Closed-loop EMV transit ticketing
with no payment fees attached

Contents

Recent white papers from Thales have detailed how our EMV white label solutions provide a **superior user experience** and put **transit agencies at the centre** of the mobility offering. Most notably, this is in the context of MaaS (Mobility as a Service). These white papers can be found at **Transit Ticketing Solutions** (2023)

In this latest addition to the series, we review the opportunities for **cost savings** that are created when Thales's EMV white label technology is applied to closed-loop cards.

## EMV is the new must-have in transit.
But why is that the case, and what is the best way to go about implementing it?

A growing number of transit agencies are accepting bank cards at their gates and bus validators. They therefore have to deploy the EMV technology that underlies these cards. In contrast to traditional closed-loop systems, this open payment ticketing is the new must-have for transit agencies. Open payment ticketing has proven its convenience for occasional users such as tourists, and demonstrated equally strong appeal to regular passengers. By displacing cash and eliminating the need to issue transit cards, open payment solutions reduce some of the hardware costs incurred with a smart ticketing system. However, new types of cost are generated by open payment. New players such as payment gateways, acquirers, payment schemes and issuers must be compensated for their services, and for sharing the debt risk with the transit agency.

Despite the current enthusiasm for open payment, there are several reasons why closed-loop cards are still required. For example:

- They enable direct engagement with passengers and keep transit authorities in the driver's seat

- The full portfolio of fare products can be proposed, and concessions granted and managed more easily

- Closed-loop cards serve users who either do not have bank cards, or are not willing to use them in crowded environments

- Closed-loop cards serve people who want to remain anonymous

- As detailed in the recent white paper **Transit Cards in Mobile Wallets (2023 White Paper)**, closed-loop cards benefit from a much better user experience in the digital world. Any type of ticket can be purchased in a click, and the user is informed in real time of what fare has been charged, and when spending caps have been reached, for example.

Now consider this. Thales has introduced an EMV white label technology for closed-loop ticketing that is cheaper to operate than other technologies.
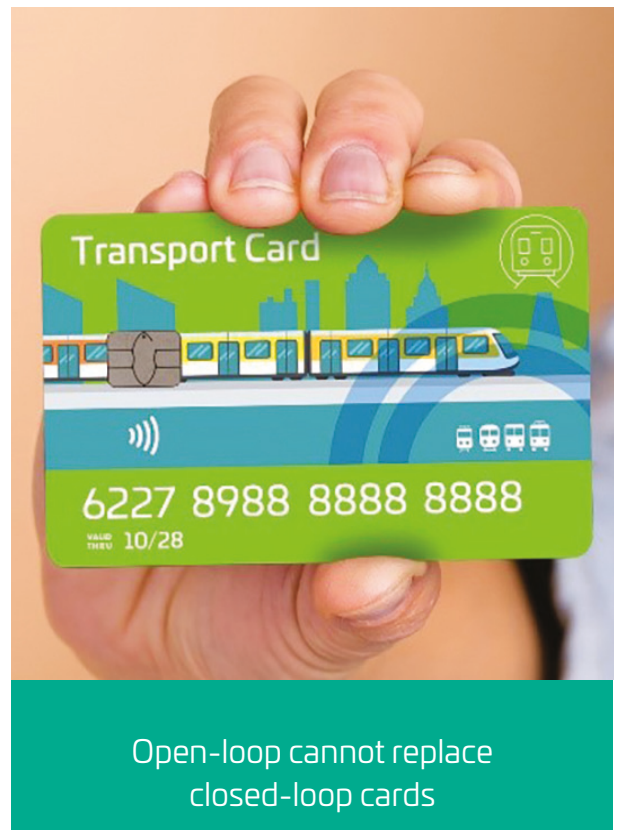
Open-loop cannot replace closed-loop cards

EMV technology
can be applied to use cases beyond payment

As far as the collective consciousness is concerned, EMV relates to payments. It carries the image of something expensive and complex. Consequently, it is assumed that payment specialists should be involved to handle this sensitive asset.

In reality, the complexity relates to the use case, not the technology. When properly implemented for ticketing, EMV demonstrates it is more straightforward than legacy technologies. There is no need to deploy Secure Application Modules (SAM) in readers. Neither security nor interoperability involves the exchange of secret keys.

EMV also proves to be more reliable, as it benefits from an established ecosystem that guarantees the interoperability of payments on a global scale. Today, 11 billion cards are in circulation and 130 million new POS (point of sale) terminals are shipped every year. All of these devices succeed in performing interoperable transactions, thanks to certification programmes executed by third party laboratories and independent certification bodies.

The use of EMV provides access to an open market comprising 45 manufacturers of payment cards, 49 makers of terminals, and all the benefits that result from such healthy competition. (Source: Nilson Report 2022).

The ubiquity of EMV technology can also be seen in the mobile domain. Most mobile phones are not only NFC compliant, but also EMV compliant. Moreover, the digitisation of EMV cards is a feature offered by many players, including Thales, without exclusivity of any kind. This is in sharp contrast to legacy technologies. In some cases, these are subject to lock-in by a single player.

Another common misconception is that EMV comes with a series of regulatory constraints such as compliance with the PCI (Payment Card Industry) standard, EMVCo

In a closed-loop ticketing context, EMV is simpler to implement than legacy technologies.

certification or tokenisation. The latter consists of replacing PANs (Primary Account Numbers) with aliases in mobile devices or online services to mitigate the harm caused if security is compromised and limit the precautions that need to be taken when using tokens.

EMV transactions are completely secure, and fraud is very scarce in the payment ecosystems even though huge amounts of money are involved in these transactions In a ticketing system, the PAN is not linked to an account containing the savings of the cardholder and protected by the PCI standards, but low amounts corresponding to a few tickets or a subscription. No additional measure needs to be taken when using EMV rather than any other ticketing technology.

In reality, with correct implementation of EMV for closed-loop ticketing, the payment constraints disappear. No PCI, certification or tokenisation requirements apply.
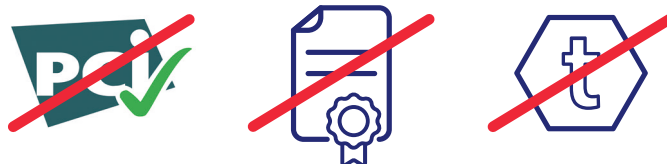
Figure 1: Key simplification factors provided by EMV white label compared to prepaid cards.

The correct approach to implementing
EMV-based closed-loop cards

After implementing open payment EMV acceptance in a transit ticketing infrastructure, the obvious temptation is to rationalise the front-end equipment and adopt EMV for closed-loop cards as well. Typically, the first idea that springs to mind is to ask a financial institution to issue prepaid cards, and add the transit authority's brand to them. Passengers can load these cards with money, and use the open-loop system to pay for their fares,

just as they would with a debit or credit card. The prepaid card can become purely closed-loop if it is provided with a specific application identifier or issuer identification number that is accepted only in the relevant transit authority's infrastructure.

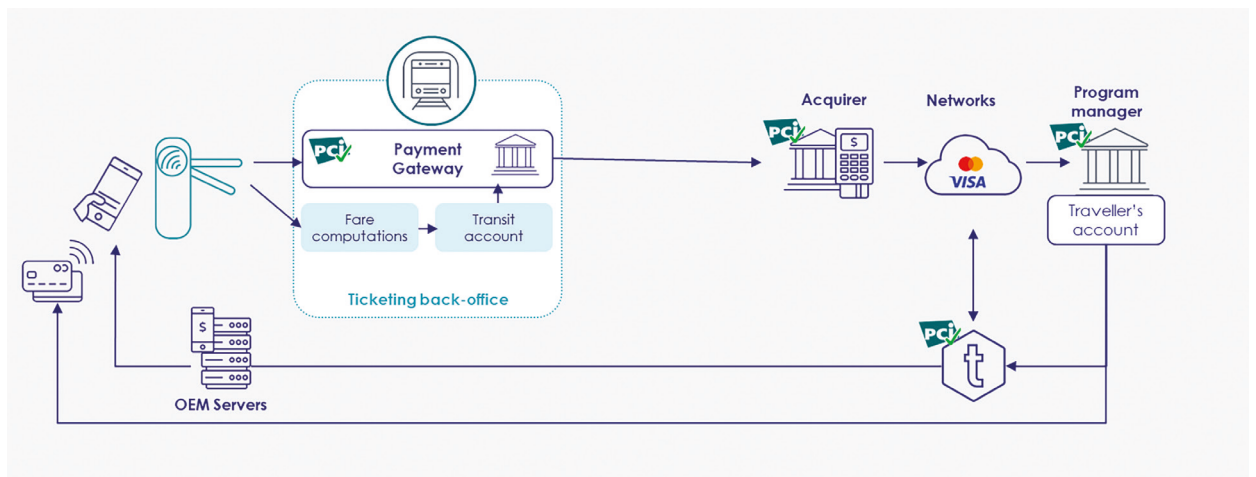Figure 2 details the main elements and connections that make up such a solution.

Figure 2: Closed-loop EMV card using a co-branded prepaid programme

This approach is clearly straightforward and brings peace of mind because it relies on an established transaction process. A series of payment players ensure that everything runs smoothly. A prepaid payment manager is responsible for the traveller's account and all interfaces with the traveller.

For transit operators that want to focus on their core mission of running buses and trains safely and punctually, rather than being actively involved in the ticketing process itself, the co-branded approach is the most convenient option. Moreover, the payment sector is perfectly equipped to manage this type of ticketing scheme. However, the service provided comes at a cost.

The transit cards are in fact bank cards. As a result, all the usual banking constraints apply. Payment players need to be involved to issue the cards, manage passengers' accounts, process transactions and digitise the cards into mobile wallets.

The genuine white label technology and relevant infrastructure proposed by Thales removes these additional cost burdens. No external party is needed. Even though the cardholder identifiers have the structure of a PAN, they can be issued, stored and processed just like transit identifiers, without the regulatory constraints that are associated with payments. Among others, the PCI regulation does not apply.
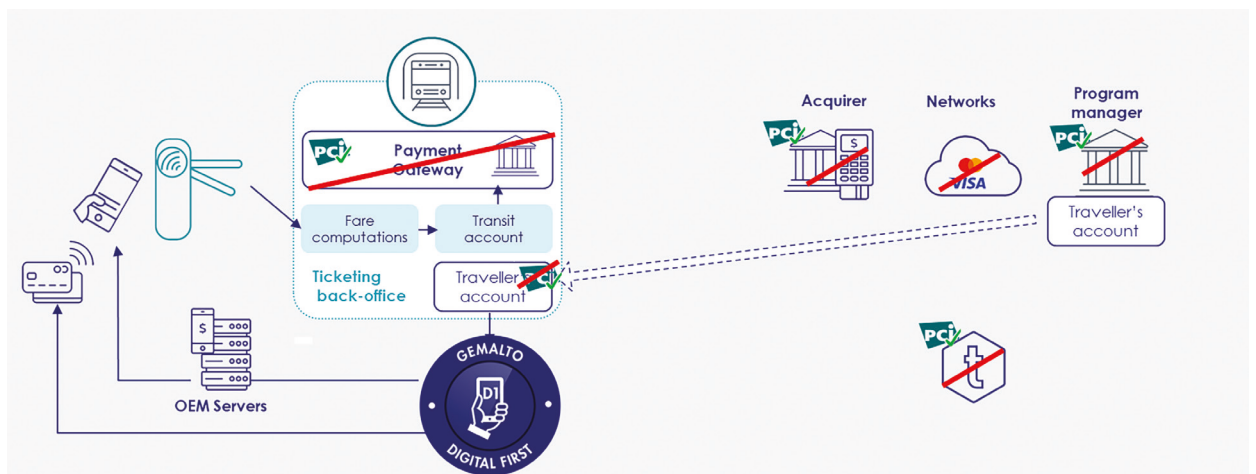

Figure 3: Closed-loop EMV card using a Thales white label implementation

As depicted in figure 3, the passenger's account is managed by the ticketing back office and the Thales Digital First platform issues EMV PANs. The same process applies for both physical and digital cards, and there is no tokenisation before digitisation. Once issued, these PANs are provisioned in the back office. The back office does not need to rely on external parties for processing transactions. Concessions and promotions can be registered to these PANs in the back office without having to deal with any additional issues. PCI certification.is not required. Passengers and the ticketing system (CRM, web services etc.) are free to exchange the PANs to identify the account.

Consequently, the customer account is checked or debited in real time on every tap. No aggregation is required, and spending caps can be applied as soon as they are reached.

- Users are informed in real time of any events that occur on their accounts: low balance, expiry, new travel logged etc.

- Risks can be limited, thanks to real time or near -real time balance updates, and the processing of every tap without aggregation. The account can only be used for transportation, the transit agency can anticipate balance getting low and make sure that a top-up will be performed by the card holder. The transit agency can favour auto top-up mechanisms, inform the users of the need of a top-up, manage grey lists and blacklists in real time etc.

Further details of the benefits of the Thales solution, in terms of the user experience and wallet adoption on one hand, and better positioning of the agency in the ticketing and MaaS ecosystems on the other, can be found in our recently published white papers:
Transit Cards Mobile Wallets.

In brief, the key advantages include:

- Real time information for passengers

- The ability to purchase tickets in a few clicks

- Putting the transit agency in control of passengers' accounts and data.

Building on these previous white papers, this document focuses on the economics of the Thales solution.

THALES

Offer the best experience to riders while reducing operating costs

Where are savings generated when deploying EMV white label?

1. Equipment rationalisation.
As mentioned, removing legacy ticketing technologies and replacing them with EMV provides the opportunity to rationalise equipment, and purchase cards and readers from an open and very competitive market. The same goes for services such as digitisation.

2. Transaction fees.
Another breakthrough can be achieved by adopting a white label architecture rather than using prepaid cards. As figure 3 highlights, implementing white label EMV eliminates the need to engage multiple different players. As a result, numerous additional fees are avoided:

- Payment gateway processing fees: these are charged by the payment gateway substituting PANs with internal tokens,
aggregating the transactions and applying business rules from the payment schemes

- Merchant Service Charge/Merchant Discount Rate: charged by the acquiring processor routing the transaction to the correct network

- Assessment fees: these are included in the Merchant Service Charge, and charged by the payment scheme network

- Issuer fees: these are included in the Merchant Service Charge, and usually made up of a programme manager fee and a BIN sponsor fee. They are charged by the issuer.

The value of these fees depends on several factors:

- The card brand

- The country. Note that only issuers' fees can be regulated, and the values are also country dependant.

- The average price of tickets

- The size of the transit agency, the volume of its closed loop transactions, and its capacity to negotiate are also key determinants.

No precise figure can be provided for the savings achieved by eliminating all these fees. The exact value will vary from one agency to another. However, it can amount to several percentage points of total farebox revenue, particularly for smaller agencies that sell tickets at low prices.

Figure 4: The positive impact of open-loop ticketing: TVM removals in London.

3. Savings generated by digitisation into mobiles

Open-loop can significantly reduce the cost of fare collection by limiting the number of issued fare media. This is critical because issuance is considered o represent almost half the cost of fare collection.

Digitisation achieves the same result as open-loop in reducing the need for fare media. There is no need for the transit agency to purchase physical fare media (paper tickets, plastic cards, contactless tokens), and personalise them (electrical and graphical personalisation). Moreover, there is no need to maintain physical sales channels. This unlocks an array of savings:

- Reduction in the number of Ticket Vending Machines (TVM), and related maintenance and operating costs. The cost of a TVM ranges from $10k to $50k; the operating costs can represent up to 20% of this figure.

- Reduction of fees paid to retailers selling tickets. This represents a few percentage points of the face value of tickets, plus the cost of shipping them to retailers.

- Reduction in cash handling and related costs, which include collection, vaulting, secure transport, change machines in TVMs, infrastructure costs to protect staff and assets handling cash (notably kiosk attendants and bus drivers), not to mention internal fraud. Typically this adds up to a few percentage points of the amount being handled.

- Reduction in bus dwell time, and consequently the number of buses needed on routes where drivers are required to sell tickets to passengers.

Removing the need for passengers to queue at TVMs and speeding up buses improves convenience for users, and enables cost efficiencies for transit agencies.

Digitisation achieves the same results as open-loop in reducing the need for physical fare media

HOW DOES EMV WHITE LABEL BOOST THE DIGITISATION OF TICKETING INTO MOBILES?

The answer is simple: by removing barriers and increasing the appeal of digitisation to passengers.

Although we live in a digital word, the digitisation of existing NFC transit cards in mobile phones remains marginal. Outside of China, fewer than ten cities worldwide have deployed this option. These include Japan's Suica, Hong Kong's Octopus, Navigo in Paris, Portland's Hop, Los Angeles' TAP, San Francisco's Clipper and Washington's SmarTrip.

Digitisation of legacy transit ticketing technologies appears to be technically painful, requiring huge efforts in validation to cover all use cases and to guarantee the compatibility of phones with existing infrastructure. In addition, some historic players in smart ticketing technologies have locked-in the digital market, forcing agencies and ticketing integrators to deal exclusively with them.

In contrast, digitisation of EMV cards in OEM wallets such as Apple Wallet, Google Wallet and Samsung Pay is very common and highly accessible:

- Lots of cardholders use the service
- Most phones are both NFC and EMV compliant
- Numerous different digital solutions are available on the market.

Another advantage is that EMV readers deployed in transit infrastructures benefit from the same ecosystem that has been established to guarantee the global interoperability of EMV cards and EMV POS. No intensive testing is needed.

For all these reasons, major wallet providers favour EMV over legacy technologies. It is therefore easier to secure their support for such projects.

Travellers are very keen on using mobile wallets rather than physical bank cards in transit systems. This is illustrated by the evolution in the share of EMV transactions that are accounted for by mobile wallets in a number of major transit ecosystems:

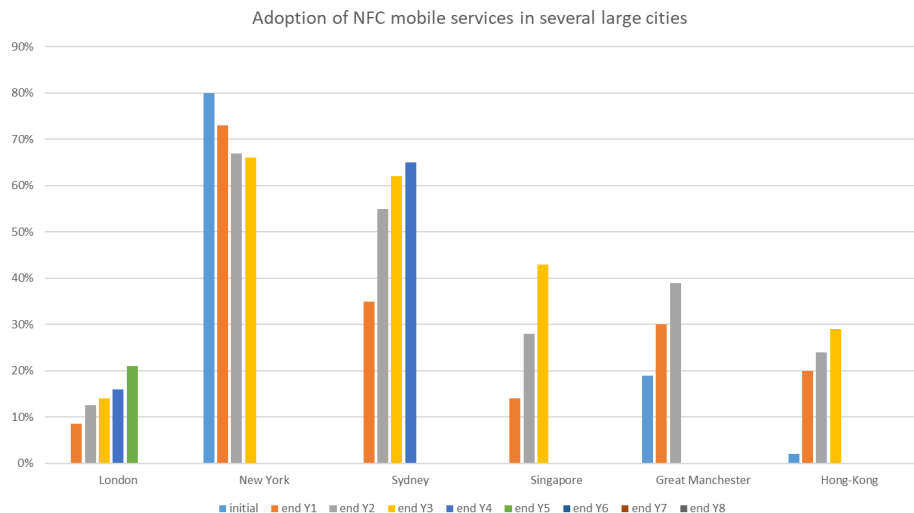EMV white label boosts digital adoption and reduces issuance costs

Figure 5: Wallet transactions as a percentage of total EMV transactions in four major transit systems

The lower figures in London are largely explained by the fact that here, mobile wallets were launched for transit and payment simultaneously. In the other cities shown, consumers were already using mobile wallets when the service was launched in transit.

Although closed-loop cards target less tech-savvy passengers, the aim should be to at least equal, and ideally exceed, the adoption figures achieved with users of open-loop cards.

The first boost to the adoption rate comes from digitising these cards in the user's main mobile wallet, alongside all their other cards, rather than in 'just another app.' The mobile wallet is precisely where a transit card belongs. Furthermore, research results listed on buildfire.com demonstrates that 'app fatigue' is a significant issue:

- 62% of smartphone users will not download an app to continue a transaction
- The average person uses 9 mobile apps per day and 30 apps per month.
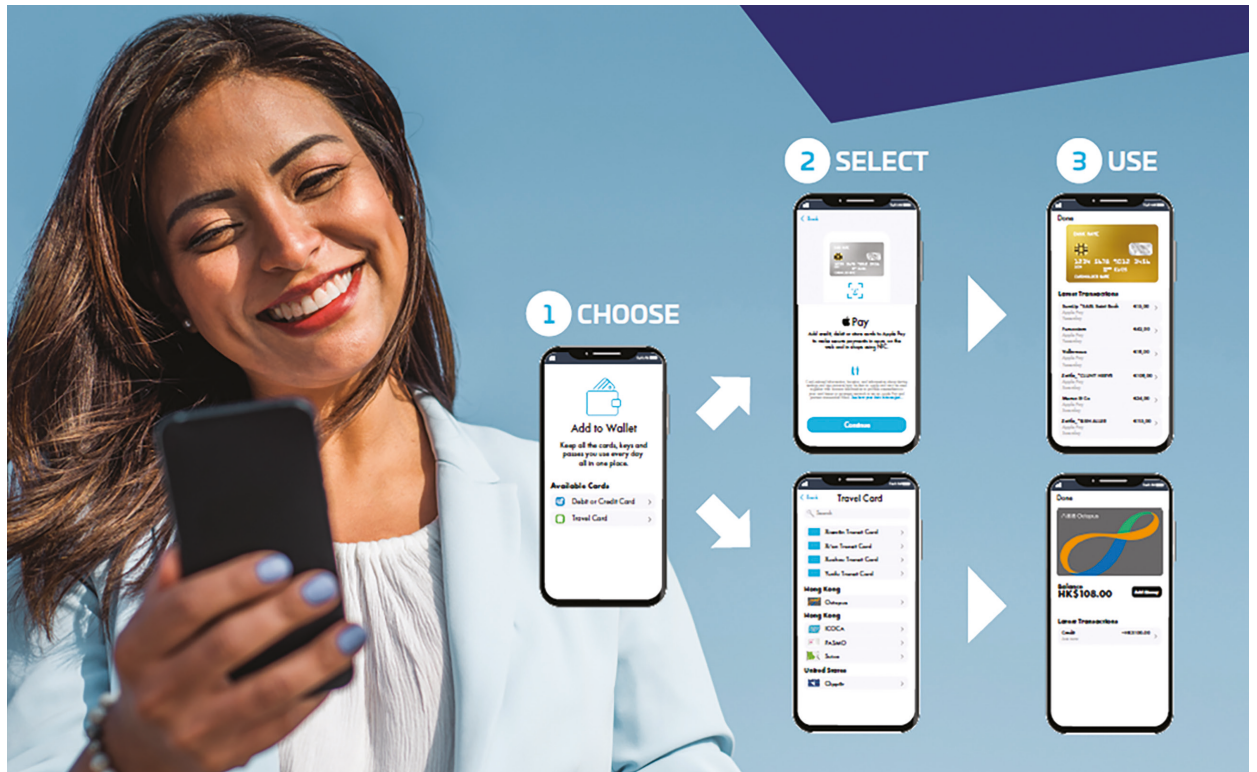
TRAVEL CARDS BELONG IN OEM WALLETS

Figure 6: Seamless digitisation in wallets spurs adoption of all cards

EMV removes the barriers to digitisation created by legacy technologies. Thales's implementation of white label EMV transit cards provides better adoption rates than prepaid solutions.

- White label cards are pre-listed and offered directly in users' wallets, or from a Public Transport Operator's (PTO) application. **Only a few clicks are needed for a traveller to buy a card**, using a payment card already digitised in their wallet. In contrast, getting a digital prepaid transit card requires the traveller to complete a standard onboarding procedure from the bank proposing the card. This is very confusing for the customer, who is not familiar with the process, or and can be concerned with the branding of a bank in the onboarding pages. This results in significant abandonment rates.

- The travel logs and accounts attached to white label EMV cards are updated in real time. Discounts and caps are also applied on the fly; low balance notifications can be received as soon as critical thresholds are reached. **Consequently, travellers feel informed, safe, and in full control of their travel costs.** This is in stark contrast to prepaid card transactions, which are aggregated, capped and cleared at the end of the day. The user is only informed the following day, leaving them with the feeling that they are travelling blind, with no opportunity to dispute transactions in a timely fashion.

- Holders of white label accounts are **free to communicate their card's PAN with transit operators. This can be done as soon as their journey is completed.** CRM (Customer Relationship Management) operators or services can use the PAN to investigate disputes or events impacting the account.

Indeed, the PAN has no PCI constraint, and is used as an account identifier within the system. For users of prepaid EMV transit cards, transactions are logged anonymously in the ticketing back office, and the aggregated amount and customer accounts held by a financial institution.

There is no simple and straightforward means of managing the customer relationship. Either the ticketing back office must be partly PCI compliant, or the customer relationship must be shared between the agency and the financial institution. In some systems, the user is solicited to collect transaction numbers from the financial institution and communicate them to the ticketing integrator.
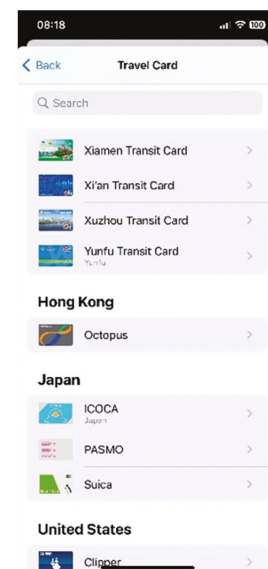

Figure 7: Prelisted transit cards in a wallet

Thales has designed the digitisation of white label EMV cards to meet these two key objectives:

- **The potential to sell cards directly from the wallet or a PTO application, using convenient in-app payment**

- **The ability to deliver real time information and notifications to users, via their wallets.**

A LOW COST DIGITAL SALES CHANNEL WITHIN EASY REACH OF THE PASSENGER

The ease with which white label cards can be purchased is not just a spur for adoption. It also offers a fully digital, low-cost sales channel. In this case, a critical difference with other types of EMV implementation is that the Payment Service Provider PSP used for payment is directly under the control of the transit agency. That means there is no prepaid card manager adding a mark-up to the cost. Negotiation over the level of fees will be helped by the fact that the transit agency can include their entire transaction volume.

4. Limit third party mark-ups

Transit agencies are free to procure their own EMV white label cards. They are free to choose their sources, negotiate their prices and avoid third parties that will mark-up prices. The same goes for personalisation services and card fulfilment. Transit agencies can take full advantage of the open EMV market, and benefit from multiple sources and competitive pricing. Every year, three billion cards are issued and personalised by 50 different suppliers operating within the payment industry.

This figure is ten times higher than the number of travel cards based on legacy technologies that are issued over the same period.

5. No PCI induced costs

Removing PCI constraints and the prepaid programme manager delivers dramatic simplification and cost reduction at every link in the chain. Here are just a few examples:

- Inspection devices do not require any certification. Simple Android devices can be connected to the back office to check the transaction logs linked to the PAN on the inspected card.

- There is no need for collaboration between the ticketing back office and card manager to communicate with the user. The ticketing operator has all the necessary information in hand and can use the PAN as an identifier of the cardholder. The holder is not required to anonymise their card and collect transaction numbers from the card manager before reaching out to the ticketing back office CRM.
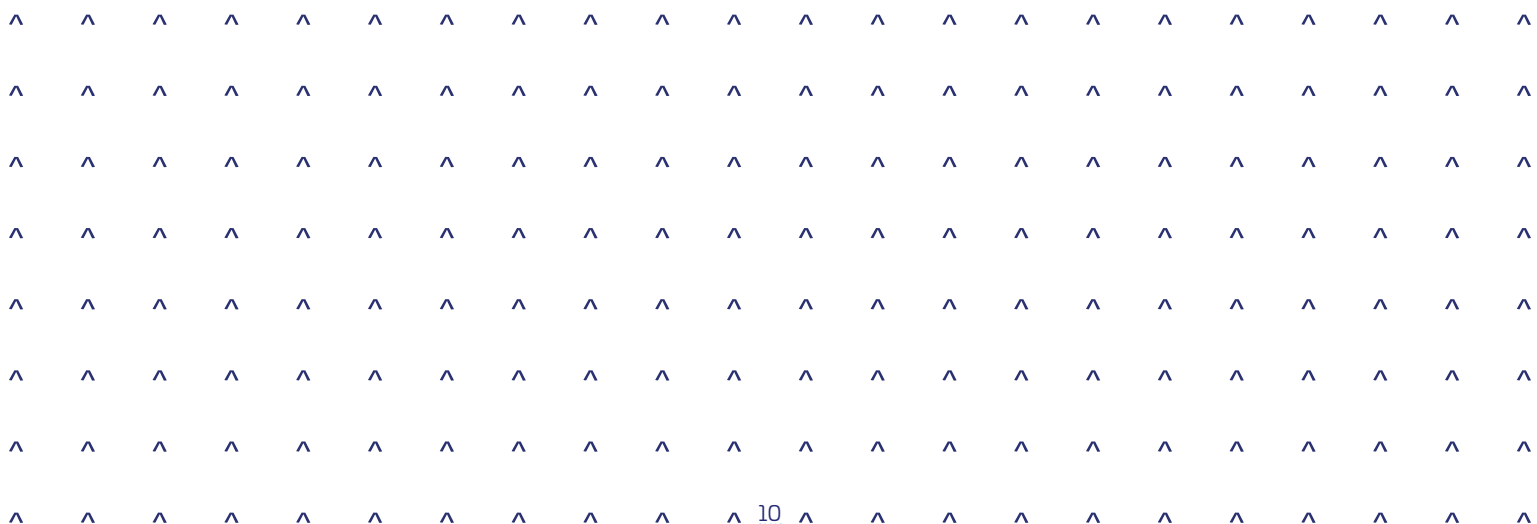
Conclusions

EMV white label combines the advantages of both EMV and legacy technologies:

- EMV: ubiquity, technical stability, mobile reach, rationalisation of front end equipment, an open market without supplier lock-in

- Legacy technologies: intimacy with the traveller, full control and independence from third parties, potential to address every type of user with every type of fare product.

Compared to prepaid EMV transit cards, **EMV white label offers multiple opportunities to cut costs:**

Infrastructure simplification	No PCI, no certification, no tokenisation. Simplification removes constraints and costs throughout the system: account management, CRM, fare engine etc.
Rationalisation of front-end equipment	A single technology for open- and closed-loop cards, with equipment sourced from a vast, open market.
No transaction fees	No third party processing, no third party fees.
Digitisation and control of all physical channel costs	Simplified processes for digitisation into mobile phones and the superior UX implemented in Thales's white label solution lead to higher adoption rates and lower physical fare media issuance costs: fewer fare media, reduced sales costs (TVM, kiosks etc.).
No mark-ups by programme managers	Transit agencies can purchase their own cards and personalisation and fulfilment services direct. PSP fees are part of a generic negotiation.
No PCI induced costs	PAN is used as a general identifier, shared between the passenger and ticketing operator; there is no need to involve a payment institution to handle sensitive data. No certifications are required for devices and databases.

Figure 8: Summary of cost reductions enabled by EMV white label technology

To unleash the full potential of EMV white label transit cards, Thales is offering technology licences, and a range of SaaS offers for physical and digital issuance of cards leveraging our established connections to leading mobile wallets.

Our unique implementation combines the best-in-class user experience with the lowest cost of operation.

To find out more about Thales's issuance solutions for transit ticketing, visit:

Transit Ticketing Solutions (2023) (thalesgroup.com)

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