WELCOME

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Module 12

Electronic Fare Payment / Advanced Payment Systems: Open Payments Acceptance
Instructor

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Learning Objectives

Define the stakeholders, terminology, standards, specifications, and regulations associated with the acceptance of Open Payments

Explain the three main options for implementing Open Payments acceptance and their impacts on agency operations and systems

Analyze the benefits, risks, and costs of Open Payments acceptance in support of the procurement and implementation of an Open Payments acceptance solution
Learning Objective 1

Stakeholders, terminology, standards, specifications, and regulations
Understand the **roles** and **responsibilities** of the key stakeholders and their influence on Open Payment implementations
The term **Open Payments** refers to the acceptance of bank-issued, contactless bankcards:

- Debit,
- Credit, and
- Prepaid debit cards ("bankcards") for payment of fares at transit points of entry

Contactless bankcards may be:

- Traditional, credit card-sized pieces of plastic
- A mobile device that stores the card data (or an electronic token of that data) and transmits it via radio waves
Key Terms and Abbreviations

- Account-based System
- Authentication
- Authorization
- Chargeback
- Contactless Bankcard
- Electronic Fare Payment System (EFPS)
- Fare Capping
- Merchant Fees
- Mobile Payment
- Pay As You Go (PAYG)

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Card Networks

Roles and Responsibilities

- Create and promote global **brand recognition**
- Establish and enforce network **operating rules**
- Provide a **global network** for transaction routing
- Support and **promote** the use of payment-related standards and specifications
Roles and Responsibilities

- Cardholder acquisition and servicing
- Card branding and distribution
- Account management
- Card authentication
- Cardholder verification
- Payment authorization and settlement
- Fraud prevention and detection
- Chargeback processing
- Debt collection (for credit cards)

Examples
- Citibank
- Chase Bank
Acquirer

Roles and Responsibilities

- Payment **transaction processing** (“acquiring”) on behalf of merchants
- Facilitates authorization and settlement processing
- Acts as the **interface to the card networks**
- Processes chargebacks
- Accepts financial liability for the merchant
- **Enforces** Payment Card Industry Data Security Standard (“**PCI**”) compliance

Examples
- First Data Corporation
- TSYS
ISO
Independent Sales Organization

Roles and Responsibilities

- Provides team for **door-to-door sales** on behalf of an acquirer
- May provide added-value services such as enhanced reporting or custom software for point of sale (POS) terminals
- Assumes primary responsibility for merchant servicing

Examples

- North American Bancard LLC
- Harbortouch Payments LLC
Payment Gateway

Roles and Responsibilities

- Operates a **processing system** for bankcard payments
- Acts as an **intermediary** between the acquirer and the merchant
- Provides an **open interface** to its processing system to simplify and shorten the systems integration effort
- Primarily focuses on online (web-based) payments

Examples
- Authorize.Net
- PayPal
- SecurePay
Roles and Responsibilities

- Develops and operates a **mobile payment** system
- **Recruits issuers** and enables integration with their systems
- Offers a **mobile app** and/or **mobile wallet** to cardholders that enables use of the mobile payment system
- Facilitates virtual card account setup by cardholders
- Performs front end **cardholder identification** (e.g. biometrics)
- Provides front end card data security (e.g. tokenization)

**Examples**
- Apple (Apple Pay)
- Google (Android Pay)
System Integrator

Roles and Responsibilities

- Design, development, and installation of EFPS
- Establishes back end connection to Acquirer system
- Ensures that equipment and software are compliant with:
  - EMV specifications
  - Card network specifications
  - PCI DSS
  - Acquirer requirements
  - Agency requirements

Examples
- Cubic Transportation Systems, Inc.
- Xerox
Roles and Responsibilities

- “Merchant of Record”
- Accepts **financial liability** for chargebacks
- Ongoing compliance with:
  - EMV specifications
  - Card network specifications
  - PCI DSS
  - Acquirer requirements
- Disputing or accepting chargebacks

Examples
- Chicago Transit Authority (CTA)
- Utah Transit Authority (UTA)
Cardholder

Roles and Responsibilities

- Account ownership
- Card (or mobile device) ownership and usage
- Adherence to
  - Issuer rules
  - Agency fare policies
- Fare payments using card or mobile device
- Debt repayment (for credit cards)
Recognize the difference between standards, specifications and regulations and the importance of these documents in defining, procuring, implementing and maintaining an EFP system with Open Payments acceptance.
Standards

Definition

A document that defines processes, procedures, and/or technology for the common and repeated use of a system that has been established by consensus and approved by a recognized organization. International standards are formally approved and maintained by the International Standards Organization (ISO) and/or the International Electrotechnical Commission (IEC).

Key standards

- Payment Card Industry Data Security Standard (PCI DSS)
- ISO/IEC 14443
- ISO/IEC 8583
- ISO/IEC 18092
Specifications

Definition

A detailed description of the performance requirements, dimensions, materials, and interfaces for the development and/or use of a technology or process. Specifications are typically defined and maintained by the party that offers the technology or process and may be changed at any time.

Key specifications

- EMV (Europay, MasterCard, Visa)
- Visa payWave
- MasterCard PayPass
- American Express ExpressPay
- Discover ZIP
Scope of Impact
Payment Card Industry Data Security Standard (PCI DSS)

- Defines bankcard data security rules
- Adherence mandated for all merchants by card network rules
- Maintained by the PCI Security Council
ISO/IEC 14443

Contactless integrated circuit cards – Proximity cards

- Widely-adopted standard for short range communications between cards and readers
- Applies to physical and virtual cards
- Incorporated in all of the leading contactless bankcard specifications
ISO/IEC 8583

Financial transaction card originated messages, Interchange message specifications

- Defines the **format** and **content** of electronic bankcard transaction messages
ISO/IEC 18092

Information Technology, Telecommunications and Information Exchange between systems, Near Field Communication, Interface, and Protocol (NFCIP-1)

- Better known as near field communication (NFC)
- Defines methods to enable short-range communications – particularly between mobile phones and readers
- Uses ISO/IEC 14443 communication protocols
- See also: ISO/IEC 21481
EMV

Europay MasterCard, Visa Specifications

- Specifications for chip-based bankcards and merchant payment terminals and systems
- Widely-implemented in Europe, Asia, Latin America, and Canada
- Includes requirements for contact and contactless cards
- Nationwide adoption by U.S. initiated in 2011
Card Network Contactless Card Specifications

- Requirements for contactless bankcards, equipment and transactions
- Unique specification for each network
- Leading card network programs
  - Visa payWave
  - MasterCard PayPass
  - American Express ExpressPay
  - Discover ZIP
- May change with little advance notice
- Also applicable to mobile payments
Card Network Operating Rules

- Define rules for acceptance of cards and mobile payments linked to cards
- **Unique** rules for each network
- Updated semi-annually
- Not true specifications per se
In the U.S., various federal regulations impact acceptance of bankcard transactions. These include:

- **E** - Electronic Funds Transfer Act
- **II** - Debit Card Interchange Fees and Routing
- **V** - Fair and Accurate Credit Transactions Act
Regulation E

Electronic Fund Transfer Act

- **Protects** individual consumers engaging in electronic fund transfers
- Defines requirements for:
  - Receipts
  - Periodic statements
  - Procedures for resolving errors
- Creates definitions for “gift” and “reloadable” cards
- Establishes rules for:
  - Assessing fees
  - Expiration of funds
  - Cardholder disclosures
Debit Card Interchange Fees and Routing

- Embodiment of the “Durbin Amendment”
- **Limits** interchange **fees** to 0.5% of the payment amount plus $0.21 per transaction
- Allows $0.01 additional interchange for fraud-prevention
- Prohibits exclusive agreements for transaction routing and processing
- Exempts issuers with less than $10B in total assets
Regulation V

Fair and Accurate Transactions Act

- Requires the **truncation of card number** and prohibits the inclusion of card expiration dates on transaction receipts
Which of the following is **NOT** a key stakeholder for an EFPS that accepts Open Payments?

**Answer Choices**

a) Issuer  
b) Card Network  
c) POS Terminal Manufacturer  
d) Cardholder
Review of Answers

a) Issuer
   *Incorrect. The issuer provides cards and card accounts for use in an EFPS system that accepts open payments.*

b) Card Network
   *Incorrect. The card network provides a global platform that facilitates open payments.*

c) POS Terminal Manufacturer
   *Correct! Although the POS Terminal Manufacturer may make equipment for open payment processing, this equipment can be supplied by a variety of different providers.*

d) Cardholder
   *Incorrect. The Cardholders carry and use contactless bankcards in an EFPS that accepts open payments.*
Learning Objective 2

Options for Implementing Open Payments acceptance
Common Benefits

Eliminates need for passengers to:
- Obtain agency-issued fare media
- Buy fare product
- Understand fares or the details of the agency’s fare policy
- Carry exact change
- Register in advance
- Create an account
Common Benefits

Reduces agency need for:

- Fare media
- Fare product sales network
  - Ticket vending machines
  - Website
  - Mobile app
  - Retail stores
Common Benefits

Transfers responsibilities to card issuer

- Card distribution and statements
- Call center (for issues relating to fare payment)
- Dispute handling
- Account management
First tap risk

- Every card approved first time
- “Bad” cards identified later and added to negative list

Mitigation strategy:

- Realtime issuer authentication and authorization of card
- Likely to increase first tap transaction time to a few seconds
Shared Issues

Merchant fees

- 10% or more of fare

Mitigation strategy:

- Transaction aggregation

Note: May increase exposure to declined payments and fraud

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Shared Issues

Minimal security for offline payments

- **Offline approval** process **bypasses** card authentication and transaction authorization processes

**Mitigation strategy:**

- Implement real-time issuer authorization

*Note: Increased transaction time (2-5 seconds) may not be viable for busy systems*
Shared Issues

Lack of cardholder adoption
- Security concerns
- **Insufficient** contactless bankcard issuance
- Unbanked

*Mitigation strategy:*
- Agency-issued cards as part of an account-based system
Cost of compliance

- Different application for each network
- Specifications may change

**Mitigation strategy:**

- None. Such costs are unavoidable.
Shared Issues

Few systems in revenue service

- Most vendors \textit{lack experience}
- \textit{Limited choices} for certified equipment

\textit{Mitigation strategy:}
- None. Without further adoption, revenue service proven vendors and equipment choices will remain limited.
Shared Issues

Long certification queues

- Type certification required for each network
- Separate EMV certification also required
- Process begins after “final” system is in place
- Changes may trigger new certification

Mitigation strategy:

- Submit EMV and network certification applications as early as possible
Shared Issues

Title VI conflicts

- Passenger must qualify for bankcard
- Policies cannot favor Open Payment in price or convenience

Mitigation strategy:

- Ensure unbanked passengers have equally convenient and equally-priced options for fare payment
Pay as You Go

Open Payments accepted only as Pay As You Go (PAYG) fares

- **Concept:** Passenger pay fares with each tap of contactless bankcard
- **Fare Policy:** All transactions = full fare
- **Process:** Fare approved locally by reader, sent to acquirer in batches later
- **Options:**
  - Payment aggregation to reduce merchant fees
  - Agency/Bank cobranded prepaid debit card issued to unbanked passengers
# Pay as You Go

## Unique attributes for this method

<table>
<thead>
<tr>
<th></th>
<th>Agency</th>
<th>Passenger</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>+</strong></td>
<td>Less* complex platform</td>
<td>Possible increase in fare revenue</td>
</tr>
<tr>
<td></td>
<td>Maximum* merchant fees</td>
<td>Highest fare paid</td>
</tr>
</tbody>
</table>

* When compared to other Open Payment methods

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*50*
PAYG with Fare Capping

Open Payments accepted as PAYG fares with fare capping

- **Core Concept:** Passengers pay fares with each tap of bankcard but **total is capped** at daily, weekly, and/or monthly amounts
- **Fare Policy:** Passengers always pay “**fairest fare**”
- **Process:** Fare approved locally by reader, amounts calculated by central system and sent to Acquirer later
- **Options:**
  - ✓ Same as PAYG
PAYG with Fare Capping

Unique attributes for this method

<table>
<thead>
<tr>
<th>Agency</th>
<th>Passenger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower merchant fees</td>
<td>Easy to use</td>
</tr>
<tr>
<td></td>
<td>Fairest fare (for full fare riders)</td>
</tr>
<tr>
<td>Reduced fare revenue</td>
<td>Added* platform complexity</td>
</tr>
<tr>
<td></td>
<td>No special fare program discounts</td>
</tr>
</tbody>
</table>

* When compared to other Open Payment methods
PAYG with Account-based System

Open Payments accepted as PAYG fares with option to link bankcards to transit accounts

- **Core Concept:** Passengers can **pay fares with tap** of bankcard or can link card to transit account with **prepaid fares**

- **Fare Policy:** PAYG plus prepaid **fare products, transfers and fare discounts**

- **Process:** Same as PAYG but prepaid fares calculated and approved by central system

- **Options:**
  - ✓ Same as PAYG
## PAYG with Account-based System

### Unique attributes for this method

<table>
<thead>
<tr>
<th>Agency</th>
<th>Passenger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supports current fare policy</td>
<td>More choices for discounts and passes</td>
</tr>
<tr>
<td>Higher % of riders served**</td>
<td>Requires network for fare product sales</td>
</tr>
<tr>
<td>Highest* platform complexity</td>
<td>Account required for discounts</td>
</tr>
<tr>
<td>Requires network for fare product sales</td>
<td>More difficult to use</td>
</tr>
</tbody>
</table>

* When compared to other Open Payment methods

** If agency-issued cards provided to unbanked
## Comparison

<table>
<thead>
<tr>
<th></th>
<th>PAYG (Only)</th>
<th>PAYG with Fare Capping</th>
<th>PAYG With Account-based System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity</td>
<td><strong>Lowest</strong></td>
<td>Higher</td>
<td>Highest</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>Easy</td>
<td>Easy</td>
<td>Complex</td>
</tr>
<tr>
<td>Fares</td>
<td>No discounts</td>
<td><strong>Fairest</strong></td>
<td>Discounts and passes</td>
</tr>
<tr>
<td>Fees</td>
<td>Highest</td>
<td>Lower</td>
<td>Depends on usage</td>
</tr>
<tr>
<td>Revenue</td>
<td>Higher (maybe)</td>
<td>Reduced</td>
<td>Minimal impact</td>
</tr>
<tr>
<td>Passengers</td>
<td></td>
<td></td>
<td><strong>Banked only</strong></td>
</tr>
</tbody>
</table>

* If no agency-issued prepaid debit card or transit benefits prepaid debit card available
Which of these Open Payments acceptance methods enables passenger purchase and use of prepaid fare products?

**Answer Choices**

a) Pay as You Go  
b) Pay as You Go + Fare Capping  
c) Pay as You Go + Account-based
Review of Answers

a) Pay as You Go
Incorrect. Using the basic Pay as You Go method, passengers are only able to make full fare payments using their contactless bankcard.

b) Pay as You Go + Fare Capping
Incorrect. Like the basic Pay as You Go method, passengers are only able to make full fare payments using their contactless bankcard. The EFPS tracks these payments and, once a predetermined maximum dollar amount has been reached, all subsequent fares using the same card within a set period of time are waived.

c) Pay as You Go + Account-based
Correct! Using this implementation method, passengers may elect to create a virtual account that is linked to a particular contactless bankcard. The passenger can then add stored value and/or a pass product to that account to pay fares.
Learning Objective 3

Benefits, risks, and costs of Open Payments acceptance
Primary types
- Interchange (paid to card issuer)
- Card Network assessments
- Acquirer fees

Fees include two types of components
- Fixed: $0.10 - $0.30 per payment
- Variable: 1.65 to 2.00% of payment amount

Interchange varies by:
- Network
- Card and product types
- Payment amount
Understand and Assess the Costs of Merchant Fees

- Fixed costs are particularly burdensome
- Total may be up to 30% of fares $\leq$ $2.00

* Excludes Visa Fixed Acquirer Network Fee (FANF). A monthly fee up to $85 assessed for each payment location
Understand and Assess the Costs of Merchant Fees

Typical Fee Calculation – Credit Card

<table>
<thead>
<tr>
<th>Fee Type</th>
<th>Fixed</th>
<th>Variable</th>
<th>Fees on $2 fare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interchange</td>
<td>$0.0400</td>
<td>1.65%</td>
<td>$0.07</td>
</tr>
<tr>
<td>Assessments</td>
<td>$0.0223</td>
<td>0.13%</td>
<td>$0.03</td>
</tr>
<tr>
<td>Acquirer</td>
<td>$0.0500</td>
<td>0.20%</td>
<td>$0.06</td>
</tr>
<tr>
<td><strong>Total fees:</strong></td>
<td><strong>$0.16</strong></td>
<td><strong>(8.0%)</strong></td>
<td></td>
</tr>
</tbody>
</table>

Example uses Visa interchange rates as of October 2015, Custom Payment Services (CPS) small ticket, credit
Understand and Assess the Costs of Merchant Fees

Typical Fee Calculation – Debit Card

<table>
<thead>
<tr>
<th>Fee Type</th>
<th>Fixed</th>
<th>Variable</th>
<th>Fees on $2 fare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interchange</td>
<td>$0.2200</td>
<td>0.50%</td>
<td>$0.23</td>
</tr>
<tr>
<td>Assessments</td>
<td>$0.0223</td>
<td>0.13%</td>
<td>$0.03</td>
</tr>
<tr>
<td>Acquirer</td>
<td>$0.0500</td>
<td>0.20%</td>
<td>$0.06</td>
</tr>
<tr>
<td><strong>Total fees:</strong></td>
<td><strong>$0.32</strong></td>
<td><strong>(16%)</strong></td>
<td></td>
</tr>
</tbody>
</table>

Example uses Visa interchange rates as of October 2015, CPS small ticket, debit
Aggregation

- **Combining** two or more payments to Acquirer as one to reduce fixed fees
- May **increase** financial risk
- Some networks offer specific rules
- Adds **complexity** to central system
- May increase cardholder disputes

* Excludes Visa FANF. A monthly fee up to $85 assessed for each payment location
Key Risks

Recognize the key operational risks and best practices for mitigation

- Insufficient products in market
  - <5% of cards
  - <20% of smartphones
- Lack of passenger adoption
- Data breaches

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Key Risks

Recognize the key operational risks

- **Fraud**
  - “First tap”
  - Counterfeits and lost/stolen
  - “Friendly fraud”

- **High Cost of Operations**
  - Merchant Fees
  - Compliance
  - Chargebacks
Best Practices

Best practices for mitigation

- **Transaction Aggregation**
  - MasterCard: Yes, following special rules
  - Visa: Yes, but no special protections
  - American Express: No, since no fixed fees or protections
  - Discover: No, same as American Express

- **Negative List**
  - Frequent updates
  - Third party (issuer or network) access
Best Practices

Best practices for mitigation

- **Compliance**
  - Assign dedicated team
  - Monitor EMVCO (entity that maintains the EMV standard) and card network bulletins
  - Use experts
  - Tokenize bankcard data

- **Fare Policy**
  - Define objectives first
  - Select method and options that best meets those objectives
Best Practices

Best practices for mitigation

- **Merchant Fees**
  - ✓ Do the math – confirm fees are affordable/reasonable
  - ✓ Consider aggregation as a mitigation

- **Passenger Inclusion**
  - ✓ Define solution for unbanked passengers
  - ✓ Minimize reliance on bank issuance of contactless cards
Recognize and Quantify the Benefits

**Cost shifting/sharing**
- Cardholder acquisition
- Card / account lifecycle management
- Reduced usage of fare product sales network
  - Ticket vending machines
  - Transit and retail stores
  - Website
  - Mobile app
- Reduced reliance on agency-issued fare media
Recognize and Quantify the Benefits

- **Passenger Convenience**
  - Familiar payment product
  - No need-to-know fare
  - No need to carry exact change
  - No need for advanced purchase of fare product
  - Ride history provided via issuer statements
ACTIVITY
Which of the following is NOT a key risk associated with the implementation of Open Payment Acceptance with an EFPS?

Answer Choices

a) Obsolete technology
b) Operational costs: Standard compliance and merchant fees
c) Bankcard data breach
d) Issuer participation
Review of Answers

a) Obsolete technology
Correct! Although the potential for technology to be or become obsolete within the expected life of an EFPS is always a concern, this is not a risk specific to open payments acceptance.

b) Operational costs: Standards compliance and merchant fees
Incorrect. The regulations, standard, specifications and fees applicable to open payments acceptance is constantly changing, making the cost associated with these elements a key risk for the agency.

c) Bankcard data breach
Incorrect. The acceptance of open payments may make the agency a target for theft of the bankcard data.

d) Issuer participation
Incorrect. Open payments acceptance is dependent on widespread issuance and promotion of contactless bankcards.
Case Study – Utah Transit Authority

Electronic Fare Program

- **Method:** PAYG only

- **Highlights**
  - Program originally launched for visitors during skiing season
  - Agency has implemented programs that promote the use of mobile wallets for fare payment
  - Open Payments <1% of ridership after 6+ years

- **Key consideration**
  - Agency-issued closed loop card is the primary media
Case Study – Transport for London

Contactless EMV

- Method: PAYG + Fare Capping
- Highlights
  - Agency developed and operates contactless platform
  - Open Payments added as layer on Oyster system
  - Growing use of contactless bankcards in retail stores
  - Over 300M fares paid in first 48 months
  - Cards and mobile wallets used
- Key consideration
  - Interchange restricted at 0.3% by EU regulations

Image provided under license from ThinkStock®
Case Study – Chicago Transit Authority

Ventra Card

- Method: PAYG + Account-based
- Highlights
  - All media adheres to card network specifications
  - Financial and technical risks borne by integrator
  - System operations performed by integrator
  - Prepaid debit card is the primary media
  - Open Payments <2% of ridership after 3 years
- Key consideration
  - Lack of contactless cards and mobile wallet users

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Module Summary

What We Have Learned

1. Open Payments acceptance is defined by various international standards, specifications, and federal regulations.

2. There are three primary options for implementing Open Payments acceptance.

3. There are distinct costs, risks, and benefits associated with Open Payments acceptance.
Thank you for completing this module.

Feedback
Please use the Feedback link below to provide us with your thoughts and comments about the value of the training.

Thank you!