Headway-Based Limited-Stop Service at New York City Transit

Stacey Schwarcz, Senior Transportation Planner
David Dubovsky, Student Intern, Rutgers University
Short Range Bus Service Planning
Operations Planning, New York City Transit
New York, NY
• 696 million annual customers
• 2.21 million daily riders
• 4,538 buses
• 2,070 bus route miles
• 244 bus routes
  • 208 local
    – 41 have limited-stop variations
    – 2 have SBS variations
  • 36 express routes (premium fare)
• 26 Routes with >20,000 weekday riders
Problems on High Volume Bus Routes

- Slow travel speed
- High operating cost
- Traffic congestion
- Unreliability and Bunching
- Customer dissatisfaction
Limited-Stop Service Characteristics

- Variant of local bus service
- Existing high volume local service
- Wider stop spacing: 0.5 mile intervals vs. 0.15 miles for local
- Reduced running time/travel time
- Longer route length
- Origin-destination data indicates longer distance trips on average.

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Limited-Stop Service at New York City Transit

- 41 routes
- All 5 boroughs
- First route began operating over 35 years ago
- 26 routes operate during peak hours only
- 11 routes operate 7 days a week
- 2 routes operate weekdays and Saturday while 2 operate all day weekdays

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Limited-Stop Service Effectiveness

- Route level running time reduction
  - The Bronx: 15%
  - Queens: 14%
  - Manhattan: 12%
  - Brooklyn: 12%
  - Staten Island: 10%

- Improve service on high ridership corridors while controlling cost increases
  - Operating cost savings when travel time savings greater than or equal to one headway
  - Accommodate growth with fewer resources
  - Reduce bunching
Limited-Stop Market Research

- Overall positive customer response
- Customer travel time perception double actual time savings
- Initially surprising, but consistent finding: increased customer satisfaction for local customers as well as limited customers
- Further research found that occasional use of limited-stop is sufficient to produce overall positive impressions among local customers
Problems with Limited-Stop Service

- Operators drive slowly or stop at green lights to hold to timepoints, annoying customers
- Bus bunching
- Variable travel times due to double parking, truck loading, and other traffic
- Limited-stop more popular than local, resulting in long dwell times on limited-stop trips
- Operators reluctant to pass their leader
Select Bus Service (SBS)

- SBS: NYCT BRT service
  - Timepoint removal precedent
  - SBS Bx12 implemented June 2008
  - SBS M15 implemented October 2010

- Characteristics
  - No Timepoints
  - Branding
  - Separate local stops/ SBS Stations
  - Transit Signal Priority (TSP)
  - Enforced bus lanes
  - Off board fare collection/all door boarding

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Headway-Based Limited-Stop Service

• Method
  • Remove all timepoints from LTD schedule except short-turn and relief points
  • Bus operators instructed not to hold at timepoints
  • Bus operators instructed to pass their leader
  • Dispatchers break up bunching if necessary
  • Local service retains timepoints

• Goals
  • Shorter running times and customer trips when traffic is light
  • Eliminate holding at green lights
  • Potential for cost-neutral service increase with enough time saved

• Challenges
  • Data availability for before and after comparison
  • Internal resistance
Timepoint Removal Expectations

- **Travel Speed**
  - Eliminate unnecessary holding for scheduled time
  - Travel times will be reduced when there is less traffic
  - Won’t mitigate slow travel speed due to traffic congestion

- **Operating cost**
  - Reduced operating cost if travel time is reduced

- **Customer Satisfaction**
  - Improvement in customer satisfaction due to reduced travel time

- **Reliability**
  - Possible decrease in reliability and increase in bunching
Timepoint Removal
10 Bus Routes

- On existing limited-stop routes
  - B6, B35, Q17, Q43, M98

- With limited-stop implementation
  - B82, Q58

- With dedicated bus lane
  - M34

- As part of Select Bus Service (SBS)
  - Bx12, M15
## Case Studies

<table>
<thead>
<tr>
<th>Borough, Route Type</th>
<th>B35</th>
<th>Q17</th>
<th>Q43</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Weekday Ridership</td>
<td>37,000</td>
<td>19,000</td>
<td>16,000</td>
</tr>
<tr>
<td>Local Service Span</td>
<td>24/7</td>
<td>24/7</td>
<td>24/7</td>
</tr>
<tr>
<td>LTD Service Span</td>
<td>7 days, Except overnight</td>
<td>Peak hours</td>
<td>Peak hrs, Peak direction</td>
</tr>
<tr>
<td>One-way Route Length/</td>
<td>6.8 miles one way/</td>
<td>7.0 miles one way/</td>
<td>6.8 miles one way/</td>
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<tr>
<td>Limited Segment Length</td>
<td>4.1 miles</td>
<td>7.0 miles</td>
<td>6.8 miles</td>
</tr>
<tr>
<td>Local AM Peak Headway</td>
<td>6 minutes</td>
<td>7 minutes</td>
<td>4 minutes</td>
</tr>
<tr>
<td>LTD AM Peak Headway</td>
<td>5 minutes</td>
<td>11 minutes</td>
<td>4 minutes</td>
</tr>
<tr>
<td>LTD Implementation</td>
<td>Summer 2005</td>
<td>Fall 2003</td>
<td>Winter 1993</td>
</tr>
<tr>
<td>Timepoint Removal</td>
<td>Spring 2010</td>
<td>January 2011</td>
<td>Spring 2010</td>
</tr>
</tbody>
</table>

*Ridership data: Nov 2009 - Oct 2010*
B35 Running Time Evaluation

- Travel Time Savings (One way, Limited-stop segment, AM Peak)
  - LTD implementation: 5 minutes, 9%,
  - Timepoint removal: 4 minutes, 8% (in addition to LTD savings)
B35 Reliability Evaluation

- Reliability
  - Data shows no consistent negative affect on headway variability

- Customer Satisfaction Survey
  - Customers notice less holding at green lights
  - Customers perceived a faster ride
Q17 Running Time Evaluation

- Travel Time Savings (One-way)
  - LTD implementation: 3 minutes, 6%
  - Timepoint removal: 3 minutes*, 6% (in addition to LTD savings)
  - AM and PM peak: 5 minutes (SB), 1 minute (NB)

Q17 LTD SB Running Times

PM Peak

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<thead>
<tr>
<th>Time</th>
<th>Before</th>
<th>After</th>
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<tbody>
<tr>
<td>5:00 PM</td>
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<tr>
<td>5:30 PM</td>
<td>32</td>
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<tr>
<td>6:00 PM</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>6:30 PM</td>
<td>42</td>
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</tr>
<tr>
<td>7:00 PM</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>7:30 PM</td>
<td>52</td>
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<tr>
<td>8:00 PM</td>
<td>57</td>
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<tr>
<td>8:30 PM</td>
<td>5:00 PM</td>
<td>5:30 PM</td>
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<tr>
<td>Running Time (Minutes)</td>
<td>Before</td>
<td>After</td>
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Q17 Reliability Evaluation

- Reliability
  - Data shows no consistent negative affect on headway variability

- Customer Satisfaction Survey
  - Findings generally inconclusive
  - Suggest some customer awareness of change and some perception improvement on local and limited

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Q43 Case Study

- Travel Time Savings
  - LTD implementation: data not available
  - Timepoint removal: data shows no travel time savings, on average

### Q43 LTD EB Running Times

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Q43 Reliability Evaluation

- Reliability
  - Data shows less headway variability
  - Unclear if any correlation with timepoint removal

- Customer Satisfaction Survey
  - There was no statistically significant change in customer perceptions
Timepoint Removal Results

• **Travel Time Savings:**
  - Strategy most useful on B35 in AM peak, and on the SB Q17 in both peaks
  - Some travel time reduction on the B35 during other periods
  - Has the potential to reduce travel time

• **Reliability:**
  - Data shows no consistent negative impact on headway variability
  - Further study needed

• **Customer Satisfaction**
  - The B35 showed clear customer satisfaction improvement
  - Potential to improve customer satisfaction
Further Study

- Why were the findings on each of these routes different? What factors make the strategy more effective on some routes than on others?

- More case studies and analysis of travel time saving and affect on reliability

- How is the strategy being implemented in the field? What is the best implementation strategy?
Discussion

• Questions?

• Contact Information:
  Stacey Schwarcz
  Senior Transportation Planner
  Short Range Bus Service Planning
  MTA - NYC Transit
  2 Broadway Room A17.31
  New York, NY 10004
  Email address: stacey.schwarcz@nyct.com