



The Future of Closed Loop Cards in Transport



Thales **Banking and Payment Services**

Ticketing ecosystems are evolving

Over the past decade, a number of major innovations have been introduced that are transforming transport ticketing ecosystems. In particular, Account Based Ticketing (ABT) and the acceptance of bank cards at passenger gates are now pre-eminent in the strategies of major transit agencies. This document explores the opportunities that these trends are creating in terms of the use of closed loop cards.

THALES
Building a future we can all trust

Thales (previously Gemalto) is a long established leader in the fields of EMV payment and, more specifically, the

issuance of physical and digital cards. Thales manufactures around one billion payment cards every year and digitises bank cards in most OEM Pay wallets, including Apple Pay and Samsung Pay.

Thales is also a key player in the digitisation in smartphones of transit cards used in Hong Kong and Paris. The evolution of Automated Fare Collection (AFC) systems therefore puts Thales in a unique position to combine its expertise in both EMV and mobile technology for the benefit of transport operators worldwide.

Reflecting this, Thales now offers an extensive portfolio of products and services for managing EMV-based fare media.

Open loop payment is the new standard in transport ticketing



Enabling passengers to enter a transport network simply by tapping a bank card on a validator or at a gate is an increasingly popular option. Close to two hundred of these open loop payment projects are currently under development, supported by international card schemes. Dozens of transport systems already use this approach.

There are several reasons for the rapid growth:

- Transport for London (TfL) has actively shared and publicised the benefits realised by its open payment scheme, particularly in terms of reducing the cost of fare collection. Since the launch of open loop payment, these costs have continued to fall and they currently stand at half the original level. Not surprisingly, this has inspired other transport authorities to follow suit.

For TfL, the benefits go much further than straightforward cost reduction:

- Open loop payment has attracted new types of travellers and increased ridership.

- Every survey undertaken has shown that travellers really appreciate and enjoy the ability to skip the queues at ticket vending machines. What's more, the wide range of different nationalities that are taking advantage of open loop payment demonstrates just how intuitive the system is. It also confirms its suitability for occasional users of transport networks.

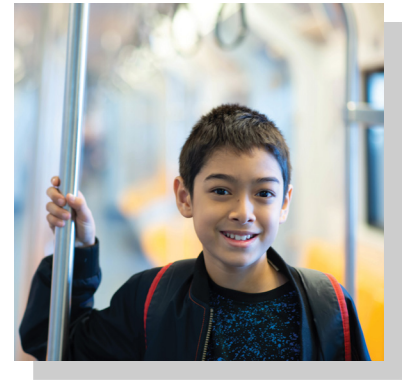
Deploying open loop ticketing is a no-brainer

Cutting the number of physical tickets that are issued clearly leads to a direct reduction in costs. But it also generates further savings, because the cash handling and manual debit transactions associated with traditional sales channels also shrink. The savings are even greater when occasional travellers use a bank card instead of purchasing the costliest types of single ticket (paper, magnetic, etc.).

In an ideal situation, all physical fare media would disappear. The benefits of the open loop payment system would be optimised. However, in London and other transport networks that have adopted this approach, the closed loop cards issued by the transit agencies and designed specifically for its transport network remain in use. Why is this?

- Some travellers do not have a bank card, and public transport must remain accessible to everyone
- Some travellers are unwilling to use their bank cards, either through habit or personal choice
- Managing special or exceptional fares can be complex when associated with a bank card
- Some transit agencies prefer to remain in control of transit cards and their holders

So the question remains: what is the best pathway to reduce system complexity and associated costs, while addressing the ongoing need for closed loop cards?



The answer: use the EMV technology that underlies bank cards for the closed loop transit cards too

Open loop is a cost saver, but running an open loop system in addition to a closed system is a far from perfect solution. Better results can be achieved by increasing the commonality between them. This implies:

- Migrating the closed loop system from a card-based to an account-based solution. Bear in mind that closed loop cards will also derive significant benefits from the power of an ABT infrastructure. For users, these advantages include remote management of their ticketing account and greater fare flexibility. Transit agencies also benefit from enhanced flexibility, as well as lower cost of operation, improved levels of customer satisfaction, and much more besides.
- Migrating the closed loop cards from the legacy technology to EMV. Acceptance devices (gates, validators, inspection devices) are simplified and can be acquired from many different sources. Many of the functionalities of both open loop and closed loop systems, such as fare calculation and transit accounts, can typically be shared on the same back office infrastructure.

Beyond the rationalisation of the ticketing system, adopting EMV for closed loop cards brings additional benefits. Notably these include greater potential for digitisation and extension to new use cases.

Physical fare media disappear when digitised into mobile devices such as phones and smart watches. The purchase of tickets from these devices no longer involves cash. Tickets can be purchased anytime and anywhere, avoiding the need to queue at a station's ticket vending machine, particularly during rush hour.

The legacy technologies used in ticketing systems demonstrate limitations when it comes to digitisation. Some are very restricted in terms of the number and types of mobile device they can support. Moreover, integration with a bespoke system can be exacting and validation complex. In contrast, the technology underlying bank cards (i.e. Europay, Mastercard, Visa, EMV) is supported by the vast majority of mobile devices and all OEM Pay wallets; hundreds of millions of bank cards can be digitised in just a few clicks by their holders.

Of course, not all travellers have a mobile phone, are tech savvy, or regular consumers of mobile applications. Physical cards remain a necessity. In this respect, deploying bank card acceptance is an opportunity to reconsider the technology involved and see if it makes sense to harmonise all the NFC (Near Field Communication) cards in use.

EMV brings a series of advantages to transit agencies:

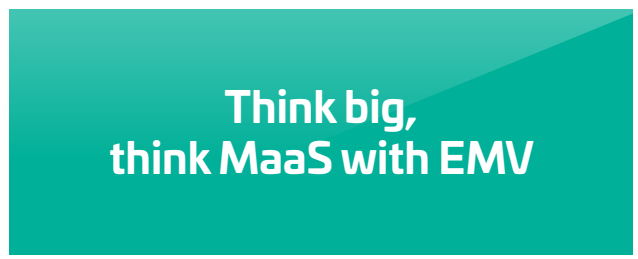
- 11 billion EMV cards are in circulation worldwide, demonstrating the high level of security that they provide
- There are a vast number of card makers and point-of-sale terminal manufacturers, demonstrating interoperability without any limits in terms of scale. This is the result of a mature ecosystem of specifications for third parties in charge of device validations, and their compliance with these specifications.
- EMV has a global footprint
- It is an open market, and fierce competition determines price strategy
- The authentication of a card holder at the gate does not require the use of a Security Application Module (SAM)

EMV is the technology of choice for digitisation



Ticketing applications tend to be integrated with broader offers. The transport card may be accepted in alternative retail outlets or the transport offer completed with Mobility as a Service (MaaS) applications. From a ticketing perspective, MaaS either collects and collates several tickets for different legs of a journey and presents the right ticket to the various validators, or collates one multimodal ticket accepted across the entire journey.

EMV is the most ubiquitous and interoperable technology enabling the convergence of retail and multiple transport use cases in a single mobile application or a single card.

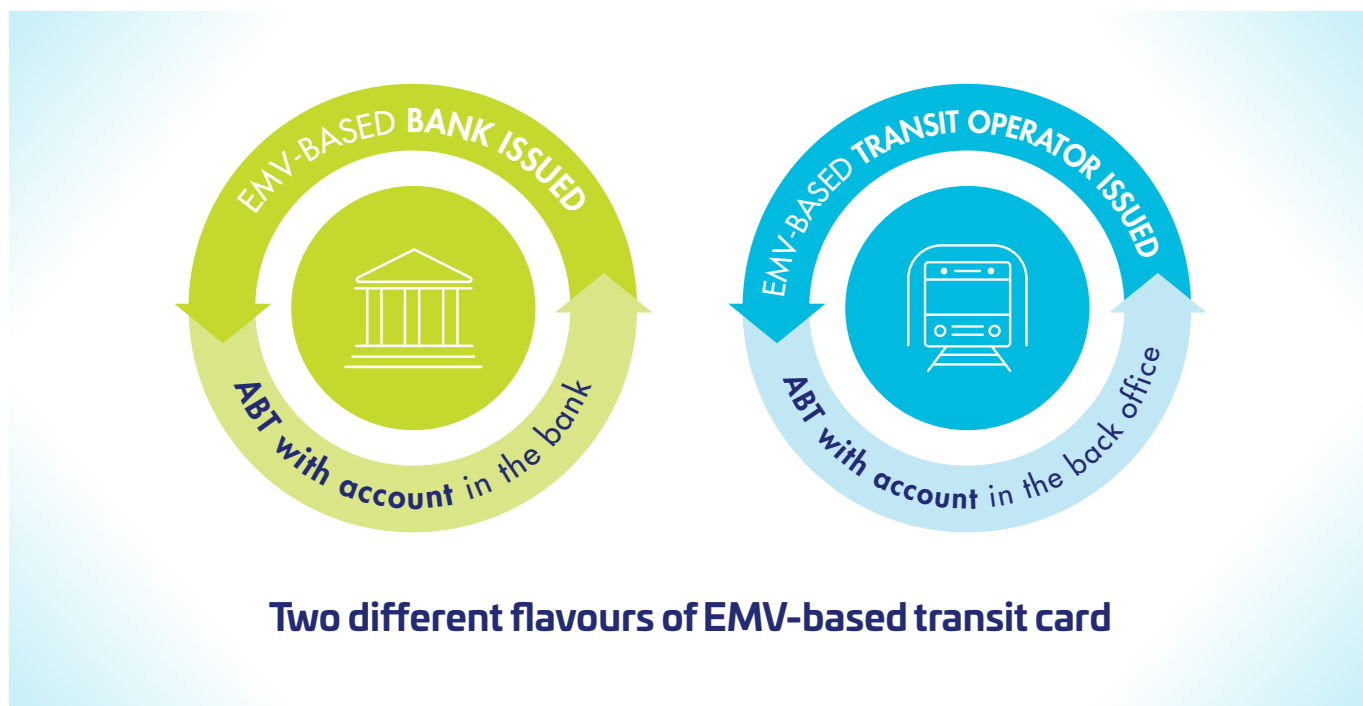


When the different infrastructures cannot be unified under the umbrella of a single ticketing system, and when multiple tickets need to be collected and redeemed, EMV presents

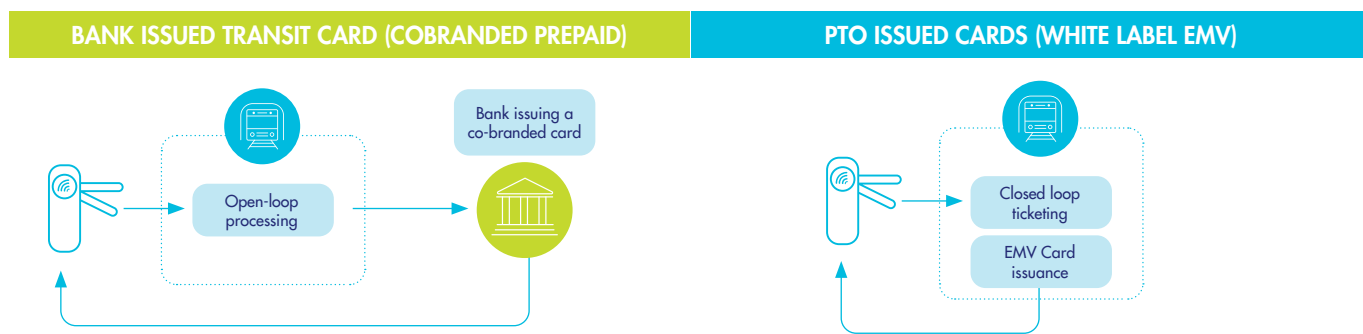
a feature that provides the best possible user experience. Traditional technology requires the user of a mobile app to select the right ticket from their touchscreen before tapping on a gate or a validator. In an EMV implementation, all tickets are active: one EMV transaction is associated with each ticket. The user presents the device to a validator, with tickets in a directory, and the validator can select its own ticket without the need for intervention by the phone user.

There are two ways of using EMV technology to issue closed loop transit cards:

- 1 The transit agency can authorise a financial institution to issue transit cards that are similar to bank cards. These prepaid cards use the open loop rail (i.e. the entire technical chain that runs from the validator to the card issuer). The traveller's account is managed by the financial institution.
- 2 The transit agency can issue the cards itself. These cards are not bank cards, but they use the same EMV technology. All transactions are processed by the ticketing back office. The traveller's account is also managed by the ticketing back office.



Two different flavours of EMV-based transit card



Prepaid fare cards offer a seamless migration

The simplest way to substitute EMV closed loop cards within the legacy technology is to use the open loop infrastructure and issue prepaid fare cards to travellers who either do not have a bank card or do not want to use their bank card in the transport system. A prepaid cards programme manager (BIN Sponsor) is in charge of the issue and distribution of cards, the management of accounts, and the topping-up of these accounts.



Benefits and opportunities

- The CAPEX is limited as it reuses the open loop transaction processing
- The prepaid cards programme manager uses the open loop infrastructure to issue physical and digital cards
- A variety of business models are enabled with programme managers and schemes to share risks and benefits

Drawbacks and risks

- Numerous stakeholders contribute to the system, which has an impact on processing costs
- The transit ticketing scheme is a payment scheme; numerous regulations apply, and certifications are required
- There is a risk that travellers engage with the programme manager, not the transit agency
- There is a high risk of bad debt if the card is a General Purpose Reloadable (GPR) Card accepted in retail, and if transport transaction processing is not performed in real time
- The programme manager notifies the traveller of payment for aggregated travel events. In the best cases, the traveller has access to their travel log the next day, provided that the ticketing back office can link the log to the prepaid card. This requires a minimum of compliance with payment regulations (PCI). Dependent on fare rules, a transit agency may want to manage the traveller information directly; for example, notification of transaction discounts, or when a cap is reached.
- Some transit agencies choose to charge maximum fare at tap-in, and refund at tap-out, only notifying the final fare paid at tap-out. A payment-oriented notification informs the traveller of both events. This may lead to confusion on the part of the traveller.

This implementation has been in use for a few years, notably in the USA. But some actors are now challenging the model, with the aim of introducing shorter loops.

White label technology removes dependence on many third parties

In this implementation, the transit agency's back office directly manages the traveller accounts. This requires the back office to support additional functionality. Everything relating to the calculation of fares is unchanged. However, instead of addressing payment requests to the programme manager, the ticketing back office holds and debits the customer account. This implementation allows additional fare structures such as monthly passes, or post-paid products (where fares are charged to the cardholder account at the end of the week or month).

In this implementation, the cards are reused as fully closed loop authentication tokens, not really as payment cards. They use a white label EMV technology. The transit agency becomes the owner of the technology and can define its own rules of use.



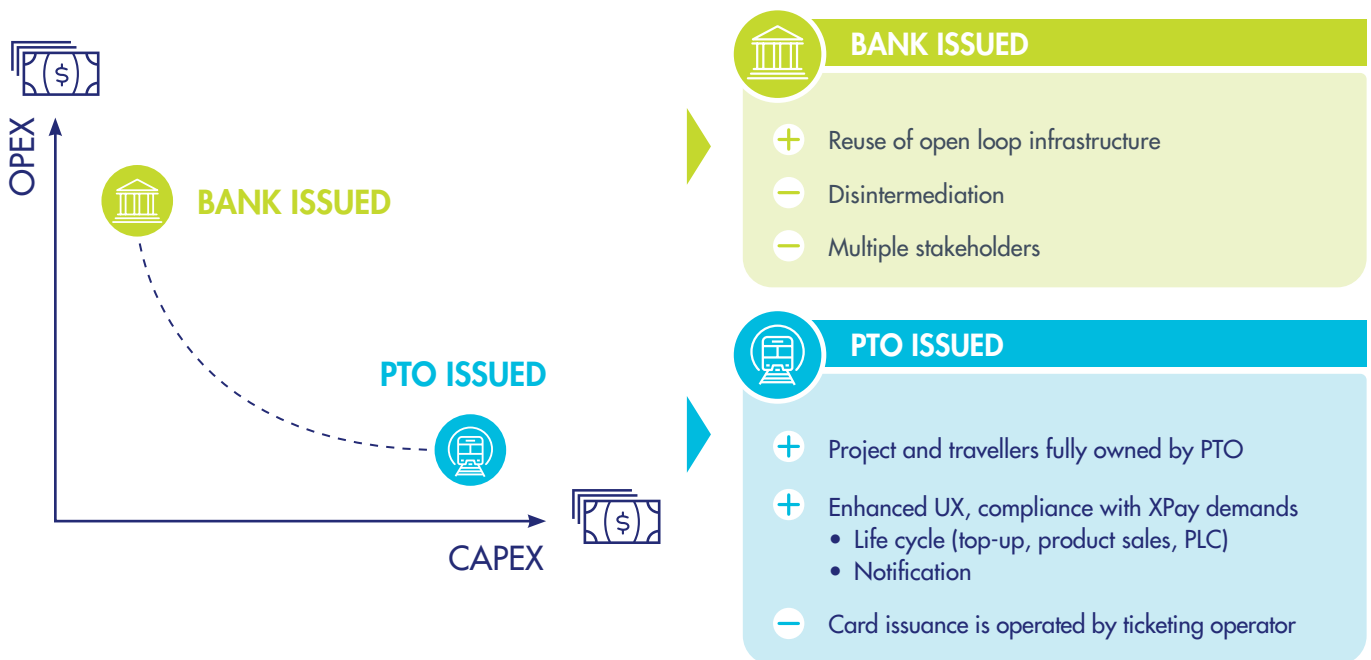
Benefits and opportunities

- Minimal operating costs with a reduction in participants
 - The cards are not bank cards: payment regulations do not apply to transaction processing
 - Full control of the customer relationship by the transit agency
 - Management of account trends to tailor risk management (minimum funds, auto top-up)
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- The ticketing back office manages notifications. They can be filtered and edited to report real ticketing events, and other types of messages and alerts. Notifications can happen in real time.
 - In the event of changes to the fare structure, notifications can be tailored and adapted
 - Fully independent solution, fully closed loop
 - Transit accounts can be linked to other forms of identity (for example, a student card), reducing card costs

Drawbacks and risks

- The transit agency takes direct responsibility for issuing EMV cards and may not be familiar with this payment standard
- The transit agency takes direct responsibility for issuing digital EMV cards and may not be familiar with the mobile ecosystem and how to address mobile wallet providers
- Additional CAPEX (development at back office level) is required

The two implementation scenarios described above present benefits and drawbacks, which are summarised in this chart:



A transit agency may prioritise CAPEX reduction and then decide to invest to reduce running costs in a second phase, or to broaden its footprint in the context of a MaaS project.

Make the system agile with a modular architecture and procurement strategy

Modularity for future proofness

Current trends favour flexible and agile fare collection systems. This requires the procurement of modular systems, designed around a series of APIs. The cards issued can be linked to either a transport account, a payment account, or a customer account, and this may vary over time; these accounts must be accessible without a complete redesign of the system. The system may be renewed or migrated progressively to a cloud infrastructure.

In addition, these complex ecosystems have seen the growing importance of specialised actors and, specifically, stakeholders from the payment industry. The procurement of a payment functionality and card distribution system must be independent from the procurement of a fare calculation engine. That's because they do not involve comparable activities and therefore the same company should not be used.

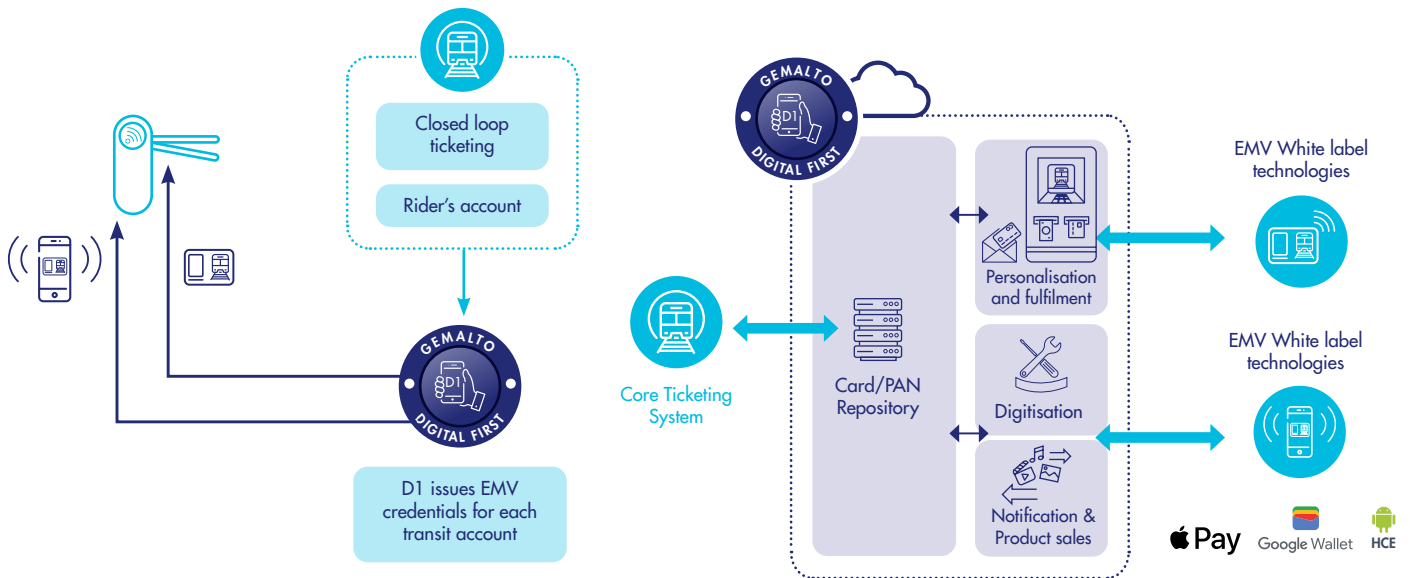
THALES helps ticketing integrators with the issuance module

To enable transit agencies to issue their own EMV cards, Thales provides ticketing integrators with a **service for issuing physical and digital EMV cards**. Thales provides a **white label EMV technology**; this reuses kernels already deployed in the open loop system thanks to a license owned by Thales.

Offered in SaaS mode, this solution also enables the mobile phone to be used as a **sales channel for transport tickets**.

A specific engine **informs the traveller** in real time of events occurring on their account, as well as more general travel information.

Thales' **D1 for transit** connects directly to the ticketing back office:



Read more at [Mobile Ticketing & payment for public transportation \(thalesgroup.com\)](https://www.thalesgroup.com/en/mobility/solutions/mobile-ticketing-payment-public-transportation)

CONCLUSIONS

- The growing number of open loop implementations has led to the definition of new architectures and new responsibilities for the various stakeholders
- EMV technology has not yet revealed its full potential in transit ticketing
- It is wise to consider all options before defining the architecture of a roadmap for a ticketing system
- A modular approach is a prerequisite to guarantee the smooth evolution of the system

Thales enables new options for the use of EMV cards as closed loop cards issued directly by transit agencies.

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