FUTURE PATHS FOR REGIONAL FARE COLLECTION IN ATLANTA: A CASE STUDY ANALYSIS OF THE PLANNING AND IMPLEMENTATION OF NEXT GENERATION FARE COLLECTION SYSTEMS FOR REGIONAL TRANSIT IN NORTH AMERICA

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FUTURE PATHS FOR REGIONAL FARE COLLECTION IN ATLANTA: A CASE STUDY ANALYSIS OF THE PLANNING AND IMPLEMENTATION OF NEXT GENERATION FARE COLLECTION SYSTEMS FOR REGIONAL TRANSIT IN NORTH AMERICA

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TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS AND ABBREVIATIONS

ARC	Atlanta Regional Commission
BVM	BREEZE Vending Machine
CCT	Cobb Community Transit
CFPS	Comprehensive Fare Payment System (DART)
CTA	Chicago Transit Authority
DART	Dallas Area Rapid Transit
DCTA	Denton County Transportation Authority
DFW	Dallas-Fort Worth
FTA	Federal Transit Administration
FWTA	Fort Worth Transportation Authority
GCT	Gwinnett County Transit
GRTA	Georgia Regional Transportation Authority
GTA	Greater Toronto Area
MARTA	Metropolitan Atlanta Rapid Transit Authority
NCTCOG	North Central Texas Council of Governments
NJT	New Jersey Transit
NPT	New Payment Technologies (SEPTA)
NTD	National Transit Database
NTTA	North Texas Tollway Authority
PATCO	Port Authority Transit Corporation
PATH	Port Authority Trans-Hudson (New York City)
POP	Proof-of-Payment
RFID	Radio Frequency Identification

RFP	Request for Proposals
RFQ	Request for Qualifications
RTA	Regional Transportation Authority (Chicago)
SEPTA	Southeastern Pennsylvania Transportation Authority
SRTA	State Road & Tollway Authority (GA)
SWOT	Strengths, Weaknesses, Opportunities and Threats
TTC	Toronto Transit Commission
USDOT	United States Department of Transportation

SUMMARY

The Atlanta region will soon be faced with a choice as to how it will go about planning for and implementing its next regional fare collection system that will replace the current BREEZE system. In 2006, MARTA became the first transit agency in the United States to implement an all contactless smartcard for use on its services. However, there have been many advances in new technologies and the consumer payment preferences have evolved since the initial implementation. These developments, coupled with the rapid consumer adoption of smartphones and changing attitudes within the financial payments industry towards transit properties, have recently led four major transit agencies within North America to implement new fare collection systems based on open payments, the development of mobile ticketing applications, or a combination.

This research uses a case study methodology to answer several questions related to the planning and implementation of regional fare collection systems in Chicago (CTA), Dallas (DART), Philadelphia (SEPTA) and Toronto (TTC). Based on the experience of the case study agencies, the implementation of Atlanta's next fare collection system is sure to be a long and arduous process. However, by utilizing the lessons learned from DART, CTA, SEPTA and TTC, MARTA and the other regional operators (Cobb Community Transit, Gwinnett County Transit and the Georgia Regional Transportation Authority) will be better poised to provide their patrons with additional means of paying fares while, at the same, minimizing the disruption to the existing fare collection system during the transition period.

CHAPTER 1

INTRODUCTION

The primary motivation of this research is to provide a discussion of the future paths that the Atlanta regional transit operators (MARTA, GRTA, GCT and CCT) can take towards implementing the next regional fare collection system that will eventually replace the existing BREEZE system. Since 2006, when MARTA was the first transit agency in the United States to implement an all contactless smartcard for use on its services, there have been many advances in new technologies and the consumer payment preferences have evolved. This, coupled with the rapid consumer adoption of smartphones and changing attitudes within the financial payments industry towards transit properties, has recently led four major transit agencies within North America to implement new fare collection systems based on open payments and the development of mobile ticketing applications.

This research uses a case study methodology to answer several research questions related to the planning and implementation of regional fare collection systems. Four case studies were conducted for Chicago (CTA), Dallas (DART), Philadelphia (SEPTA) and Toronto (TTC) in order to identify the variety of approaches or models that will be used by these agencies to either upgrade or completely replace their existing fare collection systems. A comparison and analysis of the methods used by these four agencies to implement their next generation fare collection systems will provide insight on the following topics related to deploying mobile ticketing and open payments on transit.

- Key features of approach or model

- Agency's rationale for implementing a change to its existing fare collection system

- Future payment methods and devices that will be accommodated by new system

- Availability of new features across different modes of transit and fare products

- Phasing Sequence & Deployment Plans across different operating modes

- Contract Structure, Terms, Responsibilities and Special Clauses

- Changes to the Existing Operating Environment or Collection Scheme

- Regional Efforts within the implementation

- Implementation Strategies used in the deployment of the new system

As research should never occur in a vacuum, this effort will also conduct a case study on the current state of regional transit fare collection in Atlanta. The Atlanta case study, paired with information gathered from interviews with personnel at each of the four regional transit operators and staff at the Atlanta Regional Commission, will serve to identify the existing operational and institutional relationships among the providers and allow for a diagnosis of the existing shortcomings of the current BREEZE system. Finally, the analysis and conclusions from the four case studies will be synthesized with information from the Atlanta case study to provide recommendations for implementation strategies that the region's transit partners can utilize along the long and winding road to the progeny of BREEZE.

CHAPTER 2

METHODOLOGY

According to Yin, case studies are applicable for any situation in which all of the following three criteria are applicable:

1. Research seeks to answer a "how" and/or "why" question.

2. There is lack of "control over behavioral events" relevant to the research question.

3. Research focuses on contemporary events [1, 17].

As described in the introduction, the focus of this research is on "how" (i.e. phasing sequence for deployment, specific terms of contract, regional coordination efforts, changes to existing collection environment and strategies for implementation) and "why" (i.e. agency's internal rationale for implementation) these four transit agencies are currently implementing their new fare collection systems.

There are a variety of political, institutional, economic and operational factors, but will, nevertheless, affect the delivery and operation of each of these "contemporary" fare collection systems (e.g. established inter-agency relationships among the regional transit providers, eminent budgetary pressures and the age of the current system). Therefore, a one-size-fits-all approach is not justified, as solutions for one region may not be appropriate when applied to another. Thus, in order to provide recommendations for the Atlanta region will be useful within the context of its existing political and institutional environment, a multiple case study approach was used.

Four case studies will be conducted utilizing two types of evidence: documentation and interviews [1, 85]. In terms of documentation, information presented in this paper was gathered from the following sources: transit agency's website (e.g.

3

current fares or fare collection project page), meeting minutes/notes from the agency's board or commission meetings, excerpts from the local news media, internal administrative documents and existing or prior Requests for Proposals (RFPs) related to fare collection systems. The documentation evidence allowed the existing fare collection system to be assessed and provided a basis for drafting interview questions. After collecting and analyzing all of the relevant documentation, an interview was conducted with a key official within each case study agency's fare collection department. The transcripts of the non-Atlanta case study interviews appear as Appendix B towards the end of this document. The same methodology was then repeated for Atlanta and the transcripts from these interviews appear as Appendix C at the end of this document.

CHAPTER 3

DEFENSE OF CASE STUDY SELECTION

Dallas (DART), Chicago (CTA), Philadelphia (SEPTA) and Toronto (TTC) were chosen from among the many other transit providers in North America for two reasons. First, each of these agencies operates an extensive multi-modal transit network and two of them, Chicago and Toronto, are among the largest transportation providers on the continent in terms of annual ridership (second only to New York City and Mexico City). Next, while many other large transit agencies, such as Washington DC's WMATA and New York City's MTA, are just initiating the process of moving to new fare collection systems (e.g. agency recently issued an RFP), the case studies selected for this research represent those transit agencies that are most ready to move forward with implementing these next generation fare collection systems (e.g. agency has awarded contract(s) for their RFPs).

There are other transit agencies within the United States that have already implemented fare collection systems based on open payments, such as New York City's PATH, the State of New Jersey's NJ Transit and the Philadelphia-Camden region's PATCO. However, the majority of these instances were temporary (e.g. limited pilot demonstration projects, not system-wide upgrades) and mainly saw the financial institutions, which have come to embrace transit operators as a means to attain reliable market share, covering the costs of the big unknown, transaction fees. Due to the temporary nature of these pilot projects and the fact that they were primarily undertaken to test the technological and operational feasibility of innovative payment methods on transit systems, these cases were not included in the research.

Additionally, the Utah Transit Authority became the first transit agency in the United States to implement a permanent open payment fare collection system in 2009. However, this transit agency was not included in the research due to the relatively small scale, in terms of both geographic span and magnitude of ridership, across which the fare collection system was implemented.

CHAPTER 4

LITERATURE REVIEW & BACKGROUND

In conducting the literature review for this research, it became readily apparent that the majority of the research and educational materials available that are related to the next generation of fare collection systems (e.g. open payments and mobile ticketing) tend to originate from non-academic sources, such as presentations at industry conferences (i.e. APTA TransiTech & Fare Collection Workshop) by transit agency personnel, consultants, or private vendors and white papers created by private policy groups such as the Smart Card Alliance. Aside from two TCRP reports that were published nearly a decade ago, the academic resources available for research related to fare collection systems, are few and far between. This is especially true of materials that focus on new payment technologies and not just smartcards.

Fare Collection Basics

In 2003, the Transportation Research Board published *TCRP 94 – Fare Policies, Structures and Technologies: Update*, which provides an in-depth study of the state of fare collection systems during an era that was dominated by new smartcard deployments. The report provides an excellent overview of the basics of the underlying technology and collection procedures that transit agencies across the country have utilized. One of the key contributions of this report was in identifying the types of approaches to fare collection and the conclusion that "each fare collection approach has become closely associated with a particular mode of transportation" [2, 23].

Tables 1 and 2 below provide a concise summary of the information contained within this report related to the different approaches to fare collection and their applications to the different modes, respectively.

Table 1. Summary of Different Approaches to Collecting Fares on Transit

Basis of Approach	Collection Approach	Time of Payment	Equipment	Application
Physical	Pay On Boarding	Entry	Ticket Agents, Fare Gates and/or Turnstiles	Uniform
	Barrier	Entry or Exit	Fare Box or Ticket/Card Processing Unit	Uniform
Inspection	Conductor-Validated	Before Entry or On-Board from Conductor	Conductor	Uniform
	Proof-of-Payment	Before Entry or On-Board	Ticket/Card Validator	Random

Table 2. Summary of the Use of Collection Approaches across Different Modes of Transit

Collection Approach	Modes				
	Commuter Rail	Heavy Rail	Light Rail	Bus Rapid Transit	Bus
Pay On Boarding		X	X	X	X
Barrier		X	X	X	
Conductor-Validated	X				
Proof-of-Payment	X		X	X	X

Additionally, the report provided an overview of the relative strengths and weaknesses of magnetic-stripe and smartcard fare media.

8

The following bulleted list is a high level summary of the various fare collection system elements, components and their associated activities [3].

- Fare Collection Equipment
  - Installation
  - Operation
  - Maintenance
- Fare Medium
  - Production
  - Issuance
  - Management
  - Provision of (Re-)Loading Opportunities & Devices (e.g. Ticket Vending Machines)
  - Account Management
- Actual Collections Process
  - Manual Labor
  - Revenue Reporting

The Evolution of Smartcards on Transit

During the first decade of the twenty first century, transit agencies across the world became increasingly interested in implementing contactless smartcards on their systems [4]. These new media were met with open arms by transit agencies that primarily saw them as a means to enhance the agency's reputation with customers by making the fare payment process more convenient. The following is a general bulleted list of the

benefits that transit agencies believed they could realize by implementing contactless smartcards [5].

- Provide added customer convenience to the fare payment process
- Provide flexibility within the fare payment process
- Reduce fraudulent fares
- Faster boarding
- Provide ridership and revenue data for service planning [6]
- Improve transit service by utilizing the new data to inform service planning decisions [6]

Smartcards delivered many of their original expected benefits; however, the general operating arrangement "puts all the responsibility on transit properties" [7]. Under what has been called the "traditional" approach to smartcards, the transit agency is responsible for the issuance and management of the contactless, proprietary smartcards [5]. These cards are "closed-loop" which means that they cannot be used for non-transit purposes. Furthermore, only the transit agency (and its fare collection vendor) can access and manage the data stored on these smartcards.

Although this model of fare collection made sense a decade ago, it ended up forcing the transit agencies to spend significant resources on the collection of fares, due to the high costs of smartcards relative to paper-based fare products and the increased use of customer accounts. Transit agencies were not able to truly enter the marketplace to seek a competitive bid for these smartcard systems due to the limited number of systems integrators and vendors [5]. Furthermore, due to the proprietary nature of these systems, transit agencies were essentially stuck with the original vendor and its relatively

expensive change order fees. Despite the many shortfalls of smartcard systems, they were aggressively implemented due to the absence of alternative technologies or approaches.

Change is the Only Constant

Recent developments within the financial payments industry, combined with the increased market penetration of bank-issued contactless credit/debit cards, as well as smartphones, and the relatively high cost burdens imposed on transit agencies due to their operating and management of the existing smartcard system, have allowed new alternative approaches to fare collection to emerge. These smartcard alternatives fall into two categories, open payments and mobile ticketing. The distinguishing feature between these two emerging approaches to fare payment and smartcard technologies is the incorporation of an account link. These emerging payment methods should allow the transit agency to transition from its current active role as a media issuer and fare collector to one in which the agency can take a more passive approach and become an acceptor of fare payments, thus reducing the resources required to collect fares and allowing the agency to focus on what it was originally chartered to do, provide service [5].

Open Payments

Open payments refers to the use of non-proprietary communications protocols, which have been developed by the financial payments industry, to allow customers to pay for products using standardized technology platforms and devices [9]. Open payments allow transit customers to pay their fares using a variety of payment methods and does not limit them to just utilizing a transit agency-issued smartcard. In general, open payments can be made utilizing the following equipment or media:

- All ISO/IEC 14443 Media

- Magnetic-Stripe Bank Cards

- Closed-Loop Contactless Smartcards

- Contactless Bank Cards

- Near Field Communications Devices

Although open payments have not yet been deployed on any major transit system in North America, there is much industry interest surrounding this approach to fare collection due to the significant benefits that may be realized by the agency related to reducing its current cost to collect fares. The following is a list of expected benefits that are associated with a transition to open payments on transit [10].

- Eliminate Inventory Costs

  - Purchase

  - Fulfillment

- Reduce Fare Collection Costs

  - Customer Service

  - Cash Handling

  - Equipment Maintenance

  - Media Issuance

- Enhance Customer Convenience

- Provide Additional Flexibility to Customers when Paying Fares

- Provide Additional Streams of Revenue

  - Sharing of Transaction Fees

  - Advertising

- Enhance Interoperability with Other Transit Operators

The only primary concern related to implementing open payments on transit is the relatively high transaction fees that are charged for each fare. While this approach allows the transit agency to utilize a vendor of its choosing, the agency must still at least upgrade its existing equipment.

Mobile Ticketing Applications

According to a Nielsen poll conducted in February 2012, 90% of Americans above the age of 18 and just over half of all American above the age of 13 have a cell phone [11]. Furthermore, 48% of these devices are smartphones which is up 17% from the year before. Thus, it is no surprise that mobile ticketing has become an area of increasing interest for many transit providers, as this method of fare payment relies on a device that the majority of transit users already possess. This method of payment usually involves the transit agency seeking a software development firm who then incorporates the agency's business rules (e.g. fare policies, structure and inter-operator transfer agreements)

In addition to widespread market penetration of the medium, this payment method offers additional benefits beyond those of open payments due to the technology's existing use as the ultimate multi-tasking tool [12]. Whereas open payments provide minimal opportunities to integrate information related to the transit system into the payment process, mobile ticketing applications can also provide the transit customer with additional transit-related features which are listed below [13].

- Service Alerts via Text

- Readily Accessible Account Management Platform

- Real-time and Position-based Advertising & Coupons

- GPS & Wayfinding Integration

While the expected benefits of mobile ticketing are largely equivalent to those of open payments, there are two main differences between the two approaches. One is the lack of significant upfront capital costs, which would otherwise be incurred with open payments due to the upgrading or replacement of existing fare collection hardware. The other is the speed with which mobile ticketing applications can be developed and deployed [13].

CHAPTER 5

DALLAS CASE STUDY

Overview of Regional Transit in the
Dallas-Fort Worth Metropolitan Area

There are three major transit providers in the Dallas-Fort Worth "Metroplex." Dallas Area Rapid Transit (DART) operates the region's core system and provides bus, trolley, paratransit and light-rail service within the City of Dallas and other local municipalities within Dallas County [14]. The Fort Worth Transportation Authority (FWTA), or "The T", operates bus, trolley and paratransit service within the City of Fort Worth and other local municipalities within Tarrant County [15]. DART and FWTA jointly operate the Trinity Railway Express (TRE) which provides commuter rail service between the two downtowns and will eventually directly connect to DFW International Airport [16]. The Denton County Transportation Authority (DCTA) operates bus and paratransit service within Denton County, as well as the A-Train commuter rail service, which interfaces with DART light-rail at the Trinity Mills light-rail station in North Dallas [17].

Existing Regional Agreements in DFW

There are many existing agreements between the three regional transit operators related to the regional fare structure, the acceptance of pass products, transferring between operators, and reduced fares and operations. In terms of regional fare structure, DART and FWTA currently utilize the following three-tiered fare structure which reflects different prices for different levels of service [18 & 19].

- Local – Either DART or FWTA services, no TRE commuter rail

- System – Either DART or FWTA services, includes one zone on TRE commuter rail

- Regional – Unlimited travel on DART, FWTA & TRE

In terms of pass products, customers can purchase Regional Adult and Reduced Fare Daily and Monthly Passes through any agency at the same price point and are entitled to unlimited travel across all modes and operators with the exception of paratransit [20]. Aside from the Regional fare, each agency still retains the ability to set its own price for Local service (e.g. only bus service for DCTA and FWTA, bus and rail for DART).

There is an inter-local agreement in-place between DART and FWTA to sell their System-level fares at the same price point. This is mainly an equity agreement to support the agencies' joint operation of the TRE commuter rail line and provides for free transfers from local feeder bus service into a single zone within the TRE service area. While DCTA participates in the Regional fare, the agency has its own version of the System-level fare that includes local bus and A-Train service which feeds into the DART light-rail system [21].

In terms of reduced fares, the three parties also have another inter-local agreement that unified the reduced fare eligibility and classification criteria for Seniors, Disabled/Medicare Persons, Children and High School Students [20]. Additionally, the parties have agreed to let paratransit-eligible patrons ride any fixed-route service for free [20].

In terms of operations, DART has an agreement with FWTA for joint operation of the Trinity Railway Express commuter rail line, with revenues distributed between the

two entities "based on revenue seat miles operated in each county" [16]. Finally, DART has an inter-local agreement with DCTA related to DCTA's responsibilities and liabilities regarding its operation of the A-Train within a DART-owned rail corridor [20].

Existing Fare Collection Systems & Regional Fare Issues in DFW

The transit fare collection system approach and the accepted types of fare media are, for the most part, congruent between the different regional transit operators. Each operator accepts cash for any and all services. DART, DCTA and FWTA all issue paper tickets for single-ride trips and magnetic-stripe cards for pass products. None of these agencies currently operate a fare collection system that makes use of contactless smartcards. Aside from the operators' bus and trolley services, which operate using a traditional pay on-board approach to fare collection, all rail services (e.g. Trinity Railway Express commuter rail, DCTA A-Train and DART's light-rail network) employ a proof-of-payment fare collection system. There exist minor gaps among the agencies with respect to the availability of different pass products. For instance, FWTA sells Weekly Reduced Fare Regional passes, but DART and DCTA do not.

The transfer policies of each individual operator are similar but contain minor differences, especially with respect to Local fares and the DCTA. The DART Local fare offers free transfers for up to 90 minutes on its rail service or a single bus trip [18]. FWTA does not issue or accept transfers for Local fares [19]. The DCTA is the only operator that allows free internal transfers for Local fares, but in order to transfer from DCTA to DART using a Local fare, a customer must purchase an upgrade from one of the A-Train ticket vending machines [21]. All Regional single-ride fares issued by DART provide for unlimited transfers between DART, DCTA, FWTA and the TRE rail line.

However, the single-ride Regional fares issued by DCTA only provide for restricted transfers to DART and FWTA, not the TRE.

Regional Transit Fare Policy Update for DFW

Regional transit fare policy in the DFW area is about to undergo a major transformation in December of 2012. As mentioned above, DART currently has a fare policy and structure that classifies riders and their trips into one of four categories (e.g. Local, System, Regional & Reduced), offers four different types of fare products (e.g. Single-ride tickets and Daily/Weekly/Monthly Passes) and does not provide for intermodal transfers when using the Local fare. As part of a regularly scheduled fare increase, DART analyzed its fare policy and structure and found that significant changes could be made that would likely result in additional operational efficiencies and an increased level of service for transit-dependent customers [20].

During the analysis, the service planning department came up with two substantial changes to DART's fare structure that they felt would result in better system utilization. First, they observed that many of the transit agencies that have recently implemented a two-hour pass have succeeded in increasing ridership, primarily among the non-transit dependent (e.g. choice riders). Next, they noticed that DART's bus ridership peaks during the mid-day due to high utilization among the transit-dependent. DART staff recommended that the dual implementation of a discounted off-peak mid-day pass and a regular two-hour peak pass could allow the agency to: provide its transit-dependent customers with more service (e.g. five hours instead of the current 90 minutes); increase or maintain current levels of revenue; and generate more ridership [20]. The DART Board of Directors has decided to take the advice of its service planning staff and has

voted to eliminate the single-ride pass in favor of implementing a base two-hour pass, a mid-day pass (valid from 9:30-2:30) and a multi-ride pass.

The major change in regional fare policy that will come as a result of the regularly scheduled fare increase is the elimination of intermodal transfer restrictions due to new definitions of service levels [22]. Currently, each agency classifies the nature of each trip into Local (e.g. valid for limited access to one system only), System (e.g. valid for complete access to one system and access to one zone of the TRE or A-Train) or Regional (e.g. valid for complete access to all modes and systems except for paratransit). The approved changes call for the elimination of the System fare level by redefining the Local fare level to now include all DART local and express bus, light-rail and trolley service, as well as access to the eastern half of the TRE.

Additionally, the fare change also changed which riders DART considered reduced fare college students. The agency's current college student pass program is limited to only four schools [20]. The upcoming change in fare policy will expand the eligibility criteria to include anyone who can show proof of enrollment at a local college campus. This change was incorporated for two reasons. First, the University of North Texas is building a satellite campus in south downtown Dallas and thus there will be more students with direct access to DART services. Also, DART had not yet implemented a change in its fare structure to reflect the fact that it has taken on a new operating partner, DCTA, the bulk of whose ridership is primarily college students.

Whereas DCTA is currently the only operator that provides for free Local transfers and all non-DCTA patrons must pay an additional full fare for a connecting service (internal or external), all of the regional transit operators will soon have a

consistent transfer policy both between modes and among operators. According to an interview with a correspondent at DART, the DART changes will go into effect this December, along with FWTA later in the month, and DCTA will institute these changes in January of 2013 [20]. FWTA is not planning to offer the five hour mid-day pass, but is planning on implementing the two-hour pass and the regional fare. Additionally, FWTA's price for the two-hour pass will likely be different from that of DART and DCTA. DCTA is planning to implement all of DART's fare products and will even match the price on the two-hour pass. All agencies will continue to offer the Regional fare at equivalent prices, but will likely continue to charge different prices for their Local fares and mid-day.

DART's Comprehensive Fare Payment System (CFPS)

LTK Engineering Services released a Concept of Operations document in November 2011 for DART's upcoming fare collection system upgrade. According to the document, the new system will seek to "create a region-wide electronic payment infrastructure for transportation and other services" [23, 1]. According to a correspondent at DART, the primary motivation for DART moving to a new fare collection system from its existing system is to provide "convenience for both customers and agency business needs" by incorporating open payments [20]. Customers will soon be able to utilize near-field communications devices (e.g. cell phones), secure bar codes/QR codes, bank-issued contactless credit/debit cards and frequency operated buttons (e.g. school and government RFID tags), as well as pre-paid transit smartcards to pay their transit fares.

Issues with the current DART fare collection system are listed below [23, 4 & 21].

- Significant cash handling costs

- Low degree of customer-perceived reliability

- Lack of flexibility related to accepting alternative forms of payment

Other lines of reasoning for replacing the existing fare collection system include: meeting the expectations of customer's who prefer to utilize Open Payments; taking advantage of the flexibility of software-based payment systems as opposed to traditional, mechanically-based systems; and keeping up with the general technological shift towards open payments within both the transit and payments industries [20].

The following is a list of goals that DART has for its new fare collection system [23, 6-7].

- Reduce use of cash, especially on-board buses

- Realize efficiencies by reducing collection costs

- Minimize impact of transaction fees

- Phase out the agency's role as fare media issuer

- Increase regional interoperability

- Minimize investment in new infrastructure by leveraging existing capital assets

- Provide the agency with more accurate ridership and revenue data

- Increase ridership and revenue via the introduction of new fare products

- Support the introduction of innovative fare products

- Provide for enhanced regional transportation management strategies via integration with the North Texas Tollway Authority (NTTA)

The following is a list of the expected benefits for both customers and DART that are to be realized upon full implementation of the new CFPS [23, 1].

- Enhance customer service

- Increase ridership

- Increase revenue

- Maintain or Decrease operating and capital expenditures related to fare collection

Contract Structure for DART's CFPS

Although DART has not as of yet awarded a hardware-based contract for its new fare collection system, the Concept of Operations document provides an overview of what that eventual contract would look like [23, 18]. The CFPS upgrade is broken down into three different groups of contracts which are listed below.

- Upgrading the existing equipment

- Integrating the CFPS with the existing fare collection system and other operators

- Developing the transit card network, mobile ticketing application and wireless communications infrastructure.

Under the tentative terms of the contract, DART takes on the following responsibilities listed below [23, 18].

- Negotiate with its current vendor to rehabilitate fare boxes and enhance the existing ticket vending machines

- Select a CFPS Integrator for the second group of contracts

- Establish a Central Service Bureau to operate the regional clearinghouse and provide technical support to DART, the retail partners and the other regional operators

- Negotiate an inter-local agreement with NTTA to operate the account management system

- Select a vendor for the last group of contracts

It should be noted that the document calls for DART to select a single vendor for the second group of contracts and this vendor may also compete for the third group of contracts. Under the tentative terms of the contract, the vendor selected as the CFPS integrator for the bundled procurement will complete the following tasks listed below [23, 3].

- Installation/testing/full operational deployment of on-board readers

- Develop the authentication system

- Develop the transaction settlement engine

- Develop the data warehouse

Special clauses within the tentative contract include the requirement that the new system support pricing variances for residents and non-residents [23, 8]. Also, the new system must be able to support joint ticketing (e.g. the simultaneous purchase of event tickets and transit fares).

In terms of the third group of contracts, the vendor selected for the transit card network will be responsible for supplying the transit cards and adding value to them. The vendor chosen to develop the mobile ticketing application will build and test the application; undertake a bus pilot to monitor customer satisfaction with the application;

and begin an initial launch in late 2012. The vendor selected for the implementation of wireless services is responsible for procuring the 4G modems, configuring the wireless network and installing the communications devices on all DART vehicles and at select light-rail stations.

DART's Mobile Ticketing Contract

After months of discussions with other U.S. transit operators, DART finally awarded a $1.5 M contract in October 2012 to the Danish firm Unwire for the development of the agency's mobile ticketing application [24]. The contract covers the development of a mobile ticketing application platform that can also be used by FWTA and DCTA and is intended to support the purchase and verification of all types of fare products. DART has chosen mobile ticketing as its preferred initial rollout method for the reasons listed below [25].

- Speed of Verification (e.g. can read ticket on phone faster than validating the card)

- Ease of Implementation (e.g. low capital cost and minimal agency involvement)

- Proven Effective in POP Environments

- Reduces wait times at ticket vending machines

- Ability to be utilized by a substantial portion of riders

- Allows the agency to incorporate innovative fare programs (e.g. frequent ride benefits, couponing, bundling with special events, etc.)

- Provides Cost Savings (e.g. reduces cash handling and issuing of physical tickets)

Additionally, the agency believes that by going with mobile ticketing, as opposed to hardware-intensive open payments, it will be able to save a significant amount of money relative to its current operations without significant upfront investment due to mobile's estimated 5-7.5% cost-to-collect [20].

DART's decision to lead the charge with mobile payments will result in a fundamental change to the existing regional fare distribution arrangement. Currently, all agencies sell Regional fare products and the revenues from the sale of these products is based on the geographic location of where the fare is sold, not on the amount of service operated by each agency [20]. However, preserving the existing arrangement would require each operator to completely outfit its entire fleet with GPS devices in order to track the point of sale and this is neither practical nor cost-effective.

The deployment of a mobile ticketing application should provide an easy solution for the problem of distributing regional fare revenues. Under this scenario, each agency will have its own application that will be integrated into the master back-end system [25]. Thus, the responsibility for distributing revenues among the transit agencies is transferred from three independent parties and consolidated into one central authority (e.g. the Central Service Bureau that operates the regional clearinghouse).

Equipment Needed for DART's Next System

The following is a list of the equipment needed to implement the CFPS.

- New standalone on-board readers that interface with existing fare boxes
- Upgraded existing fare boxes
- Upgraded ticket vending machines
- New 4G cellular modems and communications network

Project Schedule for DFW

According to the Concept of Operations document, the new system will be implemented in three phases and is expected to be fully operational by the end of 2014 [23, 20]. The first phase consists of developing and deploying the mobile ticketing application. Currently, the mobile pilot is expected to launch in March of 2013 with a full rollout planned for October of the same year [24]. The second phase will occur after the mobile pilot has been successfully completed and will consist of simultaneously deploying the CFPS on buses (e.g. fare box upgrades and new reader deployment) and on the rail system (e.g. ticket vending machine upgrades and ensuring media acceptance). Subject to DART's adoption of a distance-based fare structure, the new payment system may require the installation of rail platform fare validation equipment and possibly the introduction of gates into the proof-of-payment system.

Implementation Strategies within CFPS Deployment

DART's general approach to implementing the CFPS is to deploy a small number of introductions to the new system instead of one massive rollout across all modes and services [20]. According to a representative from DART, the agency's primary implementation strategy is to launch mobile ticketing first due to the multiple factors listed below [20].

- Ease with which it can be implemented on a regional scale
- Relatively large demographic that can utilize this new payment method due to substantial market penetration of smartphones
- Technological flexibility

DART is also requiring the mobile ticketing application developer to construct a digital platform that allows for the on-phone visual display of both a standard ticket and a QR code that can be read with a validator. However, readers will not be deployed on rail platforms, other than at ticket vending machines, until DART eventually adopts a distance-based fare structure.

Aside from mobile ticketing the agency is also placing a great deal of emphasis on the use of transit agency-issued pre-paid smartcards. In order to promote the adoption of DART's preferred payment methods, the agency will initially forego accepting bank-issued contactless credit/debit cards despite the fact that the new readers are capable of supporting credit/debit functionality [20]. In order to meet one of its original goals for the CFPS, DART has eliminated the acceptance of cash fare payment for the purchase of pass products on buses. This strategy should result in lower cash handling and collection costs for the agency, as well as promote further adoption of DART's preferred pre-paid transit card by riders. The CFPS will incorporate all DART, FWTA, TRE and DCTA fare products, with the exception of FWTA who will not offer the five hour mid-day pass.

In terms of simultaneous operation of two fare collection systems, DART is planning to gradually incorporate new customers and modes into its CFPS implementation and slowly phase out its existing legacy system. First, limited change will be introduced by allowing a selected group of pilot users to test the general functionality of the new system on DART services. Next, a minor change will occur when the readers are deployed on all DART buses and the general riding public will begin to familiarize itself with the workings of the new system. Finally, a major change in fare collection procedures could occur if DART chooses to adopt a distance-based fare structure.

While DART just underwent a fare change and there are no current plans in-place for the agency to migrate from its flat-fare structure to a variable-based structure, if DART chooses to introduce distance-based fares, then light-rail and commuter rail customers would have to get used to a new fare collection procedure. Both modes currently use a proof-of-payment system that requires human visual inspection of the fare media. If a change in fare structure is implemented, electronic validators would be installed along rail platforms to substitute for human enforcement. Whereas the current collection arrangement allows customers to simply board a service and present their fare media to a conductor upon request for validation, this new arrangement would require customers to now tap their fare media on the validator in order to board the service.

In terms of unbanked customers, DART, like all of the other agencies surveyed, will provide those customers who are without a credit/debit account to use a general purpose reloadable, pre-paid transit smartcard that will be issued by DART or its retail network manager. All customers who wish to receive reduced fares or link their employer transit benefits account to their card will be required to register their card and account with the NTTA, who will be in charge of the account management system. As NTTA operates and manages the regional toll roads and DART manages the HOV lanes and provides parking at its light-rail stations, there will likely be an incentive for multi-modal regional commuters to adopt the CFPS as this new system would allow these travelers to pay for tolls, future managed lane fees and parking [26].

Regional Coordination Efforts in DFW

The DFW region undertook many coordination efforts related to integrating all of the regional operators into DART's upcoming CFPS. Obviously, the most major regional coordination effort surrounding the CFPS was the recent negotiation of an agreement that calls for each of the regional operators to make fundamental changes to its fare policy and structure in order to be concordant with DART's upcoming changes to its fare policy and structure. These negotiations resulted in the following positive benefits for regional transit customers: all Regional adult and reduced fare multi-ride passes will be sold at the same price point by all operators and all Regional adult and reduced fare products will be sold at the same price point for DART and DCTA. While each agency still retains the ability to set its own local fares, the DFW regional transit operators have taken positive steps toward simplifying transit fares.

It should be noted that despite the general trend towards unification of fares on fixed-route services, paratransit service is still not covered by the regional fare products and the agencies continue to charge different prices for these services. According to a correspondent at DART, there is an effort to broaden the network of regional transit providers and establish better coordination links between them; however, it is unlikely that paratransit service will be integrated across the region. Currently, paratransit passengers must pay with exact change. As of now, there are no plans to install CFPS components on any of the paratransit vehicles.

Aside from these negotiations, another major effort to align the implementation paths of the regional operators relative to the new fare payment system is the fact that the mobile ticketing application development contract awarded by DART to Unwire also

covers functionality on both FWTA and DCTA services [24]. Thus, in terms of mobile ticketing, the regional operators are moving forward together as one group. While the Concept of Operations document strictly outlines that the recommendations contained within the report are not to be generalized beyond DART, the planning effort was, nevertheless, undertaken as a "collaborative project" that included the following partners at the discussion table [23, 2].

- Fort Worth Transportation Authority (FWTA)

- Denton County Transportation Authority (DCTA)

- Trinity Railway Express (TRE)

- North Texas Tollway Authority (NTTA)

- North Central Texas Council of Governments (NCTCOG)

- City of Dallas

In addition to incorporating regional stakeholder perspectives into its CFPS Concept of Operations document, DART also participates in regularly scheduled meetings with DCTA and FWTA related to transit marketing, fare policy and mobile ticketing. These meetings are held in addition to the monthly coordination meetings between the operators that occur within the metropolitan planning organization, NCTCOG [20].

Conclusion for Dallas Case Study

The Dallas area has taken a very infrastructure-lite, "Mobile First, Open Later" approach to deploying new payment methods. In order to allow customers to utilize innovative means to pay fares today without forcing the transit agency to incur significant capital costs tomorrow (related to implementing a more physical-based infrastructure

solution), DART and its regional partners have chosen to spend a relatively small amount of money ($1.5 M) to provide their customers with a mobile ticketing application that will be available for use on all modes of transit. This application will provide customers with convenience while allowing the transit agency to further plan its physical upgrades to the existing fare collection system and learn from the growing pains of other transit agencies implementing new open payment systems. DART is the only agency surveyed that has chosen to award multiple contracts for its new fare collection system and it has chosen to bundle all of the hardware, communications and back-end system into a single award.

Aside from the technology element, the DFW region is an exemplary case of regional coordination between transit providers. First, the three parties negotiated to deliver a simplified regional fare structure and policy across the entire region that is concordant with the new technologies being implemented. Next, DART included the DCTA and FWTA within its contract for the development of the mobile ticketing application and thus the region realized an efficiency savings by having one vendor develop a single application for use by all agencies. Finally, Dallas is the only instance in which an entity other than the transit agency or system vendor, in this case the regional toll road authority (NTTA), has taken responsibility for transit card account management. As NTTA already controls road user fees and DART manages the region's HOV lanes, Dallas is the most well poised to implement progressive multi-modal transportation policies and pricing.

CHAPTER 6

CHICAGO CASE STUDY

Overview of Regional Transit in the Chicago Metropolitan Area

There are three major transit providers, or service boards, within the Greater Chicago area. In general, each agency's operations are based on a primary or dominant mode, with the exception of the Chicago Transit Authority (CTA). Also, all agencies share the same service area which consists of the City of Chicago, six counties (Cook, DuPage, Will, Lake, Kane and McHenry) and 40 outlying municipalities. Furthermore, all of the service boards are subject to financial and budgetary oversight from the Chicago Regional Transportation Authority (RTA) which approves the five-year capital plan for the region's transit system, as well as an annual budget and two-year financial plan [27]. The regional transit system plan is implemented by distributing funding from the RTA to the individual service boards who then implement the approved capital programs. CTA operates the region's core transit system and provides extensive bus (mostly within the City of Chicago) and "L" subway service [28]. Pace operates the region's suburban/commuter bus and vanpool services, which feed commuters into the CTA core system, and has been the region's sole paratransit provider since 2006 [29]. Metra operates the region's commuter rail system for the Greater Chicago area which similarly feeds into the CTA core system and provides long-distance commuters with the ability to travel into downtown Chicago from as far away as Kenosha, Wisconsin [30].

Existing Regional Agreements in Chicago

There are several inter-governmental agreements between the three regional transit operators related to the acceptance of pass products, transfers between operators and reduced fare programs. In 2008, an agreement was reached between CTA and Pace to provide for the issuance and acceptance of a CTA/Pace Joint 7-Day and 30-Day Pass [31]. The joint passes are good for unlimited travel on all Pace and CTA services with the exception of premium/subscription routes [32]. Customers in possession of any CTA stored-value media (e.g. magnetic-stripe transit cards or any version of the Chicago Card) can use these media to pay for all services on CTA and all Pace suburban buses that are equipped with automatic fare collection equipment [33].

Outside of the joint pass and Pace's acceptance of CTA stored-value media for fare payment, transfers between operators are mainly handled through the issuance of stickers by Metra or Pace; however, CTA has an agreement with Metra and Pace for the "Link Up" sticker. The Link Up sticker is only available to Metra monthly pass holders and is affixed to the front of the Metra monthly pass [32]. This arrangement provides the rider with unlimited access to Metra commuter rail and all Pace suburban bus service, as well as peak period access (6:00-9:30 AM & 3:30-7:00 PM) to all CTA subways and buses for an entire month [34]. There is another inter-governmental agreement in place between Metra and Pace related to their "PlusBus" sticker. Similar to the Link Up sticker, PlusBus stickers require the purchase of a Metra monthly pass, are only available through Metra and are affixed to the front of the monthly pass product. This sticker provides free transfers from Metra commuter rail service onto any Pace suburban bus route for an entire month [35].

In terms of reduced fares, the RTA acts as the central agency for all reduced fare permits [36]. Eligible customers (e.g. non-college students, seniors, disabled/Medicare) must present the necessary documentation to RTA who verifies that the information is accurate and then directly issues a reduced fare permit to the customer. Each service board then accepts the RTA-issued reduced fare permit for all services. Due to the presence of a centralized regional transit oversight body, reduced fare customers in the Chicago region do not have to worry about the typical inter-agency concordance issues that arise in regions without an overarching umbrella agency (e.g. differences among operators related to reduced fare eligibility criteria and the exclusion of certain services). Similar to Dallas, RTA has also instituted a Circuit Ride Free program that allows all paratransit-eligible and all senior patrons to ride fixed-route services on the CTA, Pace and Metra for free [37].

CTA's Existing Fare Collection System (Chicago Card) & Regional Fare Issues

All Chicago area bus services, whether the operator is CTA or Pace, collect fares using a traditional pay on-board approach. CTA's "L" subway service utilizes a traditional barrier approach to collect fares on the heavy rail system. Metra collects fares on its regional commuter rail services using a conductor-validated approach, which requires a conductor to manually go through the entire train and check every passenger's ticket at each zonal boundary [38]. In terms of the regional fare structure, Pace and CTA are congruent and use a flat-fare structure with a transfer charge while Metra, due to cost considerations, utilizes a distance-based/zonal fare [39].

Single-ride customers on CTA services can utilize cash (no transfers), magnetic-stripe cards (e.g. Transit Cards) and contactless smartcards (e.g. Chicago Cards) to board all CTA services [32]. Pass products can be loaded onto magnetic-stripe cards and the Chicago Card Plus, but not onto the regular Chicago Card [32]. Furthermore, reduced fares are not available on either version of the Chicago Card and are only issued on CTA transit pass media [32]. As mentioned above, all CTA stored-value media can be used to pay for services on Pace suburban bus, but cannot be used for payment on Metra commuter rail. In addition to the selected CTA media, Pace customers can use cash or magnetic-stripe passes to board all suburban bus services [31]. Metra customers can use cash for single-rides and paper-based monthly passes to board commuter rail services.

The Chicago Card is a contactless smartcard from CUBIC that comes in two versions based on a registration requirement: the Chicago Card (not required) and the Chicago Card Plus (registration is required). The former only operates using stored-value and cannot be used to load pass products [40]. The Chicago Card Plus also operates using stored-value, but provides for the incorporation of passes by linking the registered card to a credit/debit or employer transit benefits account. The Chicago Card Plus is not available through CTA's retail network and can only be purchased directly from the CTA [41]. Strangely enough, CTA's magnetic-stripe transit pass products are only available through the retail network and not at rail station ticket vending machines.

Open Standards Fare System (Ventra)

CTA issued a Request for Proposals (RFP) in the Fall of 2009 for an "Open Fare Payment Collection System" which eventually turned into the upcoming Ventra fare

collection system. Within that RFP CTA outline the following list of technological requirements for the new system [42, 11].

- Adhere to the standards of ISO 1443 Type A/B

- Provide for temporary simultaneous operation with CTA's existing fare collection system on both bus and rail

- Allow for the eventual introduction of other contactless media (e.g. cell phones)

- Provide real-time authorization

- Increase transaction speed relative to current rate

The goal of the new fare collection system is to "allow customers to use a single card for regional transit payment on CTA & Pace buses and train rides with contactless payment methods" [43]. According to a correspondent at CTA, the primary motivation for CTA to upgrade its fare collection system is the age of the existing fare collection equipment [44]. Other reasons for migrating to Ventra include lowering CTA's overall cost-to-collect and relieving CTA of its operations, maintenance and distribution duties related to fare collection by outsourcing these activities to a third party [44]. Instead of using magnetic-stripe transit cards and contactless Chicago Cards, customers will soon migrate to utilizing the following payment methods listed below [43].

- Ventra Cards – a contactless smartcard with a transit account and a pre-paid debit account

- Ventra Tickets – a contactless plastic ticker used for single-rides and one-day passes

- Bank-issued Contactless Credit/Debit Cards

- Near-Field Communications Devices – smartphones, frequency operated buttons (e.g. RFID tags)

The following is a summary list of the issues with CTA's current fare collection system [44].

- Current smartcard is based on proprietary technology.

- Inability to procure replacement parts for various system components, such as the chips embedded in the current smartcards.

- Hotlisting of Chicago Cards due to the latency of the existing fare collection equipment.

The following is a summary outline of CTA's goals for its new payment system [42, 2].

- "Enhance the customer experience" through the acceptance of multiple forms of convenient contactless payment.

- "Upgrade the existing fare collection system" to incorporate modern forms of fare collection technology.

- Shift the burden of fare collection to the private sector in order "to minimize the capital and operating costs directly incurred by the CTA."

- "Provide flexibility for the future" in terms of new technology, payment options and fare structures.

The final list below contains the expected benefits that are supposed to result from the implementation of Ventra [45].

- Reduced costs to CTA related to issuing fare media and managing fare collection system

- Faster boarding times

- Increased convenience

- Elimination of the proprietary Chicago Card and magnetic-stripe media

- Increased availability of fare media (e.g. more places to purchase)

- Provision of real-time ridership and revenue data

Contract Structure for CTA & Pace

In November of 2011, the CTA Board of Directors awarded a contract to its current vendor, CUBIC, "to convert the CTA's proprietary-fare system to an open fare system that will utilize contactless cards… and open standards technology" [46]. The agency hopes to save up to $50 M in capital and operations costs over the 12-year term of the contract by outsourcing the responsibility of operating and maintaining the new fare collection system to the vendor. Under the terms of this contract, the vendor is responsible for procurement, installation and servicing of all of the new fare collection system components, as well as covering all transaction fees associated with payments processed through the new system. Essentially all aspects of operating and managing CTA's fare collection system, with the exception of equipment ownership and the setting of fare policy and structure, have been delegated to a third party.

In order to completely replace its existing fare collection system without incurring any upfront costs to CTA, the agency has chosen to pay CUBIC both a base fee and a variable "per tap" fee on all transactions processed once the new fare collection system goes live. The base fee will cover all capital expenses related to procuring and installing the new equipment, as well as the costs of migrating from the current system and implementing the new system [47]. The base fee will go into effect once the new

system has been fully implemented. The variable fee is meant to cover the costs of administering, operating, maintaining, marketing and financing the components of the new fare collection system. The variable fee will go into effect at the start of the transition from the existing to the new fare payment system. The estimated value of the contract (e.g. CUBIC's expected revenues from transaction fees) is $454 M.

In addition to the terms above, the contract also contains two relatively unique clauses. First, CTA and CUBIC have negotiated to evenly split all non-transit revenues resulting from customer purchases using Ventra fare products. Additionally, the vendor is required to maintain a robust retail network that gives CTA riders the ability to purchase fare media within one-third of a mile of every CTA bus stop.

Equipment Needed for CTA's Ventra

All elements of the existing fare collection system components (e.g. ticket vending machines and readers on bus fare boxes and subway turnstiles) will need to be replaced with the exception of the subway turnstile housing. Aside from one-to-one replacement of the existing devices with new ones, Ventra will also include the deployment of additional ticket vending machines at rail stations.

Project Schedule

The Ventra implementation is broken into the following four phases listed below [47].

1. Begin equipment installation (Q4 2012)

2. System Acceptance and User Testing (Q2 2013)

3. Go Live (Q3 2013)

4. Full Deployment (Q1 2014)

Implementation Strategies within Chicago's Ventra Deployment

CTA and its vendor have come up with a variety of rollout strategies that will both ease the transition from the existing legacy fare collection system to Ventra and provide enhanced customer service related to purchasing fares. CTA plans to continue to offer all of the fare products and media that are currently available during the transition period and then completely phase out the existing elements, beginning with the Chicago Card, after six months [42 & 46]. Also, CTA and CUBIC began installing new ticket vending machines and readers on buses and turnstiles in October of 2012, which is well in advance of the pilot planned for Spring of 2013 [48].

One of the main aspects of the new system's implementation is providing patrons with more opportunities to reload and manage their fare media. A minor change that should result in a major increase in customer convenience and satisfaction is to make magnetic-stripe fare products available from ticket vending machines, as well as the retail network [42]. A major change related to the implementation of the new system is the sudden expansion of CTA's retail partner network from 700 to 2,500 retailers. This dramatic change in the scope of the retailer network was a response to bus-only customers' frustration related to reloading fares onto their media. Because ticket vending machines are only located in rail stations, these customers currently must walk from the bus stop to one of CTA's retail partner locations in order to manage their fare media. While this is not likely a major issue for patrons who are in dense downtown Chicago, those customers riding on routes in the outlying areas where the density is substantially lower are often hard pressed to locate a partner within close proximity to a CTA bus stop.

In order to ensure that it does not have to undertake another round of fare collection system upgrades in the near future, the CTA RFP required that the new system's chosen technology "must provide for the potential use at a later date of other contactless media such as cell phones, tags, or other types of open payment structures" [42, 11].

In terms of the simultaneous operation of the existing legacy and new fare collection systems, the RFP required that the chosen technology must be able to "coexist with CTA's existing magnetic-stripe and contactless media technology" [42, 11]. As all of CTA's existing fare collection equipment on buses is located near the front door, the new readers will have to be placed at the back doors so that patrons can enter or exit through each set of doors.

In order to provide equitable access to the new fare system for the unbanked, all Ventra cards issued by CTA and its retail partners will be general purpose reloadable cards and thus will not require an account to be linked to the fare medium [42]. However, reduced fare customers will not be able to take advantage of the general purpose reloadable functionality of the Ventra cards because the RTA, who is in charge of issuing the reduced fare permits, will continue to issue the existing fare media indefinitely. As of now, there are no plans to incorporate paratransit fares into Ventra. All CTA and Pace fare products, with the exception of reduced fares, will be incorporated into Ventra fare media.

Regional Coordination Efforts in Chicago

During the Design phase of the new fare collection system, CTA held formal regional partner meetings on a monthly basis that included Metra, Pace and RTA. These meetings were held in order to solicit input from and to gauge the reactions of the other regional transit agencies with respect to what would eventually become Ventra. While Metra was not interested in moving forward with a major upgrade due to the significant capital investment that would be required in order to accept Ventra media for its commuter rail services (e.g. installation of barriers or the procurement of hand-held validators), Pace was interested in moving forward with a new fare collection system and had capital funding available.

The most important event that happened relative to coordinating the regional implementation of Ventra occurred when Pace was attached as an option to CTA's contract with CUBIC in August 2012 [42]. Given that Pace employs the same fare collection scheme on its bus service as CTA and the CTA had already made a major decision to move forward with implementing its new fare payment, it only made sense for Pace to be added to CTA's contract. By choosing one vendor to implement the same fare collection system across two operators' transit networks, CTA and Pace have avoided a number of possible interoperability issues that would likely arisen had two different contractors attempted to build a single integrated fare collection system.

Pace's option differs from the terms of CTA's contract with CUBIC in two fundamental ways. First, since Pace operates bus service, it does not have a need for new ticket vending machines like CTA and its only required equipment is new readers. Pace will utilize Ventra's data management and back-end system. However, instead of paying

CUBIC two fees based on the amount of transactions processed, Pace has decided to take on the risk of paying all transaction fees related to the processing of Pace fares through the Ventra network. While the terms of their agreements with CUBIC vary, the on-the-ground results will be the same for both agencies. In order to ensure that all regional transit agencies are on the same page relative to Ventra's implementation, CTA has regularly scheduled project development meetings with the RTA who relays any pertinent information to the other service boards.

Conclusion for Chicago Case Study

The Chicago region is attempting to deploy open payments immediately to transition away from, and therefore avoid the high costs associated with operating, their proprietary Chicago Card (plus) smartcard system from CUBIC. Although the CTA and Pace have chosen to stay with the same vendor for this "Open Smartcard Upgrade", the CTA has attempted to mitigate its current vendor-cost issues and some of the uncertainties related to deploying open payments on transit across such an expansive system by negotiating for the vendor to cover the cost of the great unknown – transaction fees. Additionally, CTA structured its new contract around the payment of a base and variable "per tap" fee that does not go into effect until the new system has been deployed. Thus, CTA was able to completely replace one of the continent's largest fare collection systems without paying any money upfront.

Whereas the Chicago Card's failure to incorporate CTA's pass products resulted in lower than expected adoption rates (e.g. smaller market penetration than estimated) by transit passengers, CTA's upcoming fare collection system will likely fare better. The new system will offer all CTA and Pace fare products by incorporating open payment

technologies and provide patrons with additional fare payment ease via the expansion of

the CTA retail network and the installation of additional ticket vending machines. Due to

the amount, duration and sheer size of this contract, coupled with the fact that CTA

already has a smartcard in-place and incorporated the suburban bus operator (Pace) into

its new fare collection contract, CTA's agreement with CUBIC is likely to become the

model for deploying open payments on smartcard-based transit systems.

CHAPTER 7

PHILADELPHIA CASE STUDY

Overview of Regional Transit in the Philadelphia Metropolitan Area

There are four major transit providers within the Philadelphia area. The Southeastern Pennsylvania Transit Authority (SEPTA) operates the region's core system and provides bus, trackless trolley, subway, trolley, paratransit and regional commuter rail service within the City of Philadelphia, five Pennsylvania counties and one neighboring county in both Delaware and New Jersey [49]. The Port Authority Transit Corporation (PATCO) is a subsidiary of the Delaware River Port Authority, which is an interstate compact between the State of Pennsylvania and the State of New Jersey to manage the Philadelphia-Camden port district, and operates the PATCO Speedline, which provides commuter rail service between Downtown Philadelphia and Lindenwold, NJ, as well as the RiverLink ferry which runs from Penn's Landing in Philadelphia across the Delaware River to Camden, NJ [50].

New Jersey Transit (NJT) operates bus, paratransit and commuter rail service throughout the State of New Jersey and provides critical connections from Downtown Philadelphia to Atlantic City, NJ and connecting bus service from SEPTA's Trenton Regional Rail line terminus [49]. The Delaware Transit Corporation (DART First State) is a subsidiary of Delaware DOT and provides bus and paratransit service throughout the State of Delaware that connects to SEPTA's Wilmington/Newark Regional Rail line termini [51].

Existing Regional Agreements in Philadelphia

SEPTA currently has a number of agreements with other regional transit operators related to transfer privileges between agencies, the acceptance of pass products among agencies, reduced fares for seniors and day-to-day operations. In order to provide for a more seamless morning commute for those travelling from southern New Jersey into Center City, PATCO and SEPTA have arranged to issue discounted "SEPTA Round-Trip Transfer Tickets" that are 35% cheaper than the SEPTA adult fare and even less costly than SEPTA tokens [52]. The transfer tickets are dispensed two at a time (one transfer is valid for an hour and a half and the other is valid for 24 hours) from a machine at all PATCO Speedline stations in the State of New Jersey and entitle PATCO patrons to transfer to all SEPTA services that are available at the PATCO stops within the State of Pennsylvania. Also, SEPTA has an agreement in-place with Pottstown Area Rapid Transit to provide for free transfers between the SEPTA Route 93 and select Pottstown routes that have been contracted out to SEPTA.

In 2008, SEPTA signed an intergovernmental agreement with New Jersey Transit that required both agencies to issue and accept a Joint Monthly Pass [53]. The SEPTA/NJT Joint Monthly Pass entitles the patron to unlimited travel on both SEPTA and NJT services between a given origin (e.g. Center City in Philadelphia) and destination (e.g. New Jersey destinations and New York City). Ultimately, the Joint Monthly Pass allows Philadelphia-area residents to utilize one magnetic-stripe pass to travel on two operators' services to the Big Apple.

The State of Pennsylvania has created the Pennsylvania Senior Citizen Transit ID Card program which allows all patrons who are ages 65 and up to ride all SEPTA

services within the State of Pennsylvania for free, with the exception of Regional Rail [54]. Regional Rail service within the state is one dollar for seniors and rail service outside of the state can be purchased by seniors for half the price of an adult fare.

SEPTA has an intergovernmental agreement in-place with Delaware DOT and DART First State related to operation of the SEPTA Wilmington/Newark Regional Rail line [51]. The State of Delaware does not directly contribute to funding any part of SEPTA's capital and operations budgets and the only contributions the agency receives from Delaware citizens comes in the form of farebox revenues from a premium commuter rail service. In order to correct this disparity, the parties have agreed to the following terms: SEPTA will operate the Delaware segment of is Newark/Wilmington Regional Rail line and in exchange Delaware DOT will subsidize the cost of SEPTA's operations for this portion of the route.

SEPTA's Existing Fare Collection System & Regional Fare Issues

The transit fare collection system approach and the accepted types of fare media differ between each individual operator. SEPTA currently accepts cash, discounted tokens and paper media (e.g. tickets and transfers) for single-ride trips and uses magnetic-stripe cards for pass products. Unlike many other large transit agencies in the United States, SEPTA has not migrated its fare payment system to a smartcard-based technology. All of the SEPTA bus and surface trolley services collect fares by employing a pay on-board approach. SEPTA utilizes a traditional barrier approach to collect fares on its subway lines. For its Regional Rail services, SEPTA makes use of a conductor-validated approach that requires agency personnel to manually inspect all passengers' fare media at each zonal boundary. PATCO utilizes paper tickets for single rides, as well

as the stored-value FREEDOM Card smartcard, which was launched by CUBIC in 2007, for passes and parking payment at PATCO stations [55]. PATCO operates conductor-validated approach to collect fares, similar to SEPTA's Regional Rail lines. NJT utilizes paper tickets for single-rides and magnetic-stripe cards for passes. NJT operates its bus service using a traditional barrier approach and, like the other operators, also employs a conductor-validated approach for its commuter rail services.

The transfer policies of each transit operator are completely independent of one another. There are no free transfers within SEPTA and all internal transfers require the customer to remember to purchase a one dollar paper transfer ticket before boarding the first service [56]. However, there are three free transfer interchanges at major points where the SEPTA subways interface with the surface trolley lines (13th St., 15th St. & 30th St. rail stations). Transfers to an external operator from SEPTA require the purchase of a full fare, except for customers using either the NJT Joint Monthly Pass or the PATCO-SEPTA Round-Trip Transfer Tickets. Since PATCO only operates commuter rail and does not provide any bus service, the agency does not have the need to issue its own internal transfers and only provides external transfers to SEPTA services. It should be noted that the PATCO-SEPTA Round-Trip Transfer Tickets are not currently loadable onto the FREEDOM Card due to the fact that SEPTA lacks the appropriate fare boxes to accept contactless smartcards. NJT does not issue any internal or external transfers aside from those that are provided by the Joint Monthly Pass with SEPTA.

Regional transit fare policy within Greater Philadelphia differs between each individual operator with respect to how the fare is calculated. SEPTA operates its services using a six-zone or distance-based fare system [57]. All subways, surface

trolleys, trackless trolleys and most of the bus routes only operate within the core Center City Philadelphia zone and thus essentially exhibit a flat-fare structure. However, the SEPTA Regional Rail lines, the Norristown High Speed Line and some of the suburban bus routes employ the zone-based fare structure and also incorporate peak period pricing. As an operator of commuter rail, PATCO utilizes a zone-based fare structure with six zones. NJT operates its commuter rail, as well as its bus services, using a distance-based fare structure with many zones [58].

The temporal span of reduced fares and the eligibility requirements to obtain these discounts varies depending on the operator. Reduced fare customers on SEPTA and NJT have access to all services at any time of day, while PATCO only offers reduced fares during off-peak periods. Furthermore, there are discrepancies between the agencies as to the eligibility requirements for reduced fares. For instance, SEPTA and PATCO have established that Seniors are those persons aged 65 and above [59], while NJT considers those 62 and above to be reduced fare eligible Seniors [60]. Also, there are discrepancies between the agencies as to the amount of children that are allowed to ride for free with a paying adult. On SEPTA paying adults can travel with up to two children [61] while up to three children can ride on NJT for free; PATCO does not offer any reduced fares for children [62].

SEPTA's New Payment Technologies (NPT) Program

SEPTA is now undertaking a project called NPT that looks to implement open payments technology on SEPTA's fare collection system. The result of the NPT project will be the implementation of a new contactless-based fare payment system that "will work seamlessly across the entire SEPTA network" [63]. According to a correspondent at

SEPTA, the primary motivation for SEPTA migrating to a new fare collection system from its existing legacy system is to "provide [customers with] convenient ways to pay fares" [64]. Customers will soon be able to utilize their bank-issued contactless credit/debit cards, near field communications devices (e.g. cell phones), frequency operated buttons (e.g. RFID and employer-issued identification badges), as well as pre-paid transit smartcards to pay for SEPTA fares. According to the NPT website, "the current fare system is a barrier to transit use… and the reliability and functionality of the existing legacy fare system cannot be improved due to the age of the electronics and limitations of the existing computer operating system" [65].

While the agency has needed to replace the existing system for some time now, SEPTA did not previously have adequate capital funding to undertake such a major upgrade until it acquired a $175 M loan from the Philadelphia Industrial Development Corporation in January of 2011 [66]. According to the Summary Report from the August 2011 SEPTA Fare Policy Advisory Group Meeting, SEPTA and its stakeholder group have adopted the guiding principles for the NPT project which are listed below [67].

- Increase Ease of Use & Simplicity for Customers
- Improve Convenience of Paying Fares
- "Protect SEPTA Revenues"
- Identify Ways to Repay Loan

Additionally, SEPTA and its Advisory Group adopted the following list of key priorities that are to be kept in mind when implementing the NPT project [67].

- Provide Convenience & Ease of Use to Customers
- Provide Uniformity & Equity for Riders

- Provide Cost Control & Security for Revenues

- Increase Ridership

- "Minimize Change for Our Riders" [68]

- Provide for Universal Transfer Capability between Transit & Regional Rail [69]

The final list below summarizes the expected benefits for both customers and SEPTA that are expected to be realized through implementing the NPT project [70].

- Improved Customer Experience

- Provide Flexibility to Respond to Changes among Riders and within the Transit Industry

- Reduced Reliance on Cash & Introduction of Automation [71]

- Enhance Data Collection & Processing [71]

- "Lower collection costs over time through reduced labor and material costs" [64]

- Improve Operational Efficiencies by Utilizing New Real-time Payment & Ridership Data

Contract Structure for Philadelphia

In November 2011, SEPTA awarded a contract for implementation of the new fare collection system to ACS Transportation Solutions Group for $129.5 M [72]. The contract has a duration of three years and does not include any other partners. Under the terms of the contract, the vendor is responsible for completing the following components of the project listed below.

- Design of System

- Build of System

- Installation of System

- Operations & Maintenance of Fare Collection System until Expiration of Equipment Warranty

In turn, SEPTA will use the remaining portion of the loan (about $45 M) to fulfill the following responsibilities listed below.

- Upgrade of all Existing Electronics, Infrastructure and Computer Systems

- Operations & Maintenance of Existing Fare Collection System

- Operations & Maintenance of New Fare Collection System after Warranty Expiration

Equipment Needed for SEPTA's NPT Project

The following is a list of equipment that will be installed as part of the NPT implementation [66].

- 1852 New Electronic Readers on all fare boxes

- 386 New Turnstiles at subway and Regional Rail stations

- 121 New ADA-compliant Turnstiles at subway and Regional Rail stations

- 200 New, Additional Ticket Vending Machines at subway and Regional Rail stations

Project Schedule for Philadelphia

The NPT project will be implemented in three phases and is expected to be fully operational system-wide by November of 2014 [73]. The first phase, which consists of system design, testing and manufacturing, will take place between Fall 2012 and Early 2013. In Fall of 2013, the physical components of the system will be installed, starting

first with buses and trackless trolleys and eventually deploying the equipment on the subway lines. In Spring of 2014, the contractor is expected to begin installing the new equipment on all CCT paratransit vehicles and at all regional rail stations and parking lots.

Implementation Strategies within the Philadelphia Deployment

In preparing for such a major overhaul, SEPTA made many strategic decisions that were designed to simplify the implementation process and ease the transition for customers as much as possible. First, SEPTA held two community meetings in the first half of 2011, prior to awarding the contract to ACS, in which it solicited input from both the general public and City stakeholders as to what the new fare collection system should look like and how it should function. After awarding the contract to ACS in late 2011, but prior to Final Design, SEPTA held another series of public meetings in August 2012 to perform user testing and receive input related to the functionality of the preliminary design. SEPTA will continue to hold public meetings to gauge user acceptance of NPT until Final Design and Manufacturing have been completed. Finally, SEPTA is planning to continue its public outreach and educational efforts until the system is fully operational in late 2014.

In anticipation of the NPT project, SEPTA has already begun installing the foundation of the new system's fiber optics and communications network as part of other on-going projects. In order to provide ample time to configure the new system and work out any unexpected glitches, the NPT project timeline includes separate pilot installations for each mode that are scheduled to begin at least one quarter before full rollout. As a way to reduce overall capital investment and simultaneously limit fare evasion at

Regional Rail lines, SEPTA will be installing gates and turnstiles at only five Center City stations within Philadelphia instead of gating every single Regional Rail stations [68].

In terms of simultaneous operation, SEPTA will utilize a number of strategies to help minimize customer confusion during the transition from the existing legacy system to the upcoming NPT system. As part of the gradual approach, customers will still be able to use both the traditional and new means of fare payment during the transition period between Fall 2013 and January 2014 [74]. Also, the agency is planning to install informational kiosks and use some of its existing subway attendants to demonstrate how to use the new technology and answer any customer questions.

SEPTA has internally estimated that up to 30% of its customers do not have a credit or debit card (e.g. are unbanked). In order to incorporate this large segment of the transit market, unbanked customers will have the option of purchasing a pre-paid card that can store both value and pass products either through SEPTA directly or its retail network [64]. Senior citizens and customers with disabilities will be issued special fare products (likely a magnetic-stripe driver's license) through PennDOT that will allow these customers to take advantage of reduced fares. All SEPTA fare products will be made available upon full rollout of the NPT system.

Regional Coordination Efforts in Philadelphia

While no other partners are included within the ACS contract, SEPTA has, nevertheless, issued an open invitation to all Pennsylvania public transit operators for SEPTA to act as their procurement agent for new fare collection equipment [64]. Although SEPTA currently operates the majority of paratransit service in the Greater Philadelphia region, the agency will install new fare collection equipment on all of its

paratransit vehicles in order to provide for future interoperability with other providers. Despite the fact that SEPTA is the only regional transit operator on the contract, the agency has reached out to PennDOT, the Delaware Regional Valley Planning Commission, NJ Transit, PATCO & Delaware DOT on multiple occasions to ensure that all parties are aware of the project's progress.

Conclusion for Philadelphia Case Study

SEPTA is taking a "Leap Frog" approach to implementing a new fare collection system which will involve the authority transitioning from a fare collection system primarily based on tokens and paper media to one that will eventually incorporate open payments. Similar to DART's development of a mobile ticketing application, SEPTA will rely on the use of a transit agency-issued general purpose reloadable card as a stopgap measure to provide for continuous system operation during the long transition period in which the new physical infrastructure is deployed at every SEPTA facility. It should be noted that the Philadelphia region is the only instance in which paratransit vehicles will be equipped with the new fare collection system devices.

The Philadelphia case is unique in three respects. First, SEPTA is the only entity that has chosen to be responsible for the back-end system management duties. Additionally, SEPTA is the only transit agency that will definitely implement a change to its current fare collection environment. In order to combat fare evasion that may occur due to the new system's installation and gauge the need to implement additional barriers, the authority will be installing new gates, as well as surveillance centers, at its downtown regional rail stations. Finally, while it is not the only agency that has conducted outreach efforts related to its new fare collection system, SEPTA has set an exemplary standard for

public involvement by soliciting the opinions of various stakeholder groups and, more importantly, incorporating their feedback into the design and deployment of the new fare collection system.

CHAPTER 8

TORONTO CASE STUDY

Overview of Regional Transit in the Greater Toronto Area

In the capital of Ontario, there are eight operators that provide public transit service across the Greater Toronto Area (GTA), which encompasses the City of Toronto and four regional municipalities (Durham, Halton, Peel & York), as seen in Figure 1 below.

Figure 1. Municipal Map of Greater Toronto.
(Source: http://en.wikipedia.org/wiki/File:Greater_toronto_area_map.svg)

Aside from the transit operators, there is a provincial government agency, Metrolinx, which was created to "manage and integrate road transport and public transportation in the GTA and Hamilton areas in Ontario" [75]. Metrolinx is in charge of commuter rail operations through its GO Transit division, as well as the implementation of the regional smartcard system, PRESTO. Aside from Metrolinx, which provides a truly regional

service, the operators and their services are generally confined to the geographical boundaries of their regional or local municipal government.

The Toronto Transit Commission (TTC) is by far the largest provider of transit trips within the region, mainly because it operates the core of the region's transit network. The TTC operates transit service within the City of Toronto and provides an extensive network of subways, streetcars, local and express bus services, as well as paratransit [76]. The second largest provider is GO Transit which serves to bring commuters from all of the outlying areas within the GTA into the downtown core via feeder bus service that drops passengers off at GO Transit regional commuter rail stations which ultimately connect to TTC subway stations and bus services [77]. The remaining operators provide a combination of local, express and/or bus rapid transit services that either feed directly into TTC services along the perimeter of the City or Toronto or terminate at GO Transit commuter rail stations located within their municipal boundaries. Table 3, which is located on the next page, provides an overview of the different transit agencies and their respective jurisdictions and modes operated within the Greater Toronto Area.

Table 3. Summary of Regional Transit Agencies and Modes Operated in the GTA.

Agency/Mode	Jurisdiction	Commuter	Subway	Streetcar	Local Bus	Express Bus	BRT	Para-transit
TTC	City of Toronto		X	X	X	X		X
GO Transit (Metrolinx)	All of GTA	X			X			
York Region Transit	York Region				X	X	X	X
Brampton Transit	City of Brampton				X	X	X	
Durham Region Transit	Durham Region				X	X		X
MiWay	City of Mississauga				X	X		
Burlington Transit	City of Burlington				X			X
Milton Transit	City of Milton				X	X		X
Oakville Transit	City of Oakville				X	X		X

Existing Regional Agreements in the GTA

There are several existing agreements in-place between the local operators related to the acceptance of pass products, transfer privileges, reduced fares and operations. First, there is an inter-local agreement between TTC, MiWay, Brampton Transit and York Region Transit for free transfers and unlimited travel across all operators' services, including paratransit, for customers holding a GTA Weekly Pass [78]. The GTA Weekly Pass was created primarily to provide suburban commuters with a convenient means of paying fares when travelling into the City of Toronto without incurring a supplemental fee each time they cross the GTA zonal boundary [79].

Currently, TTC charges a supplemental GTA Zone fee on all of its contracted bus routes that cross the city limits of Toronto and connect to the other three operators' services. Thus, customers wishing to travel from downtown Toronto on a TTC bus and transfer to the other outlying operators' services must pay the full fare for the second

service by using the other operators' fare products or they can use a TTC non-pass product (e.g. single-ride ticket or token) and pay the supplemental GTA zone fee. However, the GTA Weekly Pass arrangement completely removes the need for customers to carry around multiple operators' fare products and worry about having change to pay the zonal fee.

When PRESTO was introduced in 2009 by Metrolinx as the regional smartcard system, all of the regional operators, with the exception of TTC, agreed to fully implement the new fare payment system on their transit systems [80]. In order to promote the adoption of PRESTO by regional transit users, Metrolinx/GO Transit and the other operators agreed to offer "co-fares" which provide for free or discounted transfers from the local operator's bus service to GO Transit commuter rail and bus services [81]. However, TTC does not participate in this program for a variety of reasons that will be discussed below.

Nevertheless, the agency has attempted to provide its customers with the ability to receive a discounted rate for chained trips with GO Transit [82]. Under the "TTC 2 Times with GO Transit" program, all TTC customers who begin their journey on a TTC service, transfer to a GO Transit train or bus at one of 22 select GO Transit stations, and then transfer back to a TTC service can use their initial TTC-issued transfer to board the second TTC service.

In terms of reduced fares, the first round of PRESTO implementation resulted in the unification of reduced fare classifications and eligibility standards for children, students and seniors across all of the regional transit operators except for TTC [83]. Before the fare payment system was implemented the age definitions for children and

seniors varied across operator, as well as which customers were officially considered students. According to a correspondent at TTC, variation still exists between the reduced fare policies of TTC and all of the other regional operators [84].

In terms of operations, TTC has an inter-local agreement with Metrolinx/PRESTO for the operation and maintenance of all 28 Metrolinx-owned PRESTO readers that were deployed at 14 TTC subway stations during PRESTO's initial implementation in 2009 [84]. Also, as mentioned above, the TTC has inter-local agreements with two outlying operators (York Region Transit & MiWay) for the TTC to provide bus service from the City of Toronto to points outside of the municipal limits where passengers can connect to additional transit services provided by the two other operators [79].

Existing Regional Fare Collection Systems across the GTA

As mentioned above, all of the other transit operators outside of the City of Toronto decided to get on-board with the provincially-led PRESTO fare system and currently provide for true fare payment interoperability between multiple operators via PRESTO smartcards. All non-TTC operators accept cash and paper-based media (single-ride tickets, pass products and transfers), in addition to Metrolinx's PRESTO smartcards. However, despite its position as one of the largest transit providers in North America, TTC is still only accepting cash, tokens (single-ride) and paper-based media (single-ride ticket, pass products and transfers) for fare payment on its services [85]. As mentioned above, TTC has 28 PRESTO readers in-place at some of its subway stations, but these readers do not service TTC-only customers because none of TTC's fare products are currently offered on the PRESTO. Essentially these readers were provided by

Metrolinx/PRESTO solely to allow GO Transit customers to utilize PRESTO at TTC subway stations that interface with GO Transit commuter rail services.

TTC uses a different fare collection approach for each mode operated. All bus services operated within the GTA, including those of the TTC, utilize the traditional pay on-board approach to collecting fares, except for York and Brampton's BRT services which use a proof-of-payment approach and GO Transit buses which use a non-traditional conductor-validation approach to collecting fares [86 & 87]. TTC's subway services collect fares based on a traditional barrier approach (e.g. turnstiles) and there are no other heavy rail services offered in the region. TTC's streetcar network employs a proof-of-payment system similar to the aforementioned BRT services [88]. Lastly, GO Transit's commuter rail services (and buses) operate using a proof-of-payment system [87].

Regional Fare Issues within the GTA

The current PRESTO system is not fully-functional on TTC for two main reasons [83]. First, the PRESTO smartcard system does not currently allow customers to load any TTC fare products onto the PRESTO medium. Next, none of the TTC-owned fare collection equipment is capable of reading the PRESTO smartcards. Thus, the regional smartcard cannot be used as a form of payment on any of TTC's services. Given that TTC is estimated to carry around 75% of the regional ridership, the agency's decision to opt-out of the initial PRESTO deployment has resulted in the negation of many of the convenience and economic benefits for regional transit passengers that the PRESTO system initially aimed to achieve. While all other operators have joined together to allow their customers to take complete advantage of PRESTO's functionality (e.g. support for

concession fares, co-fares between the operators, loyalty rewards programs and transfers), the TTC has remained an island and is still relying on antiquated means of paying fares.

TTC's Initial Issues with PRESTO Round One

When the initial discussions about developing a regional smartcard system began in 2007, the commission of the TTC directed its staff to prepare a "Business Case Review for a Smartcard System at TTC" [89]. The document weighed the pros and cons of implementing smartcards from the perspective of TTC and came up with the following list of risks:

- Significant capital investment that is hard to recover once implemented

- Current approach to smartcards might be obsolete by the time the system is fully implemented

- Could become locked-in to a proprietary technology

The report also noted that there were emerging open payment technologies that the TTC would need to be able to accommodate if and when it decides to implement a new fare payment system. Ultimately, the internal report concluded that "while the existing fare collection system has its limitations, it is cost-efficient to operate and did not need to be replaced" [89].

According to a respondent at TTC, there were four main issues that led to TTC's decision to forego a system-wide deployment of the PRESTO smartcard collection system [83]. Most importantly, the first round of PRESTO did not provide for the acceptance of open payments. Next, there was the simple fact that TTC operates within

the confines of a limited capital budget. Therefore, if TTC chose to fully implement PRESTO, then the agency would have had to shift a significant amount of capital funding towards this project and away from other internal efforts. In other words, a full PRESTO implementation may have put TTC's other capital projects at risk. Furthermore, staff at the TTC believed that "the $140 M is not sufficient to fully implement the PRESTO smartcard system at the TTC" [89].

From a financial and operations perspective, the TTC was concerned about PRESTO's initial ability to meet the agency's business requirements (e.g. maintain existing reduced fare classifications and special tourism-oriented fare products) which were relatively more complex than the other small operators. Additionally, TTC was reasonably hesitant to enter into the PRESTO partnership because doing so would have forced the agency to surrender its complete autonomy over the fare collection process. With all of these factors in mind, TTC concluded that there was still "too much to discuss for us to sign-on at that point" and only chose to implement PRESTO readers at a limited number of subway stations [89].

Political Evolution & TTC's Newfound Interest in PRESTO

While TTC made the decision to offer only a limited deployment of PRESTO, the agency has become interested in the second round of PRESTO (PRESTO Next Generation or "NG") for two reasons. Most importantly, in 2010 Metrolinx, who is in charge of disbursing all provincial funding to the transit operators (e.g. gas tax revenues and capital grants), believed that "without the full participation of TTC, the interregional benefits of the PRESTO system would be reduced" [89]. In order to achieve its own internal objectives (e.g. providing for a regional fare medium that can be used on all

operators within the GTA), Metrolinx flexed its political muscle and decreed that the disbursement of over $8.5 B in provincial funding to TTC, which had been allocated to support operations, procure a fleet of new streetcars and build two rapid transit lines, would be put in jeopardy if TTC did not fully participate in PRESTO. According to a correspondent at TTC, putting such a large amount of funding at risk "speaks very, very loudly and provides and incentive for TTC to seriously look at PRESTO" [83].

Additionally, while the development of the initial PRESTO smartcard system was catered to the needs of regional operators other than TTC, PRESTO NG has been developed with TTC specifically in mind. While Metrolinx has repeatedly made commitments to accommodate all of TTC's business needs, the ultimate catalyst for TTC to go with PRESTO NG was the fact that it will incorporate open payments.

PRESTO Next Generation (NG)

Although the smartcard version of PRESTO has only been in the hands of the general riding public since 2010, Metrolinx is looking to deploy PRESTO Next Generation in the next few months. PRESTO NG will incorporate open payments and allow for the inclusion of additional media and devices, such as contactless credit/debit cards, mobile phones, independently-issued IDs, fobs, etc. [90]. Metrolinx was content with the smartcard version of the PRESTO system until the agency decided it wanted to expand the reach of PRESTO to include Ottawa, as well as Toronto and Hamilton [83]. The inclusion of Ottawa's OC Transpo in the PRESTO system was the collection system's first true test of interoperability. Ottawa is adjacent to Montreal; however, due to the fact that they are each in a different province, this single metropolitan area is served by two independent public transit providers, OC Transpo in Ottawa and STM in

Montreal. The problem arose when transit officials realized that the initial PRESTO cards could not be read by the STM card readers [91].

In order to provide for seamless regional connections between provinces and transit providers, the PRESTO team has decided to issue a second round of fare cards, called PRESTO Next Generation (PNG) cards, which allow for greater interoperability by providing for open and mobile payments [92]. The second round of PRESTO implementation is likely to be better embraced by TTC, as the agency rejected the initial version of the PRESTO system specifically due to the fact that it failed to incorporate open and mobile payments into its design and operation [83]. All future expansions within the regional transit system of Toronto and Hamilton will come equipped with PRESTO card readers and vending machines. The full rollout is scheduled to occur just before the opening of the 2015 Pan-American games [93].

According to a PRESTO representative, the next deployment of PRESTO has been designed to perform four roles/functions which are listed below [94].

1. Payment of Fares
2. Settlement of Payments with transit operators and banks
3. Collection & Distribution of information, fares and revenues; and
4. Universal Payment Medium across the GTA.

Within the same meeting, the representative mentioned the following list of customer benefits derived from using the next generation of PRESTO [94].

- Providing the ability to use just one card for all payments, not just transit
- Providing the option to still use multiple systems for payment
- Providing the ability to access payment information via different methods

- Auto-load feature eliminates the customer's need to worry about the current stored balance

- Lost/Stolen card replacement if card is registered

Similarly, the list below contains the operator benefits that were mentioned in relation to the utilization of the second version of PRESTO [94].

- Provide trip data in support of operator service and ridership assessments

- Reduce the acceptance of fraudulent transit fare payments

- Flexibility of payment schemes

- Reduce environmental impact of paper-based tickets and transfers

Contract Structure for TTC

Currently, Metrolinx/PRESTO has a 10-year, $250 M contract with Accenture that expires in 2016 [93]. Under the terms of this contract, the vendor must complete all of the tasks listed below for the regional transit operators of the GTA, except for TTC, relative to the PRESTO fare collection system and its devices [93].

- Design

- Build/Install

- Operate

- Replace

Under the non-TTC agreement, the individual operators are responsible for maintain and repair the PRESTO devices. Across the board, the regional operators contract with PRESTO to handle these activities. In terms of cost-sharing for the procurement of the new fare collection equipment, each of the municipalities contributes two-thirds of the

overall cost of procurement, with the province (e.g. Metrolinx) contributing the remaining third [83]. Under this arrangement, the individual transit operators own the PRESTO fare collection devices.

Due to the 2004 allocation of $140 M from the Canadian Strategic Infrastructure Fund to support the development of a universal fare card for the GTA, the terms of TTC's agreement with Metrolinx is slightly different from those of the other operators [95]. Under the terms of this federal funding program, the cost of this project would be split equally between the City of Toronto, the Province of Ontario and the Canadian federal government, with each partner contributing $46.7 M. Thus, TTC is essentially paying half of what all of the other operators were charged to implement PRESTO. However, the TTC agreement devolves ownership and all other responsibilities related to the design, installation, operation and maintenance of the new equipment to Metrolinx/PRESTO.

TTC and Metrolinx both believe that system-wide PRESTO NG implementation on TTC will cost more than the $140 M originally allotted back in 2004. In order to mitigate any potential cost disparities between the two partners, TTC will contribute the original $46.7 M upfront and then pay Metrolinx/PRESTO for any cost overruns beyond the $140 M via an annual fixed-fee of 5.25% of all TTC transactions processed through PRESTO [96]. Additionally, TTC will pay for upgrading its power systems at select subway stations to accommodate the new PRESTO readers [89]. Similar to CTA's agreement with CUBIC, TTC's 15-year contract with Metrolinx/PRESTO, for the most part, only requires the transit agency to pay the vendor and nothing more.

Equipment Needed for TTC's Full Implementation of PRESTO NG

The following is a list of the equipment that will need to be installed on the TTC system.

- Upgraded power systems at select subway stations

- New PRESTO Readers on subway turnstiles and bus fare boxes

- New PRESTO NG Cards

- New ticket vending machines

- Expanded wireless communications network

Project Schedule for PRESTO NG on the TTC

Although the timeline of the PRESTO NG implementation on TTC has not been set in stone, a look at the first round of PRESTO deployment should provide a rough overview of the expected process the second time around. The first round was divided into the following three phases which occurred over a period of two years [92].

1. Limited Deployment

    a. Recruited users to test the new system.

    b. Provided readers at only four transit stations and ten bus routes.

    c. No transit operator was completely reliant on PRESTO.

2. Expansive Rollout

    a. PRESTO payment system and media were made available to the general public.

    b. Provided readers at 11 additional transit stations.

    c. Two transit operators fully converted their collection systems to PRESTO.

3. Full Rollout

    a. PRESTO devices were made available at all non-TTC transit stations.

    b. All transit operators except TTC fully converted their collection systems to PRESTO.

    c. Incorporated each operator's concession fares.

    d. Incorporated co-fares for transfers between the regional operators and GO Transit.

For TTC, the migration process is expected to begin in late 2013, with a full rollout to be completed by Summer of 2015.

Implementation Strategies within PRESTO NG's Deployment on TTC

Obviously, the TTC implementation will not involve the gradual deployment of PRESTO across different operator's services because these other operators are already fully participating in PRESTO. However, TTC is likely to be in favor of a gradual hardware rollout in order to avoid the hassles that have arisen during OC Transpo's PRESTO NG implementation due to bugs, glitches and other issues with the PRESTO NG devices and payment network [97].

In order to ensure that PRESTO NG meets customer expectations and needs, TTC held a meeting in late 2011 with its Advisory Committee on Accessible Transit that represents patrons with disabilities. The meeting featured a discussion of current accessibility issues related to the existing fare collection system, as well as an identification of proposed improvements that are to be made by implementing PRESTO NG [94]. It seems that this meeting resulted in a productive dialogue, as a report to the

TTC commission in November 2011 notes that "accessibility will be an important element of a new fare collection system" [95].

In terms of unbanked customers, TTC plans to issue a TTC-branded pre-paid card which will have general purpose reloadable functionality [84]. In terms of reduced or concession fares, discounted fares will be loadable onto PRESTO media; however, users must register their smartcards with the TTC in order to take advantage of these discounts.

In terms of the simultaneous operation of two fare collection systems, TTC plans to operate both systems and continue to accept its current fare media for a period of six to nine months in order to allow customers to orient themselves to the new fare payment system over time. The TTC commission has noted that during this transitional phase, "TTC's overall costs for fare collection may increase" due to operating two systems at once [95]. In terms of mobile payments, TTC already deployed a pilot program in the summer of 2012 to accept contactless payment by mobile phone at its College Station subway stop [98].

In terms of incentivizing the adoption of PRESTO NG by TTC customers, TTC is planning on introducing a loyalty rewards program similar to GO Transit's arrangement [83]. GO Transit currently offers a progressive discounting scheme, called the "Loyalty Rewards Program" that encourages regular utilization of the system and predictable travel behavior. All passengers are entitled to receive a 7.5% discount on the first 35 rides regardless of the trips' origin-destination pair [80]. However, those riders who take the same trip more than 35 times receive an additional percentage discount beyond the initial 7.5%. While TTC is only intending to offer its existing fare products initially, one of the business demands made to Metrolinx was that PRESTO NG must have the flexibility to

allow for the implementation of these innovative fare policies [83]. One adoption incentive already exists in the form of co-fares that provide discounted transfers between non-TTC operators. All TTC fare products will be made available for purchase on PRESTO NG media upon full rollout [83].

Regional Coordination Efforts within the GTA

As part of TTC's discussions with Metrolinx on the development of PRESTO NG and its deployment on TTC, the parties agreed to create a formal entity to facilitate coordination during implementation. The Joint Steering Committee consists of key officials at Metrolinx's PRESTO division, personnel from TTC's fare collection department and is "chaired by a senior representative from TTC" [95]. Meetings mainly consist of updates on project development and coordinating on a variety of issues (e.g. civil works planning, deploying PRESTO on new fleet of streetcars, project schedule). These gatherings are intended to provide an open forum in which both entities can address any concerns they have with the project and come to a consensus on what needs to be changed [83].

According to a correspondent at TTC, coordination was formalized due to the fact that this is a joint project. PRESTO (vendor) has an incentive to coordinate with TTC (client) in that it will be owning, operating and maintaining a fare collection system for TTC on TTC's premises and thus will be subject to the needs and desires of its client. TTC (client) has a need for coordination with PRESTO (vendor) in that in order to continue to fund its transit operations (e.g. collect fare box revenues), PRESTO's deployment of the new TTC fare collection system must result in a system that functions

reliably, provides additional convenience to riders and, more importantly, does not inconvenience them.

Whereas most decisions about regional fare collection technology in U.S. metro regions tend to originate from the largest local transit provider, in Ontario, Canada the provincial transportation agencies took the lead in developing the technological standards and specifications for a regional fare collection system (the Ontario Ministry of Transportation for the PRESTO smartcard system and Metrolinx, which was not yet created at PRESTO's first inception, for the PRESTO NG system). By letting the provincial and federal governments to subsidize the costs of developing a standardized technology platform that can used by multiple regional transit operators to collect fare payments, "Metrolinx has been able to leverage this investment to provide a cost-effective solution to municipalities and enable an integrated fare approach, providing benefits to all Ontarians" [75]. Furthermore, as Metrolinx has awarded a single contract to Accenture to provide for the procurement, installation, operations and maintenance of the PRESTO regional fare collection system across all of the operators, it has reduced, to the maximum extent possible, the likelihood that interoperability issues will arise for transit users traveling across multiple operators' service areas.

As mentioned above, the first deployment of PRESTO resulted in the unification of reduced fare eligibility standards for seniors, students and children across all of the operators with the exception of TTC. In terms of coordination for accessible services, there were already agreements in-place related to co-fares between the paratransit operators prior to PRESTO's initial deployment. The first round of PRESTO successfully incorporated these reduced fare transfers for paratransit customers. According to a

correspondent at TTC, the TTC is currently undertaking efforts with adjacent operators to provide for a coordinated paratransit transfer point [83]. The same interviewee noted that one of the main impediments to the regional coordination of paratransit services is that "while TTC operates paratransit in-house, some of the other agencies contract this out, so there are different arrangements that have to be worked out."

Conclusion for Toronto Case Study

The Toronto Transit Commission has experienced the "Top Down" approach to implementing a new fare collection system. Whereas all of the other models surveyed have featured the transit agency originating the idea for a new fare collection system and then seeking a vendor to meet this need, the Toronto model relied on a provincial transportation planning and operations agency, Metrolinx, to develop a standardized technology platform (PRESTO) that could be implemented across all of the municipal operators.

By allowing a single regional government to be the sole proprietor of fare collection technology, the transit providers of Ontario have realized economies of scale benefits and cost efficiencies. Additionally, the sole proprietorship model mitigates, to the maximum extent possible, any potential inter-operability issues with the hardware, software and communications networks that tend to arise when multiple transit operators are each using their own vendors and technologies for fare payment.

While the TTC initially chose to forego the deployment of the provincial transportation agency's PRESTO devices, primarily due to the inability of PRESTO to accept open payments, some political maneuvering by Metrolinx and hard negotiating by TTC eventually led to one of the continent's largest transit agencies finally coming on-

board with the rest of the regional operators. Due to the fact that all of the other operators already deployed PRESTO the first time around and the unique institutional structures in the GTA, there was no need for TTC to partner with any entity. Whereas Chicago and Philadelphia are undertaking complete system-wide replacements, Toronto will merely be upgrading its existing equipment to incorporate PRESTO. A unique feature within TTC's implementation of PRESTO NG is the specific request for the vendor (Metrolinx) to retain ownership of the new equipment.

CHAPTER 9

ATLANTA CASE STUDY

Overview of Regional Transit in the Atlanta Metropolitan Area

There are four major transit operators within the core of metro Atlanta. The Metropolitan Atlanta Rapid Transit Authority (MARTA) is by far the largest provider of transit trips within the region and serves as the backbone or spine of Atlanta's regional transit system. MARTA operates heavy rail, extensive local bus, two limited BRT routes and paratransit service within the City of Atlanta, Fulton County and DeKalb County [99].

One of these operators, the Georgia Regional Transportation Authority (GRTA), was created as an entity of the state and is responsible for "managing land transportation and air quality within certain areas of this state [the 20-county Clean Air Act non-attainment area designated by the Environmental Protection Agency in 1998]" [100]. In addition to its planning and oversight duties as the state-appointed regional transportation agency, GRTA also operates 33 "Xpress" commuter bus routes on weekdays that span 13 counties throughout the metro Atlanta region, as well as vanpool services [101]. GRTA is the only regional transit operator that does not provide paratransit service.

In addition to MARTA's core system in Fulton and DeKalb County and GRTA's Xpress commuter bus network, there are also two county-based operators that provide local and commuter transit services. Cobb Community Transit (CCT) is an operating division of the county's DOT and provides 7 local and 6 express bus routes within Cobb County, as well as paratransit services on every day of the week except for Sunday [102]. Through the combination of its directly-operated express bus service and GRTA's five

additional Xpress routes that run into Cobb County, Cobb commuters are provided with connections to Fulton County, Cherokee County and five MARTA heavy rail stations within Atlanta's downtown core [103]. Similar to CCT's institutional arrangement, Gwinnett County Transit (GCT) is a department of the county's DOT and provides five local, three GCT express and three GRTA-contracted Xpress bus routes within Gwinnett County, as well as complementary ADA paratransit services on weekdays [104]. Through the combination of its six directly-operated express routes and GRTA's five additional Xpress routes that serve Gwinnett County, Gwinnett commuters are provided with connections to five MARTA heavy rail stations in the downtown Atlanta core and one station in northern DeKalb County [105].

Existing Regional Fare Collection System (BREEZE)

Atlanta's MARTA was the first transit system in North America to fully implement an all-contactless smartcard technology for its fare collection system in 2006 [106]. The automated fare collection system is called BREEZE and has been managed by CUBIC Transportation Systems since MARTA awarded the vendor a $72.5 M contract in October 2003 to "replace MARTA's existing magnetic ticketing and token-based system" with a smartcard-based system [107]. According to a 2010 APTA presentation, the BREEZE automated fare collection system offers the following customer and operator benefits relative to its predecessor [108]:

- Customer convenience

- Seamless multi-modal transfers

- Multiple fare structures

- Additional ridership data

- Greater revenue control

- Lower maintenance costs

The BREEZE System consists of the hardware components pictured below in Figure 2, as well as a host of other communications devices and software components that support the operation of BREEZE and the issuance of fare products [108].

Figure 2. Graphic Overview of BREEZE Hardware Components (Source: http://www.apta.com/mc/fctt/previous/2010fare/ Presentations/Breeze-Program-Overview.pdf).

The paper-based BREEZE tickets only offer stored-value functionality. However, the more durable, plastic-based BREEZE cards are capable of holding pass products, in addition to stored-value, and feature balance protection, automatic reload, lost/stolen card replacement and online account management for those customers who choose to register their BREEZE cards [109]. Customers have the option of purchasing their BREEZE cards through a variety of outlets: BREEZE vending machines (BVM) located in every

MARTA rail station, the MARTA RideStore, the BREEZE online store or at the non-MARTA operator's corporate office [110]. Bus-only customers who do not have frequent access to a BVM nor the internet can still use cash to pay the on-board automated fare box. Riders who need to reload their BREEZE card can do so by visiting a BVM, a bus fare box, the MARTA RideStore or the BREEZE online store [111].

MARTA and all of the other regional operators currently utilize the same pay on-board approach to collecting fares on buses and paratransit services. Additionally, MARTA collects fares on its heavy rail system through a traditional barrier approach. MARTA accepts only cash and BREEZE products as payment for fares while the other regional operators accept cash, paper tickets (GCT only) and magnetic-stripe cards (CCT & GRTA only) in addition to BREEZE fare products. GCT and GRTA currently operate a dual-fare system [112]. These two operators have chosen to maintain their own cash and paper-based (GCT)/magnetic-based (GRTA) fare collection equipment and have provided for integration with the regional BREEZE fare collection system by installing BREEZE-compatible fare boxes (driver control units) on buses and BREEZE light validators on paratransit vehicles. The current regional fare collection system architecture is shown on the next page in Figure 3.
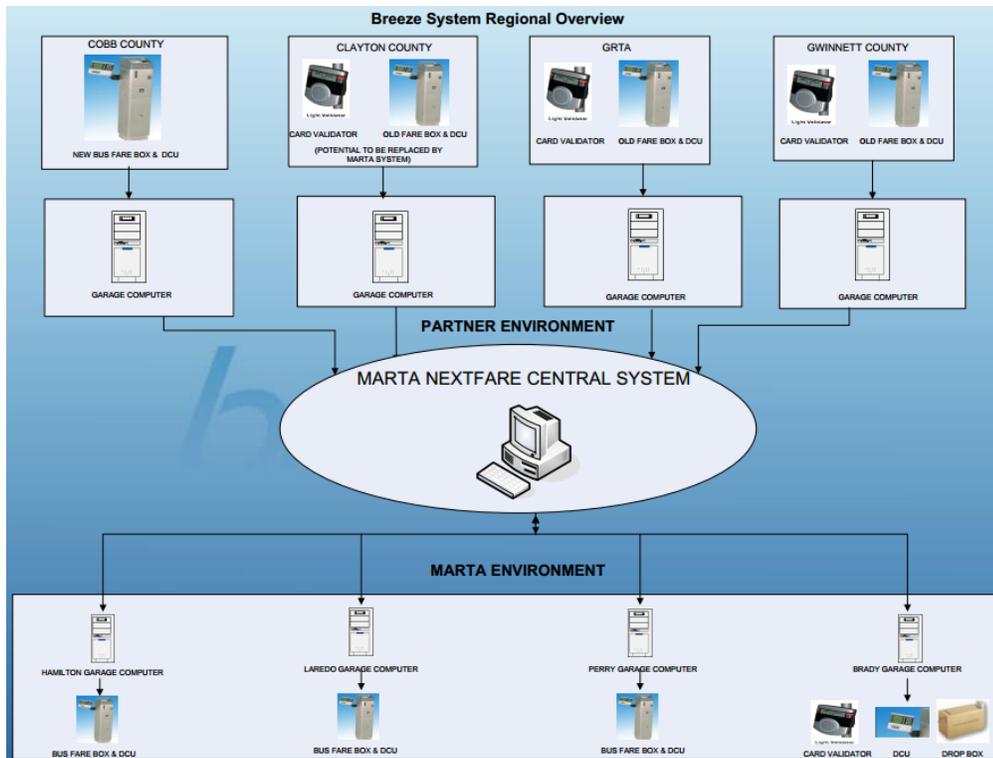
Figure 3. BREEZE Payment Processing and Data Transaction Flows (Source: [108]).

BREEZE Contract Structure

Under its original 2003 contract with MARTA, CUBIC was responsible for the following relative to the MARTA system and BREEZE [107]:

- Design of new automatic fare collection (AFC) system

- Procurement of all AFC Equipment for all modes and facilities (e.g. buses, trains, paratransit vehicles and parking lots)

- Installation across all modes and facilities

- Development of software transaction processing components/clearinghouse capabilities

- Development of all computer networking and communications infrastructure

- Operation of payments clearinghouse

- Maintenance of all new system components

- Repair of all new system components

Under its contract with CUBIC, MARTA was essentially only responsible for owning the equipment and thus was also responsible for its eventual replacement. As part of this agreement, MARTA stipulated that CUBIC will "allow regional partners to procure equipment items under the terms and conditions negotiated" by the authority [113].

The terms of MARTA's current maintenance contract with CUBIC have been slightly modified from those in the original contract. Under the second agreement, MARTA has required CUBIC to maintain a 99% uptime on the availability of replacement parts for BREEZE devices [114]. Additionally, MARTA has chosen to take over the duties of operating the regional clearinghouse, which sorts fare payments and distributes revenues to the regional transit partners, and has even had its IT department write the software in-house [114].

Existing Regional Agreements in Atlanta

MARTA led the effort to migrate to a smartcard-based automatic fare collection system beginning in 2003 and had completed its full deployment by July 2007 [113]. Due to MARTA's role as operator of the region's sole heavy rail system and most extensive bus network, as well as the USDOT's "strong encouragement" for the other operators to adopt smartcard technology, it did not take long for the other operators to see the merits of integrating their own fare collection systems with MARTA's new BREEZE system. The decision for the non-MARTA operators to go along with BREEZE essentially

became a reaction when MARTA announced its plans to close the rail system to cash and discontinue issuing paper bus-to-rail transfers as part of the BREEZE implementation strategy [112]. Thus, if the operators wanted to continue to provide their customers with convenient access (e.g. allow them to take advantage of a free transfer instead of paying two full fares) to MARTA's downtown core transit services, especially the region's only heavy rail network, then they were forced to, at least partially, integrate their existing fare collection systems with the MARTA's upcoming BREEZE devices and new communications systems.

In October 2004, representatives from each of the regional transit operators, as well as officials from each of the five core counties, the Atlanta Regional Commission, state transportation agencies (GA DOT and State Road & Tollway Authority) and federal transportation agencies (FHWA & FTA), met at MARTA headquarters to "explore implementation of smartcard technology [for the rest of the regional operators] as one of many methods to improve its [the region's] transportation system" [113]. As all of the partners believed that BREEZE could enhance the existing regional transit system, the group chose to create the BREEZE Card Regional Executive Steering Committee whose expressed purpose was "to further investigate regional smartcard application" for non-MARTA operators [113]. This group then created the BREEZE Card Task Force which was charged with working out all of the technical and implementation aspects related to deploying a single regional fare collection system across multiple operators. The BREEZE Card Task Force eventually became what is now known as the BREEZE Policy Group which meets on a monthly basis at the Atlanta Regional Commission to discuss fare collection issues among MARTA, GRTA, CCT and GCT.

In order to ensure the successful initial deployment of BREEZE, MARTA secured inter-local agreements with CCT, GCT, GRTA and the former Clayton County Transit (C-TRAN) between the summer and fall of 2006. The terms of these "BREEZE Participation" agreements are summarized below [115].

- 3 year term from the date of implementation.

- MARTA will supply each operator with "pre-encoded cards and tickets pre-loaded with value."

- MARTA will also supply each operator with "non-encoded cards and tickets for BVMs."

- MARTA will supply each operator with BREEZE tickets to the extent that they are needed.

- Operator of the first service boarded receives 100% of revenues for that trip.

- Each operator pays $3,000 per month plus a share of proportional costs, but no more than $4,000 per month to MARTA for its services as the regional clearinghouse operator (e.g. processing all of the BREEZE transactions that occur on the other operator's systems, issuing BREEZE fare media and distributing revenues).

- All operations are close door (e.g. inbound trips only) with the exception of GRTA.

- All operators will coordinate schedules with MARTA with the exception of CCT.

- Sharing of bus stops between MARTA and other operators.

- Each operator is provided with "supervisory and maintenance access to intermodal transfer areas of MARTA rail stations."

As it took a full two years for the regional partners to finally arrive at these agreements, it is no surprise that each of the non-MARTA operators has chosen to renew their original agreements with MARTA for reciprocal transfers and participation in the regional BREEZE fare collection system and delay what is sure to be a long renegotiation process [116].

In addition to the BREEZE Participation agreements, there is another set of agreements held between MARTA and each of the individual operators that date as far back as the late 1980s [117]. Under the current "Reciprocal Transfer" agreements, typical morning commuters on CCT/GCT/GRTA services can use their BREEZE card to transfer into the MARTA system for free and then, on the afternoon commute back, use their BREEZE card to freely transfer from MARTA services to CCT/GCT/GRTA [115]. It is important to note that these agreements only cover transfers for trips in which MARTA is playing the role of one of the connecting agencies (e.g. a customer cannot freely transfer between CCT/GCT/GRTA, regardless of whether or not they are using a BREEZE card, they must pay the full fare).

Furthermore, the reciprocal transfer agreements do not cover transfer between multiple operators' paratransit services [118]. According to a correspondent at GCT, this is mainly due to the fact that all of MARTA's reciprocal transfer agreements with the other operators were based on the original CCT agreement that was reached in 1989 [117]. As this agreement was signed prior to the passage of the Americans with Disabilities Act in 1991 and thus there was no federal requirement for transit agencies to provide ADA complementary paratransit services, the primary focus with the initial contract was on "how people are going to move between local and express buses to the

rail system" [118]. Therefore, the exclusion of paratransit services from the original CCT agreement was reasonable.

Regional Fare Issues in Atlanta

While MARTA's BREEZE system was the first all-smartcard fare collection system deployed in the United States, there still exist a plethora of issues which combine to inconvenience both frequent and infrequent riders. These problems have been classified into two categories:

1. Customer & Operational Issues
2. Regional "Big Picture" Issues

BREEZE's Customer & Operational Issues

There are a variety of customer convenience and operational issues that still exist with the nation's first all-smartcard system. First and foremost, according to a correspondent at the Atlanta Regional Commission, "not all of the [regional operators'] fare products are available through BREEZE right now" [119]. According to a correspondent at GRTA, the agency does not currently offer multi-ride tickets or passes for its services on BREEZE, just stored-value [120]. As GCT issues paper-based pass products, the only regional operator other than MARTA who provides for the ability to load all of their fare products onto BREEZE is CCT [121]. Given that one of the ultimate benefits of adopting a smartcard technology is that one medium can potentially be used across multiple operators' services, it appears that BREEZE still has room for improvement.

Next, the rollout of the web store, which supports the ordering of BREEZE cards, loading of stored-value and other account management functions for the BREEZE card system via the internet, was delayed five years from its originally scheduled launch date (2006) and finally came online in June of 2011 [122]. To add insult to injury, many of the non-MARTA operators' fare products were not made available for loading on the BREEZE web store until the middle of 2012 [121].

Additionally, there are many issues related to the BREEZE Vending Machines (BVMs). First, there have been periodic problems with accepting credit/debit payments at the BVMs and the BREEZE web store over the past two years [123]. These instances of inoperability usually last between three to four days and always seem to be caused by a distinct, unanticipated glitch in either the communications network or the clearinghouse software [124]. Due to MARTA discontinuing paper transfers and gating the rail stations as part of a necessary implementation strategy for the deployment of the BREEZE smartcard fare collection system, when the BREEZE credit/debit feature is down, there are only two ways to enter into the MARTA rail system: cash payment loaded onto BREEZE card at BVM or using existing stored-value on a BREEZE card [106]. Obviously, this is an inconvenience to most customers.

Also, none of the non-MARTA regional operators are in possession of these devices and thus when their customers want to purchase a BREEZE card patrons must either seek a MARTA facility (rail station or RideStore) or travel to the agency's headquarters [121]. Due to the fact that the majority of the regional operators' bus service into the MARTA system only occurs during the day, non-MARTA customers "have to purchase BREEZE cards during business hours" [121]. Furthermore, due to the

86

operational arrangement of their dual-fare systems, GRTA & GCT do not allow for customers to load value onto BREEZE cards on their buses and thus customers on these services must either travel to a MARTA BVM or the BREEZE web store to reload their BREEZE cards [120]. Thus, in terms of the availability and usability of BREEZE cards for regional transit customers who are not already riding the MARTA system, there is, once again, room for improvement.

Aside from not offering all operators' fare products, long-term delay of the web store launch and inconveniences related to the BVMs, there are fundamental barriers to the facilitation of transfers within MARTA and across the other operators that have arisen. First, customers paying their MARTA fares with cash on-board buses must have a BREEZE card in order to be eligible for a transfer, as MARTA has discontinued issuing paper-based transfers [125]. Also, patrons who first board a non-MARTA service and wish to transfer into MARTA are not entitled to a free transfer if they are utilizing non-MARTA pass products or are paying their first fare with cash [126]. Furthermore, MARTA recently discontinued issuing and accepting the contactless BREEZE tickets [127]. Thus, in order to receive a free transfer on MARTA services, whether internal or external, the customer must utilize a BREEZE card. While this incentivizes adoption of the smartcard as a universal fare payment medium, it is not necessarily convenient for infrequent MARTA riders and, as has been shown above, can still become inconvenient for frequent GCT, CCT and GRTA patrons.

Additionally, there are two critical issue related to BREEZE's ability to provide customers with a convenient means of paying fares on-board buses. MARTA's bus fare boxes only allow BREEZE cards to be reloaded using cash [128]. Thus, patrons who

desire to utilize a credit/debit card cannot do so. Given that the current trend in the retail and payments industry is towards credit/debit utilization and the general trend since the introduction of financial networks and the birth of credit cards has been for people to carry cash less and less, this is potentially a major source of customer inconvenience, especially for visitors who are not familiar with MARTA's particular fare payment policies. In addition to not being able to utilize credit/debit payments on-board buses, patrons on a bus can only load stored-value onto their BREEZE cards (e.g. bus customers cannot load reduced fares, trips or pass products). Thus, bus-only patrons who wish to utilize the reduced rates offered by MARTA must, at some point, travel to a rail station or RideStore. While having to travel to these facilities is not difficult due to the fact that MARTA has structured its bus network to feed into its rail system, these trips, nevertheless, require the patron to contribute both their time and money.

Regional "Big Picture" Issues for Atlanta

Besides the customer inconvenience issues, there still exist a number of regional equity and participation issues related to the operation and maintenance of the existing BREEZE regional fare collection system, as well as variations in fare policy among the operators, that will affect the region's ability to move forward with the next generation of fare collection systems and incorporating new payment technologies. First and foremost, there are cost disparity and equity concerns, between both the operators and MARTA and between the non-MARTA operators themselves, related to MARTA's operation of the BREEZE system in general and the regional payments clearinghouse in particular. According to the July 2011 RTC Meeting Minutes, "MARTA was [and still is]

shouldering a large share of the costs associated with the upkeep of the [BREEZE] regional [fare collection] system" [116].

According to a presentation given to the MARTA Board of Directors in June 2011 related to the authority's study of implementing a variable-based fare system, Table 4 below represents the BREEZE utilization rates of all of the metro Atlanta regional transit operators circa 2011 [129].

Table 4. Summary of Regional Fare Transactions Processed with BREEZE System.

Transit Agency	% BREEZE Transactions	% Non-BREEZE Transactions
MARTA	100	0
CCT	100	0
GCT	24	76
GRTA	5	95

Both MARTA and CCT run all of their fare payments through the BREEZE system while about one in four trips on GCT and one in twenty trips on GRTA result in a fare payment being processed through BREEZE. Despite the fact that there are different rates of utilization between the non-MARTA operators, each agency, nevertheless, contributes the same annual amount ($36,000) to support MARTA's efforts to operate, maintain and manage the regional BREEZE fare collection system.

Appendix A contains a regional fare cost allocation exercise that looks at what each regional operator would contribute to the BREEZE system if the contributions from the non-MARTA operators were actually allocated based on logical performance measures, such as the transit services provided (e.g. number of unlinked passenger trips, number of passenger miles traveled) or the number of each non-MARTA operator's transactions that are processed through BREEZE.

Table 5 below provides a summary of the results from the exercises in Appendix A and uses red text to indicate that the specific agency would be paying the additional amount listed to MARTA if the specific cost allocation or performance metric is used to divvy up the costs of operating and maintaining the BREEZE system (e.g. MARTA is currently subsidizing the agency this amount relative to the terms of the existing BREEZE Participation agreements) and blue text to designate that the specific agency would be saving the amount listed relative to its current payment to MARTA based on the allocation metric (e.g. specific agency is currently overpaying MARTA the amount listed relative to the terms of the existing BREEZE Participation agreements).

Table 5. BREEZE Participation Agreement Regional Operator Equity Table

Agency	BREEZE Utilization Rate	Unlinked Passenger Trips	Passenger Miles Traveled	BREEZE Transactions
MARTA	100%	$606,712	$1,150,875	$635,573
CCT	100%	-$590,911	-$867,568	-$617,549
GCT	24%	-$40,611	-$268,384	-$18,939
GRTA	5%	$24,810	-$14,924	$915

From Table 5, it is apparent that MARTA is providing a substantial subsidy to all of the other regional operators, especially CCT, by operating and maintaining the BREEZE regional fare collection system, regardless of which performance metric is used to allocate the contribution costs. Based on the fact that all of the numbers are red for CCT, it appears that CCT is not covering its fair share of BREEZE transaction costs, regardless of the allocation metric used to distribute the costs. This disparity exists because of the fact that CCT processes all of its fare payments through BREEZE and yet pays the same contribution as the other operators who run a significantly lower amount of transactions through the regional fare collection system. Except for the condition in which fare

revenues are divided among the operators based on passenger miles traveled, the only agency that is not currently underpaying MARTA for its services as operator of the regional clearinghouse is GRTA. While it is obvious that the flat-fee structure of the existing BREEZE Participation agreements creates disproportionate cost burdens on MARTA due to its operation of the regional clearinghouse, there is the bigger issue of the fact that the regional partners only pay MARTA to operate the regional clearinghouse. Although there are certain necessary elements and functions that are required to operate the BREEZE system (e.g. operating the web store, call center and customer support services, account management), none of the non-MARTA operators subsidize any portion of these expenditures.

Additionally, while the majority of the trips provided for by the reciprocal transfer agreements are based on a trip with two ends (e.g. one transfer), MARTA and GRTA are the only two agencies that can functionally serve as a middle segment of a two transfer regional trip. Under the current arrangements, the agency operating the first service boarded collects 100% of all of the fare revenues from a regional trip. Thus, in most cases where there is only one transfer being made, there are no major equity or revenue sharing issues with the current arrangement for round-trips, as one agency will be paid for the inbound trip and the other agency will be paid for the outbound trip. However, as can be seen on the next page in Figure 4, MARTA and GRTA are the only agencies that can functionally serve as the middle parties in the rare case that a passenger wishes to utilize two transfers for a regional transit trip.
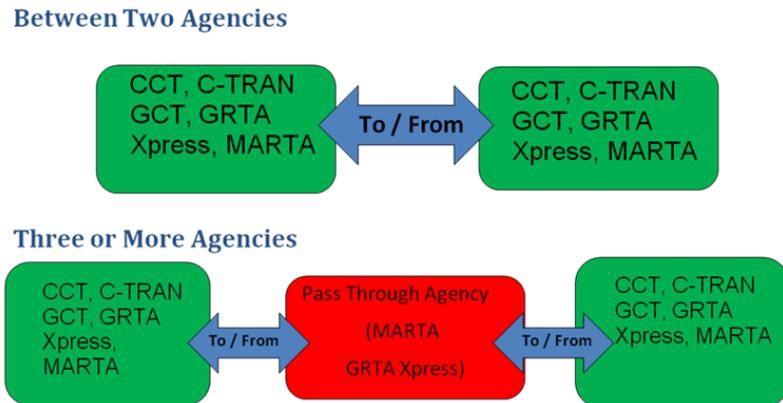
Figure 4. Atlanta's Regional Transit Transfer Scenarios (Source: [115]).

Thus, under the current arrangement, neither of these agencies is rewarded for carrying what is likely to be the critical long-haul (e.g. GRTA commuter bus or MARTA heavy rail/local bus) portion of a truly regional transit trip.

Under the terms of the original BREEZE Participation Agreement, MARTA and the other three operators were to renegotiate the terms of the agreement three years after its initial signing date in 2006 (e.g. 2009). However, as all of the parties expect that this will be a lengthy process that will require the mutual balancing of internal and regional interests, renewal agreements have not been reached. As MARTA is already under significant financial pressures due to its operation of the BREEZE regional clearinghouse, "ARC has proposed an additional $1 M annually in regional funds to sustain the system for up to five years while a longer-term [BREEZE Participation] arrangement is negotiated" [116]. Although approximately $4 M of the $5 M grant from ARC will go toward funding general preventive maintenance for BREEZE system components, this grant will also fund an effort to ensure that all of the regional operators' fare products are available through BREEZE [119]. This stopgap measure enhances the capabilities of the existing BREEZE fare payment system by incorporating the majority

of the other operators' fare products and provides MARTA with additional subsidy that will, at least temporarily, relieve the financial burden related to the clearinghouse operation.

Another issue of regional significance with respect to upgrading the existing fare collection system, is the fact that the regional operators undertook their own independent deployments of the BREEZE system and its devices on their systems at different points in time, with MARTA doing a general public rollout in October 2006, with CCT following in February 2007, GRTA in August 2008 and GCT in August 2009 [108]. While these rollouts were not independent in the sense that there were regional BREEZE coordination meetings during each of the deployments, the separation of the system launches over a three year span has created a potential issue in that each agency's fare collection equipment was procured at a different point in time using some portion of federal funding.

Thus, due to the distinct deployments, each operator's fare collection devices will have a different end to what FTA considers its 10-year useful life. This is a problem because unless a transit provider desires to issue a refund to the USDOT for the federal government's share of the existing equipment's procurement costs, it must continue to use the existing equipment until the end of the 10-year term. Therefore, MARTA will not have the capability to replace its existing fare system until 2016 [115]. Furthermore, the other agencies will not be eligible to receive federal capital funding for new fare collection equipment that is interoperable with the new system until at least a year after MARTA's assumed deployment. In other words, assuming MARTA is looking to move forward with a new fare collection system when it is once again able to apply for federal

capital funds to be put towards the procurement of new devices, a long discussion will need to be had between the BREEZE partners as to how to phase the new deployment while still providing for interoperability between the existing BREEZE devices that will still be used by the non-MARTA operators and the new MARTA devices.

Also, despite the fact that each agency worked jointly with MARTA and GRTA to procure its existing BREEZE fare collection equipment MARTA's contract with CUBIC, each individual operator owns all of its fare collection equipment [115]. This was not a problem initially, as CUBIC provided a one-year warranty on all of its provided equipment. However, after the warranty's expiration, CCT and GRTA (e.g. all of the non-MARTA operators except for GCT) all decided to shift their fare collection equipment maintenance responsibilities in-house [120 & 121]. In general, the more independent parties who are working on separate elements of what is supposed to be an interoperable system, the more likely it is for there to be gaps in interoperability (e.g. introduce additional degrees of freedom to a system, it will be harder to predict what will happen). Thus, an ideal environment for maintaining interoperability between each operator's BREEZE devices would consist of one set of personnel who are in constant contact with both each other and the regional fare collection system.

However, as each agency must work within the confines of a limited budget, the consideration of the cost to maintain the BREEZE devices always comes into play. Depending on the size of an agency's "fleet" of fare collection devices and its own internal knowledge related to the maintenance of fare collection devices, it might make too much sense for an agency to delegate its maintenance responsibilities to either a third party or in-house (e.g. not with CUBIC). According to a correspondent at GRTA, while it

made sense for the agency to take advantage of CUBIC's maintenance staff during the warranty period, when GRTA sent the provided equipment back to CUBIC after the warranty expired, the vendor's prices were simply too high. "It would have been cheaper to buy new equipment that sign-on for a new maintenance contract [with CUBIC]" [120]. Luckily enough, some of GRTA's personnel are former MARTA employees who interacted with the CUBIC team during the initial deployment of BREEZE and, thus, allow the agency to avoid signing a "cost-prohibitive" maintenance contract with the vendor [120].

As mentioned previously, due to the absence of the federal ADA complementary paratransit requirement for fixed-route transit operations when the agreement was reached, the initial exclusion of paratransit services from the original CCT-MARTA Reciprocal Transfer agreement was reasonable. Currently, only some of the paratransit vehicles within the region are equipped with BREEZE light validators [119]. Thus, paratransit customers who wish to travel on the services of more than one operator must use cash for most trips taken across the region and are not eligible for free transfers between any combination of operators [119].

The final "big picture" issue essentially originates from the age-old tension that has plagued all transit agencies: finding the right balance between providing for customer convenience and enhanced operations (e.g. meet market demand), on the one hand, and securing the firm's ability to recuperate the expenses that arise due to its attempt to meet the expectations of its consumers (e.g. stay afloat financially). The combination of the BREEZE Participation agreement and MARTA's Reciprocal Transfer agreements with the other regional operators definitely serves to incentivize the use of both transit, in

general, and BREEZE as a means of fare payment, in particular, for multi-jurisdictional trips. Thus, by providing for interoperable fare collection technologies and seamless transfers among operators, it seems that MARTA and the regional operators have adequately taken care of the market demand side of the equation. However, in so doing, they may have shifted the equilibrium a little too far to the left.

The two regional transit fare collection and policy agreements have detrimentally impacted the fiscal health of each of the transit agencies because, in terms of regional trips, the operators are, by and large, still providing the same amount of service, but are collecting only half of the revenue. The "first service boarded collects all of the revenue from a regional trip" clause within the BREEZE Participation agreement was not originally intended to be the final means of allocating regional fare revenues. However, it was agreed to initially due to the general uncertainty surrounding patrons' propensity to use multiple operators' services and also in order to avoid having to incorporate a lengthy accounting process, which would determine the percentage of services rendered by each operator on a multi-operator trip and thus allocate revenues based on a metric that more accurately reflects that amount of services rendered (e.g. agency costs incurred), into the BREEZE software's business rules.

Regardless of the initial motivations for adopting the "first service wins" clause into the BREEZE participation agreements, if MARTA and the other regional operators are to continue to provide for free seamless inter-operator transfers while, at the same time, remaining out of financial trouble and avoiding service cuts, then a new revenue allocation metric that is based on the pay-per-use principle (e.g. customer pays each

individual operator for delivering a portion of his/her multi-operator regional trip) must be adopted.

Conclusion for Atlanta Case Study

While the BREEZE system and its relevant inter-local agreements have provided many of Atlanta's transit patrons with added ease when transferring between MARTA and GRTA, CCT and GCT, there still exists a variety of operational issues with the existing system and, more importantly, cost and equity disparities among the regional transit operators with respect to equally contributing for the services rendered by MARTA in support of BREEZE. Under the terms of the BREEZE Participation Agreement, each operator pays MARTA $36,000 annually for fulfilling its duties as the operator of the regional fare payment clearinghouse (e.g. back-end), regardless of the amount of fare transactions that the operator runs through BREEZE. Under the terms of the Reciprocal Transfer agreements, a BREEZE card can be utilized to transfer between MARTA and all of the other operators' services but not between the non-MARTA operators.

In general, these two agreements are good for customers (e.g. they pay a single fare for a trip on two transit agencies), but bad for the transit agencies, especially MARTA. The primary cause of the BREEZE system's financial inequities is the fact that the contributions from the regional partners are not based on a pay-per-use metric and are instead composed of a single flat-fee that is uniform for all operators regardless of their individual BREEZE utilization rate. It should be stated that any changes to this arrangement would likely involve a long-term consensus building period and one of the operators making a highly political decision. However, if the regional partners decided to

implement a pay-per-use regional fare revenue distribution metric, as opposed to the existing arrangement in which the operator of the first service boarded gets all of the revenue, then a new fare collection system which is based on open payments and/or mobile ticketing would likely streamline the distribution and accounting process.

CHAPTER 10

CASE STUDY OBSERVATIONS & COMPARISON

Project Development Process

While DART had a Concept of Operations document completed in November 2011 and is expecting to have system-wide implementation by late 2014, the usual timing between an RFP being issued for a next-generation fare collection study and the full deployment of the new fare system is between four and five years. With a few minor exceptions, the sequence of the project development process for these four transit agencies to implement their new fare collection systems is outlined below.

1. Award RFP for Study

2. Develop Needs, Desires & Expectations of New Fare Collection System

3. Release RFQ, Issue RFP & Award Contract to Vendor for New Fare Collection Project

4. Solidify Expectations of New Fare Collection System with Vendor

   o This is often the time when transit operators define the business rules which incorporate the agency's fare policies, structures and transfer agreements with other regional operators into the payment processing and transaction settlement software.

5. New System Design & Development

6. New Prototype User Testing

7. Reiterate New System Design & Development, if necessary

8. Procurement of Equipment for New System

9. Upgrade Existing Equipment to Interface with New System

o This can be strategically done during the Pilot Deployment of the New System. The risk, however, is that if the pilot does not pan out well, then the agency could be temporarily without a working fare collection system.

10. Simultaneously Operate Two Different Fare Systems – with a partial exception for Toronto

    o New System Installation, Configuration & Testing

    o Pilot Deployment

        ▪ Generally 6-9 months before rollout on each mode

    o System Updates, if necessary

    o Rollout on Initial/Selected Modes

11. Phase Out the Existing Fare Collection System

    o This should only be done once the agency is finally confident and ready (e.g. satisfied with the development and current operation of the new fare collection system).

    o Usually begins with ceasing the sale of pass products loaded onto the existing media during the pilot or a few months before full rollout of the new system. Ultimately occurs when the transit agency has stopped accepting old fare media (e.g. tokens, paper-based fare products and/or magnetic-stripe cards).

12. Rollout on Additional Modes

    o This is sometimes done before phase out of the existing system.

13. Adoption of Additional Open Payment Methods & Technologies

- o These payment methods and technologies include Mobile Ticketing, Contactless Bank-issued Credit/Debit, Near-Field Communications Devices (e.g. contactless smartphones linked to digital payment accounts like GoogleWallet), RFID tags and frequency operated buttons (e.g. school, government or employer-issued identification badges).

14. Launch of Other Payment Features & Innovative Fare Polices

- o These elements either allow customers to pay for other transit service elements (e.g. parking, in-station concessions or car-share service) or allow the agency to pursue alternative sources of revenue through partnership programs (e.g. Joint Ticketing with special events, Couponing with transit-adjacent retailers, etc.).

Preferred Payment Methods

Often after soliciting extensive input from key stakeholders within the organization, other regional transit operators and the general public, the personnel at each of these transit agencies come to finally arrive at and adopt a preferred method of payment(s). It should be noted that all case studies surveyed will utilize a transit agency-issued contactless smartcard that has a pre-paid debit option. However, out of those who have made a firm decision, Dallas is going ahead with mobile ticketing and Chicago is deploying open payments right out of the gate.

Dallas decided to develop a mobile ticketing application for two reasons. First, whereas allowing for open payments necessitates a purchase of new hardware, this approach does not involve significant capital costs upfront (e.g. pay consultants to develop software, host website for dissemination of ticketing application). Secondly, the

agency believes this method's cost-to-collect will be substantially lower than its current collection system and definitely lower than that of open payment technologies due to the associated transaction and processing fees incurred for each micro-payment.

Chicago selected open payments as its preferred method of fare collection and will initially push the use of bank-issued contactless credit/debit cards. As mentioned earlier, the Philadelphia region's PATCO and New York City's PATH have already conducted limited pilot deployments for contactless credit/debit cards. Both agencies reported that their pilot, from a customer satisfaction and operational perspective, was a success. Nevertheless, they chose to eliminate the acceptance of contactless credit/debit cards for transit fare payment once the financial institutions that were sponsoring the pilot programs ceased footing the bill for all of the transactions fees. Therefore, CTA negotiated a contract with its current vendor that would allow the agency to go ahead and deliver a new customer-approved payment method without taking on any long-term financial risks. In the event that open payments result in higher than anticipated expenditures due to CUBIC's variable "per tap" fee, which could happen if the new method is widely adopted, CTA is not barred from exploring and implementing mobile ticketing.

Philadelphia and Toronto, who undertook a mobile payment pilot in June of 2012, have decided to slowly phase in these alternative methods of payment (e.g. not agency-issued contactless smartcards) as their new fare collection systems are deployed over time, primarily due to the uncertainty of how open payments will work for the transit industry. These two agencies will initially rely on agency-issued contactless smartcards that will incorporate a pre-paid debit account. As a result of their patience, these regions

will have the added benefit of being able to learn from the experiences of Dallas and Chicago and make a more informed decision.

Contract Structure

All of the case study agencies, with the exception of Dallas, chose to seek one vendor for every aspect of developing and deploying their new fare collection system. The non-Dallas agencies likely chose a single vendor in order to reduce the degrees of freedom and uncertainties related to any potential interoperability issues that may arise due to multiple teams of personnel installing separate components of what is to ultimately become an integrated communications and hardware network. Thus, the more hardware-intensive transit agencies have likely enhanced the predictability of the implementation timeline and ultimate reliability of their new fare collection system by putting all of their eggs in a single basket.

Dallas chose to award multiple contracts due to the project's relatively unique phasing plan, which favors mobile ticketing being deployed before any hardware. As the agency knew it would have to eventually upgrade some of its existing infrastructure, but wanted to move forward with mobile as soon as possible, the organization logically chose to separate out the various elements of its long-term project into multiple piece-meal contracts that could be awarded when the time is right. Dallas has decided to bundle its contract for new readers, the authentication system, the transaction settlement engine and the data warehouse functions for its new fare collection system. In DART's side of the equation, the agency is responsible for: negotiating with its current vendor to replace fare boxes and upgrade existing ticket vending machines; securing an inter-local agreement with the North Texas Tollway Authority who will be performing the account

management services for the new system; and awarding three contracts for its media issuance (e.g. transit card network), mobile ticketing application and the installation of a wireless communications network.

Other Regional Transit Partners within Contracts

Toronto and Philadelphia were the only regions surveyed to not include additional transit operators within their awarded contracts for the deployment of new fare collection technologies and methods. In the GTA, this was trivial because all of the other regional transit operators already had a contract with TTC's new vendor, Metrolinx/PRESTO.

In the case of Philadelphia, the failure to incorporate connecting transit services into the contract mainly resulted from three different agencies investigating the future of their fare collection systems independently. As indicated in the interview, PATCO launched the Freedom smartcard less than a decade ago and will likely be sticking with this decision for the remainder of the system's FTA useful life. NJ Transit recently undertook a contactless credit/debit pilot that was successful, but was, nevertheless, ended once the cost of the transaction fees was no longer subsidized. SEPTA's existing fare collection system is far beyond its useful life and has been cited as a barrier to using the transit system. Due to the temporal gaps between the deployment of different fare payment systems across the Philadelphia region and the significant capital costs that would be incurred by each of the regional transit operators if the decided to join SEPTA's NPT effort, SEPTA was forced to go it alone.

DART in Dallas and CTA in Chicago both found a way to bring other connecting transit services on-board for their fare collection system upgrades and replacements respectively. As the three parties in Dallas already had an extensive history of coming

together to provide a regional amenity for citizens of the metroplex (e.g. a simple Regional fare that allows for transfers across all modes and agencies with a universal ticket or magnetic-stripe pass), it is not surprising that they once again united to deliver a mobile ticketing application to all of their riders. The effort related to developing a mobile ticketing software platform is mainly expended on developing the code that will support the program's core functionalities. Minor alterations to the visual display of the software, such as changing the agency logo at the top of the page, and the development of inter-operator business rules, which allow the program to price and distribute revenue from trips across multiple operators based on the various fare policies and structures in-place, are the only changes that need to be made to allow a mobile ticketing platform developed for one agency to be used by another.

As CTA already had an agreement in-place with Pace to accept CTA Transit Cards and Chicago Cards on Pace bus services, it is, similarly, unsurprising that CTA allowed Pace to be added as an option to its Ventra contract with CUBIC in order to procure new on-board readers for the commuter coaches. It is important to note that while CTA's terms stipulate that CUBIC will maintain the new devices installed on CTA premises and also cover all transaction fees associated with processing fare payments through Ventra, Pace has decided to seek its own vendor for maintenance services on the new devices and has also chosen to taken on the risk of paying its customers Ventra transaction fees.

Special Features within Contracts

Each of the agencies surveyed had at least one special stipulation within its contract with the vendor. In Dallas, DART demanded that the vendor of its upcoming

new fare collection system be able to incorporate differential fares and parking pricing for residents and non-residents of Dallas County. Also, due to its operation of America's most extensive light-rail network, DART wanted to allow itself to pursue alternative streams of revenue by engaging in couponing and joint ticketing activities. In Philadelphia, SEPTA decided to let its vendor operate the new fare collection system for the full life of the new equipment's warranty. At the end of the warranty period, if the agency sees that it is in its best interest to do so, SEPTA will renegotiate with the vendor for a new operations and/or maintenance contract.

In Chicago, CTA allowed itself to pursue implementing open payments by incorporating a clause that would mitigate its primary source of uncertainty and hesitation related to this pursuit. By negotiating an agreement where the vendor takes on the risk of higher than expected costs stemming from transaction fees associated with micro-payments for transit fares, CTA allowed itself to provide customers with additional convenient methods of payment without endangering its ability to operate service over the long-term. Additionally, CTA negotiated with CUBIC to secure half of all non-transit revenues that arise from retail transactions processed through the Ventra payment network.

In Toronto, there were many special clauses that were incorporated into the final agreement between TTC and Metrolinx, primarily due to the fact that the two agencies had not seen eye-to-eye on the PRESTO system from its inception. The first round of PRESTO did not adequately respond to the business requirements of TTC. Also, the TTC only engaged in a limited deployment of PRESTO because the agency did not want to spend significant capital funding on a new fare collection system that did not provide for

open payments. As there seems to have been some mistrust between the two agencies, TTC incorporated the following clauses into the final agreement: Metrolinx, not TTC, is responsible for owning, operating and maintaining all PRESTO-related equipment and devices; Metrolinx/PRESTO will reimburse the TTC for any lost revenues that result from PRESTO system down-time; and the TTC maintains the right to sign-on privileges at key points within the project development process (e.g. preliminary design, system testing, final design, procurement, etc.).

Changes to Existing Operating Environment & Collection Scheme

The only case study that was forced to change its existing operating environment due to its new fare collection system was Philadelphia. SEPTA operates Regional Rail services that utilize a conductor to validate fares. All of these rail lines feed directly into several hubs located in high-traffic Center City Philadelphia transit stations. As these stations are interchanges that are, by nature, multi-modal, a problem arises when customer travel between modes utilize different approaches to collecting and validating fares. In order to combat any potential fare evasion issues that might result from Regional Rail passengers freely transferring onto subway lines within the station, SEPTA has decided to install barriers at these major hubs. While this is not a change that should significantly affect how fare paying customers interact with the transit system, it is, nevertheless, a change that requires capital investment and labor costs on behalf of SEPTA.

In Dallas, gates will be installed at selected light-rail stations contingent on the adoption of a distance-based fare system by DART. Although these installations would not be due to the deployment of the agency's new fare collection system, this would,

nevertheless, be a change to the operating environment. DART's light-rail services currently employ a proof-of-payment (POP) approach to collecting and enforcing fares. Thus, a change in DART's fare structure would necessitate the installation of readers at these stations to record the customer's origin and destination in order to allow the fare collection system to apply the appropriate fare.

Account Management Services

One interesting difference among these case studies is the delegation of the duty to provide account management services for the new fare collection system (e.g. hotlisting, customer service and database management for the accounts that are linked to the agency-issued contactless smartcards). SEPTA is the only transit agency who has decided to continue to keep its account management functions in-house. This is likely due to the fact that the agency does not currently utilize a smartcard system. All of the other agencies surveyed, with the exception of Dallas, have chosen to let their vendor take care of these activities. Due to the unique project development arrangement in Ontario, a significant similarity exists between Dallas and Toronto in relation to the delegation of account management services.

As mentioned above, Dallas has contracted with the NTTA to manage the transit accounts for its new fare collection system. Given that DART manages HOV lanes across the region and NTTA manages the regional "TollTag" program (e.g. RFID device linked to pre-paid account used for express toll payment), the Dallas Fort Worth metroplex, from a technological perspective, is capable of employing some truly innovative transportation demand management policies. By having the transit agency team up with

the only entity that makes automobile users pay to drive across the region's roads, Dallas

might be able to encourage a modal shift.

In the Greater Toronto Area, Metrolinx, which is roughly a hybrid of a State DOT

and a Regional Transit Authority (e.g. responsible for planning and funding roads and

transit across the entire province) and operates the GO Transit regional commuter rail

services, developed the initial version of PRESTO and has expanded its use across all of

the region's transit operators. Additionally, Metrolinx, through its PRESTO operating

division, handles the provision of the account management services for all PRESTO

cards across the entire province of Ontario. By developing PRESTO NG and working to

incorporate one of the largest public transit providers on the continent (TTC) into the

mix, Metrolinx, as a policy-making agency that houses a significant operations division

(GO Transit), has provided itself with the ability to implement new alternative programs,

such as the commuter rail loyalty rewards program and PRESTO co-fare reduced rate

inter-operator transfers program, that incentivize the general public to use transit and

provide the planners with a greater capacity to truly impact how citizens move across the

GTA.

Scale of Deployment & Approach to Hardware

Out of all case studies surveyed, Dallas is, once again, the exception to the rule

with regard to hardware deployment. While the other three transit agencies are attempting

to completely replace (e.g. Chicago and Philadelphia) existing fare collection systems

that are far beyond the end of their useful life or are engaging in a system-wide overhaul

(e.g. upgrading of all the existing fare system equipment to meet new standards a la

Toronto), DFW's current fare collection system is still fully functional. Thus, DART and

the other agencies have chosen to forego system-wide hardware upgrades in favor of strategic upgrades in order to avoid incurring significant capital costs which could be federally subsidized once the existing fare collection equipment has passed beyond its FTA-declared useful life.

Presence of an Existing Smartcard

Toronto and Chicago were the only two case studies surveyed that were already utilizing a smartcard for fare payment. While Toronto avoided a full deployment of Metrolinx's smartcard-version of PRESTO and only chose to install PRESTO devices at 14 of TTC's 69 subway stations, CTA went all-in with the Chicago Card. However, due to the fact that pass products can only be loaded onto the account-based Chicago Card Plus, CTA customers did not meet the agency's level of enthusiasm for the new medium. Aside from basic issues related to the high cost of utilizing proprietary smartcards, the presence of an existing smartcard does not significantly affect an agency's decision to pursue a new fare collection system. Since all of the new deployments will utilize a transit agency-issued contactless smartcard with GPR capabilities to avoid possible environmental justice claims, smartcards are here to stay anyway.

Motivation & Rationale for Adopting Open System Architecture

The fundamental characteristic of the next generation fare collection systems is a general move away from closed-loop or proprietary system architectures to "open" system architectures. Closed-loop systems utilize specialized equipment, patented software packages and proprietary communications protocols developed by the individual vendor. Therefore, any change, whether major or minor, that a transit operator wishes to

make to the existing collection environment, such as introducing an innovative fare product or incorporating reduced transfer fees to connecting operators, requires the involvement of the vendor due to the fact that this entity and its staff are the only ones who know what is going on "under the hood." Furthermore, the vendors have become notorious for requiring change orders and thus additional payments from the transit agency to remove minor bugs and glitches that mysteriously arise years after the system was originally tested and successfully deployed.

Thus, closed-loop systems often provide the vendor with significant revenue collected from relatively easy-to-implement change orders and leave the transit agency stuck between a rock and a hard place with little flexibility (e.g. save money by not submitting a change order to vendor and thus fail to respond to changing demands for transit service or implement fare changes and hope that your strategic decision affects ridership and revenue enough to offset the cost of the change order). Across the board, all of the agencies surveyed, especially those with smartcards already in-place, noted that the high cost of operating and making changes to their current closed-loop system was a primary motivating factor for adopting a new fare collection system. Even Chicago, who is staying with its current vendor (CUBIC), has chosen to implement an open system architecture.

Open system architectures allow the transit agency to enter into the marketplace and have multiple vendors compete for their money. The hardware devices are non-proprietary and thus their operating elements can be easily inspected, thereby allowing the transit provider to train its own staff in-house to maintain and repair the equipment or seek external services. Regardless of who ultimately services the equipment, the

important thing is that the transit provider now has the ability to seek more than one bid for a given change order.

More importantly, open architectures utilize non-proprietary communications protocols that have been adopted by the financial and payments industries. Thus, agencies operating open system architectures are no longer left in the dark with respect to what data is being sent, where and how it is being processed, etc. In conclusion, open system architectures equip transit agencies with the flexibility required to meet the changing demands of the market (e.g. provide the agency with the ability to make changes without incurring significant financial penalties) while at the same time allowing the agency to utilize the power of the invisible hand to operate their fare collection systems in a more cost-effective manner.

Phasing of Deployment across Different Modes & Simultaneous Operation of Fare Collection Systems

While Toronto is still undecided as to the timing of implementing its new fare collection system across its many modes, the other agencies have taken two distinct approaches to multi-modal deployment. Philadelphia and Chicago have decided to install and configure their new equipment in one fell swoop across the bus, heavy rail and light-rail (Philadelphia only) modes while Dallas has decided to segment its deployment based on two general phases, acceptance of mobile tickets and hardware installation, and further break up the implementation across each mode.

While CTA cannot ultimately control whether or not commuter rail customers in Chicago utilize open payments (e.g. Metra is responsible for setting fares and dictating acceptable means of payment), SEPTA, as the operator of Philadelphia's Regional Rail

network, has chosen to delay implementing its project on commuter rail until all of the other modes have been successfully deployed and are fully functional. This is a strategic decision by SEPTA as implementing NPT on its Regional Rail services will certainly require the gating of its downtown rail stations. However, the authority does not know whether it would be more cost-effective to gate the outlying Regional Rail stations or simply let a few suburbanites evade the fares. In order to make a truly informed decision related to a major capital investment, SEPTA has installed mini-surveillance centers in its to-be-gated Center City stations in order to determine what effect its attempt at closing the Regional Rail system will have on fare evasion.

Dallas is the only agency that will use two distinct sequences of deployment across different modes based on the type of payment method or technology implemented. As DART is leading the charge with mobile ticketing, it will first begin deploying its new fare collection system by accepting standard tickets and QR codes displayed on a smartphone as fare payment on its light-rail services. Assuming this does not result in substantial customer inconvenience, the agency will then expand mobile ticketing's use to the Trinity Railway Express commuter rail operations. Finally, due to the fact that bus drivers are not accustomed to reading tickets from a phone and the use of QR codes would necessitate the procurement and installation of light validators, bus customers will be the last market segment to make use of mobile ticketing.

After mobile ticketing has been launched system-wide, DART will then begin performing its strategic upgrades to the existing fare collection equipment. DART's bus operations currently utilize a pay on-board approach to fare collection and its light-rail operations, along with the TRE commuter rail service, operates using a proof-of-payment

approach to fare collection. As bus customers are more likely to pay their fares relative to light-rail customers, due to the presence of a uniformed employee at the point of entry, DART has chosen to upgrade its hardware on buses first, followed by rail.

CHAPTER 11

CASE STUDY CONCLUSIONS

This section provides general conclusions from the experiences of other transit agencies that are moving forward with a new fare collection system. These conclusions will then be used in the next chapter to provide recommended strategies for moving Atlanta forward into the next generation of fare payment methods and technologies based on its current political and institutional climate and the existing operating characteristics of MARTA and the other regional transit operators. The next seven pages contain the following tables listed below, which summarize the information presented within the case studies and provide an easy reference for comparison of the implementation approaches taken by the four transit agencies, and will be followed by a general discussion related to key characteristics of and considerations for the next generation fare collection systems.

- "Before" or Existing Fare Collection Systems
    - Table 6 – Existing Fare Collection Systems & Transfers
    - Table 7 – Existing Inter-agency Agreements & Collection Arrangements
    - Table 8 – SWOT Analysis of Existing Fare Collection Systems
- "After" or Future Fare Collection Systems
    - Table 9 – Summary of New Fare Collection Systems & Motivating Factors
    - Table 10 – Accepted Methods of Payment & Modal Phasing for Upcoming Deployments
    - Table 11 – Summary of Contract Terms & Structure of Agency's Agreements with Vendor

- o Table 12 – Implementation Strategies & Regional Efforts within the Deployment of New Systems

Table 6. Existing Fare Collection Systems and Transfers

Category	Type/Feature	Dallas (DART)	Chicago (CTA)	Philadelphia (SEPTA)	Toronto (TTC)
Cost-to-Collect		14%	Not Shared	15-18%	7%
Payment Methods	Cash	Single-Ride (Bus Only)	Single-Ride (Bus Only)	Single-Ride (All Modes)	Single-Ride (Bus & Streetcar)
	Tokens	N/A	N/A	Single-Ride	Single-Ride
	Paper Tickets	Single-Ride	N/A	Single-Ride	Single-Ride & Passes
	Magnetic-Stripe	Passes	Stored-Value & Passes	Passes	N/A
	Smartcard	None	Chicago Card (Stored-Value) & Plus (Value & Passes)	Freedom Card (PATCO)	PRESTO (Metrolinx) at 14 TTC subway stations
Operating Environment & Collection Scheme	Commuter/Regional	Proof-of-Payment	Conductor-validated (Metra)	Conductor-validated	Proof-of-Payment (GO Transit)
	Light/Streetcar	Proof-of-Payment	N/A	Pay On-Board	Proof-of-Payment
	Heavy/Subway	N/A	Barrier	Barrier	Barrier
	Bus/Trolley	Pay On-Board	Pay On-Board	Pay On-Board	Pay On-Board
	Media Issued	Paper	On-Card	Paper & On-Card	Paper & On-Card
Transfers	Internal - Same	90 minutes for Rail	$0.25 for 1st w/ 2nd free	$1 Each	Free
	Internal - Different Mode	Full Fare	$0.25 for 1st w/ 2nd free	3 Free Interchanges between Subway & Trolley	Free
	External	Full Fare	Full Fare	Full Fare	Full Fare
	Paratransit	Full Fare	Full Fare	Full Fare	Free w/ GTA Weekly Pass
	Inter-operator	Free w/ Regional Fare	Free w/ Stickers	Discounted with PATCO Round-Trip Transfer Tickets	Discounted when using PRESTO; Not Yet Available for Use by TTC Patrons

Table 7. Existing Inter-agency Agreements and Collection Arrangements

Category	Type/Feature	Dallas (DART)	Chicago (CTA)	Philadelphia (SEPTA)	Toronto (TTC)
Other Regional Operators		FWTA, TRE & DCTA	Pace & Metra	PATCO, NJT & DART First State	GO Transit, MiWay, Brampton Transit & York Region Transit
Existing Regional Agreements	Fare Structure	Complete Regional Integration (Flat + 1 Zone)	Concordant w/ Pace (Flat), but not Metra (Zonal)	Fully Concordant (Zonal)	Complete Regional Integration (Flat + 1 Zone)
	Home Media Acceptance & Other Agencies	All Use Same Media	Pace Only	None	Only on Bus Routes Contracted out to TTC; No Passes
	Pass Acceptance	Regional Single-Ride & Passes w/ All	CTA/Pace Joint 7-Day; Stickers - CTA/Pace/Metra LinkUp & Pace/Metra Plus Bus	SEPTA/NJT Joint Monthly Pass	PRESTO Smartcard Accepted by All Operators; GTA Weekly Pass
	Reduced Fares	Unified Eligibility	Unified Eligibility (RTA)	Independent Policies	All Unified, except TTC
	Paratransit	Free Fixed-route	Free Fixed-route	N/A	Free Transfers w/ GTA Pass
Payment Processing & Back-end Duties		Agency	Vendor (CUBIC)	Agency	Agency (non-PRESTO)
Retail Network		100	700	400	1200

Table 8. SWOT Analysis of Existing Fare Collection Systems

Category	Dallas (DART)	Chicago (CTA)	Philadelphia (SEPTA)	Toronto (TTC)
Strengths	Simplified Fare Structure with FWTA & DCTA	Customers Accustomed to Contactless Technologies	Provides Free Intermodal Transfers at Regional Hubs	Cost-Efficient Existing System
Weaknesses	Low Level of Flexibility, Customer Service & Reliability	Limited (Re-)loading Opportunities & Pass Availability	Significant Transfer Costs outside of Downtown	TTC is the Sole Agency to not Fully Deploy PRESTO; Inconvenience for Both Regional Riders & TTC Customers
Opportunities	Incorporate Increase in College Commuters (DCTA)	Incorporating Metra into the Mix via RTA	Simplify the Hybrid Fare Structure for Select Buses	Increase Ease of Regional Travel by Adopting PRESTO
Threats	Agency that Sells Fare Collects 100% of Revenue	Equipment Latency & Hotlisting of Chicago Cards	Age of Equipment	Coercion to Upgrade to Provincial Agency's PRESTO

Table 9. Summary of New Fare Collection Systems and Motivating Factors

Category	Feature	Dallas (DART)	Chicago (CTA)	Philadelphia (SEPTA)	Toronto (TTC)
Name		Comprehensive Fare Payment System	VENTRA	New Payment Technologies (NPT)	PRESTO Next Generation (NG)
Model		Mobile First, Open Later	Open Smartcard Upgrade	Leap Frog	Top-Down/Late Conversion
Expected System-wide Launch		Late 2013 (Mobile) & Late 2014 (Open/Hardware)	Early 2014	Early 2015	July of 2015
Key Features	General Approach & Preferred Method	Emphasis on Development of Mobile Ticketing & Agency-issued GPR Transit Card	Emphasis on Deploying Open Payments & Doing Away w/ Existing Proprietary ASAP	Emphasis on Development of Agency-issued GPR Transit Card & Deploying Open Later	Upgrading Existing Regional Smartcard System to Open Payments
	RFP/Contract Structure	Multiple Vendors for Different Elements	Use Current Vendor to Replace Existing System	Use a Single Vendor to Replace Existing System	Use a Single Vendor to Integrate Existing with New System
	Scale of Deployment (Hardware & Devices)	Minimize Capital Costs through Limited "Strategic Upgrading" of Hardware	Complete Replacement w/o Costs Upfront	Complete Replacement w/ Costs Upfront	Upgrading of All Equipment
	Existing Smartcard	None	Chicago Card	None	PRESTO, not PRESTO NG
Rationale to Change	Primary Motivation	Enhanced Convenience for Customers & Agency's Business Needs	Shift the Risks/Hassles of Collecting Fares & Uncertainty of Open Payments to a 3rd Party	Provide a More Convenient Way for Customers to Pay Fares	New PRESTO (NG) Offers Open & Mobile Payment Capabilities; Old Did Not
	Key Consideration for Replacing Existing	High Cash Collection Costs	Past Useful Life & Some Components can no Longer be Replaced	Reliability & Functionality Cannot Improve due to Component	Limited Initial Participation in PRESTO Led to Threat of from Provincial Funding
	Other Reasons	Increase Ridership & Revenue	Proprietary Nature of Current System	Provide Flexibility to Allow Agency to Respond to Needs of	New System Designed Specifically to Meet Agency's Business
	Expected New Cost-to-Collect	10-11%	Save $50 M over 12 Years	Expected to Be Less	Save Up to $10 M Annually

Table 10. Accepted Methods of Payment and Modal Phasing for Upcoming Deployments

Category	Type/Feature	Dallas (DART)	Chicago (CTA)	Philadelphia (SEPTA)	Toronto (TTC)
Future Payment Methods	Cash	Single-Ride (Bus Only)	Single-Ride (Bus Only)	Single-Ride (All Modes)	Single-Ride (Bus & Streetcar)
	Paper Tickets	N/A	N/A	N/A	N/A
	Magnetic-Stripe	All Fares	N/A	N/A	N/A
	Agency-issued Smartcard	N/A	Venta Tickets (Single-Ride & Day Pass) & Cards (All Fares)	All Fares	All Fares (PRESTO NG Cards)
	Mobile Ticketing	Immediately for All Fares	Not Initially, but Eventually	Not Initially, but Eventually	Summer 2012 Pilot
	Open Payments (Bank-issued Contactless Credit/Debit)	Not Initially, but Eventually	Immediately for All Fares	Not Initially, but Eventually	Immediately for All Fares
Phasing of Deployment across Different Modes	Bus/Trolley	3rd (Mobile); 1st (Hardware)	Simultaneous	Simultaneous	Undecided
	Heavy/Subway	N/A	Simultaneous	Simultaneous	Undecided
	Light/Streetcar	1st (Mobile); 2nd (Hardware)	N/A	Simultaneous	Undecided
	Commuter/Regional	2nd (Mobile); 2nd (Hardware)	Metra will Not Participate	Last	Already Deployed on GO Transit (Metrolinx)
Changes to Existing Operating Environment & Collection Scheme		Installation of Gates at DART Rail Stations, Contingent upon DART's Adoption of Distance-Based Fares	None	Installation of New Readers for Regional Rail has Necessitated Installing Gates at SEPTA Hubs in Downtown	None

Table 11. Summary of Contract Terms and Structure of Agency's Agreements with Vendor

Category	Dallas (DART)	Chicago (CTA)	Philadelphia (SEPTA)	Toronto (TTC)
Vendor	Unwire (Mobile); Hardware not Yet Awarded	CUBIC	ACS Transportation Solutions Group	PRESTO (Metrolinx)
Amount	$1.5 M	$454 M	$129.5 M	$140 M + Overruns
Method of Payment	Lump-Sum	Base + Variable "Per Tap" Fee on All Transactions	Lump-Sum	Lump-Sum + Base Fee of 5.25% of Annual Transactions through PRESTO
# of Contracts	Up to 6 - Bundled Hardware/Payments; Individual Mobile App; Wireless & Card Network; Negotiations w/ Current for Upgrading of Existing Equipment	1	1	1
Term	33 Months	12 Years	3 Years	15 Years
Additional Partners	FWTA & DCTA (Mobile)	Pace Added as Option for Additional $55 M	None	None in TTC's Contract; All Operators Use PRESTO
Account Management Duties	Partner Agency (NTTA - Regional Toll Authority)	Vendor	Agency	Vendor (Metrolinx/PRESTO)
Special Features/Clauses	Support for (Non-)Resident Pricing for Fares & Parking; Joint Ticketing Opportunities (Mobile)	Vendor Takes on Risk for All Transaction Fees for Ventra; Provide Retail Outlets within 1/3 mi of Every CTA Bus Stop (1800+ New Outlets); CTA Receives 50% of All Non-Transit Revenues from Ventra Transactions	SEPTA Will Renegotiate w/ Vendor at End of Equipment Warranty for O&M Duties; SEPTA Responsible for Back-end Management	Vendor, not TTC, Takes on Ownership and O&M Responsibilities for All PRESTO Equipment; PRESTO Reimburses TTC for any Revenue Losses due to Downtime; TTC Required Right to Sign-off Privileges at Key Points in Development of NG

Table 12. Implementation Strategies and Regional Efforts within the Deployment of New Systems

Category	Dallas (DART)	Chicago (CTA)	Philadelphia (SEPTA)	Toronto (TTC)
Regional Efforts	Simplified Regional Fare Structures as a Group	RTA Mandate for Universal Fare Payment by 2015	Extensive Stakeholder Outreach Informed the Needs/Expectations for NPT	Provincial Transportation Planning & Oversight Agency Subsidizes Cost of Developing Standardized Technology Platform
Implementation Strategies & Best Practices	Required Mobile Developer to Provide Both Standard Tickets & QR Codes to Facilitate Quick Inspection	Increased Availability of Pass Products through Provision of Additional TVMs	New Technology will be Made Available on Paratransit Vehicles	Involved the Accessibility Community in Identifying Existing Issues & Future Needs for PRESTO NG
	Delegated Regional Toll Authority (NTTA) as Account Manager, Could Integrate Transit Fares w/ Toll System	Performed Some Equipment Upgrades Months in Advance of Pilot as Part of Other Work Programs/Projects	Implemented Surveillance Control Centers at Major Hubs to Determine the Extent of Evasion Issues & Need for Additional Gates	One Contract Covers All Aspects of Deployment Across All Operators
	Many Small Introductions instead of One Massive Rollout	Responded to Bus-Only Riders' Needs by Increasing Size of Retail Network		Created Joint Steering Committee with PRESTO for Implementation on TTC

General Conclusions on Next Generation Fare Collection Systems

These new systems exhibit a fundamental shift in the transit agency's general approach to fare collection. Whereas the traditional "fare collector" approach saw the transit agency issuing and managing its own fare media, as well as operating and maintaining its fare collection equipment and supporting communications infrastructure. However, the new "payment enabler" approach features the transit agency diminishing its direct involvement in the operation and management of a fare collection system and increasingly taking a position similar to that of retailers.

The new methods, media and devices that are accepted by transit agencies for the payment of fares now provide riders with additional convenience and ease when traveling between different transit operators. These upcoming systems are dramatically different from the existing legacy systems that will be replaced in that they allow customers to now use their own devices as a substitute for the closed-loop, proprietary media that are currently issued by the transit agencies and are generally not available for use outside off-property.

Due to this externalization of the fare media accepted, new fare collection systems, which make use of mobile ticketing applications and/or accept open payments, rely increasingly more on the management of digital accounts and less on the manual collection of fares. Many of the agencies surveyed initially viewed these open approaches to fare payment as a means to reduce the organization's current operational expenditures related to the existing proprietary-based fare collection system.

The Influence of Existing Infrastructure & Modes Operated on Selecting a Preferred Payment Method/Technology

The current on-the-ground fare collection infrastructure of a transit agency, as well as that of any other partner entities that are working in conjunction with the agency on deploying the new fare collection system, is a major determinant of which technology or method will likely be chosen as the preferred means of fare payment. In order to avoid losing revenue to fare evasion, the acceptance of open payments by a transit agency requires that there be something standing in the way of the customer and the transit service (e.g. a gate). Transit agencies that operate modes that are hardware-intensive, such as those which utilize a barrier (e.g. heavy rail, sometimes light-rail and BRT) or employ a pay on-board approach to fare collection (e.g. non-BRT bus), do not need to spend any additional money to "close" or gate the system because they have already done so. However, transit agencies that operate modes that are equipment-lite, such as those which utilize a conductor to validate fares (e.g. commuter rail) or employ a proof-of-payment approach to fare collection (e.g. light-rail, streetcar, commuter rail and BRT), would need to spend significant funds to close their systems.

Thus, it is more likely for transit agencies that operate substantial light-rail, streetcar or commuter rail services to choose mobile ticketing as the preferred method of paying fares because incorporating open payments may be cost-prohibitive due to the significant costs of installing both gates, which is essentially a sunk cost, and hardware system-wide. Conversely, agencies that employ closed operations for heavy rail and bus services have already incurred the costs to implement the security infrastructure and, thus, are less likely to be as hesitant to accept open payment technologies.

125

The Unbanked & New Fare Collection Systems

As mentioned above, all of the regions will utilize a transit agency-issued contactless smartcard in order to avoid equity and environmental justice concerns related to disparate impacts. These media are general purpose reloadable (GPR) contactless ISO 1443 A/B smartcards which allow each agency to provide some of their customers with new convenient payment technologies (e.g. mobile or contactless bank-issued credit/debit) and, at the same time, preserve the ability for riders without bank accounts or credit/debit cards (e.g. cash-only, under- or unbanked) to continue to use the system with minimal changes to their fare payment procedures. Additionally, all case studies intend to continue to accept cash on all of the modes/services that are currently allowed under the existing fare collection system.

Chicago used two main strategies to mitigate any disparate impacts that the implementation of Ventra might cause. First, a special clause within CTA's contract with CUBIC, which stipulates that there must be at least one retail partner within one-third of a mile of every CTA bus stop, will have the effect of expanding CTA's current retail partner network from 700 to around 2,500 locations upon full implementation. This was done in response to bus-only customers being inconvenienced by the inability to quickly locate a site where they can purchase and load fares. Next, CTA decided to increase the range of available transit fare products that are sold by these partners by now offering passes. This was done as a means to decrease the frequent long lines at rail station ticket vending machines and tom once again, provide more convenience for bus-only customers who do not regularly access the rail system.

The Effect of Open Payments on Account Management Services

The number of transit card accounts that an entity must manage increases for any agency that is moving away from a fare collection system that is largely paper-based because these involve using relatively less durable media. Therefore, from a practical perspective, any move towards a fare collection system that is based on more durable media, such as plastic and near-field communications devices, will necessitate the creation of more transit accounts relative to an existing system that is based on media that customers do not think twice about throwing away.

Furthermore, given that a move to open payments often implies the introduction of new functionalities, such as the auto-loading of transit accounts from customer's bank or pre-paid debit account, and innovative fare payment programs, such as joint ticketing with third parties for special events (which implies that a separate account will need to be created within the database management system to distribute the partner its share of revenues), even regions which have a smartcard system in-place are likely to experience an increase in the number of account that have to be managed. Thus, in general, the move towards open payment technologies, which are always account-based, will likely result in an additional burden for whoever manages the transit account system and database.

The Influence of the FTA's Useful Life Eligibility Requirements on the Scale of Deployment & Approach to Hardware

As alluded to above, the age of an agency's existing fare collection equipment is a key determinant of whether or not the organization will decide to implement a new fare collection system, in general, and also affects the scale at which new hardware elements are introduced into the transit operating environment. When a fare collection system has

reached the end of its FTA-declared useful life, the transit agency will be more likely to investigate implementing a new fare system for two reasons. First, due to the old age of the existing system, the agency is now eligible to seek federal funding from FTA for new fare collection equipment. Obviously, this makes it easier for the agency to say yes to the implementation of a new fare system due to the presence of an external subsidy. Next, it is likely that by the time an existing fare collection system's useful life has expired, replacement parts and/or software modifications for many of the existing fare collection system's components can no longer be obtained or accommodated. Thus, in some cases, the agency may essentially be forced to perform a complete replacement due to antiquated equipment. This was the case in both Chicago and Philadelphia.

Therefore, a transit agency whose existing fare collection equipment is beyond its useful life is more likely to be in favor of a complete system-wide replacement of its devices rather than a strategic upgrade strategy. However, for agencies who operate a fare collection system that is not yet beyond its useful life and is still functioning properly (e.g. Dallas and Toronto), the lack of external subsidy forces the agency to make a strategic decision as to what devices to install on which modes and which pool of money will be used to fund these corresponding hardware upgrades. Given that transit agencies, especially in this current economic and political climate, are trying to locate money just so that they can continue to offer the services they currently provide (e.g. they do not have significant discretionary income), the economics of the situation tend to nudge agencies whose fare collection systems are not entirely broken towards a more limited deployment, at least initially.

Open System Architectures Provide for Additional Flexibility & Expected Reduction in Collection Costs

In terms of the primary motivation for the surveyed agencies to switch to a new open fare collection system, all but one (Chicago) cited the desire to provide customers with new and more convenient means of paying fares. TTC chose to not adopt the first deployment of Metrolinx's PRESTO smartcard almost exclusively because it failed to provide for open payments capabilities. Even after the provincial agency had threatened the organization with the withdrawal of $8.5 B in capital and operations funding, the TTC was still hesitant to adopt a system that would not meet the agency's customer and business needs. Ultimately, TTC's obstinacy in moving forward with the next round of PRESTO resulted in Metrolinx incorporating open payments technologies into the development of PRESTO NG.

As alluded to above, Chicago has experienced its share of difficulty with the high costs of operating a closed-loop fare collection system. Therefore, it is no surprise that CTA's primary motivation for implementing Ventra was to remove the risks and hassles that have arisen with its current system. Additionally, as no major transit agency in North America has implemented open payments on such a large scale, CTA was worried about the uncertainties related to using open payments on transit, especially accepting the risk of paying all transaction fees. Chicago's major transit authority was able to negotiate a new contract with its vendor that both provides for the complete replacement of its existing fare collection system with no upfront costs and moves the risk related to processing fees to an external third party (vendor). Furthermore, as CTA's vendor does not make a dime until the new fare collection system goes online, it is in the vendor's best interest to deliver a system that works as soon as possible.

As Chicago will be the first large transit provider in the United States with an open payment fare collection system, CTA's process will likely become widely emulated by other transit agencies. However, beyond reducing costs and efforts related to collecting fares for the transit agency, CTA's move to an open fare payment system can be seen as a complement to a larger overall strategy to sustain positive economic growth for the Chicago region by "Building a New Chicago" [130]. In March 2012, Chicago Mayor Rahm Emanuel announced that the City is planning to undertake $7.2 B worth of infrastructure investment over the next three years [131]. Within his address, the Mayor specifically noted that CTA provides a critical regional competitiveness factor by easing worker commutes, supporting high-density development and providing for efficient connectivity between the downtown core and surrounding communities. He concluded that, "To compete with other cities, to draw the best workers and businesses for Chicago, we need a strong and vibrant CTA" [131].

Concurrent with the Mayor's announcement, World Business Chicago, an executive group of business consultants and leaders who advise the Mayor on economic development matters, released a regional growth plan called "Plan for Economic Growth and Jobs". The document begins with an identification of current problems or issues that exist in the Chicago region and notes that "the region's traditional infrastructure assets… need upgrading and modernizing" [132, 5]. In order to correct these issues, the plan identifies ten strategies to encourage more sustainable growth as a region, of which two are "enhance our competitive position as a leading transportation and logistics hub" and "invest to create next-generation infrastructure" [132, 6].

The implementation of CTA's new open payments fare collection system is not included within the Mayor's $7.2 B redevelopment budget. However, the transit agency's effort will, nevertheless, serve to complement the other CTA-related upgrades that will be financed by the City (e.g. construction of 16 miles of bus rapid transit, maintenance and repair work at 100 rail stations and significant track maintenance). By modernizing Chicago's transit fare collection system, CTA will enhance its position as a leader within the transit industry and the City will already have begun to lay the groundwork for implementing "next-generation infrastructure" in the region.

Other Regional Operators within Contracts

As observed in two of the case studies, groups of regional transit operators came together to award a single contract for elements of their new fare collection systems. By awarding a single contract, these agencies can deliver a new system that it likely to be more reliable and provide for greater interoperability between the partner systems than if each agency went into the marketplace and sought a unique vendor for these services. Furthermore, by uniting forces, the operators stand to realize reductions in planning, procurement and installation of the new fare collection system due to general economies of scale.

Special Features within Contracts

As each of the case studies surveyed included at least one special clause within the agency's contract with the vendor, other regions who are expecting to implement these new payment technologies should expect that they will need to do the same. The

majority of the specific stipulations that were included within the contracts were incorporated in order to address the following topics or concerns listed below.

- Delivering a working product that meets the agency's business needs (i.e. TTC's sign-on privileges)

- Providing for innovative fare policies and products (i.e. DART's non-resident pricing)

- Providing the agency with the ability to utilize alternative streams of revenue and create market-based fare products (i.e. CTA's non-transit revenue and DART's third-party sales partnership and couponing programs)

- Reducing the fiscal risk associated with the uncertainty of the use of open payment within the transit industry (i.e. CTA's avoidance of all transaction fees)

- Ensuring that the agency does not forfeit revenue due to system down-time (i.e. TTC's reimbursement requirement for all lost revenues that would have been processed had PRESTO been working correctly).

Changes to Existing Operating Environment & Collection Scheme

None of the agencies surveyed chose to change their collection schemes across any of their services. However, based on the technology or method used within the new fare collection system, transit operators who utilize proof-of-payment and conductor-validated collection procedures on their light-rail and commuter rail services may need to gate some of their stations. As none of Atlanta's operators currently utilize either of these approaches to collecting fares and the implementation of a variable-based fare system, from a political viability perspective, is years, if not decades, away, this is not currently an issue for the region.

Phasing of Deployment across Different Modes & Services

All of the agencies surveyed will be operating two unique fare collection systems simultaneously during the six to nine month transition/rollout period. Once the rollout is complete, all agencies surveyed are planning to eliminate the existing fare media that is no longer accepted by the new devices and, if the existing equipment is not being upgraded, remove all elements of the legacy fare system. Furthermore, as has been seen in the case studies, there exist two distinct approaches to implementing new fare collection systems across multiple modes. In the case of Chicago and Philadelphia, the deployments were not temporally separated across modes and were all completed simultaneously. This approach assumes that the installation and configuration of the new system will proceed with little hindrance, as the contradiction of this would mean that the agency is perfectly fine with not being able to collect fares across all modes in the event that the new system runs into major issues and is down for a sustained period of time. The more cautious approach, as used by Dallas, consists of slowly rolling out the new fare collection system or payment method on each mode one by one.

General Conclusions from Case Study Analyses

Despite the fact that each transit agency is implementing a new fare collection system based on open payments and/or mobile ticketing, each case study chose to approach the transition to a new fare collection system in a manner completely unique to its own context. A fundamental decision that determines the overall course that a transit agency will take in implementing a new fare collection system is the preferred payment method. In general, each agency has come to arrive at its preferred method only after conducting public outreach activities, taking into account its own business needs and,

possibly, incorporating the needs, concerns and desires of other local transit operators into its implementation plan. Given that mobile ticketing requires little to no additional infrastructure to be added while fully incorporating open payments necessitates tinkering with physical infrastructure, the choice of a preferred payment method will affect the project's overall timeline, as well as the temporal sequencing for the new collection system's rollout across the transit services.

Depending on the conditions of the existing on-the-ground fare collection equipment and infrastructure, as well as the transit modes operated, each agency chose to either completely replace all of its system's components (i.e. Chicago and Philadelphia), completely upgrade all of the devices (i.e. Toronto) or strategically upgrade its existing system (i.e. Dallas). The majority of the transit agencies surveyed were motivated to implement a change to their collection systems either due to the age of the existing devices or to provide consumers with additional means (i.e. contactless bank cards, near field communications devices, RFIDs, etc.) to pay the transit agency for its services. For agencies that are operating legacy fare systems, such as Philadelphia and Chicago, the inability to order replacement parts for the existing system's components and the use of antiquated software essentially necessitates the complete replacement of the existing fare collection devices.

All of the case studies surveyed plan to operate the existing and new fare collection system simultaneously for a six month transition period during which new and old media will be accepted as fare payment. Additionally, if a transit provider operates a proof-of-payment or conductor-validated commuter rail service, then a transition to a new fare collection system based on open payments will likely involve the gating of some or

all of the currently ungated rail stations. Therefore, if an agency operates commuter rail and wishes to minimize its infrastructure upgrade costs, then it would be strategic to develop a mobile ticketing application which provides customers with additional payment options but does not require the transit agency to spend additional money to gate the presumably ungated rail stations.

CHAPTER 12

FUTURE PATHS FORWARD FOR ATLANTA

The next three pages contain the following tables, which provide a summary of the existing regional transit fare collection operating environment, BREEZE and current inter-agency fare payment issues, and will be followed by specific implementation strategies for the Atlanta region based on the information gathered and conclusions drawn from the four case studies.

- Table 13 – Summary of the Atlanta Operators' Fare Collection Systems and Policies

- Table 14 – Summary of the Atlanta Regional Fare Collection Environment & BREEZE Inter-operability

- Table 15 – SWOT Analysis for BREEZE System and Other Fare Collection Systems

The implementation strategies are formatted with the relevant subject area or conclusion from the preceding chapter as the top heading of the section, followed by bulleted text for the Atlanta-specific recommendation and, finally, a body of text below the Atlanta recommendation that provides reasoning as to why the recommendation is applicable to, and strategically aligned for, the regional transit operators based on the existing political climate and established institutional relationships.

Table 13. Summary of the Atlanta Operators' Fare Collection Systems and Policies

Category	Type	MARTA	GRTA	CCT	GCT
Payment Methods	Cash	Single-Ride on Buses Only; Rail Requires BREEZE	Single-Ride & Round-Trip	Single-Ride	Single-Ride
	Paper Tickets	N/A	N/A	Transfer Slips	10-Ride & Passes
	Magnetic-Stripe	N/A	Passes	Passes	N/A
	BREEZE Smartcard	Stored-Value & Passes	Single-Ride Only	Stored-Value & Passes	Stored-Value & Passes
Operating Environment & Collection Scheme	Bus/Trolley	Pay On-Board	Pay On-Board	Pay On-Board	Pay On-Board
	Heavy/Subway	Barrier	N/A	N/A	N/A
	Light/Streetcar	Proof-of-Payment (City)	N/A	N/A	N/A
	Media Issued	BREEZE	On-Card (Either)	On-Card & Paper	BREEZE
Transfers	Internal - Same Mode	Free	Free for Magnetic & BREEZE; Full Fare for	Free	Free
	Internal - Different Mode	Free	N/A	N/A	N/A
	External	Free to GRTA, CCT & GCT	Only Free to MARTA	Only Free to MARTA	Only Free to MARTA
	External - Paratransit	Full Fare	N/A	Full Fare	Full Fare
Reduced Fares	Reduced Fares for Seniors, Medicare & Disabled	62%	50% Off-Peak	60% Off Local	50% Local Bus & Off-Peak Express
	Card Needed	Agency-Issued	Government-Issued	Agency-Issued	Government-Issued, except Paratransit
	Youth & Students	K-12 & Universities	None	Youth	None
Current Fare Structure		Flat	Zonal (Express)	Zonal (Local & Express)	Zonal (Local & Express)

Table 14. Summary of the Atlanta Regional Fare Collection Environment and BREEZE Inter-operability

Category	Type	MARTA	GRTA	CCT	GCT
Agency Fares Offered on Breeze?		All (Home System)	None, Only Stored-Value	All	All
Collection Responsibility	Cash & Magnetic-Stripe Cards	Agency	Agency	Agency	Agency
	BREEZE Card	Agency	MARTA	MARTA	MARTA
FTA End of Useful Life		October of 2016	August of 2018	February of 2017	August of 2019
Maintenance of BREEZE Equipment		Vendor (CUBIC)	In-house	In-house	Vendor (CUBIC)
Regional Transit Operating Environment	Agency Accepts Whose Media?	Home Only	Home & MARTA	Home & MARTA	Home & MARTA
	Pass Acceptance	Home Only	Home Only	Home Only	Home Only
	Paratransit	Transfer at Arts Center w/ CCT #10 & MARTA #12	N/A	Transfer at Arts Center w/ CCT #10 & MARTA #12	All Vehicles Accept BREEZE

Table 15. SWOT Analysis for BREEZE System and Other Fare Collection Systems

Agency	MARTA	GRTA	CCT	GCT
Strengths	Can Load Fares onto BREEZE with Cash On-Board Buses	Former MARTA Personnel Experienced w/ BREEZE Equipment	Full Integration with BREEZE & Enhanced Convenience	Full Integration with BREEZE & Enhanced Convenience
Weaknesses	Lack of Flexibility to Implement Minor Changes to Fare Systems	Incomplete Integration (Only Stored-Value & No Agency Fares Available)	Limited Availability of BREEZE Cards	Agency Does Not Sell BREEZE Cards
Opportunities	Reduce Cost Disparity & Equity Issues Related to Operating BREEZE for Regional Partners	Provide Fares on BREEZE & Reduce Internal Media and Web Sales Costs	Coordinate w/ MARTA to Consolidate Reduced Fare ID Programs	Use New Technologies (e.g. Mobile) to Reduce Equity Issues Related to Reciprocal Transfer Agreements
Threats	High Change Order Costs & Proprietary Pricing	Operates Dual-Fare System w/ Different Useful Lives	Late Loading of Pass Products onto Web Store	High Vendor Maintenance Costs

The Influence of Existing Infrastructure & Modes Operated on Selecting a Preferred Payment Method/Technology

- Preferred Method → Open Payments

As none of the Atlanta operators currently use a hardware-lite approach to fare collection (e.g. proof-of-payment or conductor validation) on their "closed" systems, the region will not incur any sunk costs related to gating its system. It is unlikely that any one operator will incur a disproportionate amount of expenses related to procuring and installing new hardware necessitated by the incorporation of open payments. Thus, a major political and financial barrier to implementing open payments does not apply to Atlanta. The general trend within the payments industry is moving towards the proliferation and increased use of contactless credit/debit cards by customers for all types of payment. Therefore, in order to keep up with shifts in technology and meet changing customer expectations, the "son of BREEZE" should provide for the incorporation of open payments.

- Lead Agency for New System → MARTA

There are two reasons why MARTA's fare collection decisions must serve as the precedent for the other regional operators. From an operations perspective, the authority's existing fare collection equipment will reach the end of its useful life at least a year before that of any of the other regional operators. Thus, it is naturally positioned to be the lead agency when discussions about a new regional fare collection system begin because implementing the next generation will, by that time, likely already be an issue of great internal concern. From a political perspective, MARTA is the only agency with enough weight in the game (e.g. only rail operator and the only provider of transit service within the City of Atlanta) to even have a chance of making a decision around which a regional consensus among the various transit operators could be built.

- Mobile Application Development → Downtown Streetcar Pilot

As the Atlanta Streetcar will accept fare payments through the BREEZE system and the City of Atlanta (owner of project) has not indicated how it will contribute to MARTA's operation of BREEZE, the authority should consider asking the City to pay for the development of a mobile ticketing application that could be used to pay fares via mobile phone on MARTA, GRTA, GCT and CCT. The streetcar makes sense as a venue for a mobile pilot due to the demographics of its expected ridership (e.g. tourists or CBD residents and employees who likely have smartphones).

As an alternative strategy, the Atlanta Regional Commission, as the entity charged with the coordination of transit services for the Atlanta metro, would be a logical source of funding for a mobile ticketing application since the developed product could easily be used by all operators. This strategy is similar to the approach that Ontario's provincial transportation planning agency, Metrolinx, has taken with respect to developing PRESTO.

The Unbanked & New Fare Collection Systems

- Establish Retail Network & Utilize Agency-issued GPR Cards

Atlanta does not currently have a network of retail outlets that sell regional transit fare media. Allowing retailers to sell transit fare media incurs little to no cost to the transit agency while providing increased customer convenience for fare payment. All of the case studies surveyed, as well as the majority of MARTA's peer agencies in the United States, have established these systems. As transit agencies within the Atlanta region could stand to realize cost savings associated with diminishing their role as issuers of fare media, the regional operators should seek to establish a robust retail network. Additionally, any

equitable new fare collection system would include a transit agency-issued contactless general purpose reloadable (GPR) smartcard.

The Effect of Open Payments on Account Management Services

- Account Management Duties →Atlanta Regional Commission (ARC) or State Entity

From a practical and operations-based perspective, ARC may not be the best entity suited to provide significant database and customer account management services in support of the transit card program, as it is not currently in the business of doing so and there are other, more qualified entities. Currently, the State Road and Tollway Authority (SRTA) already operates an extensive database management system in support of its PeachPass toll products and it is the only entity with the ability to set and apply a user fee to some of the region's roads. Additionally, MARTA personnel are already more than experienced with providing these types of services due to the agency's operation of the BREEZE regional clearinghouse since the fare collection system's original deployment. However, if the Atlanta region would like to utilize its new fare collection system to encourage the use of alternative modes by enacting innovative transportation demand management policies, then ARC or SRTA are the only entities that makes sense to provide the transit card's account management services.

From a legal perspective, the ARC is one of the only entities within the region, along with GRTA, that has been officially delegated the responsibilities of preparing a regional transportation plan. Furthermore, while the commission is legally prohibited from owning any capital assets, the organization is not restricted from operating an

account management services division. From a practical and organizational perspective, ARC has ample experience implementing transportation demand management programs as it already manages a regional shared ride program, among other activities. From an institutional perspective, the entity already provides an established venue for both the BREEZE Policy Group and Regional Transit Committee meetings which are the major entities that hold discussions related to regional fare collection. Furthermore, from a political perspective, ARC is the only entity that could be seen by the other parties as an objective decision-maker.

While choosing SRTA to perform the day-to-day account management services for the program makes sense from an operational perspective, this entity, nevertheless, is not well-positioned to implement progressive multi-modal transportation policies for two reasons. First, the agency's expressed purpose is not multi-modal (e.g. tolls on roads). Second, the agency does not have an extensive background in developing the kind of regional consensus that would be required in order to implement regional change in transportation policies. Thus, assuming it can adapt its operations to perform new functions, the Atlanta Regional Commission should be the entity best equipped to enable the region to truly take advantage of the capabilities of open payment technologies to implement innovative fare programs, progressive transportation demand management policies and provide transit agencies with alternative streams of revenue.

The Influence of the FTA's Useful Life Eligibility Requirements on the Scale of Deployment & Approach to Hardware

- Scale of Deployment → Complete Replacement at End of Useful Life (2016)

As is evident by the fact that the Atlanta Regional Commission recently issued an RFP on behalf of the regional transit operators to investigate how the region should go about moving forward with a new fare collection system, the Atlanta region is just now beginning to take the necessary first steps to develop its future fare collection system. As has been stated above, the project development timeline for implementing a new fare collection system is usually about five years in length. By the time that the Atlanta regional transit operators are ready to move forward with a new fare collection system, most of the BREEZE devices will be at the end of or beyond their useful life. Thus, the majority of the operators will be eligible for capital funding from FTA to replace their current equipment. Therefore, the Atlanta regional operators should continue to take their time to form the needs, desires and expectations for their next fare collection system and wait until 2016 before procuring equipment.

Open System Architectures Provide for Additional Flexibility & Expected Reduction in Collection Costs

- New System Architecture → Convert from Closed-Loop to Open Architecture

Half of the Atlanta regional transit correspondents surveyed cited that their agency's former agreement with MARTA's current vendor for maintenance of the existing closed-loop system devices was cost-prohibitive. Furthermore, these same personnel suggested that it is obviously not in the vendor's best interest to deliver a reliable fare collection

system when any instances of unreliability help the vendor bring in more revenue. With these sentiments in mind, Atlanta should avoid once again adopting a closed-loop, proprietary system like BREEZE. By deciding to move forward with a new open system architecture, the regional transit partners should be able to leverage the power of the market to acquire a new system that is more reliable than BREEZE.

- Utilize New System's Flexibility to Implement New Fare Policies & Structures

Current smartcard systems require the submission of a change order to enact any and all changes to the accounting software's business rules (e.g. digitally-stored, logic-based rules that allow the program to incorporate each operator's specific fare policies and structures). Staff from each of the region's transit agencies have complained about the BREEZE's systems high cost for change orders. Furthermore, some personnel have even cited that the current fiscal arrangement can make it "cost-prohibitive" to implement new fare policies and structures that would serve to positively affect the agency's bottom line. However, these next-generation systems utilize open architecture and therefore do not impose significant financial penalties on innovators, Thus, when the Atlanta region inevitably migrates to the use of open payments for transit services, the region's operators should be equipped with more flexibility to recuperate their costs to provide service by implementing changes to their fare structures and/or policies.

While variable-based fares are not impossible to implement using a smartcard fare payment system, the ease with which a transit agency can transition from a flat-based to a variable-based fare structure increases for open payment systems. Smartcard-based systems require the customer to reload fares at a ticket vending machine, station attendant booth or retail outlet, unless their card has been registered with the transit authority and

the customer has activated the auto-load feature. On traditional, flat fare systems, this is not an issue as the customer can easily predict the cost of the trip and accurately assess whether or not they should add value to their smartcard. However, when the cost of the trip varies based on the distance traveled or the time of day, it becomes difficult for customers to keep track of how much value is on their smartcard. Thus, customers would have to travel to the points of sale more frequently to inquire about their card's balance and to load value. For the majority of smartcard customers (e.g. those not using auto-load), paying fares and moving through the transit system will be less convenient under a variable-based fare system than a flat-fare structure.

Open payments allows customers to use their own devices for fare payment and not just the proprietary transit card. Therefore, customers who choose to utilize their contactless bank cards and other devices are no longer required to intermittently travel to a point of sale to purchase or load value on their fare media. Thus, there are fewer customer convenience issues that would arise when operating a distance-based fare system with open payments as opposed to a smartcard. As MARTA has been considering implementing a variable-based fare structure for many years now to meet its fiscal needs, a move to a new fare collection system incorporating open payments could be a means to meet the agency's bottom line without imposing a burden of inconvenience on its customers.

Contract Structure

- Model after CTA's Agreement for Ventra

From a practical and psychological perspective, in order to secure a new system that is even more reliable than the existing, the regional partners must structure an agreement with whichever vendor is eventually chosen that provides an incentive for the vendor to do their job right the first time. By structuring the terms of its payment to the vendor using a pay-per-use basis, CTA has turned the tables on the traditional vendor-client relationship. Whereas before the vendor was essentially rewarded for doing a poor job (e.g. gets paid when the product it was supposed to deliver, a reasonably reliable fare collection system, does not fully materialize), the client has now created a situation in which the vendor cannot afford to not have the new system be fully deployed as soon as possible and reliable to the maximum extent possible.

Other Regional Operators within Contracts

- Take Advantage of Cost Efficiencies through Regional Bundling

The Atlanta operators should come together and bundle their individual fare collection systems as one regional fare collection system. This should not be difficult, as this is the agreement that MARTA and the other three operators reached for the procurement and initial maintenance of the BREEZE fare collection equipment. To the extent that it is economically justifiable and politically viable for the operators to do so, the regional partners should continue to engage in coordination discussions related to the development of their new fare collection systems. Ultimately, due to the ease with which the product

developed can be applied to other transit agency's services, the region should seek to award a single contract for the development of a mobile ticketing application, like DART, FWTA and DCTA in Dallas. Furthermore, the partners should only dismiss the option of awarding a single contract for new system hardware after one of the agencies has demonstrated that there will be a significantly disproportionate cost impact resulting from the agency participating in a bundled contract. As Chicago has shown, if a significant gap in providing for seamless regional transit trips and transfers exists (e.g. CTA not expanding the reach of its new fare system to provide connections for suburban commuters who work downtown and utilize rail service would result in a significant customer inconvenience), the partners can still choose to award a single contract and simply amend selected terms for an individual operator.

Special Features within Contracts

- Negotiate for Non-Transit Revenues
- Provide Flexibility to Incorporate Alternative Sources of Revenue

As each of the case studies specifically tailored a clause within the contract to hedge its risk related to implementing the new fare collection system, the Atlanta regional operators need to come together to discuss each of their concerns related to moving forward with a replacement for BREEZE. Given that transit operators across the country, not just those in metro Atlanta, are strapped for cash, MARTA and the other partners should pursue incorporating special clauses into the eventual contract that provide the operators with the flexibility to pursue additional means of recovering their operations

costs, whether through the acquisition of non-transit revenues (CTA) or the introduction of new fare policies and structures.

Phasing of Deployment across Different Modes & Services

- Cautious Approach → Single Mode at a Time

As the BREEZE system still suffers from down-time issues with respect to accepting credit/debit payment, its progeny will likely have its own share of unexpected issues. With this in mind, the Atlanta regional transit operators should take a gradual and precautionary approach, much like the approach used by DART in its upgrade, to implementing its eventual fare collection system or new payment methods across the region's transit infrastructure. Bus customers will always be able to purchase a single-ride using exact cash fare on-board. Thus, in the event that the new collection system is temporarily down due to initial bugs or glitches, the transit operator still stands a chance to receive revenue for its service. While from a practical perspective it may be more difficult to deploy the new system on buses first, as this mode, by nature, lacks the hardwired communications infrastructure that is present at rail stations, this phasing sequence provides the agencies with the certainty that they will never be operating a service that they will not be at least partially paid for.

Other Recommendations Based on Interviews with
Atlanta Regional Transit Operators

There are three additional recommendations for Atlanta that came out of the regional transit operator interviews. First, MARTA, CCT and GCT all participate in the BREEZE web store. Despite the fact that it provides for limited acceptance of the

BREEZE card, GRTA operates its own web sales site independently of these other parties. Thus, there is an opportunity to realize cost efficiencies by eliminating this redundancy. A simple, but critical change to the regional transit fare payment environment that could save the region money and provide suburban transit users with additional convenience is the incorporation of GRTA fares onto the BREEZE system and the migration of the agency's web sales to the BREEZE online store.

In a similar vein, each of the regional transit operators issues its own set of identification cards for their reduced fare programs, with the exception of GRTA. As before, at the regional scale, this is not a cost-efficient operation. Although it may impose a degree of inconvenience on suburban transit riders, the regional partners should consider the establishment of a single, consolidated reduced fare ID operation. Given that MARTA's service area is wedged in between that of GCT and CCT, it makes the most sense, politically, for these consolidated operations to be housed within MARTA headquarters or at the region's origin (e.g. Five Points rail station).

Lastly, every correspondent surveyed noted that there exist significant opportunities for the regionalization of paratransit services. As paratransit trips incur the highest cost of any mode and are, by nature, very specific and hard to predict, the region could stand to realize cost-efficiencies by enhancing the coordination between paratransit providers. Currently, MARTA operates its complementary ADA services in-house and provides an order of magnitude more paratransit trips than any other provider within the region. GCT and CCT use third party contracts for their services and GRTA does not provide paratransit service. Thus, due to the fact that two of the operators are locked into contracts with a third party, securing the coordination of services between these operators

is likely to be difficult. Ultimately, many of the correspondents noted that MARTA, as the region's largest provider of paratransit trips, will have to fulfill the role of lead agency and facilitate any future discussions related to regionalizing paratransit service across the operators.

General Conclusion & Recommendations for
Atlanta's Next Fare Collection System

Based on the experience of the case study agencies, the implementation of Atlanta's next fare collection system is sure to be a long and arduous process. However, by utilizing the lessons learned from DART, CTA, SEPTA and TTC, MARTA and the other regional operators will be better poised to provide their patrons with additional means of paying fares while, at the same, minimizing the disruption to the existing fare collection system during the transition period. In summary, whenever MARTA and its partners decide that the time is right to begin the transition, the group should keep the following recommendations in mind.

- Let MARTA lead the charge and take the reins in developing the new payment system.

- Continue to realize regional cost efficiencies by bundling all equipment and support services for the new fare collection system into a single contract that covers all of the operators' systems.

- Completely replace the existing closed-loop BREEZE architecture and system components with an open architecture that does not necessitate relying on proprietary vendors for operating, maintaining and repairing the new fare collection system.

- Undertake the installation of the new system using a gradual approach that phases in the new technology on one mode at a time.

- Establish a retail partner network to sell the transit agency's general purpose reloadable media and reduce the internal agency costs related to distributing fare media.

- Consider deploying a mobile ticketing application on the Atlanta streetcar.

- Delegate account management duties to a regional entity like ARC.

- Consider implementing variable-based fares across all of the operators' services in order to cover the actual costs of operating regional transit service.

- Renegotiate the BREEZE Participation Agreements to incorporate contributions based on performance metrics, such as unlinked passenger trips or passenger miles traveled, instead of a flat fee.

- Utilize the new payment system's additional flexibility and enhanced accounting capabilities to their fullest extent by incorporating innovative fare products and inter-operator policies.

- Pursue alternative sources of revenue that are enabled by implementing a more flexible payment system, such as negotiating for a percentage of non-transit revenues that result from customer's use of the GPR transit card or establishing a joint ticketing program for special events and couponing.

- Consolidate the issuance of reduced fare ID cards and paratransit services among the multiple operators by regionalizing these services (e.g. allowing only one entity to provide these services).

APPENDIX A

ATLANTA BREEZE PARTICIPATION AGREEMENTS

EQUITY EXERCISE

The following section contains an explanation of the methodology and process used to demonstrate that a financial burden is being imposed on MARTA by the other operators. Table A.1 below includes labor and non-labor cost estimates that were provided on pages A-10 and A-11 of the June 2012 VBFS Final Report to the MARTA Board of Directors related to the agency's potential move to a Variable-Based Fare System [133].

Table A.1. Fare Collection Costs for MARTA and Regional Operators.

Fare Collection Costs	Total	MARTA	Regional Partners
Fully Allocated Direct Labor	$14,824,701	$14,176,290	$648,411
Direct Non-Labor Costs	$6,616,797	$6,236,055	$380,742
TOTAL	$21,441,498	***$20,412,345***	$1,029,153

After incorporating the BREEZE Participation Agreement fees that each of the regional transit partners provide to MARTA for its operation and maintenance of the BREEZE regional clearinghouse (e.g. $108,000), the total direct costs to MARTA to operate the BREEZE fare collection system is $20,304,345.

$$\$20,412,345 - 3 \text{ Operators} * \$36,000 \text{ Each} = \$20,304,345$$

Table A.2 below provides a summary of the relative magnitude of the service provided by each regional transit operator during 2011. The table incorporates each agency's BREEZE utilization rate in order to determine the number of transactions that would be processed for each agency using each performance metric based on the service provided.

153

The ridership and performance data shown in Table A.2 below come directly from the 2011 National Transit Database (NTD) service tables [134].

Table A.2. Service Characteristics & BREEZE Payments for MARTA and Regional Operators.

Metric/Agency	MARTA	CCT	GCT	GRTA	Total
Agency's BREEZE Utilization Rate	100%	100%	24%	5%	
Unlinked Passenger Trips	139,873,115	4,451,703	2,266,717	1,589,234	148,180,769
% Regional UPT	94.39%	3.00%	1.53%	1.07%	
# Agency's UPTs Processed by BREEZE	139,873,115	4,451,703	544,012	79,462	144,948,292
% BREEZE Transactions Based on UPT	96.50%	3.07%	0.38%	0.05%	100%
Passenger Miles Traveled	731,062,282	34,487,972	48,407,962	38,874,039	852,832,255
% Regional PMT	85.72%	4.04%	5.68%	4.56%	
# Agency's PMTs Processed by BREEZE	731,062,282	34,487,972	11,617,911	1,943,702	779,111,867
% BREEZE Transactions Based on PMT	93.83%	4.43%	1.49%	0.25%	100%
Sample Transactions (April - June 2010)	47,246,951	1,569,911	131,971	84,278	49,033,111
% of All BREEZE Transactions	96.36%	3.20%	0.27%	0.17%	

In order to determine the amount of money that each agency should be paying MARTA to operate the BREEZE regional fare collection system, the total cost of the BREEZE system to MARTA was divided by three different performance metrics (total number of regional unlinked passenger trips, passenger miles traveled and sample BREEZE transactions counts) to arrive at three different unit costs to process a BREEZE transaction. The unit costs for each performance metric were then multiplied by the relevant services delivered by each agency in order to estimate the theoretical amount that each agency would contribute to BREEZE if contributions to MARTA's operation were based on an equivalent pay-per-use rate across all of the regional operators. These estimated pay-per-use payments, as well as the amount of money that each agency is currently saving (red) or losing (blue) by paying MARTA $36,000 per year for its clearinghouse services as required under the current BREEZE Participation Agreement, are included on the next page in Table A.3.

Table A.3. Regional BREEZE Cost Equity Calculations using 2011 NTD Service Data.

EQUITY TABLE	Utilization Rate	UPT	PMT	Sample Transactions
Unit Cost for Transactions Processed through BREEZE Based on Performance Metric		$0.1408	$0.0262	$0.4163
MARTA's New Contribution	100%	$19,697,633	$19,153,470	$19,668,772
Amount Saved Relative to Existing Agreement		$606,712	$1,150,875	$635,573
Cost Share as % of BREEZE Transactions		96.50%	93.83%	96.36%
Cost Share as % of Regional Performance Metric		94.39%	85.72%	96.36%
CCT's New Contribution	100%	$626,911	$903,568	$653,549
Amount Added Relative to Existing Agreement		-$590,911	-$867,568	-$617,549
Cost Share as % of BREEZE Transactions		3.07%	4.43%	3.20%
Cost Share as % of Regional Performance Metric		3.00%	4.04%	3.20%
GCT's New Contribution	24%	$76,611	$304,384	$54,939
Amount Saved (Blue) or Added (Red) Relative to Existing Agreement		-$40,611	-$268,384	-$18,939
Cost Share as % of BREEZE Transactions		0.38%	1.49%	0.27%
Cost Share as % of Regional Performance Metric		1.53%	5.68%	0.27%
GRTA's New Contribution	5%	$11,190	$50,924	$35,085
Amount Saved Relative to Existing Agreement		$24,810	-$14,924	$915
Cost Share as % of BREEZE Transactions		0.05%	0.25%	0.17%
Cost Share as % of Regional Performance Metric		1.07%	4.56%	0.17%

Table A.4 below provides a concise summary of the results from this equity exercise.

Table A.4. Regional BREEZE Costs Equity Exercise Results.

Agency	BREEZE Utilization Rate	UPT	PMT	Transactions
MARTA	100%	$606,712	$1,150,875	$635,573
CCT	100%	-$590,911	-$867,568	-$617,549
GCT	24%	-$40,611	-$268,384	-$18,939
GRTA	5%	$24,810	-$14,924	$915

APPENDIX B

CASE STUDY INTERVIEWS

This section consists of four subsections which contain the interview transcripts from the case study research. The cases and their interviews are presented in the following order:

- Appendix B.1 - Dallas

- Appendix B.2 - Chicago

- Appendix B.3 - Philadelphia

- Appendix B.4 - Toronto

APPENDIX B.1

DALLAS CASE STUDY INTERVIEW (DART)

- Has there been another formal document developed since the LTK Concept of Operations from November of 2011? If so, can I have it?

  o Awarded a contract for mobile ticketing at last board meeting in September, we have posted this PowerPoint presentation and an explanation of the competitor's scope of services, etc. (can be sent if not available online). Unwire (mobile vendor) was in our offices meeting with different parts of the agency last week and participating in focus groups with different kinds of riders who use phones to conduct their day-to-day business.

  o It is not a pilot, it is a contract for full scale deployment, also involves FWTA and DCTA.

- Any major updates within regional fare policy and collection since November?

  o When DART adopted its fares at the end of August, which are effective in December, inside of that set of fares was a specific set of adjustments in the regional fare pricing.

  o We raised the monthly and annual – we price this based on 16 times the day pass and the annual pass is 10 times the monthly pass.

  o Regional fares had fallen off from 16 and were closer to 12.

o We made a conscious decision to adjust it upwards due to consistency with other DART local products and the fact that it is a regional product and thus requires a higher pricing point to subsidize these operations .

o All agencies participate in the regional fare, regardless of one-way/day pass/monthly, it's the same price for all agencies.

o Concept had been in place since the late 1990s when DART was working with The T.

o We have worked hard to make sure the regional product is as easy as possible for consumers and transit agencies.

o The other thing that is going on is the way in which regional fares are collected is likely to change.

o Currently the regional fare revenue allocation is structured to where whichever agency sells the (regional) fare product, that agency gets 100% of the revenue. In the early days this was convenient and it wasn't worth a long accounting process for relatively few transactions.

o As we have added more service and another regional agency (e.g. DCTA) and mobile ticketing, we will have to change off of this.

o Mobile ticketing makes continuing the existing allocation structure practically difficult.

o Current system is based on the geographic location of the point of sale of media and with mobile this is irrelevant. We're not making planning on

making agencies activate GPS just to see where the customer purchased the ticket.

o We need to come up with the manner in which we allocate regional ticket sales done through mobile payments and this will be a growing part of our payment technology (hopefully 30-40%) with all transactions being done through the phone.

o This is only an issue relative to the regional sale.

o If a rider is regularly riding on one of the agencies and buying a local pass, then 100% of that ticket goes to the agency with the local service area.

o Shouldn't be difficult, but will probably take a lot of time.

o In regard to overall fare product, we are a tax-based system and one change we made last year was eliminating the single ride trip that was non-transferrable (e.g. customer could not transfer from bus to bus or between modes).

o Now we have a 2-hour pass that allows you to use any mode and move among modes as many times as you want for 2 hours.

o We eliminated the non-transferable single-ride ticket because we want our system to be increasingly intermodal (e.g. we want to deliver more people to our trains via buses).

o Differentiating and eliminating passes really defeats the purpose of flexibility and promoting intermodal usage.

159

- o We are not distance-based at all, we might move to this in the future but we are an open system (e.g. no gates).

Current Fare System

- Why aren't (mag-stripe) monthly passes currently available online?

    - o They are but they are mailed to you, we have a yahoo store option and get one that way.

    - o Also at retail outlets (e.g. Kroger).

    - o We introduced ability to get monthly at TVM when we introduced credit card functionality in 2009.

- Is there an IGA in-place between DART and FWTA/DCTA? For what?

    - o Yes, an ILA is in place with both agencies (two documents).

    - o FWTA - We are the contracting agency for TRE.

    - o DCTA – rights of DCTA to use the DART-owned rail corridor.

DART's Future (December 2012) Fare Increase

- What is the impetus for these fare changes/restructuring?

    - o Two things.

    - o This was a regularly scheduled fare increase per our business plan, any time we have an increase we look at fare policy and structure to id room for improvements.

- The service department felt that the 2 hour pass would greatly increase ridership for choice riders based on other system experiences.

- Also implemented the non-peak mid-day pass to induce people to utilize the system during the day.

- Bus ridership peaks mid-day via transit-dependent, so we were trying to speak to them with an option that would have no adverse impacts (get 5 hours with unlimited transfers at reduced fare of $1.75, compared to regular fare for 2 hours with no transfers, even non-benefits customers are eligible).

- What was the motivation for creating a new reduced fare category (e.g. College Students)? Will FWTA and the jointly operated TRE be adopting the same classifications?

  - Partially a recognition that UNT is building a campus in South Dallas (e.g. there will be a new commute established from South Downtown to Denton, so we need to accommodate it as best we can).

  - We currently have a college program, but this initiative represents a policy expansion to allow individual students that weren't in a participating contract program between the university and DART to present the credentials to demonstrate that they are enrolled full-time at school in service area to get the reduced rate.

- o Specifically addressed to those outside the three or four universities that were already participating.

- o Students must come to DART offices and present documentation to demonstrate eligibility.

- Will this new structure be concordant with those of the other regional operators?

  - o Yes, The T will become effective in December (Around when we do) and DCTA will do so in January (do to cycle in board operation).

  - o The T will likely not offer the 5 hour mid-day, but will do the 2-hour and the regional fare; their local fares will work a little differently and the price will be different for a 2 hour product.

  - o DCTA will do the mid-day pass and they also chose to match both the 2 hour and mid-day at our fare levels.

  - o Price for local service is different across operators due to sizes of systems and modes operated.

Regionalism

- Discuss the impact of the 2006 NCTCOG Regional Coordination plan, which lists encouraging common technology among service providers as one of five goals and goes on to recommend "coordinating fare collection, such as by universal fare card", on DART's current approach to upgrading its fare collection system.

  - o Hasn't affected DART's approach much, we had already implemented a regional fare product, in large part we were addressing the observed need

which had occurred well before 2006; back then we agreed to use the same TVMs and then DART will lead the initiative with open payments/mobile ticketing/etc.

- o We will deploy mobile first because it is relatively easy to implement region-wide and speaks to a large demographic and is flexible.

- o 3 agencies have regular meetings together (marketing, fare/mobile ticketing).

- o We do that because the market demands it, not NCTCOG.

Paratransit

- Is there a formal entity that is in charge of coordinating paratransit?

  - o No, it is handled by each individual agency.

  - o In a non-paratransit service area, service is at best sporadic.

  - o DART's paratransit is contracted (recently changed from OM to MV).

  - o Paratransit teams inside of the three agencies interact, but DCTA doesn't have many people in that area.

  - o We outsource dispatching to a contractor who also operates service.

  - o We only do quality control, oversight and contract administration.

- Are there plans to integrate paratransit fares and/or service for the DFW region (DART, FWTA MITS & DCTA Access)?

- o To the extent that that is possible

- o Paratransit is quite different because you are actually trying to reduce the amount of service provided because it is very expensive (34-35 per trip), but the nature of the rides is so specific depending on the service area you're in, it is a little more difficult to standardize pricing and you don't have paratransit trips from Dallas to Ft. Worth very often.

- o There's certainly an orientation to broaden the network of paratransit providers so that there is coordination among them.

- o But integration, I'd be skeptical that this is likely.

- Are there any plans to create a consolidated ID issuance center or Reduced Fare Center between FWTA/DART/DCTA?

  - o Those are areas where there are opportunities for coordination.

  - o We have a mobility initiative that is region-wide to address areas where economies of scale can be realized (e.g. call center, etc.), opportunities for more efficiency and better service delivery.

  - o We have a grant that is looking at region-wide service coordination opportunities.

  - o This will probably be the focus of those agencies, outsourcing the common back office capabilities and fare policy will still be specific to agencies as well as selection of operators.

- How has the paratransit-eligible patrons ride fixed-route for free policy working out?

    - A little early to tell, but it seems to be working.

    - this is an overall long term operational objective for paratransit customers to use the existing modes as opposed to non-fixed (level boarding accommodations).

Future Fare System

- What is the primary impetus for updating DART's fare collection system?

    - 5 things.

    - Modern payment technologies are better for riders and agencies, these have recently expanded and customers expect to use this.

    - Opportunity to generate ridership.

    - Opportunity to lower costs.

    - Shift in payments to open systems and mobile payments. Need to keep up with technological change/shifts.

    - New technologies are less reliant on physical and mechanical equipment that breaks down and has operational issues. The more mechanical it is, the more inflexible it is because you have to do all these things anytime you want to make a change.

- There are many practical reasons why software-based payments are compelling for transit agencies.

- Do you have an estimate of your current cost-to-collect and what it is projected to be after implementation of the new system?

  - Currently around 14% which considers all forms of payment.

  - Customers using credit cards at TVMs is 40-65% of all revenues.

  - All bus transactions received on the bus (e.g. non-pass) are cash.

  - Cash at fare boxes and TVMs → 25% of all revenues.

    - Monthly pass is a little bit higher.

  - Mobile ticketing (5-7.5% cost-to-collect) could get up to 30-40% penetration and this will significantly affect amount of cash handling and thus significantly reduce total cost-to-collect.

  - Hopefully 10-11% after full implementation.

  - At $70 M in fares right now → about $10 M or so. Knock off 20% you save as couple million dollars, so that's the potential of scale.

  - Credit card transactions are 2.5% of charge + $0.30 base fee, thus a $2 ticket generate 30-45 cents for the payments industry.

- Are there any discussions to procure equipment/seek a vendor as a group? Create a Central Service Bureau?

- o Have to buy electronic validation equipment that would work for all agencies, will issue RFP in next six months.

- Will the DART contract include the third party being in charge of fare collection maintenance as well or just design/build/install? Who is responsible for changes to DART's existing FC infrastructure?

  - o No, we are in the best position to be a systems integrator.

- Discuss any strategies employed in developing the phasing approach for rollout of this system.

  - o Begin mobile implementation, one person said their best decision was to do a number of small system introductions instead of one large system launch.

  - o There are certain things you have to do technically to get the platform established.

  - o But after that you want to be able to continue to introduce capabilities and features without putting the agency at risk.

- Explain the decision to have NTTA manage the account registration system and DART manage the master back-end payments system.

  - o Toll road user is another form of payment that is account-based.

- NTTA already has many people registered with credit cards on file, so it was easiest to make the transition for these customers by taking NTTA onboard.

- Discuss the idea of joint ticketing for special events and couponing.

  o We have someone under contract to approach 3rd party merchants (state fair, sports arena, marathon association, 7-Eleven, Starbucks) and identify the opportunities for joint sales.

  o We are working through the mechanics of how you sort out the payments and transactions settlements for something like this.

  o This will be done in the third phase.

  o 1st – basic in place

  o 2nd – flesh out university and corporate pass program

  o We view it as a value proposition.

  o Still determining technically how we want to do this and which identified candidates actually have an interest in partnering with us.

  o At this point we know how to do it, but we don't know who with.

  o Holding meetings through the next 6 months we will go through a census of candidates to see who has the most interest.

APPENDIX B.2

CHICAGO CASE STUDY INTERVIEW (CTA)

CHICAGO CARD (CTA)

- Does the Chicago Card incorporate reduced fares (e.g. do reduced fare customers have to use the transit card to be eligible)?

  o Two programs, regular Chicago Card and CC Plus, which is account-based.

  o No reduced fares on the Chicago Cards, most fare programs require validation and issuing of special media via RTA who does registration, validation and issuing of media.

- Does the Chicago Card incorporate various passes (e.g. can customers only use transit passes for daily, weekly and monthly passes)?

  o No, regular has only stored value.

  o The Plus card has a monthly pass or pay per use.

- Who currently manages the Chicago Card back-end payments/clearance system?

  o CTA operations group handles some of this work, but AmericanEagle currently hosts our back-end for Chicago Card Plus, they will be building our new website as well.

PACE

- Discuss the interaction between CTA & Pace relative to Ventra.

  o Pace signed on to our contract about two months ago, still working through business rules and some of the fare media type things.

- They have some of their own passes that they will keep, we have joint passes we will both keep and CTA-only products we will keep.

- Rollout plan is keep what's available now during a transition period.

- Eventually, they will only be available on one card.

- Pace was a change order to our agreement; they don't have their own contract with CUBIC.

- All the data management and back-end warehouse stuff still belongs to CTA.

- Pace doesn't have to purchase any vending machines, just the readers being deployed.

- Paratransit is not included yet, no readers on vehicles initially, maybe later on.

- All transaction fees for CTA fares are being paid through the contract to CUBIC.

- However, Pace has decided to takes its own collection costs risk and will pay all of its transaction costs .

METRA

- Why wasn't the Chicago Card adopted by Metra?

  - Primarily because it is a POP system.

  - Also, old infrastructure with onboard conductors checking fares manually.

  - They don't have infrastructure in-place and didn't have any money to move forward with big infrastructure changes right now.

  - Also, they are zone-based, not flat-fare like CTA and Pace.

- Discuss the origin/history of the CTA/Metra Link-Up Pass (e.g. voluntary or mandated?).

  o Don't know specifics.

  o There are two forms of link up.

  o CTA mag-stripe card with a link-up sticker on it, works on cta regularly → will be kept

  o CTA Link-Up sticker affixed to a Metra monthly pass → this will be eliminated will still

- Why isn't Metra involved in Ventra? Will they be more involved for NFC development?

  o Pretty much the same reason, infrastructure is not there.

  o We have approached them several times, ongoing meetings proposing alternative solutions – hand held conductors on train, tag in/tag out.

  o They are not ready to move forward this quickly.

  o One Possible Solution → Metra could accept Ventra for payment at Metra ticket windows, a simple solution that would be the cheapest to implement.

RTA

- Discuss RTA's 2011 mandate for a universal fare payment system for the region by 2015.

  o It's on everyone's radar.

  o We are working with Metra to find a solution and get them involved.

  o Metra's plan is to issue an RFI later this year to see what's out there.

- Like Metra, we have been meeting regularly with RTA, so everyone is up to speed on what we're doing and push this thing forward.

- Discuss RTA's involvement in the deployment of both the old (Chicago Card) and new (Ventra) fare collection system (e.g. did they lead the charge for regional adoption?).

  - CTA did Chicago Card on its own.

  - Some of the special programs administered by RTA, like smart card media, help fund these efforts.

  - Although the RTA, as an organization, is not heavily involved.

- Are conversations about fare collection between the operators mainly housed within RTA meetings or is it on an operator-to-operator basis?

  - We had monthly regional partner meetings (Metra, RTA, Pace & CTA) ongoing for a few months during the design stage.

  - Now that we are doing installations and equipment, we are not doing that much with them.

  - Haven't met in 2-3 months, but everyone knows where we're at.

CURRENT ISSUES

- Discuss the current challenges with the Chicago Card with respect to regional fare collection and policy.

  - System-wise there is not a whole lot issues, across CTA & Pace customers are happy with the program.

  - Issues

    - Card is proprietary.

- We are running out of chips for those cards.

- Hotlisting of cards & latency of equipment getting the updates

  - Someone could run out of value and have auto load turned on, but the bus hasn't got the data yet and therefore the card gets hotlisted, then you have to call customer service to re-activate.

  - Because it is an account-based program Ventra is trying to make customers more aware of these issues - give them more notice when they get low value.

  - Bus readers are not online all the time and data is pulled at garage at end of run.

  - New system will be continuously online/cellular and this should correct a lot of these latency problems.

VENTRA

- Discuss who is involved in this P3.

  - We went through a bid process from 2009-2011, there was a lot of back and forth (RFI to gauge interest in doing something like this, creating this kind of partnership, responses indicated there was a lot of market interest), lot of bidders, many teams with presentations.

- What was the impetus for this large-scale effort (e.g. antiquated equipment, technological change/keeping up, eliminate magnetic-stripe cards, reduced collection costs, etc.)?

  - Mostly due to age of equipment, we knew we needed something new.

- - Main Reasons
    - We can't get a lot of the parts for the old system anymore.
    - Card is proprietary.
  - Other Reasons
    - Save operations cost.
    - Have someone else do collection, maintenance and distribution/card printing for fare collection.
- What are the primary expected benefits of Ventra? Do these vary by operator?
  - We want to concentrate on what we do best (provide service).
  - Open benefits relative to closed system.
- Discuss strategic implementation strategies in the rollout/deployment of Ventra.
  - Still very early, we just started installing vending machines.
  - One of the big changes that will make/break the system is customer outreach.
    - One of the subcontractors is a PR firm out of Chicago, working to develop strategy for reaching out to elected officials, customers, retailers; figure out best way to educate everyone.
  - Big change for customers that is pretty complicated compared to the existing system.
- Will Ventra store passes or just value (e.g. on what medium will passes be issued)?
  - Will include passes in addition to stored-value.
  - The existing product catalog will be mimicked.

- o You can pay multiple ways (pay as you go with bank card – no account tied, but no transfer abilities).
- Will Ventra be available to paratransit customers?
  - o Will not be for initial rollout, but we have been talking about looking at it once we go live.
- Discuss the decision to forego capital procurement in exchange for a per tap charge (e.g. what was the motivation behind this → Couldn't take on any more debt? Didn't want to hassle with the payments industry or managing fare collection system? Were uncertain of the financial burdens of the per transaction costs? Etc.).
  - o The main reason is it's an expensive project that is hard to get funding for.
  - o This worked out best because we didn't have to come up with a lot of initial funding to start it.
  - o We don't pay cubic anything until the system is live Under this arrangement, it is in CUBIC's best interest to make it work as soon as possible no big change order process for minor system changes.
  - o As opposed to typical fare collection projects around the country where there are a lot of change orders that get made after the contract is signed, this arrangement allows us to eliminate the hassle of big change order processes for minor system changes.
- Will the same entity be in charge of the back-end for both Pace & CTA payments?
  - o Yes.

- Discuss CTA's clause to receive 50% of non-transit revenues and the retail vendor-bus stop proximity requirements within the contract.
  - This is on the GPR side of things, if there are fees being collected. then we get a cut of that.
  - It's kind of an open thing, anything that comes up, CUBIC can run it by us and if it's a revenue generator and we implement it, then we both share in that revenue, there are probably more things that will come up.
  - Bus stop, we have a lot of bus-only customers; this is a challenge with the existing system, they have nowhere to go to reload or buy media; thus, those who don't go to rail stations can still purchase media and make changes at many locations.
- Discuss the issue of market penetration of contactless media and unbanked customers.
  - We are doing an analysis now to come up with better demographic data for riders.
  - As far as penetration goes , out of our customer base about 10% is cash on bus and 60% use some sort of pass product, the rest use smart card type/stored value mag-stripe media.
  - We are kind of forcing adoption with the system.
  - We will run both systems in parallel once we go live, then phasing out old media, first Chicago, then mag stripe passes and stored value.
  - Bus-only customers will now have a robust network from which to reload fares.

- Mag stripe pass products are only available at currency exchanges and other retail outlets, now we will have vending machines that will dispense all products (stored value and passes).

- If unbanked, you can still get a ventra card and add money at retail locations.

- Will the unbanked use CTA-only or MasterCard/Visa branded card that can be used for those without bank accounts?

  - First Data Corp. will be the issuer, working with MetaBank.

  - Ventra cards issued out of vending machines are all GPR and same as retail-issued; all cards (except media issued by RTA) have GPR functionality but you don't have to use it.

- Do you expect some riders to be more confused than others?

  - Chicago Card Plus customers will likely not be confused, because it will work the same way as it does now.

  - Regular pass users may have some initial confusion because they are not used to using just one card for multiple fare products.

  - Cash-only or customers who use mag-stripe passes will likely be the most confused.

- Why are reduced fare customers restricted from using a prepaid debit account on Ventra?

  - If it is a special fare program administered through RTA, then these cards will not have GPR functionality on it; buy it from retail, vending or online

177

you will have GPR; but if you're in a special program (seniors or students) then you will not have GPR functionality.

- o Still finalizing a lot of special program details with RTA, planning to administer them the same way.

- Rollout

  - o May or June 2013.

  - o 6 month transition period after that, after which we eliminate the existing Chicago Cards, magnetic-stripes and transit cards.

APPENDIX B.3

PHILADELPHIA CASE STUDY INTERVIEW (SEPTA)

General

- Discuss the organizational structure of this project (e.g. Advisory Committee, other entities)?

  - Advisory Committee monthly meeting, over and above fare collection project, on their agenda every now and then for updates, they have their own broader agenda; since this is the highest profile project at SEPTA right now it is on their radar quite often; staffing of project is 13-15 individuals, mostly engineers full-time SEPTA staff; assisted by program manager (consulting firm) providing unique expertise in DB and systems integrations/supply, serve as go between agency and vendor (LTK).

- Is the primary motivation for introducing this new fare collection system the fact that the aging FC technology that can't be repaired anymore or is it something else?

  - Yes, it was beyond its useful life, we kept it alive and running because it's fairly utilitarian, didn't have capital earlier to replace it; skipped the proprietary, closed loop system within the industry.

- Are you also looking to change your fare policy/structure?

  - It's on the front burner, we run commuter and transit so we now have this potential for a complete integration from operations and fare policy to ride seamlessly between the two modes, we do that to an extent now, but only if you have a calendar pass.

- What is the current transaction flow for the magnetic system? Who will be in charge of operating the payments clearinghouse? Has there been any effort to let one entity perform all of the regional transit fare clearance functions (e.g. utilize NJT or PATCO's current setup or build a new one on your own)?
  - Currently transactions go to a dial up server once a day for the subway and buses are probed when the farebox reaches a certain threshold; communications network will be fiber optic for subway, wireless for commuter rail and bus; new system will take any compliant ISO 14443 A & B contactless cards, whether bank-issued or not (university, employer, etc.); more of a back end light processing, doesn't have to go for a full authorization, in addition to common bank cards (need authorization); if system has never seen card before, it has to go back for a full authorization, otherwise it just goes to the back end; other motivation in heading this way is we have a high percentage of people on fixed passes, commuter 60-65% on weekly/monthly pass, 55% on transit; non-pass holders go to stored value.
- Any tentative names for the fare medium?
  - NPT is place holder; branding is tricky because we won't have a focal card with a name, still deciding if going this route.

Funding & Project Development

- What was the reason for awarding an extra $29.5 M for the ACS contract relative to the initial estimate of $100 M?

- $122 M with 7 M contingency, many of the projects are on our side of the ledger because we had to build out network and do arch/eng to anticipate the new system (e.g. subway conversion of fare arrays, mini control centers over 5/6 stations for remote monitoring if we don't want to have a staff presence there "zone offices", monitors in stations with cameras that feed back to the zones.

- Discuss the source of delay in awarding the contract from the January 2011 projection of May/June to the actual award in November 2011?
  - Most of it was on vendor-side, wanted more time for best and final offer; the actual board decision was in November 2011, award was February 2012.

- Discuss the failed fed/state grant seeking process from 2008-2010? Is it hard to make the case for this kind of program at these levels?
  - We have been in a low point for state capital funding, SEPTA usually runs about 400 M, has dropped to about 300 M overall. Most of the regional/non-elected officials realize that this is what other places are doing, numbers were not unusual.

Equipment & Procurement

- How much is SEPTA planning to spend on the new fare equipment (e.g. turnstiles, fare boxes, ADA gates & TVMs)?
  - Not all committed, most of the $130 M is covering this, a lot is for the other companion projects.

- Are any other entities sharing in the costs of new equipment?

- We need to work that out, we are trying to build this in phases, slowly do interoperability with DE and PATCO; the way we are looking at equipment is to be equipment lite on outer stations and equipment heavy on downtown stations, won't have a big need for TVMs and turnstiles outside of downtown.

Implementation Process

- Discuss the issue of/rationale for phasing out magnetic stripe cards and tokens?
  - Collection costs come from many sources (production management of media is a major one),general idea is to remove that from our side of the ledger and have it provided by somebody else; if we did a general purpose reloadable card a card or program manager would operate that system and we would share in the revenues; the tracking, production and auditing of all the products that we use today, we would shed that part of the cost; a lot of this is dealing with the magnetic stripe card supplier; did work several years ago and estimated between 15-18 cents for every dollar collected.
- Are you still expecting a full system implementation by 2015?
  - We are but we're only six months into it, plenty of room for delay.
- Discuss the decision to hire a marketing firm (e.g. were you worried or simply SOP)?
  - A lot of this project lies beyond the skill set of this agency from a branding and marketing perspective, not one of those things where you have the skill set right away.

Regional Coordination

- Was there any discussion at the MPO level about creating a universal fare medium between PATCO/SEPTA/NJT?
  - This kind of thing will fall within industry trends nationally, as proprietary systems age people will be looking forward, with rise of mobile devices it just becomes natural to pay that way.
- Discuss any issues that arise within regional transfers (e.g. differences in reduced fare classifications/definitions, designation of peak or off-peak on PATCO, availability of weekly/monthly pass, etc. between operators in the region) both now and in the future?
  - PATCO possible fix for transfers: we record ahead of time all the PATCO pax that transfer, take serial # from PATCO Freedom card and store that in our back end, then we can just bill PATCO for those passengers.
- Discuss any MOUs/ILAs/IGAs that you have in place with other transit operators (e.g. NJT, PATCO, DART, Pottstown Area Rapid Transit or Krapf's Transit) or local governments (e.g. New Castle County, DE or Mercer County, NJ)?
  - Open invitation for PA transit operators to join in on should they wish to upgrade their fare system and use our payment processing, economies of scale benefits.

PATCO

- Did PATCO reach out to SEPTA in 2006-2007 when it was developing its Freedom Card or during the Wave and Pay VISA open contactless demonstration?

- They were under the gun to get a fix in bc equipment was beginning to fail and they knew we were years away from getting something underway; open payments had not really emerged yet.

- Will NPT be compatible with Freedom Card?

  - Yes

NJT

- How are you coordinating with NJT, if at all?

  - They have a pilot with GoogleWallet on limited routes right now. They are still deciding and, for the moment, have decided not to decide. NJT is in a crunch with the current Governor and state budget.

  - Any new initiative now would not be on the front burner given fiscal climate.

Regional Coordination

- Discuss any coordination efforts between providers of paratransit services in the region?

  - There are five operators, one for each of five regions, city and four counties.

- What is and who operates "CCT paratransit" services?

  - SEPTA handles intake for calls and riders and then hand them over to the operators.

- Discuss coordinating with Penn DOT to deliver senior/disabled fares (e.g. are you mandated to consult them, why do this)?

- Seniors get free transportation, we need a way to bring them into contactless, probably a driver's license fix, magnetic driver's license.

Long-Range

- How long does the agency expect this new FC system to last?
    - Hoping 10 years out of this, equipment-wise (TVMs).
    - FTA doesn't have firm figures for life-cycle purposes.
- What are the expected O&M costs of the new FC system?
    - We expect the collection costs to be lower than the legacy system over time. The contract includes vendor operation until the end of equipment warranty. We will then decide to re-negotiate.

Public Response

- How do you see FOBs (e.g. frequency operated buttons) being used in the future?
    - Unfamiliar with this term.
- Discuss the issue of contactless card market penetration (e.g. 15% currently)?
    - SEPTA will either directly issue a contactless card or work with a Program Manager to issue a General Purpose Reloadable card.
- Discuss the issue of unbanked customers (estimated at 30% of SEPTA ridership)?
    - We expect unbanked riders to use the SEPTA card or the GPR card since the legacy media will be discontinued.
- Discuss SEPTA's approach to the public education process (e.g. how are you planning to help "minimize change for riders")?
    - A combination of in-house and external firms will market and promote the new system.

185

- How has the public responded to this? What are some key citizen concerns?

  o Yes, numerous focus groups, online survey and ongoing stakeholder meetings.

  o Generally the reaction has been favorable.

- Do you expect Regional Rail customers to be relatively more confused/resistant than others?

  o A high percentage of our customers already use credit/debit to buy passes and are familiar with electronic payment.

APPENDIX B.4

TORONTO CASE STUDY INTERVIEW (TTC)

- Have there been any major updates on agreements with Metrolinx/PRESTO since the May 2012 Commission meeting?

  - Making progress on the issues hoping to have a document signed by the end of the year but there are some issues that need deciding (TTC's role in system design and testing) but we will get through them no doubt.

  - We have ongoing working group with PRESTO on a variety of issues – planning for civil works, PRESTO devices on new streetcars, overall project schedule – some planning/design activities in anticipation of moving forward.

TTC – THE ORGANIZATION

- Discuss TTC's relationship to the City of Toronto (e.g. is it a department or a separate entity? How much funding does the city provide? Any federal/provincial funding now?).

  - 44 City Council members & mayor

  - the TTC commission is operated as a public agency board/commission and operates at arm's length relative to the city council.

  - We have about 9 members from the council on the commission.

  - The commission has authority to make policy decisions for TTC and can do this independent of the city council.

187

- o So we do report to a political body.

- o Reality is we still have to operate under the overall umbrella of city who provides our capital budget monies, so we ultimately have to take our budgets to the city, not just the commission.

- o There is currently a move to replace political representatives on board and replace them with public members, but not sure when this is slated to happen (probably next year).

- Did the City of Toronto really become interested in open payments on its own accord? To what level and effect?

  - o TTC had done a business case back in 2007, we said there are a bunch of +/- about smartcard systems, certainly some customer benefits, but there is a cost associated with it.

  - o We also highlighted how a traditional smartcard system works, but noted that there is also a movement out there within the payments industry to move towards open payments.

  - o We said that this is something new and we have to make sure we are able to evolve to it if we are to transition to a smartcard system.

  - o Between 2007-2009 PRESTO was TTC fare's main focus and we worked with them because they are the provincial agency.

  - o We began to learn more about open payments (via NYC Open Payments pilot) and how they might become feasible for use on transit and that there

was newfound interest within the payments industry. Previously, the financial players didn't really see the business case for transit. The financial groups started to see transit as a way to tap into general market share and began to change their industry rules from 2007-2010.

- o Our internal champion was the chair of our internal commission and he was looking at what was happening in the industry and elsewhere. He became very interested in pursuing open payments and in 2010. He asked us to look at it more seriously. We worked with Chicago and New York to investigate this and created an RFP to send into the marketplace that would implement Open Payments in Toronto. The idea being that this system could ultimately support the provincial system (PRESTO).

- o The fact of the matter is that the political decision at the time was to go with Open Payments and see if it can support PRESTO.

- o That political direction changed in 2011. One of the reasons was we had a change in our chair and a change in our mayor. These two new individuals are more focused on what Open Payments could provide within the context of PRESTO.

- Discuss the impact of Metrolinx's Transit Procurement Initiative department and its position as the regional procurement agency (e.g. Does it really help to reduce the cost of purchasing FC equipment for individual operators?).

- o Since PRESTO is an operating division of Metrolinx, they have procured and installed devices on all of the systems around the TTC, but not TTC.

189

These systems were procured through Metrolinx's agreement with Accenture (PRESTO's contractor).

- o This may change for TTC because our order is much larger and has fare more significant ramifications.

- o One of the key differences here is that the other devices procured for the non-TTC agencies were going to be owned by those agencies with the municipalities contributing two-thirds of the equipment cost and the province paying the other third. The transit agency would own those devices, but would also be responsible for maintenance/repair and replacement to be provided through PRESTO.

- o TTC is taking the opposite approach where a 3rd party does everything, including ownership. With TTC, PRESTO is essentially procuring these devices (and owning) for themselves and installing them in TTC.

- o TTC is hands-off on procurement, we won't own them, replace them, etc.

- o We just want those devices to do what we want them to do, nothing more

- o TTC has 75% of total ridership in region

PRESTO & TTC

- Discuss the various sources included within the $140 M grant for TTC's PRESTO implementation.

- In 1999, TTC had done a high level review of smartcard system and determined that a smartcard system that was owned and operated by TTC would cost too much.

- In 2004, a joint funding agreement, under the Canadian Strategic Infrastructure Fund, was announced between the City of Toronto, the Province of Ontario and the Canadian government. Within that agreement there was $140 M allocated for an integrated fare system for the Greater Toronto Area. This was not a number that had been updated since the 1999 report.

- 3-way split, with each partner paying $47 M.

- After the announcement, TTC put together a more detailed analysis and decided it would take a lot more money than $140 M.

- Our thought was before we even think about implementing a smartcard system, we need to find more money first.

- Discussions were held between 2004-2006 and 2009 to figure out what the overall cost of a smartcard system would be and the appropriate funding split between the parties.

- In 2010, TTC issued an Open Payments RFP that was structured along the "managed services approach" (e.g. Open Payments vendors are responsible for all devices and operation of those devices and system services).

- In 2011, we moved from trying to do Open Payments with a private vendor to doing PRESTO with Open Payments. By that time, PRESTO had adopted their own Open Payments model (e.g. cover all capital costs for devices, back-office, upgrades, replacements and TTC will be responsible for power upgrades and staff resources to support PRESTO using the $140 M).

  - We're not sure what it is going to cost PRESTO to deliver this system to us. We are only concerned with a delivery of the promised performance and to not exceed our capital allotment of $140 M.

  - But Metrolinx actually has the federal portion of that grant and they have chosen to use it to support TTC's implementation of PRESTO ($47 M).

- What was the primary motivation for TTC not to adopt PRESTO initially?

  - There was definitely the risk of having other TTC internal projects having money pulled away from them and put towards this upgrade.

  - There were also some concerns about whether PRESTO could meet the relatively complex business requirements of the TTC.

  - There were definitely concerns about the lack of provision for open payments.

    - We knew we just still had too much to discuss to sign-on at that point.

CURRENT OPERATIONS

- How are TTC internal transfers currently handled? External transfers?

    o Paper slips, you go into a subway station, you put fare (ticket/token) in fare box and you get a timed transfer slip from machine or bus operator.

    o Transfers are both direction- and time-based. It is a very complicated system that requires a lot of operator intuition and know-how. An electronic system's ability to mimic this will be challenging.

    o External transfers to services not operated by TTC require the purchase of a full-fare from the other operator.

    o The PRESTO readers we do have our strategically located for surrounding regional transfer services. If a YRT bus customer comes in, they can tap YRT on the PRESTO reader and get a TTC transfer.

    o Soon enough it will simply be a fare deducted all from the same card.

- Why doesn't PRESTO currently offer concession fares for TTC services?

    o Very limited deployment (14,000 taps per day) and the devices that are in there now are not the ultimate devices that we will have in our turnstiles.

    o When they move to full rollout they said they will support all of our fare products and policies, as well as our concession (e.g. reduced) fares.

- Discuss the issues/customer hassles that have resulted from TTC implementing PRESTO at only 14 subway stations.

- This transfer interface is only available on two readers on two turnstiles in 14 stations.

- Given the limited nature of deployment, the actual use of this arrangement probably doesn't even approach 1% of all regional riders.

- Discuss the motivation for and creation of the "TTC Two Times with GO Transit" free reverse transfer program.

  - This existed before PRESTO was put into place.

  - This was a recognition that certain trips that made sense for someone to go from TTC to GO Transit and back to TTC.

  - A lot of these transfers now occur at places where PRESTO doesn't exist now within the TTC.

  - There is only a small percentage of people that use this. It is a quite unusual combo of trips that would make it beneficial for someone to actually utilize this arrangement.

  - However, this agreement will be more easily facilitated with the PRESTO system.

- Are there currently any discrepancies between TTC's reduced fare classifications and those of other regional transit operators? How are these dealt with now? In future?

  - Yes there are.

- o Part of TTC's business requirements are that PRESTO would be able to support these differences in classification.

- o Child policies vary across regional operators. At the TTC those 2 years and under ride free. For everyone else the free cut-off is around 6 years old.

- o There are similarities with among the high school, adult and senior classifications.

- o Some other operators offer post-secondary programs beyond just a pass product while we only offer a post-secondary monthly pass.

- o Additionally, there are also many group and weekend programs that are unique to TTC due to the inclusion of major tourism destinations within its service area.

PRESTO NG & TTC

- What was the primary motivation for TTC to adopt PRESTO NG (e.g. open payments features or coercion a la withholding of provincial subsidies for other major TTC programs)?

  - o It's obviously both factors.

  - o As one report outlines, the agency couldn't move ahead with an electronic fare system if it didn't meet our business requirements. The primary focus in the creation of the original PRESTO system was the other regional operators around TTC.

- In PRESTO NG the commitment is that they will evolve PRESTO NG specifically to meet TTC's business requirements and eventually operate an Open Payments arrangement alongside the PRESTO card.

- The risk of $8B in funding made us look at it and say, "Well, PRESTO is probably going to deliver and if we don't commit to PRESTO we are putting a lot of service at risk. I guess it only makes sense to go ahead with it."

- $8 B speaks very, very loudly and provides an incentive to seriously look at PRESTO.

- But if PRESTO couldn't do what we wanted it to do business-wise, we aren't sure if we could have committed because it might have meant many other significant changes that we wouldn't be able to live with.

- Are the partner entities still concerned about the various unknowns due to lack of open payments implementation on transit?

    - Someone described these to me as large computer systems. You know with these systems, you will have problems with the machines.

    - When the system is rolling around on 1800 vehicles you get concerned about how well any electronic payment system is going to operate, not just smartcards.

    - We wanted to see a much broader implementation than the New York pilot.

196

- o We do need to make sure we're not assuming it is just going to work properly when it gets in (e.g. we must do the appropriate user testing first before deployment to general public).

- o Hopefully we will use some of the experience from Chicago and Philadelphia and come up with some implementation lessons to be applied in Toronto.

- Discuss Metrolinx's suggested Capital Surplus Fund relative to TTC's suggested absolute cap.

  - o This has been put on the back burner for now. We are trying to resolve other issues.

  - o If we can resolve the others, we believe that here is a simple compromise that could be reached between the parties.

- Discuss TTC's hesitancy to enter into the Metrolinx/PRESTO agreement relative to governance.

  - o There would be a significant change to how we operate our fare collection now, because currently we have complete autonomy.

  - o Now we are all of the sudden becoming part of a club and we have to play by the rules of that club.

  - o Despite the fact that we have 75% of ridership, we still only get one vote.

- Thus, we are moving into a relationship with Metrolinx and the other operators where decisions that we previously made on our own must now be made using the process that Metrolinx has already established.

- Obviously this takes a little bit of control out of the decision-making process for us.

- Our concern was that while we believe we can work effectively with the group, there may be certain things that we want to do that others might not want to do at all, or at least not move quickly on, so how do we handle these situations? These issues will be worked out as a political solution, as necessary.

- Discuss the current status on the expected performance indicators and service level agreements between TTC and Metrolinx/PRESTO.

  - These are on the front burner.

  - There is recognition on both sides that you need to have these targets be meaningful.

  - The question now is how do we get to an endpoint where we agree on these numbers?

IMPLEMENTATION

- Do you have any concerns related to the new PRESTO NG readers (e.g. OC Transpo's launch date was pushed back 6 months due to hardware issues)?

- o Absolutely concerned. The software platform being built for Ottawa's requirements is planned to be the basis for a lot of the changes that TTC would need for its deployment of PRESTO.

- o We need this other system to work properly, because that's essentially how all of our business requirements are going to be developed and incorporated.

- Discuss any strategic implementation or phasing strategies that have been taken by TTC.

  - o Working with PRESTO now and hope to have worked out by the end of the year.

  - o Those questions are still up in the air right now.

  - o This depends on: timing of TTC subway power upgrades, wired or wireless communications that will eventually be chosen by PRESTO.

- Discuss the creation of a joint Steering Committee, chaired by a TTC representative, to coordinate implementation of PRESTO at TTC.

  - o Intent is to just have a formalized structure with PRESTO that has representation from both entities so that key staff from each agency can get updates on development and project concerns.

  - o So we know if things need to be changed.

- o Joint project because PRESTO will own all of the equipment being installed on TTC.

- Is TTC planning on using a loyalty program similar to that of GO Transit?

  - o At this stage, the business requirements say that we want PRESTO to support our existing pass structure, but also provide the flexibility to employ the loyalty program if we so choose in the future.

  - o We want to make sure the technology supports the ability to implement new fare products, not constrain it.

  - o This is a policy decision that our Commission will ultimately make down the road, just a switch we can turn on/off.

PARATRANSIT

- Has there been any effort to coordinate paratransit service and/or fares at the regional level?

  - o There are efforts looking at the ability for one operator to drop off in another's service area for convenient transfers.

  - o PRESTO will look at this in the future.

  - o While TTC operates paratransit in-house, some of the other agencies contract this out, so there are different arrangements that have to be worked out.

o In terms of fares, there are already many co-fare arrangements in place for paratransit service.

o In terms of TTC & other transit properties, other than the TTC weekly pass, there really aren't any fare arrangements right now.

o These could be discussed once fully implemented.

APPENDIX C

ATLANTA REGIONAL TRANSIT OPERATOR INTERVIEWS

This section consists of five subsections which include the interview transcripts from the Atlanta case study. The agencies and their interviews are presented in the following order:

1. MARTA
2. GRTA
3. CCT
4. GCT
5. ARC

APPENDIX C.1

MARTA INTERVIEW

- Discuss your current contract with CUBIC (e.g. contractor responsibilities & MARTA responsibilities).

    o MARTA has maintenance contract with CUBIC to do regular maintenance and repair on all gates, bus fare boxes, garage computes, all components we originally purchased from them in contract; they must maintain inventory of parts an 99% uptime; 3 year term with a 3 year option, total value 5.2M per year, about 40 M total.

- What is your current cost-to-collect?

    o 27% for BREEZE system as a region.

Regional Transfer Agreements

- Any updates relative to BREEZE agreements (e.g. have they changed since 2010)?

    o No

    o There are two agreements.

        ▪ BREEZE Participation (region's paying MARTA for a part of the cost off operating)

        ▪ Reciprocal (transfers for free)

- Does the arrangement still allow for:

    o Transfers between two agencies → MARTA receives revenue for trips that begin on MARTA

- Transfers between three agencies with MARTA as "pass-through" → MARTA receives no revenue unless it is the first carrier; the only person who can be in the middle is MARTA.
- No transfers between COBB AND GWINNET, just agencies and MARTA.

- Discuss any other ILAs MARTA has in-place with transit operators (e.g. City's streetcar).
  - Nothing contractually yet. Will go along with BREEZE.

Current BREEZE System

- What do you like about BREEZE?
  - Closed-loop, card-based system, when it was installed it was the latest and greatest.
  - Since that time we have had innovations and some pioneers moving towards account-based systems.
  - Current system is good, solid, available 99% of time.
  - But we should look at other systems that are changing.
  - There are technological and social issues to overcome (unbanked).
  - Account-based more important than open payment.

- What are your current issues with BREEZE?
  - Proprietary
  - Don't have access to all parts
  - Doesn't work across the industry

- Did MARTA assist other agencies in procuring BREEZE hardware/software?

- Back when Clayton did theirs, MARTA ran their operations and used federal grant from GRTA/MARTA

- Other than that, everyone else bought their own and has to go through CUBIC.

- PACTO does their own maintenance, so it's not impossible but you have to go through the transfer of knowledge and labor relations issues.

- Who operates the payments clearinghouse?

  - Within IT department, MARTA wrote the clearinghouse's software.

  - We've added several things to CUBIC system clearinghouse, like web sales and data reporting mechanisms.

- Do you feel the need to upgrade/replace your current system? Why? Expected Life?

  - I don't think we're at the right place in the industry to say yeah yet.

  - Plus we're not into the life cycle of our system 2016.

  - But the time is now to start looking at these systems, a year of planning and another year to implement.

  - Wed like to look at this on a regional basis.

  - Also look at fare policy/governance, not just technology.

Issues with BREEZE Agreements

- Discuss the issue of software/hardware updates with the BVMs relative to other operators.

  - Not just at BVMs, but everywhere.

  - The protocol is proprietary (memory map and transmission of date).

- The reads are just off-the-shelf ISO 14443A/B readers.

- We need an industry standard like IPSO.

- Discuss the issue of dormant value and its distribution among operators.

  - Not a big contentious issue.

  - Card restitution (replacement and addition of lost value) is more of a pressing issue.

New FC System

- What do you want from fare collection that BREEZE currently doesn't offer?

  - Account-based

  - Open standards

  - Open source

- Do you have a strong interest in mobile ticketing application development?

  - We have been approached by 3 different entities

    - ATT

    - Sprint

    - CoreFire → group that handles the T-Money network in Korea

  - We have had discussion of pilots, but just high-level stuff.

  - E-ticketing, in general, could be a way forward.

- Discuss your future approach to deploying an Open Payment system (e.g. contract it all out in one RFP, multiple RFPs for different parts of system)

  - I don't think we would want to do one RFP for everything.

  - We would probably do multiple RFPs or at least have multiple components to one RFP.

- o The vendors of these systems are not necessarily operators of the fare collection system.

- o I'm not sure that the vendors are the best to operate, this could be a separate component.

- Discuss your interest in letting a contractor operate the system and transaction processing of a base fee + per tap fee.

  - o For Open Payments, I would be looking to get a share of the interchange fee (e.g. non-transit revenue).

    - Vendors take on interchange for your card (can be used at any retail place). As transit agency, I would like to get in on a component of that.

  - o If the business case was right and there's money to be made, then yeah we would look at that.

  - o Anything to move costs out of the authority, get a P3 going, generate revenue and help subsidize transit is a good thing.

Paratransit

- Discuss the issue of ADA complementary paratransit service requirements relative to providing for regional fares and transfers.

  - o Transfer between systems would be identical in an account-based system.

  - o You just need to make the right business rules for the software.

  - o Paratransit is probably the first and best place to do regionalization.

    - From a customer point of view, a regional paratransit system is way more advantageous to everyone.

- From an agency perspective, it allows us to realize economies of scale.

- From an Environmental Justice perspective, this would be the biggest gain.

- The fixed route stuff is all built as rail feeder, but paratransit goes anywhere.

- This is a big win for all involved and the metro region as a whole.

APPENDIX C.2

GRTA INTERVIEW

Agency's FC System

- Describe your fare collection system.

    o Two fare systems on our vehicles

        ▪ Fare box with a TRiM unit manufactured by GFI (Sens-A-Bill) these are used to collect cash on the vehicles and to process our Express product set on magnetic media (same system in use by GCT)

        ▪ BREEZE system – "the paratransit solution"; its different from MARTA's solution on buses (full farebox integration). We have a standalone driver control unit and light validator which allow us to accommodate these fare media.

    o Allow transfers from MARTA to Xpress services operated by GRTA.

    o Allow transfers from GRTA to MARTA if customers are using a BREEZE card, you must use one to transfer.

- Are all GRTA fares available on BREEZE card?

    o We do not offer BREEZE products on our services.

    o In terms of loading products onto BREEZE, we use the MARTA BVMs for this.

- Did your agency purchase all of the components for this system by itself or did it receive assistance in procurement?

- o All regional partners purchased equipment through a contract established by MARTA with the idea of purchasing these items in sufficient quantities to reduce the overall cost, ensures best price for all.

- o Hard to get larger organizations to work with small agencies.

- What funding source was used?

  - o Our portion was a combination of federal funds matched by State dollars (80/20).

- What is your current cost-to-collect?

  - o Back of the envelope based on GFI systems around 12% (hardware/support/operation).

  - o MARTA side about 27%.

- Do you feel the need to upgrade/replace your current system? Why?

  - o Current system is operating well, its useful life will be up in the next 5-6 years.

  - o You want to end up with no federal interest in equipment before you procure more.

  - o In terms of the GFI fare boxes, FTA says they have a 12 year life expectancy (fare gates).

  - o Driver control units and validators have a shorter life expectancy, about 10 years.

  - o By the time we're ready to do "son of BREEZE" we need to know what we want from open systems payment technology

  - o Next system is going to be:

- Easier to manage

- Will support technology and technological change more effectively (currently very difficult to make changes to a system this large).

- Do you own and maintain all of your FC equipment or is this contracted out?

  o We own and maintain all of our FC equipment.

  o We sent stuff back to CUBIC for repair but the price of the contract was cost-prohibitive. It would have been cheaper to buy new equipment than sign on for a new maintenance contract.

  o We were lucky in that we had staff that was familiar with fare boxes and their repair.

  o These people had previously worked at MARTA and participated in installs and configuration with original CUBIC installation. So our staff can learn how to do it by themselves.

  o In this particular instance, it was cost-effective.

  o As a rule, you should buy maintenance with anything you get because you need to provide a resource to maintain equipment and this needs to be accounted for upfront.

BREEZE System

- What do you like about BREEZE?

  o One thing that BREEZE has done is it has made it easier for customer to ride multiple services and transfer between systems. From a customer perspective, this is really good.

- o In terms of a marketing tool, it's gotten the word transit out in front of the people of the region since its inception.

- What are your current agency and customer issues with BREEZE?

  - o Currently GRTA has no multi-ride tickets or period passes through BREEZE, only stored-value.

  - o The realities of having to make fare change (few years ago adopted a zonal), we had to make changes faster than we could handle with BREEZE.

  - o We were forced to do a workaround → take old passes off and add zonal structure back on.

  - o This is a goal of ours -- we are actively working to make sure these products get added to the BVMs back on as soon as we can.

  - o There is also interest in using the online BREEZE store more effectively.

New FC System

- What do you want from fare collection that BREEZE currently doesn't offer?

  - o One of the things that BREEZE didn't end up being the way we originally envisioned it (been working on this since 1999), from the start we envisioned a truly open system so we would not be so tightly tied to an individual vendor.

  - o At the time, we were very much dependent on CUBIC.

  - o The hope is to create a more open standards model.

  - o Would like to see mobile payment systems.

- o Right now we are putting new MARTA BVMs at rail stations ($50K a piece without maintenance).

- o What if I don't have to put so many of these out there because customers are walking around with their BREEZE BVM in their hand (e.g. smartphone app)?

- o This should be very cost-effective for us, but this will be just one of the many methods used.

- o We still have to provide legacy support for customers who don't have access to these technologies.

  - ▪ Cash will always be accepted

- o New system needs to accommodate as many technologies as we can

- o Another area for improvement with BREEZE is bulk sales and discount programs.

  - ▪ We all do this by ourselves and in the future my hope is that we can do a better job for customers by providing all of these services on BREEZE for all of the systems.

- o BREEZE is expensive and given the budget constraints "son of BREEZE" has to be more efficient than the current system.

- • Discuss the need for flexibility within a regional FC system.

  - o In terms of the open source/open systems approach, right now we are completely bound to a single vendor for many of the activities associated with making changes to the system. It is not an open system.

- In an Open Standards environment, we would put two or three vendors against each other to compete for modifications.
  - When you have a single vendor, you are stuck with a single solution, often of a proprietary nature.
  - This really boxes you in because you can't do incremental upgrades to the system without seriously paying for it.
- What equipment upgrades would need to be in-place to transition to the next FC system?
  - Driver control units (Windows MobileCE, no longer supported by Microsoft) and light validators have computers built for a life expectancy of 3 years.
  - From a mechanical perspective, we view this as a 5 year useful life.
  - Current equipment is beginning to show its age, trying to send all DCU to have their battery upgraded.
  - On-going maintenance and incremental improvements need to happen to extend useful life to its fullest.
- Discuss your interest in letting a contractor operate the FC system and transaction processing for a base + per tap fee (e.g. Chicago).
  - I don't know about Chicago.
  - One of the models I've pitched from the beginning of this is the E-Z Pass model (e.g. have gotten a diverse group of jurisdictions to make it work because they have separated the technology piece from everything else on the policy side of the equation).

Regionalism

- Who is ultimately responsible for making decisions about the integration of transit fare collection systems in Atlanta?

  o What you have to look at in setting something like this up is ensuring that the project is sufficiently funded, as there are non-capital staff activities related to managing all of this.

  o Requires someone with the resources to run the system, currently we are sharing these costs.

  o TPB was housed in GRTA.

  o RTC is kind of working on this in terms of starting the conversation and housing the dialogue.

  o This will likely continue as we have seen some benefit from that.

Paratransit

- Discuss possible routes to facilitating seamless paratransit transfers in Atlanta.

  o Right now, MARTA/CCT/GCT each operate their own.

  o GRTA has wheelchair lifts installed on their vehicles, so they potentially service an ADA rider.

  o The issue that happens is that if customers need to transfer among different systems, but can be very difficult and time-consuming to do so.

- Which agency do you believe would be best equipped to lead the charge?

  o Personal opinion, it should be someone with a real stake in that game, which is MARTA right now.

  o The only way it will be done is for everyone to agree to it.

o The leader has to have credibility and experience with day-to-day operations and issues.

APPENDIX C.3

CCT INTERVIEW

Agency's Service

- Modes Operated

    o Local

    o Express

- Connections with Regional Operators

    o MARTA

    o GCT

- Reciprocal & Transfer Agreements (IGA/ILA)

    o Free transfers between CCT & MARTA

    o No others

Agency's FC System

- Describe your fare collection system.

    o Magnetic-stripe cards & BREEZE

- Are all CCT fare products available on BREEZE card?

    o All are available on BREEZE card.

    o However, we don't have all the equipment that will allow us to put all of our products onto BREEZE in-house, you might have to go to MARTA or a BREEZE TVM, especially for reduced fares.

    o They are working to make sure we have all this equipment eventually.

- Did your agency purchase all of the components for this system by itself or did it receive assistance in procurement?

- Purchased the equipment through MARTA via a specific procurement contract.

- What funding source was used?

  - Had an FTA grant and we probably had some state money involved as well.

- What is your current cost-to-collect?

  - All BREEZE transactions go through MARTA and we pay $36,000 per year.

- Do you own and maintain all of your FC equipment or is this contracted out?

  - Yes

- Do you feel the need to upgrade/replace your current system? Why?

  - We are tied into the regional system at this time.

  - So the interoperability and compatibility with these other systems is important to passengers.

  - We will look to upgrade when everyone else starts looking at upgrades.

BREEZE System

- What do you like about BREEZE?

  - From my perspective, it is more convenient for the customer and it makes for more seamless travel. It's easier for passengers to understand when going between the system.

  - People don't have to worry about having change, they can just use their BREEZE card.

- What are your current agency and customer issues with BREEZE?

- We don't have BREEZE BVMs yet.

- So when customers purchase BREEZE cards, they have to purchase them during business hours.

- Some of the features that have been promised have not materialized, such as online loading. They might be available now, but it took a while, if they are online at all

- Atlanta does not have a retail network for fare products, so customers have to go to either CCT or a MARTA place to purchase them. Thus, access is more limited.

New FC System

- What do you want from fare collection that BREEZE currently doesn't offer?

  - I'd like to be even more convenient with new features such as one card that can be used on GA-400

  - Needs to incorporate some of the more advanced features that have become available to the market since our last installment.

- Discuss the need for flexibility within a regional FC system.

  - I have heard complaints related to hassles and costly change orders with BREEZE.

  - You want to be in an integrated system, but you want to have the flexibility to make changes you need to make for your agency and your customers.

  - This can be done, but it costs money currently.

- o That is a downside of having a vendor like CUBIC where they are the sole proprietor.

- o You can't go into the market and buy an apple. You have to go back to the vendor and you are subject to their procurement policies and service availability. In short, you get locked-in.

- o I do wonder if there are other systems out there that wouldn't have those same drawbacks because once you make a large purchase like that you are somewhat tied to the vendor until it becomes obsolete or until you change.

- Describe your interest in Open Payments for transit.

  - o I don't know a lot about that.

  - o From what I have heard, that would resolve some of the issues with the sole proprietorship and give us more flexibility and perhaps be less costly if we had that type of system

- What equipment upgrades would need to be in-place to transition to the next FC system?

  - o By the time that would occur, the life cycle of the equipment we have would likely be past anyways.

  - o So it would probably be full removal and installation of new equipment.

- Are you interested in mobile ticketing relative to other open payment mechanisms/devices?

  - o There are some more basic things that we haven't even gotten to. This would be a goal.

- o Our agency is interested in any advancement that would make it more convenient and more efficient for those of us who work here and use transit.
- o Basic Things
  - We must make it to where a person is able to go onto the internet and load their BREEZE card efficiently.
  - Creating more outlets to purchase the BREEZE card or reload value onto the card.
  - Incorporate on-site discounted fares, I don't know if there's a way to incorporate reduced fares onto the BREEZE card at a CCT site.

Regionalism

- Who is ultimately responsible for making decisions about the integration of transit fare collection systems in Atlanta?
  - o ARC RTC
  - o BREEZE Policy Group
  - o Discussions frequently, but decision must be approved by each of our respective service/agency boards.

Paratransit

- Discuss possible routes to facilitating seamless paratransit transfers in Atlanta.
  - o No reciprocal agreements regarding paratransit throughout the region.
  - o A lot of them end up paying more than one fare to transfer.
  - o There have been discussions at the regional level, but nothing has materialized yet

- o The need is recognized and documented.

- o But in terms of that materializing into a change of policy, that hasn't happened yet

- Which agency do you believe would be best equipped to lead the charge?

  - o ARC Human Services Transportation might lead for now.

  - o Ultimately, it will have to be a MARTA Board of Director's decision/policy.

  - o Part of the problem is MARTA has so many more trips than anybody else. Therefore, from their agency's internal perspective, it is very costly to offer paratransit transfers into the MARTA system. Thus, they have potential to incur more charges than the rest of us.

  - o From a practical perspective, this ultimately becomes a financial decision for MARTA as to whether or not the region will go about regionalizing paratransit.

APPENDIX C.4

GCT INTERVIEW

- No magnetic-stripe media.

- GCT accepts BREEZE for all GCT fares.

Agency's Service

- Modes Operated

    o 5 Local

    o 7 Express → 3 operated through GRTA

    o Paratransit

- Connections with Regional Operators

    o Xpress buses pull in at MARTA stations.

    o 2 different downtown route patterns for Express began in Late Winter/Early Spring, mainly to deal with streetcar implementation and congestion on Peachtree (moved off of Peachtree St.),

    o Buses use HOV lane and HOT lane, get off HOV ramps at Williams/Spring, stop by Civic Center station and then pull in a few blocks away from Five Points, within a block of GSU station and then travel back up Peachtree Center Ave.

    o Not pulling in an intermodal area, just being dropped off on street.

    o GCT & CCT serve the intermodal area of Arts Center station.

    o GCT has one route that goes to Lindbergh Center station.

    o Person could also interface with CCT at any number of places there.

- o No really significant interface with Xpress bus service between Gwinnett or GRTA or Cobb because it's all peak-hour in/outbound service.

- o Since Cobb operates the Route 10A/B, there is a potential for a person to come in on any of these peak services inbound and go outbound on Cobb.

- o While we would like to have interoperability all day long, you really don't need it because there is no service that does that.

- o On our local routes, all the routes interconnect and one of these connects to the Doraville MARTA rail station.

- Reciprocal & Transfer Agreements

  - o Cobb started this service first.

  - o There was a lot of discussion about how people would move between a suburban transit system and MARTA. The focus of this late 1980s discussion was reciprocal agreements where you pay the fare on the first system you boarded. Customers were given a magnetic bus-to-rail pass so we could count the number of people making that movement. Also had bus-to-bus passes as well.

  - o Clayton and Gwinnett started about the same time and these agreements were patterned after the Cobb-MARTA agreement.

  - o The whole focus of these initial reciprocal agreements was the movement of fixed route local and express transit to primarily the MARTa rail.

  - o Since Cobb started prior to ADA legislation, there was no thought put forth about anyone other than fixed-route passengers. All of these

agreements are about how people are going to move between local and express buses to the rail system.

Agency's FC System

- Do you feel the need to upgrade/replace your current system? Why?
  - o We currently operate with a GFI GenFare Sens-a-Bill farebox. This farebox is really set up for cash and either flash media (paper ticket or show monthly pass). It can also be setup for a magnetic-stripe card on the back. GRTA uses magnetic-stripe cards for their monthly passes. GCT operates it as cash and either puts ticket from GCT ticket book in there or the patron presents a pass.
  - o In addition to that, we are all participating in the BREEZE system, so we all have BREEZE validators on the buses that allow patrons to use their BREEZE card for transfers onto GCT services.
  - o We have the same farebox as GRTA. They also added BREEZE validators.
  - o We are operating a dual-fare system versus MARTA/CCT who are years ahead and chose to replace their existing fare boxes with fully integrated BREEZE vending machines.
- Costs with dual fare system?
  - o Problem you get into on the capital side is that when you buy this equipment with federal assistance it has to be used for a specified useful life (in our case it was 10 years). So we were about half way through the useful life of the existing systems and if we had changed back we would

have had to buy the new equipment and pay about half of the cost of the original equipment back to the feds. That really prohibits you from making changes sometimes even though the technology kind of warrants that (these would end useful life in 2019).

o Since that time, we have bought additional fare boxes because we bought new buses.

o There's 3-4 years left on MARTA's BREEZE. We should be close to move as a whole to some new technology around the end of this decade.

o Primary reason we need BREEZE is because of decision MARTA made about going to the smartcard technology and basically closing the rail stations so that you have to have a smartcard to get into a rail station, you can't use cash to get in anymore. A lot of our and GRTA/CCT patrons, in order to make these transfers, you have to have a BREEZE card to enable you to do that; otherwise you pay two fares.

o Even to get on MARTA rail or bus you have to have a BREEZE card, so you might as well have a BREEZE card on our systems if you are making that trip.

o We have many passengers who don't transfer to MARTA (tickets/passes/cash).

o Unbanked - A lot of people just have a hard time paying $10/20/30/40 dollars upfront for a pass or ticket book.

- Who does maintenance for BREEZE validators?

  o We do it 2 or 3 ways since we went live.

- - When everything was under warranty during the first year, they were sent to CUBIC.

    - Then we made a one year maintenance agreement to do the same with CUBIC.

  - The past year and a half we have all been grappling with the high cost of CUBIC. Just covering MARTA's operational cost expenditures is difficult.

- What was initially called a clearinghouse cost for MARTA to reconcile money/transactions and disburse money to the regional partners. Everyone was paying $3,000 per month.

- The agreement was once everybody went live, we would renegotiate this price and reciprocal agreements

- Everyone realized the price would be more.

- What shocked everyone was once MARTA ran the numbers, the cost was going to be significantly more (from $36K/year to $1 M/yr)

- MARTA did some work that said 27% cost-to-collect for regional BREEZE. This isn't sustainable.

- How can you tell someone I'm going to charge you 3 dollars for a bus ride and 75 cents of that is going towards me collecting that fare?

- Everyone is balking now. We're all about to engage another consultant to take a look at what the costs are. I don't think they are going to see the cost significantly different, but it will be an independent review, not a MARTA consultant.

- We're all saying we got to find a better way to do this. Everyone works well together and wants something in the future that seems more reasonable.

- When I first started I heard maybe 5-7%, it stayed in this range under 10% for years and years, but this was a non-technological perspective (e.g. only cash, tokens and some magnetic-stripe media).

- There is hope that moving away from proprietary systems and towards open payments, possibly contracting the whole thing out and making it a business.

- Only government would devise a system with this cost-to-collect.

- The issue is how do you cost-effectively deal with a lot of small transactions? But at the same time we see all business going in that (open) direction. Just five years ago merchants wouldn't even consider using a credit card for a small purchase, now things are different.

- From the public side, the revenue has always been something that has been closely held in the public sector (e.g. the trust). So you have to make sure this is collected in a fair and trustworthy way so it can't be called into question/scrutiny.

- If you're going to move towards an open system and maybe doing this with cell phones, then I think it may be time to contract this out totally.

New FC System

- What do you want from fare collection that BREEZE currently doesn't offer?

- o 1) We want to go to a system that, in terms of agencies having to operate it, is something that is open so that we can make changes to it because right now CUBIC has got us! Any change we need to make (and we still find bugs) they want to charge us for, even for simple fare policy alterations.
    - ▪ If it's more open, then the system would be using equipment that you can get into and train your own people to maintain.
    - ▪ More open and cost effective operations and maintenance.
- o 2) New system takes advantage of new approaches to fare payment (e.g. NFC and contactless).

Paratransit

- GCT has BREEZE validators on paratransit vehicles.
- All ADA customers use a GCT paratransit BREEZE card with Picture ID on it.
- There is really no agreement at all to deal with paratransit transfers. It just wasn't even looked at. It was all about moving people form buses to intermodal areas at rail station. All of this, though, preceded ADA requirements.
- Basically, ADA says that each operator can set up the fare in their service area. This fare can be no more than twice the local service fare.
- Right now it is only CCT/GCT/MARTA, GRTA doesn't have to provide paratransit with its Xpress service.
- All three paratransit providers have a $2.50 local fare for fixed-route.
- We all gravitated to only charging paratransit riders $4 for each trip, even though we could charge $5. There has been stuff in the news lately about charging a

double fare, but we really aren't because the ADA requirements allow you to determine the charge within each individual service area.

- We have all found that this is totally different from fixed-route service in that it is complementary ADA service to supplement a person who either can't ride independently on fixed-route or can't negotiate to get to a bus stop due to accessibility issues relative to stop/house.

- Paratransit service costs between $50-70 per hour of operation.
    - Because people are going at different times, it is very hard for trip productivity to go beyond 2-3 people per 12 person bus. You're not anywhere close to a reasonable farebox recovery with an ADA trip. You are down in the, at best, 5% range.

- The only way we could fix this is to maybe regionalize the ADA paratransit service.
    - I keep advocating that when we go to meetings. There might be some interest in looking at this. GCT/CCT both contract out its operations, including paratransit service (two separate contracts). MARTA directly operates paratransit service.
    - If everyone came together and said maybe as a first step let's evaluate contracting out regionally partarnasit service to one provider, that may be a cost-effective solution and the three entities could cover their share of the contract costs.

- There's a high proportion of riders using paratransit service for medical needs and thus need more specialized services.

- That's something really beyond fare technology.

Other Comments

- What I would like to see form a fare policy perspective, I would like the region to go something towards like WMATA and distance-based fares and possibly a peak/off-peak fare structure. This provides the best equity in pricing. There are places that have distance-based fare and peak/off-peak pricing, but really WMATA is the best example of how the two can be blended. It really makes no sense for us to take someone from out here in Lawrenceville to MARTA for $2.50 and then they can ride free really all the way to the other side of the MARTA service area. That's quite a deal! But the person who gets on at North Avenue and gets off at Peachtree Center, they are also charged $2.50. To me, that's just dumb that we are still stuck in that mentality, that people should be paying some share of what the cost is. I'd like to think that based on me being here all these years, it seems like somewhere around 30-35% ought to be a regional share that we ought to collect (e.g. farebox recovery ratio). If we can get to this level of cost recovery, I think we would have more ridership, especially for short trips. I think this is where we, as a region, are really missing it. Maybe the technology will determine how to do this, but if you use a cell phone to pay it seems that the way you do that is to pay every time you board a new vehicle. There wouldn't be a need for reciprocal agreements with this arrangement. What I don't understand with how the new technology is going to work is how the system determines how far you've been.

231

- The other part of this is how you deal with the unbanked customers. I think the more alternatives you have to build into a system; the more expensive you make it. But I think it is ridiculous that we are having to do a dual fare system, it is really hard to track what our ridership is. Ostensibly, we are paying 27% for BREEZE customers. Giving the unbanked an option for payment will be a cost that we have to incur.

- If you could get on the rail system with cash, then that would be the way to go because we can still collect cash on the buses. It is pretty cost-effective to collect cash and tokens.

- We have to come back and think about how we can easily deal with the unbanked. Maybe the way is to not discount tickets and passes because that's what you get into, You provide all these discounts for higher-income people that can put this stored-value on their smartcards and yet there are all these hidden transaction fees that you have to eat in order to use technology. Why not just say the privilege of using technology is to charge the same fare as the cash fare. You're just getting the discount of convenience, not on the value. We are using those monies to provide the cost of issuing unbanked fare media. Then you could make the case that paying some kind of way to the unbanked that they are paying the same amount. You don't want to get into a Title 6 or equity issue where you are charging lower-income people more money.

APPENDIX C.5

ARC INTERVIEW

Regional Transit Service

- Modes Operated

    o Heavy Rail

    o Express Bus

    o Local Bus

    o Circulators

    o Streetcar

- Regional Reciprocal & Transfer Agreements (IGA/ILA)

    o Quad Party Reciprocal Transfers

    o Quad Party Participation

    o No paratransit

    o Marta/GCT fairly informal (Doraville)

    o CCT agreement tighter because of 10/12 route

Agency's FC System

- Discuss ARC's involvement in the initial BREEZE procurement.

    o Probably involved with coordination of getting other operators onto BREEZE, but not sure about MARTA's procurement.

    o Flexed highway funds, about a million dollars.

- Do you feel the need to upgrade/replace your current system? Why?

    o Yes.

- Current system is fully functional and working right now, but will reach end of useful life around 2016.

- Our study is looking at what we can do in the short-term between now and then to maximize efficiency and upgrade current breeze system and then put in place a recommendation for the full upgrade coming online 2016.

- There may be opportunities to stretch the useful life of the existing and they will probably look at this, this is something that we would like to happen within the scope

- All of this is contingent on where we find money to do minor and major upgrades and the timing of when that money is available.

- Timing of other operators?

  - We don't know yet.

  - We don't know how FTA would consider the different components of the system.

    - If the core of the BREEZE system reaches its end and you have to upgrade the core, is it worth holding onto the regional operators' newer pieces?

  - We are currently in the process of doing some upgrades to current system utilizing flexed over federal highway funds that we gave to FTA to get all of the operator's products on the BVMs.

- What are the goals for BREEZE now with these $5 M upgrades over 5 years?

  - This includes a portion of funding for the RFP on fare collection systems.

  - Fare products available

- Making sure all operators fare products are available on the machines
  - BVMs
    - Haven't deployed in Cobb because they need upgrade their BVM user interface to display CCT logo instead of MARTA logo
  - Getting the TMA site for the BREEZE, TMAs need site to sell discounted passes.
  - General preventive maintenance for 4 years at around $750,000 to $1 M worth of work per year.

BREEZE System

- What do you like about BREEZE?
  - Reload cards on website
  - General web accounting feature
  - Don't have to carry paper passes anymore
  - Do your transfers on MARTA and to others
  - Better customer experience than always having to have cash or multiple fare products in your wallet
- What are your current agency and customer issues with BREEZE?
  - Paratransit vehicles mostly aren't equipped, paratransit world is separate in general.
  - Not all of the fare products are available through BREEZE right now, but this will be corrected soon enough.

235

- Discuss the BREEZE Policy Group (e.g. constituents, updates, role in developing the next generation).
    - They have a regularly scheduled meeting once a month.
    - This consists of a fairly small group of the four BREEZE partners and their key staff. MARTA has a few more people attending than the other operators. The others usually just send one person because they contract out their operations, so there actual transit agency staff is very small.
    - The purpose of this group is to facilitate coordination on the BREEZE systems, especially negotiating agreements for work to be done, such as these upgrades that we are going to do. They can deal with some policy issues at a staff level (e.g. making recommendations on policy). They were the core group involved in developing the recent RFP for the fare study and they will carry on as the advisory committee for that study.
    - Maintenance agreements are handled between MARTA and CUBIC and then there are agreements with the operators to provide a local match to provide for the federal funds that MARTA is using to operate and maintain the collection system.
    - MARTA is the clearinghouse operator and owner of the system. The others have just bought into it.

New FC System

- What do you want from fare collection that BREEZE currently doesn't offer?
    - Technology is rapidly changing.

o We are evolving beyond the smartcard technology to other fare payment options, such as integrating it with your bank account cards and potentially smartphone applications with QR codes or something like that.

o We definitely need to get the paratransit system fully integrated with BREEZE or whatever technology/policy we move forward with.

o The relationship with the TMA pass sales is a lot of work for the TMAs to do that (e.g. back of the house work) and it's also a lot of work for MARTA to do as the clearinghouse for everything. There should be a way to simplify the process so we can encourage those that live in activity centers to utilize transit, make it more efficient and less burdensome on the TMAs.

  ▪ Recently Central Atlanta Progress was doing all of the TMA pass sales for state agencies and they dropped that because they didn't have the manpower to do that anymore. So now the state agencies aren't getting that 10% discount

o This is something the fare policy group won't have control over, but really does significantly impact the use of transit – parking costs.

o We're not going to address parking in the fare study, but in a lot of cases, especially in midtown and downtown, it is cheaper to pay for monthly parking than to purchase a transit pass. Also, in the outer suburbs there is no fee to park.

o Talks have been had about variable-based fares here in the region and our study will look at that. But it's kind of been looked at to death by MARTA

and they have unofficially made the decision that it's not right for them. There are not many successful stories of an agency transitioning from a flat fare structure to a variable one.

o Universal fare products, this is part of the hope to figure out how to unify these reduced fare classifications, so the region can have some consistency across the board.

o While the study won't address this it's directly related, parataransit eligibility criteria vary from operator to operator. So when it comes to making transfers with BREEZE or the future collection system, you may be eligible on one and not on the other, so how do we deal with that?

o Beyond the typical public transit provider who operates fixed-route and partransit, you have all the human services transportation folks providing their own pricing and the technology for collecting the fare and all of that.

o The long term goal is we coordinate all of this, whether or not they are all on the same technological standard is to be determined. But at least better coordination to avoid multiple operators driving by the same location, maximize region's resources.

o Coordinating with paratransit and fixed-route along with HST.

o Back of the house operations of BREEZE is burdensome on MARTA. The cost to them is not being fairly covered by the operators.

o Without regional transit governance, we are doing this coordination totally by choice, not out of a mandate, which isn't necessarily a bad thing. But I think you could have increased coordination through some sort of

the region's transit systems.

     o   Coordinating vanpools and advancing the technology to do this.

- Discuss your interest in letting a contractor operate the FC system and transaction processing for a base + per tap fee (e.g. Chicago).

     o   Transaction costs are a huge concern for MARTA right now, there are disproportions currently among the operators and MARTA is absorbing a lot of that cost.

     o   That's on the table, particularly in light of the recent audit that MARTA had done, which recommended privatizing or outsourcing some operations elements. Fare collection could potentially be one of them.

     o   Anything that maximizes efficiency, saves money and makes the customer experience better is on the table.

- Are you interested in mobile ticketing relative to other open payment mechanisms/devices?

     o   Definitely interested in application of new technologies for transit fare payment, including mobile.

     o   Its already happening on the service information side of things, trip planners and all of that, utilizing GTFS, real-time data.

Regionalism

- Who is ultimately responsible for making decisions about the integration of transit fare collection systems in Atlanta?

- These conversations come up in RTC meetings occasionally, HST too, but mainly within the BREEZE Policy Group.

- Paratransit has been elevated to the RTC level.

- Generally it is each operator making its own decisions in the absence of governance.

- ARC is fulfilling this role in the current absence of a governing entity.

- Discuss different positions/responsibilities that ARC is not legally restricted from relative to the upgrade and operation of a new regional fare collection system (e.g. any duty that does not require the ownership of a capital asset).

  - Planning

  - We can be requested by our local governments to plan, design, construct and operate at their request.

- Do you believe ARC has the legal ability to procure equipment as an agent for the region assuming it works out ownership policies?

  - We could do that because we're not going to own the asset.

  - We're doing this in a way right now. We're procuring consultant services to do planning work but it is on behalf o f the transit operators.

- What about regional public outreach and education efforts?

  - We will be a critical partner in that, but I can't answer to whether we should be the lead agency.

  - Customers know who their transit providers are and its critical for Cobb, Gwinnett and GRTA to get out there and do that. It's more important for them to do it because they are on the ground interacting with riders.

- ARC could be the lead coordinator to make sure everyone is using the same story or using the same marketing materials.
- What are some key issues that you believe need to be worked out before moving forward?
    - Unknowns
        - New GM at MARTA starting December 10th of this year.
        - GRTA has an uncertain future as far as their local funding to continue operations. Their state level funding ends at end of next year. In order to continue its operations, in PLAN 2040 ARC made the assumption that the state would continue to fund GRTA Xpress, by possibly getting more money from the state's general fund or talking to local governments to see if they are willing to contribute financially to continue running service into their jurisdictions or other creative solutions. Currently, the gas tax legally can't pay for it. Anything is on the table at this point, we should have some answers soon because we are doing a major update of 2040 to be in line with MAP 21 (financial requirements and latest planning work). We will have to address this issue in this update adopted late next year.
        - New streetcar system coming online.
        - General squeeze at all levels of government to cut back, particularly relative to funding. Thus, more money isn't out there on the horizon for us.

- Rapidly changing population that is getting older and younger.

- Technology changes faster than government can react to it.

- People are travelling less by vehicle in terms of VMT. You are seeing a shift to beefing up our centers and living closer to where you work.

Paratransit

- Discuss HST's possible role in facilitating seamless transfers.
    - Paratransit is an area that HST is involved in even though HST is a little more holistic. HST looks at all of the elderly/disabled/low-income services, so you get DHS/VA/Human and Social Service Entities Providing Transportation/New Freedom Contracts for NFPs that got money and all of these other non-traditional sources outside of USDOT. You're also looking at mobility from a pedestrian and bicycle perspective, too.
    - Paratransit is our most expensive service to run and carries the lowest number of passengers. Right now there aren't transfers set up between operators and BREEZE isn't fully functional for this user class.
    - Only three of the operators provide paratransit services, GRTA is exempt.
    - CATS operates a small fixed-route system in Canton and doesn't necessarily have ADA complementary paratransit because they have a county-wide on-demand system that essentially serves this function.

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