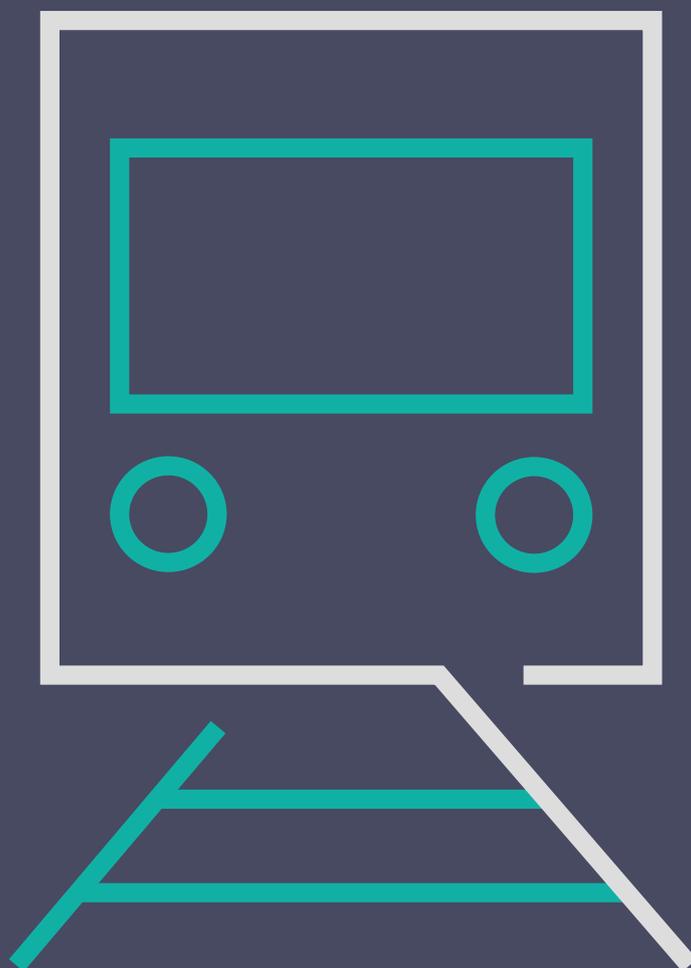


Contactless Transit EMV Framework

December 2017



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1.0 Executive summary

This document summarises the UK Finance Contactless Transit Framework that has been developed by the card payment and transit industries. This Framework describes how a customer could travel on public transport using an EMV contactless card (or device such as a phone or wearable) which has been issued by their bank or card company.

The Contactless Transit Framework was developed to support transit operators' own implementation plans to enable delivery of a consistent customer experience and help achieve interoperability across regions and transport modes.

The Framework includes three Contactless Transit Models:

Building on the success of contactless payments on the Transport for London network, and recognition of customer demand outside of London to pay using contactless.



Model 1, Single Pay-As-You-Go

The contactless card or device is used at the start of the journey with a known fare; primarily for buses and trams.



Model 2, Aggregated Pay-As-You-Go

The contactless card or device is used multiple times, and the fare is aggregated at the end of the day or journey leg; for multi-mode operators.



Model 3, Pre-Purchase

A contactless card or device is associated with a pre-purchased ticket and then used to access the travel.

The cards industry and transit industry developed the detail underpinning Models 1 and 2 in 2015, refining them as transit operator implementations went live in 2016/2017¹, and developed Model 3 requirements in 2016.

The Framework was initially published in January 2016, at a parliamentary event co-sponsored by the card payments and transit industries and the Transport Minister Andrew Jones MP.

The Framework documents have been updated in H1 2017 to take account of refinements and further developments. The Framework now includes:

- **Contactless Transit EMV Framework:** this document, which describes the Framework at a high level, including the case for transit operators, the card payment industry and government bodies to support EMV contactless as a ticketing option; an overview of how the Models work; and the ongoing governance of the Framework.
- **Contactless Transit EMV Implementation Guidelines:** this describes Models 1 and 2 in detail including minimum viable propositions, transaction processes and the underlying risk and liability agreements between the two industries to support them.
- **Card Payment Accreditation Guide:** description of the stages of accreditation that the suppliers for the transit operators will need to go through to meet card scheme requirements.
- **Contactless Transit EMV Communications Toolkit:** this includes guidelines for customer and staff communication, and a current set of FAQs about the Models.

¹ By the end of H1 2017, a number of bus operators had launched Model 1 and 2 implementations around the UK.

- **Pre-Purchase EMV Business Requirements Definition (BRD):** an amalgamation of the Customer Proposition and the Statement of User Requirements for Model 3. It provides an outline of the proposed Pre-Purchased solution and requirements for participation, implementation and running of a contactless service.
- **Contactless Transit EMV Project Analysis:** this includes supporting analysis providing rationale behind the detail included within the framework documents.

The Framework is jointly owned by the card payments industry, transit industry and government bodies and will be updated if required by mutual agreement of all the parties. Related documentation is available on request from UK Finance.

The Framework does not include technical specifications or infrastructure. The Framework is intended to help transit operators consider whether to implement one or more of the Models, and it is the commercial decision of the transit operators as to how they deploy their own contactless solutions.

2.0 Background

2.1 Contactless Transit Project

Card payments have been used for many years in the transit industry to buy paper tickets, or to top up smart ticket cards or devices. In 2007, in order to provide a fast and frictionless payment experience, the UK card industry introduced contactless payments where up to a certain value (currently £30²) the normal cardholder verification method of entering a PIN is not required. Contactless card payments are ideal for certain transit environments where speed and convenience are key to a good customer experience.

In 2013, Transport for London (TfL) introduced contactless card payments on its bus network as a complementary alternative to its proprietary Oyster card. This was followed by the rollout of contactless payments on the TfL tube, DLR and rail network³ in 2014. TfL's objective in introducing contactless was to provide more convenience to customers using pay-as-you-go (avoiding the need to top up Oyster cards), and to cut their own operating costs in producing and maintaining Oyster cards. The initiative has been hugely successful with steady growth, resulting in over 19m individual cards being used by H1 2017 (over 650,000 cards used on a typical day) and over 40% of all pay-as-you-go journeys completed on contactless cards.

The success of the TfL initiative led to interest from other UK transit operators in implementing

contactless payments alongside smart ticketing and cash payments. Contactless use in transit is also seen as an important step on the journey towards future payment and ticketing methods in the UK, specifically on mobile.

A number of discussions took place between transit operators and individual card companies and by the end of 2014 it became clear that it would be helpful to have a central project to allow the two industries to discuss the most suitable models for contactless transit. The UK Cards Association was integral to the original collaborative discussions between its members, the card schemes and TfL, and therefore was the natural choice to run a project to build on TfL's success and expand contactless cards on transit outside of London.

From 2015 – 2017, the UK Cards Association ran the Contactless Transit Project⁴ (as part of a wider 2-year programme to increase the use of contactless cards across the UK). The purpose of this Project was to create a national Contactless Transit Framework. This was designed to help transit operators consider whether to implement contactless, and support the delivery of a consistent and good customer experience for journeys made across the UK where a contactless card⁵ has been used during that journey. The project was jointly funded by the cards industry, transit industry and government.

²The cardholder verification limit has been increased over time to accommodate spending patterns on contactless cards, and was raised from £20 to £30 from 1 September 2015.

³ London overground and National Rail services within the TfL Travelcard zones

⁴ See also the Contactless Transit Programme Initiation Documents (Stage 1, Stage 2 (Phase 1 & 2))

⁵ An EMV contactless card is only one EMV contactless form factor that can be used. Others include mobile and wearable devices.

2.2 Stakeholder engagement

As the Contactless Transit Project relied on capturing business requirements from both the card and transit industries, it required a high level of engagement from operators in both areas. From the transit industry this included bus and train operators, and from the card industry, card schemes, card acquirers (that hold the relationship with transit operators) and card issuers (that issue credit and debit cards to customers). The UK Cards Association also engaged with various levels of government that have an interest in transport, including the national and devolved administrations, and regional and city level administrations.

A Contactless Transit Working Group was set up. These monthly workshops across the two industries were designed to progress its

deliverables. A Contactless Transit Steering Group, involving representatives from both industries and government, met every 6 weeks and was responsible for making decisions and signing off the deliverables. Overall sponsorship of the Project came from a Contactless Transit Executive Group which met three times annually. More details on stakeholder engagement and the Project Governance are included in Annex B.

At a national level, the Department for Transport, Transport Scotland, Northern Ireland Department for Regional Development, Transport for North, Transport for West Midlands and Transport Wales showed their support for contactless use for transit, and for providing an integrated customer journey for those who want to travel across the UK on their EMV contactless card.

3.0 Case for adopting contactless transit

3.1 Customer Engagement & views

The card payment industry is always looking at ways to make payments more convenient for consumers, retailers and transit operators alike. The case for adopting contactless transit for all of the stakeholders was set out at the beginning of the cross industry Project⁶, and the benefits outlined then have broadly been confirmed during the course of the Project. These are outlined below.

Engagement & views

The Project did not have the capacity to engage with consumers directly, but relied on the transit operators and card issuers reflecting the views of their customers, whether through customer feedback or their own customer surveys.

In addition, Transport Focus, the organisation representing passenger and transport user views, was integral to the Project, with representatives on both the Contactless Transit Working Group and Steering Group. Building on work conducted in 2014 around using contactless cards for train travel, a survey conducted by Transport Focus in 2016 asked how people were using contactless outside of London. The survey also asked what people thought of being able to use contactless for public

transport. The survey found that 61% of customers were very interested, or interested, in a contactless transit proposition⁷.

Benefits

- Fast and easy payment for passengers, eliminating the need to queue for a paper ticket or to 'top-up' smart tickets. These benefits have been demonstrated through the TfL rollout. The Transport Focus survey found that of customers using contactless payments in general retail, 84% cited 'speed' and 79% cited 'ease' as reasons for use⁸.
- Secure and transparent payments, which can be seen on the customer's bank statement or app.

⁶ See the EMV Contactless Transit Programme Initiation Document.

⁷ See Transport Focus survey results <https://www.transportfocus.org.uk/research-publications/publications/paying-for-public-transport-with-contactless/>

⁸ See above footnote

- Usability on different form factors, including card, mobile and wearables. By end H1 2017, EMV mobile payments accounted for around 10% of TfL contactless payments.
- Ability to travel on different operators using the same device, and without needing to register.
- 45% of people (outside London) have contactless and have used it, and 43% would be likely to use contactless on public transport if it were introduced tomorrow⁹.
- 45% of passengers would feel more positively towards public transport operators if contactless was introduced¹⁰.

Costs

There should be no costs for customers in adopting contactless. Over 60% of all payment cards in issue are contactless with 16 card issuers providing them, and contactless cards are generally provided on request by issuers. There is no transactional cost to the customer for using a contactless card. (The one exception to this is where a customer from outside the UK may be charged a foreign transaction fee.)

3.2 Transit Industry

Engagement & views

The Project engaged both with transit operators directly and through the representative bodies of the Rail Delivery Group (RDG) and the Confederation of Passenger Transport (CPT), the latter representing bus operators.

There has been broad support for the Project from transit operators, both for the contactless transit proposition in general, and for creating a framework between the industries. The transit industry co-funded the second Phase of the Project.

Benefits

- Increase number of journeys (as a result of simplified ticket purchasing)
- Increase speed of customer throughput
- Increase the range of payment options that can be offered to their customers

- Permits interoperability between transit operators, and is the most likely solution to be able to interoperate with TfL, where 70% of rail journeys begin, take place or end.
- EMV contactless global security standard provides assurance for transit operators.
- Operational cost savings for the transport operator from reduction in cash handling, increased customer throughput and reduction in paper ticket printing or producing and maintaining smartcards. 40% of TfL pay-as-you-go journeys now take place on contactless.

Costs

- Infrastructure costs - investment is required to deliver a 'card capable' infrastructure
- Transactional costs
- Transit operators costs in sharing liability

3.3 Card Payment Industry

The UK Cards Association began engaging its issuer and acquirer members, and card schemes, on extending the contactless transit proposal in 2014.

Benefits

- Increased transactions for card schemes and issuers through cash replacement. In 2014, 36% of bus and train payments were made using cards (27% debit, 9% credit), with the remainder made by cash¹¹. By the end of

2015, 11% of all contactless payments were being made on TfL. In a mature market there are few comparable opportunities for transaction growth.

⁹ See Transport Focus survey results <https://www.transportfocus.org.uk/research-publications/publications/paying-for-public-transport-with-contactless/>

¹⁰ See above footnote

¹¹ UK Payments Consumer Payments Survey data 2014.

- The halo effect of first-time users going on to use their contactless cards in other retail environments. Over 19m individual cards have been used on the TfL system to date. By Q1 2017, around 6% of all contactless payments were being made on TfL, so even though TfL numbers have continued to grow, contactless use in other sectors has risen even faster.
- Championing the contactless experience in the transit environment helps prepare customers for contactless payments using mobile devices.

Costs

- Card scheme costs in adjusting operating regulations
- Card issuer costs in sharing liability

3.4 Government and devolved administrations

Engagement & views

The rollout of contactless-based ticketing solutions is the focus of increased political interest nationally and internationally. The solution provides a vehicle for fare simplification and integration of regional transport, both of which are high priority for the Department for Transport (DfT) and other devolved administrations.

The UK Cards Association engaged with the DfT from 2014 and during the Project engaged with the devolved administrations in Northern Ireland, Scotland and Wales. The DfT and Transport Scotland co-funded Phase 2 of the Project and sat on the Contactless Transit Steering Group, and DfT was represented on the Executive Group.

In January 2016, the Transport Minister, Andrew Jones hosted a parliamentary event at which the Framework was launched and commitments made by the transit industry to deliver contactless ticketing.

In 2015 the Government passed the Cities and Local Devolution Act and in 2016 the Buses Act. The combination of these two pieces of legislation allows regional bodies to assume transport powers once a mayor has been appointed, and such devolution agreements have already been agreed

for Manchester and the Midlands. In Phase 2 of the Project we worked closely with Transport for the North and Transport for West Midlands to help them apply the Models into their regional context, and to ensure that interoperability with other regions is a key consideration in any development.

Benefits

- UK model will be one of the leading global models
- Delivers transport strategy and enables UK commerce
- Supports the political agenda for integrated ticketing
- Supports the international business and tourist visitor communities
- Provides interoperability between transit operators

Costs

- Investment into a back office hub, to ensure interoperability
- Possible funding of pilots

4.0 Contactless Transit Models

4.1 Customer Use Cases

The first deliverable for the Contactless Transit Working Group to develop was identifying the key customer use cases for which implementing contactless as a payment option would deliver the most benefit.

This involved a number of workshops, using the following questions to identify the key use cases:

- What type of transit journeys will the customer make (e.g. commuter, intracity)?
- How will the customer make those transit journeys (i.e. mode of travel, fare class)?
- What are the specific issues that need considering?
- What are the key components that make up a transaction between the customer, the transit operator and the cards industry (i.e. pre-authorisation, value)?

The judgment criteria used to identify the key use cases were that each should:

- Address a large customer segment
- Be strategically important
- Be politically important

- Have the potential to lead to major cost savings
- Represent a large volume/% of journeys taken
- Represent a large % of revenues or margins
- Be perceived to be feasible

The priority use cases that were agreed by both industries were:

- Journey type: intracity (mass market, medium to low value); and town to city/commuter (medium to high value)
- Customer type: single adult and visitors/tourists
- Transit mode: trains, underground, bus and tram
- Fare type: full rate and reduced fare, season tickets
- Operator model: cross-operator, multi-ownership model, single regulated and single unregulated

4.2 Contactless Transit Models

The Contactless Transit Working Group then took these agreed Customer Use Cases, which describe the customer journeys, and assessed how these could be delivered in different contactless transaction models. The agreed Contactless Transit Models are outlined below.



Model 1, Single Pay-As-You-Go Model

Previously termed (Standard Retail Model); A pay-as-you-go model with a known fare, for single-mode operators (particularly bus and tram).

Description

This is based on an existing pay-as-you-go model that was developed for the retail environment.

- In this model, the fare is known beforehand – it is either a flat fare, or inputted into the device by the driver or customer before the transaction takes place.
- For contactless only terminals: the customer should be able to make journeys up to a maximum value of £30 with contactless cards and make journeys that are more than £30 in value on mobile devices where operator terminals are high value payment enabled, and where the customer can self-authenticate on their mobile.
- The customer only touches in with their card or device at the beginning of the journey (as the fare is already known).
- The fare is charged to the customer's issuer and will then be viewable on the customer's issuer statement (depending on

communications from the device this could take a couple of days).

- The customer must be able to obtain a suitable ticket, receipt and/or proof of purchase upon request. A receipt can be delivered via a download from a website.
- The transit operators' terminals will need to be online capable, even if communication capability means they are not able to go online at all times. Offline capability should be limited to where online connection is lost¹².

Applicability

- The model offers transit operators an 'entry level' use of contactless cards as an alternative to cash payments.
- This model is suited to low to medium value single operator bus and tram services.

2

Model 2, Aggregated Pay-As-You-Go Model

A pay-as-you-go model where an aggregated fare is charged at the end of the day or a completed chargeable fare is charged, for single and multi-mode operators (including bus, tram, metro, train).

Description

- This is based on the existing pay-as-you-go model that was developed for Transport for London. The model supports unknown and variable fares on trains (using touch in and touch out).
- Flat or known fares are supported on buses (uses touch in only).
- The fare is calculated at the end of a defined period (e.g. day) or after a completed chargeable fare by processing all the taps and calculating the appropriate fare.
- Daily or weekly caps can be applied to this system.
- The charge will generally appear on the customer's issuer statement the day after

travel.

- The top end value for the use of a contactless card is £30 per aggregated or completed chargeable fare.¹³
- All devices should be able to be used with this model (card, wearables, mobile). The potential exists to exceed the £30 contactless limit in the settlement process (although this is not encouraged from a customer confusion perspective).

Applicability

This model is suited to low to medium value multi-mode operators, including train, underground, bus & tram services (e.g. mass transit and commuter).

¹² Transit Operators should authorise transactions that require an online authorisation as soon as possible. Authorisation can however be deferred to allow for instances where online data connectivity is not available or fast boarding speed is a requirement. In such instances, authorisation should not be delayed longer than 24 hours.

¹³ 90% of all daily journeys are under £30 (percentage includes journeys within London).

3

Model 3, Pre-Purchase Model

A pre-purchase model where contactless cards are associated with the ticket in advance and then used to access travel (particularly train).

Description

- This model is to support higher value tickets, where a contactless card / device is associated with a customer's pre-purchased travel journey.
- A process will be required for the customer to associate their contactless device with the product they have purchased / are entitled to receive.
- The customer touches the associated card / device during their journey on a card reader, as specified by the transit operator. It will be recognised during this journey as their authority to travel where challenged by a Revenue Inspector.
- All transit operators on which the customer is travelling to complete their journey will need to recognise that the nominated contactless card / device is authority to travel.

- It is suggested that a back office is required to record the traveller's journey and recognise the card that has been associated with the journey. This back office(s) would need to be interoperable between all the transit operators that are supplying the customer's travel.

Applicability

- High value ticket e.g. Edinburgh to London return.
- Season tickets and carnets.
- Differentiated fares e.g. 20% off for a customer segment.
- Concessions and free travel.
- Reservations (e.g. long distance coach travel where a seat is reserved on a specific coach).

5.0 Sharing the risk and liability

5.1 Background

A key part of the Framework is the Risk & Liability Agreement between the two industries that can support the Contactless Transit Models. In 2015 the Project developed Agreements to support Model 1: Single Pay-As-You-Go and Model 2: Aggregated Pay-As-You-Go set out below.

Card payments have a unique characteristic in contrast to other forms of payment, in that payees (retailers or transit operators) often provide goods and services to payers (customers) prior to receiving cleared funds. The payee does so on the basis of the card payment guarantee, whereby the card issuer guarantees the funds to the payee even if the customer does not have sufficient funds to pay for the goods or services. In return for this guarantee, the retailer needs to adhere to specific acceptance rules, and if they fail to do so, the payment guarantee is extinguished and liability resides with the retailer.

There are a number of controls that the card industry uses to manage the risk of the funds not being available from the payer. For non-contactless card payments, generally this involves requiring an online issuer transaction authorisation for particular transactions.

For contactless cards the card industry needs to manage two risks – of funds not being available, and of potential fraud if the card has been stolen. There are a number of controls that the card industry uses to manage these risks:

- Contactless card chip settings - a combination of volume and value counters within the chip that force PIN entry where a number of consecutive contactless transactions have occurred without entry of the PIN.
- Card scheme floor limits – these will trigger an online authorisation request at certain transaction values.

- Online cards – some cards automatically are required to go online for issuer authorisation for every transaction. These are generally for cardholders with low credit limits or specific circumstances (such as under-18s).

There are additional challenges posed by the Contactless Transit Models for the card industry in managing risk:

- Communication capability varies greatly and therefore there is no guarantee that cards will be able to go online for authorisation.

- There is generally no scope for a PIN entry alongside the contactless card readers (unlike in a retail environment where most readers have PIN entry as standard).
- In Model 2, the fare is not known beforehand. This means that the customer could deny that they intended to make the payment and therefore reclaim the amount from the issuer¹⁴. Moreover, legislation requires card issuers to make the cost of a transaction known to the customer before they undertake a transaction¹⁵.

5.2 Transport for London

To facilitate contactless payments on the Transport for London (TfL) network, the card industry developed a specific acceptance model which is Model 2 Aggregated PAYG. Within this model, the following controls are in place to mitigate the risks:

- Trigger limits – in certain conditions the transit operator's back office require the operator to seek an online issuer authorisation i.e. if the card has not been used on the system for a pre-defined period, or if the cumulative value of chargeable fares exceeds a threshold.
- To address the concern around the unknown fare, TfL provided posters in every station with common fare brackets. TfL also provided an automatic refund to all customers who claimed an unauthorised transaction for the first incident only, with the expectation that the customer would be aware of the likely fare thereafter.

Despite these mitigating factors, it was considered equitable for the transit operator and card issuer to share some of the financial risk between them. The risk of reduced fare revenues was of concern to TfL, while issuers were concerned with the prospect of less issuer protection than in the normal retail environment.

Negotiation between the parties resulted in a compromise solution, under which it was agreed that TfL would assume liability for unauthorised transactions exceeding £6, while issuers had liability for any transaction under that amount. From an operational perspective, this results in TfL submitting into clearing and settlement transactions for under £6, even though the authorisation request relating to that transaction has been declined. At the point at which the £6 chargeback limit was agreed, the average TfL fare was below £4 and 90% of all daily journeys were under £6.

5.3 Model 1: Risk and liability agreement

The risk and liability agreement underpinning Model 1 is set out below.

Overview

- The customer is not verified at the point of payment (as this requires a Chip & PIN or signature verification).
- The card is checked as being valid (and not counterfeit) through the card-terminal interaction.
- Transit Operators can manage cards associated with insufficient funds through Deny Lists.
- Hot lists at the terminal can be used to stop lost or stolen cards completing the purchase.
- Contactless only terminals should be online capable. Card counters do not trigger a PIN entry request for online capable, contactless only terminals.
- Card issuer fraud systems check for any unusual activity such as the same card identity being used in two geographically separate locations at around the same time.
- For authorised transactions the card issuer is liable for the full amount.

¹⁴The right to claim back an 'unauthorised transaction' from an issuer is set out in the Payment Services Regulations 2009 <http://www.legislation.gov.uk/uksi/2009/209/part/6/crossheading/authorisation-of-payment-transactions/made>.

¹⁵Relevant section from the Payment Services Regulations 2009.

- For payments made where the authorisation is delayed or the authorisation is denied then the merchant is liable for the full amount (Note: this includes payments for delayed authorisations where the authorisation is declined).
- Note: Auto debt recovery may or may not be applicable in this model, please refer to the relevant schemes. Debt Recovery is

the process whereby the transit operator attempts to recover the debt incurred on a card that was allowed to travel but where their issuer declined the authorisation request.

More detail on this is provided in the Implementation Guidelines.

5.4 Model 2: Risk and liability agreement

This is broadly similar to the agreement underpinning the TFL Model, but has been adjusted to cater for the higher average transaction values across the UK compared to TFL.

The new proposal is that, from April 2017¹⁶, the transit operator would assume liability for unauthorised transactions exceeding £10, while issuers would have liability for any transaction under that amount.

This Risk and Liability Agreement would be underpinned through the implementation, by transit operators, of robust risk controls including debt recovery and revenue inspection processes. The implementation of both of these controls by TFL has resulted in the risk exposure to both industries being minimised.

Overview

- The customer is not verified at the point of payment.
- The card is checked as being valid (and not counterfeit) through the card-terminal interaction.
- Deny lists (used) and Status lists (if used) at the gates and validators indicate if customers are able to travel using that card (lost, stolen, outstanding debt).
- A zero or low value authorisation or account check takes place when the back-office detects a card that is new or not been seen for the previous 14 days¹⁷.
- Online authorisations also take place for the daily spend when the back-office calculated cumulative spend reaches £15 (Trigger Limit)¹⁸.

- Delayed authorisations up to 24 hours are allowed to accommodate the bus operators.
- Revenue inspection devices capture the card identity which can either interrogate the card terminal to check if the customer has touched in (e.g. in the case of a bus) or pass the information to the back office which can assess at the end of the day if the card has been touched in or out correctly (e.g. in the case of a train).
- For denied authorisations less than or equal to £10.00 (issuer liability limit) the card issuer takes the liability and the transit operator places that customer's card on the deny list¹⁹.
- For denied authorisations over £10 the transit operator takes the full liability, places the customer's card on the deny list and undertakes the full debt recovery.
- Customers that have a denied authorisation are put on the deny list. The transit operator attempts to remove them from the deny list through one or more of the following methods:
 - Scheduled automatic debt recovery as per card scheme parameters.
 - Initiating an authorisation for the outstanding debt by the customer tapping their card at a reader/transit terminal.
 - Customer visiting the operator's website and settling the outstanding debt themselves online.
 - Customer calling customer services to settle any outstanding debt.

¹⁶This was implemented through card schemes operating regulations. These are implemented in April and October annually.

¹⁷ This relates to the Trigger Limit deployment, at the time of issuing this document End of Journey Period Processing can not be implemented as an alternative approach.

¹⁸ As above

¹⁹ The maximum issuer liability is the trigger limit plus the issuer liability, which equates to £25 in this proposal. This is considered to be an edge case with the scenario outlined in the Transaction Processes.

Spirit of the Agreement

- Operators are able to submit an intra-day authorisation for a completed chargeable fare:
 - Example - single leg journey
 - Exclusions - return fares, aggregated fares, capped fares, inter-operator fares

Operators should not submit multiple authorisations to build up liability protection for higher value fares

More detail on this is provided in the Implementation Guidelines.

5.5 Cross-operator risk management

There will need to be consideration as to how the £30 upper limit will be managed between different transit operators' infrastructure and without the closed network TfL that benefits from.

To manage this initially, we envisage contactless implementation occurring on a controlled deployment basis by single operators. To accommodate longer term inter-operator solution, work on a back office will need to be undertaken.

There is an implication that the issuer liability will be applied per back office with no guarantee of national back office broker capability.

Consideration is also required as to how customers will understand when they are travelling between different transit operator hubs and the implications of this.

6.0 Contactless Transit EMV Implementation Guidelines

The Implementation Guidelines are comprehensive document that provides guidance for transit operator teams engaged in delivering Models 1 and 2.

The Guidelines cover the following topics:

- Card Payments Overview & Commercial Framework: how card payments work (including contactless cards); the players involved in card payments, how they interact and the commercial arrangements between them, including the breakdown of fee elements transit operators would pay.
- Minimum Viable Proposition and boundaries: an explanation of the core customer proposition that transit operators must deliver for each Model in order to benefit from the Framework agreement, and to maintain a consistent customer experience across operators. Equally there is an explanation of the Model boundaries which transit operators must remain within.

- Transaction Processes Diagrams: including customer use cases for happy and unhappy paths.
- Additional description, processes and deployment:
 - Minimum Support Requirements – requirements underpinning the Risk and Liability Agreement, such as debt recovery and revenue inspection.
 - High Level Architecture and Processes – high level explanation of how the systems would work.
 - Deployment Activities and suggested Deployment Plan – to put the two Models in place, including business requirements, solution design, technical requirements, terminal procurement and commercial arrangements.

- Back Office Components and Processes – if an operator decides to implement Model 2, this explains the components and processes of a back office that would aggregate and manage fare settlement, and lessons learned from previous deployments
 - Known Restrictions – issues that the TfL implementation has demonstrated
 - Revenue Inspection Approaches: as the ticket information is not held on the EMV contactless card (unlike a smartcard), this outlines different approaches to revenue inspecting for EMV.
 - Legal & Regulatory Considerations: card payment regulations, on technical requirements and customer protection; transit industry regulations including passenger terms and conditions
 - Implementation Considerations for Model 2:
 - Deny List Management – how to manage cards that have a declined transaction to limit the risk to the transit operator/issuer
 - Debt Recovery – how to recover debts in the case of declined transaction
 - Migration & Upgrade Considerations – if a transit operator has already installed readers or gates
-

7.0 Contactless Transit EMV Accreditation Guidelines

The Accreditation Guidelines provide a description of the stages of accreditation that the suppliers for the transit operators will need to go through to meet card scheme requirements for Model 1 & 2. This includes:

- The different levels of accreditation for terminals, including detailed requirements and likely timescales
- Best practices for achieving accreditation, including communication between the transit operator, card schemes and acquirers
- Contact details for card scheme and acquirer representatives
- Description of PCI DSS requirements

8.0 Contactless Transit EMV Communication Toolkit

The Communications Toolkit is a slide deck that provides information on the communications activity for transit operators and card issuers to deliver to support contactless implementation, both from a customer and a staff education perspective.

This deliverable draws heavily on the excellent communications campaign that sat behind the phased TfL implementation, and that continues to evolve as issues progress in their customer use of contactless.

The Communications Toolkit covers the following topics:

- Customer Communication:
 - Content – explanation of how contactless payments work; the three models; customer experience; key messages; and issues to address (e.g. card clash)
 - Channels – guidance on marketing; social media; press; website and consumer
- research
 - Plans – pre-launch; during launch; and post-launch
- Staff Communication:
 - Challenges – of getting staff to embrace and understand contactless
 - Content – explanation of how contactless payments work; troubleshooting; fare breakdown
 - Channels – guidance on training, materials, contact centres
- Materials:
 - Existing consumer research
 - Frequently asked questions
 - TfL collateral examples

9.0 Model 3, Pre-Purchase EMV Business Requirements Definition

The Model 3, Pre-Purchased Business Requirements Definition is an amalgamation of the Customer Proposition and the Statement of User Requirements. It provides an outline of the proposed Pre-Purchased solution and requirements for participation, implementation and running of the service.

The document has been produced with the following objectives:

- Define the customer experience for when a contactless device is used as authority to travel for pre-purchased 'tickets'
- To help the transit industry deliver a consistent customer experience for customers travelling across the UK using multi-operator and multi-mode interoperable journeys
- To help facilitate transit operators' business case development
- To provide a source of service descriptions and customer experience information to help Transit Operators with their infrastructure procurement.

Part 1 (Customer Proposition) outlines the vision for a Pre-Purchased Contactless Service, whereby it:

- Explores customer needs
- Gives a high-level overview of the proposition and solution for pre-purchased contactless travel

- Contains requirements and food for thought for industry
- Specifies key principles
- Examines the benefits and costs to the industry of such a proposition

Part 2 (Statement of User Requirement) is intended as an elaboration of the Customer Proposition. The User Requirements have been written to enable a transit operator to understand the main processes and third-party relationships needed for a Pre-Purchased Model, and to provide information essential to the development of a business case for the deployment of contactless cards for Pre-Purchase travel. The document could additionally be used as a basis for developing supplier Requests for Information and the development of industry wide standards for system messages and interoperability. The document includes:

- High Level Architecture
- High Level Processes
- Operational Considerations
- Legal & Regulatory Considerations
- Interoperability Considerations

10.0 Contactless Transit EMV Framework Governance

A governance structure was put in place for the 2015-2017 Contactless Transit Project to allow thorough and clear decision-making by the card and transit industries in developing and refining the Models. This included a monthly Working Group, six-weekly Steering Group, and quarterly Executive Group. Following the completion of the Project in May 2017, these groups were disbanded.

A Business As Usual Framework Governance approach is set out below, which will allow the

transit and card industries to continue to work together to ensure the Framework remains commercially and operationally viable for contactless transit in the UK.

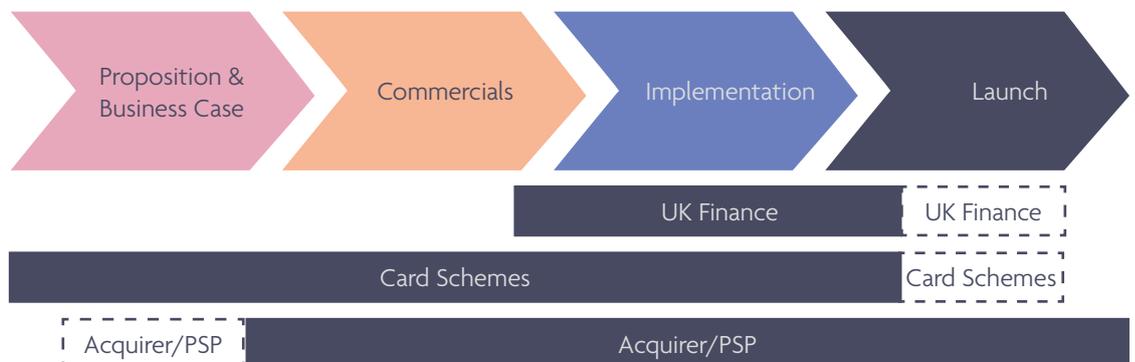
This could include material changes being made to the Framework documents, if agreed under the Governance model; or additional documents being developed by other parties to complement the Framework documents.

10.1 Engagement Model for New Implementations

As implementations of Models 1 and 2 are adapted to fit transit operators' specific needs, it is inevitable that variations of the Models will emerge. Moreover, the principles underpinning the Models – especially the Risk & Liability agreements – may need to be amended to reflect commercial realities.

It is vital therefore that for those transit operators, schemes or retailers considering implementing contactless as a payment/ticketing solution, there is engagement with the following stakeholders throughout the various phases:

- Engage card schemes and card acquirers at the outset
- General queries to UK Finance
- Card scheme/ acquirer specific issues – direct to card schemes/ acquirer
- Launch communications – UK Finance and card schemes



10.2 Business As Usual Framework Governance

The aim of the Business As Usual Framework Governance is to ensure the underlying principles of the Framework are maintained, and any significant changes to the Models are given due consideration and agreed by both the card and transit industries.

In particular the Governance structure has been developed to; manage changes to the Framework and outline how the Framework documents will be updated; set out reporting requirements from transit operators; and establish the Review Process for the Framework.

10.2.1 Transit and Card industry changes

The following may trigger a need for a change to the Framework:

- Lessons learned from live implementations
- Amendments to the regulatory context for either the card or transit industries
- Card scheme developments

The table below shows the different types of changes that could be made to the Framework.

Types of Changes to the Contactless Transit Framework		Party able to update
Clarification	Clarifies the intent of the requirements or topic	Card Payments: Card Schemes, Acquirers, CTIF Transit: TfN/Bus Alliance or RDG
Additional Guidance	Explanation definition and/or instruction to increase understanding or provide further information or guidance on a particular topic	Third party
Material Framework Changes	Changes to the fundamental principles of the Models, for example, to the underpinning Risk & Liability Agreements	UK Finance following review by both industries

The following process will be put in place to manage these changes:

- The UK Finance Policy Team will operate the Contactless Transit Implementation Forum (CTIF), where issues to do with actual implementation of the Models can be raised by the relevant transit operator, their supplier or acquirer, or the wider card industry to the UK Finance Policy Team. The CTIF will hold a call or meeting where necessary with representatives from card issuers, schemes and acquirers. CTIF meeting actions represent a responsibility on issuers/acquirers to respond in writing, otherwise no reply is support for the decision.
- It is anticipated that the following issues will be discussed in the CTIF:
 - New variations to Models 1 or 2, especially if they do not adhere to the Minimum Viable Proposition.
 - Queries on the issuance or acceptance of different card types.
 - Technical issues that are preventing the smooth implementation of the Models, and that which can be addressed on an industry-wide basis.
- The following issues will not be managed by the CTIF:
 - Commercial issues between any of the parties involved in an implementation.
 - Technical issues specific to a particular party.
 - Accreditation process for an individual implementation.
- Clarifications and Additional Guidance can be resolved in discussions between UK Finance and the relevant parties. This was/is the working model used to support the contactless implementation on Transport for London (TfL). This may involve a third party developing additional guidance documentation that can sit alongside the Framework.
- Material Framework Changes will need to be managed through a fuller discussion with both industries, most likely through a bespoke meeting or call. This will require measurable evidence of the need for the change. This could either be to improve the customer experience or to enable transit operators' business.
- Any changes to the Framework that imply card scheme changes will require a significant period before implementation can take place. Typically card schemes will announce changes to stakeholders in the April or October to be implemented 6 months later.

10.2.2 Maintaining the Framework documents

- The baseline version of the Framework documents will be published in December 2017. UK Finance will act as the repository for the Framework documents and will make them publically available.
- If it is decided by both the card and transit industries that the Framework documents need to be updated subsequently, then a proposal will be put forward on how this will be resourced.
- Subject as otherwise agreed in writing between the parties all copyright, design rights and other intellectual property rights in any work which is developed shall be made publically available under a Creative Commons Attribution Licence²⁰.

10.3 Central Reporting

In order to encourage implementation of the Models so that customers will be able to travel more widely on contactless across the UK, it is invaluable to be able to demonstrate the uptake of contactless in individual implementations.

Transit Operators that have implemented contactless should therefore provide the following metrics to UK Finance on a monthly basis:

Model 1 Reporting	CPU Usage		Liability	
	No of CPCs Journeys	CPC % of all Journeys	% of declined authorisations	No.of devices attempting to travel on the deny list
Auth Instantly				
Auth within 15 mins				
Auth within 60 mins				

Model 2 Reporting						
Transit Operator Name		CPU Usage			Liability	
% of vehicles contactless enabled		No of CPCs used	No of completed Journeys	CPC % of PAYG travel	% of declined authorisations	No.of devices attempting to travel on the deny list

10.4 Framework Review Process

On an annual basis, the two industries will come together to review the overall Framework. The purpose of this will be to ensure that the Models remain commercially and operationally viable for both the transit and cards industries. The review will include analysis of liability impact and debt recovery performance.

UK Finance will facilitate the Framework Review by providing accommodation and secretarial support. The first review is anticipated to be in May 2018. As described above, if a Material Framework Change is suggested then UK Finance can arrange an ad hoc meeting or call involving both industries.

²⁰Under this licence, anyone is free to share and adapt the documents for their own purposes, but appropriate credit must be given to UK Finance and, where significant changes are made, these must be indicated. See <https://creativecommons.org/licenses/by/3.0/>.

11.0 Contactless Transit EMV Project Approach

11.1 Project approach

The UK Cards Association, (now UK Finance) employed a project team of two people to run the Contactless Transit Project, working alongside two policy personnel. The Project was delivered in two phases:

Phase 1:

Model 1 and Model 2 detailed implementation guidelines.

Phase 2:

- Stage 1: Model 3 Business Requirements Definition and High Level Variant Impact Assessment.
- Stage 2:
 - Transit Operator Implementation: supporting business case development and implementations.
 - Model and Framework Development: refining the Framework and Models based on learnings from transit operator implementations.

- Model and Transit Operator Interoperability: outlining how the Models and transit operators' implementations could interoperate.
- Digital Transformation: understanding how future EMV standards and form factors could impact on the transit use cases and models.

Project Phasing & Funding		
2015	2016	2017
<ul style="list-style-type: none"> • Buy-in from card and transit industries • Contactless Transit Framework developed • Model 1 & 2 detailed implementation guidelines 	<ul style="list-style-type: none"> • Model 3 requirements • Minimum Viable Proposition for Models 1 & 2 • Support of Model 1 implementations • Mobile support for Models (value added services) 	<ul style="list-style-type: none"> • Support for Model 2 Implementations • Back office and interoperability requirements • Model 3 further development
<ul style="list-style-type: none"> • Funded by UK Cards Association (UKCA) 	<ul style="list-style-type: none"> • Funded by UKCA, RDG, bus companies, Department for Transport, Transport Scotland, Transport for the North, international card schemes 	

11.2 Project success criteria

At the outset of the Project phases, the various stakeholders involved agreed what success would look like for them, and how this would be measured. These are set out below²¹. All of these measures have been completed or are on track.

Phase 1:

1. The Card Schemes (American Express, Discover, MasterCard, Visa Europe) and the UK Cards Association Members (now UK Finance) agree to the framework

Measure 1: Letter of Commitment to implement the agreed framework, within their respective governance and rules²², from each Card Scheme.

Measure 2: UK Finance Members endorse the framework through the Contactless Rollout Committee and Management Committee.

Measure 3: Minimum policy and technical impacts are required for Card Schemes to implement the EMV contactless framework.

2. Transit operators agree to the framework and use the project deliverables (the products) to consider implementing EMV contactless.

Measure 1: Those representing the transit operators on the project steering group sign off the framework.

Measure 2: Rail Settlement Plan (RSP) agree EMV contactless framework can be implemented within their RSP standards.

3. DfT adopt the framework to deliver its EMV strategy

Measure 1: The DfT agree to support one or more EMV contactless transit pilots.

Measure 2: The DfT adopt the contactless framework for DfT led initiatives.

4. Customer journeys using EMV contactless and transit operator charging models can be understood by customers across the UK

Measure: Transit operators and passenger bodies confirm journeys can be understood by customers across the UK.

Phase 2: Stage 1

1. The Card Schemes and the UK Finance Members agree to implement changes to rules and/or systems if required

Measure 1: UK Finance Members and Card Schemes endorse the Business Requirements Definition (BRD) through the Contactless Transit Steering Group (CTSG).

Measure 2: Card Schemes provide commitment to implement any changes required.

2. Transit operators agree the BRD can be used to engage suppliers with a Request For Information (RFI).

Measure 1: Those representing the transit operators on the CTT&FG sign off on the project deliverables.

3. DfT support the requirements of Operators retailing in this way

Measure 1: The DfT give serious consideration to including the requirement within the Bus Bill and within future rail franchise agreements

4. The solution will create a good customer proposition for customer journeys using Card as Authority to Travel

Measure: Transit Operators and Transport Focus confirm journeys can be understood by customers across the UK.

²¹ Also referenced in the EMV Contactless Transit Programme Initiation Document.

²² Recognising each of the Card Schemes have their own specific operating models.

Phase 2: Stage 2

1. **Model and Framework Development:** The Project Stakeholders agree to changes to the Models and the Framework to encompass currently unsupported use cases.

Measure 1: Clarity on project assets and those organisations that will have responsibility for developing.

Measure 2: Framework documents have been updated to capture lessons learned from implementation and new requirements.

2. **Transit Operator Support and Framework Promotion:** Transit operators and suppliers use the Project assets and Project team support to plan and implement pilots. There is a good level of awareness and support for the Framework from wider stakeholders and the public.

Measure 1: Pilots have launched (5 * M1 & 2 * M2)

Measure 2: Positive rhetoric from Public Affairs activity (including 1 X Parliamentary Event)

Measure 3: Positive press coverage on EMV as a payment and ticketing option for transit

3. **Model and Transit Operator Interoperability:** Project stakeholders agree to the proposed interoperability approach, implement changes where necessary, and use that approach for their own implementations as and when required

Measure 1: Agreement on the approach to UK wide interoperability between Model 2 and Model 3 by Rail (RDG), Bus (Joint 5 & ALBUM), TfL, Regions (TS, TfN, TfW), to include agreement on the:

- vision for UK wide interoperability
- the customer proposition
- the technology (architecture and processes)
- Standards have been developed that allow transit operators to develop systems

4. **Digital Transformation:** Project stakeholders understand impact of future specifications and EMV devices such as mobile.

Measure 1: Impact assessment of future payment specifications conducted and understood by transit industry.

Measure 2: Impact assessment on the use of mobiles within contactless for transit understood by the transit industry.

11.3 Supporting project analysis

Throughout the project, a number of pieces of analysis were conducted. Conclusions reached through analysis are included within the Framework documents. To fully understand the rationales, the analysis is also available. This includes information on:

- Payments regulation
- Interoperability between models and transit operators

- Pre-purchased challenges and mitigations
- Implementation resource requirements
- Payment and access disintermediation

11.4 Ongoing work

The Project handed over work to stakeholders for further development:

- Private labelled cards – to the Rail Delivery Group

- Interoperability standards – to the Rail Delivery Group
- Payment Account Reference – to UK Finance

Annex A: Glossary of Terms

UK Cards Association	The UK Cards Association, former trade association now integrated into UK Finance
CTSG	Contactless Transit Steering Group
CTWG	Contactless Transit Working Group
Acquirer	Payment Service Provider that processes card payments on behalf of the transit operator/transit operator schemes.
Card Schemes	Owners of payment scheme, into which a bank or building can become a member. They define the set of rules to be applied within their network.
CPC	Contactless Payment Card
CPT	Confederation of Passenger Transport
DfT	Department for Transport
EMV Contactless	EMV Contactless works by holding a contactless chip-enabled payment device (typically a card or smartphone) within proximity of an EMV contactless-capable reader.
Form Factors	EMV contactless devices including mobile and wearable variants.
Issuer	A Payment Service Provider that offers card associated branded payment cards directly to consumers.
ITSO	ITSO is the national specification, or standard, for smart ticketing.
Oyster	Oyster is the London smartcard which can hold pay-as-you-go credit, Travelcard and Bus & Tram Pass season tickets. Used by customers to travel on the Bus, Tube, Tram, DLR, London Overground and most National Rail services in London.
NFC	Near Field Communication – communication protocol that allows contactless EMV devices to communicate with an EMV contactless-capable reader.
Pay-As-You-Go	Customer either loads credit on payment card which is debited for different ticket values during their journey, or uses their EMV contactless device to travel with fares calculated then debited directly from their account.
Payment in advance	Customer pays in advance for ticket which generates a travel token which is either loaded to the card (or other EMV contactless device), or generates a ticket in the cloud.
PSP	Payment Service Provider
RDG	Rail Delivery Group
RSP	Rail Settlement Plan
TfL	Transport for London
TOCs	Train Operating Companies
TPP	Third Party Payment processor may sit between the transit operator and acquirer
Transit Operator	A private enterprise or agency that operates one or more transportation routes.
Use Case	Describes a type of customer journey from the perspective of how it is made by the customer and any supporting requirements that are required to make it happen

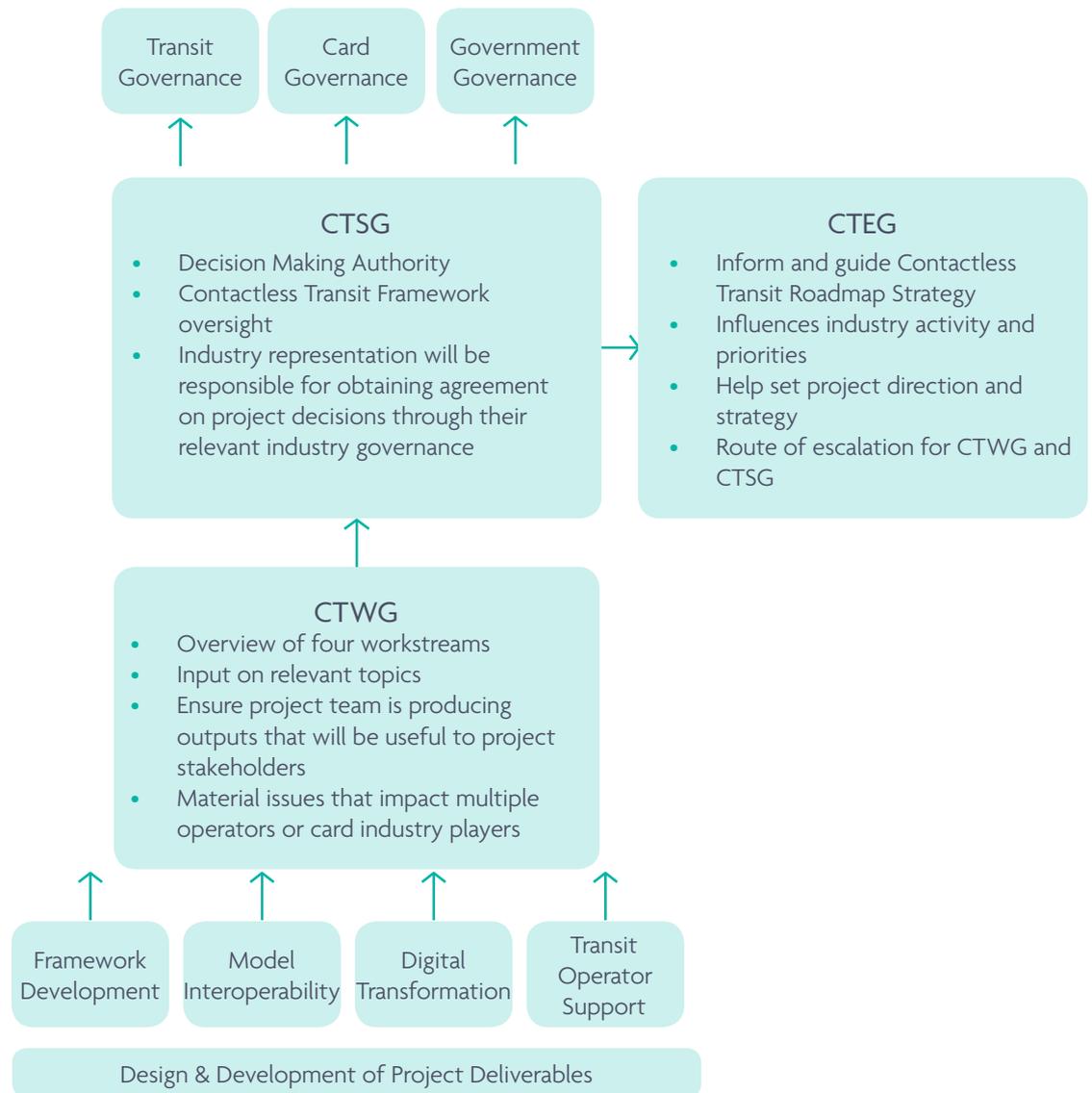
Annex B: Stakeholders and Governance

Stakeholders

The following table describes the different stakeholders involved in the Project.

Stakeholder Group	Description
UK Finance (formerly The UK Cards Association)	Provide overall management and monitoring of the project. Report progress and issues to Steering Group.
Card Schemes	Owners of payment scheme, into which a bank or building can become a member. They define the set of rules to be applied within their network.
Issuers	A PSP that offers card associated branded payment cards directly to consumers.
Acquirers	A PSP that processes card payments on behalf of the transit operator.
Transit Operators	A private enterprise or agency that operates one or more transportation routes.
Department for Transport	Setting the strategic direction for the transport industry in England and to encourage the use of new technology such as EMV contactless card. To assist with resolving any project transit issues.
Rail Delivery Group (RDG)	Represents all train companies to preserve and enhance the benefits for passengers of Britain's national rail network. Owns the Rail Settlement Plan (RSP).
Confederation of Passenger Transport (CPT)	Represent the majority of bus companies to preserve and enhance the benefits for passengers of Britain's buses. To assist with resolving any project transit issues.
Suppliers	Provide transit operators with technology and infrastructure to deliver the customer experience and support revenue collection.
Transport Focus	Represents the customers to put the interests of the transport users first.
Transport Authorities	Represents and administers many of the multi-modal-operator schemes

Contactless Transit Project Governance



Contactless Transit Executive Group composition

Role	Name	Key Responsibility	Organisation
Senior Stakeholder	David Reynolds	Representing card industry	Barclays
Senior Stakeholder	Stephen Fidler	Representing government strategy	DfT
Senior Stakeholder	Dennis Rocks	Representing rail industry strategy	RDG
Senior Stakeholder	Steve Salmon	Representing bus industry strategy	CPT
Senior Stakeholder	David Brown	Representing transit strategy	Go Ahead
Senior Stakeholder	John Henkel	Representing the cities and transport authorities	TfGM

Contactless Transit Steering Group composition

Role	Name	Key Responsibility	Organisation
Chair	Graham Peacop	CTSG Chair	UK Cards Association
Sponsor	Richard Koch	Overall Executive Project Sponsor	UK Cards Association
Business Owner	Briony Krikorian	Contactless Programme Manager	UK Cards Association
Senior Stakeholder	Vanessa Brouwer Annette Street	Involvement in project workshops. Ensure consistency with own forum. Representing their (issuers and acquirers) members views	Mastercard American Express
Senior Stakeholder	Duncan Henry	Representing Rail Transit Operating Companies	RDG
Senior Stakeholder	George Connell	Representing Bus Transit Operating Companies	Stagecoach
Senior Stakeholder	Steve Blackmore	Ensure project objectives and plans are aligned to DfT strategy	DfT
Project Managers	Adrian Burholt & Nicola Moir	Responsible for the day-to-day management and delivery of the project	UK Cards Association
Senior Stakeholder	Mike Hewitson	Representing transit passengers	Transport Focus
Senior Stakeholder	John Henkel	Representing the transport authorities and cities	Passenger Transport Executive Group (PTEG)

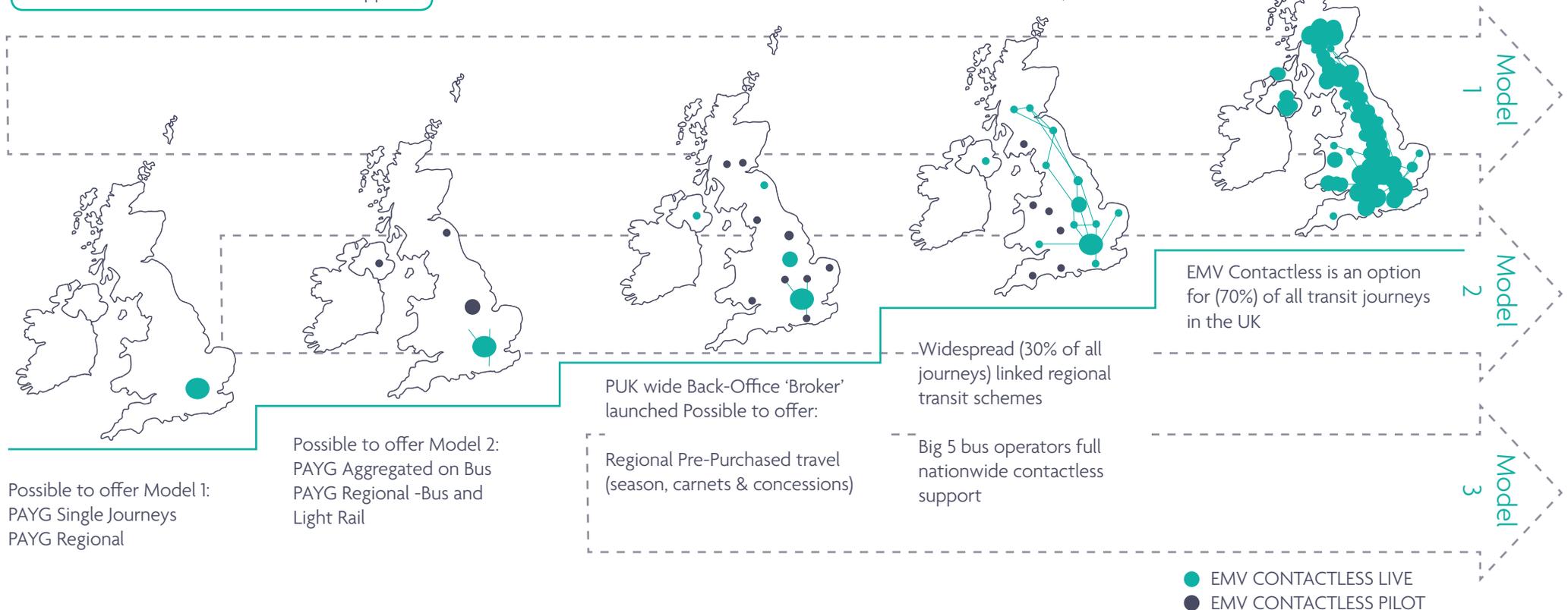
Annex C: Contactless Transit Implementation Roadmap

→ 2016 → 2017 → 2018 → 2019 → 2020 → 2021 → 2022 → 2023 → 2024 → 2025

- Minimal Viable Proposition for launch
- Single Journey (fare values up to (£30)
 - Single Operator
 - Single Mode
 - Full fare paying individual adult
 - No concessions or First Class travel support

First wide scale EMV for Transit launches outside London

Locations are indicative only:



EMV Contactless is an option for (70%) of all transit journeys in the UK

Development & Pilots*	Standalone Regional	Linked Regional	Full UK Roll-Out
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*Outside of TfL

Annex D: Contactless Transit Models

1 Single Pay-As-You-Go model

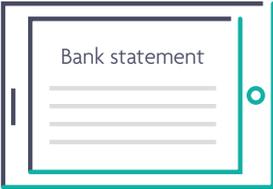
- Replaces cash
- Fare charged at start of each journey

Suited to low-to-medium value single operator services (e.g. bus)

1. Customer uses their contactless card or device to make a single journey. Touch in only.



2. Customer can view charge on their bank statement



2 Aggregated Pay-As-You-Go model

- Replaces cash
- Can combine several journeys into one charge
- Charge typically collected at the end of each day
- Fare capping possible

Suited to low-to-medium value single operator services (e.g. bus)

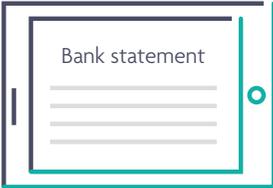
1. Customer makes multi-leg journey or multiple journeys using their contactless card or device. Touch in and touch out.



2. End of day processing settles customer's daily charge.



3. Customer can view charge on their bank statement.



3 Pre-purchase Model

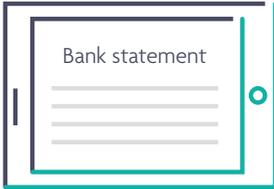
- Replaces paper tickets
- Fare charged at point of purchase
- Card permits travel
- Can include seasonal tickets

Suited to higher value services (e.g. long distance travel)

1. Customer purchases their ticket online and associates it with their contactless card or device.



2. Customer can view their journey on their bank statement.



3. Customer uses their contactless card as their ticket to travel.

