

Transportation Portfolio Management Research Project Overview

31 October 2008



MIT Center for
Transportation
& Logistics

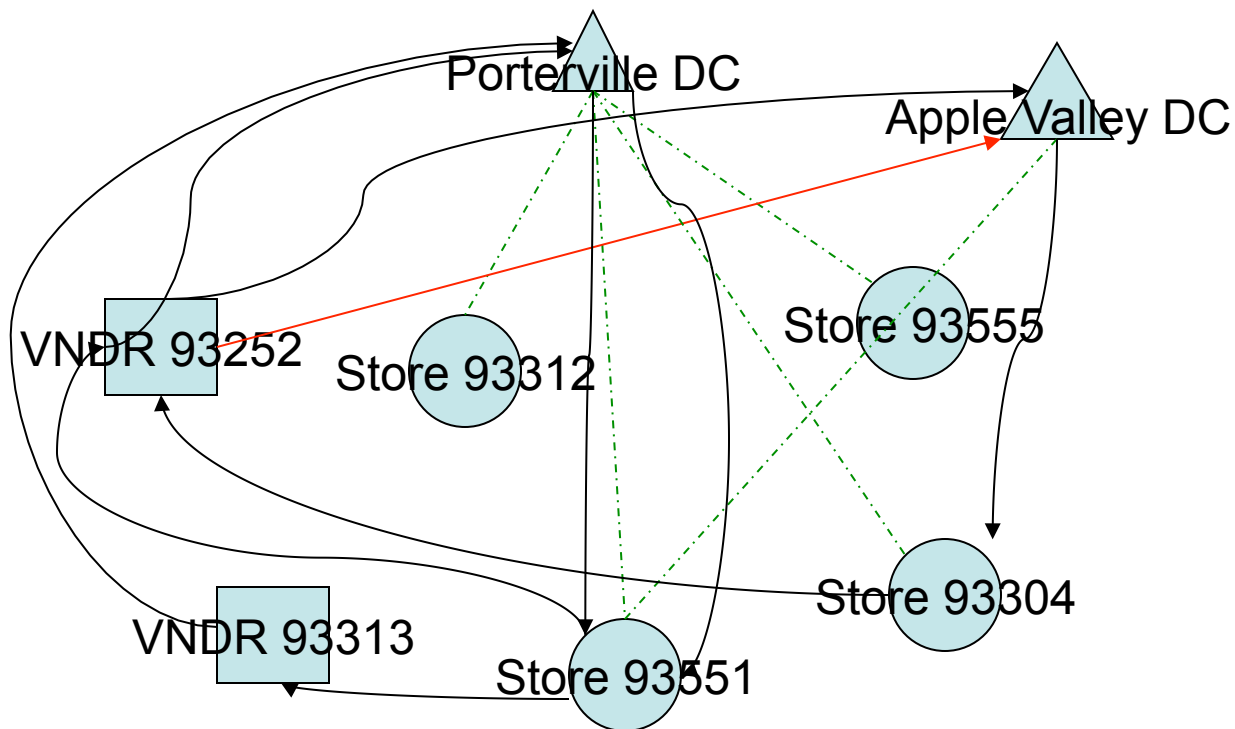


**Massachusetts
Institute of
Technology**

Goals

- Find the optimal assignment of loads between our research partner's private fleet and third party carriers in the transportation network.
- Find optimal private fleet back-haul lanes.
- Assess the optimal service level of the fleet in each individual lane.
- Find if relays help reduce the overall transportation cost and the optimal relay points in the network.

A Sample Network



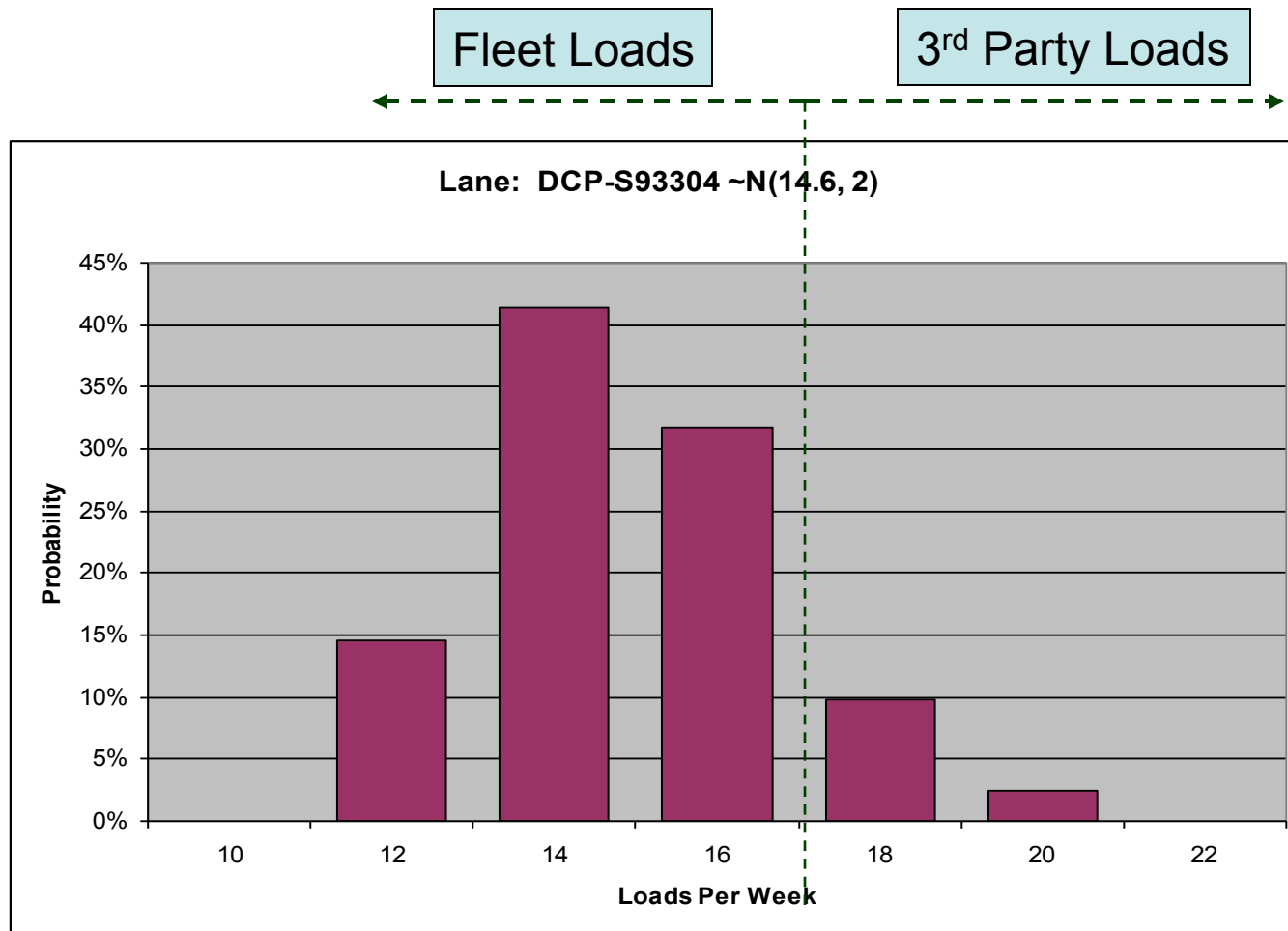
Private Fleet vs For Hire Carrier

- Private Fleet:
 - Cheaper in high volume, short distance hauls.
 - In general, cheaper per mile rate.
 - Empty haul cost is paid by the company.
- Third party carriers:
 - Useful for long distance, infrequent hauls.
 - Deadhead costs are the responsibility of the 3rd party carrier.
 - In general, more expensive per mile rate.

Back Hauls

- It makes sense to bring something back to the DC whenever a fleet truck delivers to a store.
- The additional transportation cost of the back haul is a function of the out of route miles.

Fleet Service Levels



Fleet Service Levels

- Outbound Fleet service levels will be determined by the user based on his or her level of risk aversion.
- Inbound Fleet service levels will be determined by the optimizer based on the demand distribution of the lane, the shadow prices, and fleet availability.

Relays

- In a relay, the trailer is dropped in an intermediate facility before it is hauled to its destination.
- A relayed shipment cost per load is reduced if it can exploit the deadhead miles of other shipments.
- In an optimal routing, the marginal cost of a relay lane will be less than the marginal cost of a direct haul.

Methodology

- Large Scale Stochastic Linear Programming
 - It will allow us to find optimal backhauls and relays from a potential pool of several millions.
 - Column generation and constraint generation will allow us to deal with the curse of dimensionality.
 - Statistics will help us find reasonable service levels for outbound lanes.

Conclusion

- We expect to create and validate an optimization approach to plan and manage transportation networks for companies with private fleets that require to hire 3rd party carriers as part of regular operations.
- Modern mathematical programming tools allow us to reduce the overall transportation cost by considering network effects and service levels.