipping). However, the literature has mostly focused on studying such technologies or strategies independently, and research is still needed to understand how these could work under an integrated system.



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## WHAT ARE WE DOING?

This project will add spatial and temporal resolution to the assessment of different strategies and technologies to quantify the traffic impacts over the network, the changes in vehicles miles traveled (potential vehicles miles traveled displacement by drones, ADRS, or bikes), and emissions.

## WHAT IS OUR GOAL?

The research team will develop a Time-Dependent Stochastic Capacitated Vehicle Routing and Facility Location (TD-S-CVRP-FL) model to evaluate various last-mile strategies/technologies.

## WHAT IS THE BENEFIT?

The findings would be of interest to the Caltrans Offices of Freight and Multi-Modal Planning, as well as the Research and Modeling Branches, and are consistent with the California Freight Mobility Plan, the California Transportation Plan (2050), other important efforts that seek to move goods more effectively and efficiently.

## WHAT IS THE PROGRESS TO DATE?

A kick-off meeting will be scheduled at a future date.

## IMAGE

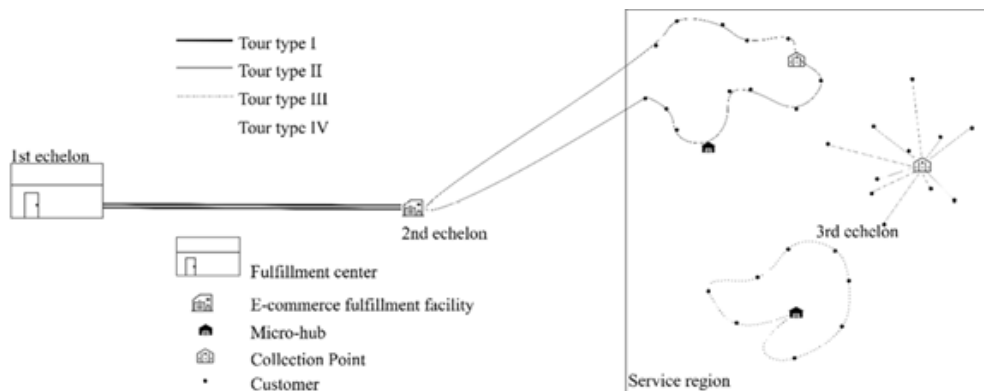


Image: Last-Mile Multi-Echelon Distribution Structure