

Improving Public Transport – The Way Forward

Introduction

The East Midlands conurbation leads the way in delivering high quality public transport services within a deregulated environment. The recent progress made in delivering integrated ticketing, most notably in Nottingham with the delivery of the Robin Hood Pay As You Go travel card which is the first of its kind outside of London, shows that close partnership working between operators and Local Authorities can lead to significant improvements to public transport services.

Midlands Connect is a collaborative body made up of Local Enterprise Partnerships, Local Transport Authorities and the transport industry, and its main focus is to improve connectivity 'within, to and from the Midlands'. Midlands Connect is currently leading the agenda on improving public transport provision across the Midlands, and its objectives are very much aligned with those of the East Midlands' authorities in terms of promoting connectivity.

This note builds upon the note presented on behalf of public transport operators of Greater Nottingham at the meeting between the East Midlands authorities and representatives of Midlands Connect held in Nottingham in February 2016. It provides a more thorough review of existing public transport provision across the East Midlands region, specifically in terms of smart ticketing, but also real time information provision and retail networks which support the use of public transport services.

The note goes on to consider the options available to deliver 'quick wins' in supporting Midland Connect's aims and objectives, but also discusses a longer term strategy for delivering integrated ticketing, amongst other things, across the Midlands region.

Overview of existing public transport provision

This section will consider how public transport services are delivered across the East Midlands. It focusses on the aspects that can be influenced through the involvement of Midlands Connect, LEPS, Local Authorities etc. This includes:

- Smart Ticketing
- Real time information
- Retail networks
- AMS-HOPS

Ticketing

Table 1 presents an overview of the different ticketing products available throughout the largest urban areas of the East Midlands, focussing on the smart and 'technology'-oriented ticket products. It is evident that there are a wide range of different products in each of the urban areas, each adopting different technologies, different products and with different retail networks. It is notable that the interoperable ones tickets see to work together on the common ITSO platform.

Table 1 Overview of public transport ticketing options across the East Midlands

| | Product / operator | Single/Multi-operator | Description | Retail |
|------------|---------------------|---------------------------|--|--|
| Nottingham | Robin Hood PAYG* | Single and multi-operator | Pay as you go smart card with day capping for single operators and multi-operators. Plans to introduce weekly and four-weekly capping in near future. | On-street TVMs, travel centres |
| | Kangaroo* | Multi-operator | Long-standing day & season multi-operator tickets in paper & smart formats. Plans to re-brand to Robin Hood Day and Robin Hood Season tickets later in April. | On vehicle, on-street TVMs, travel centres |
| | Mango | Single and multi-operator | Pay as you go smart card with day, week and 28 day capping. Can be used on Trent Barton as well as NET services, although there is no 'bundling' or discounting when travelling on both TB and NET services. | On-line & travel centre card application, top up on-line, on vehicle & at tram stop TVMs |
| | Easy Rider | Single operator | Smart season tickets (Easyrider Everyday) and smart advanced purchase of whole days' travel (Easyrider Anyday). NCT also has a pay as you go smart card for use on longer distance routes only. | On-line & travel centre card application, top up by phone, on-line & on vehicle |
| | Genie | Single Operator | Smart e-purse for single, return & day tickets. Smart season tickets for students only. Week & 4-week mobile ticketing | On-line card application, top up on bus or online |
| Derby | Spectrum* | Multi-operator | Non-smart paper day tickets plus 10 day smartcard | Paper tickets bought on bus, smartcards bought at travel centre |
| | Arriva M-Ticket | Single | Mobile ticketing app enabling purchase of day, week, 4 week, annual and family tickets. | On-line purchase |
| | Kinchcard | Single | Smartcard. 10 trip carnets, 28 day, 6 and 12 month products available. | On-line and on bus purchase and top-up |
| | Mango | Single | Pay as you go e-purse smart card with day, week and 28 day capping functionality. | On-line & travel centre application, top up on-line, on vehicle & travel centres |
| Leicester | One Card* | Multi-operator | A multi-operator week ticket that allows unlimited travel within a defined geographic zone around the urban area of Leicester | On-line to purchase, on bus top up |
| | Kinchcard | Single | Smartcard. 10 trip carnets, 28 day, 6 and 12 month products available. | On-line and on bus purchase and top-up |
| | Arriva M-Ticket | Single | Mobile ticketing app enabling purchase of day, week, 4 week, annual and family tickets. | On-line purchase And at Paypoint and Payzone outlets |
| | First Leicester | Single | Mobile ticketing app enabling the purchase of day, week and longer term season tickets. | On-line purchase. Tickets also bought from travel centre. |
| | Centrebus Leicester | Single | 10-trip carnet and week ticket smart products for within a defined Leicester area. Smart week season tickets for a wider geographic area are also available. | Purchased on-line, topped up on bus |
| All | PlusBus | Multi operator | Plusbus tickets available in Leicester (£3.50), Derby (£3.50) and Nottingham (£4.50) for when purchasing with a rail ticket | Tickets can be bought on-line or in-station |

*ITSO governed ticketing

There are a variety of ticketing products available to customers across the different areas. In Nottingham, the delivery of the Robin Hood PAYG travel card scheme has helped to simplify the ticket choice for the passenger as the mechanism of payment is designed to offer the best-value based on mode and operator used. There is scope for enhancing multi-operator ticketing in other areas of the East Midlands and more widely outside of defined urban areas using the primary interoperable versions of the above – passes, PAYG and possibly ride-based carnets. These can even be extended reciprocally to the West Midlands. The ‘difficulties’ of extending interoperability within the East Midlands (or to the West Midlands) have been over-exaggerated.

Real time information

Real time information systems providing live bus departure and location information is prevalent across the East Midlands, with some area wide systems in place, while some individual operators provide their own information for passengers. Considering each area of the three urban areas in turn:

Nottingham – Around 1,500 INIT based real time information displays at bus stops and bus stations throughout Greater Nottingham, Derby and Derbyshire – as well as East Midlands airport - providing a live countdown for when next buses will arrive. A recent LEP funding bid, if successful, will increase the number of RTPI displays across Nottingham, Nottinghamshire, Derby and Derbyshire. The City Council is also looking to use the relevant SIRI (Service Interface for Real Time Information) feeds to enable a single portal for providing real time travel information across Greater Nottingham in a mobile/web-based format.

Individual public transport operators also provide live departure information. NCT and Trent Barton both have mobile and web-based applications while NET provides live information on its electronic displays at tram stops.

Derby – INIT-based real time information displays are prevalent throughout Derby and Derbyshire, providing consistency in information provision between Derby, Nottingham and surrounding areas.

Both Trent Barton and Arriva provide live RTPI feeds for customers using mobile and web-based applications.

Leicester – Until 2011, Star Trak was prevalent across Leicester and Leicestershire (as well as Derby and Derbyshire). Unfortunately the Star Trak project ceased in 2011, but since then the City and County Councils have sought to re-introduce a new real time information system.

Individual operators have their own applications that provide information directly to customers. First Bus App provides scheduled and real time information (where available) as well as service updates and relevant news. Arriva has a web and mobile application that provides live real time information, while Kinchbus provides live bus location information via its website, alongside relevant travel alerts.

There are a variety of platforms through which public transport information is provided to customers. There is increasingly a coordinated approach across the East Midlands, however, supported by the recent LEP funding bid submission.

Retail networks

How customers can purchase public transport tickets varies across the region. All bus operators enable cash tickets to be bought on-bus, but all operators also offer some form of discounting to encourage advance purchase of tickets, and many through the use of smart or mobile platforms. In Nottingham, the tram operator encourages all ticketing to be off-vehicle, providing ticket vending machines at all tram stops. Again, there are incentives to encourage smart ticket use and longer term season tickets.

Table 1 illustrates the various retail networks that operators have in place. This includes:

- On-line ticketing where smart cards can be topped up (though this can take 24 hours or more)
- Mobile ticketing where the ticket can be purchased on-line and the ticket stored on a smartphone
- On-street ticket vending machines – in Nottingham the City Council has introduced 80 on-street TVMs across Greater Nottingham to enable sales of Robin Hood and Kangaroo tickets. In addition, tram TVMs enable sales of tram tickets as well as Mango smartcards at every tram stop
- Payzone and Paypoint – some operators, notably Arriva in Derby and Leicester, enable customers to purchase season tickets from Payzone and Paypoint outlets. The Kangaroo ticket in Nottingham used to use Payzone outlets but ceased primarily due to low ticket sales
- Travel centres – some operators have their own travel centres where they can direct customers to purchase tickets

In terms of topping up smart cards, some operators accept cash top ups on bus while others insist on on-line top ups or through travel centres.

There is a large mix of retail options across the East Midlands which enables customers to purchase public transport tickets from a variety of different outlets. The trend is towards greater choice but where this has confused the market steps are being taken to simplify both choice and usage (eg PAYG precisely does this by automatically charging the right price based on usage and the trend will likely continue through Account Based Token and, in time, EMV ticketing and ticketless travel)

AMS-HOPS

The Asset Management System and Host Operator or Processing System ('ITSO Back Office') plays a key role in managing products and security (AMS) and monitoring the recorded usage of ITSO enabled smartcards (HOPS). As part of the English National Concessionary Travel Scheme (ENCTS) every Travel Concession Authority has to have in place a suitable AMS-HOPS for product management and recording uses of the ENCTS travel card. In delivering any regional ticketing scheme that relies on HOPS data – just as the Robin Hood Pay As You Go scheme does – it is necessary to consider how compatible the HOPS data records are between different Authorities but the 'tools' for doing this are firmly in place.

Some investigative work has been carried out to consider the feasibility of amalgamating AMS-HOPS providers across the East Midlands authorities. While some Authorities are approaching the end of their contract with their current HOPS providers, some have extended arrangements remaining for a number of years. Due to this mix of asset-management and data-collection functions, it is not easy to introduce a region-wide HOPS in the very short term, it is feasible to put in place a mechanism whereby, upon renewal of the AMS-HOPS provider, Authorities could look to collaborate and adopt one single provider. This will reduce cost but is not a silver bullet for facilitating the simpler administration of integrated ticketing schemes as the ITSO messaging system back to product owner

takes care of this irrespective of message-routing. Unfortunately the opportunities are poorly understood and there is a track record, particularly outside this region in the rail industry or some poor and costly decisions that the Midlands Authorities would neither wish to repeat nor to 'buy into'.

There is scope for amalgamating the AMS-HOPS over time across the six East Midlands Authorities, providing not only potential cost savings for each of the Authorities. It could also enable a single back office to support the delivery of one or more integrated ticketing solutions but this is NOT a barrier to significant progress in the meantime. Indeed it would be a missed opportunity to wait for EMV ticketing such that nothing is delivered before 2022 on the existing platforms where such substantial investment has already taken place and integrated ticketing has proven to work.

Overview

Due to the deregulated nature of the public transport market across the East Midlands, there is a variety of single and multi-operator ticketing schemes, differing approaches to customer information provision and differing approaches to retailing their products. All three of the cities in the East Midlands have delivered multi-operator ticketing in differing, but not mutually exclusive, ways and are all looking at developing these ticket offers further in the near future. The differences are more to do with which market has been targeted first and what paper tickets were in place. Indeed Derby had nothing until the paper ticket Spectrum was delivered as the first phase of 'going smart'. Indeed the Leicester and Derby schemes are virtually identical – but Derby launched with 1 day tickets (lowest revenue risk) but Leicester launched with 7-day Flexi (the key market to convert first from a more established scheme). Even Nottingham's PAYG is not dissimilar to Centro's in the West Midlands (for the subset of the cash-replacement purse, ignoring the capping add-on feature). This illustrates that the operator/authority communication channels and relationships are already in place and that there is desire amongst all parties to improve public transport ticketing further.

The Robin Hood Pay As You Go Travel Card in Nottingham has shown how a single product can be delivered to simplify ticketing arrangements by simultaneously catering for markets that have historically been served by more than one ticket-product, and the systems put in place to deliver this scheme can be replicated and developed further for other areas. This scheme took approximately 10 months to deliver from the start of the technical and commercial discussions to the scheme starting in December 2015, so extending the Robin Hood PAYG scheme to other areas offers an opportunity to deliver integrated ticketing much more widely in a short space of time. Delivering some stored-passes in the interim while this is developed would also be relatively simple. The following section examines the available options for delivering improvements to integrated ticketing across the East Midlands which meets the aim of Midlands Connect in terms of improving connectivity.

Strategy Development

A series of meetings have taken place in recent weeks to consider the possible options to improve public transport provision across the East Midlands and drive forward the Midlands Connect agenda. Meetings have been held between Nottingham City Council, Derby City Council, Leicester City Council, Nottinghamshire County Council, INIT, SYSTRA (as well as ITSO representatives), ITP and public transport operators to understand the opportunities and constraints in delivering integrated ticketing, information and retailing systems in a more co-ordinated way. This section considers two options available, some of the technical requirements and constraints of each option, before concluding on the feasibility of delivery subject to funding availability.

Discussion of possible options

This note has identified some of the inconsistencies and potential inefficiencies of delivering ticketing, real time information and retail networks within a deregulated public transport market. This can lead to fragmented provision of essential services for public transport users, potentially increasing barriers to its use. However, despite a variety of issues being identified, some of the developments across the East Midlands in recent years provide an excellent illustration of the possible solutions to improve public transport services and help reduce barriers to its use.

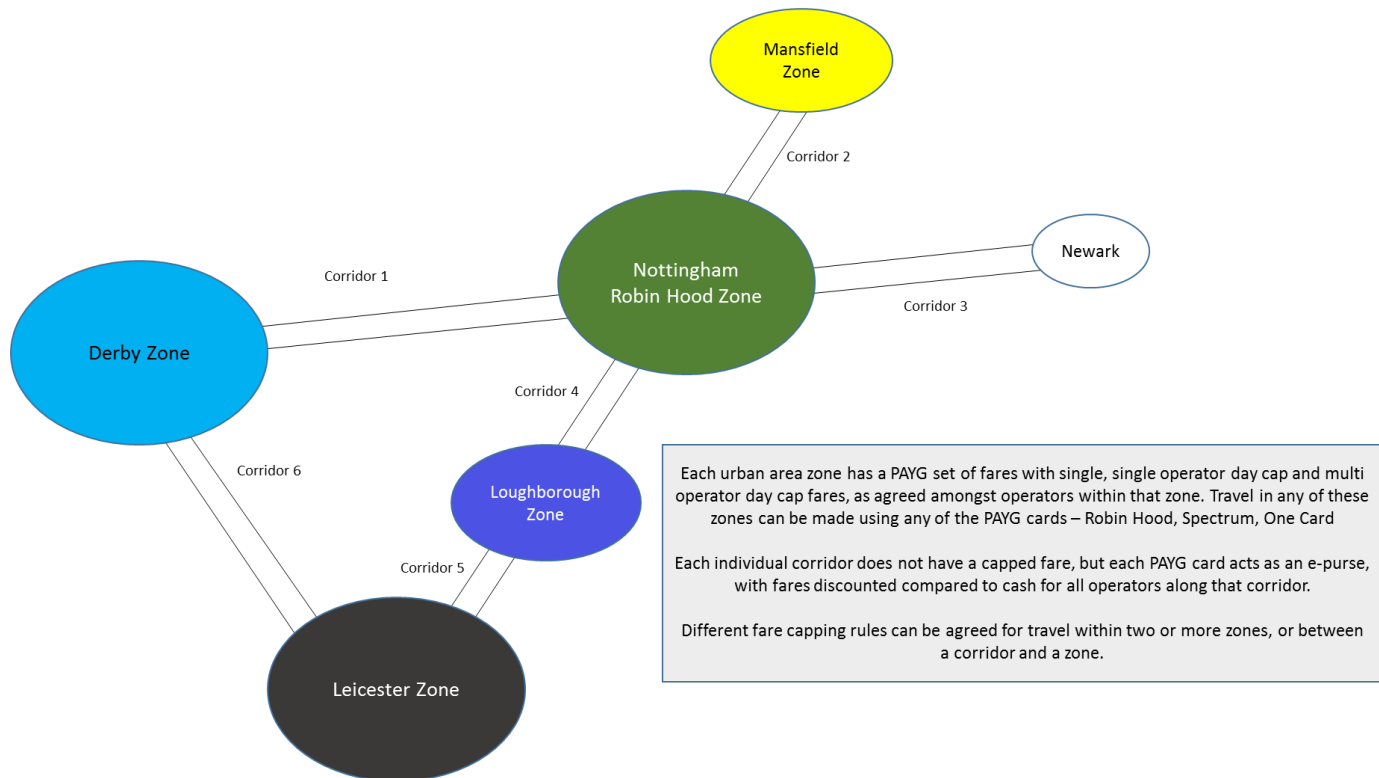
The successful delivery Robin Hood Pay As You Go travel card which enables both single operator and multi-operator capping demonstrates how one product can traverse several public transport operators (and different modes) and provide a variety of travel options for the user within a defined geographic area. This shows that in areas with a flat fare structure, an area-wide smartcard system can simplify the ticketing offer for users, although flat fares are not necessary for delivery as schemes like Centro have shown.

Option 1 - expand the current Robin Hood Pay As You Go travel card scheme and deliver it across the East Midlands, focussing primarily on the urban areas, but with functionality and capping mechanisms to enable region-wide travel. This could easily be achieved on a zonal basis and using “state-fare on boarding” on bus and entry-exit validators (or gates) on rail modes. Whether a token-based or EMV solution can successfully replace this in a multi-fare environment without full-exit reading or (potentially inaccurate) ‘reverse journey matching’ is a point yet to be properly researched.

Figure 1 illustrates how a region-wide Pay As You Go smart card system might work across the East Midlands. In each large urban area, there are entire zones – just as there are the Robin Hood, Spectrum and Flexi-ticket zones at present – with additional zones for some smaller urban areas. In each of these zones there would be flat fare structures for both single operator and multi-operator trips with single ticket prices and day capping available. In addition to the zones, corridors emanating to and from each of the zones would have their own fare structures to enable travel between the zones with the one card. In this instance, the fare paid on each corridor could be paid for using an e-purse only, or could have business rules assigned to it to enable some form of capping in addition to single zone capping. Multi-zone capping could also be introduced, enabling seamless travel around and between different zones. This approach is not dissimilar from the ‘lollipop’ fare system (town flat fare with 3 interurban fares bands) devised for the Bath and West operation of First Group (Weston, Wells, Bath, Trowbridge).

Delivering such a scheme would build upon the systems already delivered in Greater Nottingham, so the technology and delivery mechanisms are proven. Broadening the geographic scope of Robin Hood PAYG (notably the branding could differ in different areas) does raise some technical issues:

- Work is required to ensure all possible ETM providers can ensure their ETMs meet the technical specifications required.
- At present, none of the ‘Big 5’ operators are involved in Robin Hood PAYG, so it requires building new relationships and ensuring the corporate ‘buy in’ by some of the ‘Big 5’.
- Some collaboration of AMS-HOPS is required across the participating Authorities to ensure there is co-ordination of back office system, recording all of the trips made and collating and processing payments for operator revenue apportionment efficiently.
- Significant operator engagement is required to put in place appropriate business rules for fare pricing and specifically fare capping in one zone, multi-zones and along corridors.

Figure 1 Simple illustration of how Robin Hood PAYG could be expanded across the East Midlands

The strength of this proposal is that it can largely be delivered with existing infrastructure provided that operators not currently so equipped can perform the on-card capping solution.

If this cannot be achieved as PAYG then stored passes – as already used in the four main schemes already live - can be implemented on an overlapping zonal basis. This could include multi-modal versions for specific areas or all areas. In addition, particularly if the trend of fares simplification continues (in terms of reducing the number of fare-bands), then ride-based carnets can also be considered – potentially also solving the PlusBus issue given Centro have now proved multi-modal tickets can be a single product and work the gates.

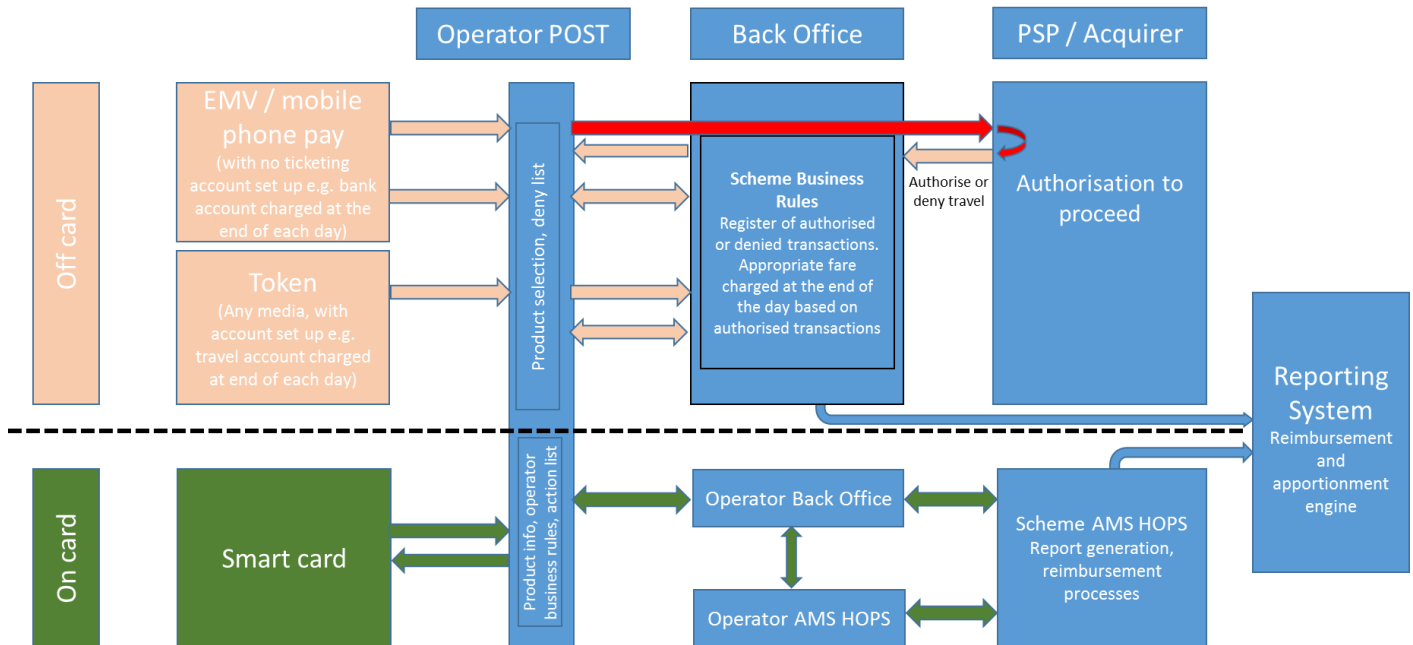
Ideally, future ticketing solutions would involve a variety of media including mobile phones, smart cards, EMV/bank cards and any new technologies that develop in the near future. Introducing a region-wide scheme in this way, however, is likely to require further developments to enable alternative media so such an option is seen as a straight forward ‘quick win’ to roll out region-wide ticketing before further work can be carried out.

The delivery timescales for a region-wide roll out of Robin Hood, but with different branding in different areas, is approximately 18-24 months. This could be for any of the PAYG, stored-passes and ride-based carnet combinations or sub-set thereof.

Option 2 - develop an account based back office system that calculates the fare charged at the end of each day for journeys made on public transport services – akin to the system in place in London. This would enable customers to use a variety of different payment methods, including smart cards, EMV, mobile pay functions and other payment ‘tokens’, which should enable all existing and future public transport users to be able to access at least one of the available media.

Figure 2 provides a simple overview of how an account-based back office system might work alongside smartcard-based systems that are already in place. Based on the discussions between Authorities and operators, this approach appears to be the future optimal approach to delivering integrated ticketing on a region-wide basis, enabling a variety of different payment methods to be used.

Figure 2 Illustration of how an account-based back office system would function



There are two specific elements to the system illustrated above: off-card and on-card payments. The on-card payment system builds on the example of the Robin Hood PAYG travel card and relies on smartcard technologies. Off-card charging where fares are calculated within a back office system enables a variety of payment 'methods' to be used. It is envisaged that off-card charging is likely to be targeted at the regular traveller market – albeit with the ability for people to use EMV and mobile phone pay applications should they want to – while the on-card market are more likely to be less frequent, more flexible public transport users.

For the off-card account based system to work, there are some issues that need to be considered:

- There may need to be touch on and touch off (or some form of beacon/exit recognition) readers to accurately record the journeys made so appropriate fares can be charged.
- There is a likely need for an independent service-provider to collect, process and distribute revenues for journeys made, as opposed to one or more local authorities leading a regional scheme (though this would constitute abstraction of revenue/profit from the transport industry and should not be underestimated – it is some bus companies profit margins!).
- A collection of payment options including EMV, smart cards, mobile pay applications and any new technologies that may appear in coming years could be considered. The vision is to future proof (as much as possible) the scheme while breaking down barriers to public transport use, not limiting users to one particular technology.

In delivering an account-based back office system to facilitate integrated ticketing, there are also some short term quick wins, as well as the longer term aim illustrated above. In the short term, a significant development would see existing **Robin Hood, Mango and possibly other current smart products migrate onto the single back office account based system**. This would provide region-wide

functionality due to the geographic scope of participant operator(s) services but due to a limited number of stakeholders initially, it would be deliverable between 12 and 18 months. The experiences gained from this first stage will provide a strong guide for the subsequent roll out throughout the region with a variety of public transport operators.

Summary and Conclusions

This note has discussed the strong potential for building upon the recent gains in integrated ticketing across the East Midlands. In building upon the experiences and delivery mechanisms from the Robin Hood PAYG travel card in particular, and the similar regional ITSO schemes based on stored-passes elsewhere in both the East and West Midlands, there is scope to develop the integrated ticketing offer on a region-wide basis in the short term with some clear 'quick wins'. This note has identified two particular opportunities, which complement one another and, notably, are not mutually exclusive:

1. Expand the Robin Hood PAYG scheme technology (PAYG/STR, Stored-passes and ride-based carnets – one of or all) to include other areas across the region
2. Introduce an account-based back office system to permit the use of a variety of media to allow customers to pay for travel. While this is a longer term (3-4 year) project, there are short term quick wins that can be delivered through developing a system for a small number of ticket products, such as Robin Hood and Mango in the very short term, with a view to expanding the available products in due course for different operators and in different areas of the East (and possibly West) Midlands.

What these two options highlight is that there is not one solution or one technology that will meet everyone's needs, instead there is likely to be a market for both card-based ticketing and account based ticketing. Card-based ticketing with day capping functions is best likely to serve the infrequent and informal traveller market where cards are transferable within families, businesses or used for short periods of time. The more 'personal' account based system is likely to better serve the needs of the more frequent public transport user. Therefore, developing the two systems concurrently, focussing on the quick wins in the short term, will develop an infrastructure that meets the needs of users and public transport operators.

In conclusion, there are options that will greatly simplify public transport ticketing and reduce barriers to accessing public transport services. These options can be delivered in the short term and can be further expanded in future. They will also build upon the many schemes, relationships and commercial arrangements put in place across the region in recent years to ensure that they will be delivered to meet the aims and objectives of Midlands Connect.