

APPENDIX A

Analysis of Transfers in the MTA Core Bus, Metro and Light Rail System

Introduction

As a component of BNIP, MTA desired an analysis of transfers within and between its Core Bus, Metro and Light Rail (LR) systems. The purpose of this analysis was to highlight major points of transfer and which routes could potentially be combined, deviated, or changed completely in order to better serve customers' origins and destinations.

Methodology

In order to conduct a transfer analysis of the MTA Core Bus, Metro and light rail system, one full day of Charm Card transactions from October 2012 was obtained from the MTA. Two separate data sets were acquired: one detailing Charm Card use transactions and one detailing Charm Card sale transactions. Both data sets contained Charm Card serial numbers as unique identifiers; the farebox, ticket vending machine or faregate ID number where the card was used; a timestamp showing when the card was used; and the facility name or bus route where the card was used. The goal of the analysis was to identify the top bus-to-bus, bus-to-rail and rail-to-rail transfers in the system, as well as any three seat transfers being made.

While bus fareboxes and Metro faregates require the user to tap their Charm Card before entering and therefore register in the system, the light rail cars do not. Because of this, the only data available for light rail transactions was purchases made at ticket vending machines (TVMs) that are located at light rail stations. These purchases do not necessarily need to be used for the light rail however, as all types of MTA fares and passes are available at them. Additionally, not all customers would have purchased their fare that day or at that particular station. This resulted in only a small number of LR-to-bus and LR-to-Metro transfers registering in the query.

Once the data was processed initially, a program was created in Microsoft Visual Basic in order to process the nearly 320,000 records received. The basic methodology for the transfer analysis was as follows:

1. If a serial number showed up in the system more than once within 60 minutes, count each as a transfer and record the route(s) and/or station(s);
2. If a serial number showed up at the same station or same bus route twice in a row within 45 minutes, do not count it as a transfer;
3. If a serial number showed up at a light rail TVM and then showed up again at a bus farebox or Metro faregate between 30 and 90 minutes later, assume this person boarded the light rail before the bus or Metro and count this as a transfer;

4. Ignore certain fare instruments used by employees, facility IDs, transaction statuses and device IDs that are not used by riders when transferring. Specifically:
 - a. Ignore if Transaction Status does not equal 0
 - b. Ignore if Fare Instrument ID=39808
 - c. Ignore if Facility ID =101
5. The output file generated a list of trips by serial number.
6. To analyze the results, a matrix of all the possible stops was created (A to B, A to C, A to D, B to A, B to C, etc.). For each combination a count was made of all the instances where that combination occurred in that order in all of the recorded trips.

Results

The results of this analysis show the top transfer patterns in the system, including two-seat, three-seat and four-seat rides. For rides with more than two seats, the data was also summarized to show the individual transfers. For example, if someone rode the Route 8 bus, transferred to the Route 44 and then got on the Metro at Rogers Avenue to Owings Mills, the data would display as the following:

- 8_44_Rogers_Owings Mills
- 8_44
- 44_Rogers_Owings Mills
- Rogers_Owings Mills
- 8_Owings Mills