Open Payment for Regional Public Transportation Travel

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Prepared for The Rudin Center, New York University
Leveraging Technology for Transportation
June 16, 2010

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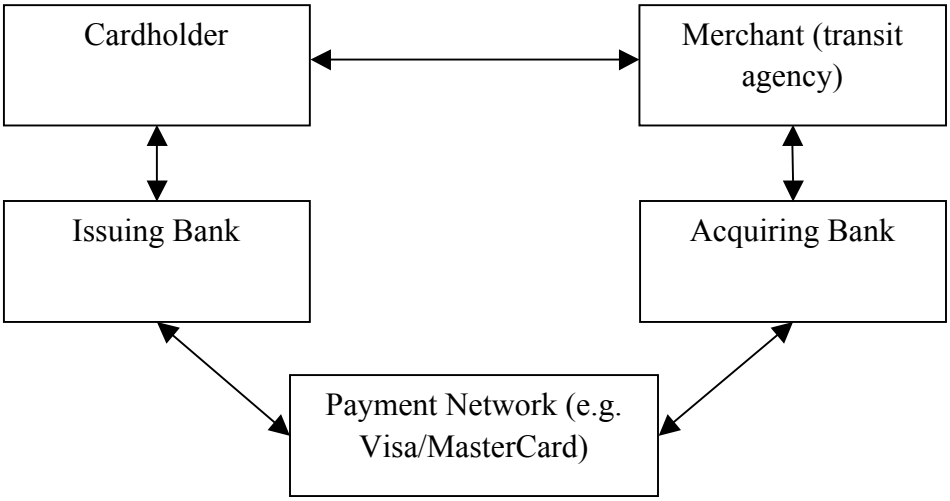
1. Overview of open payments

1.1 Open payment systems

In open payment systems, contactless bank cards issued by banks and processed by bank card networks are accepted by transit agencies at gates and fare boxes as the primary fare payment medium. The system uses standard merchant readers, and merchant acquirers/banks, card networks, and the issuing banks process fare transactions. This is a five-party system:

- The cardholder uses his or her credit, debit or prepaid card at a gate or fare box
- The transit agency's acquirer captures the transaction.
    - Either the agency or its acquirer performs transit-specific processing to handle passes, prepaid value, aggregation, transfers and other features
- The bank card network carries the transaction from the agency's acquirer to the bank that issued the passenger's card
- The issuing bank bills the consumer and is responsible for many types of fraud and most non-payment.
- The transit agency receives payment via a settlement process. The merchant (transit agency) is financially liable for some types of fraud.



The use of contactless bank cards for direct payment of transit fares differs from transit smart card practice in two significant ways. First, no value or passes are stored on the bank card. The card is used only as an identifier that ties the passenger to a payment account stored on a server. Second, the transaction to open a gate or accept payment at a fare box is authorized by a server connected to the gate or fare box via a data network. The open payment option requires a high-availability, high-performance network and server to process transactions. Bus transactions are processed online, as broadband wireless network costs and performance appear to be acceptable.

Open payment systems are based on open standards, commodity products such as contactless bank cards and readers, and payment industry services provided to retail merchants and other industries outside transportation. Adoption of an open payment framework will fundamentally reshape the way passengers pay for public transportation services. In a number of cities in the U.S. and around the world, public transit authorities are moving in this direction.

Contactless bank card technology is relatively mature, but has yet to become ubiquitous among merchants and consumers. It relies on banking standards, unlike transit smart card technology, though some variation exists in different countries and banking networks. (The U.S. is nearly alone in not adopting the Europay-MasterCard-Visa, or EMV, standard, for example.) In an open system, the payments industry would primarily manage fare payment, possibly including nontraditional participants such as PayPal, cell carriers, or even Facebook.

1.2 Open payment in public transportation

An open payment approach satisfies the major requirements of a transit fare payment system:

- Fare policy flexibility. Fare logic resides on servers, enabling a virtually unlimited number of fare policies
- Fare model. The fare model is an account-based, online model that enables pre-paid (pass) and post-paid (pay as you go) products. It enables Web purchase and other self-service channels.
- Regional interoperability. A common card allows interoperability and does not require (but allows) coordination between transit agencies.
- Modal interoperability. Contactless cards at gates and fare boxes are proven technology; Several options for open payments in un-gated regional rail systems are being explored.

- Future-proofing. By using mainstream payment technology, transit agencies benefit from new services and technologies such as NFC phones and lower-cost providers (PayPal, other online services) without the need for customization for transit.
- Broad availability of contactless media. Banks have issued a substantial number of contactless cards and indicate they plan to issue more as transit accepts open payment.
- Core technology. Servers, wireless data networks and fiber optic networks are proven technology, used as core components in open payments by banks, card networks and merchants.
- Performance. Card or phone transactions can be completed in 600 milliseconds or less at gates and fare boxes.
- Security. Payment card industry data security standards (PCI/DA DSS) are followed.
- Equity. Prepaid card options are evolving rapidly to serve riders without bank cards. Transit agencies may choose between closed loop (but open standard) and open loop cards. Government benefit cards are also possible payment media.
- Customer experience. Existing holders of bank cards and younger riders are likely to be early, enthusiastic adopters. Older riders and people without bank cards will be served well but are expected to use fewer innovative features of the open payment system.

What enables the bank card's fare policy flexibility is the fact that its fare logic is stored on a server rather than on the card or card reader. This approach also makes bank card acceptance across many agencies easier, since cards and readers are standard and all fare logic is on a server, not on a card or reader. Future trends will likely make the bank card option more favorable over time, since it uses commodity server and network technology whose costs are decreasing. By relying on the payments industry to issue cards which can be used to pay transit fares, a transit agency can also realize savings from avoiding the costs to produce, distribute, and track its own smart card or other fare media. However consumers have not demanded contactless bank cards and, while their ultimate adoption is highly likely, a period of years may be required for them to be widely accepted. A transit agency will need to issue its own contactless cards, probably in large numbers at the start of open payments adoption, lessening over time.

2. Customer experience: regional travel with open payments

2.1 Scenario

Jane in New Jersey decides to visit a restaurant in Brooklyn on a Friday evening. She checks Google Maps or a similar service to find the expected travel time by auto and by transit and decides that transit will be quicker. She also knows that transit will be less expensive and, with

regional fare payment, she knows she will have no difficulty paying her fares or deciding which fare products to buy.

She parks at an NJT rail station, paying for parking with her contactless credit card. She walks onto the station platform and taps a validator with her credit card. The validator indicates her boarding station, necessary since NJT rail has distance-based fares. She rides to Hoboken and taps a validator on the station platform when she exits the NJT train and taps at the PATH gate to enter that system. (If she forgot to tap on the station platform, PATH and NJT share tap data and her entry tap on PATH fills in as the exit tap for NJT.)

She exits PATH at 33rd St and enters the NYCT subway system by tapping her credit card, and she rides to her final destination. She does not need to be aware that she is riding three different transit systems with three different fare policies. Of course, she is aware that she is changing modes.

If Jane is taking an out-of-town guest with her, she can use her own card or phone to pay two fares. Alternatively her guest can use his or her contactless card or phone, even if he or she has never used public transit in New York before.

On her return trip to New Jersey, Jane taps at the NYCT subway gate, the PATH gate, the NJT validator at Hoboken Station and at her destination. Finally she can tap to exit the parking lot if the lot charges time-based fees.

She receives her credit card bill at the end of the month, which shows three transactions, for NJT, PATH and NYCT, each covering two trips, and a fourth transaction for parking. NJT, PATH and NYCT each receive payment via their merchant bank overnight for Jane's travel.

In future years, as the regional fare system evolves, the open payment approach can provide additional value and convenience:

- The restaurant, which validates parking at a nearby garage, also validates transit fares. Jane uses the same credit card to pay the restaurant bill, and one part of the transaction is a $2 credit toward her transit trip. The credit appears that evening on her online credit card summary, along with the restaurant and transit charges.
- NJT, PATH and the MTA implement a fare policy that gives a 25 cent discount on the second and third legs of a trip when using services from more than one agency. This policy gives Jane another $1 credit, which also appears on her online summary.
- If Jane is a frequent transit user who doesn't travel enough to buy a monthly pass , she obtains reward points from the credit card issuer as part of its New York region frequent traveler program. She gets more points when she travels off-peak, which is the case for this trip.

- If Jane registered her origin and destination with the regional Web site via her mobile phone, NJT holds her outbound train at Hoboken if PATH is running a few minutes late. This saves Jane and her friend (an probably some other passengers) a long wait for the next late evening departure to her destination. Hold strategies are often not justified since the transit operator doesn't know if any passengers are actually transferring, but open payment allows easier integration of fare and service control.
- Jane will be able to use her payment-enabled mobile phone instead of a contactless card as the payments industry implements this option. This development allows Jane to use the same account and payment management applications on her mobile phone for transit as for all her other purchases.

If Jane doesn't use transit for a period of time, one of the agencies can send her a marketing email, inviting her back to transit and offering a 50 percent discount on her next two trips. This type of targeted marketing will help regional agencies build ridership.

2.2 Customer interactions with transit agencies, payment industry

In open payments, customers interact with a merchant by purchasing goods and services and with the payment industry by managing their account. With a transit-only card, the transit agency provides part of the account management function, while the payment industry also provides part if the transit product was bought with a credit or debit card. Open payments will change customer interactions.

2.2.1 Purchase options

In open payment, transit riders use bank-issued credit, debit and prepaid cards, or agency-issued cards, directly at gates and bus fare boxes. Open payment supports the following alternatives for purchasing travel:

- Individual trips can be taken without preregistration or purchasing a ticket before entering the system. The user taps his or her card on a contactless reader and is charged a single-trip fare. The transaction is a standard merchant transaction.

- Single- or multi-trip travel can be purchased online, via a call center, ticket vending machine or using a mobile phone before use to obtain a discount in the per-trip price and possibly other benefits such as free or reduced fare transfers. The agency can select the fare policy rules and discounts.

- Passes can be purchased online, via a call center, ticket vending machine, or using a mobile phone.

The transit agencies are “just a merchant” with open payments. Riders purchase transit in the same way they purchase other goods and services.

2.2.2 Purchase by riders without credit or debit cards

Agencies will also need to issue an MTA Card or PATH Card or NJT Card, for example, to un-banked or under-banked users. The agency-issued card meets bankcard standards and is reloadable with cash at retail reload locations and possibly bank ATM machines. An agency-issued card can be used on any other agency’s services in the New York area. Metro area agencies could issue a single “Tri-state Transit Card”; it would have high volume and visibility, and would probably have lower costs than individual agency cards. The retail distribution and reload network will use merchants’ existing point of sales terminals for reload; cards can be on J-hooks along with prepaid cards, phone cards, and others.

Credit and debit bank card penetration in the New York region is about 85 percent. Therefore, at least 15 percent of New York transit riders would require an alternative agency- or payment industry-issued medium in the long run. As many as 50 percent may use the agency-issued card initially.

Based on focus group surveys in other cities, riders using the agency-issued card are expected to want a familiar fare medium that operates as closely as possible to current magnetic stripe or paper media. They are likely to want a clear, understandable customer experience that requires little change from today’s experience. (Riders with contactless credit and debit cards are likely to use new features, such as mobile account management; many will be “early adopters”.)

2.2.3 Account management

Riders pay for transit on their monthly credit card bill, via debit transactions that they track in the same way as other spending, or via cash reloads on their agency-issued or general purpose prepaid card. If an account problem occurs, riders will have to understand whether to contact the transit agency or the bank that issued the card. Evidence from pilots and focus groups suggests that riders generally apply the same principles as in other transactions: if the problem is with the goods or services, customers contact the merchant; if the problem is with the billing or the card, they contact the bank. Problems are handled through mainstream dispute resolution, refund and other customer service processes.

3. Interoperable payment media (cards and phones)

3.1 Payment means

Many credit and debit card customers in the New York region already have contactless credit or debit cards. Banks have issued over 10 million such cards in the region and are likely to issue more if transit agencies move to open payments. Transit payment would be a daily use of a card, which would create a "top of wallet" effect, meaning that riders are more likely to use that card for other purchases. Issuing contactless cards would also help banks retain or increase their market share.

3.2 Agency-issued cards: open versus closed loop

In early stages of open payment, a substantial number of riders will use agency-issued cards. Agencies have two primary issuance options and may also accept government/employee IDs:

1. Closed Loop Prepaid Cards: Closed loop cards can only be used at a single merchant or chain of retailers. Closed loop cards (often called gift cards) have traditionally targeted larger value transactions such as department store purchases, although merchants with low value transactions, such as Starbucks, now also issue them.
2. Open Loop Prepaid Cards**:** Open loop cards are also known as network branded prepaid cards or general purpose prepaid cards and carry the label of a card network, such as Visa or MasterCard. They are accepted at retailers that accept credit payments and can generally be used to withdraw cash from ATMs. Open loop cards are used by consumer groups that cannot or will not use a traditional prepaid card, such as the unbanked or teenagers. Some examples of general purpose reloadable cards include Green Dot MasterCard and Visa ReadyLink.
3. Government and Employee Cards**:** Prepaid cards for government benefits programs are issued instead of mailing checks. For example, the Direct Express Card is used for social security payments for recipients without bank accounts, and many states issue similar cards. The Federal government is also issuing Personal Identity Verification (PIV) cards that are bankcard standards-based and may be used for transit benefits. PIV cards are issued to Federal employees and contractors, and the standard is available to state and local governments. Bankcard standard university and employee IDs may be accepted by transit agencies as well. PIV and other ID cards could be accepted for prepaid transit products. The employer would transmit the list of IDs and funds to the agency at the start of each month.

A closed loop card could be issued on behalf of the agency by a payment industry partner; the agency would bear the costs of card issuance, management, reload, transactions, account management, and risk management. This "white label" card would use the same readers, network and processing as other payment cards. The transit agency would benefit from lower

costs and a degree of competition in procuring these services. Closed loop cards do not require registration to identify the user.

An open loop card could also be issued on behalf of the agency by a payment industry partner; the agency and partner would typically share the costs but would also share the revenues from off-transit system use of the card at general merchants. The transit agency would be the issuer, which is the party that typically retains the large fraction of revenue: perhaps 2 percent interchange on transactions, plus issuance and other fees. However, the partner would take a substantial fraction, perhaps half, of the issuer revenue in exchange for its management services, including risk management. If the agency issued card was widely used, the agency might earn significant revenues to offset agency-issued card costs. Open loop prepaid cards carry some reputational risk for an agency because they are associated with high fees. Substantial care is required in negotiating an open loop card. Los Angeles MTA has issued an open loop card, as an example.

Reloadable open loop cards require registration, which limits their usability for transit systems that must serve a diverse population, not all of whom can meet identity requirements. However Visa has proposed an open loop card that is reloadable up to a limit of $1000, does not require registration, must be co-branded with a transit agency, and does not allow cash withdrawals. This card is potentially viable for transit use. Visa charges a very low reload fee; merchants set their reload fee for customers. The merchant fee currently ranges from $2 to $5, but it is likely that merchants reloading transit cards will accept lower fees.

Closed and open loop cards require a reload network where customers may use cash to load value into their open payment accounts. Reload at merchants such as pharmacies, gas stations and convenience stores via existing point-of-sales terminals is the most likely means because it provides a fairly large network of reload points, though at a cost. Envelope-less ATM machines at bank branches or rail stations are another potential option. Users could “deposit” cash, which is scanned in real time and placed into their card account for immediate use.

Acceptance of government and employer ID cards, especially for pass purchases and transit benefits, offers the potential to sharply reduce payment industry fees by obtaining electronic funds transfers directly from governments and employers. It also offers the potential to reduce agency-issued card costs and associated eligibility determination processes.

3.2 NFC phones

Another possible medium is Near Field Communication (NFC) payment-enabled phones. The mobile phone penetration rate in the New York region is over 100 percent, and smart phone penetration is rising rapidly (about one-third of cell phones are smart phones in the U.S.). This statistic suggests that the penetration for NFC phones, when they become broadly available— likely in 2012— may develop quickly, since phones with data capabilities are likely to have NFC also. (The average life of a cell phone in the U.S. is about 18 months.) Mobile network operators, handset manufacturers, SIM manufacturers, trusted system managers, various payments industry players, and others are debating the share of revenues received from NFC

payment. This debate is the principal factor slowing down introduction of phone-based payment.

One NFC option may be deployable and usable quickly in New York once NFC handsets are available: an NFC handset can send its hardware identifier securely to the gate or fare box reader. No payment application is involved; the phone is used strictly as an identifier.

A transit agency would have a database of registered phone users and would be able to associate the trip taken with the correct registered user. The user would provide a payment means, such as bank account, credit, debit, prepaid, ACH or agency card, when registering.. Because transit agencies have a large, stable user base, a registration option for NFC phone use may be viable.

Phone payment is expected to be a major consumer convenience for many purchases, and it offers some unique potential benefits for payment of distance-based fares on regional rail, described below.

The figures below show an NFC phone and its use at a contactless card reader.

NFC phone

NFC use at a contactless reader

4. Regional payment processing

4.1 Loosely coupled fare policies (rewards, loyalty, post-processed discounts)

Early in the use of open payments, agencies are likely to have separate fare policies and tariffs. Even without integration of fare policies across agencies, some forms of coordination can be adopted quickly:

Rewards or loyalty programs. Agencies can cooperate on a "New York region" rewards program that awards points for travel on any of the participating agencies. Additional points can be given to customers using multiple agencies as a partial offset to the lack of integrated fares. Card issuers may fund a fraction of these rewards benefits.

Post-processed discounts. Discounts can be applied by the acquirer to create a limited level of fare integration for inter-agency trips. As an example, the rewards program could apply a maximum daily cap on single ride fares across agencies. The cap could initially be applied only to flat fare services such as subway, PATH, and local bus routes. If this pilot were successful, the approach could be extended to regional rail routes, where the capping rules would be more complex due to distance and time-based fares. It could also be extended to weekly or other time periods. The rewards program manager would perform the calculations using trip data from all the agencies for registered users. The agencies would need to agree on revenue

apportionment in these options, but this cooperation may be more easily achieved than a fully integrated fare policy.

4.2 Integrated fare policies

Because they store no data on the card and contain no fares logic on the reader, open payment systems provide essentially limitless flexibility in fare policy. Possible fare policies include pre-purchased fares at a discount across agencies (including automatic top-up), period passes of any length, free or reduced fare transfers between modes or agencies, reduced fare tickets, time-of-day pricing, associated services such as parking, and best value calculations (that guarantee that the sum of single tickets will not exceed a one-day or one-week cap, typically the pass price). These policies can be implemented across agencies. The changes required are:

- Fare policies and associated fare calculations must be established and programmed in the servers. The technical aspect of this is straightforward.
- Revenue allocation mechanisms to determine the amount of revenue each agency receives from joint fares must be established. Reaching this agreement is often a difficult step.
- These shares are then programmed into the settlement process. The programming is straightforward.
- Marketing, consumer and staff information must be created to explain the new fare policies.

Open payment can support fare policies that other options cannot, especially marketing initiatives that are commonly employed in other industries, including:

- Route- and time-specific fares, as promotions

- Introductory fares for customer acquisition. Having promotions such as 'first month 50 percent off' is feasible, since they can be tied to the user's bank card (and cannot be transferred to another user) and there is no card issuance cost.

- Price caps, regional fares and other fare policies that involve multiple modes and agencies and multiple trips, for which the fare logic could exceed the capacity of cards and readers in traditional transit fare systems.

- Validated transit fares. These are analogous to validated parking, where a merchant pays the transit fare if the same bank card is presented that was used to purchase merchandise. These can cover, completely or partially, the cost of a one-way fare or can be applied as a credit if a passenger has a pass.

- Frequent traveler or reward plans that provide discounts based on the frequency or total value of use. These plans can be especially attractive for long-term transit riders who travel less than 5 days per week and who are not well served by existing pass products.

- Joint promotions with events, where the transit ride is free or reduced price if the same bank card is presented that was used to purchase the ticket.

- Commuter rail pricing on a per-train basis, similar to airline yield management. This concept is radical but feasible with the flexibility of server-based transactions. It is discussed in more detail below.

All of these options can be implemented on a single- or multi-agency basis. Coordinated fare policies and marketing across the region may increase the effectiveness of these measures.

5. Station and vehicle operations in regional payment

This section briefly highlights novel options for using open payments for subway, bus and rail services in the region.

5.1 Rail station services and ticket machines

Because banks will, in the long term, issue the majority of the cards in an open payment system, the number of ticket vending machines in stations can be reduced. Envelope-less ATM machines that accept cash and reload card accounts for ticket vending machines may be used to serve the remaining demand by riders without credit or debit cards. This approach may turn a cost item into a revenue item or reduce the cost of ticket vending at rail stations. Fewer ticket machines reduces station queuing.

5.2 Bus services

Buses must have broadband wireless connections to use open payments effectively in North America. Typical commercial wireless service costs of about $40 per month per bus appear affordable in the context of fare collection. The wireless modem and fare reader can also be used to provide bus location information, since GPS units are commonly included in commercial wireless modems. This location information also provides detailed data on passenger trip origins on bus routes.

5.3 Regional rail services

Two broad options are available for accepting contactless cards or NFC phones in an open payment system on regional or commuter rail services:

- Gates and validators at stations. In the most common configuration, gates are placed at major terminals and validators at suburban stations. Since the large majority of riders use one of the major terminals, the gates provide a high degree of revenue control. Riders who do not validate on the suburban platform are charged a maximum or penalty fare. Intermediate riders must be inspected on board, either targeting 100 percent inspection or using a proof-of-payment system.
- Onboard self-validation by riders. This new possibility is based on NFC phones.
    - The railroad installs passive RFID tags on each seat in every car. The tags are inexpensive (50 cents); they require no power or communications. They can be placed in a holder attached to a seat back that also shows the seat number.
    - A rider, upon boarding, taps his or her NFC phone on the seat tag. The phone has an application to send the NFC phone ID and the RFID tag number to the server. The tag number is associated with the seat number and car number in the server database. The phone is associated with the payment card and pass product bought.
    - Single trip riders would enter their origin and destination zones in an application on their NFC smart phone before tapping. If they have a GPS phone, it can display their current zone and zones for every station. If a rider does not have an NFC phone, he or she can continue to use a flash pass or other current media, or he or she can Short Message Service (SMS) text the car and seat number to a railroad 800 number to self-validate.
    - Conductors will have an application on a mobile device that displays validated seats on each car. He or she only checks seats that have not self-validated. This approach reduces the checking load, which otherwise might increase since checking electronic media takes longer than flash passes, for example.
    - This option avoids capital investment in validators and gates.
    - Since validation is per train, train-specific fares can be charged. Services such as reserved seats can be provided, possibly for a premium fare. A user reserves a seat online for a single trip or for the duration of a pass, or changes the reservation to a different train if needed.

5.4 Intercity rail and other services

Amtrak and intercity bus operators could accept the same ticket media as urban operators, either by having staff use a handheld device to check or validate electronic tickets bought on a contactless card, or by the rider using his or her mobile phone to display the ticket, possibly with a bar code or via NFC (an existing electronic receipt standard in NFC could potentially be used). The ticket purchase and collection methods used by intercity operators are different

from those used for public transit, but the same media can be used, allowing for future interoperability and joint fares.

6. Costs

6.1 Contactless credit, debit and prepaid cards

Card transactions issued by the payments industry require authorization by a payments industry server. The payments industry provides the majority of the back office functions, as it does to all merchants. These costs are borne by the interchange and other fees collected by the industry.

Transit agencies currently have extensive interactions with the payments industry, since bank cards are accepted for purchase of transit and commuter rail tickets. Audit and other financial control processes are in place to manage these financial arrangements. In the Lexington Line fare pilot, NYCT found that the back office needed to support purchases of MetroCards with credit and debit payments at vending machines was virtually the same needed for an open payment solution.

Credit and debit cards are used already for half or more of transit purchases in many agencies, and the percentage is increasing over time. Transit agencies are already paying significant fees to the payments industry. By adopting open payments and eliminating a second level of media issuance, enhanced transaction processing, improved customer service, and meaningful cost savings appear possible.

A major area of potential cost savings is in the acceptance of government, employer and university ID cards for transit use. Washington and Boston receive over 50 percent of pass revenue through funds transfers from employers at very low cost. Region-wide acceptance of ID cards would make this option even more attractive because it would lower processing fees significantly and avoid card issuance and management costs.

6.2 Agency issued closed and open loop contactless cards

Controlling the cost of agency-issued cards will require careful attention to several items:

- Card churn. A fee or deposit is likely to be required so that riders retain the card for as long a period as possible, preferably one or two years. NFC phones, when available, can emulate bank cards, including the agency-issued card, to lower card issuance costs.
- Reload fees. Setting the reload amount to the highest value that is reasonable for the lower income users most likely to use the agency card will lower reload fees. Agencies

will almost certainly absorb reload fees for closed loop cards and for transit use of open loop cards. These fees range from $2-$5 at a merchant currently; they will almost certainly be lower for transit use but may well be in the $1-$2 range. A $10 or higher minimum reload amount may be needed to control these costs. Incentives to riders to use their own bank cards, government-issued benefits cards, or to use rail station machines can reduce the use of the reload network. Bonuses or discounts can be limited with reloads, to the extent consistent with equity.

- Account management. Automating customer service so that account balance inquiries and other routine questions are answered online, or via IVR or email or text messages, is important to limit costs.
- Off-system revenues. Open loop card issuance may gain revenues from off-transit system use to offset card costs.

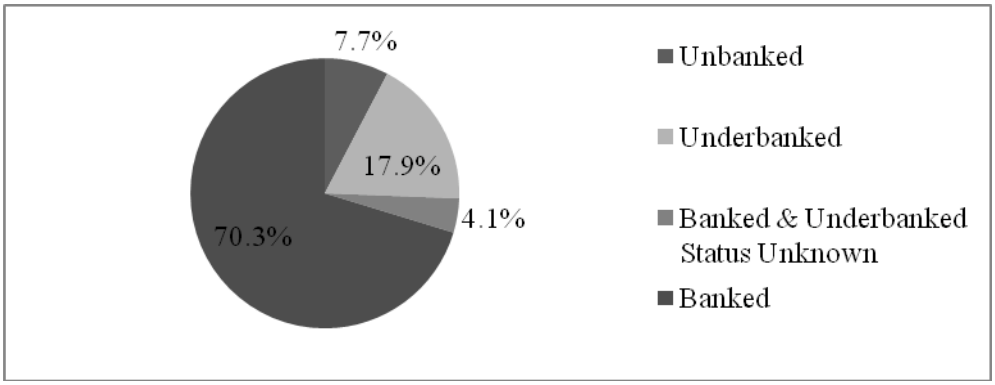
6.3 NFC phones

Merchants state that they will not pay a premium for NFC payments, but the NFC industry may still be hoping that consumers will force merchants to accept NFC payments at a higher payment fee because consumers will find NFC so convenient (and merchants will get some lift in spending). Transit has an opportunity to use NFC without additional fees due to its large base of repeat customers, by using the phone just as an identifier for registered customers. Transit will be in the same situation as other merchants with respect to broader acceptance of NFC in the future, and there may be some cost risk.

7. Equity issues

Equity issues focus on the impacts of using prepaid or agency-issued cards on their users, who are likely to be unbanked or under-banked individuals:

- Unbanked**:** Individuals who do not have a basic checking account, savings account, or other type of transactional account at a bank or credit union.
- Underbanked: Individuals who have a basic checking or savings account but do not have other common financial instruments such as credit or debit cards.



Banking Status of US Households (FDIC 2009)

The following types of households are more likely to be unbanked:

- Minorities: Black, Hispanic, or American Indian/Alaskan households;
- Noncitizens: Those where a householder is a foreign-born noncitizen;
- Language: Households where Spanish is the only language spoken at home;
- Single: Unmarried female or male households;
- Lower Incomes: Those with an annual income less than $30,000;
- Lower Education: Those holding less than a high school degree;
- Lower Ages: Those under age 45;

To meet equity goals, agencies will need to issue these customers an agency-issued or prepaid card reloadable with cash at a sufficient number of reload and distribution points with no transaction or other fees. The same fare and pass products must be available on these cards as on credit or debit cards, perhaps with exceptions such as rewards programs or online promotions. As noted above, the use of government issued benefits contactless cards would be an effective policy.

8. Security and privacy

Agencies adopting open payment are subject to Payment Card Industry (PCI) Data Security Standards (DSS). This evolving standard is used by the entire payments industry and supported by a broad group of vendors and service providers. Measures to ensure physical, network, data, process and application security are required. These security measures appear appropriate for transit agencies and are essentially required today for agencies that accept bank cards at ticket machines or online. Direct acceptance of cards at gates and fare boxes requires those pieces of equipment to be PCI DSS compliant. Compliance is common practice since this equipment is similar to merchant point-of-sales devices unattended merchant terminals.

Agencies have already adopted privacy standards. While these standards should be reviewed, the move to open payments does not appear to create substantial new privacy issues. More users will be using registered media to pay fares in open payments and more trip detail will be available, but these privacy issues exist now.

9. Benefits to customers, agencies, region

The table below briefly summarizes the potential benefits of open payments to customers, agencies and the region. These benefits are increased through the "network effect" when open payment is adopted by multiple transit agencies and intercity operators in a region. The same benefits that customers receive within a single agency would then be available for multi-agency trips. Likewise, agency benefits also increase with adoption by multiple agencies: A single agency-issued card can be accepted at all agencies, reload networks can be shared, etc.

Benefits of open payment		
Transit Riders	**Transit Agencies**	**Region**
Bus travel time savings	Reduced card & ticket issuance	Network effect multiplier
Easy for visitors	Reduced retail commissions	Lower agency card issuance
Interoperable between	Reduced customer support	Shared reload network
One card & billing	More standardized equipment	Shared intercity payment
Reduced queuing in stations	Revenue uplift opportunities	Agency transfer points better
Additional card security	Co-branding & rewards program	Broader marketing options
	Positive public relations	

The key issues to be addressed in regional open payments are listed below. They include developing fare processing software to translate taps into merchant transactions, integration and test of components from multiple suppliers instead of a single turnkey vendor, choosing the means to collect distance based fares (primarily on railroad validators/gates or onboard), serving unbanked riders, and negotiating with the payments industry. Transit requires faster transaction speeds than other merchants, and it requires inspection/revenue protection devices, primarily on regional rail vehicles. Managing payment industry fees may involve negotiating a special set of fees and rules for public transportation to meet specific requirements.

Transit-specific differences in open payment systems	
Transaction speed	Distanced-based and zonal fares

Bus-based transactions	Revenue protection
Fare processing	Riders without contactless bank cards
Systems integration	Managing payment industry fees

10.Key issues in regional adoption

The key issues in assessing whether to adopt a regional system of open payments and, if adopted, the key decisions to be made include:

1. Policy: Agreement to adopt open payments among all or most agencies in the region is the central decision. This may be done for transit, highway tolls, or both.
2. Policy: If open payments are adopted, they can be implemented at different times and with different fare policies by each agency, as long as the media accepted are the same. Regional coordination in the introduction of open payments will improve utility to users, and harmonization of fare polices, even partially, may be an effective element in improving the customer experience and perhaps increasing usage.
3. Policy: Having a shared agency-issued card for unbanked users may provide benefits to riders and agencies. A decision on open versus closed loop cards must be made by each agency or perhaps across agencies.
4. Policy: Sharing payment services across agencies is possible. The shared EZ Pass customer service center is a model that can be considered. Shared marketing, a shared Web site and call center, and shared payment processing elements are part of the current MasterCard phase 2 fare pilot. Shared retail reload points are another possibility in the future. Agencies could opt out of shared arrangements when contracts were renewed.
5. Technical/policy: Development of regional/commuter rail fare collection systems based on electronic media. The issues are the same whether a proprietary smart card system or open payment system is used. The expected time for on-train staff to inspect electronic media is about double that for visual inspection. An increase in on-train staffing is almost certainly not acceptable, so rail operators must move either to proof-of-payment systems with random inspections, or to self-service validation by passengers, possibly using NFC phones. While open payments can be implemented across bus and gated rail environments initially, a truly regional system will include commuter/regional rail systems as well.
6. Technical: Verification that wireless connectivity is sufficiently good for bus transactions. This is not expected to be a significant issue, but feasibility must be assured.
7. Cost: The interchange and other fees charged by banks are a cost element that must be negotiated at the start of an open payments strategy; it may be possible to negotiate

these down. Substantial payment fees are already being paid by agencies, but these will increase in open payments; this should be offset by savings in no longer operating a transit-specific ticketing system. It may also be possible to accept employer and other ID cards for transit payment, further lowering payment fees. A coordinated approach to accepting ID cards would have greater benefits than individual agency efforts.

11.Summary

London and New York are implementing open payment systems, and Salt Lake City and Kaohsiung, Taiwan have already implemented them. Philadelphia, Chicago and Washington DC are strongly considering their use. While the use of open payments in transit is not an established practice, most open payment elements are the same in transit as they are for retail merchants. The list of challenges presented above is a list of the differences between transit and a standard merchant. As individual systems work through open payment implementation issues, they will, with little additional effort, be positioned to participate in a broader regional fare system. The cards, readers, transactions, communications, and payment industry components will be common across open payment systems. Users will see the same customer experience at all systems, though with existing variations in fare policy and collection means (gates, fare boxes, validators).

The use of open payment standards allows fare interoperability across a set of transit systems without requiring a single design or a single vendor. Each system can proceed on its own schedule and with its own fare policies and processes. Interoperability is provided primarily by acceptance of a common card or phone, with which customers pay for many other goods and services in a familiar process. The greater New York region, with a set of large and interconnected transit systems, may obtain substantial future benefits from adopting open payments across the region.