Commuting Gets a Little Easier with Transit Mobile Payments

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By Elisa Tavilla

Smartphones have significantly transformed the way people use the transit system. Today, commuters can get news updates, respond to emails, listen to music, and shop directly from their mobile devices as they ride the subway, bus, and commuter rail. A growing number of transit riders use smartphones as ticket vending machines (TVMs), eliminating the need to carry cash and wait in line. Even more, mobile technology allows commuters to access real-time travel information, such as arrival times and service alerts. More U.S. transit agencies are adding mobile payment options and related features that enhance convenience for commuters and encourage habitual use of mobile payments.

Transit Mobile Payments Landscape

Transit fare collection is complex. Thousands of agencies[1] use different types of fare media (e.g., paper tickets, magnetic stripe/contactless cards, tokens, cash), multiple validation methods (e.g., fare gates, visual/electronic validation, proof of payment), and varied pricing structures (e.g., flat rate, distance-based, peak/off-peak hours, intermodal transfers, unlimited passes). Commuters often must navigate and pay separately for each transit system. Mobile payments can improve the efficiency of paying and collecting fares. According to Bytemark, a mobile transit payment costs between four and five percent of an agency's revenue, compared with eight cents per dollar for a smart card and fifteen cents per dollar for cash payments.[2]
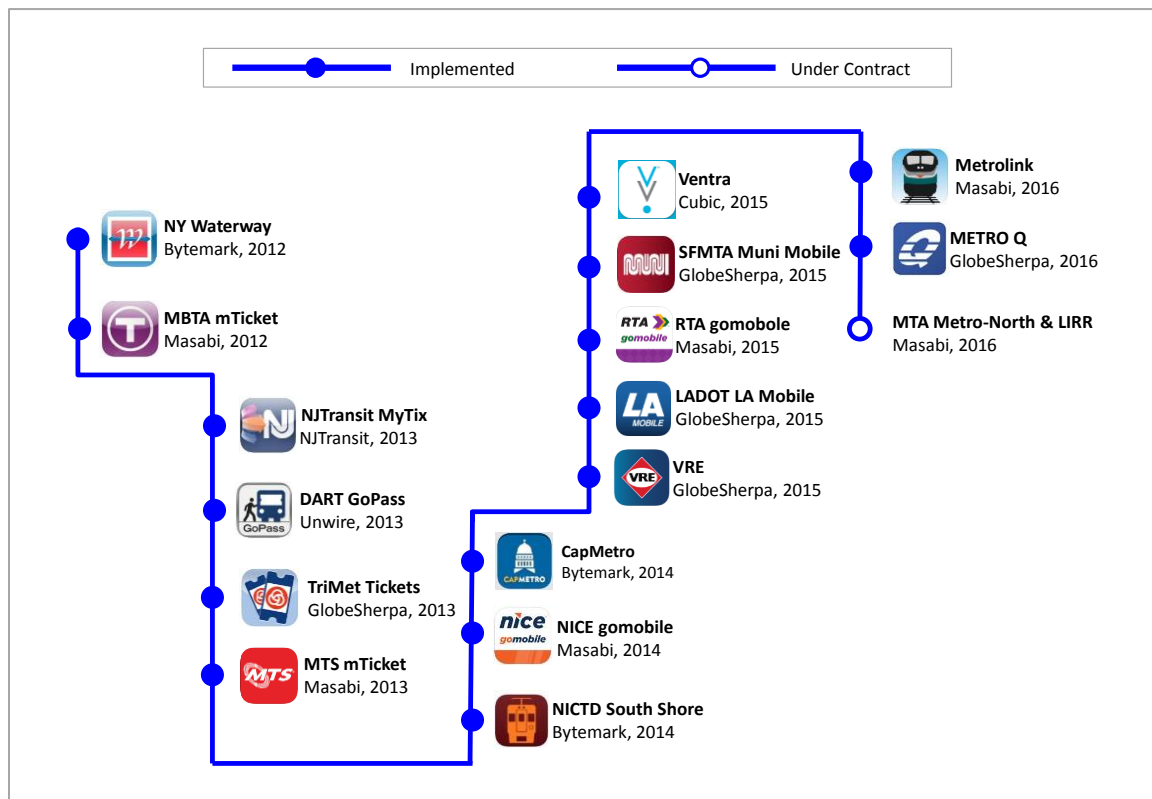
Mobile ticketing

Mobile ticketing is gaining momentum among transit agencies in the United States (Figure 1). Benefits include low cost, easy implementation, and broad customer (device-agnostic) accessibility. Transit riders buy mobile tickets similar to the way they make other m-commerce purchases. A commuter downloads

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[1] There are over 800 transit agencies providing service in urbanized areas, and nearly 1,400 operators in rural areas in 2013. Transit agencies in urbanized areas carried over 98 percent of all transit passengers in 2013. (2015, November). 2015 P*ublic Transportation Fact Book*. APTA. Retrieved from http://www.apta.com/resources/statistics/Documents/FactBook/2015-APTA-Fact-Book.pdf

[2] Daly, J. (2016, February 1). *Why transit is boarding the mobile-payments train*. Digital Transactions. Retrieved from http://www.digitaltransactions.net/news/story/Why-Transit-Is-Boarding-the-Mobile-Payments-Train.

the ticketing app, creates an account, and adds a credit, debit or commuter benefits prepaid card[3] to fund his ticket purchases. He selects his fare product and pays – payment occurs in real-time over a cellular network or WiFi and is processed on the backend like a standard credit or debit card transaction. After the transaction is complete, tickets are stored on the mobile device and can be accessed offline. The mobile ticket serves as a proof of payment; no fare calculation is required at the time of validation. Mobile ticketing is commonly used in open-entry systems that do not employ fare gates. In most implementations, train conductors and bus drivers visually inspect mobile screen displays to validate the ticket. Some operators may choose to validate mobile tickets electronically with a QR code scanner.[4]

Figure 1. U.S. Transit Agencies with Mobile Ticketing Apps (*by Provider and Launch Dates*)

Source: Payment Strategies, Federal Reserve Bank of Boston, 2016

Some of the first agencies to deploy mobile ticketing have achieved success in customer adoption and increased fare collection efficiency. The Massachusetts Bay Transportation Authority (MBTA) launched its *MBTA mTicket* app for commuter rail and ferry in 2012. New Jersey Transit (NJ Transit) introduced the *MyTix* app, Dallas Area Rapid Transit (DART) launched the *GoPass* app, and Tri-County

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[3] Some agencies also accept PayPal and allow split payment.
[4] A Quick Response (QR) code is a machine-readable two-dimensional barcode that contains information (e.g., payment account data) which can be scanned and decoded quickly.

Metropolitan Transportation District of Oregon (TriMet) deployed *TriMet Tickets* in Portland in 2013. The apps have been well-received and usage continues to grow in all four regions. Mobile represents a growing percentage of ticket sales and revenue for each agency. They have also observed decreases in other fare channels, including TVMs, fare boxes, retail outlets, and cash. The MBTA currently sells 60 percent of its single-ride commuter rail tickets via mTicket. Mobile accounted for 18.9 percent of MBTA commuter rail sales, and about 6 percent of the agency's total fare revenue in fiscal year (FY) 2015.[5] Today, NJ Transit sells 28 percent of its rail tickets via the MyTix app.[6] Mobile accounted for 17 percent of NJ Transit's rail ticket sales in FY 2015 compared to 5 percent in the previous year.[7] DART's mobile ticket sales represented 13.9 percent of total sales in FY 2015, up from 9.6 percent in FY 2014.[8] Similarly, mobile ticketing comprised about 11 percent of TriMet's fare revenue in FY 2015 versus 8 percent the previous year.[9]

NFC Contactless Payments

The use of NFC[10] for mobile transit payments is also growing in the U.S. Transit agencies are installing new fare systems that accept open contactless payments, including NFC mobile wallets (e.g., Apple Pay, Android Pay, and Samsung Pay) (Figure 2). Unlike mobile ticketing, this type of fare system can require substantial capital investment and new infrastructure. Similar to a retail point-of-sale (POS) mobile transaction, a fare validator calculates payment for each trip when the commuter taps his NFC mobile wallet at the reader. Both Chicago's Ventra and Utah Transit Authority (UTA) fare systems accept mobile NFC wallets and contactless credit/debit cards. However, actual use of these payment methods remains low (less than 1 percent) primarily due to the limited availability/adoption of NFC-enabled smartphones and contactless cards.

Several of the largest U.S. transit agencies – Washington Metropolitan Area Transit Authority (WMATA), Southeastern Pennsylvania Transportation Authority (SEPTA), DART and TriMet, are scheduled to implement open payment fare systems within the next two years. The New York

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[5] Data provided by MBTA, November 2015. MBTA subways and buses are gated.
[6] Data provided by NJ Transit, May 2016.
[7] Data provided by NJ Transit, May 2016.
[8] Data provided by DART, November 2015
[9] Altstadt, R. (2015, August 26). *TriMet mobile tickets top 5 million in less than two years*. TriMet News. Retrieved from http://news.trimet.org/2015/08/trimet-mobile-tickets-top-5-million-in-less-than-two-year/.
[10] Near Field Communication (NFC) is a standards-based wireless communication technology that allows data to be exchanged between devices that are a few centimeters apart. Some NFC-enabled mobile phones incorporate a smart chip (secure element) that stores payment credentials (or token) securely. NFC payment transactions between a mobile phone and a POS terminal use the standard ISO/IEC 14443 communication protocol also used by EMV and U.S. contactless credit and debit cards that allows the mobile phone to emulate a physical contactless card.

Metropolitan Transportation Authority (MTA) has plans to begin introducing contactless open payment acceptance starting in 2018.

Figure 2. U.S. Transit Agencies with Open Payment Systems (*by Provider and Implementation Dates*)
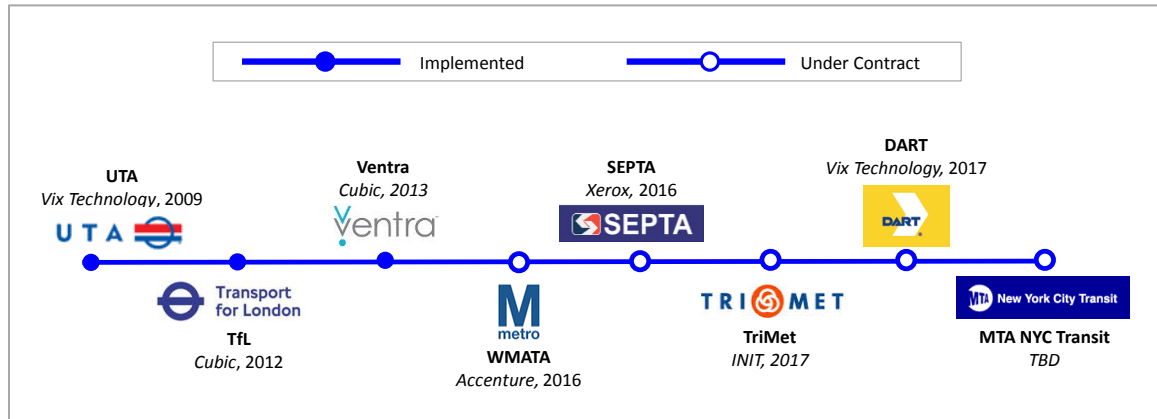
Source: Payment Strategies, Federal Reserve Bank of Boston, 2016

Mobile Fare Products and Incentives

Fare Products

To help strengthen the mobile payments value proposition, transit agencies could offer mobile fare products and incentives that are comparable or more attractive than those via traditional fare media. Examples include free intermodal transfers, unlimited passes, and other discounts. Most transit mobile ticketing apps offer options similar to paper tickets, including single-ride, multi-trip tickets, weekly- and monthly-passes. Some agencies also offer reduced fares to senior citizens and persons with disabilities, with proper identification. Few mobile ticketing apps currently support discounted corporate passes, which require a separate registration process. Nonetheless, transit agencies continue to add more fare products as mobile ticketing evolves. For example, DART introduced prepaid corporate and student passes via GoPass, and NJ Transit expanded its MyTix app to include mobile ticketing for all transportation modes in 2014.

Fare Incentives

Currently, commuters using multiple transit modes may experience less optimal pricing. Mobile ticketing may not provide the same incentives as those offered with traditional fare media. For example, MBTA commuter rail mobile monthly passes do not offer free transfers to bus and subway, which are provided with plastic monthly passes that can also be electronically validated at fare gates. Installing secondary fare readers (e.g., QR code scanner) at existing fare gates is one way for transit systems to support intermodal connections using multiple types of fare media and validation methods, which NJ Transit has

done at select stations (Secaucus Junction and Newark Liberty International Airport stations) and Metrolink is considering in Southern California.

In the limited deployments thus far, there are some instances where paying with NFC mobile phones may be more expensive than traditional fare media. Most open payment fare systems charge a pay-as-you-go (PAYG) fare equivalent to an adult cash fare. These systems are not configured to offer discounts or free intermodal transfers. For example, UTA riders using an NFC mobile wallet cannot get the 20 percent discount offered with fare cards. Without intermodal free transfers, commuters have to pay for each segment separately, making the trip more expensive.

To incentivize use of open contactless payments (e.g., NFC mobile payments), a transit agency can institute a fare capping policy, which limits the amount commuters pay for travel within a day or week to ensure trips are not costlier than traditional fare products. In 2014, Transport for London (TfL) added fare capping for contactless payments on all transit modes in a single day or week.[11] In part, this incentivized many London transit riders to use contactless bank cards and NFC mobile payments instead of TfL's Oyster Card, which does not offer weekly fare caps. Today, 31 percent of all PAYG trips are made using open contactless payments, 3.5 percent of which are NFC mobile.[12] With 7,000 new mobile devices detected each week, TfL predicts NFC mobile payments will continue to grow within its network, helped by greater availability and adoption of NFC-enabled smartphones and mobile wallets. Contactless payments in London's transit system have also influenced overall consumer payment behavior. Visa and MasterCard both saw a large surge in contactless spending in the UK in the last year.[13] In 2015, 40 percent of transactions made in London were contactless, up from 30 percent in 2014.[14] Following London's success, the UK Cards Association is working with transport operators across the country to expand open contactless transit payments nationwide.[15]

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[11] Unlike in the U.S., contactless EMV cards are widely available in the UK. For more information on Transport for London (TfL) fares and payments, see https://www.tfl.gov.uk/fares-and-payments/.

[12] (2016, January 29). *Mobiles join London's contactless travel revolution*. Finextra. Retrieved from https://www.finextra.com/news/fullstory.aspx?newsitemid=28402. Data provided by TfL, May 2016.

[13] Briggs, F. (2015, August 27). *Contactless spending in UK surges in last 12 months, latest Barclaycard and MasterCard data shows*. Forbes. Retrieved from http://www.forbes.com/sites/fionabriggs/2015/08/27/contactless-spending-in-uk-surges-in-last-12-months-latest-barclaycard-and-mastercard-data-shows/.

[14] Briggs, F. (2015, August 27). *Contactless spending in UK surges in last 12 months, latest Barclaycard and MasterCard data shows*. Forbes. Retrieved from http://www.forbes.com/sites/fionabriggs/2015/08/27/contactless-spending-in-uk-surges-in-last-12-months-latest-barclaycard-and-mastercard-data-shows/.

[15] (2016, January 29). *Mobile joins London's contactless travel revolution*. Finextra. Retrieved from https://www.finextra.com/news/fullstory.aspx?newsitemid=28402.

Mobile Travel Tools

Mobile technology enables transit riders to plan and pay for trips seamlessly via a combination of public transit and other transportation options. Transit agencies are integrating a variety of travel tools with mobile payments. Most apps include trip planning capabilities, such as transit directions, schedules, real-time arrival information, and service alerts.[16] These tools help commuters minimize waits and missed connections, and occasional riders better navigate unfamiliar transit routes and fare systems.

Many potential transit riders do not take public transportation because they lack options to get to or from their final destination after getting off a bus or train. To help solve the first-mile/last-mile challenge in areas not covered by public transit, some agencies are incorporating complementary services, such as mobile parking, rideshare, and car-share. For example, DART recently added access to Lyft, Uber, and Zipcar through the GoPass app. While multiple travel services can be accessed via one transit app, users currently have to pay for each separately. DART and other agencies envision future versions of their mobile apps will be able to present one consolidated bill to customers, with discounts for bundled services, similar to a "one-click" e-commerce transaction.

Several transportation service providers such as RideScout, Xerox, and Cubic are developing apps that aggregate all available transportation options around a city and compute optimal routes by distance, time, cost, or environmental sustainability. The apps would also integrate booking and payments for all modes of transportation including transit, rideshare, bikes, tolling, and parking into a single-account system, so users can coordinate their entire trip with a single click of a button. Users could personalize their commuting options based on individual travel preferences. Cities could offer users incentives via the app to change their transportation habits to help alleviate congestion. While these apps have not been deployed yet, they could potentially provide great value to commuters, cities, and other service providers.

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[16] While some transit operators share some of their data with third-party developers of travel tools and services apps, they prefer to maintain control over payment services for security reasons.

Chicago's Ventra App Creates "One-Stop" Regional Transit Payments

In November 2015, Chicago Transit Authority (CTA) launched the *Ventra* app, which supports fare payment and travel information for Chicago's three regional transit agencies. CTA and Pace customers can use the app to manage their Ventra accounts (e.g., check account balance, manage funding source, view transaction history) and add transit value and passes. Metra Rail customers can purchase mobile tickets through the app using their Ventra account or other payment method. The app also offers schedules, real-time arrival information, and nearby route locations for all transit modes. CTA plans to add trip planning capabilities and a virtual Ventra card to a future generation of the app. Commuters paying with NFC smartphones will be able to take advantage of the same fare incentives as traditional Ventra cards. Riders will eventually be able to plan and pay for their entire trip on any bus or train operated by the three agencies with just their smartphones – similar to "one-stop shopping."

Transit and Business Partnerships

In some cities, transit agencies have partnered with local businesses to encourage use of mobile payments for public transit and to generate new customers. Mobile ticketing can help public event attendees, many of whom are occasional riders, navigate transit routes and fare systems. The MBTA promotes use of its mobile ticketing app to purchase commuter rail rides to Gillette Stadium, located in a suburb of Boston, for New England Patriots games and other public events. In Dallas, DART's GoPass app bundles transit fare with discounted general admission to several local attractions, including the Dallas Zoo and State Fair of Texas. DART has its highest ridership volume of the year during the State Fair. Mobile ticketing significantly helps to alleviate pressure on its TVMs.

To celebrate the opening of its new MAX Orange Line in September 2015, TriMet integrated a mobile scavenger hunt into its mobile ticketing app. The game used Bluetooth Low Energy (BLE) to connect with beacons at approximately 100 participating retailers near Orange Line stations. When TriMet mobile ticket users approached participating businesses, the beacons sent notifications of coupons, special deals, and other promotional offers to their smartphones. Local businesses were able to gain more exposure and new customers through the transit mobile ticketing app.

Looking Ahead – Recommendations and Conclusions

As transit mobile payments evolve, the convergence of fare payments, real-time travel information, complementary transportation services, incentives, and other capabilities will help transit customers optimize convenience, efficiency, and cost. To further strengthen the value proposition for commuters, more regional transit agencies could collaborate to offer interoperable mobile fare solutions. Future transit and local business collaborations could potentially include location-based offers, transit loyalty rewards, or a "transit button" on local attraction ticketing websites or apps that allow attendees to easily add transit mobile ticketing to and from the event venue.

Transit agencies could increase use of NFC mobile payments by offering virtual closed-loop fare cards similar to store-branded credit or prepaid cards in a mobile wallet, or through their own transit apps. Virtual fare cards enable agencies to offer more mobile fare products and incorporate discounts and rewards for loyalty. In February 2016, the American Public Transportation Association (APTA) and NFC Forum announced an initiative to jointly educate the industry on mobile NFC technologies, including Apple Pay, to support the needs of public transportation operators.

Transit mobile payment adoption should continue to grow as more riders use and appreciate the convenience afforded by the technology. Positive experiences have led to repeat use and influenced overall changes in consumer payment behaviors as evidenced by growth in U.S. transit mobile ticketing and London's contactless payment adoption. Broader mobile ticketing and NFC mobile payment acceptance in transit systems help build greater consumer awareness and familiarity with the technologies. As commuters habitually enjoy using their smartphones to conveniently pay for their fares and conduct other daily activities during their transit ride, they will be motivated to use it to make other purchases beyond their commute.[17]

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[17] For more information about transit mobile payments, see Tavilla, E. (2015, February). *Transit mobile payments:driving consumer experience and adoption*. Federal Reserve Bank of Boston. Available for download
http://www.bostonfed.org/bankinfo/payment-strategies/publications/2015/transit-mobile-payments.pdf.