Chapter 5

BRTA · FRTA · MART · WRTA · LRTA · MVRTA · CATA · GATRA · VTA · NRTA

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5. FARE RATES AND COLLECTION METHODS

5.1 Collection Methods

The Worcester Regional Transit Authority (WRTA) purchased and installed the Scheidt & Bachmann Fare Collection system as one of the 10 RTAs and the MBTA to participate in unified fare media program through the interoperability of the CharlieCard. The CharlieCard is a 'smart card' which stores values and can be reloaded using cash, credit or debit cards online, at customer service locations or at fare vending machines. WRTA installed the equipment and it went into service in April, 2012. This new system replaced a model year 2002 GFI electronic Fare Collection system. Fareboxes are installed in all fixed route buses, allowing passengers the ease of purchasing passes or adding value onto their Tap and Ride card on the bus. Below is a brief description of the farebox technology.

Farebox

Each Farebox includes a Smartcard target. This target allows a passenger the ability to pay for their fare, to load value onto their Stored Value card directly on the bus or transfer from one Route to another by simply tapping their Tap & Ride card on the target. In addition, the farebox is capable of electronically validating and registering (verifying) all coins and bills inserted for payment. All coins and bills are automatically identified by denomination, without operator action. All invalid coins and bills are automatically rejected and returned to the passenger. The VARE point Farebox assists operators with verification of the fare deposited by showing on the Operator Control Unit (OCU) and on the customer display the value of the coins and bills inserted. All accepted coins and bills are deposited into a single Cashbox, securely compartmentalized to separate the coins and bills. Partially damaged bills can be processed by the driver on the OCU using the "Accept next bill" command, entering the amount and bypassing the validation process.

Ticket Vending Machine (TVM)

The Ticket Vending Machine (TVM) to purchase fares and passes and reload values to an existing card. The TVM has a touch screen interface that allows an individual to specify the type of Magnetic Ticket or Smart Card to be sold. The user interface also allows the individual to display details of the data stored on an existing Magnetic Ticket or Smart Card and to add value. The TVM accepts coins, bills, or bankcards. WRTA has three TVM outlets. In addition to TVM WRTA has a customer service center at The Hub where passes can be bought from agents. CharlieCards can be reloaded online (not purchased) through the MBTA. Value can also be added at any of the multitude of ticket vending machines in the Boston area.

Sales Outlet Terminal (SOT)

The Sales Outlet Terminal provides Customer Service Staff the ability to inform customers of the value remaining or days remaining on a 31 day pass as well as being a cash or credit point of sales for all fares and media sold on the TVM.

5.2 Fare Structure

In 2008 WRTA commissioned a fare restructuring study which recommended that WRTA get rid of their zonal based fare system in favor of a flat fare structure. On January 1st 2009 WRTA implemented the fare restructure and increased the fare from $1.25 to $1.50. It was the first increase in six years. Historically, WRTA has raised their fares approximately every 6-7 years since the early 1980's. When WRTA implemented the fare restructuring and increase in 2009 they also began introducing a 1-day pass and eliminated transfers. In 2012 WRTA installed the CharlieCard which stores vales for single or multiple rides and monthly passes. WRTA offers incentives to use the CharlieCard; riders pay a reduced fare when using the card. It saves 10 to 20 cents per ride and promotes the use of the card and minimizes cash transfers. Decreasing the amount of fares paid by cash increases the security in counting fares, decreases dwell time as passengers are able to board faster and decreases potential conflicts between the rider and operator for incorrect fares. WRTA offers a wide range of fares which can be found in Table 9.

Table 9. Fares

CharlieCard Fares (Stored Value)	
Adult	$1.30
Senior/Disabled	$0.65
Children 5-13	$0.65
Children under 5	Free
Day Passes	
Adult	$3.50
Senior/Disabled	$1.75
Cash Fares	
Adult	$1.50
Senior/Disabled	$0.75
Children 5-13	$0.75
Children under 5	Free
Monthly Passes	
Adult	$48.00
Senior/Disabled	$24.00
Other	
College Semester Pass	$100

5.3 National Best Practices

This chapter provides an overview of different fare policies and fare media that are used throughout the United States. While the fare policies and practice of WRTA reflect local needs and practices, the comparison with national standards can provide helpful insight and guidance regarding ways to improve available fare media and policies. The fare policy and standards section describes various policies and fare pass types employed by transit agencies and represent standard fare practices on a national level. A wealth of information regarding best practices in fare policy, technology, and fare media is presented by the Transit Cooperative Research Program (TCRP) and forms the basis of this section. Information is also supplemented by research on specific fare practices of transit agencies throughout the country.

An overall summary of TCRP Report 94, the update on Fare Policies, Structures, and Technologies shows that[12]:

- Overall fare levels are increasing, specifically the base cash fares
- Agencies are moving towards a more simplified fare structure
- Many agencies are moving away from a policy of free or reduced cost transfers and replacing the transfer policy with a day pass that can be purchased onboard vehicles
- Pre-paid and multi-trip fare media is growing
- Many agencies have either implemented or are exploring Smart Card technologies
- Regional fare integration, where multiple operators within a metropolitan region, are moving towards a common fare policy and media improving the customer experience

5.31 Fare Technology and Media

Fare technology and media represent the primary hardware and software for collecting passenger fares onboard transit vehicles. Transit agencies throughout the country use a variety of different fare technology and media (how the fare is paid). The technology and media have evolved greatly over the years. Current fare technology runs the range from non-registering fareboxes which are literally just containers that house the fare revenue deposited by passengers all the way up to SmartCard technologies that allow passengers to pay their fare with a quick pass of a credit card size fare instrument. Technology is evolving in such a way that some agencies have been experimenting with paying fares using SmartPhone applications. Some systems, primarily rail and Bus Rapid Transit systems, have off-board fare collection technology with a proof of payment system. Below is a description of different fare technology and media.

Non-registering fareboxes are the simplest fare technology. These fareboxes are little more than containers where passengers are able to deposit fares. These fareboxes can only accept cash fares or, if the system utilizes them, fare payment coupons. Flash passes, coupons, and punch cards are used for prepaid fare media. These fareboxes do not have the ability to track ridership payment characteristics.

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[12] Transit Cooperative Research Program Report 94: Fare Policies, Structures, and Technologies pages 2 through 5

Many operators who use these fareboxes will have a separate passenger counter device that the operator manual "clicks" for each fare type.   Very few systems use non-registering fareboxes nowadays.

Registering fareboxes allow for fares to be paid and data to be collected regarding fare types. These fareboxes can collect the number of passengers boarding a bus by each fare type for each trip operated. Registering fareboxes can be designed to accept different types of fare media including flash or punch passes or even magnetically coded fare cards. With magnetically coded fare cards, the fare type can be read automatically by the farebox.   For punch and flash passes, operators can manually enter information regarding fare type paid. These are currently the most common types of fareboxes.

The newest fare technology used by transit agencies are known as a SmartCard system. The SmartCard fare instrument is the size of a credit card and can be loaded with any kind of pass or stored value passes.   SmartCard readers are needed on fareboxes in order to process fares.   Similar to the magnetically coded fare media, many different fare types are available and are automatically counted by the farebox itself.   By installing SmartCard readers at each door of a transit vehicle, multiple door boarding can be facilitated.   Another advantage of SmartCards is that they can be used by multiple systems. The Massachusetts Bay Transportation Authority (MBTA) Charlie Card, which is also accepted by ten of the fifteen Regional Transit Authorities[13], is an example of a SmartCard. There is a high cost to transit agencies when implementing SmartCards as they require new or modified fareboxes, and the fare media itself is rather expensive.

SmartCard technologies are constantly evolving such as with contactless technology where a user no longer swipes a farecard but simply taps the card on a reader and enters and mobile ticketing where ones pays their fare from their smartphone. An example of a contactless card is the Washington METRO SmarTrip card. Transit agencies are also starting to experiment with fare payment through cellular telephone. With this, the cellular telephone operates as a SmartCard and has the ability to store multiple pass options and fare types. This works by riders downloading an application onto their cell phone, payment is processed through the app and a transit pass is produced on the person's phone[14]. This mobile ticketing system is currently used by TriMet in Portland, OR, the first agency in the US to pilot this for fixed route. The user simply selects their rider and mode type to purchase a ticket, then when they want to use it they select the ticket which generates a QR code that the fare inspector can scan. The technology was developed by GlobeSherpa, a Portland based software company.   Similar technology, developed by Bytemark, was deployed in 2014 at Capital Metro in Austin, TX. Locally the

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[13] Charlie Card is accepted for fare payment by the following operators: Massachusetts Bay Transportation Authority, Berkshire Regional Transit Authority, Brockton Area Transit Authority, Cape Ann Transportation Authority, Cape Cod Regional Transit Authority, Lowell Regional Transit Authority, Merrimack Valley Regional Transit Authority, MetroWest Regional Transit Authority, Montachusetts Regional Transit Authority, Southeastern Regional Transit Authority, and Worcester Regional Transit Authority

[14] http://trimet.org/mobiletickets/

MBTA uses technology developed by Masabi for mobile payments on their commuter rail and ferry systems.

In the future, other technologies such as the Magic Band which Disney uses as admission to the park, connects to your credit card for easy payment and unlocks your hotel room, may be possible for travel on transit. The band contains a short range RFID chip similar to the read-only RFID[15] chip found in contactless SmartCard technology. The Disney Magic Band is similar to the UBand made by IDenticard. The UBand uses MIFARE[16] technology to provide contactless access and payment and is currently being used by Mohawk College in Ontario. In the United Kingdom, Barclaycard launched the bPay band a similar wrist band which users can link any VISA or MasterCard debit or credit card to and can be used at any establishment that accepts contactless payments (300,000 locations). Amongst the many things the band can be used to pay for is the fare (bus or rail) on Transport for London[17].

Figure 31. SmartCard Technologies. Left WMATA Smartrip contact-less; Center TRI MET mobile ticketing; Right Disney's Magic Band

Fare media has evolved drastically over the last 100 years for transit from an entirely cash based system to the new innovative contactless technology merging today. The first fare media was the token followed by the ticket. These allowed transit agencies to offer discounts over the cash fare. Tickets were used until magnetic stripe cards were introduced, this allowed for the development of passes. Tap cards were developed next with RFID technology and had the capability of operating as a stored value card and as a daily, weekly, monthly, etc pass. The newest technology is contactless "open" fare payments which are directly linked to debit or credit cards and can be in plastic card form, on a mobile device and

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[15] Radio-frequency identification cards (RFID) is a wireless chip which uses electromagnetic fields to transfer data,

[16] MIFARE is the name of the technology (chip) that is created by NXP. It complies with international standard ISO/IEC 14443 for data security and transmission protocols for communication with contactless integrated circuit cards, proximity cards and identification cards.

[17] The agency who oversees the London rail and bus network.

now a wrist band. Regardless of the type of technology used, reducing cash transfers benefits the transit system all around. The overhead cost to process cash as opposed to cards can be as much as double due to the security measures and personal needs to empty vaults and count money. Improved farebox technologies not only can improve operating costs but can speed up the boarding time of passengers thus reducing the overall travel time.

In Helsinki, an innovative fare strategy is being implemented through a new market approach viewing Mobility as a Service (MaaS). The principle of the MaaS approach focuses on door-to-door service and mobility as a whole package, instead of each mode individually. Through this method, users are able to plan their trip through one portal and payment system. Different packages provide riders with unique options to meet their transit needs. For example, an urban commuter package, available for purchase at a set price point, may include free public transport in the rider's home city, up to 60 miles in taxi services, 300 miles for rental cars, and 1,000 miles in domestic public transport. Packages are flexible and can be adjusted to meet the needs of different service areas. Incorporating all transport modes into one, user-friendly interface will provide seamless service to the rider and encourage the use of public transportation over personal vehicles.

Some systems have implemented off-board fare collection/proof of payment fare payment. Off board fare collection requires fare equipment located at stops and stations and allows for faster boardings. Passengers pay their fare off-board and are issued a receipt or their farecard is validated for the trip. Fare inspectors randomly check to see if passengers have paid their fares by scanning farecards or looking at the receipts. Those who have not paid fares are issued a citation.

5.32 Fare Policy and Standard Practices

A review of fare policies around the country provides a myriad of different fare types and fare media. Fare media types include unlimited ride passes and multi-ride/stored value transit fares. A description of cash fares and transfer policies are included in this section. Fare policies and standard practices vary amongst various transit agencies and are suited to meet individual local conditions.

Fare Policies

Cash fares are accepted by almost all transit agencies. Most transit agencies accept only exact fare and will not make change. A small number of agencies will make change for passengers on some or all services. Some agencies have limitation with their fare collection equipment that only allows the farebox to accept coins, while most operators are able to accept both bills and coins.

Unlimited ride passes allow users to take as many rides as needed over a set period of time. These passes are a pre-paid fare media and come in many increments. Most agencies have either a 30-day, 31-day or "monthly" pass. For a shorter duration, agencies may have a week pass or even a two-week pass. The shortest duration pass is a one-day pass and agencies that sell a one-day typically do not have free or discounted transfers. Unlimited ride passes provide a discount over cash fares, with the discount related to the number of times the pass is used as it represents a single payment over a time period.

The issue with unlimited ride passes is that it typically requires a large upfront payment by customers to take advantage of the discount, which may be difficult for lower income users.

Multi-ride passes or stored value cards allow for passengers to buy a set number of transit trips ahead of time usually at a discount. These pass/stored value cards allow for the pre-paid purchase of discounted fares. Similar to the unlimited ride passes; these fares require a large upfront payment, although not as large as the unlimited ride passes, in order to take advantage of discounts. Multi-ride passes/Stored value cards can come in a variety of different types of media and formats including ticket books, tokens, punch cards, or as stored values on a fare card or SmartCard.

Some agencies have instituted free fares. Free fares primarily exist in places where the primary generator in the area is a major university. In these areas, funding sources for transit services come from the university. In other locations, college students are provided a free transit pass that is funded by student service fees, parking revenues at the college, general fund revenue, or a combination of these sources. An example of a system that has a free fare policy is Chapel Hill Transit in North Carolina, which serves the University of North Carolina[18].

Transfer policies are a very important consideration and part of any fare policy and fare media. Transit passengers have varied origin and destination locations so it is impossible to serve all passengers without requiring passengers to transfer. Many systems are designed around bringing passengers to a central location where they can connect to another bus to reach their destination. Other systems have transfers occur at points where two or more routes intersect. Regardless of transfer location, transfer policies have an impact on ridership. The existing transfer policies include allowing transfers to occur for free, transfers to occur at a low cost, or requiring passengers to pay full fare when transferring. Some systems have different policies based on fare media used, for example a free transfer if using a SmartCard while cash passengers have to pay full fare when transferring.

Standard practices

Fare policies typically respond to local needs. In some locales the fare policy and changes to fare policies are well codified. In other locations, fare policies change only in response to an identified issue; otherwise fare policies may not change at all for a long time. Fare policies need to be responsive to local needs. The fare policy has to be cognizant of the need to provide an adequate local share of operating costs. That being said the fare policy has to also strike a balance between being equitable to all users, encourage pre-paid fares, encourage ridership, and the need to raise local revenue.

Federal rules and guidelines need to be taken into account in fare policy discussions. Environmental justice concerns also need to be taken into account as part of fare policy and fare policy changes as it relates to Title VI of the Civil Rights Act of 1964. Legal proceedings have forced modifications to fare

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[18] http://www.townofchapelhill.org/town-hall/departments-services/business-management/fee-schedules/transit-policies-fee-schedules

policies and fare policy changes due to environmental justice concerns[19]. Environmental justice concerns are addressed by ensuring that fare policy changes are equitable for all services an agency operates. Fare policies also need to be consistent with rules and guidelines with the American's with Disabilities Act.

As stated previously, very few agencies have a policy regarding fare changes. Primarily, agencies adjust fare levels based on a specific need, usually the need for additional directly generated revenue. This could be in response to cuts in funding from other sources, changes in cost structure, or overall cost increases. On a philosophical level many agencies prefer to increase fares along with improvements in service so that passengers are receiving "better service" as part of higher fares.

The key elements of a fare policy include a base cash fare, multi-ride fare media, unlimited ride passes, and a transfer policy. Ten out of fifteen RTA's in Massachusetts use the Charlie Card SmartCard for fare payment which does have the ability to store unlimited ride passes. Beyond this fare policy, transit agencies have been partnering with colleges and universities to fund UPass programs which provide free trips for students and guaranteed revenues for the transit agency.

5.4 Conclusion

Moving forward, the best plan of action involves each of the RTA's joining together to research and develop innovative fare policies and media for the next generation. Through collaboration, the RTA's have the chance to implement fare strategies that can function collectively across Massachusetts and be a model for innovation. As the Sheidt & Bachmann fareboxes and CharlieCard technology, that many of the RTAs have, becomes outdated and must be replaced, this presents an opportunity for the RTAs to explore alternative technology such as the MaaS project in Helsinki, mobile payments, or the bPay/Magic Band/Uband. A system-wide approach, as opposed to individual fare strategies for each RTA, will foster a cohesive transit system and provide riders an easier opportunity to travel between the RTA's.

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[19] Transit Cooperative Research Program Report 94: Fare Policies, Structures, and Technologies page 5

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