



ADVANCING  
PUBLIC  
TRANSPORT



► REPORT

# OPEN-LOOP PAYMENT IN PUBLIC TRANSPORT

IMPLEMENTATION ROADMAP - PART 1

STRATEGIC VISION AND CONCEPT OUTLINE

JANUARY | 2024

## Acknowledgements

### AUTHOR

Andrea Soehnchen, UITP

### CONTRIBUTORS

**Mark Ammundsen**, Visa  
**Alexandra Baginski**, American Express  
**Gavin Bennet**, Discover Global Network  
**David Caamaño Cuenca**, Indra  
**Antonio Carmona**, SFey  
**Stephen Cooles**, Visa  
**Arnaud Depagne**, Fime  
**Anne Dowling**, Cubic  
**Jeremy Gugger**, Flowbird

**Jonathan Hill**, Google Pay  
**Imededdine Hosni**, Worldline  
**Frederico Pimentel**, CCR  
**Eric W. Pitts**, Switchio  
**Jean-Luc Ricard**, Thales  
**Annette Street**, American Express  
**Jaroslav Stuchlik**, SFey  
**Andy Taylor**, Mastercard  
**Manfred Troll**, Scheidt & Bachmann

### Lead partner



### Partners



### Supporting partners



### Associates



International Association of Public Transport (UITP)  
Rue Sainte-Marie, 6 | B-1080 Brussels | Belgium

Tel: +32 2 673 61 00  
[info@uitp.org](mailto:info@uitp.org)  
[www.uitp.org](http://www.uitp.org)

© UITP – International Association of Public Transport, January 2024

All rights reserved / No part of this publication may be reproduced or transmitted in any form or by any means without the written permission of the International Association of Public Transport

# TABLE OF CONTENT

— 2 —

Introduction

— 2 —

The implementation process

— 4 —

Open-loop payment – how does it work

— 10 —

Phase 1: Strategic vision

— 16 —

Phase 2: Concept outline

— 22 —

Outlook

— 23 —

Glossary

## INTRODUCTION

Over the last twenty years, ticketing and payment systems in public transport have substantially evolved. From replacing paper tickets with automatic fare collection systems, the launch of dedicated smartcard systems, to contactless payments cards introduced in public transport from 2012 onwards and now accepted in hundreds of cities globally.

Open-loop payment allows passengers to simply pay for mobility and to experience the convenience and simplicity of contactless payments. Solutions can be considered to make open-loop available to all passengers, including underbanked or unbanked people. Offering this option can help attract new passengers, improve customers' journey experience, deliver cost savings and operational efficiencies, and use technology to better meet your customer's needs.

While the motivations, ambitions and starting points to introduce contactless payments are different for each public transport organisation, there are several consistent steps to follow to successfully implement open-loop payment in public transport.

With this implementation roadmap, the Urban Mobility Open Payments Forum aims to guide Public Transport Operators (PTOs) and Public Transport Authorities (PTAs) through the planning, building, launching, and ongoing improvement of open-loop payment acceptance in public transport networks.

The current edition of this document focuses on the planning and design phase. Subsequent editions will add guidance for the tendering process and considerations for system development and project launch.

## THE IMPLEMENTATION PROCESS

### SIX STEPS TO IMPLEMENT OPEN-LOOP PAYMENT IN PUBLIC TRANSPORT





The process to implement open-loop payment can be broken down into six distinct phases.



## 1. STRATEGIC VISION

The starting point to implement open-loop payment acceptance in a public transport network should be a clear understanding and vision of what you want to achieve by the launch.

- What do you want to achieve as an organisation?
- What customer experience do you want to provide?
- What could be the implications of open-loop payment on your business model and internal processes?



## 2. CONCEPT OUTLINE

Once you are clear on your vision, it's important to understand the changes you need to implement and pre-requisites you need to put in place.

- What internal processes are affected and what are the updates that need to be made?
- Who are the stakeholders that play a role and need to be included in the change?
- What requirements need to be met and what agreements need to be in place to accept contactless payments?
- What steps do you need to consider, moving from the current ticketing offering to making open-loop payment available for your passengers?
- How do you ensure that the customer experience is frictionless?



## 3. TENDERING AND PROCUREMENT

A clear idea of the payment options you wish to provide is the basis for describing your needs and enable the market to come up with a good answer.

- How do you describe what you need and expect?
- How do you identify technology and service suppliers with the capabilities and experience needed to support you?
- Reflecting on the concept outline you have built, what products and solutions will be off the shelf and what needs to be customised?



## 4. DEVELOPMENT, TESTING AND CERTIFICATION

Having all the needed partners in place, it's time to build the system that can deliver what you expect and make sure that it works. It's crucial to ensure that the customers stay at the heart of everything you do. This step will be successful when:

- All front and back-end equipment is correctly set up and integrated.
- The back office and administrative processes deliver all expected customer experience journeys.
- The entire system is rigorously tested and certified to comply with necessary standards and requirements.
- Your staff is trained and have been involved in internal testing.



## 5. LAUNCH

Once the homework is done, it's time to go live. Some supporting activities must be considered to ensure a smooth launch and speedy uptake.

- How to map out a roll-out strategy that allows validating the new payment option with a limited number of users and grow from there?
- What measures help to generate public awareness about the new payment option and how to use it?
- What incentives or rewards could be used to get customers buy-in to build a critical mass for success?



## 6. REVIEW AND REFINE

Most likely, the first open-loop solution is only the first step in an exciting journey. Once the open-loop payment system is launched and working, it's time to focus on maintenance and finetuning of processes. At this phase, collecting feedback from customers and employees is essential.

- Monitor the uptake to understand how customers accept the new payment option and where more opportunities might be.
- Prepare the next steps to follow your project roadmap and work towards the vision you want to achieve.

## OPEN-LOOP PAYMENT - HOW DOES IT WORK?

When starting to outline how to embed open-loop payments into the existing ticketing system, there are some context elements that you should be familiar with.

### The eco-system

Accepting payment card payment brings some new players on board and has an impact on the role that some stakeholders play. In payment terminology, the open-loop payment eco-system comprises:



**The Cardholder** – the passenger using a contactless payment card to tap into public transport systems.



**The Issuer** – the financial institution that issued the payment card for the passenger.



**The Merchant** – the PTO, PTA or ticketing system operator accepting contactless payment cards to tap into public transport.



**The Acquirer** – the financial institution of the PTO or PTA, processing and settling payments and charging for journeys made.

These four players form the corner stones of an online transaction. Their connections are facilitated by:



**The Technology partners** – system integrators and technology providers connecting the fare collection system of the PTO or PTA with the financial institutions.

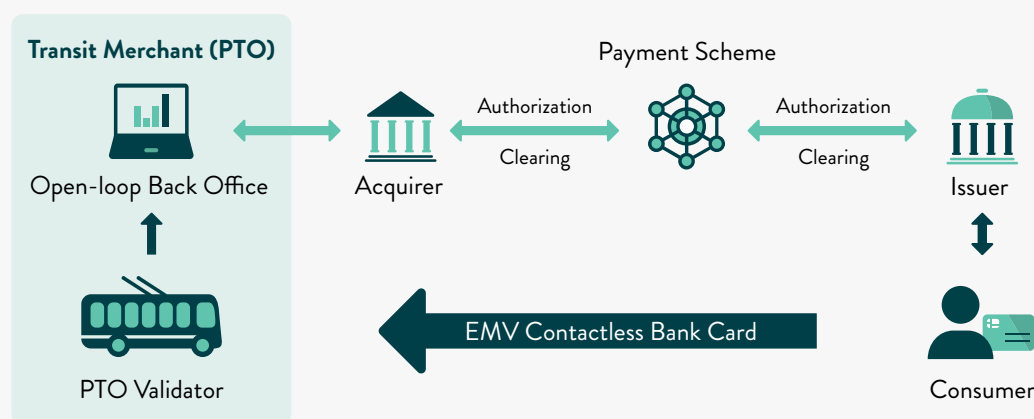


**The payment gateway** – collects and verifies a passenger's payment card information before sending it to the acquirer.



**The Payment schemes** – enable all payments between the Issuer and the Acquirer ( e.g. American Express, Discover, Mastercard or Visa, or one of many domestic schemes such as Interac in Canada, and Carte Bancaire in France).

There are scenarios, where not all players are present and there are organisations that can play more than one role. But as an example, a public transport open-loop payment system could look like this:

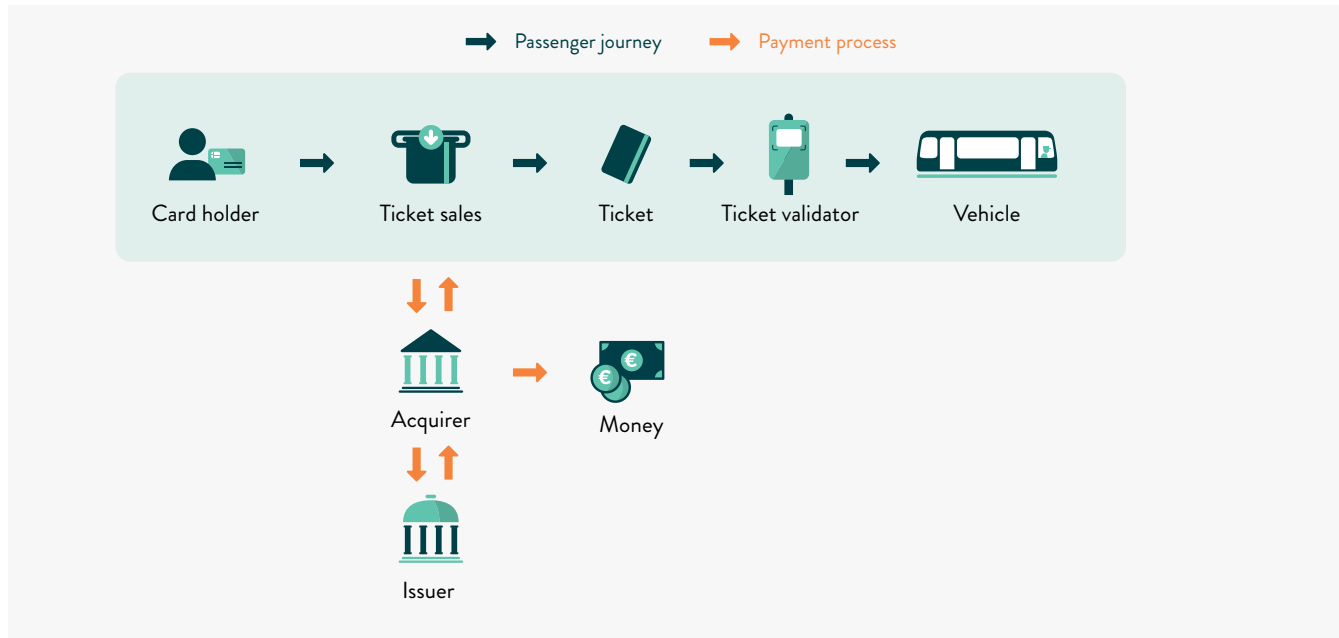


- ▶ If you accept any form of electronic payment to buy a ticket, you already work with financial institutions such as acquirers and issuers. The players you work with will still have a place in the open-loop payment process, but the business rules and contractual responsibilities may be different.

## The payment process

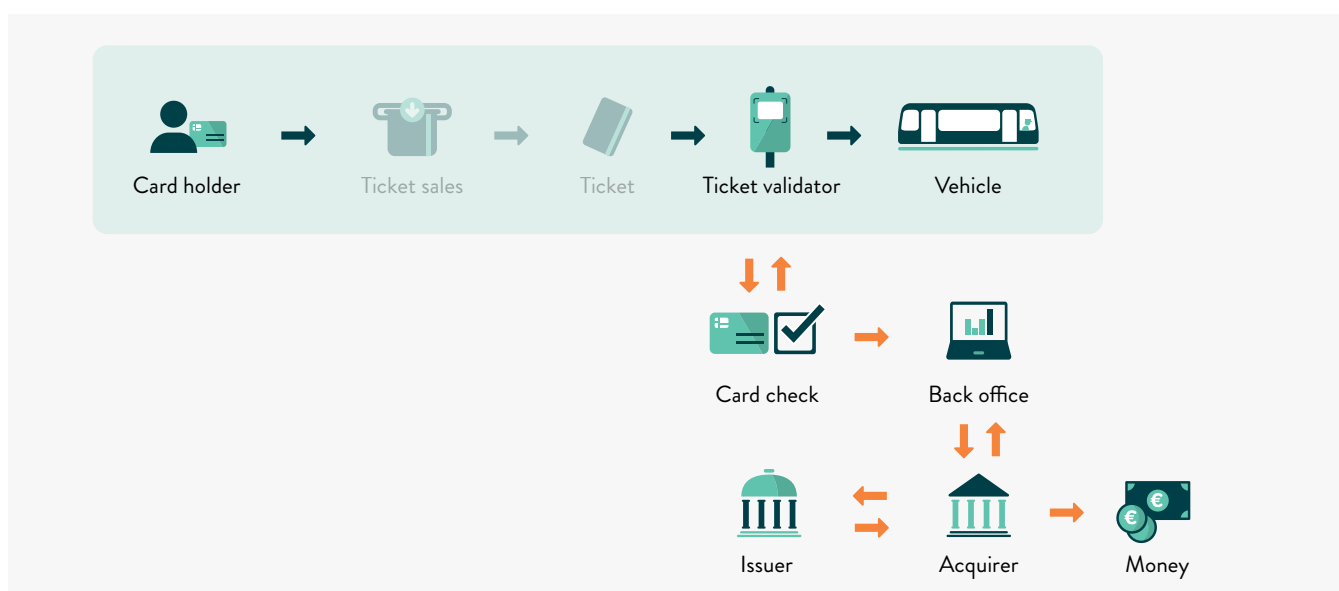
In a traditional closed-loop ticketing process, the passenger selects a fare and buys a ticket, or tops up a stored value account before travelling. Only once the financial transaction between the PTO or PTA and the

passenger is concluded, the ticket (or right to travel) is issued, which enables the passenger to use public transport.



Open-loop payment removes that barrier and the need for fare selection and ticket sales. It allows to travel while the payment is still processed. When the passenger taps a payment card at the terminal, a validation process is

initiated that verifies the card and customer account while the passenger is travelling, calculates the correct fare and settles the transaction after the journey is completed.



- ▶ While in a traditional closed-loop system the financial transaction is concluded before the passenger uses any transport service, with open-loop payment and travelling may happen in parallel.



## The safeguards

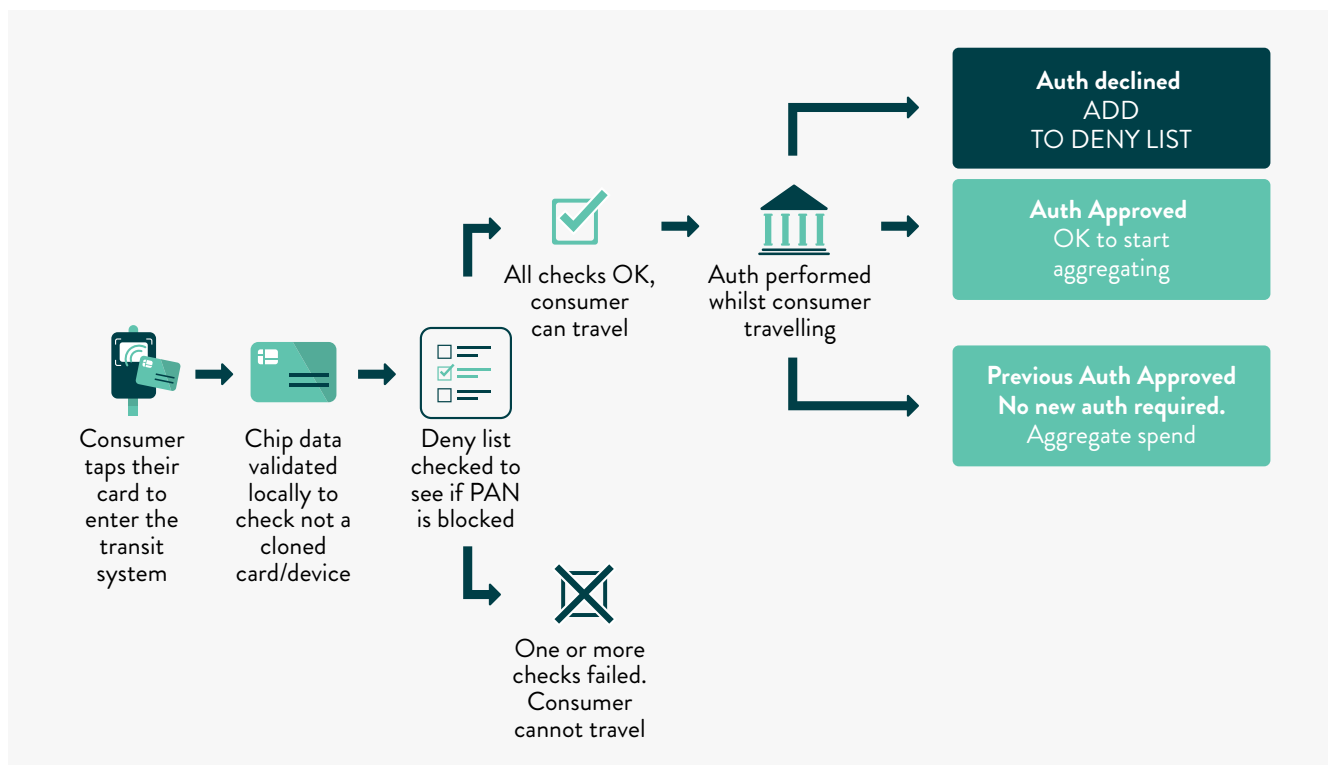
Allowing passengers to travel while paying is a paradigm-shift in public transport and requires a new approach to risk management. As with every commercial process, risk management is key to ensure success.

- When passengers tap their card to enter the public transport system, the terminal first performs a **card check** to verify that a card chip is genuine – that it is not cloned, not expired and that it has been issued by a payment scheme that is accepted by the PTO/PTA. This Offline Data Authentication (ODA) is a feature of EMV® chip cards, using secure key cryptography to

verify that a payment card is genuine without the need to connect online to the issuer. This is the first step in managing risk in this process.

- The second step is a **deny list check**, which identifies blocked cards. A card could be blocked by financial institutions, or it may be blocked by the PTO/PTA based on previous behaviour (unpaid travel). This deny list is managed by the PTO's backoffice. Cards should be added to and removed, if subsequently approved, from the deny list as quickly as possible. Cards that fail to pass either of the first two steps cannot be used to travel.
- The third step is an **online account status check**, checking that a customer's bank account is in good standing. In the financial world, this means that an account has no debts outstanding, past or present, and that the account holder is considered a trusted client. If this verification fails, the card would be added to the deny list.

After the payment card has been authenticated at the terminal and has passed the deny list check and account status verification, it is authorised to be used as ticket token and the back office starts to track the token within the public transport network.





As the passenger has already entered the public transport system while the account status check takes place, a fare might be due already. This is called the first ride risk and must be carefully considered.

➤ **First ride risk mitigation** mechanisms are specified by Payment Schemes and will be subject to individual agreements. Low value fares up to agreed thresholds may be eligible for issuer payment (which means the issuer would honour the cost of the first ride, but the first ride only), while higher value fare can be managed by debt recovery.

➤ If an outstanding fare cannot be settled through first ride risk mitigation, there are several **debt recovery** methods helping to secure the revenue for the PTOs/PTAs. These processes could be initiated by either the passenger or the PTO/ PTA. The passenger could settle the outstanding amount through customer service or online via his ABT customer account. The PTO can request the resubmission of a previously declined transaction for a period of time following transit specific rules that allow this. If such resubmission is successful and approved, it will allow to remove a card from the deny list, and for the funds to be sent to the PTO.

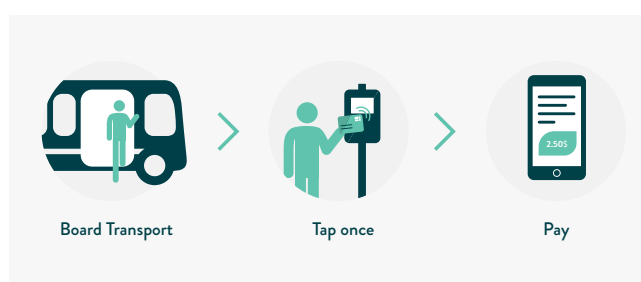
➤ The system set-up and the partners involved in an open-loop payment system provide safeguards and mechanisms that protect both passengers and PTO/ PTAs. These rules should be thoroughly addressed as early as possible in the project.



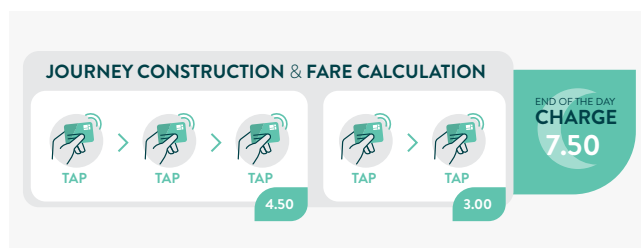
## EMV transaction models

Contactless open-loop payment today allows three transaction models for public transport, the Known Fare Model, the Accumulated Model, and the Pre-purchase Model.

With the **Known Fare Model**, the value of the transaction is known when the passengers tap their payment card at the validator. This model is applicable for single-ride tickets. Every time the passenger taps their card, a transaction is processed, and if approved by the issuing institution, the operator receives payment for the specified amount.

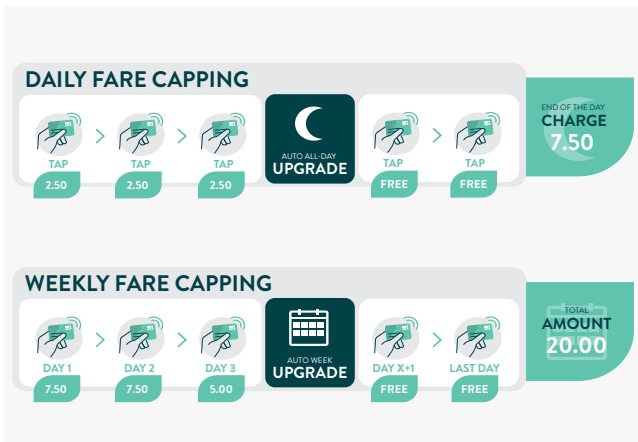


With the **Accumulated Model**, the final transaction value is unknown at the start of a journey. The payment card is used as credential for travelling and a financial transaction is processed when the full journey is completed, and the fare is calculated accordingly.



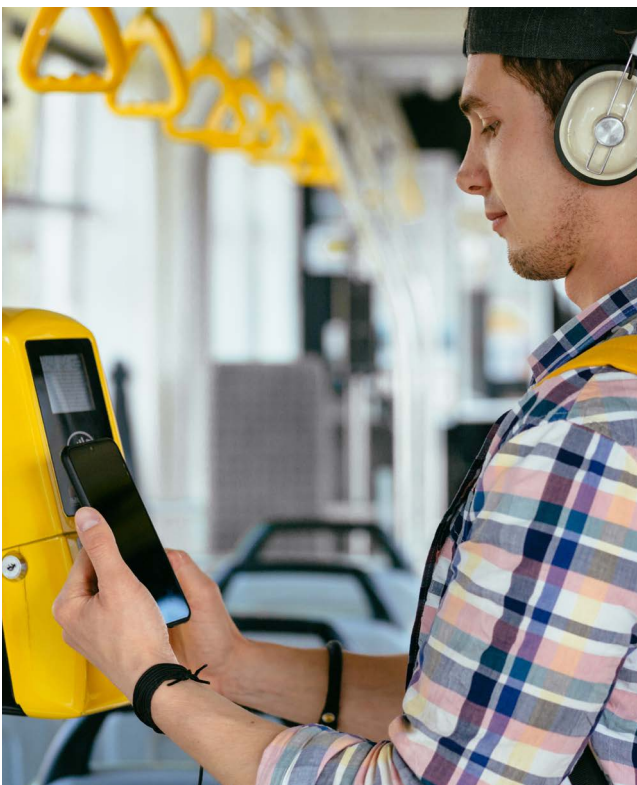
Accumulating trips also allows fare-capping. Capping means that a PTO/PTA limits the amount of money a passenger is charged for fares during a specific period, such as a day, a week, or a month. Passengers' payment cards will be charged until the defined limit is reached and the passenger travels without charge for the rest of the specified period.

Fare capping with open-loop payment allows to offer the same value for money as you offer with pre-purchased travel passes.



The **Pre-purchase Model** is based on a standard retail payment. It implies that a defined fare product needs to be purchased before travelling and is stored in a travel account that is associated with the same payment card.

Upon the first tap of the card, which has to be the same that was used for the purchase, the fare product is activated at the central system and no further transactions will occur until the pre-purchased ticket runs out. This model allows a direct integration of higher-value fare products, such as monthly or annual subscriptions into open-loop payment.



### ➤ What about concession tariffs?

In principle, also concession tariffs can be handled through open-loop payment. The PTO/PTA would register the concession via the back office and once the associated payment card is used the passenger will be charged the appropriate amount. Work to develop a suitable approach is ongoing and initial pilot projects are under development. UMOPTF will provide more information.

### Card acceptance and transaction security

Using a contactless bankcard triggers a payment transaction process, which inherently requires protection against fraud. In order to accept payment cards directly to tap into public transport, there are some requirements set by the payment industry that ticketing equipment and administration have to comply with.

Two organisations are governing interoperability and security aspects for payment transactions, the PCI (Payment Card Industry) Security Standards Council and EMVCo (Europay, Mastercard and Visa).

PCI has defined a suite of security standards setting the ground to ensure that all companies processing, storing, or transmitting payment card information create and maintain a secure environment.

EMVCo is a standardisation body co-owned by the six international card schemes American Express, Discover, JCB, Mastercard, UnionPay and Visa. It governs technical specifications and testing procedures for open-loop payment systems.

Some of the specifications and tests are common for all card schemes, but some need to be performed separately for any card scheme a PTO/PTA wants to accept.

The standards requiring compliance are described in more detail in the White Paper Open-loop Payment in Public Transport published by the Urban Mobility Open Payments Forum.

- Be aware, beyond the global card schemes, there are also some local schemes that might be relevant in your region. Examples are Carte Bancaire in France or Interac in Canada. There might also be additional requirements mandated by regional financial authorities.

## Account-based ticketing

Automated fare collection (AFC) systems can be built on two principles:

In a **card-centric system**, the smart card contains all relevant information including travel rights, available funds, and journey records. The field equipment (validator, fare gates, etc.) updates the records and performs a fare calculation each time a card is presented.

The issues with this system are that if the passengers lose the card, they could lose the value stored on it. It also means that often, a lot of processing capability has to be put at the reader level on public transport and can result in complex systems.

In an **account-based ticketing system (ABT)**, the smart card or ticket media (including smart phones and digital devices) only acts as an identifier (or token). Travel rights, trip records and tariff policy are stored in the back office. The field equipment (terminal) only has to collect taps, while any fare calculation is done at the back-end.

Account-based ticketing offers several advantages for both, passengers, and PTOs. PTOs can enjoy a wealth of data generated in the back office to monitor passenger numbers nearly live and improve planning and scheduling. Passengers can access a transparent overview of their journey history, costs and receipts, and would not lose any stored value if losing a card.

Card Based/Card Centric: Fare stored physically on the card



Account Based: Fare stored physically on an account



- ▶ To fully harness the advantages of open-loop payment, an Account-Based Ticketing (ABT) system is indispensable, especially when compared to the basic open-loop payment model, which relies on single financial transactions triggered by each tap. Embracing ABT becomes paramount for unleashing the full potential of open-loop payment solutions.







## PHASE 1: STRATEGIC VISION

*The starting point for the journey to implement open-loop payment should be a clear understanding of why you want to implement it. Open-loop payment can help to:*

- **Attract new customers** – an easy “turn-up and travel” option can help enticing people away from private transport onto the public network.
- **Improve the customer experience** – removing the need to decide on a ticket removes friction from the passenger journey and makes paying for travel as easy as for many other products and services.
- **Save operational costs** – using existing payment technology that works in the retail sector allows public transport to capitalise on existing processes, expertise, and reduce dependencies on legacy ticketing sales equipment.

Your overarching ambition is key to outlining the vision for your open-loop payment offer.



### A NEW VALUE PROPOSITION

A key factor in scoping the value proposition for a new payment system is determining who it is for, what gains it could create and what pains it will relieve. This strategic vision needs to be considered in all design decisions – keeping the customer experience as the guiding principle.

#### *Who is it for?*

Open-loop payment can be an attractive offer for both – regular and occasional travellers for various reasons.

- **Occasional travellers**, who may have a small radius of daily activities or a general preference for their car, may not be familiar with the network nor the tariff system. They can simply turn up and go whenever convenient and trust that they will pay the correct price for any journey.
- **Tourists and business travellers** can avoid having to purchase or carry the travel card for each city, or multiple apps on their mobile and still be sure to easily access public transport.
- **Regular travellers** might not need to plan their travel in advance and carry a separate travel card, they can rely on fare capping to get an advantageous price for any mobility pattern during the day or week.
- **Commuters** remaining hybrid work patterns post pandemic, can trust to get the best fare for any weekly routine, where the previously held weekly or monthly ticket is not needed anymore.

Consider who your target customers are and what problems you are trying to solve with implementing open-loop payment. Sticking to this vision will help to avoid getting side-tracked amongst the technical options and potential solutions you will discover along the way.

## Questions to be considered



- Where do you want to increase ridership?
- What offer would encourage users to take more rides or switch from a private mode of travel?
- Do you want to make the public transport more attractive to occasional users? Being able to use their own payment credentials can help getting out of town users (tourists) onto public transport.
- Can you provide a guaranteed maximum price that can help removing uncertainty?
- Do you want to offer regular users a more convenient way to pay for their journeys while retaining the price they currently pay?

### *What payment options should be offered?*

Local travellers, who have bank accounts with a financial institution in your region, will most likely use a payment card common in your area, which may be issued by a global or local payment scheme. Tourists and business travellers, however, may only rely on global card schemes. When you decide to accept open-loop payment, you will need to determine which global payment schemes to include in your proposition. You will also need to consider domestic payment schemes acceptance if you so choose. The key consideration is ensuring that both local and international passengers can travel on your network.

One benefit of contactless EMV is that it enables customers to choose the payment device that is most convenient for them. Payment cards, mobile phones, smart watches, and smart jewellery; your customers will benefit by being able to pay and travel with these options without the need for you to do anything extra.

Besides added convenience and choice for customers, using the mobile phone as payment means also offers the potential to engage passengers and deliver complex information, such as service updates, or notices of fare caps being reached.

## Questions to be considered



- What financial institutions are active in your market?
- What payment schemes are most used in your market?
- Which payment schemes are likely to be used by tourists visiting your city?

### *What tickets and fares should be available?*

An important step is deciding which existing fares would be most suitable to be included in your open-loop payment concept. The fares which could be considered are varied and are likely to include a significant proportion

of any PTOs fare matrix. These can include, but are not limited to single or return tickets, carnets, and daily or weekly passes.





Different passenger groups may have very distinct needs and expectations:

- **Occasional travellers** may not want to commit to pre-purchase any fare, they do currently prefer using single tickets or carnets.
- **Tourists** may want to be flexible and avoid surprises, they are likely to look for a travel pass that covers all journeys during their stay.
- **Regular static travellers**, such as commuters, may prefer knowing a maximum price for their journeys and may currently use weekly or monthly passes.
- **Regular dynamic travellers**, frequently using public transport but not having stable itineraries, may be interested to always pay the best price and currently use various ticket types depending on their activities.

Offering a simple pay-as-you-go option complementing single ride tickets might be a good start and provide the best approach to pick up occasional users that do not have a transport card and do not want to worry about figuring out where to get a ticket and which one to buy.

Implementing a more sophisticated solution including fare capping allows offering a 'fair-price promise', which is a compelling option for more frequent customers and helps to instil trust into the commercial offer.

This approach is required to cover a wider range of tickets, such as daily or weekly passes within the open-loop system. The capping rules (how many days to include) depends on the needs of the target passenger group that you focus on.

## Questions to be considered



- Which tickets are your top-sellers? With what tickets would you reach the biggest audience?
- Which options are the favourites of your target group?
- What capping rules do you want to apply?
- Could you consider streamlining your fare policy around the introduction of open-loop payments?

### *For what transport modes should open-loop payment be offered?*

Obviously, you can best unlock the full benefit of open-loop payment, if it is available across the entire urban mobility system and travellers can go as they please, without worries about zones, lines, or operators.

Depending on the size and complexity of an urban mobility system, this project may be too large and expensive, and you might prefer a phased introduction of open-loop payment. This offers the advantage of being able to start small and learn and improve along the way. Potential starting points for an open-loop implementation could be:

- One mode of transport that is operated by one operator only, and which shows a limited number of journeys connecting to other transport services.

- A new or upgraded mode of transport complementing the existing travel options like for instance bus rapid transit (BRT).

- A special mobility service limited to just one or a few lines, such as an airport connection.

There are several aspects you need to consider when developing your open-loop payment project in phases:

- Outline the entire project first and plan the individual phases backwards, making sure that you do never lose sight of your strategic vision.
  - Outline a minimum viable product – a system covering the transport modes, geographies, and fare products to be included in the launch version of open-loop payment
  - Determine a final vision with all modes, services and features enabled to enjoy maximal benefits of open-loop payment

- Define intermediate steps to move from the launch version to the final vision, whilst finetuning and improving along the way.
- Start with the low-hanging fruits, select your starter phase ensuring that as many travellers as possible can enjoy the new payment option. This will enable fast adoption and help to spread the word.
- Keep your target customer group perspective in mind and design a pilot that aligns with their behaviour and needs. Being able to pay with a payment card for one part of a journey, and then still having to buy a ticket is not attractive. Seek to find a transport mode used by most travellers without having to change to another mode.
- Involve the PTA from the beginning and try to get every operator's buy-in, even if they don't want to join into offering open-loop payment yet. Any future enlargement of the open-loop offer will be much smoother if the basic agreements are in place, technology is aligned, and interfaces are open.

## Questions to be considered



- Do you want to enable the full network for open-loop payment at once?
- Do you have specific lines or areas like an airport line or the city centre which would address majority of all expected open-loop payment passengers?
- Would a phased rollout by mode de-risk the project like for instance phase 1 metro and phase 2 buses?

## THE COST IMPACTS

In order to evaluate the potential impact of implementing open-loop payment for both capex and opex, the costs of the current ticketing system need to be compared with the potential costs and savings generated by open-loop acceptance and considered over the lifetime of the fare collection system(s).

### *Fare collection Back-office*

A requirement for an open-loop payment system is a ticketing back-office, which controls tariff settings, collects contactless taps, and calculates fares for journeys.

For PTOs and passengers to fully enjoy the benefits of open-loop payment, an account-based ticketing back office is required. The flexibility of an account-based system with configurable tariff rules, fare capping, and multi-modal support enhances the value proposition overall by removing the complexity of ticket selection for the customer.

### *Hardware and infrastructure*

Frontline system elements to be considered include equipment for ticket sales, inspection, and validation as

well consumable media like smartcards and paper tickets. In many scenarios open-loop payment acceptance reduces the number of ticket vending machines and sales points needed to serve customers.

To accept payment cards, all terminals within the public transport system are required to be certified according to current security standards, payment scheme requirements, and local regulations, if applicable.

With open-loop payment, passengers bring their own ticket medium, which reduces the costs for producing, issuing, or replacing ticket media.

### *Communication technology*

Supporting open-loop payments requires near-real time communications to and from the frontline system elements and the back-office infrastructure to ensure data transfer of tap transactions, deny lists, and many other operational data elements. Requirements for IT infrastructure, additional hardware, and ongoing mobile data costs vary depending on local needs.

### *Payment processing*

Contactless payment card processing involves transaction processing fees to be paid to the organisations involved –

the payment schemes, payment gateways, and acquiring banks. Generally, open-loop payment comes with fees per transaction. Specific models (see section “EMV transaction models” above) have been developed for payments in public transport, allowing transactions to be bundled and save costs.

### Operation and maintenance

Along with the reduced use and need for ticket vending machines and sales points, there are also reduced staffing costs for installation, maintenance, and operation of ticket sales equipment. If 3<sup>rd</sup> party retailers are part of current ticket sales channels, a reduction in commissions to be paid might apply as well.

However, with the implementation of open loop payments, new operational processes must be supported within the PTO/PTA including customer service support extension to open-loop payments, ongoing financial services support including accounting and handling of transaction issues and maintenance of end-to-end security compliance. Besides technical maintenance of the equipment, also the maintenance of required EMV and security certifications must be considered.

Inspection devices able to read payment cards have different requirements to traditional equipment, but there are devices that can do both- read traditional tickets as well as payment cards.

### Security and fraud prevention

Accepting payment card payment can help removing cash handling from the operation, which considerably reduces the company's exposure to theft and robbery. Relying on the security standards of the payment industry helps to reduce fraud.

To meet **efficient operations and total cost of ownership objectives**, several considerations are important to consider:

- **Compatibility:** The new solution must be compatible with the expected payment technology, such as EMV payment cards or mobile payment device, as well as existing AFC solution. The solution must be able to integrate with other systems and software used by the public transport authority or operator.
- **Security:** The new solution must be secure to ensure the safety of customer and payment data and protect against fraud. It is important to choose hardware and software that supports the latest security standards.
- **Scalability:** The solution must be scalable to support future growth and expansion. Considering that EMV Open-loop payment's usage is often ramping-up across months, the back-end shall be able to manage high volume of transactions.
- **Flexibility:** The software must be flexible enough to accommodate future changes and updates. It is important to ensure that software support integration of fixes and enhancements at speed, as well as can integrate changes in regulations or compliance requirements.
- **User Experience:** The solution must provide a great user experience to ensure customer satisfaction and adoption, as well as requirements from the payment industry.

## Questions to be considered



- Can you shift to account-based ticketing for any ticket type and benefit from streamlining the ticketing administration for all travellers?
- Could implementing open-loop payment help you reduce paper, magnetic tickets or closed loop smartcards that are still in use? Streamlining the accepted ticket media also streamlines the hardware needed to issue, validate, and check tickets.
- How future-proof do you want your validators to be?
- If you plan to invest in new rolling stock, consider adding communication requirements for open-loop payment into the vehicle specification to avoid retrofitting.

With this first step you have outlined your strategic vision for the implementation of open-loop payment. You have clarified:

- Who are the target passengers that you focus on with this new value proposition and the benefits you want to generate.
- Which are the payment schemes and financial institutions you need to reach out to.
- What EMV models you need to enable in the open-loop system to attract your target passengers to this new option.
- Which PTOs and PTAs you should consult in your project to be able to work towards the vision of open-loop availability across the entire urban mobility system.
- What cost- and operational efficiencies you could unlock with the implementation of open-loop payment.

Keep this vision highly present in your mind for the next steps to make sure you stay true to your original intention and avoid losing focus being side-tracked by too many options.







## PHASE 2: CONCEPT OUTLINE

*Open-loop payment is mostly offered as an additional option for passengers to pay for mobility, most likely to be implemented alongside or included as part of the already existing ticketing system. This means there will be a coexistence between closed- and open-loop. This may stay forever in cases where open-loop payment is not supposed to completely replace the legacy ticketing environment.*

In order to enable open-loop payment next to the existing ticketing system, PTOs need to develop an integration strategy that addresses the following aspects:

- Equipment
- Tariff structure and ticketing
- Backoffice and payment processing
- Customer service
- Communication and marketing

Some strategy aspects must be developed and implemented once for the implementation of open-loop payment. Others will require a phased approach to mitigate risks and learn along the way.

### EQUIPMENT

#### *Status quo assessment and gap analysis*

Enabling passengers to directly use their contactless

payment cards for tapping, travelling and fare payment brings a new type of media with their own requirements into the fare payment system. A status quo assessment of the currently used ticketing hardware needs to determine whether the system is suitable to handle EMV payment cards.

Device classes that should be considered for this assessment include:

- On-board validators
- Platform validators
- Fare gates
- Inspection devices
- Fare box

It is also important to understand if any device is certified against the required standards (see “Card acceptance and transaction security” above) when a certification would expire and whether it is renewable.

### Questions to be considered



- Do all devices need to be connected online?
- Where do you need PCI certifications within your open-loop system?
- Do all existing/ required devices have EMV L1 certified hardware?
- Do all existing/ required devices have EMV L2 certified software for all card schemes in scope of the project?
- How will you coordinate and maintain EMV L3 certifications?
- Are all the existing EMV certifications valid for a longer period than the Go-Live milestone?



### Investment and roll-out considerations

The status quo assessment will clarify whether the current ticketing equipment might be able to handle EMV payment cards or not. If you cannot keep using the existing devices, there are several ways to address this:

To be preferred

- You could retrofit installed devices to fulfil the necessary requirements of connectivity, security and interoperability and allow ticket validation and payment card tapping in one device.
- You could replace equipment to install devices that handle both, open-loop and closed-loop cards.

The remaining lifetime of your equipment and investment costs associated with the upgrade or replacing will obviously drive your decision. Either of the options described above will give a homogeneous equipment set and minimise the impact on the passenger journey.

- You could consider adding additional equipment and have separate validators and terminals in parallel for passengers to check-in.

Be aware that offering multiple devices may easily confuse passengers and erode the customer experience.

### Questions to be considered



- Can the legacy devices process the new open-loop payment media?
- Can any new devices to be installed process the legacy media?
- How will passengers recognise the terminals to tap payment cards?
- Does every entry point to the public transport system get the option to tap in with payment cards?
- Could open payment be introduced as the sole scenario for existing or new modes, lines, areas in a greenfield approach?

## TARIFF AND TICKETS

### Fare product assessment

A key question when implementing open-loop payment is how to translate the existing fare policy into the new offer. ABT with open-loop removes a lot of historic constraints on fare policy, such as the need to calculate pay-as-you-go fares in real time at the terminal or rely on complex asset management updates to refresh fare tables held on terminals.

As outlined above, contactless open-loop payment today allows three transaction models for public transport.

- A flat fare is suitable for direct contactless payment at every tap (see **Known Fare Model** above). Passengers simply use their payment card instead of a dedicated transport card for each journey and pay for every leg of a longer trip.

- More complex fare products, such as travel passes (daily, weekly, or monthly), carnets, return tickets, multi-modal / multi-leg trips in zonal fare systems are suitable to be interpreted within the **Accumulated Model** including fare capping.

- More complex and expensive fare products could also be transferred into the **Pre-purchase Model** approach.

When reviewing your fare structure, there are some deployment considerations of open-loop payment that you may have to consider:

- Reporting, accounting, and fare management in the back office could get more complex with the more tickets and fares you decide to implement. It may be a good moment to review and consider simplifying your tariff structure.

- Simplification of a customer-facing tariff structure does not necessarily simplify the complexity of the tariff configuration and management in the ticketing back office. Keep in mind the need for a comprehensive tariff engine from the outset.
- Higher price fares may be too expensive for a deferred authorisation (allowing the passenger travel before the financial transaction is completed), so make sure to address these issues in an early phase when discussing risk management with the payment stakeholders.

You may have to increase limits or agree to manage the risk more equitably.

- Concession tariffs, group, or family travel as well as bike tariffs are still challenging to be included in standard open-loop deployments. Back-office upgrades and new media types may allow this soon, but you may want to consider not including those into the initial phase of your open-loop payment system

### Questions to be considered



- Which open-loop payment model do you want to support?
- Do you want to support a best-price policy?
- Which of the established fare products are candidates to be implemented in open payment?
- Could the fare structure be made less complex?
- Should new fare products be introduced which are most suitable to be used in open payment scenarios?
- How do you bring the majority of passengers in scope for your new proposition to achieve a critical mass for the investment?

### Integrated tariff systems

Optimally, open-loop payment should be available across all public transport and mobility offers in an integrated system, but perhaps not every operator can or wants to join from day one. You could start with “island solutions” and connect them later but thinking about integration later only will make the challenge much more difficult.

It is recommended to involve all relevant operators from the beginning and develop a common vision for an open-loop payment offer. When outlining the concept, keep the door open and don't build barriers and exclude the other players.

The PTA could have a key role in moderating this process and make sure that everybody has the option to join.

### Questions to be considered



- Does your city or regional transport environment allow for collaboration between operators for fare payment?
- Do you require payment apportionment across multiple operators and how should apportionment work?

## BACKOFFICE

The ticketing backoffice is a major element of the strategic shift towards open-loop payment as it is a key component of the payment solution that provides access to system key functionalities, including:

- Customer Service
- Fare and tariff management
- Hardware and Device management
- Analytics and Reporting
- Other data services

The introduction of open-loop payment in a public transport network has an important impact on these backoffice functions, and there are new capabilities required for a successful open loop deployment.

- For customer service, shortly after open-loop payment is enabled, new use cases need to be addressed, for example, customers not understanding the charges to their payment card.
- New fare products may be introduced to make use of the potential of open-loop payment, an example is the introduction of fare capping to offer an equivalent to existing periodic tickets.

- Within open-loop payment systems, data management is subject to PCI specifications (see “card acceptance and transaction security”). The management of passenger payment data and the design of interfaces with the payment processing function defines what needs to be PCI compliant and certified, and ultimately shapes the complexity in the backoffice. For example, there may be PCI implications in the way Customer Service agents access customer's payment data from the backoffice when trying to find specific transactions or customer accounts during a customer service call.

These new requirements on the backoffice solution need to be considered when outlining the system concept and deployment strategy. A future proof and interoperable design will require the backoffice have clear interfaces with all the different components of the solution and outlining these interfaces from the early concept stages will minimise costs and risks when extending and upgrading the system in the future.

## Questions to be considered



- What tariff options should be handled by the backoffice system?
- Do you want to operate the backoffice system yourself or hosting by supplier?
- If you do it yourself, are you willing and able to fulfil the needed PCI requirements?



## CUSTOMER SERVICE

Introducing open-loop payment impacts business processes including customer servicing. The PTO/PTA and payment providers need to work together to ensure the customer knows where to go for their servicing needs. This includes easy access to customer service information, clear boundaries of responsibility, as well as consistent terminology and language.

A variety of customer service channels/ customer touchpoints can be used to support customer needs, these could be service centres and operational staff, websites and apps, or hotlines.

Collaboration is needed as customers may address the payment provider or the PTO/PTA with any question. It is important to agree on the roles and responsibilities of the different partners to ensure good feedback to customers wherever they reach out, be clear about feedback you need to provide and when to refer to partners.

Customers require clear and concise information about:

- What are the available ticketing options – fare pricing, accepted payment forms, validity, etc.
- How it works - how to use a contactless card or mobile device to access public transport, and what happens once the customers tap their card (aggregation of journeys, debt recovery and so on)
- Where to go if the customer needs assistance.
- How to create, access, read and manage a customer account.

Frequently Asked Questions can be developed for use across online channels, in app and at customer service centres.

### Questions to be considered



- Is your existing servicing platform sufficient for your needs, or is this an opportunity to upgrade or integrate existing capabilities?
- Do you want to encourage self-service or use traditional servicing channels?
- How well can your customer self-serve today and/or are there opportunities to improve self-service functionality (e.g. view transaction data, obtain online receipts, manage payments, request refunds, manage disputes etc)
- Can the customer manage their servicing needs through a single portal?
- Are you compliant with local regulations for customer services (i.e. VAT receipts, General Data Protection Regulations, etc.)?



## COMMUNICATION AND MARKETING

Contactless payments can bring a lot of change for customers, from the way they enter the public transport system to how and what they pay for their travel tickets, and perhaps new servicing capabilities. For some customers, they may be regularly using contactless technology for the first time. Contactless may be as new to your staff as it is to customers, so plan for both.

- Preparing the internal communication may need to include staff training materials and activities, intranet publications, internal workshops, webinars and briefings;
- Getting ready for external communication may comprise targeted information to existing registered customers, PTO/PTA marketing material including on-site posters, press release, print, social media, and above and below the line advertising.

When building your Communication Plans, consider what you want to communicate to your staff and customers and when, then decide on the most appropriate mix of servicing and marketing communications, for example:

- Pre-launch: communications introducing the idea of contactless, education on how it works, any new things customers have to do, the benefits, launch dates, new factual information (e.g. ticketing innovations etc) – for both staff and customers
- During launch: public relation and promotional launch activities, connect with partners to ensure fast response to customer feedback especially if it's going great or trouble shooting if something has gone wrong
- Post launch: ongoing servicing and marketing communications

### Questions to be considered



- What terminology needs to be aligned with your partners and where to add these to your marketing, servicing and training materials?
- What servicing and marketing plans need to be developed to include pre, during and post launch activities?
- What branding requirements, approval processes and lead times need to be agreed with your partners?
- What contingency plans are necessary – for example, what happens to marketing activities if launch is delayed?





With this second step you have translated your strategic vision for the implementation of open-loop payment into a concept and laid out the development work to be done.

You have clarified:

- The capabilities and limitations of your existing ticketing equipment, and the upgrades and improvements needed to be able to accept payment card payment.
- The strategy to roll out open-loop payment and to integrate the needed hardware with the existing ticketing system.
- The fare products to be translated into the open-loop payment offer to reach the maximum number of passengers.
- The foundation you need to lay to enable open-loop payment across the entire mobility system, either already now, or in the future.
- The functionalities your back-office system needs to be capable of and how to integrate existing processes into one coherent system.
- The implications of open-loop payment on customer service.
- The communication and marketing needs associated with the implementation of open-loop payment.

Having your concept outlined with these details will give you the building blocks to describe your needs and expectations for the procurement of systems, technology, and services to implement open-loop payment.

## OUTLOOK

*With this implementation roadmap, the Urban Mobility Open Payments Forum aims to guide interested public transport stakeholders through the planning, building, launching, and ongoing improvement of open-loop payment acceptance in public transport networks.*

*The current edition of this document focuses on the planning and design phase. Subsequent editions will add guidance for the tendering process and considerations for system development and project launch.*

*UITP is committed to helping PTOs create efficient and sustainable open-loop systems through enabling secure digital payment solutions.*

*To learn more about UITP's Urban Mobility Open Payments Forum and how to get involved, please visit [openloopmobility.uitp.org](https://openloopmobility.uitp.org).*

## GLOSSARY

<b>Account-Based Ticketing (ABT)</b>	The smart card or ticket media only acts as an identifier (or token). Travel rights, trip records and tariff policy are stored in the back office.
<b>Accumulated model</b>	An EMV transaction model developed for public transport, where the final transaction value is unknown at the start of a journey. The payment card is used as credential for travelling and a financial transaction is processed when the full journey is completed, and the fare is calculated accordingly.
<b>Acquirer</b>	The financial institution of the PTO or PTA, processing and settling payments and charging for journeys made.
<b>Automated Fare Collection (AFC)</b>	The collection of components that automate the ticketing and fare collection in public transport. It stands in contrast to manual fare collection.
<b>Back-office</b>	Administrative and operational components of the ticketing system that are not directly visible and accessible to passengers, and which handle various tasks related to fare management, financial transactions, and data analysis.
<b>BRT</b> (Bus Rapid Transit)	High-capacity bus system that runs on dedicated lanes, stops at well-defined stations, and includes a technology that enables passengers to pay before boarding.
<b>Closed-loop ticketing</b>	<p>It reflects the classic ticketing process in public transport relying on dedicated cards such as those based on MIFARE®, CIPURSE™ or Calypso®. It requires customers to buy a ticket first, which enables them to travel and they use this ticket to gain access into that public transport operator's system.</p> <p>This form of ticket media is specific to public transport and can only be used for travel purposes on the services that the PTO/PTA who issued the closed loop ticket provides or has agreements with. The management of ticket media and related infrastructure is the responsibility of the PTO/PTA.</p>
<b>Debt Recovery</b>	A method PTO/PTAs can use to recover unpaid fares. This process could be initiated by the passenger through customer service or via his ABT user account. It could also be initiated by the PTO/PTA following transit specific rules that allow the resubmission of a previously declined transaction for a period of time.
<b>Deny list</b>	Contains payment cards blocked by financial institutions because of suspicion of fraudulent use, blocked by the PTO/PTA based on previous behaviour (unpaid travel). Cards listed in the deny list cannot be used to access the public transport network.
<b>EMV</b>	Payment standard that enables globally interoperable secure payment, originally created by Europay, Mastercard, and Visa.
<b>Fare capping</b>	PTO/PTA limits the amount of money a passenger is charged for fares during a specific period, such as a day, a week or a month. With this option, PTO/PTA can guarantee a cost limit for regular passengers, removing the need to offer a daily-, weekly- or monthly ticket.

<b>GDPR</b> (General Data Protection Regulation)	European Union regulation on Information privacy in the European Union and the European Economic Area.
<b>Issuer</b>	The bank or financial institution that issue a contactless payment card to the passenger.
<b>Merchant</b>	The PTO, PTA or ticketing system operator accepting contactless payment cards to tap into public transport.
<b>Mobile Wallet</b>	An App that stores payment card information on a mobile device, examples include Google Pay, Apple Pay, Samsung Pay and others.
<b>Open-loop payment</b>	A payment card or mobile device becomes the ticket and is the means of payment at the same time. Passengers are able to access public transport simply by tapping a valid open-loop contactless payment media on the terminal.
<b>PAN</b>	Primary account number - is the 16 digit number displayed on the card.
<b>Payment gateway</b>	Connects the back-office to the payment network (acquirers, payment schemes and issuers), it manages sensitive payment data and processes (incl. PAN decryption, PAN storage, tokenisation) and needs to be PCI-DSS certified
<b>Payment schemes</b>	Facilitate digital payments between cardholders, merchants, and financial institutions. They provide global standard payment rules that help connect these individual parties, and ensure transactions are routed correctly so payments can be processed successfully.
<b>PCI-DSS</b> (Payment Card Industry Data Security Standard)	An information security standard used to handle credit cards from major card brands. The standard is administered by the Payment Card Industry Security Standards Council, and its use is mandated by the card brands
<b>PCI-PTS</b> (Payment Card Industry PIN Transaction Security)	A security standard for all terminals and other hardware used for handling PIN. All suppliers of PIN applications must comply with the requirements and the guidelines related to PTS.
<b>PTA</b>	Public Transport Authority
<b>PTO</b>	Public Transport Operator
<b>Tokenization</b>	The process of replacing a card's credentials ( PAN, expiry date and sequence number) with a unique alternate card identifier or "token." Tokenization reduces fraud related to digital payments by making transactions more secure.



---

This is an official Report of UITP, the International Association of Public Transport. Its membership includes transport authorities, operators, both private and public, in all modes of collective passenger transport, and the industry. UITP addresses the economic, technical, organisation and management aspects of passenger transport, as well as the development of policy for mobility and public transport worldwide.

This Report was prepared by the Urban Mobility Open Payments Forum.



---

**JANUARY | 2024**



Rue Sainte-Marie 6, B-1080 Brussels, Belgium | Tel +32 (0)2 673 61 00 | Fax +32 (0)2 660 10 72 | [info@uitp.org](mailto:info@uitp.org) | [www.uitp.org](http://www.uitp.org)