STOP TALKING ABOUT LONDON-STYLE

WHY DIGITAL PAYG IS NOW THE FUTURE OF TICKETING

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ABOUT THE AUTHOR

Thomas Ableman is the founder of Freewheeling, where he supports the leadership teams of city-region transport authorities and operators with integrated transport and organisational strategy. He was previously Director of Strategy & Innovation at Transport for London, the world's largest integrated transport authority. At Chiltern Railways, he led the creation of the UK's first barcode ticketing app, and subsequently led the nationwide rollout of barcode ticketing at the UK Rail Delivery Group. As this report explains, he also attempted to bring Contactless ticketing to Chiltern Railways a decade before it finally happened.

NOTE FROM THE AUTHOR

I have spent my career in British public transport: as Commercial Director of Chiltern Railways (a train operator running from London into the English Midlands), as Director of Strategy & Innovation at Transport for London (the world's largest integrated transport authority), and now as an independent adviser working with governments, city regions and operators.

Britain's ticketing history is unusually instructive – London has built the world's most admired urban ticketing system, and we have also made, in public and at great expense, most of the mistakes available in this field.

This report draws on both.

Chapter One:

THE LONDON STORY

The deal I couldn't do

In 2010, at Chiltern Railways, we created the first barcode ticketing app in the British rail industry. Customers could buy a ticket on their phone and show it to be scanned. I later kicked off the industry programme to roll barcode ticketing nationwide.

Three years after that first app, I tried to bring another kind of ticketing to Chiltern Railways, and failed.

London had just launched contactless payment on its buses, with the Tube and rail network to follow. It was obviously the future. Our customers were already using it when they reached London, and it made no sense that they should tap their way seamlessly around the capital and then queue at a machine to travel with us.

But the British government's preferred ticketing standard was a domestic smartcard system. My aim was to divert some of that budget into a contactless pilot on Chiltern, but I couldn't get it done. So instead of contactless, Chiltern got the smartcards, which customers barely used.

Contactless finally arrived at Chiltern stations in June 2024, eleven years later. By then, whole countries had moved on to something better.

I learned two things from those years, and this report is built on both.

First, the mobile phone is a superb delivery mechanism for transport ticketing. Second, give customers the current technology, not one from the previous cycle. If you take them back a whole technology cycle, they will notice.

The System that London built

The contactless system I was trying to provide to Chiltern customers in 2013 deserves its reputation as a world-leading innovation.

London had already transformed ticketing once. The Oyster card, launched in 2003, took the transaction out of the journey: load money onto a card, touch in, touch out, and the system worked out what to charge. From the mid-2000s, Transport for London and its banking partners began work on the next step. Why should customers have to acquire and top up a special card at all, when the bank card in their pocket could do the same job?

Contactless launched on London's buses in December 2012 and across the Tube and rail network in September 2014, complete with daily and weekly price capping.

The result transformed the experience of using public transport. A visitor can land at Heathrow and travel across one of the world's great cities without buying anything, understanding anything, or queuing for anything. A Londoner can move between bus, Tube, train and tram all day and be guaranteed the best available fare with a defined ceiling. London's fares are still highly complex (there are seven different adult single rail fares between my home in Walthamstow and Richmond, for example) but no-one cares any more because no-one has to think about them.

The yearning

Almost every transport decision-maker in Europe has travelled on the London system, and most have admired it. "London-style ticketing" has become continental shorthand for a wholly reasonable ambition: travelling around any city should feel as effortless as travelling around London.

But what exactly is the thing being yearned for? When people say they love the London system, what do they love? I would list eight things, in three groups.

Time and effort

- There is no ticket to buy. You walk in and you travel.
- There is nothing extra to remember. You travel using something you have with you anyway. You don't need a special card or ticket.

Money and price

- You never overpay. The system works out the best fare for the journeys you actually made, after you made them.
- Your spending has a ceiling. Daily and weekly caps mean that however much you travel, you never pay more than the equivalent season ticket.

Peace of mind

- You cannot buy the wrong ticket. You are charged retrospectively for the journey you actually made, so the fear of being fined disappears.
- You can change your plans. If you get a text while on the train that changes your plans, it's no issue. The system charges you for what you did, not what you originally said you'd do.
- You never have to predict your week. Nobody has to guess on Monday morning how many journeys they will make by Friday to figure out if a weekly pass will be good value.
- Pricing becomes invisible. You stop performing a transaction every time you travel, and so the resentment that comes with repeatedly handing over money disappears with it.

We'll come back to this list later in this report.

Chapter Two:

ABOUT DIGITAL PAYG

Digital Pay As You Go is an app on your phone. When you start a journey, you swipe to check in. Your phone then uses its own sensors, mainly location, to work out the journey you make: which services you used, where you changed, where you got off.

When you finish travelling, you swipe to check out. If you forget, the system notices your journey has ended and checks you out itself. Soon, the need for a starting swipe will be abolished; instead you can simply let the app run in the background and it will automatically sense when you're making a public transport journey.

As with Contactless, a back office looks at the journey you actually made and charges you the best available fare, with daily and weekly caps applied automatically.
In summary, it's the same as London but delivered through your phone. The differences are all about the benefits gained from using a phone not a card: you can see information in real time, you can be informed on a screen, and the system knows your whole journey rather than two taps at either end of it.

One clarification matters before we go further. Digital PAYG does not mean buying a ticket on your phone. Barcode ticketing, which millions of people already use on British trains and buses, is an existing proposition (choose a ticket, buy it, show it) on your phone. Barcode is the proposition I helped to kickstart, both at Chiltern Railways and at the Rail Delivery Group (the association of Britain's train operators).

It's good but different. Digital PAYG removes the ticket altogether.

It also does not mean tapping your phone on a contactless reader, which is simply using your phone to access a bank card stored on your phone.
This report is about the primary ticketing system - the default channel most customers use for most journeys. That is Contactless in London, and it is Digital PAYG in some other countries, such as Denmark. Most systems have niche channels alongside for specific groups (visitors, children, people without phones) but the core question is about the system that everyone thinks of when asked to buy a ticket.

Digital PAYG is about using the full capabilities of a modern smartphone to create the most frictionless travel possible. Think of it as London-style Plus (or even Plus Plus).

Where it is already normal

Though new to many countries, Digital PAYG is not a new concept. In Switzerland, whose integrated public transport network is the most sophisticated in the world, Digital PAYG has been operating since 2016, when launched by FAIRTIQ. Since 2019 it has been fully embedded in the SBB (Swiss state railways) app as EasyRide and is now used for one in five Swiss rail journeys.

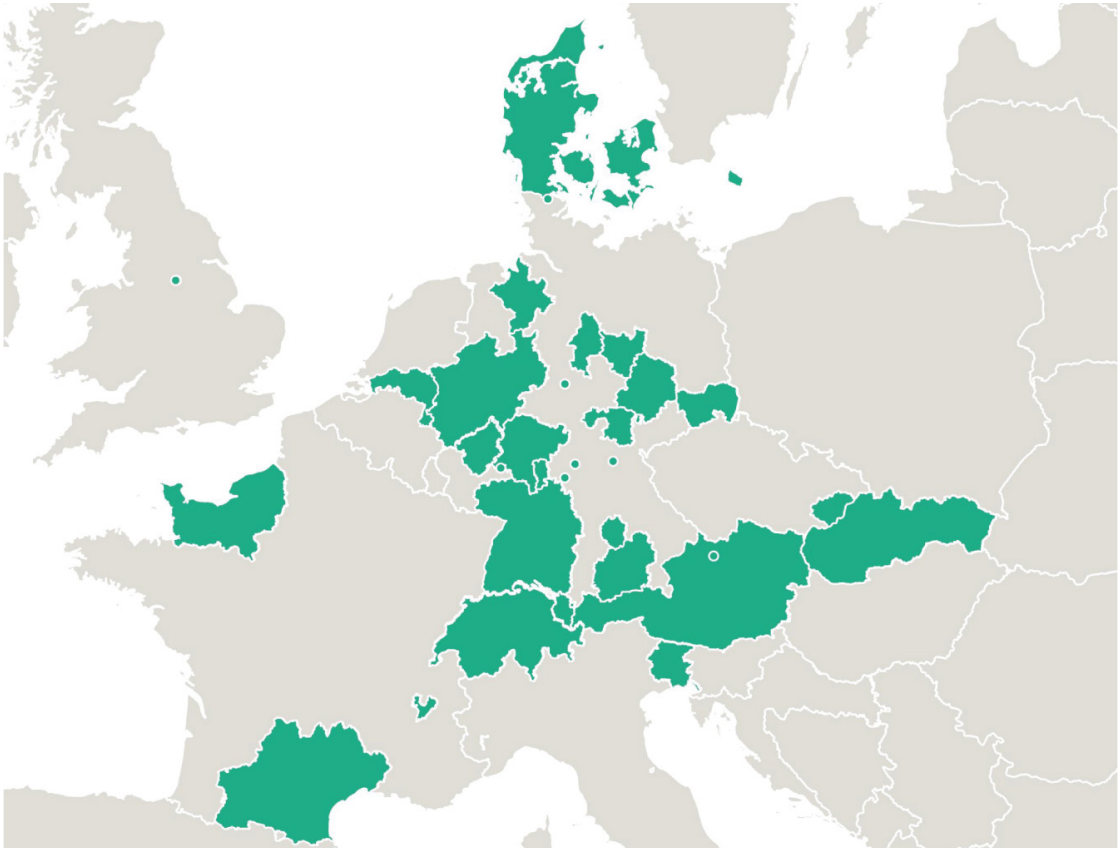
This Swiss system is both fully integrated and universal; covering every train, tram, bus and boat in the entire country. It's possible to swipe to check-in at an Alpine pier, and not touch your phone again for the rest of the day. In the background, the system will work out the cheapest fare for your boat trip across the lake, train journey to the city and tram ride across town.

Many towns, cities and regions across Europe use Digital PAYG (including one public transport region stretching across three countries at the border of Germany, Belgium and the Netherlands; and the entire nation of Austria). But only one country has not only enabled Digital PAYG across its entire national ticketing system but also deliberately chosen to make it their primary ticketing channel. That country is Denmark, which decided to do so in 2023 and then switched off its legacy transport ticketing system in summer 2026.

Interestingly, the system that Denmark previously used was a card-based system (not dissimilar to Oyster) but they decided to replace it with FAIRTIQ-based Digital PAYG. It took less than a year from decision to launch of the new system nationwide in September 2024. These timelines were made possible by the lack of need for physical infrastructure.

Britain's Department for Transport has commissioned pilots on selected networks in the Midlands and North of England, though they're not great illustrations of the system's potential. Operators report the trials have exceeded their targets, and they are seeking both to expand and extend the trials as a result of customer feedback.

So the question this report puts to every transport authority in Europe is this: given that Digital PAYG is proven at national scale – and given the customer benefits – and given the cost advantages; why would the default for your next ticketing investment be anything else?



FAIRTIQ Validity Map, 2026

Chapter Three:

MEDIA AND PROPOSITION

Two different things

Every ticketing system involves two things: the proposition (what you get from it) and the media (how it's delivered). Propositions used to be quite simple: generally it was either a single journey, a return journey, or unlimited journeys within a defined time and place.

The media also used to be quite simple: typically a piece of cardboard.

When the only media was cardboard, thinking through the distinction between media and proposition wasn't very important.

But as digital ticketing has emerged, the distinction has become relevant. There were lots of things a smartcard could offer that a paper ticket could not.

Similarly, Contactless could offer things that a smartcard could not.

But when TfL conceived Contactless in the mid-2000s, there were elements of the proposition and media that were still welded together. If you wanted seamless entry with charging worked out afterwards, the only conceivable media was a card, because a card was the only thing that a machine could read and everyone could carry.

The iPhone launched in 2007, the same year TfL began trialling Oyster functionality on Barclaycard bank cards. It would be years before the potential for using smartphones as tickets became clear – and before most people had them. In the meantime, almost everyone had a card. The people designing London's future ticketing system were making the right choice to use cards.
But in the two decades since, the smartphone has become a piece of media that could do everything a card does, plus a great deal a card cannot.

The proposition and the media are now separate questions, and they need separate answers.

The trouble is that our vocabulary has not caught up. "London-style ticketing" and "Contactless" are used as if they both name the proposition. But they don't; Contactless is the media.

Why do customers love Contactless?

Let's look again at the eight things customers love (we first listed them in Chapter One), and ask of each one: is this a property of using a card, or a property of the proposition behind it?

There is no ticket to buy. This is achieved by an account that charges you after you travel. Any token linked to such an account delivers it. It doesn't require a Contactless card.

There is nothing extra to remember. This one genuinely is about media, but a card is no longer the best media. The point is that the token is something you carry anyway. In 2012, the thing everyone carried anyway was a bank card. In 2026, it is a phone, and for a growing share of the population the bank card itself now lives inside the phone with the card left at home.

You never overpay. Best-fare calculation happens in a back office, hours after your journey. It doesn't require a card.

Your spending has a ceiling. Capping is arithmetic performed on an account. Again, it doesn't require a card.

You cannot buy the wrong ticket. This is a feature of a charging system that charges you retrospectively as opposed to in advance. This depends on back office calculations, not the card.

You can change your plans. The system charges you for what you did rather than what you predicted because the account settles afterwards. The card neither knows nor cares.
You never have to predict your week. This requires an account-based system with weekly capping. It doesn't require a card.

Pricing becomes invisible. The transaction disappeared because payment moved into the background of an account. The card is simply what you tap.

Seven of the eight are properties of an account-based, post-pay system. They would be delivered identically whether the token was a card, a phone, a wristband or a ring. The eighth is about using a token people always have on them, and the answer to that question has changed since 2012.

Where cards are better

The one thing a card genuinely does better is pace of transactions through ticket gates. This was the original business case driver for Contactless in London. That is why I would not recommend London moves away from a card-based system for as long as it relies on gates for revenue protection.

So this advantage is real and relevant to a handful of megacities like London, but not to the vast majority of towns, cities or regions of Europe.

Chapter Four:

IMAGINE A CAPABLE CARD

The user experience of Contactless is great, but it's not perfect. It's not always easy to understand why you've been charged what you've been charged. It's hard to communicate important features (e.g. you need to touch a pink reader if you're changing outside central London). Many of these can be solved with a companion app, but then the user needs two different devices with them – and to know which to use on which occasion.

If the device being used for travel was already a communication device, it would be possible to communicate with the customer in real time.

For example, you could tell the customer that one more journey will take them to the cap – and give them free travel for the rest of the day. Customers could instantly see which fare they'd been charged and why it was right. And you could communicate all kinds of other useful messages relevant to the actual journey the customer is taking.

Card-based Tap, AI generated

This is especially relevant outside London as networks are more complex, and pricing structures less familiar. The longstanding zonal pricing structure of London means customers can intuit the rough fare they expect to be charged. Where there is not this longstanding structure in place, it is helpful to be able to interact directly with the device.

The wallets in smartphones can, sometimes, do some of this but a dedicated app can do so much more.

Imagine the card knew where you were

Most of Contactless's imperfections as a user experience result from the fact that the system only knows where you are when you touch a reader.

That's why there's the clunky "pink reader" system for interchanges outside London. It's why customers get frustrated when they think they've touched out, but the gate didn't pick up their tap and so they are charged a maximum fare. It's why customers repeatedly forget to touch out on London's ungated Docklands Light Railway (DLR) (which costs them money) or forget to touch in and out on the DLR (which costs TfL money). Each year, 22 million customers get the shock of a maximum fare from the TfL system, most of whom – I suspect - won't be expecting it.

As Contactless schemes get larger, the maximum fares get higher. When London's scheme launched, the maximum fare was only slightly more than a typical fare paid. But the zone now covers the whole of South East England, so the maximum fare has gone up. Someone expecting to pay £4.40 for a local journey will be charged up to £30.40 if they fail to touch out. By contrast, Digital PAYG will just check them out.

Across the UK, card tap rules cause confusion. In some cities (like Edinburgh) trams require a tap on and tap off. In London, they only require a tap on. It is similar with buses. These confusions cease to exist with Digital PAYG, because there is no need to tap at all.

Imagine the card knew where you were and had a screen

If the card could talk back, it could remind you to check out. In fact, forget that: it could check you out itself, without you needing to do anything. It could automatically charge you the lowest fare for a journey that bypassed central London without you risking missing your train while you find the pink reader (an experience that visiting decision-makers don't have, but people that use the system do).

All of this would be better – and it's all achievable today with Digital Pay As You Go.
Some of it can be replicated using a companion app, but it's attempting to make a dumb media (a card) smarter by using the phone as a partner.

It's much better just to use an intelligent media to start with.

Imagine the card was clever

An intelligent media can offer multiple benefits to the customer. Try figuring out how to make a journey in London as a non-resident family. Contactless is not helpful, as it's impossible for the card to 'know' whether it's letting through a single adult or an adult plus two kids. The solution TfL adopts is highly clunky (and, for the user, expensive): on arrival in London, you need to buy (paying £10.50) an Oyster card for each kid, then add credit to it and then find a member of staff to add a child flag to each card. Finally you need to claim a refund for the unused PAYG credit when you've finished.

By contrast, the phone's settings can be changed with a simple tap of the screen. The crucial point is that the media interacting with the gate is intelligent – whereas a card is not. Even the people touching through London using their smartphones are using the card lodged in Google or Apple Wallet: they're using an intelligent device (a smartphone) but pretending it's a dumb media (a card). So the opportunities are lost.

Chapter Five:

THE COST, TIME, FLEXIBILITY CASES FOR DIGITAL PAYG

Chapter Four described why customers get a better experience from Digital PAYG. But Digital PAYG also offers a much better experience for transport authorities.

Flexibility

Contactless was designed for a single megacity, but is far less well-suited to the tapestry of Britain's regions. Through my Mini Switzerland project, I've been actively considering integrated transport in the Hope Valley in the UK, which connects Sheffield and Manchester. This is a great illustration of the challenge as the valley connects multiple UK regions.

The Hope Valley itself is in the East Midlands (so should be part of an East Midlands scheme) but most passengers are travelling to or from the Greater Manchester or South Yorkshire regions.

Contactless generally requires that each vehicle, platform validator, or gate is linked to only one scheme. This arises because the customer is identified by their bank card number, which has to be processed and held securely, and the card reading equipment needs to be part of a scheme with "Level 3 certification" with a single accountable operator.

Therefore, Contactless for somewhere like the Hope Valley requires one of the following:
Multiple physical readers, which is confusing for customers and likely to result in many customers receiving two maximum charges per journey (having accidentally touched in and out with separate schemes). This means a £5 fare could end up costing £60 (based on London's £30 maximum fare).
Complex infrastructure to exchange taps. Britain is attempting exactly this – a programme called Project Coral – and it is not easy. It requires that every contactless transaction from every participating scheme goes through a central broker and then at the end of the day, the broker advises if there are eligible multimodal products. This adds cost to every transaction alongside set-up costs. It also reduces flexibility to introduce new fares/products, as the broker has to be able to understand and process all possible fare types and products to establish which offers the best value.
A single scheme for all participating regions (e.g. for Hope Valley, this would be Greater Manchester, South Yorkshire and East Midlands). This, however, immediately becomes enormous as South Yorkshire would wish to also be in a scheme with neighbouring West Yorkshire, and Greater Manchester with Warrington & Cheshire (which itself would wish to be in a scheme with Merseyside, etc). Such a scheme would end up with serious governance challenges and a maximum fare costing three figures.
By contrast, Digital PAYG can be extended between multiple areas entirely in the back office without any meaningful technical work.

Baden-Württemberg, a German state with 11 million people covering 35,750 square kilometres, had 19 different transport associations offering different tariffs and ticketing systems that didn't talk to each other.

They have introduced a state-wide digital PAYG system as they wanted one system that worked everywhere. They didn't even evaluate Contactless as it was patently cost-prohibitive. Earlier this year, they were also able to introduce state-wide monthly capping. Other than Digital PAYG, all the other systems are still incompatible.

Time

Contactless is technically complicated because the card number has to be kept secure but the card is also the unique identifier which needs to be shared between operators, and because physical hardware needs to be installed in every station or vehicle.

As a result, it takes many years to get a new scheme live.

Project Coral, Britain's broker scheme for the West Midlands and beyond, has been in development for seven years and is not yet live. Many other cities are awaiting the development of this scheme for their own solutions. As a result, huge cumulative delays to rolling out PAYG ticketing build up across every waiting region.

Even the lower risk approach of extending an existing scheme can result in significant time and delays. Project Oval is the £68 million project to extend the London scheme to 233 stations in the commuter belt around London. It was due to be complete by 2024, but has actually rolled out around 100 stations at time of writing.

By contrast, Denmark implemented an all-operator, all-mode scheme nationwide on Digital PAYG in two years.

Cost

The London model is extraordinarily expensive. It requires readers at every station, tram stop and on every bus. These readers have to be networked and secure.

This is cost-effective in London where the busiest tube station in London, King's Cross St Pancras, sees 73 million entries and exits. Even the lightest-used (270 out of 270; Roding Valley on the Woodford-Hainault shuttle in Essex) is used 200,000 times per year. By contrast, there are 1,189 stations on Britain's national rail network with less usage than Roding Valley. Even some stations on urban networks like Merseyrail or the Glasgow Subway have fewer passengers than the Tube's quietest station.

The problem with seeking a London-style ticketing system is that London is the only London-style megacity in Britain in which infrastructure-intensive systems can be cost-effective. It might be worth attempting to build a business case for the extra expense if Contactless offered extra benefit but, as we're establishing, all that cost provides is a legacy solution with less capability.

The scale of cost differential is extraordinary. Rolling out Contactless to a metropolitan region is likely to cost well into 7 figures, largely in physical infrastructure. As already noted, the rollout of the TfL Contactless scheme to 233 stations in the South East cost £68 million. By contrast, rolling out Digital PAYG to a similar number of stations would cost a fraction of this amount as the physical infrastructure being used (the smartphone) has already been purchased (and is owned by) the customers themselves.

A detailed comparison of the implementation costs was recently undertaken for a metropolitan region in Europe with a population of approx 2m and it was calculated that a Digital PAYG scheme would cost less than 5% of a contactless scheme.

The cost gap continues to widen after opening day. In addition to various card payment provider costs, a Contactless scheme makes a commitment to physical infrastructure. This infrastructure requires cleaning and maintenance. As it's technology, it also required replacement at end-of-life, which needs to be built into any business case at the start. Of course, all these are true of the physical infrastructure used for Digital PAYG. It's just that because it's the customer's own smartphone, the customer pays those costs themselves.

Chapter Six:

THE STORY SO FAR

Switzerland: proof at scale

Switzerland was the country of birth for Digital PAYG, and it's not surprising that it's been a huge success. Despite no other retail channels having been retired, 20% of public transport journeys in Switzerland are made using Digital PAYG. Obviously, a higher share could have been possible (and higher cost savings achieved) if the Swiss had also elected to get rid of some of their existing channels.

Nevertheless, it is a remarkable vote of confidence in Digital PAYG that customers have proactively changed their behaviour and moved from a channel that has remained available to one they didn't previously have access to.

Oyster uptake in London was incentivised by putting up the price of the remaining legacy channels. That has not occurred in Switzerland: one in five journeys are made on Digital PAYG simply because customers prefer it.

Ten years of Swiss operation is the proof that Digital PAYG works, at national scale, and that customers love it.

Denmark: proof of migration

Denmark is the first country in the world to adopt Digital PAYG as its primary national ticketing system across all operators and modes. And it built the business case by retiring a legacy system.

They made ticketing both better, and cheaper.

It also shows just how easy it is to introduce Digital PAYG. The decision was taken in 2023, the app launched nationwide in September 2024 and the legacy system was switched off in June 2026. You can hear an interview with Tina Hørbye Christensen, chief executive of Rejsekort & Rejseplan, the national ticketing body that did it, on the Freewheeling Podcast.

The decision

Denmark's rationale for Digital PAYG was both customer-focused and commercial. They needed a better system than the one they had, and they needed to build a business case to achieve it at zero cost.

Their existing system was a card-based system and needed ongoing investment to keep it going. They evaluated other options (including Contactless) but only Digital PAYG offered customers a solution to the most common pain point they experienced – forgetting to touch in and touch out.

This, by the way, will be a significant issue wherever bank-card ticketing rolls out beyond gated metro networks. Without gates, customers need to remember to tap out – and, if they forget, they are charged. With Digital PAYG, this problem does not exist.

The Danish case also introduced an additional element to the Digital PAYG offer: a dedicated "Basiskort" (basic card). Because Denmark was replacing its entire existing system, they needed something for those without mobile phones. The Basiskort provides pay-as-you-go functionality but with the cost efficiency of it being managed through the FAIRTIQ Digital PAYG back office. Because most people 'bring their own device', it is much cheaper than a full Contactless solution.

A Basiskort equivalent is only required when a country, region or city decides to retire its legacy channels and go fully digital-first, as Denmark has.

Denmark is pragmatic about the edges of the system. The Basiskort serves people without phones, and a contactless bank-card option is planned for tourists who arrive without the app, using the small validator estate retained for the Basiskort.

The order of decisions is crucial here. Denmark chose Digital PAYG as the primary system first, then bolted narrow channels onto it cheaply for the groups that need them. Britain is currently contemplating the reverse – adopting what should now be a niche channel as the national solution.

The business case

This was built as a total-sector case – the costs and savings of the ticketing body and all the transport companies together – and it is recalculated every quarter, so the numbers below are live rather than a launch-day press release.

The headline: net savings of 1.1 billion kroner (roughly £125 million) by 2035. The savings come from switching off the old system and from cheaper operations afterwards. These savings are despite the costs of rolling out the Basiskort.

Delivery at software speed

One of the huge benefits of Digital PAYG is that it works at software timescales, not hardware timescales. Contactless requires validators in stations, whereas it took six months from contract to Digital PAYG working nationwide.

The fact that they also introduced the Basiskort provided a real-time counterfactual. They've been able to make frequent, instant changes to the app-based product in response to customer feedback.

Whereas for the Basiskort, when they needed to modify the validators to make them work better for blind passengers, it has been a huge challenge as hardware has needed to be changed at every station.

Public reaction

The forecast was 2.4 million app users but, by the time the old system was closed down in June 2026, there were 3.2 million, in a country of six million people. Ninety per cent of travellers say the app makes public transport easier to use, twenty-five points better than the card-based system ever scored. Eighty per cent of Rejsekort users had already moved to the app before the Basiskort even existed or before the old system was withdrawn. As Tina Hørbye Christensen described to me, the app sold itself.

Chapter Seven:

YES, BUT...

In researching this report, many people have raised objections to Digital PAYG.

Many are reasonable but few are insoluble. Many are true of Digital PAYG but just as true of Contactless.

In this section, I try to deal openly and frankly with each of the potential objections, and not simply wave them away.

A few of these questions do not have tidy answers, and I say that too.

Access and exclusion

It won't work as some people don't have smartphones	Smartphone ownership now stands at 95% of UK adults and continues to rise across every age group. The wider shift to digital government means accessing services by phone will become the norm. Millions of rail and bus journeys are already made by smartphone through barcode ticketing, so this question has been asked and answered at national scale for over a decade. Moreover, contactless bank cards are actually less universal in the UK, with ownership at 91%. Contactless faces the same challenge but with a different, larger excluded group. In the short term, it's not an issue as multiple other ticketing media still exist. This only becomes relevant in the event that it's decided to switch off all other channels and move exclusively to Digital PAYG. And – if we ever did get to that point – we have a fully worked-up case study to learn from: Denmark. They created the Basiskort, a simple fallback card for people without phones, alongside the app when the country switched its old system off.
It's exclusionary to only offer the cheapest ticket via a digital channel	This isn't a question about Digital PAYG; Contactless PAYG faces the same challenge for the unbanked. Ultimately, the choice becomes whether or not to maintain equivalent analogue ticket products at the same price (e.g. paper based travelcards) or not. Doing so is less exclusionary but at a significant cost. It's not a reason to delay Digital PAYG.

Kids won't be able to access this, especially once smartphones are banned in schools	Solo kids aren't easy for any digital solution, as most children own neither bank cards nor mobile phones. But Digital PAYG handles accompanied (and even solo) children far more elegantly than Contactless. Kids without phones and bank cards will need to use a different ticketing media, such as a Danish-style basic card.
The elderly and disabled rely on their existing concessionary passes for travel, which won't work with Digital PAYG	There is no need to make any changes to existing concessionary travel arrangements to introduce Digital PAYG. Existing concessionary passes can continue exactly as they are. However, in the long term, there are very considerable cost savings available by replacing everything with Digital PAYG as Denmark has done. At that point, a country could adopt the Danish solution, of concessionary travel embedded in the app – with a card (using the Digital PAYG back-office) available for those without a phone.
It doesn't work with groups travelling together	In many ways, Digital PAYG is an ideal solution for groups. Cards are notoriously problematic as there's no way for the card to know whether it's being used as a token for a single or multiple travellers. Whereas a phone can be set as required to manage group travel.
Business travellers prefer to pre-pay	That's absolutely true and totally fine. Existing pre-pay tickets will continue to be available, including barcode tickets on mobile. Digital PAYG will only ever be one option.

The phone itself

Phone batteries die	This is true but it hasn't stopped largescale adoption of barcode ticketing, which also depends on a working mobile phone. People tend not to let their phones die as they need them for many things beyond Digital PAYG. Battery lives are extending and wireless chargers are more common, including embedded in all tables on Avanti West Coast trains.
Location services drains the battery even faster	This is a better question than the dead battery, because location sampling does carry a power cost, and the perception that it is heavy dates from an era when it was. Denmark has looked into this and concluded that use of Digital PAYG drains the battery by about 5% per hour. This is consistent with any other app running in the background. Moreover, phone users increasingly keep location services running in the background anyway to serve health and fitness apps. Increasingly, trains and buses have charging sockets.
There are too many places with no phone signal	Digital connectivity is only required when the customer checks in or out, but can take place well before boarding or after alighting. There are very few stations without any connection. Moreover, Digital PAYG is not the only service that consumers use that relies on mobile connectivity, which is why further improving it is a policy priority in every country.
People don't like having their location tracked	There is a small minority of people who feel very strongly and refuse to use digital services that collect data. However, it is a very small minority and shrinking as more services require digital solutions. At the start, Oyster attracted exactly this objection, with people complaining that TfL could monitor peoples' journeys. Now it's no longer seen as an issue. What is important is that there is robust governance around Digital PAYG: with explicit rules about what is collected, how long it is held, who can see it and what the customer gets in return, with location sharing as a visible, revocable choice. The Danish experience is highly instructive here, as they've run a natural experiment. They've introduced app-based Digital PAYG alongside the Basiskort, a card-based system for those that prefer not to use the app or are unable to access a mobile phone. The system allows personal cards for those who want an account but don't have a mobile phone, and anonymous cards for those who prefer not to be tracked. There are 191,000 personal cards and just 26,000 anonymous cards against 3.3 million app users. 95% of usage of the system is using the app.

Using the data for things like promotional offers is illegal under data protection laws	It would be if the user hasn't consented. Best practice for this kind of thing is to be explicit about how data will be used, start in a very limited way, demonstrate value and extend with explicit consent as trust builds. TfL's use of Wi-Fi data followed a similar path, from an anonymised trial to an accepted part of TfL's planning processes.
Transport firms will end up being asked for data by the Police	This is already the case. Under warrant, the Police can request digital data such as Oyster records, bank statements and mobile phone location in order to build a picture of the movements of a suspect. Once Digital PAYG data exists, they will almost certainly request this data from transport companies as well. Some may see this as a nuisance (which it can be) but it's also a new contribution transport can make to society. Journey data helps find missing people, and has been used to identify people who have died. Richer data means transport making a greater contribution to keeping society safe, under the same judicial safeguards as everything else.
GPS is too unreliable to be used as evidence for billing customers	Because we've all experienced GPS drift on phones, it's particularly tempting to think that location services (which actually use many more technologies than just GPS) are insufficiently accurate for Digital PAYG. However, the level of accuracy required is not pinpoint, as the algorithm is matching against an entire journey. It is very rare (almost unheard of) for two vehicles with two different pricing structures to run adjacent to each other from the first stop to the last stop.

Fraud and revenue

People will switch off location services part-way through the journey	This was a significant concern when it went live in Denmark. However, the good thing about Digital PAYG being a digital proposition is that all user actions are visible as a behaviour pattern. So customers who attempt to cheat can be warned – or switched off. One of the advantages of Digital PAYG is that these 'difficult conversations' happen digitally, not on the train. Rejsekort has been watching carefully and they have seen no increase in fraud levels since they switched to Digital PAYG.
You're dependent on Apple and Google, who can change rules overnight	This is a smaller issue than it seems. The big risk here is for those apps with "in-app purchases", where the payment is facilitated by Apple or Google's payment system. This isn't the case for Digital PAYG apps – the customer's payment happens within the app itself. The alternative, Contactless, leaves users dependent on Visa and Mastercard; also American tech giants.
The barcode sometimes disappears before the customer's reached the gate	This was a genuine issue with early UK Digital PAYG trials, where it can take a long time for customers to reach the gate from the train. This is why these trials were so useful and it has now been fixed.

Operators and money

Small operators cannot wait weeks for their money	This is a real issue with any post-pay system, whether it's Contactless or Digital PAYG. With prepay, the operator gets the cash upfront. With postpay, they get it afterwards. But similar issues have been solved before. When South Yorkshire launched free youth travel in Barnsley, operators received a cashflow advance each period, reconciled against actual usage: a bridging mechanism any scheme can copy. The lasting fix is faster apportionment, as there's no reason why payments cannot be made nightly. In Denmark, Rejsekort runs its own settlement, has the journey data instantly, settles operators weekly and could settle faster.
Digital PAYG will put ticket office staff out of work	Booking offices in the UK are inefficiently used. For the majority of time, at the majority of stations, staff are available but not serving any customers. There has been a longstanding objective among UK rail operators to redeploy these staff into roles that more directly benefit customers in other parts of the station. Digital PAYG provides an easy way for customers to self-serve, enabling operators to achieve this ambition if they wish to.

Infrastructure

Some operators' vehicles cannot read barcodes at all	The number without barcode readers is falling, and the cost of fitting barcode readers to remaining buses is much lower than fitting Contactless readers across a scheme area. However, even if there are buses without readers, they can still take part from day one. A check-in on the customer's screen can be validated visually by the driver, with no hardware on the vehicle. This can be made secure through bespoke animations. There is no equivalent visual inspection for Contactless, as a Contactless card can only be 'inspected' by a reader device.
It doesn't work with gated stations	Digital PAYG relies on there being a barcode reader on the gate but these are now almost universal on the British national rail network (they need to be because of barcode tickets, which are accepted on every British train operator) and highly likely to be fitted to all Underground stations that interchange with National Rail.
It's only ever been tried on trains	That's completely true in the UK – but only because it was specified that way. In most locations, such as Denmark, it's overwhelmingly used on buses but is available on all modes. The same is true in Switzerland, where it's used on every public transport mode including ferries, cable cars and even public lifts. It is a truly multimodal solution.

Chapter Eight:

RECOMMENDATIONS

We are in danger of missing an opportunity but the good news is that nothing has yet happened that guarantees that outcome.

The recommendations below do not require legislation nor new national programmes, and will cost significantly less than the card-first direction most countries are currently pursuing.

They generally involve stopping something, redirecting something or changing a decision. Collectively, they will give passengers a better service at lower cost to the transport sector and state.

No-regrets moves, whichever media a region chooses

These strengthen any modern ticketing scheme, Contactless included. There is no reason to delay any of them.

1. **Simplify fares first.** Overlapping fares and products that offer no customer benefit should be removed rather than encoded into a new system. Chiltern, the British operator I used to work for, had to halve its return fares into single-leg prices before Pay As You Go could launch; every region will face the same sequence, so start now.
2. **Establish cap governance before launch.** The cap is the promise on which customer trust rests. Every scheme should settle how cap levels are set, how they change, and how they relate to existing day and season products. Some regions have existing multi-operator ticketing scheme governance, in which case this will be relatively easy. For others, something new will need to be created.
3. **Sequence savings correctly.** There are huge savings available from digital ticketing; primarily in the reduction of ticket office costs, ticket vending machine costs and the release of station retail estate. But these only become available after digital channels have won customer trust. Britain's national rail network has already tried the reverse order, and it failed. London Underground did it right.
4. **Protect small-operator cashflow in scheme design.** Where cash fares migrate into a settlement cycle, small operators should be protected. One solution is that they can receive a periodic advance reconciled against actual usage, a mechanism South Yorkshire proved with the Barnsley MyCard.
5. **Accelerate settlement.** Contactless pays operators daily; in Britain, rail settlement takes four weeks. That gap is a policy choice, and it prices smaller operators out of participating in modern ticketing. Settlement bodies should move settlement towards daily as a stated objective with a date attached.

Digital-first recommendations

For national governments and transport ministries

1. **Do not designate a media as the national standard.** Britain has just declared a 15-year-old technology its preferred option, repeating the mistake it made in 2009, when it mandated a domestic smartcard nationwide in pursuit of Oyster and delivered it a technology cycle late – with all the cost, waste and customer disappointment that followed. If your country already has a preferred media standard, ask when it was conceived.

2. **Instead define a national proposition standard.** A national body should not be defining a media as a standard. Instead, it should be defining a minimum benchmark customer proposition for the primary national system. For example, it could say that any national solution should:
    - enable a customer to pay for any door-to-door journey in a single transaction;
    - charge the best available fare automatically, with a guaranteed cap;
    - work across every operator and mode within the scheme's area;
    - meet national requirements on data protection, accessibility, concessions and operator settlement.
3. **Certify solutions against the proposition rather than specifying them.** Any technology that demonstrates compliance should be accredited to operate and to receive support, as per the model of Swiss accreditation.
4. **Trial it multimodally, at small scale, now.** A regional Digital PAYG trial costs a few hundred thousand euros and can be live within months. Where trials already exist – as in Britain – extend one across bus, rail and local modes together; where they do not, one region and one year is all that is needed.

For national railways

5. **Publish a national, multi-modal digital ticketing strategy anchored in Digital PAYG.** The strategy should state explicit intent to support regional schemes, with interoperability between national rail retail and regional caps designed in from the start rather than reconciled afterwards.
6. **Put Digital PAYG in the national app.** A national railway should offer check-in travel as a native capability of its own app. SBB – the state railway with the highest customer satisfaction in Europe – already does this.

For Operators

7. **Participate in schemes when they happen.** Digital PAYG makes it easier for customers to access public transport. Participate in multi-modal schemes, publish fares data via open national fares registries (in Britain, the Bus Open Data Service) and – as a minimum – accept Digital PAYG via visual validation.

For regional transport authorities

8. **Specify outcomes, never media.** Every ticketing strategy, procurement and business case should define the customer outcomes required and ask officials to evidence the options against those outcomes and whole-life cost for the region's actual geography. This is the best way to avoid disappointing customers by accidentally specifying out the best solution.
9. **One region should simply build the exemplar.** A full multimodal Digital PAYG scheme costs a few hundred thousand pounds or euros – a rounding error in any regional transport budget. The first region to do it will define the benchmark that every other region, and eventually London, comes to visit.

ABOUT THIS REPORT

This report was commissioned by FAIRTIQ. It was written under my full editorial control, and the arguments, judgements and any errors are mine alone. FAIRTIQ saw the report before publication (as did other organisations quoted, such as Rejsekort) and were able to correct matters of fact about their own products and deployments; they did not direct the conclusions.

In preparing the report I interviewed, among others: Alex Hornby (Northern), Adrian McMullan (Transport for London), Paul Bowden (Rail Delivery Group), Lucy Dean (Great British Railways Transition Team), John Henshall (TravelMaster), Tina Hørbye Christensen (Rejsekort & Rejseplan), Chris Williams (Transport for Wales), Andreas Sigloch (Baden-Württemberg), Dorthe Noehr (Movia) and Suzanne Hutchinson (SYMCA). In some cases, these interviews were to get feedback on their experience of using Digital PAYG; in other cases, it was to invite perceived challenges and obstacles so I could research solutions. Some interviews were conducted on the basis that comments would not be attributed. I am grateful to everyone who gave their time; none of them is responsible for what I have done with it.

Factual claims in this report can be checked against the sources below, other than those that are matters of general record.

The Government's 2009 commitment to Oyster-style schemes on the domestic smartcard standard — Hansard, House of Commons Written Statements, 15 December 2009: "similar to the Oyster scheme in London." https://hansard.parliament.uk/commons/2009-12-15/debates/09121583000018/SmartAndIntegratedTicketingStrategy

The designation of contactless as the preferred national approach — Department for Transport, Better Connected: A Strategy for Integrated Transport, 2 April 2026, https://www.gov.uk/government/publications/better-connected-a-strategy-for-integrated-transport

Station usage figures for London Underground — Transport for London, Usage Statistics for London Stations, 2025 (published 13 April 2026).

The number of National Rail stations with less usage than Roding Valley — Author's analysis of Office of Rail and Road, Estimates of Station Usage, Table 1410 (April 2024 to March 2025). https://dataportal.orr.gov.uk/statistics/usage/estimates-of-station-usage. TfL figures are gate counts by calendar year; ORR figures are ticket-based estimates by financial year.

91% ownership of contactless bank cards — https://www.ukfinance.org.uk/policy-and-guidance/guidance/uk-contactless-payments-research-survey

The Danish migration: selection of FAIRTIQ (December 2023), nationwide launch (September 2024), adoption and satisfaction figures, the Basiskort (basic card), the planned supplementary contactless channel for tourists and retirement of legacy systems Rejsekort (May–June 2026) — my interview with Tina Hørbye Christensen, CEO of Rejsekort & Rejseplan

The Basiskort fallback card — Rejsekort & Rejseplan; The Local Denmark, 17 February 2026. https://www.thelocal.dk/20260217/denmarks-rejsekort-gets-new-physical-version-despite-switch-to-app

The Baden-Württemberg case study: 19 incompatible transport associations replaced by a state-wide Digital PAYG scheme — my interview with Andreas Sigloch, Baden-Württemberg.

22.2 million maximum fares totalling £164.7 million in 2023 — Transport for London, FOI response FOI-4311-2324, 25 March 2024, https://tfl.gov.uk/corporate/transparency/freedom-of-information/foi-request-detail?referenceId=FOI-4311-2324.

Project Coral: formation, merger and procurement — WMCA £18m announcement, September 2022, wmca.org.uk; Find a Tender notice 032340-2024 (system value £16.75m); rollout from 2027, routeone, June 2026.

30,000 journeys on Britain's Digital PAYG trials with Northern— Northern Railway, July 2026. https://www.northernrailway.co.uk/news/future-ticketing-passengers-use-new-pay-you-go-technology-make-30000-journeys-northern

Smartphone ownership — Ofcom Technology Tracker, 2025

Expanding Contactless to 233 stations at cost of £68.1m - https://www.find-tender.service.gov.uk/Notice/030896-2021