



Module 12: Electronic Fare Payment / Advanced Payment Systems: Open Payments Acceptance

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1. Module Description

Electronic Fare Payment (EFP) is the automated calculation, validation, collection, recording, and reporting of passenger fare payments using some form of electronic media for rides on a mass transit system. Agencies universally embrace the need to adopt electronic fare payment systems that provide for more automated means of distribution and validation of fare media. This substantially improves the quantity and quality of payment and ridership data that is collected, and offers significant improvements in the convenience and ease of use for the passenger.

Included in the options available for EFP systems is the acceptance of contactless bankcards (credit, debit and prepaid debit cards that are issued by financial institutions) and mobile wallets linked to bankcards for the payment of fares directly at transit points of entry. Such acceptance is generally referred to as “Open Payments” within the mass transit industry.

2. Introduction/Purpose

Implementation of Open Payment acceptance as part of an electronic fare payment system will create a number of technical and operational impacts for the agency and its system integrator although these may, depending on the implementation approach applied, be offset by certain benefits that are unique to this form of fare payment. This module provides an in-depth review of the key stakeholders within the bankcard industry as well as the standards and specifications, regulations and techniques associated with the procurement and implementation of Open Payments acceptance capability. Contents of the module will identify and explore the challenges, risks, and benefits associated with Open Payments acceptance in order to enable participants to understand this approach and to evaluate its use as part of an EFP solution.



3. Samples/Examples

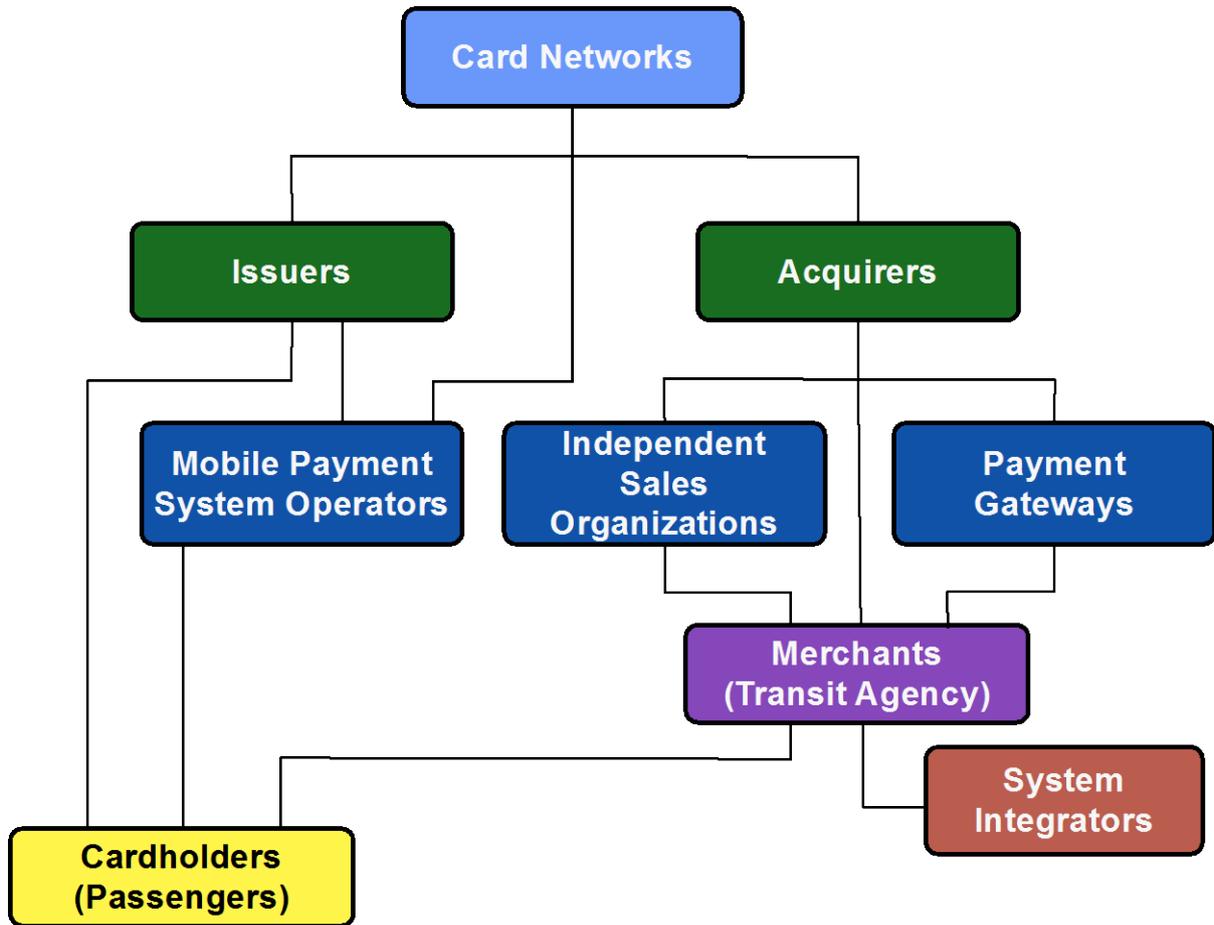


Figure 1: Enlarged version of diagram from Slide 9-Stakeholders



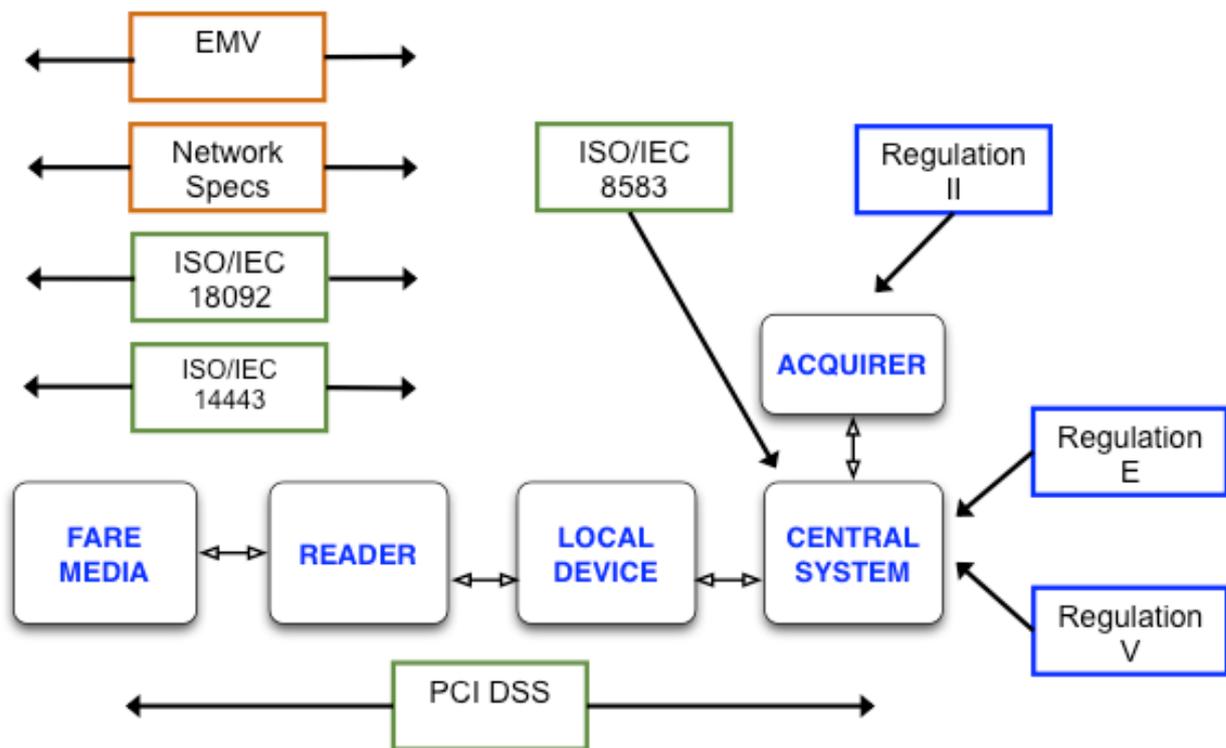


Figure 2: Enlarged version of diagram from Slide 22-*Scope of Impact*

4. Reference to Standards, Specifications and Regulations

Acceptance of Open Payments requires understand of and compliance with a variety of international standards, regulations and specifications. It is important to understand the nature of each of these types of documents and how they differ.

Standard

A document that defines processes, procedures, and/or technology for the common and repeated use of a system.

Unlike specifications and regulations, a Standard is established by consensus and approved by a recognized standards organization.

International standards are formally approved and maintained by the International Standards Organization (ISO) and/or the International Electrotechnical Commission (IEC).

Example: ISO/IEC 14443 Contactless integrated circuit cards – Proximity cards. This standard defines the physical and electrical requirements for devices that communicate using certain types of radio waves over short distances.

Specification

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.

Specifications are different from standards and regulations because they can be created and maintained by private companies and may be changed by those companies without approval from any external party. Compliance with specifications is typically voluntary although it may be required in order to use the owner’s products or services.

Example: American Express Expresspay. This specification was developed and is maintained by American Express and is applicable to all cards that bear the American Express brand and all payment terminals that are used to process payments using those cards.

Regulation

A rule or order issued by an executive authority or regulatory agency of a government and having the force of law.

Regulations differ from standards and specifications because they are created, managed and enforced by a government agency, which can make compliance a legal requirement. Agencies that manage regulations typically are required to seek industry comments for a lengthy period of time before adopting any changes.

Example: Regulation E Electronic Fund Transfer Act: This US federal regulation defines requirements for the recording, reporting and dispute of electronic transactions posted to a deposit account.

The following table is a list of the standards, specifications, and regulations described in the training module as well as other related documents. It includes information on how to obtain a copy of each listed documents.

Resource / Provider	Cost and Access Method	Website
American Express EMV Acceptance on a Terminal	Cost: No charge Access: Via website	https://www209.americanexpress.com/merchant/singlevoice/pdfs/chipnpin/EMV_Terminal%20Guide.pdf
American Express Expresspay	Cost: No charge after free registration on site Access: Download specifications from American Express Technical Specification website	https://www406.americanexpress.com/MT/inter/UN/nsNavigateAction.do
Discover D-PAS and ZIP	Contact network for	https://www.discover.com/credit-



Resource / Provider	Cost and Access Method	Website
	additional information	cards/help-center/account/zip/
EMV	Cost: No charge Access: Download from EMVCO website	http://www.emvco.com
EMV: Minimum EMV Chip Card and Terminal Requirements	Cost: No charge Access: Download from EMV connection	http://www.emv-connection.com/minimum-emv-chip-card-and-terminal-requirements-u-s/
ISO/IEC 8583	Cost: <\$210 Access: Download from ISO website	http://www.iso.org
ISO/IEC 14443	Cost: <\$50 Access: Download from ISO website	
ISO/IEC 18092 (NFCIP-1)	Cost: <\$200 Access: Download from ISO website	
ISO/IEC 21481 (NFCIP-2)	Cost: <\$100 Access: Download from ISO website	
MasterCard Rules	Cost: No charge Access: Download from network website	
MasterCard PayPass	Cost: Paid license required Access: Download specifications from MasterCard PayPass	https://www.paypass.com/chip-information.html



Resource / Provider	Cost and Access Method	Website
	website	
Mobile/NFC Standards Landscape Reference Guide	Cost: No charge Access: Download from the SmartCard Alliance website	http://www.smartcardalliance.org/publications-mobile-nfc-standards-landscape/
Payment Card Industry Data Security Standard	Cost: No charge Access: Download from PCI Security Council website	https://www.pcisecuritystandards.org
Regulation E Electronic Funds Transfer Act	Cost: No charge Access: Download from the Electronic Code of Federal Regulations website	http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=635f26c4af3e2fe4327fd25ef4cb5638&tpl=/ecfrbrowse/Title12/12cfr205_main_02.tpl
Regulation II Debit Card Interchange Fees and Routing	Cost: No charge Access: Download from the Federal Government Publishing Office website	https://www.gpo.gov/fdsys/pkg/FR-2011-07-20/pdf/2011-16861.pdf
Regulation V Fair and Accurate Credit Transactions Act	Cost: No charge Access: Download from the Federal Government Publishing Office website	https://www.gpo.gov/fdsys/pkg/PLAW-108publ159/pdf/PLAW-108publ159.pdf
Technologies for Payment Fraud Prevention: EMV, Encryption and Tokenization	Cost: No charge Access: Download from the SmartCard Alliance website	http://www.smartcardalliance.org/publications-technologies-for-payment-fraud-prevention-emv-encryption-and-tokenization/
Preliminary Strategic Analysis of Next Generation Fare Payment Systems for	Cost: No charge Access: Download from the TRG.org website	http://www.trb.org/Main/Blurbs/172494.aspx



Resource / Provider	Cost and Access Method	Website
Public Transportation		
Transit and Contactless Open Payments: An Emerging Approach for Fare Collection	<p>Cost: No charge</p> <p>Access: Download from the SmartCard Alliance website</p>	http://www.smartcardalliance.org/publications-transit-financial-2011/?redirect=http%3A%2F%2Fwww.smartcardalliance.org%2Fpublications-transit-financial-2011
Visa Integrated Circuit Card Specifications (VIS) 1.5	<p>Cost: Paid license required</p> <p>Access: Download specifications from Visa Technology Specifications website</p>	https://technologypartner.visa.com/Library/Specifications.aspx#42
Visa Core Rules	<p>Cost: No charge</p> <p>Access: Download from the network website</p>	https://usa.visa.com/dam/VCOM/download/about-visa/15-April-2015-Visa-Rules-Public.pdf
Visa payWave	<p>Cost: Paid license required</p> <p>Access: Download specifications from Visa Technology Specifications website</p>	https://technologypartner.visa.com/Library/Specifications.aspx

5. Case Studies

- Utah Transit Authority (UTA) Electronic Fare Program
- Originally launched in January 2009
- Buses and light rail system
- Media:
 - ✓ Third party, contactless cards
 - ✓ Contactless bankcards (full, single adult fares only)
 - ✓ Agency-branded, closed-loop prepaid card added in 2013
- Implementation method: PAYG. Agency also offers account-based system linked to agency-issued, closed-loop cards
- Usage of bankcards <1%



Other Open Payment Acceptance Programs in the U.S.

Agency	Program Name	Open Payments Acceptance Method	Status as of July 2016
Chicago Transit Authority (CTA) Chicago, IL	Ventra	PAYG plus Account-based System	Full revenue service beginning in late 2013
Southeastern Pennsylvania Transportation Authority (SEPTA) Philadelphia, PA	SEPTA Key	PAYG plus Account-based System	Pilot implementation
Tri-County Metropolitan Transportation District of Oregon (TRIMET) Portland, OR	HOP Fastpass	PAYG plus Account-based System	In development
New York Metropolitan Transportation Authority (NY MTA) New York, NY	New Fare Payment System	PAYG plus Account-based System	Request for Proposals

6. Glossary

Term	Definition
Account-based System	Type of electronic fare payment system where fare processing rules and passenger account information is stored and used in a central system to calculate and approve fares
Acquirer	Entity responsible for the processing of bankcard transactions on behalf of a merchant
Aggregation	A method of temporarily storing bankcard payment transactions and then submitting those as a single payment in order to reduce the merchant fees
Authentication	A mechanism for confirming the legitimacy of a device, payment media or transaction
Authorization	Process used to provide real-time guarantee of payment to merchant
Authorization Code	Alphanumeric value representing an authorization
Authorized User	Any person with permission to use a card
Bankcard	Any debit, credit or prepaid debit card issued by a financial institution
Cardholder	A person that applies for and receives a bankcard from an issuer and subsequently uses it to pay for products and/or services at merchant locations
Cardholder Verification Method (CVM):	One of three different, optional processes provided in the EMV specifications to verify that the authorized cardholder is present at



Term	Definition
	the merchant point of sale or an ATM
Card Network	Entity that operates a system and sets and enforces rules for the processing of bankcard transactions
Card Network Contactless Card Specifications	This term refers to the unique specifications for contactless bankcards that are independently developed, maintained and enforced by each of the Card Networks
Card Network Operating Rules	This term refers to the unique set of rules for issuing of bankcards and processing of all transactions involving those bankcards that are developed, maintained and enforced by each of the Card Networks
Card Not Present	Transaction where card information is manually entered to initiate payment process
Card Present	Transaction where card is physically used to initiate payment process
Chargeback	Rejected or disputed payment transaction
Chip and PIN	Term used to refer to EMV-compliant cards that require entry of a PIN with each use of the card
Combined Data Authentication (CDA):	Optional, more secure method using two cryptograms with each transaction to verify the authenticity of an EMV card being used at a point of sale terminal
Common Payment Applications (CPA):	One of several EMV specifications distributed by EMVCo that defines a payment application that can be applied to EMV cards
Data Breach	An incident where personally identifiable information (PII) data and, in particular, bankcard data stored or being processed by a merchant, ISO, acquirer, issuer or other entity is accessed by an authorized party
Dynamic Data Authentication (DDA):	Standard method using a unique cryptogram for each transaction to verify the authenticity of an EMV card being used at a point of sale terminal
Electronic Fare Payment System (EFPS)	A system that performs automated calculation, collection, recording, and reporting of fare payment transactions for rides on a public transit system. An EFPS uses some form of electronic validation and, in most instances, electronic fare media (e.g. contactless smart card, magnetic stripe card, card emulated through mobile phone)
EMV (Europay, MasterCard, Visa)	Abbreviation used to refer to a set of international specifications for computer chip-based bankcards and terminals
EMVCo	Public corporation responsible for the maintenance and distribution of the EMV specifications
Fare Capping	Form of fare policy where fares using a distinct card are assessed and tracked for a particular time period until a predetermined maximum amount is reached, after which the passenger is allowed to ride for free for the duration of the time period
Fare Media	Any instrument, such as cash, credit cards, debit cards, benefit accounts, employer transit accounts, or mobile device that may be used to purchase transit services or fare media
Fare Product	Any for of prepaid instrument that can be applied to the payment



Term	Definition
	of fares such as a monthly pass or single ride ticket
Independent Sales Organization (ISO)	An entity that acts as a reseller of an Acquirer’s bankcard payment processing services to merchants. The ISO may also provide added value services, such as customer loyalty programs, that are supplemental to the bankcard payment processing services.
International Organization for Standards (ISO)	ISO is an independent, non-governmental international organization with a membership of 162 national standards bodies. Through its members, it brings together experts to share knowledge and develop voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges.
Interchange	A portion of the merchant fees that are paid to the card issuer
ISO/IEC 14443	An international standard that defines short range, radio wave-based communications between a card and a device
ISO/IEC 8583	An international standard that defines the format and content of messages that are exchanged to enable electronic processing of payments and other transactions using a bankcard
ISO/IEC 18092	An international standard that defines methods to facilitate short range, radio wave-based communications between any two devices (e.g. a mobile phone and a payment terminal). This standard, commonly known as “Near Field Communications” builds on the ISO/IEC 14443 and others preexisting standards.
Issuer	The entity responsible for the distribution of the card, management of the card accounts and provision of cardholder service
Merchant	An entity that accepts bankcards for payment of its products or services. In an electronic fare payment system with Open Payments acceptance, the transit agency is the merchant.
Merchant Fees	A collection of charges assessed to an organization for the acceptance of bankcards for payment of the organization’s goods or services
Mobile Payment	A point-of-sale payment transaction made through a mobile device (such as a smartphone, “smart watch,” or other smart device), in which the mobile device functions as a contactless payment card.
Mobile Payment System Operator	Entity typically responsible for the design, development, operation and ongoing maintenance of a system enabling mobile devices to be used to make payments at physical points of sale.
Mobile Wallet	A term used to refer to a software application that resides on a mobile device and is used to store data, or a token of the data, for any number of card products for a particular cardholder including but not limited to bankcards, loyalty cards and identity cards.
Open Payments Acceptance	The acceptance of bank-issued contactless debit, credit and prepaid debit cards (“bankcards”) for payment of fares in an electronic fare payment system at transit points of entry. These contactless bankcards may be used in the form of a traditional credit card-sized piece of plastic or in a mobile device that stores the card data (or an electronic token of that data) and transmits it



Term	Definition
	via radio waves to a device on a transit vehicle or in a station.
Pay As You Go (PAYG)	A type of fare payment where each transaction results in a monetary charge to an account of the passenger. The charge may be applied to a pool of stored value that was previously purchased by the passenger or to a bank account or line of credit when the passenger uses a bankcard to initiate the transaction.
Payment Card Industry Data Security Standard (PCI DSS)	A set of documents which define requirements and guidelines for the protection of bankcard data
Payment Gateway	A system that provides for processing of bankcard payment transactions as a service to merchants
Personal Identification Number (PIN)	Four digit number used to verify that the authorized cardholder is present at the point of sale or ATM where an EMV transaction is originating
Point of Sale (POS)	Term used to refer to merchant terminal used to perform authorization and settlement
Public Key Infrastructure (PKI):	For of cryptography that uses a public/private key pair to enable distribution of keys to devices and systems to enable decryption of a cryptogram and/or electronic validation of a digital certificate without compromising the security of the encryption scheme
Regulation E – Electronic Fund Transfer Act	This US regulation defines requirements for electronic transactions that add or deduct funds from a bank account
Regulation II – Debit Card Interchange Fees and Routing	This US regulation establishes maximum limits on the amount of interchange that can be assessed to merchants for their acceptance of a bank-issued debit card. It also defines requirements for the routing of payment transactions initiated with a debit card.
Regulation V – Fair and Accurate Transactions Act	This U.S. regulation defines requirements for the correct posting and reporting of bankcard transactions as well as certain limitations on the amount of bankcard data that can be recorded on transaction receipts
Settlement	Process used to obtain funds from Issuer to pay to merchant and all other network providers
Smart Card	A transit fare card, bankcard, or identification card or other credential that includes an embedded computer chip and antenna
System Integrator	An entity that typically designs, develops and installs an electronic fare payment system under contract with a transit agency
Title VI	A portion of the Civil Rights Act of 1964, a U.S. law that prohibits discrimination based on race, color or national origin in programs or activities which receive federal financial assistance
Tokenization	The process of securely storing bankcard data and providing merchants and acquirers with a representative value that can be used like bankcard data to process payments while greatly limiting the possibility of that data being used fraudulently if stolen
Zero Liability	Policy of card issuers protecting cardholders for losses due to fraud



7. Study Questions

To include the quiz/poll questions and answer choices as presented in the PowerPoint slide to allow students to either follow along with the recording or refer to the quiz at a later date in the supplement.

Learning Objective 1

Which of the following is NOT a key stakeholder for an EFPS that accepts Open Payments?

- a) Issuer
- b) Card Network
- c) POS Terminal Manufacturer
- d) Cardholder

Learning Objective 2

Which of the following three methods for implementing Open Payments acceptance enables passenger purchase and use of prepaid fare products?

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

Learning Objective 3

Which of the following is NOT a key risk associated with the implementation of Open Payment Acceptance with an EFPS?

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

8. Icon Guide

The following icons are used throughout the module to visually indicate the corresponding learning concept listed out below, and/or to highlight a specific point in the training material.

- 1) **Tools/Applications:** An industry-specific item a person would use to accomplish a specific task, and applying that tool to fit your need.



- 2) **Remember:** Used when referencing something already discussed in the module that is necessary to recount.





- 3) **Refer to Student Supplement:** Items or information that are further explained/detailed in the Student Supplement.



- 4) **Example:** Can be real-world (case study), hypothetical, a sample of a table, etc.

