Increasing the Productivity of Parcel Operations in Urban Areas

CSRF Conference

30 November 2017

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Agenda

• Freight Traffic Control (FTC) 2050 project aims and objectives
• Current parcel operations in central London and business-as-usual trends
• Future scenarios being investigated
FTC 2050 project partners

• Research team

• Public sector

• Parcel carriers

• Funding body

• Project duration: April 2016 - March 2019
The freight transport challenge in urban areas

• Economic importance of freight transport services to businesses & residents:
  - rise of service economy (more small items)
  - growing population, employment levels, & demand for goods & services
  - rise of ecommerce / rapid last mile delivery systems
  - growing large, multi-occupier buildings (business and residential)

• Pressure on public sector to:
  - reduce road freight traffic
  - improve road safety
  - reduce CO₂ emissions & improve air quality

• Methods to achieve this:
  - Private sector develops more efficient operating methods
  - More interventions by policymakers to increase efficiency / reduce impacts
FTC 2050 - Questions

• How does delivery activity impact on carrier activities & urban street performance?

• How might last-mile operations be improved with a better knowledge of stopping locations and walking activity?

• What might benefits be of carriers working together to serve clients in the same area?

• What role may there be for a 3rd party ‘Freight Traffic Controller’ to manage collaboration and last-mile operations?
Focus on parcels sector in central London

- Parcel operations link to ecommerce growth
- High customer service levels
- Proliferation of operators / fierce competition
- Overlap in activities by geographical area
- Parcel sector is major user of vans
  - Vans = 75% of London road freight vehicle activity
  - Van traffic forecast to grow by 20% in London by 2030 in BAU
  - Impact on traffic, GHG emissions and air quality
Analysis of parcel sector operations in central London

- Vehicle rounds studied in London’s ‘West End’
- Average drive time between stopping locations of 4 minutes, with 8 minutes vehicle dwell time at each vehicle stop
- 95% of vehicle stops took place on-street at kerbside
- Vehicles parked for 60% of total vehicle round time
- Average walking distance per vehicle round - 5 miles
- Major kerbside space and time consumption
- Now exploring alternative delivery systems including portering
Heatmapping parcel deliveries from manifest data of two parcel carriers.

Carrier 1, Top 8
1 379
2 372
3 312
4 283
5 262
6 253
7 249
8 238

Carrier 2, Top 8
1 4041
2 1390
3 740
4 732
5 549
6 454
7 374
8 357
Business as usual situation

• Road capacity and traffic speeds
  - 30% decrease in road capacity 1993-2009
  - average traffic speeds in London 2-9% lower than 2008/9

• Freight depots moving ever-further out from central London over time (affordability and availability):
  – Increase in distance travelled to delivery catchment area

• Demand for parcel delivery services:
  – Time guarantees (e.g. 9 AM, 10 AM, 12 AM)
  – Growing demand for next- & same-day deliveries instead of economy
Logistics sprawl: change in warehousing floor-space 1998-2008 (% in selected London boroughs)

Recent research indicates trend continued 2008-2015 (i.e. reduction in central boroughs and increase in outer boroughs)

Total warehousing floor space in London fell 7% between 2006 and 2015
Speed of delivery response / proportion of timed guaranteed deliveries

• As senders / receivers:
  – increase their delivery response requirements
  – reduce their requests for deliveries / collections to be made before specified time of day

• Analysis of vehicle rounds:
  – If 10%, 20%, 30% and 40% more parcels have time guarantees, what % of current rounds could be successfully carried out?
  – Indicates % of current vehicle rounds that would require additional vehicles

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<th>% of additional parcels with time guarantees (compared with now)</th>
<th>Delivery time guarantee (before stated time)</th>
<th>% of current rounds that can successfully meet time constraints</th>
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Business as usual trends adding to impacts of parcel operations

Freight trends:
- Continued road space reduction for freight
- Parcels depots relocation further from urban centre
- Parcel delivery service

Operations lead to increase in:
- Vehicle km
- Vehicle driving time & traffic level
- Kerbside space and time occupancy
- Vehicle fleet required

Link to strategic objectives:
- Fossil fuel use and resource consumption
- Local air quality
- Safety
- Meeting timing and reliability needs of businesses and residents
Information and technology to assist the inexperienced driver

Operational issues include:

- Parcel loading strategy at depot
- Vehicle routing and scheduling
- Best place/s to park vehicle
- Finding parcels each time vehicle is stopped
- Which/how many addresses to deliver to when vehicle is parked
- Walking routeing and scheduling
- Finding actual point of delivery

Experienced v inexperienced driver (on per parcel basis):

- 44% less total driving distance
- 35% less total time taken
- 29% less driving time
- 39% less parking time
Observed sequence of visits on the round (46 vehicle stops)  

Optimised round using the 33 suggested clusters

Results suggest substantial savings in total time taken, vehicle kms, and fuel use
Using portering as a parcel delivery system

- Vehicle driver rendezvous with porter at kerbside
- Driver passes deliveries to porter
- Driver departs kerbside quickly while porter carries out several deliveries (either on-foot using backpack/trolley or cycle/cargocycle)
- Possible systems:
  - Virtual kerbside meeting point
  - Physical portering reception facility
Actual vehicle round v portering solution

Observed sequence of visits on the round (46 vehicle stops)  

Same vehicle round with 10 drop-off locations for porters

Potential transport–related impacts:

- Vehicle kms travelled: 50% reduction
- Kerbside stopping time: 90% reduction
- Increase in walking distances
Micro-consolidation centres / mobile depots

- 50% reduction in total driving distance and 15% reduction in total driving time by delivery vans using micro-consolidation depot (and related fuel savings/GHG emissions – plus scope for electric vehicles)
Company collaboration in sharing parcel deliveries

• Could be carrier-led collaboration in final deliveries in central London or Freight Traffic Controller-led (i.e. imposed)

• Barriers to overcome:
  – Traditional competitive culture
  – Develop inter-company trust
  – Data confidentiality and security
  – Integrating IT systems
  – Finding suitable allocation of costs and benefits
Equitably dividing daily work by areas
Company collaboration: delivery rounds in W1 – results of analysis

• Before: 10 vehicle rounds despatched from 3 different operations/depots
• After: 7 vehicle rounds despatched from one depot
• Results:
  ➢ 14% reduction in vehicle km
  ➢ 20% reduction in driving time
  ➢ Assumes no change in vehicle types used so, with vehicle change, could be greater
FTC 2050 initiatives for urban parcel delivery

Timescale

Efficiency of road and kerbside use

Now

2050

Short-term

Portering delivery systems

Other tech aids to improve driver efficiency

Optimised routing for driving and walking

Micro-consolidation centres

Concierge services in large buildings

Medium-term

Best location for personal deliveries

Removing ‘free’ delivery offer

Relaxing timed deliveries

Collaborative procurement

Delivery retiming

Long-term

Freight Traffic Controller

Company collaboration in parcel deliveries

Increased on-site storage at receivers

Inefficient
Conclusions

- Portering delivery trial being carried out
- Visualisation / heatmapping of vehicle operations in central London (inc. GPS data)
- Focus groups with parcel carriers to discuss benefits and barriers to scenarios investigated
- Further analysis of future scenarios including energy implications up to 2050