fime

eBook

EMV® in transit. Everything you need to know

Exploring the key considerations for public transport operators and authorities wanting to deploy EMV in transit.

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Mobility is at the heart of our society and should mirror its evolution. Today’s mobility challenge is about finding smart and effective solutions. Thus, there is a continuous need for all stakeholders to explore new options and adopt a different perspective on existing ones.

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1. Why EMV in transit?

Over the years, the transit ecosystem has seen ticketing payment options evolve in line with ever-increasing traveler expectations.

First there was the transition from simple cash payments to many different styles of paper tickets.

Towards the end of the last century, we accelerated through magnetic stripe cards to contactless smart cards and unified fare collection systems for greater automation.

More recently, the world of retail payment cards has moved fast, with contactless revolutionizing payments for low value items. This trend has accelerated in the past year, with people concerned about the hygiene risks of handling cash during the Covid-19 pandemic. According to Barclays, the UK saw contactless payments rise to 88.6% of total card payments in 2020[1].

1 https://home.barclays/news/2021/02/Insights--COVID-19-and-the-rise-of-the-contactless-consumer/

As people naturally became used to contactless, it seemed reasonable to combine contactless travel cards and payment cards into one system, reducing the number of cards that travelers need to carry.

The payment card effectively becomes the **ticket to travel**, alleviating the need for transport providers to offer their own card management systems, reducing card stock overheads.

The use of cards produced by others and usable elsewhere has led to the term “Open Loop”.

Many transport providers are looking to deploy EMV in transit, whether they are implementing a new EMV Open Loop system or deploying a Closed Loop framework.

In this eBook, we will explore the different options available to implement EMV in transit, and the benefits of each solution.

2. How does EMV in transit work?

What is EMV?

EMV refers to all of the specifications administered by EMVCo. Organizations around the world use EMV Specifications to develop and deploy card-based payment products that will work together seamlessly and securely, regardless of where their customers make or receive a payment. This is critical to the delivery of reliable and convenient payments that businesses and consumers expect.

Why are there different approaches to using EMV in transit?

Many payment schemes aim to simply be accepted by transit systems, and some have gone a step further to provide dedicated guidelines for transport operators intending to adopt their scheme. Often operators pick one scheme as a pilot and then implement others over time.

There are differences between the use of EMV in transit and the use of EMV for retail payments.

- In retail the price is known at the time of payment. In transit, consumers may not always know the fare until the journey is complete.
- The payment terminal is usually attended for retail payments, whereas in transit this is often not the case.
- In transit there are sometimes daily caps and discounts that are only calculated at the end of the day, after the traveler is long gone.
- High throughput at terminals is usually a requirement, especially in mass transit systems.

What are the main approaches to using EMV in transit?

To address the challenges posed by EMV in transit, payment schemes have defined certain frameworks that cover three modes of transit fare type.

Model 1 – Known Fare

- The payment card itself is used as the ticket.
- The fare is known prior to entry to the system, so the system is best suited to a flat fare transport model.
- Authorization may be completed after entry to not delay throughput.
- This is the simplest solution for low value / high throughput scenarios. For example, it is often deployed by standalone bus companies.

Model 2 – Aggregated Fare

- The payment card itself is used as the ticket.
- The fare calculation is done in the back office, on a per journey basis or at the end of the day.
- Authorization is completed after entry to not delay throughput.
- This is suited to complex multi-modal solutions, with often more than one operator and / or trip.

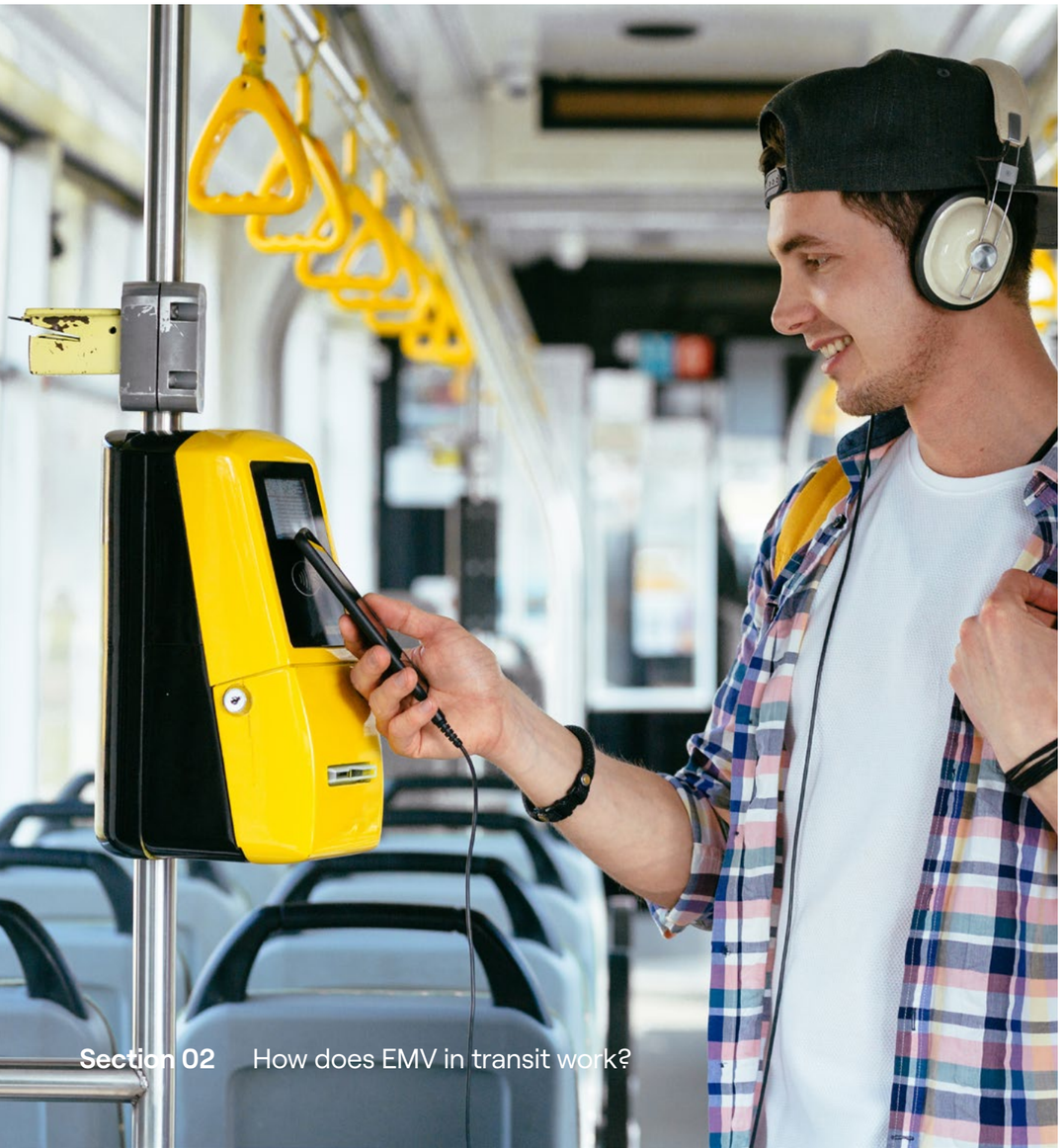
Model 3 – Retail mode

- Payment is made in exchange for a ticket.
- There are no differences from the retail payment ecosystem.
- No daily transaction processing is needed.
- This is suited to higher value transactions (e.g., season tickets, long distance travel).

What is the impact of EMV on Automated Fare Collection (AFC) architecture?

When deploying EMV in transit, there are varying degrees of upgrades required to ensure that the AFC infrastructure in place can process EMV transactions. These differ across the different modes of transit fare type:

Known Fare – There is an impact on transit devices (gates, bus validators…) as they now need to read and process EMV cards and transactions as well as their normal transit transactions.
PCI compliance is required. Previously transit card systems have not required this step but adding EMV acceptance makes it a compulsory requirement. With this approach, public transport operators (PTO) may choose to rely on an off-the-shelf solution. These rely on Point-to-Point Encryption (P2PE) between the payment gateway and the terminal. **This is a straightforward approach for single operator scenarios.**



Aggregated Fare – This mode is the most flexible, as it permits a wide variety of payment options and allows the operator to offer features such as aggregation, best-fare calculations, and fare capping.

However, with this flexibility comes a greater impact when installing and integrating such a system.

This may be exacerbated when it is the chosen route for transit authorities that have previously deployed smartcard and unified card interoperable systems. As with the known fare mode, new PCI compliant devices must be installed.

Additionally, the back-end needs to integrate with the payment gateway to exchange information about the aggregated usage of the card. As part of this integration, payment card data must be tokenized to keep legacy systems out of scope of possible PCI compliance.

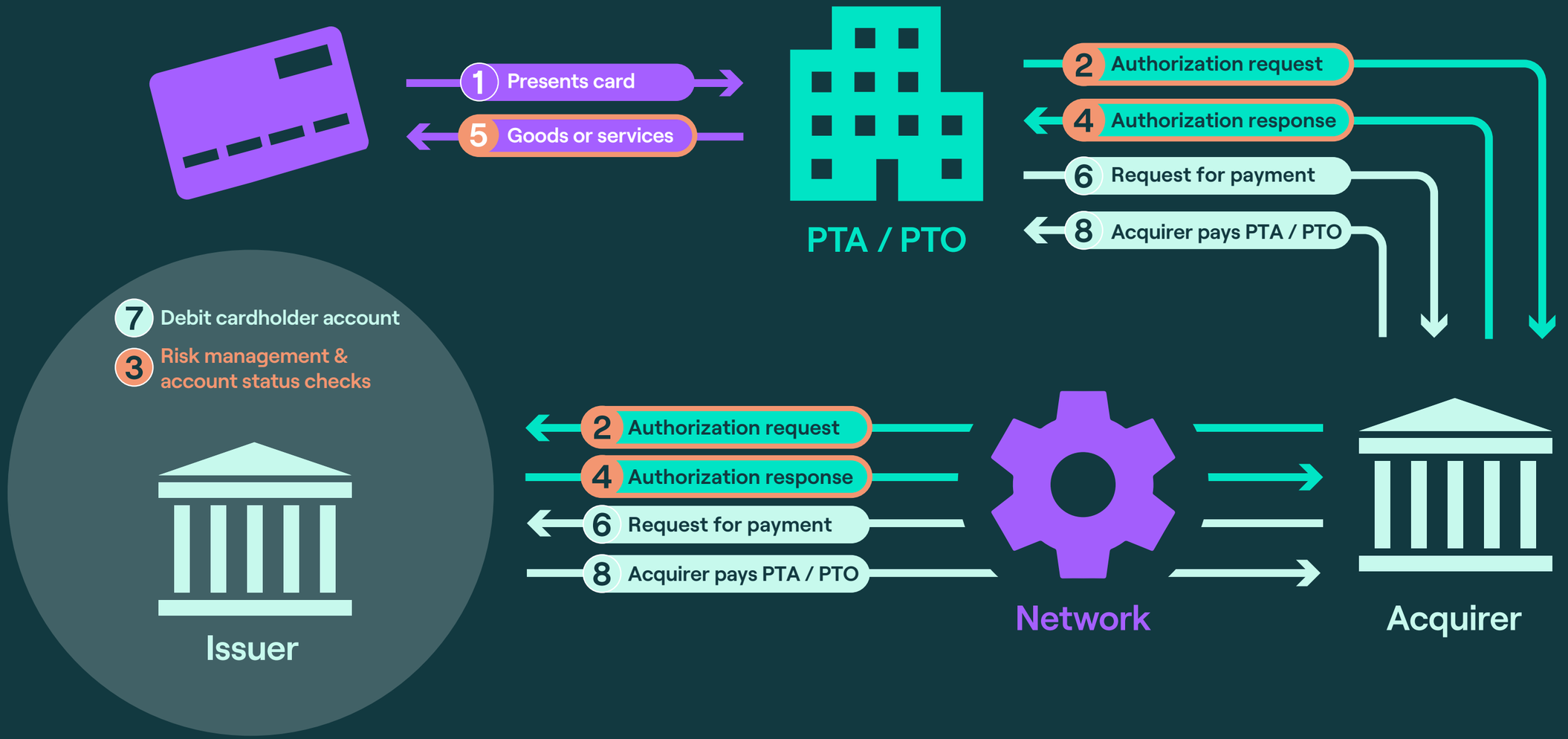
Retail mode – For this approach there is no change to the fare collection architecture. Standard tickets or existing smartcards are still used to travel across the network. Retail-type payment terminals are sourced and processed via a payment gateway. PCI compliance is not usually an issue, as this mode utilizes P2PE communication between the payment device and payment gateway.

System architecture – The two major payment authorization flows.

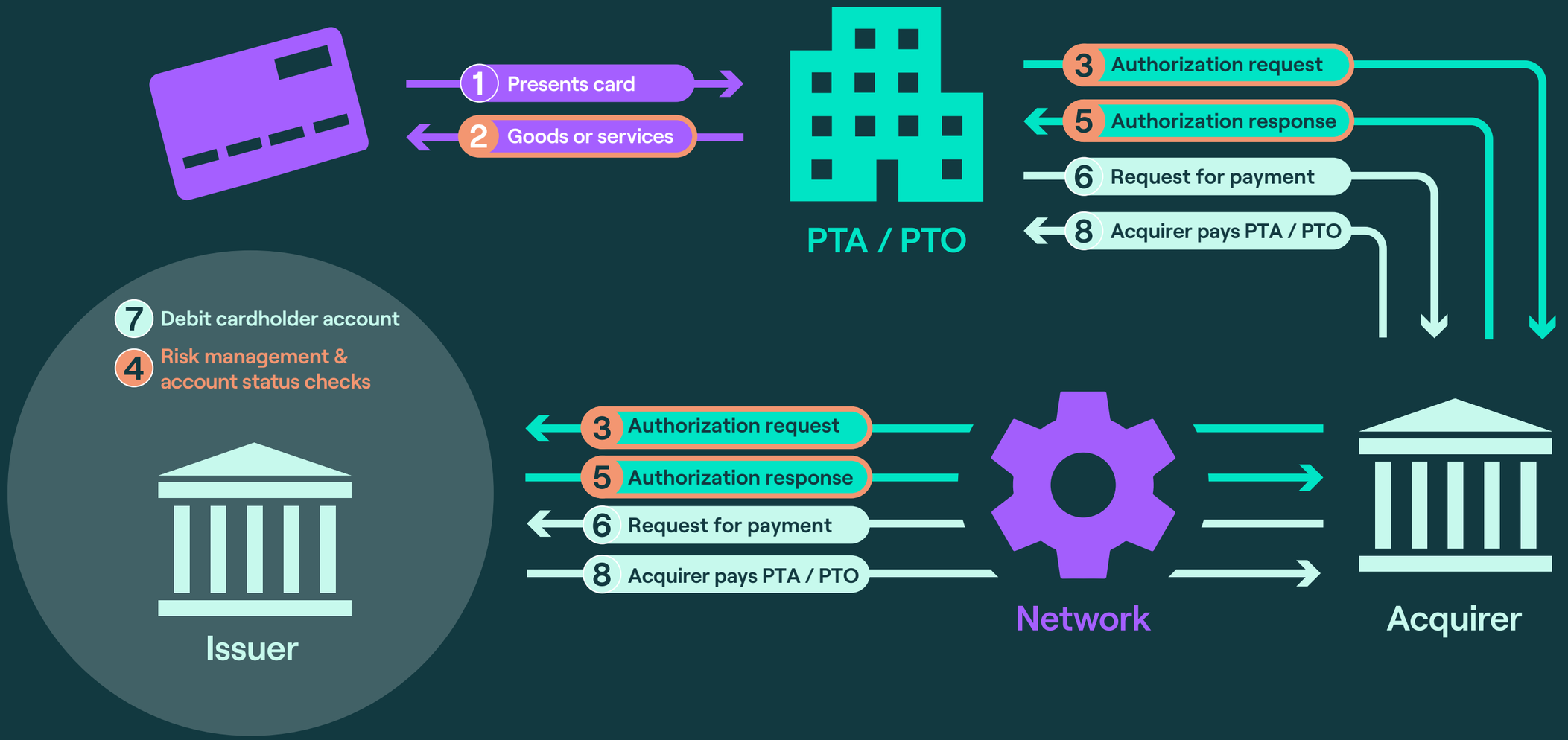
For **Retail mode**, online pre-authorization for the payment transaction is obtained before the traveler ‘consumes’ the service. This is therefore very low risk for the operator, as the money is in their hands before service delivery.

To allow travelers to proceed quickly through the gates, the other two modes use a mechanism known as ‘deferred authorization’. Travelers start their journey before operators know if their card or account is valid and has balance.

System architecture – Online pre-authorization model.



System architecture – Deferred authorization model.



The risks of deferred authorization.

Deferred authorization is obviously a greater risk for the operator. However, in mass commuter situations, fares are not usually high, so loss is balanced against increased convenience. Failed authorizations can also be identified before the customer completes their journey, or starts the next one. Authorization processing often occurs in the minutes after the first tap to enter the transit network. If the authorization fails, the system can be set to prevent subsequent journeys until the debt is settled.

3. Open Loop vs Closed Loop.

Is EMV Open Loop the same as Account Based Ticketing (ABT)?

One point that crops up repeatedly is whether EMV and ABT are synonymous. The short answer is no. While it is true that EMV is a form of ABT, there is no need to have ABT installed as a precursor for a pure EMV deployment. Neither does an ABT system need to have EMV deployed as a default.

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Operators should determine their business objectives and what they require from their ticketing systems before focusing on the technical solutions available to meet those requirements.

Why choose EMV Open Loop?

For any new AFC technology to succeed, it must benefit both travelers and transport system operators.

For travelers, EMV Open Loop has multiple benefits:

- It enables a single-step process (use EMV card on gate) rather than a two-step process (buy ticket, use at gate).
- Global usage of travelers' payment cards means there is no requirement for cash or different cards in different locations.
- It provides an equivalent experience to using the card in retail, with the potential for discounts.
- Travelers can track transactions online, either with an ABT system or through their card issuer.

For operators, the benefits include:

- An improved traveler experience, which adds value to the operators' brand.
- Security is built-in, reducing misuse and fraud.
- There is no need for own card-issuance and management systems or large stocks of cards.
- It provides familiarity for tourists.
- There is a reduction in the amount of overall cash required (especially coinage on buses) as well as a reduced estate of Ticket Vending Machines (TVMs) to be purchased and maintained.
- Financing is often available as part of smart cities or cashless society initiatives.
- In light of the pandemic, staff are protected by reducing face-to-face contact with travelers.
- There is the opportunity to extend operators' income beyond transport via partnerships and opportunities with other service providers.

Does EMV apply only for Open Loop payment?

Despite the benefits of EMV Open Loop payment solution, the implementation relies on long project cycles due to complex integration when ticketing systems shall be upgraded, with additional banking certification costs and mandatory business negotiations between operators, bank and payment schemes for fees and risk management.

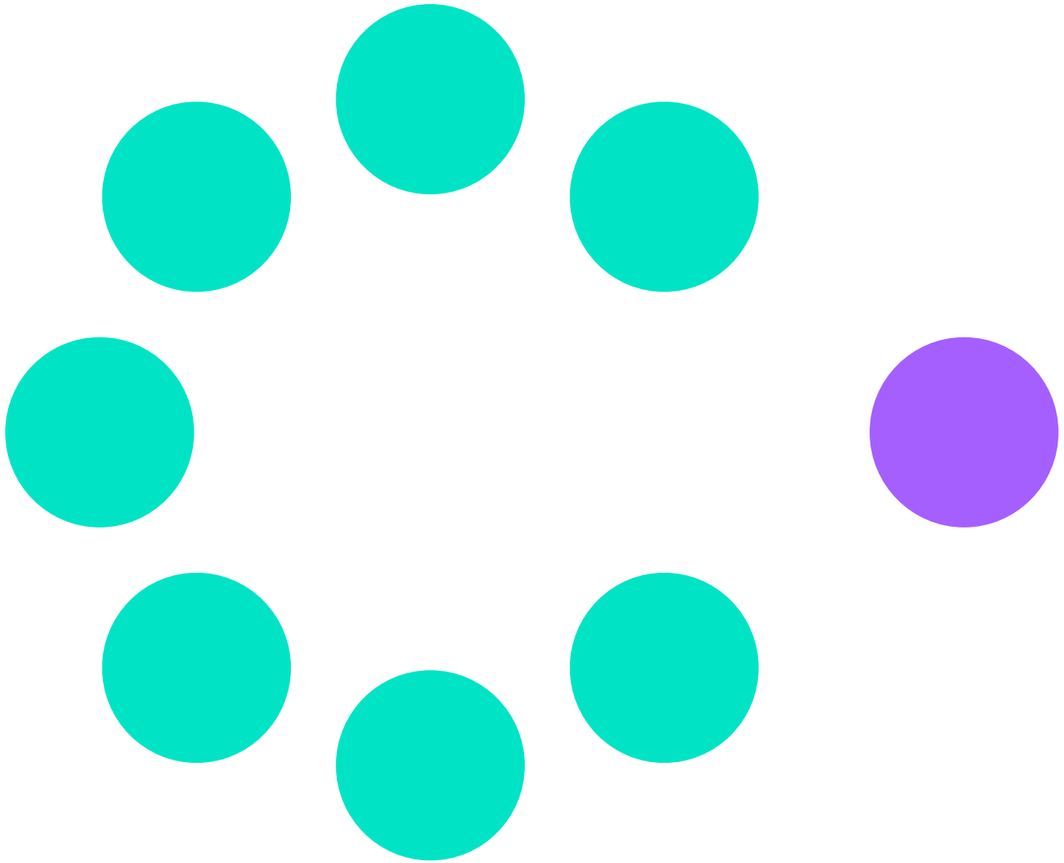
However, the maturity of EMV standards offers the benefit to introduce such technology independently from payment institutions.

What are the options available for EMV Closed Loop?

Card as credential

This allow customers to travel using their payment card or mobile device at a reader, based on their transit account information. It is a pre-purchase model where the passengers register with the transit organizations' ABT system and choose to use their card as a credential. The EMV card is inspected upon request and authorizes entry to the travel system based on the customer's transit account, but no financial transaction is triggered.

This model is often dismissed as it brings the complexity of an EMV Open Loop project implementation but does not deliver the main benefit: giving customers access to the transit system without prior registration.



EMV White Label

A white label EMV card can be thought of as a branded EMV transit card. Instead of being issued by one of the banks, it is issued by the transit authorities / operators themselves (or on their behalf) independent from any payment scheme. The card can only be accepted within the transit system, and transactions processed by the AFC system – without interaction with the payment network.

This approach has some advantages:

- The logo of the authority / operator can be included in card graphics.
- It simplifies the integration of loyalty points or awards as part of the overall offering.
- It speeds up the deployment of mobile ticketing services (including access to OEM Pay wallets) that can rely on digital tokenization platforms.
- If starting without a legacy card-based system, it provides a proven route in terms of equipment and standards.
- Having already deployed a white label solution, the system can be partially ready to accept normal EMV cards (for instance to help tourists...).

Not being connected to the payment scheme networks prevents the need to enforce an industry standard security protocol (PCI) when deploying a white label EMV solution.

The transit authority / operator can also have control over the certification process of its products (type approval, validity period, renewal process) and can adapt some specification options to its specific needs.

Limited use prepaid cards

Alternatively, it is possible to co-brand a transit card with an existing payment scheme. This creates what is often known as a “limited use EMV card”. Issued by a partner financial institution (prepaid issuer), this card follows all concepts and certification of a standard EMV card but is only usable within the transit organization’s defined bounds.

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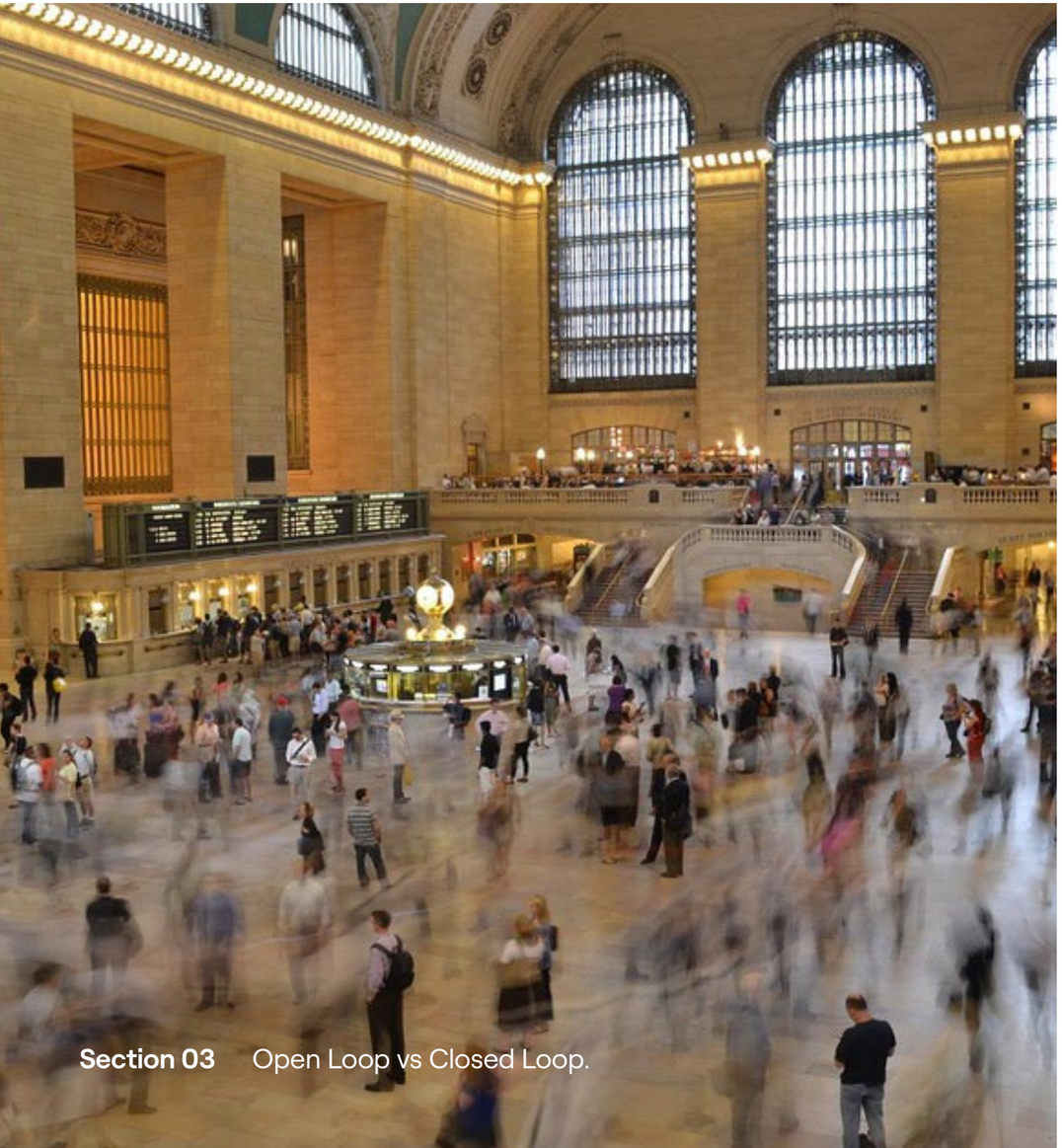
Limited use prepaid cards give cardholders the ability to set spending limits for themselves or dependents, and do not require a banking relationship with the card issuer.

Individuals can buy prepaid cards through various channels, including online, issuer bank branches, transit operator / authority sales channels and retail stores.



Choosing the best solution

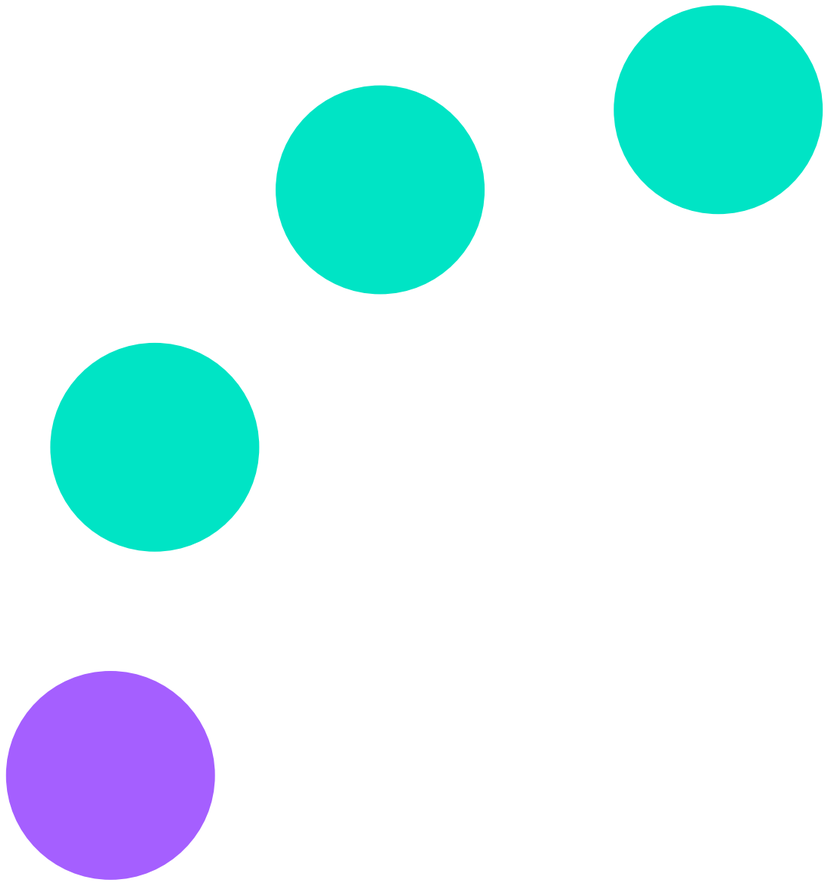
Technology selection for implementing or modernizing an AFC system depends heavily on the transit authority or operator’s business objectives. For example, some companies may choose to prioritize customer relations, and others may place more importance on return on investment.

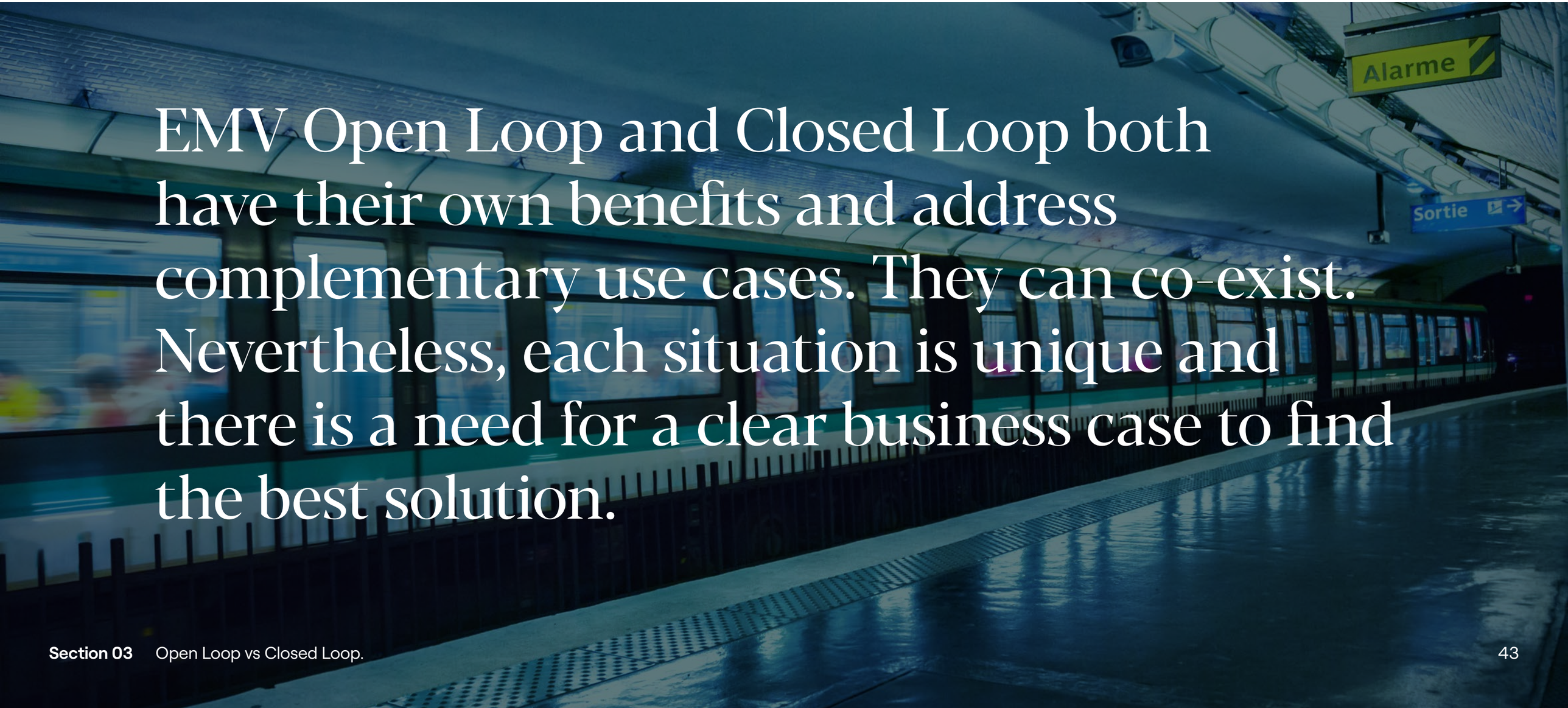
If stakeholders prioritize customer relations:

- Implementing EMV Open Loop is a good opportunity to attract new customers (e.g., occasional users and tourists). They can increase customer satisfaction by adopting a simple one-step process to provide access to the transit system.

If stakeholders prioritize return on investment:

- Implementing EMV Open Loop is a good opportunity to reduce costs in multiple areas, including cash handling, card issuance, sales and distribution.
- However, stakeholders must also keep in mind that there is the inherent cost of certification and operational fees for EMV Open Loop implementation.





EMV Open Loop and Closed Loop both have their own benefits and address complementary use cases. They can co-exist. Nevertheless, each situation is unique and there is a need for a clear business case to find the best solution.

4. Approaching deployment.

While proven, secure and widely adopted across the payments market, the EMV ecosystem can be complex. Multiple players, technologies and guidelines must be navigated to make a project a success. For transport players looking to cash in, getting to grips with these complexities first is essential.

Therefore, preparing to deploy an EMV project is a huge undertaking. Strong expertise, experience and project management principles must be used to keep to time, budget and quality delivery.

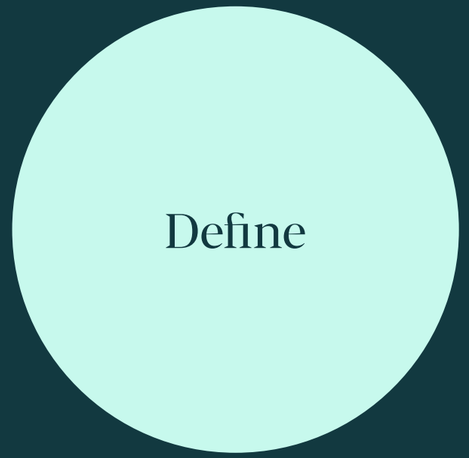
As multiple stakeholders need to be managed, fare strategies determined, risk management policies defined and appropriate technologies selected, operators should consider partnering up with a consultant to guide them on their journey towards EMV deployment

There are a number of key topics to address throughout the project lifecycle:

- What strategic approach to take.
- Business rules and fare strategy.
- Specify and issue RFP(s).
- System integrator(s) evaluation and selection.
- Development and pre-launch testing.
- Switch over strategy.
- User communications.
- Risk management.
- Quality management.
- Logistics management.
- Payment Card Industry (PCI) compliance.

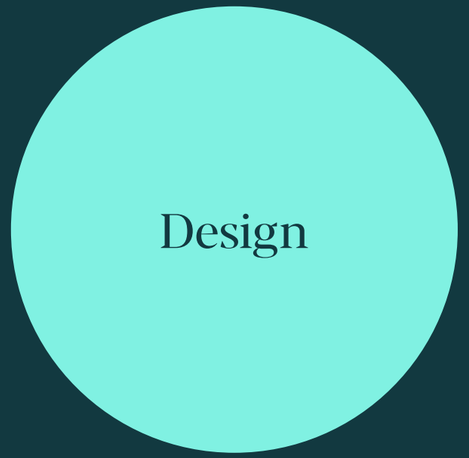
Fime's consultants and technical experts can support the whole process, helping you understand the payment ecosystem, assess what solution is best for you and upgrade existing systems to enable best-in-class traveler experiences.

Get accompanied during your AFC modernization journey.



Go ahead.

We help our clients answer critical business questions formulate their technical strategy to grasp new business opportunities.



Improve efficiency.

We help our customers choose the best technical and cost effective options, and design an efficient test strategy.

Make it happen.

We help our clients roll out the chosen solutions, and develop the ad-hoc test plan and testing tools.

Ensure trust.

We help our clients test their solutions for compliance and quality assurance purposes.

Share your challenge.

Our Fime experts are here to help you make innovation possible, from defining, designing to delivering and testing your products and services.

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