



Séminaire des étudiants du CIRRELT Students Seminar\*

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## AN ADAPTIVE LARGE NEIGHBORHOOD SEARCH FOR THE TWO-ECHELON MULTI-TRIP VEHICLE ROUTING PROBLEM WITH SATELLITE SYNCHRONIZATION

**ABSTRACT:** Urban freight transportation is known as one of the major challenge in logistics. Because of increasing traffic congestion, environmental issues and new regulations, direct shipping strategies are dropped in favor of two-tiered distribution systems. In such system a fleet of large vehicles leave an urban distribution center to visit satellites via major roads (first echelon). At such location, goods are transferred to smaller and "green" vehicles, which will drive the remaining kilometers to deliver orders (second echelon). Several algorithms, both exact methods and heuristics, have been proposed for a simpler model of such distribution strategy: 2E-VRP (Two Echelon Vehicle Routing Problem). We propose a model closer to real-life by incorporating time windows constraints, synchronization constraints at satellites and multiple trips for the second level vehicles : the Two-Echelon Multi-Trip Vehicle Routing Problem with Satellite Synchronization (2E-MTVRPSS). We have developed an Adaptive Large Neighborhood Search to solve the problem. It features custom ruin and recreate heuristics, as well as an efficient scheduling algorithm that ensures synchronization at satellites.

**Note:** Philippe Grangier is presently doing an internship at CIRRELT, under the supervision of Professors Michel Gendreau and Louis-Martin Rousseau.

**MARDI / TUESDAY**  
**18 novembre 2014, à 12h**  
**November 18<sup>th</sup>, 2014, at 12:00**

**Salle / Room 5441**  
**Pavillon André-Aisenstadt**  
**Université de Montréal**

***Pizza et boisson gazeuse fournies***  
***Pizza and soft drink offered***

**Réservé aux membres du**  
**CIRRELT**

**Inscription obligatoire avant le 17 novembre / Registration required before November 17th**  
**<https://symposia.cirrelt.ca/Seminaires-Etudiants/register>**

**\* Étudiants de 2<sup>e</sup> et 3<sup>e</sup> cycle intéressés à présenter / Graduate students interested in presenting : [Antoine.Legrain@cirrelt.ca](mailto:Antoine.Legrain@cirrelt.ca)**



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