

Transit Payment Systems: A Case for Open Payments

Transit authorities that use proprietary payment systems today have new options available to them. There are now opportunities to move away from expensive, inflexible proprietary fare systems, enabling transit authorities to focus more resources on providing top-quality transportation services.

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Executive Summary

In the metropolitan area surrounding Salt Lake City, Utah, bus riders use their Visa®, MasterCard® or American Express® branded contactless bankcards to “tap on” when they board and to “tap off” when they leave their buses. Using the open specifications of the payment cards, the transit authority has a lot of flexibility to incorporate new products in the future.

These scenarios are the future of transit payment systems. If your transit authority isn't there yet, it's time to consider how you are going to get there.

Pilot programs for open standard payment systems are revealing the opportunity for cost saving, new revenue streams, improved customer convenience, easier integration with other transit modes and innovative partnerships.

The fact of the matter is most U.S. transit agencies have proprietary fare payment systems today. These systems were implemented years or decades ago when there was no practical alternative, and even today they are still the most proven and widely available transit payment systems. In the past, only a proprietary payment system could meet the requirement to move riders quickly through the faregates while ensuring that the transit authority collected its appropriate fare from each rider. It's true that proprietary payment systems still work today, but they are expensive to maintain and constrain their customers, making it hard for transit authorities to reduce costs, develop innovative services and generate new revenue streams.

In recent years, the technology and processes for open standard bankcard payment systems have reached the point where they can meet the needs of transit systems. This paper looks at the current trends in payment systems and the benefits they hold for transit authorities. Pilot programs are proving that the opportunity is there for cost saving, new revenue streams, improved customer convenience, easier integration with other transit modes and innovative partnerships. What's more, such systems enable transit authorities to focus on their core competency—transportation—and get out of the costly business of processing payments.

Many agencies would like to modernize their transit fare payment systems through electronic payments based on contactless bankcards that support Visa payWave, MasterCard Worldwide's PayPass™, or other open bankcard contactless applications. Doing so would have a profound impact on not only the transit authorities but also the millions of customers they serve. Philip Keitel writes in a Federal Reserve Bank of Philadelphia discussion paper: “The move to fare payment systems based on contactless open loop payment cards represents a significant change, one that will affect the daily lives and possibly the payment preferences of millions of Americans.”¹

Although it could take a few years to arrive at that point, now is the time for your agency to start laying the tracks to get there.

Key Takeaways

As you read this paper, we hope that you will take away and consider several key points in the context of your own transit operations:

- Transit authorities that use proprietary payment systems today have new options available to them. There are now opportunities to move away from expensive, inflexible proprietary fare systems that force transportation agencies to be their own bankers. By turning payment processing over to the open market, transit authorities can focus more resources on their core business of providing top-quality transportation services.
- General payment trends in recent years are very favorable for adopting open systems. Fare solutions based on open industry standards and using existing non-proprietary payment processing networks offer significant benefits to transit authorities as well as their customers.
- There are several U.S. pilot programs and procurements of open payment systems in the transportation industry that provide lessons learned to pave the way for others.
- The future of open fare payment systems depends on the broad delivery and acceptance of mobile payments. These new fare payment solutions require a whole new ecosystem of partners that bring proven specialty expertise to the table. Working together, these partners can develop a suitable economic model that fits the modern transportation industry.

Why It's Time to Consider New Fare Payment Systems

Today, most transit authorities use some type of proprietary fare system that was purpose-built solely for the transportation industry. Over the years, agencies have implemented new technologies such as contactless smart cards that complement or replace cash, token coins and magnetic swipe cards. For the most part, however, these cards can be used only for services provided by the transit agency and not for goods and services offered by other merchants. ("Closed loop" is the common term for a payment system that restricts what goods or service can be purchased and from which merchants.)

Operating in this closed loop, the transit authority must act as its own bank for issuing the stored-value payment cards as well as serve as the financial clearinghouse for transaction settlement. In other words, the agency is "issuing its own currency to customers to pay for rides."² Providing these types of services in-house is expensive for the agency. For example, Transport for London spends £100 million (US\$148 million) a year to administer its proprietary stored-value card system known as Oyster.³ A major transit authority in the Southeast United States spends over \$39 million annually on its proprietary fare system.

Transport for London spends £100 million (US\$148 million) a year to administer its proprietary stored-value Oyster™ card system.

These issuing and settlement activities performed by transit agencies are redundant services. Each transit agency builds and maintains a huge infrastructure to support the same types of card issuing and transaction processing services that are readily available from the existing financial services industry. Moreover, a transit agency spends much more to perform these services, as it cannot achieve the economy of scale that financial services companies can.

Proprietary fare systems are clearly showing their age. Here are a few other reasons why they no longer meet the needs of the agencies that use them:

- **Cost** – Ongoing support and maintenance costs are high for systems whose components are unique or obsolete.
- **Vendor lock-in** – Proprietary hardware and software lock the transit authority into using one vendor for the long term.
- **Resource allocation** – Enormous resources must be devoted to the process of fare collection, which comprises customer service, information technology, maintenance and fare handling.
- **Inconvenience for customers** – Riders must purchase and carry an intermediate form of payment, such as a ticket, ride pass or token, instead of paying for a ride with a payment medium existing in their wallet, such as a standard debit, credit or prepaid card.
- **Lost revenue opportunities** – Transit authorities that operate a proprietary fare payment system miss out on revenue opportunities, such as revenue sharing from cobranded bankcard interchange or usage fees.

What Is the Difference Between Open Loop and Closed Loop Prepaid Cards?

There are two basic types of prepaid cards: open loop and closed loop.

Open loop prepaid cards work like standard debit cards. They can be used at any retailer that accepts credit/debit cards, and they can be used for receiving direct deposits or making withdrawals at ATM devices.

Closed loop prepaid cards are restricted for use with specific merchants or purchases. Merchant gift cards, prepaid telephone cards and transit fare cards are all examples of closed loop cards.

General payment trends dictate a fresh look at fare payment systems

There are significant trends in the broader scope of commerce payments that have an impact on transit fare systems. In light of these trends, the prudent transit authority will re-evaluate its commitment to a proprietary fare system and look for ways to incorporate new payment methods and processing systems into its way of work.

- **Electronic payments** – In recent years, consumers have embraced electronic payments wholeheartedly. In 2006, and for the first time ever, payments made with credit and debit cards exceeded 50 percent of all noncash consumer payments.⁴ Consumers are now quite comfortable with using their debit, credit and prepaid cards to pay for low-dollar-value transactions. The person who thinks nothing of using his debit card to buy his daily cup of coffee at a Starbucks is also the person who would use the card to pay his \$2 transit fare to get to work.
- **Prepaid cards** – The use of open loop prepaid cards is on a steep growth path. Packaged Facts, a market research company, predicts \$200 billion on prepaid debit cards in 2011.⁵ These reloadable spending cards are now commonly used by employers to provide pay to employees; by government and nonprofit agencies to provide payments or assistance to constituents; by unbanked individuals who do not have a regular debit or credit account; by tax preparation agencies to issue tax refunds; and even by parents to give a spending allowance to teenagers. The proliferating cards are like “a walking bank account.” As more people carry the cards, they want to use them in more payment situations—including making micropayments such as paying for a ride on a transit system.

- **Open loop payment systems** – The prepaid cards described above can be either “restricted” or “unrestricted.” An open loop prepaid card is typically branded by one of the major card brands such as Visa, MasterCard or American Express. The card can be used anywhere that payments via the brand are accepted and payments are processed over the regular card payment network. The infrastructure to support an open bankcard payment system is already built and is maintained by a vast network of suppliers. The advantage this method has for transit authorities that accept open bankcard payments is that they don’t have to support their own expensive infrastructure in order to process and settle fare payments for themselves.
- **Contactless payment systems** – Several major transit authorities in the United States have already implemented contactless systems, albeit as part of their proprietary fare payment systems. This scenario is encouraging, as it helps transition customers to become comfortable with the concept of using contactless devices based on radio frequency identification (RFID) and ultimately near-field communication (NFC) for initiating secure payments. Outside the transportation industry, the growth of contactless payment systems is steadily trending upward. At the beginning of 2008, more than 35 million contactless financial payment cards branded with MasterCard PayPass, Visa payWave or American Express ExpressPay™ had been issued in the United States, with more than 400,000 readers in place at 80,000 merchant locations.⁶ What’s more, the transition to NFC-enabled devices is an easy one for merchants, since NFC is designed so that it is compatible with the base of contactless payment devices already installed in the United States, providing a ready infrastructure.
- **ISO standards** – There are open standards issued by the International Standards Organization (ISO) that dictate how cards and other devices interact with hardware such as readers. The bankcard standard is ISO/IEC 14443 Type A or B. With this standard, equipment from different manufacturers works together and is interchangeable, challenging the notion that transit systems require proprietary cards and card readers. As more suppliers adopt these open standards, the cost to deploy the devices drops. Experts attribute the growth of contactless devices to the industry standard card reader interface, which all the major card networks support.

The convergence of these trends, and the new technologies and extensive systems behind them, are important for transit authorities that want to shed their proprietary fare systems and step into the world of open payments. With the growth of standardized contactless solutions through the credit card payments standard, there’s more flexibility in terms of change management, cost management and business innovation.

The Case for Open Bankcard Payments

“Open bankcard standards” for payments are set by the world’s most common financial networks, including Visa and MasterCard. Customers (riders) would be able to use electronic payment methods—credit, debit and prepaid—that get processed through an existing financial network. By adopting an open bankcard standard for fare payments, a transit authority could take itself out of the banking business and become just another merchant capable of accepting electronic payments at the point of sale. It enables a transit authority to procure a merchant acquirer and a prepaid program competitively. If the market changes and a more competitive arrangement is negotiated, a transit authority could make a change in providers without switching hardware and automated fare collection (AFC) providers.

Many transit authorities have a genuine interest in moving to open bankcard payment standards. For example, Jerry Kane, manager of Capital Program Planning at the Southeastern Pennsylvania Transportation Authority (SEPTA) New Payment Technologies Project, describes his vision for the future, characterizing SEPTA’s planned system as “an integrated electronic fare payment and collection system capable of accepting both SEPTA- and bank-issued cards and capable of interfacing with both bank and nonbank financial clearing systems for transaction settlement.”⁷ SEPTA is not alone in this vision, and one can see why transit authorities are attracted to the call of open bankcard payment systems: to reduce or eliminate the need to be in the banking and payments processing business. Below are the key benefits in the world of open bankcard payment standards:

- **Fare cards** would no longer be issued by the transit authority. The fare products would be tied to bankcards and maintained by a systems integrator, fare systems provider or transit authority. The transit authority would be able to leverage the existing network of retail distributors to supplement the card distribution at its own kiosks. Customers would be able to purchase a card from multiple sources and reload it at multiple locations, including the Web.
- The **card readers and other equipment** deployed at turnstiles, faregates and fareboxes would adhere to ISO standards. Numerous vendors could supply these devices to the transit authority, which would make them easier and less expensive to purchase, replace, service and upgrade relative to the proprietary equipment commonly used today.
- The **payment networks**, with their well-defined processes for settling payments, would replace the proprietary systems the agencies use now for transaction settlement. The processes—and especially the fees associated with them—might need to be customized for the transportation industry, but the payment networks want the transit business enough to work through these issues. Already there are signs that payment networks are willing to develop new business models for micropayments such as transit fares. For example, MasterCard orchestrated the process of aggregating numerous small fares as a single payment transaction in the MTA New York City Transit pilot program. “We recognize aggregation of micropayments as a means for transit authorities to become more operationally efficient,” according to Burt Wilhelm, vice president – Advanced Payments, MasterCard Worldwide.

Important Contactless Payment Terms

Contactless payments

Payment transactions that require no physical contact between the consumer payment device and the physical point-of-sale (POS) terminal are considered contactless payments. In a contactless payment transaction, the consumer holds the contactless card, device or mobile phone in close proximity (less than 4 inches) to the POS terminal, and the payment account information is communicated wirelessly (via radio frequency [RF]).

RFID tags

Simple, low-cost and disposable electronic devices that can be used to transmit payment data are called RFID tags. RFID tags include an integrated circuit that typically stores a static number (an ID) and an antenna that enables the chip to transmit the stored number to a reader. When the tag comes within range of the appropriate RF reader, the tag is powered by the reader’s RF field and transmits its ID to the reader.

Mobile payment

Use of a mobile device to make a purchase or other payment-related transaction is defined as a mobile payment. Such payments can be initiated in the physical or virtual worlds and can be conducted in

a variety of ways, including SMS/MMS, mobile Internet and contactless chip (e.g., NFC technology). Examples of mobile payments include payments via the mobile Internet, tap-n-go purchases using a contactless chip embedded in the mobile device and person-to-person transfers.

NFC – Near Field Communication

A standards-based wireless communication technology that allows data to be exchanged between devices that are in close proximity (less than 4 inches) is classified as NFC. NFC-enabled mobile phones incorporate smart chips that enable them to be used for payment. NFC payment transactions between a mobile phone and a POS terminal use the same communication protocol utilized by contactless credit and debit cards.

Smart card

A smart card is a device that includes an embedded secure integrated circuit, like an NFC chip. The card connects to a reader with direct physical contact or with a remote contactless radio frequency interface. Some smart cards have the ability to securely store large amounts of data, carry out their own on-card functions (e.g., encryption and mutual authentication) and interact intelligently with a smart card reader.

Source: Smart Card Alliance

- The payment card industry has a **security standard** that reduces the risk that merchants will lose money to fraudulent transactions. Transit authorities can implement the recommended security measures for the bankcards and minimize their worries about losses commonly attributed to leakage and fraud associated with proprietary payment systems.

The Case for Contactless

"In the same way that chip and PIN have revolutionized the way shoppers pay, contactless is the future of small-ticket transactions," says Matt Rowsell, head of business development at RBS WorldPay. "It is in line with customer preferences and gives retailers an ultra-low-cost, fast and secure payment option at the tap of a card."

Contactless cards and other devices such as cell phones use embedded or attached RFID or NFC chips to exchange data with a reader device that is just a few inches away. The technology is mature, secure and standardized, meaning no proprietary equipment is required to read the data on the cards or phones.

Many transit authorities have already adopted or are at least testing contactless technology. Contactless smart cards streamline fare payment, reduce customer service costs, increase throughput and decrease bus dwell time.⁸ However, most transit implementations to date have primarily been in a closed loop system, and they have barely scratched the surface of what is possible with contactless payment systems. The Bay Area Rapid Transit (BART) pilot program described later in this paper demonstrates the wider potential for cell phones as the contactless devices of the future.

In addition to mobile ticketing in public transportation, there are other current and potential uses for contactless-enabled NFC phones:

- **Mobile payments** – the device acts like a credit or debit card linked to a prepaid account or bank account.
- **Smart posters** – the device reads a tag on an outdoor poster in order to get more information.
- **Electronic keys** – the device can replace car keys, door keys, etc.
- **Identity documents** – an electronic version of an identity card, such as a passport.

As the practical uses for contactless devices continue to expand, more people will adopt them and expect to use them in places like transit systems. In order for contactless cards to reach critical mass, a single card must be usable in multiple locations.

The Case for Open Bankcard Payments

Transit authorities are readily embracing the use of contactless cards, and many are interested in deploying a solution based on open bankcard standards. A slightly tougher decision may be the one to adopt open payments (i.e., network-branded debit, credit and prepaid card payments), although interest in the United States is strong. The road to open payments is still being paved, and there may be a few potholes to get around. Thus, we present our considerations and view of what lies ahead.

Benefits of deploying an open bankcard payment system include a reduction in the transit authority's payment infrastructure, the opportunity for new revenue sources and enhanced customer satisfaction.

The big benefit to transit authorities

The biggest enticement of open bankcard payments is the notion that a transit authority can vastly reduce the infrastructure it has in place today to support issuing and managing its own expensive closed loop card and paper ticketing systems. The goal is to allow consumers to use the debit, credit and prepaid cards that are already in their wallets to directly pay for rides on a transit system, rather than using those cards to buy another card sold by the transit authority. The agency can still sell a branded prepaid card, but the transactions of that card would be processed by the regular card networks, not by the transit authority itself.

A potential revenue source

A transit authority that sells a network-branded version of an open payment card may have the opportunity to participate in the sharing of the spend attributed to that card, even for non-transit-related purchases. This scenario opens a world of possibilities of generating net new revenue through joint programs and promotions with retailers and other businesses that offer complementary services.

It's worth noting that there are several ways that a transit authority can earn revenue share on customers' use of open loop prepaid cards sold by that agency. One financial model charges the cardholder a nominal fee, as well as a monthly fee to use the card, each time he uses his card outside the transit system.

A second financial model does not charge the customer any fee to hold or use the card outside of the transit system. Instead, when the customer uses his prepaid card at any merchant's business outside the transit system, the merchant pays the interchange fee to process the payment on that card. The issuer shares a portion of this interchange fee with the program manager of the prepaid card and the transit authority.

The amount of revenue share that each financial model returns to the transit authority can vary greatly. While the first example might generate far higher revenue, it could be rather unpopular with customers using the prepaid card that is loaded with fees they aren't accustomed to paying. The second model is already part of the normal card payment process; that is, merchants expect to pay interchange, and customers expect to not pay extra to use a card. The transit authority wanting to generate revenue from prepaid cards must consider which model or models would work best in its own environment.

Customer convenience

Everything about an open bankcard payment fare system is a positive for customers. Riders can use the cards they already have without going through an intermediate step of purchasing a transit-specific card or token. The same cards can be used at retail locations located near the transit stations. Prepaid cards can be reloaded at many convenient retail locations as well as on the Web, and not just at transit authority kiosks. The convenience and comfort of using a familiar card encourages new people to ride—a real plus for the transit authority.

Proceed With Caution: Challenges Ahead

The adoption of an open bankcard payment system isn't without its challenges for any transit authority. With the exception of the Utah Transit Authority's full rollout and a handful of pilot programs in the United States, there are few implementations that have already created a roadmap for others to follow. In fact, it seems as though the road is being built as we are traveling on it. Here are a few things to consider as we all enter uncharted territory.

The differences between card systems

Today, a majority of the smart card systems used by transit authorities are card-based systems. The monetary value is stored on the card itself. When a rider taps a card at the reader, the reader sees what value is on the card. The software turnstile hardware calculates the fare, decrements the value for that fare from the balance and writes the new value back to the card. All this action goes on between the turnstiles. Thus, the process takes place very quickly.

Card-based systems also can be tied back to a host server, where the shadow account balance is kept. Value is stored on the card, but the balance amount is shadowed back to an account each time the card is used. When a rider taps a card at the reader, the reader sees what value is on the card. The turnstile system calculates the ride fare, decrements the value for that fare, writes the new value back to the card and stores the information about the transaction for later reconciliation with the host account. It's possible for the card balance and the host balance to be out of sync for a short period of time, but they eventually need to reconcile. Because value is stored on the card, the rider can pass through the turnstile quickly if the card has sufficient funds to cover the ride fare.

Bankcards such as credit, debit and prepaid cards use a host-based system, where the value is stored off site on a host server. The card has no stored value. In order to get an accurate reading of the account balance, the transaction may need to go all the way back to the host server, which takes more time—possibly more than the current threshold of 300 milliseconds that is common in the transit industry today. This is a top challenge to overcome in an open payment system where riders can use whatever cards they have in their wallets.

Ways to accommodate the need for speed at the point of sale

Yes, challenges exist, but there are innovative solutions to address them. Here are a few methods that speed the riders through the turnstiles, even when open payment cards are used.

→ **Aggregation (credit and debit)**

The AFC software can have a policy whereby there is a set amount pre-authorization (pre-auth) value on credit or debit card. The pre-auth value, which might be around \$25, gives the cardholder the right to buy ride fares against that amount. Since individual ride fares are typically small—for example, \$2—the fare collection system provider would aggregate all the ride transactions on the card over a period of days, total the value of those rides and apply that total amount against the pre-auth value. The payment processor would settle the actual amount used and then perform a reverse authorization for the remaining balance, if needed. This practice is being tested in the New York City pilot program. This system may work well for credit and debit card transaction but needs further analysis for prepaid transactions.

It is possible to maintain transaction speed with an open loop system by using aggregation, shadow balances, negative files, near-real-time authorization or direct connect to host solutions.

→ **Shadow balances (prepaid)**

The processor of a prepaid card (such as First Data or another processor) knows what the value on the card is at any given time. This value can be sent down to the transit authority on a very regular basis, creating a shadow balance at the turnstile. For example, a file can be sent from the First Data host to the fare collection system provider. Policies in the AFC software would determine what to do when a rider presents a card whose shadow balance is zero or negative; he could be turned away or be given access to a single ride.

→ **Negative files (credit, debit, prepaid)**

Payment card regulations change regularly and must be reviewed with the merchant processor to ensure adherence to the latest rules and regulations. Currently, situations arise where a transaction may be checked against a negative file. A payment processor such as First Data would provide a daily negative file to the fare collection system provider, who would incorporate checking the file into the AFC process.

→ **Near-real-time authorization (credit, debit, prepaid)**

A rider taps his card at the faregate, and it opens immediately to allow him through. At the same time, the transaction is being sent to the host server for authorization. If the transaction is authorized, there is no problem. If the transaction is declined, the transit authority must have a policy on how to handle the situation. If the transit system uses tap in/tap out, it's possible to stop the customer on the tap out and require him to pay. Or the agency could show leniency with this one ride and put the card on a negative file to prevent future rides.

→ **Direct connect to host (prepaid)**

Similar to the process for a shadow account, a fare collection system provider can connect directly to the prepaid card provider to get the card balance. This process validates that it's an open account and there's money in it to buy. While this method provides a way to ping a host quickly, it doesn't satisfy an authorization request.

With all of the options listed above, it's important to note that these solutions do not replace the need for an AFC system. The AFC system will still need to calculate the fare. But in an open scenario, a payment processor will take the result of that calculation and process it against an account.

Interchange fees

In an open bankcard payment system, there are processing fees for every transaction on a network. The term "interchange" describes a fee that a merchant's bank (the "acquiring bank") pays a customer's bank (the "issuing bank") when merchants accept cards using card networks such as Visa and MasterCard for purchases. In the context of a transportation system, the "merchant" is the transit authority and the "customer" is the rider.

In a credit card transaction, the card-issuing bank in a payment transaction deducts the interchange fee from the amount it pays the acquiring bank that handles a credit or debit card transaction for the transit authority. The acquiring bank then pays the transit authority the amount of the transaction (the fare) minus both the interchange fee and an additional, usually smaller fee for the acquiring bank, which is often referred to as a discount rate, an add-on rate or pass-through.

The Smart Card Alliance advocates the aggregation of numerous small payments over a short period of time—a week, for example—before a single transaction is processed for the total amount. This method requires the payment of interchange just once instead of every time a fare payment is logged. As mentioned earlier, this is a good solution for credit and debit products, but it needs further evaluation for prepaid products.

Banking laws

Unique banking laws designed to prevent fraud and money laundering apply to unrestricted reloadable prepaid cards. These laws require the card issuer to validate the identity of the person purchasing the card, once the card is reloaded. Transit riders who are unaccustomed to having to prove their identity might see this requirement as a violation of their privacy. A potential solution to this issue could be an open loop bankcard card with restricted usage that does not require registration.

Payment association rules

Association rules from Visa and MasterCard are different, and they change several times a year. Since there are many parties to the full solution for an open payment transit fare system, it's in all the parties' best interest to understand and manage the rules and work together to mitigate risk for all. A transit authority should work with its merchant acquirer for the rules for the transit merchant category code.

Transit Pilot Programs in the United States and Around the Globe

There are several recent and current transit pilot programs that everyone in the industry is watching closely. Expectations are high, and much is at stake. Here is an overview of some of the programs that we all are eager to learn from.

MTA New York City Transit (NYCT)

In 2006, MTA New York City Transit (NYCT) began Phase 1 of a pilot program in partnership with MasterCard and Citibank. The trial was intended to test the viability of accepting standard contactless bank-issued smart card devices to pay transit fares directly at the point of entry without the need to purchase the fare media. Select subway stations were chosen for the pilot. A standard ISO/IEC 14443 and MasterCard PayPass-certified smart card reader was placed at the entry points to these stations. The participants' PayPass device functioned as a credit or debit card, depending on the individual customer's relationship with Citibank.

When a participant passed through a faregate, he would tap his card or fob against a reader. However, his account was not charged at this point. Instead, a preliminary approval verified the card's legitimacy and processed a pre-auth for \$15. A cardholder's first transaction would always be allowed, even if his account were not in good standing. The account status would be checked later when a series of fares were aggregated and submitted as a single transaction.⁹

Average fares for NYCT subway lines participating in the phase one pilot increased by 17 percent, and revenues rose 8 percent to 13 percent

The successful first-phase pilot showed that unmodified contactless bankcards can be used to pay for transit rides at the gate. What's more, NYCT average fares on the subway lines involved in the pilot were up 17 percent, while revenues were up 8 percent to 13 percent. The increase was attributed to the convenience factor of using the contactless cards.¹⁰

Phase 2 of the pilot is under way at this writing, with NYCT collaborating with the New York Port Authority, New Jersey Transit and the Port Authority Trans-Hudson (PATH). In this phase, all card brands and issuers' contactless payment cards will be accepted. The industry standard card readers have been added to 275 MTA buses and 104 NJ Transit buses, and at turnstiles on the Port Authority of New York and New Jersey's ferries, PATH train and AirTrain systems.¹¹

Los Angeles County Metropolitan Transit Authority (LA Metro)

In 2008, LA Metro began a 25,000-person pilot program in conjunction with Visa and Ready Credit Corporation to offer special Visa payWave contactless cards that also incorporate the transit system's Transit Access Pass (TAP) fare application. These dual-use prepaid cards allow riders to pay their fares and purchase fare products using their Visa account, while also allowing cardholders to make purchases anywhere Visa debit is accepted. Visa and Ready Credit are paying for the pilot.

Two types of cards are available through the pilot:

- **Ride, pay and reload cards** – Sold through automated ReadySTATION kiosks within the LA Metro system, these cards are active and ready to use immediately for both transit fares and Visa purchases everywhere Visa debit is accepted. Riders are able to add up to \$500 in value at the kiosks.
- **Ride, pay, reload and ATM cash access cards** – These are personalized cards, which are ordered online or over the phone, with a maximum value limit of \$10,000. Beyond a larger value limit, the personalized cards have the added feature of a personal identification number (PIN) for obtaining cash at ATMs. It also functions as a standard Visa prepaid card for purchases outside the transit system.

Riders can use either type of card on all Metro bus and Metro Rail lines. They tap their cards when boarding and disembarking from the vehicles to calculate the fare and initiate payment.

Though the prepaid cards can be used outside the transit system, the cardholder pays a nominal fee for non-transit-related purchases, for monthly maintenance and for the initial issuance of the card. The pilot is relying heavily on the generation of these usage fees that would be shouldered by the cardholders. The cards are aimed primarily at the unbanked population, a demographic that is accustomed to paying fees to cash checks or to buy money orders. The transit authority is not charging a fee for the cardholder to pay a ride fare or reload the transit account.

If LA Metro decides to fully roll out the program throughout its bus and train network, it could expect to share in millions of dollars' worth of prepaid card fees, in addition to enjoying reduced card and processing fees.

Utah Transit Authority (UTA)

The recognized trailblazer in the United States for having piloted and then fully implemented a contactless open payment fare collection system is the Utah Transit Authority. UTA serves six counties over 1,400 square miles with bus, light rail and train service. UTA began with a ski bus pilot program in 2006, and based on this program's success, moved into full implementation shortly thereafter. In October 2009, the agency was awarded the American Public Transportation Association Innovation Award for 2009 for the development and launch of its new electronic fare collection (EFC) system. The EFC was launched in January 2009, making UTA the first transit agency in the United States to roll out to its entire fleet a transit payment system based on the open payment network.¹²

Experts suggest that the rapid growth of UTA's light-rail ridership is partially attributable to the ease of use of its new contactless payment system.

What's unique about UTA's payment scenario is that it was essentially green field when the pilot program started; that is, the agency didn't have a legacy electronic fare system. Prior to 2006, UTA accepted only cash and tokens. Craig Roberts, manager of Technology Program Development for UTA, says, "We had no magnetic readers in our systems. This [EFC system] gave us the freedom to try contactless bankcards, which were just coming onto the market back then."

The system in place today allows riders to pass contactless smart cards over electronic readers when boarding. The smart card can be one that is issued by UTA or open standard contactless credit and debit cards, including Visa payWave, MasterCard PayPass, Discover Network[®] Zip and American Express ExpressPay.

UTA issues two of its own smart cards: Eco Pass for workers and Ed Pass for students. These cards are prepaid and purchased by the cardholder's employer or school. The system also can accept compatible school or employee ID cards that have been activated to work on UTA's system. UTA manages and settles the transactions for these particular cards.

The EFC system also accepts standard open payment contactless cards. Riders are asked to register their participating cards with UTA one time to facilitate authorization when they board. As a rider boards and exits a vehicle, he taps his card against a reader and boards the bus or train. The transaction is sent to a centralized server and then on to the open payments network for authorization. Using this near-real-time authorization solution, UTA speeds riders onto their vehicle while the transactions get authorized (or declined) in the background. At the end of the ride, the passenger taps off to complete his trip or get an electronic transfer. In a transfer, the rider is able to tap onto a new bus or train without being charged for a new trip. The final charge is processed through a back-office system that matches up individual card taps within the two-hour transfer window to create a complete trip and calculate the final charge.¹³

The back-office processing is an important measure for cost saving. When fares, rules or policies change, programming work is needed only in the office and not at the thousands of devices in the field.¹⁴ “We do the heavy lifting for the fare calculations in the back office,” says Roberts. “The card used at the gate is just a credential.”

By asking riders to tap on/tap off with their cards, UTA is able to collect valuable data that enables planners to better understand travel patterns, improve bus routing and increase service for routes with higher ridership. UTA General Manager John English says, “This new electronic fare collection system will be an enormous advantage in planning and development in the years ahead.”¹⁵

According to the American Public Transportation Association (APTA), light-rail ridership in the Salt Lake City area increased 12.3 percent in 2008 over 2007’s figure. This is a far higher increase than the national average of 4 percent. Experts suggest that the increase is due, at least in part, to the ease of use of the new contactless payment system.¹⁶

In addition to the increased ridership, UTA attributes millions of dollars in cost avoidance to the open payments approach. “Our rough estimate of the cost of a conventional approach was 30 million to 40 million dollars,” says Roberts. “We were able to cut that cost at least in half, and we were able to cut the time for deployment in half as well.”

Other transit programs

Similar to the LA Metro trial, Visa Europe is collaborating with the Régie Autonome des Transports Parisiens (RATP) in metropolitan Paris, France, in a proof-of-concept project. The intention is to demonstrate the feasibility of using Visa payWave cards directly at a Paris Metro faregate that is configured to accept Navigo, the local closed loop card in use today.

In Kuala Lumpur, Malaysia, domestic Visa contactless cards are accepted at the faregate on the train that runs from the airport to the central bus station. Riders can use the regular contactless card provided by their issuers; no special transit enabled card is required.

A standard Visa payWave card is all that’s needed to board a ferry in Istanbul, Turkey. Riders wave their card over the gate reader to pay for their journey.

Numerous programs are in trial or full rollout in places like Hong Kong, New Delhi, London and Korea. In fact, many countries seem to be ahead of the United States in the use of contactless payments for public transportation.

What's New in Mobile Payments

Earlier, we discussed contactless payment devices and hinted that there's much more that can be done with them. Now we'll explore what's possible in the world of mobile commerce—when the device is an NFC-equipped cell phone operating on a telecommunications system that provides the phone owner with real-time access to his banking accounts. This complex amalgam of technology enables a consumer to use his cell phone to initiate a payment for a good or service and select which banking account will be debited for the purchase amount. What's more, the consumer can use his phone to conduct mobile account management by checking the balance of his account(s) and reloading his stored-value account(s) that are accessed via the phone. Going one step further, the NFC-enabled phone can receive time- and location-sensitive marketing messages and special offers that encourage further commerce.

If this sounds like something out of a futuristic TV show, consider this: The San Francisco Bay Area Rapid Transit system has already tested the technology and proven it is viable in a transit authority situation.

An overview of the BART mobile commerce pilot program

First Data and a select group of partners worked with BART to conduct an innovative trial of mobile commerce. The pilot program was able to take advantage of the many BART turnstiles already equipped with contactless readers.

In the pilot program, 230 BART riders were provided with NFC-enabled mobile phones that worked on the Sprint telecommunications network. Each rider had multiple prepaid accounts that were managed through account management software on the phones. One account allocated funds for rides on BART. Another account was for use at Jack in the Box restaurants, utilizing the pre-existing "JackCa\$h" prepaid program.

For the transit portion of the trial, riders tapped the mobile phones on top of the turnstiles. Their payments were automatically registered and debited from their BART fare accounts. Data from the trial shows that participants took nearly 9,000 trips using the phones, representing an average of 50 trips per person over the four-month period of the trial. In addition, participants reloaded their BART accounts more than 800 times using the over-the-air feature in the phone, which equates to an average of five BART reloads per trial participant.¹⁷

At the conclusion of the trial period, 80 percent of the participants indicated that the mobile wallet application was easy to use. Evidence from the trial indicates the participants were highly satisfied with their phones.

The inclusion of Jack in the Box restaurants made for a unique aspect of the pilot program. The company placed "smart advertisement" posters in various BART stations. A rider with one of the specially equipped Sprint phones could tap the poster and get directions to the nearest Jack in the Box restaurant. Once in the restaurant, the consumer could use his phone to purchase food and pay for it via the JackCa\$h account.

This part of the trial validated two important concepts: One, that marketing and commerce involving retailers beyond the transit authority can benefit from open payment system contactless mobile applications, and two, that a phone with a single NFC chip can support payments from multiple accounts.

Both of these elements are vitally important to bring about widespread consumer acceptance of mobile commerce. In a chicken-and-egg scenario, consumers are likely to adopt mobile commerce if they can use the payment method in many convenient places and with many merchants. At the same time, merchants might consider accepting mobile payments only if they are assured of a critical mass of customers using the technology.

New Partnerships Are Needed to Put It All Together

In order to make contactless open standards-based payments work in a transit environment, new partnerships are needed to bring together diverse services and expertise. The BART pilot program required the collaboration of nearly a dozen companies—many of which were working together for the first time.

In addition to the transit authorities themselves, here are some of the companies considered important in wide-scale implementations of mobile commerce applications for the transit industry:

- **Systems integrators and fare systems providers** – The companies that currently provide transit fare solutions are important partners for their extensive knowledge on how such systems need to function. Their expertise is invaluable, especially as agencies may need to run the legacy system in parallel with a new system for a few years until a majority of riders adopt the new system. Integrators still play a key role in the design of the AFC system, managing fare tables and managing risk of system.
- **Telecommunication firms** – In a mobile scenario, carriers have an important role to play in mobile commerce, since all account information and text-based marketing must pass over the carrier network. In addition, customers are likely to get their NFC-equipped mobile phones from their carrier.
- **Technology firms** – New infrastructure depends on new and advanced technology. For example, a range of NFC-enabled devices and NFC software is needed for broad deployment of contactless payments.
- **Transaction processing** – An infrastructure provider such as First Data is required to provide secure and reliable mobile commerce transaction processing.
- **Financial institutions** – Credit card companies, banks and other financial services providers are needed to enable riders to register their payment information and to facilitate funding of the stored-value reload directly over the mobile network.
- **Consulting firms** – Strategy and technology consultants are needed to provide the business case analysis and project management support.
- **Merchants and retailers** – To overcome the chicken-and-egg syndrome, a critical mass of merchant and retailer deployment of contactless solutions is needed to encourage consumers to use such solutions. Once consumers are comfortable with these types of applications, they might be more likely to want and expect them at the rail, bus and train stations.

The challenges of developing new transit payment systems are complex and require the specialized expertise of various kinds of companies. Nevertheless, everyone involved in this type of mobile commerce infrastructure stands to gain from the successful and broad deployment of integrated mobile account management, payments and marketing. Above all, the potential for new revenue sources can bring these partners to the table, where it is likely to be necessary to develop new fee assessment and revenue-sharing agreements.

Conclusions

Now is the time for transit authorities to consider their options. Clearly, the time for proprietary systems has passed. Sitting on the sidelines and maintaining the status quo mean lost opportunities and ever-increasing expenses to maintain complex systems and equipment.

Open bankcard payment standards using existing payment systems hold the promises of lower costs, new revenue sources, added customer convenience and better integration of multimodal systems. In addition, payment trends point to customer acceptance of (and expectations for) open bankcard payments.

Still, there are challenges ahead. Mobile commerce is in its infancy; widespread deployment requires cooperation from many parties with differing interests. But there are bridge technologies and systems that can be deployed today to set transit authorities on the path to more convenient, less expensive fare payment transactions.

We encourage you to learn more about what's possible with open bankcard payment systems and mobile commerce by reading the following white papers:

- Mobile Commerce Goes Live, First Data Corporation, February 2009,
http://www.firstdata.com/downloads/thought-leadership/fd_mobilecommercelive_successstory.pdf
- The Risks and Opportunities in a Mobile Commerce Economy, First Data Corporation, 2008,
http://www.firstdata.com/downloads/thought-leadership/fd_mobilecommerceoverview_whitepaper.pdf
- The Electronification of Transit Fare Payments: A Look at the Southeastern Pennsylvania Transportation Authority's New Payment Technologies Project, Federal Reserve Bank of Philadelphia, April 2009,
<http://www.philadelphiafed.org/payment-cards-center/publications/discussion-papers/2009/D2009AprilSEPTA.pdf>
- Transit and Contactless Financial Payments: New Opportunities for Collaboration and Convergence, Smart Card Alliance Transportation Council, October 2006,
<http://www.smartcardalliance.org/pages/activities-councils-transportation>
- Co-Branded Multi-Application Contactless Cards for Transit and Financial Payment, Smart Card Alliance Transportation Council, March 2008,
<http://www.smartcardalliance.org/pages/activities-councils-transportation>

As growing ridership and massive investment come on board, billions are riding on the future of public transportation. And with our leading payment innovations, First Data can help you drive its growth and deliver more value to your community—and your bottom line. From open payments and contactless cards to a significant investment in advancing mobile commerce technology, our solutions can help you add convenience, cut expenditures and enhance the entire transportation experience. To request additional information about First Data's transit solutions, please write to govinfo@firstdata.com.

Sources

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- ² Dan Balaban, "Open-Loop Transit Payment Starts to Pick Up Speed," *Card&Payments* magazine, January 2009.
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- ⁵ Arlene Hauben, "Prepaid Debit Card Trend: What's Driving Their Success?," the Prepaid Press, February 16, 2009.
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- ⁸ Michael Laezza, "Contactless payment acceptance and fare standards lead to transit smart card growth in 2006," *ContactlessNews*, December 14, 2005.
- ⁹ Daniel Wolfe, "MasterCard: Contactless Fares Well in Transit," *American Banker*, August 1, 2008.
- ¹⁰ Smart Card Alliance, "Contactless transit uptake paves way for mass-market NFC mobile payments," March 18, 2008.
- ¹¹ Daniel Wolfe, "MasterCard: Contactless Fares Well in Transit," *American Banker*, August 1, 2008.
- ¹² UTA press release, "UTA Wins APTA Innovation Award for Electronic Fare System," October 7, 2009.
- ¹³ "Utah Transit Authority Showcases Open Payment System for Transit," *Payments News*, February 2009.
- ¹⁴ Press release, "APTA 2009 Innovation Award Recognises Vix ERG's New eO EFC System," Vix ERG Group, October 6, 2009.
- ¹⁵ Ibid.
- ¹⁶ Karen Epper Hoffman, "Electronic Payments Aim for Critical Mass in Transit," *Digital Transactions*, May 2009, p. 18.
- ¹⁷ A First Data Case Study, "Mobile Commerce Goes Live," February 2009, http://www.firstdata.com/about/thought_leadership/whitepapers/WP_Mobile_Live.pdf.



The Global Leader in Electronic Commerce

First Data powers the global economy by making it easy, fast and secure for people and businesses around the world to buy goods and services using virtually any form of payment. Serving millions of merchant locations and thousands of card issuers, we have the expertise and insight to help you accelerate your business. Put our intelligence to work for you.

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