



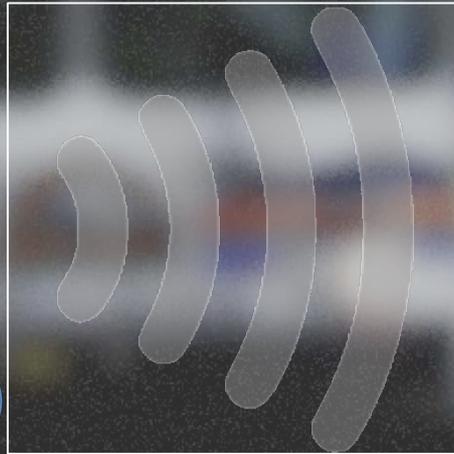
W E L C O M E



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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Three Point Consulting, Inc.**

# 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

# Open Payments Acceptance

The term **Open Payments** refers to the **acceptance of** bank-issued, contactless

- 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

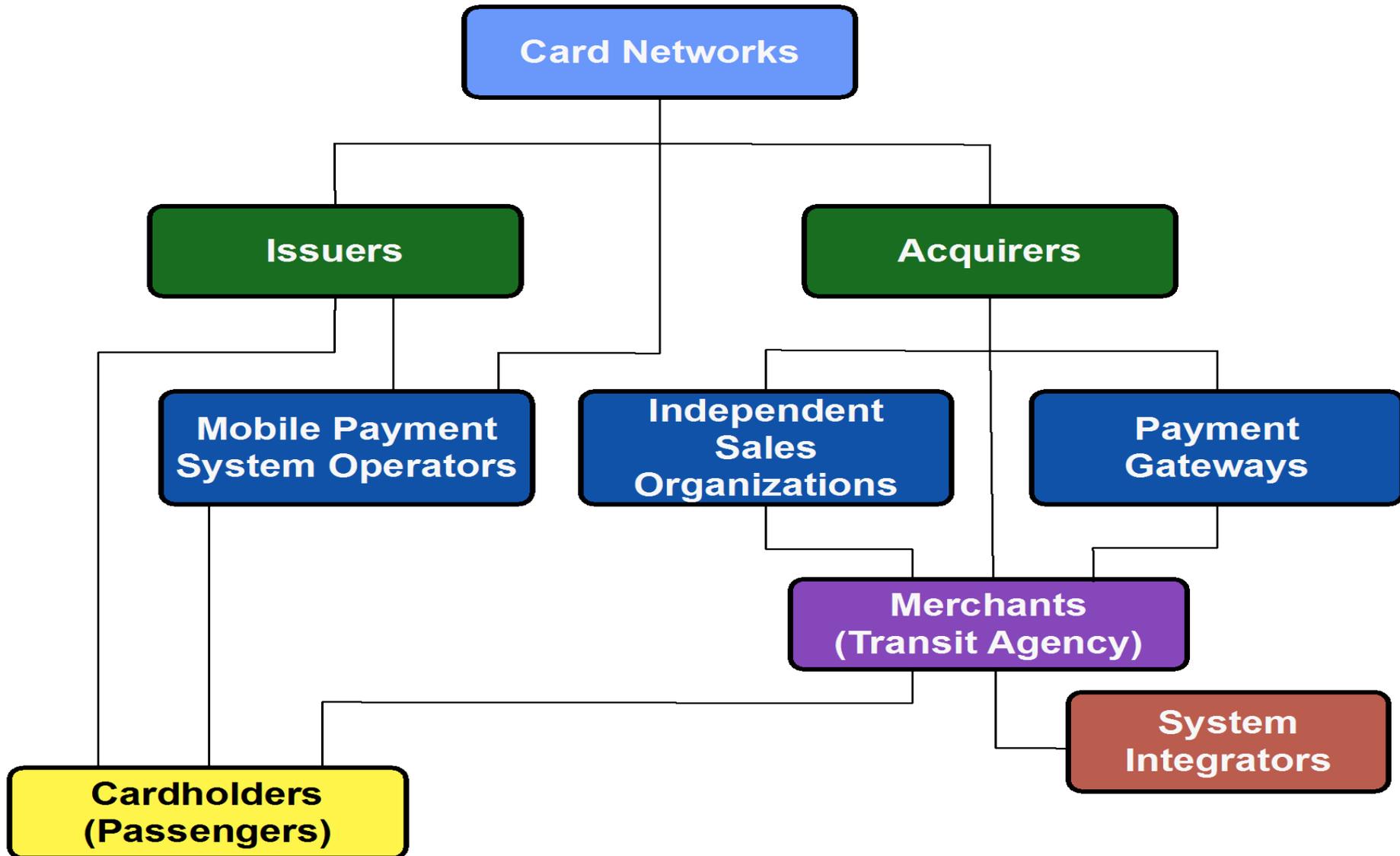


# Key Terms and Abbreviations

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



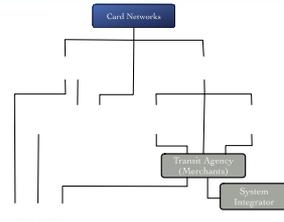
# Stakeholders



# Card Networks

## Roles and Responsibilities

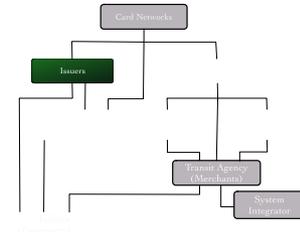
- Create and promote global **brand recognition**
- Establish and enforce network **operating rules**
- Provide a **global network** for transaction routing
- Support and **promote** the use of payment-related **standards and specifications**



# Issuer

## 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)



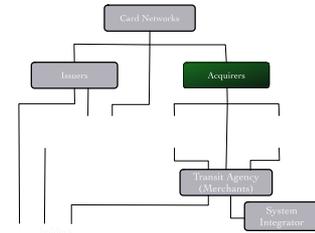
## Examples

- 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

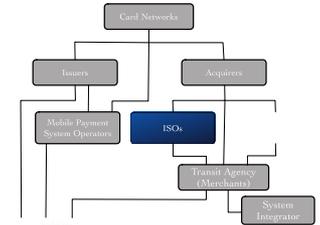
- First Data Corporation
- TSYS

# 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



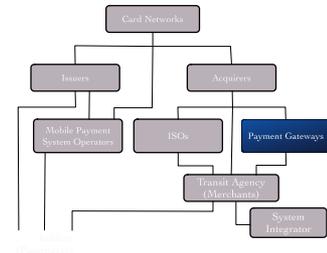
### Examples

- 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



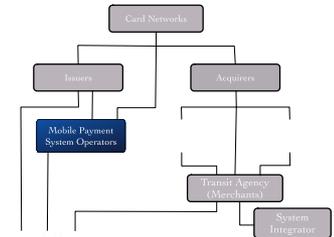
## Examples

- Authorize.Net
- PayPal
- SecurePay

# Mobile Payment System Operator

## 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)

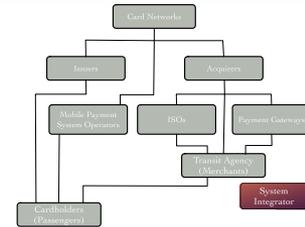
# System Integrator

## 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

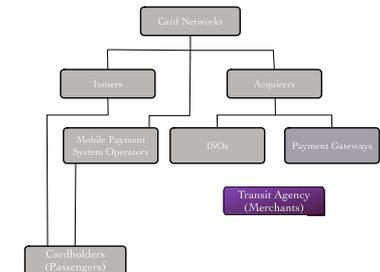
- Cubic Transportation Systems, Inc.
- Xerox



# Merchant (Transit Agency)

## 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



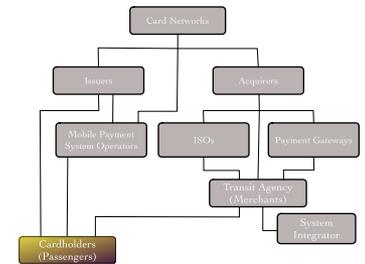
### Examples

- 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

SUPPLEMENT

# 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

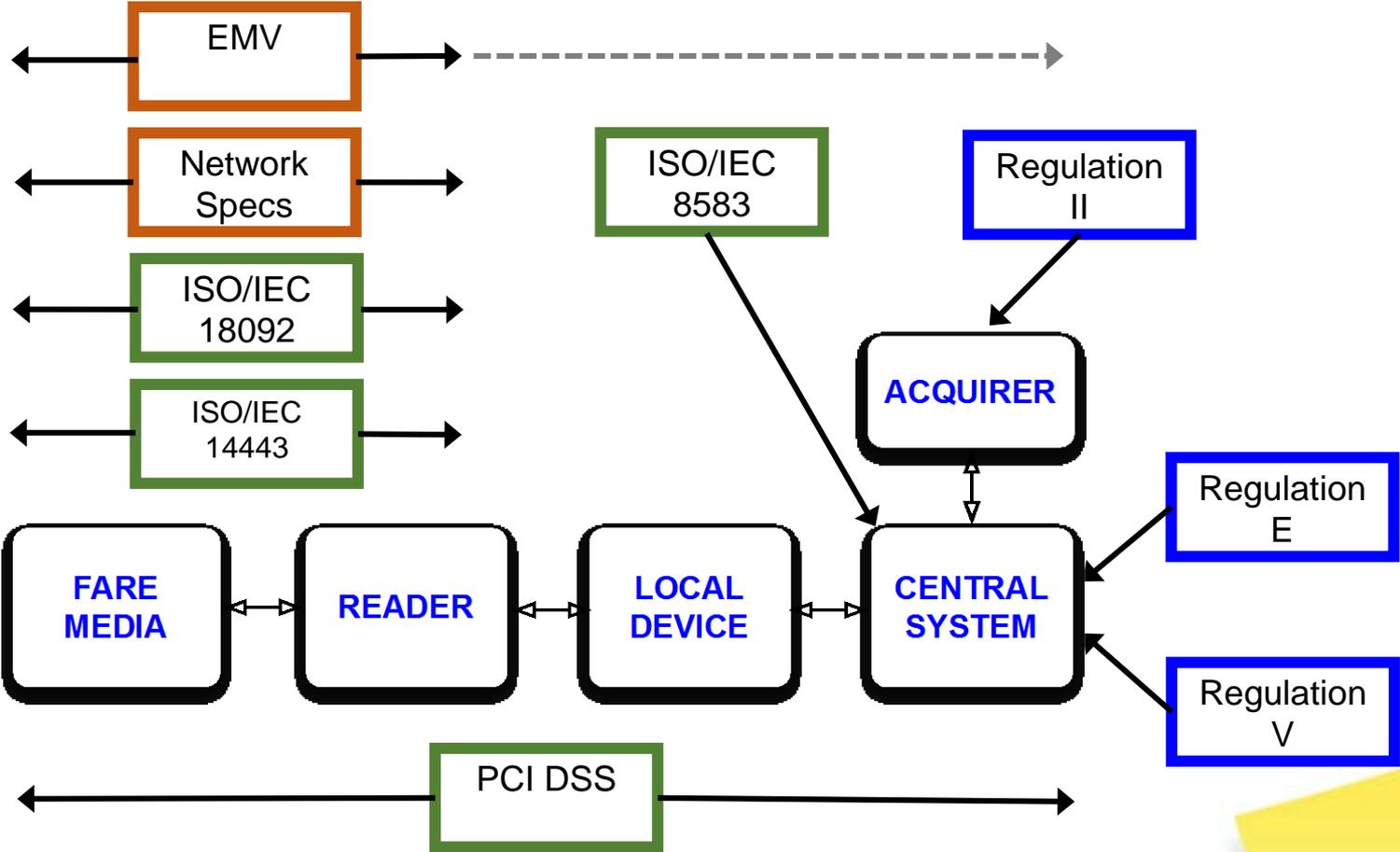
A detailed description of the performance requirements, dimensions, materials, and interfaces for the development and/or use of a technology or process.

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



## Financial transaction card originated messages, Interchange message specifications



- Defines the **format** and **content** of electronic **bankcard transaction** messages



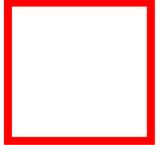
## Information Technology, Telecommunications and Information Exchange between systems, Near Field Communication, Interface, and Protocol (NFCIP-1)



- 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



## Europay MasterCard, Visa Specifications

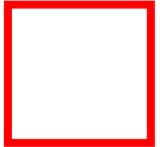


- Specifications for chip-based bankcards and merchant payment terminals and systems
- Widely-implemented in Europe, Asia, Latin America, and Canada
- Includes requirements for contact and contactless cards
- Nationwide adoption by U.S. initiated in 2011



# 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



# Regulations

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

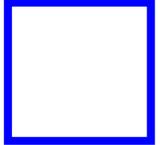


- **Protects** individual **consumers** engaging in electronic fund transfers
- Defines requirements for:
  - ✓ Receipts
  - ✓ Periodic statements
  - ✓ Procedures for **resolving errors**
- Creates definitions for “gift” and “reloadable” cards
- Establishes rules for:
  - ✓ Assessing fees
  - ✓ Expiration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



# Regulation II

## 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



# ACTIVITY



# Question

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**

# Shared Issues

## 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*



# Shared Issues

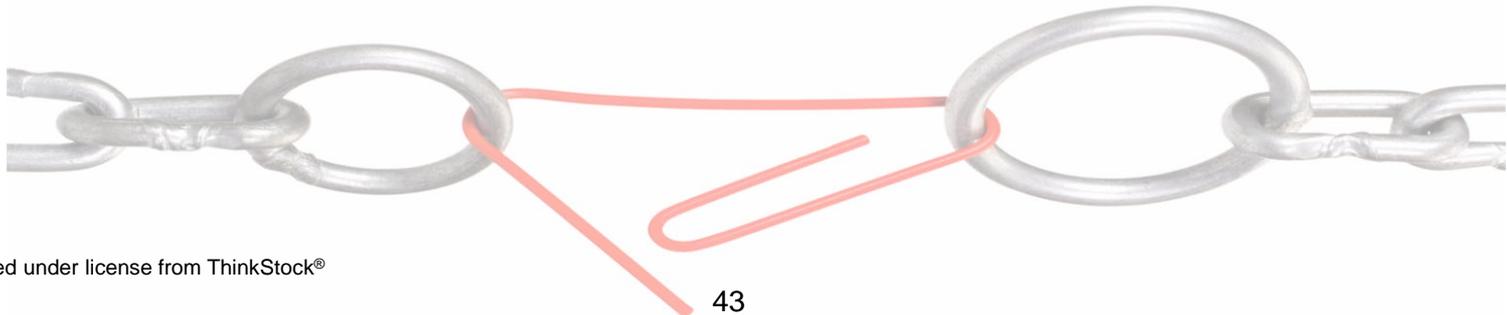
## Minimal security for offline payments

- **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

# Shared Issues

## 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 **lack experience**
- **Limited choices** for certified equipment

### *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

	Agency		Passenger	
+	Less* complex platform	Possible increase in fare revenue	Easy to use	
-	Maximum* merchant fees		Highest fare paid	Every ride incurs fare

\* When compared to other Open Payment methods

# 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

	Agency		Passenger	
+	Lower merchant fees		Easy to use	Fairest fare (for full fare riders)
-	Reduced fare revenue	Added* platform complexity	No special fare program discounts	

\* When compared to other Open Payment methods

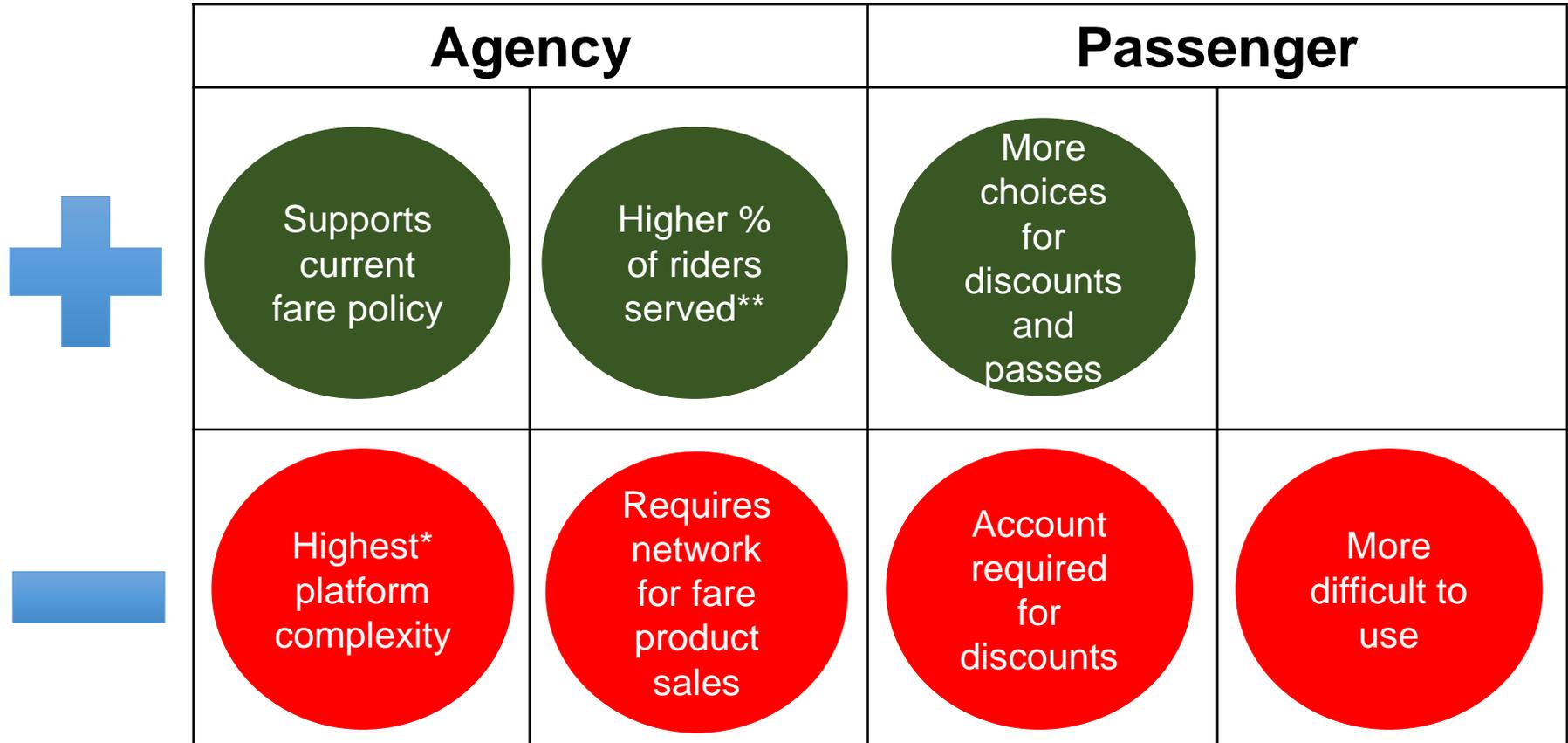
# PAYG with Account-based System

## 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



	Agency		Passenger	
+	Supports current fare policy	Higher % of riders served**	More choices for discounts and passes	
-	Highest* platform complexity	Requires network for fare product sales	Account required for discounts	More difficult to use

• When compared to other Open Payment methods

\*\* If agency-issued cards provided to unbanked

# Comparison

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

\* If no agency-issued prepaid debit card or transit benefits prepaid debit card available

# ACTIVITY



# Question

**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

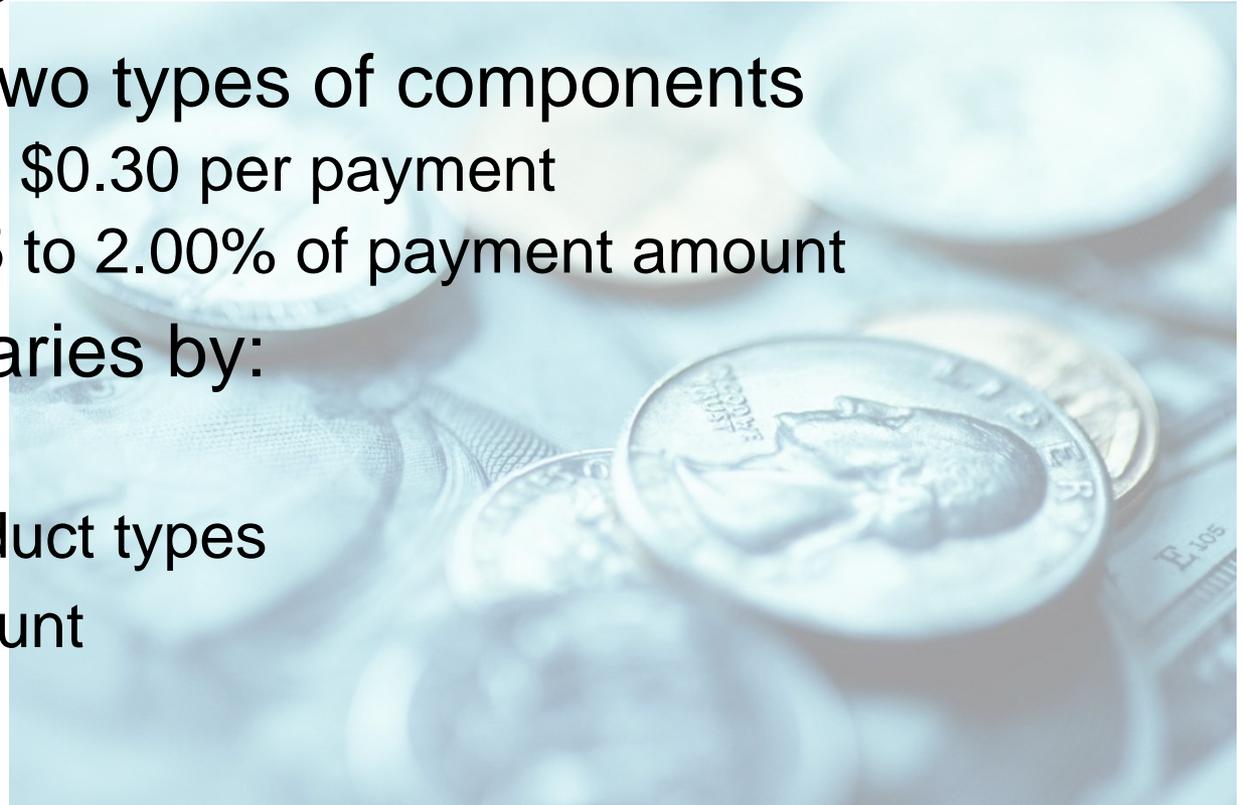
***Correct! Using this implementation method, passengers may elect to create a virtual account that is linked to a particular contactless bankcard. The passenger can then add stored value and/or a pass product to that account to pay fares.***

# Learning Objective 3

Benefits, risks, and costs of  
Open Payments acceptance

# Understand and Assess the Costs of Merchant Fees

- 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

Fee Type	Fixed	Variable	Fees on \$2 fare
Interchange	\$0.0400	1.65%	\$0.07
Assessments	\$0.0223	0.13%	\$0.03
Acquirer	\$0.0500	0.20%	\$0.06
<b>Total fees:</b>			<b>\$0.16 (8.0%)</b>

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

Fee Type	Fixed	Variable	Fees on \$2 fare
Interchange	\$0.2200	0.50%	\$0.23
Assessments	\$0.0223	0.13%	\$0.03
Acquirer	\$0.0500	0.20%	\$0.06
<b>Total fees:</b>			<b>\$0.32 (16%)</b>

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



# Understand and Assess the Costs of Merchant Fees

## 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 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 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



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

# Question

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



# 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



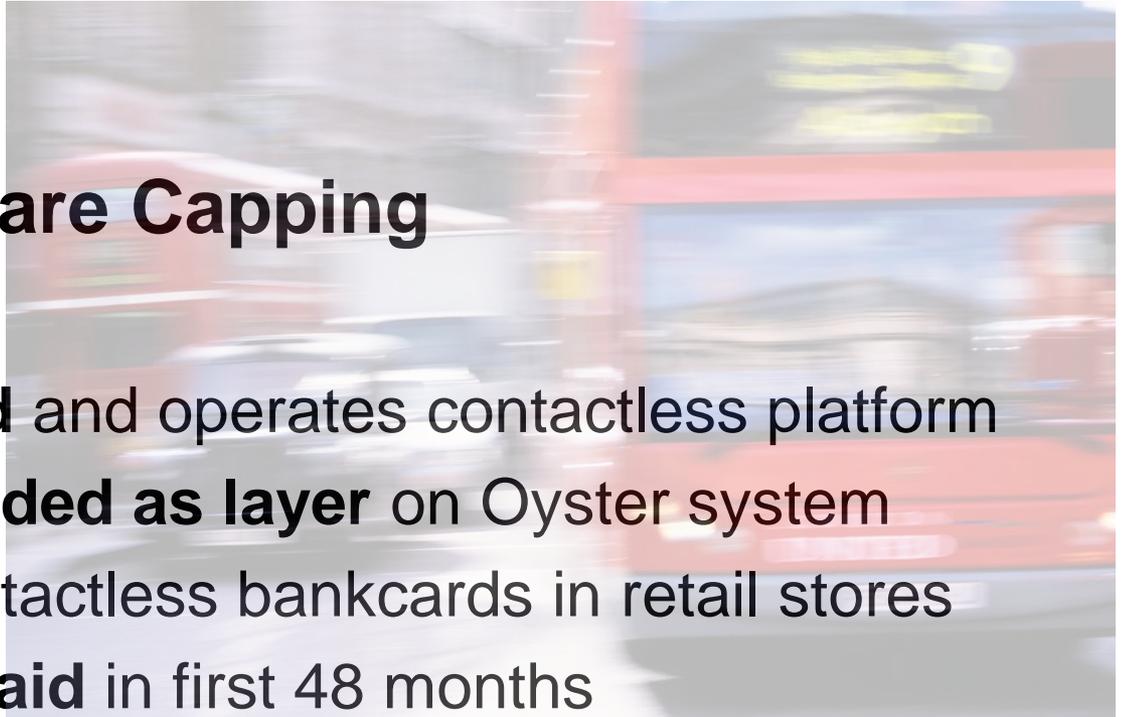
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# Case Study – Transport for London

## Contactless EMV

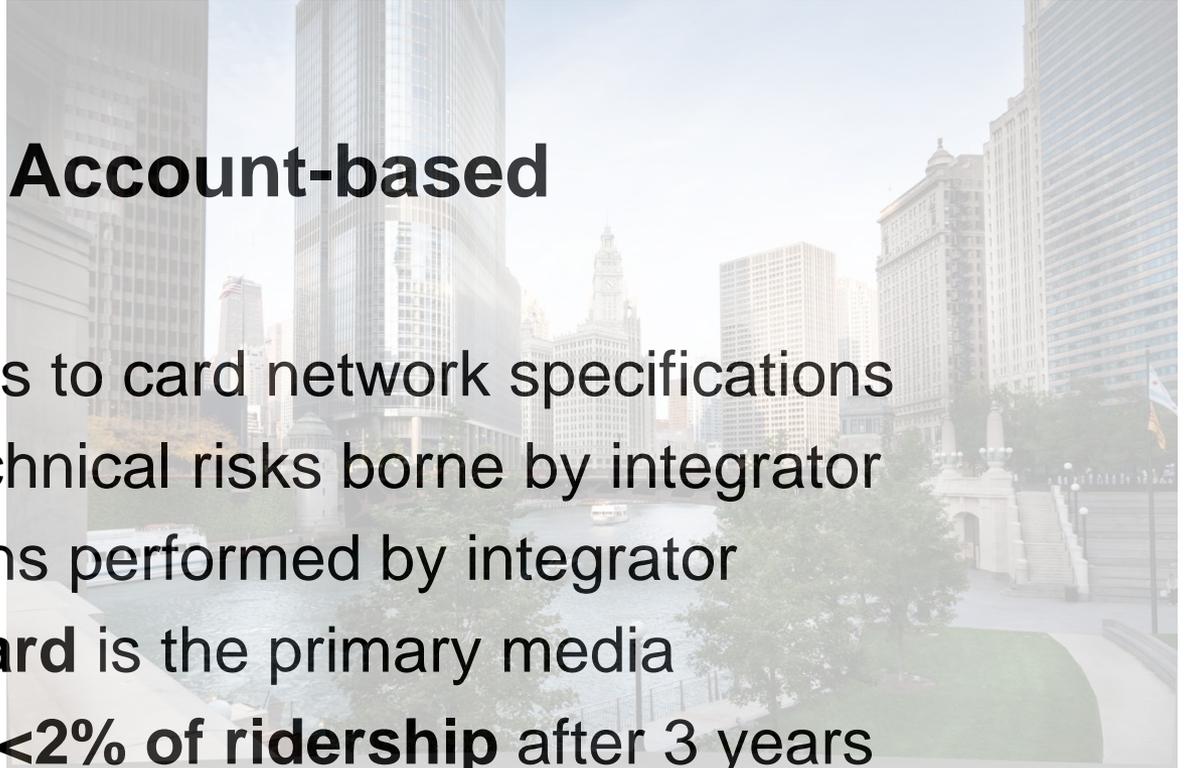
- Method: **PAYG + Fare Capping**
- Highlights
  - ✓ **Agency developed** and operates contactless platform
  - ✓ Open Payments **added as layer** on Oyster system
  - ✓ Growing use of contactless bankcards in retail stores
  - ✓ Over **300M fares paid** in first 48 months
  - ✓ Cards and mobile wallets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



# 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



**EXAMPLE**

# 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!