



Regional Payment Systems Partnership

Action Plan

Executive Summary

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Volpe National Transportation Systems Center

In association with:



EXECUTIVE SUMMARY

Project Overview

Advanced electronic payment system technologies are creating new business opportunities for transportation service providers to partner and develop a truly “seamless” regional transportation network for their customers. The ability to use a single payment mechanism or a single “transportation” account within a regional transportation network provides users with an enhanced level of convenience and improved access to transportation services in comparison with traditional forms of payment.

The Regional Payment Systems Partnership project had its beginnings in inter-agency discussions within the Electronic Payment Systems Working Group (part of the ITS Technical Task Force within the Metropolitan Washington Council of Governments). The study was contracted through the Virginia Department of Transportation (VDOT) and is being managed by the Northern Virginia Transportation Commission (NVTC).

The purpose of this study is to complement other electronic payments systems efforts in the region by:

- Engaging a wide range of potential stakeholders through a sequence of interviews.
- Identifying a longer-term vision for a multi-modal, and multiple agency system.
- Proposing a practical action plan that builds on the current programs and accomplishments.

As part of this study, exploratory interviews were conducted with a wide range of stakeholders. Although it was not feasible to meet with every potential stakeholder, a diverse and representative distribution was achieved as shown in the following table (Appendix C provides a specific list of interviewees and dates):

State and Regional	Transit	Toll Roads	Parking	Taxi, Paratransit and Airport Ground Transportation
<ul style="list-style-type: none"> • Metropolitan Washington Council of Governments • Virginia Department of Transportation • Virginia Department of Rail and Public Transportation • Maryland Mass Transit Administration • Northern Virginia Transportation Commission 	<ul style="list-style-type: none"> • Washington Metropolitan Area Transit Authority • MARC • Virginia Railway Express • Montgomery County Ride On • Fairfax Connector • Arlington Transit • Alexandria DASH 	<ul style="list-style-type: none"> • Dulles Toll Road • Dulles Greenway • Smart Tag Operations 	<ul style="list-style-type: none"> • Arlington County Parking • Park and Ride Operations for WMATA, VRE and Dulles Toll Road • DC Parking (Lockheed Martin) • Metropolitan Washington Airports Authority • Washington Parking Association 	<ul style="list-style-type: none"> • Arlington Transit • Alexandria Yellow Cab / Diamond Transportation • Metropolitan Washington Airports Authority

The report includes the following sections:

- Context – Background information on regional electronic payment systems coordination as well as an overview of current revenue systems initiatives in the region.
- Market segments – An overview of available information and data on existing market segments and identification of market segments that may benefit from participating in a multimodal transportation payments system.
- Suggested ten year vision – An overview of the long-term vision for a regional transportation payments system and anticipated transitional steps. A review of potential costs and funding implications is also included.
- General migration strategy – Examines the underlying objectives that should drive the development of a coordinated migration strategy for all participants, as well as identifying various courses for expansion that complement the migration strategy.
- Logical architecture – A detailed discussion about key subsystems and information flows in electronic payment systems.
- Deployment challenges and issues – Identifies some of the main factors underlying the action plan.
- Procurement, financing and business governance approaches – Alternative approaches are examined both conceptually as well as through a review of the approaches used for a variety of other regional electronic payment systems either in place or under development around the world.
- Action plan for regional consensus – The Action Plan addresses the issues of linking various payments systems with multiple technologies. The Plan includes specific suggestions for a sequence of near-term actions to build on the region's current momentum and achievements to date.

In this report, we discuss a potential future payment system where a customer's payment instrument would be accepted for transportation payments throughout the region. The discussions about a future system involve no preconceived assumptions about which payment system technology is used, which agencies are accepting smart cards for fare payment, which agencies are issuing smart cards for regional use, which agencies may use other available technologies, or how a clearinghouse is operated. Most of these issues have yet to be resolved, and will be critical factors in the development and success of a regional, multimodal electronic payments system.

Complementing Recent Regional Initiatives

Related regional efforts that this study is intended to complement and support include:

- The recent deployment by the Washington Metropolitan Area Transit Authority (WMATA) of the SmarTrip smart card system for Metrorail and parking.
- The current WMATA procurement of Metrobus fareboxes that will support Metrorail magnetic and smart card fare media, including options for the purchase of similar equipment by other local bus agencies in the region.
- The current Virginia Railway Express (VRE) procurement for fare collection system enhancements, which may incorporate a magnetic stripe or smart card and for which interoperability with other existing or planned fare collection systems including WMATA could be developed.
- The joint effort by several regional transportation agencies in 1999 to submit the SmartAccess proposal to the Federal Transit Administration, for a regional system to enhance multimodal payments integration.
- The Dulles Corridor Rapid Transit Project Technology Implementation Plan completed by the Dulles Corridor Task Force in late 1999.
- Current deployment of Amtrak system enhancements for the Northeast Corridor services that may include a smart card demonstration.
- An application for access to a portion of the federal funding allocated to the region for Intelligent Transportation Systems (ITS) deployment in Fiscal Year 2000.
- A commitment by the Virginia Department of Rail and Public Transportation (VDRPT) to provide funding to equip VRE and all local bus systems in Northern Virginia with fare collection equipment that supports interoperability with the WMATA advanced fare collection system. This commitment extends to establishing a clearinghouse for smart card payment transactions of the region's transit, toll and parking agencies.

A number of factors suggest that the time is right for seeking to develop a Washington, DC regional payment system. These include:

- **Successful introduction of electronic payment options in the region:** The strong customer interest in VDOT's Smart Tag and WMATA's SmarTrip programs have clearly demonstrated the potential of advanced technology to make transportation payments more convenient. Section 2.2 discusses these and other current revenue initiatives in the region in greater detail.
- **Growing emphasis on multiple agency coordination around the world:** The success of the regional multiple agency smart card fare program launched in Hong Kong in 1996 has led to a wave of similar regional programs around the world. In addition to major programs abroad (including Berlin, London, Paris, Rome and Singapore), several other regions in the United States (San Francisco and Seattle) are in the process of implementing similar programs.

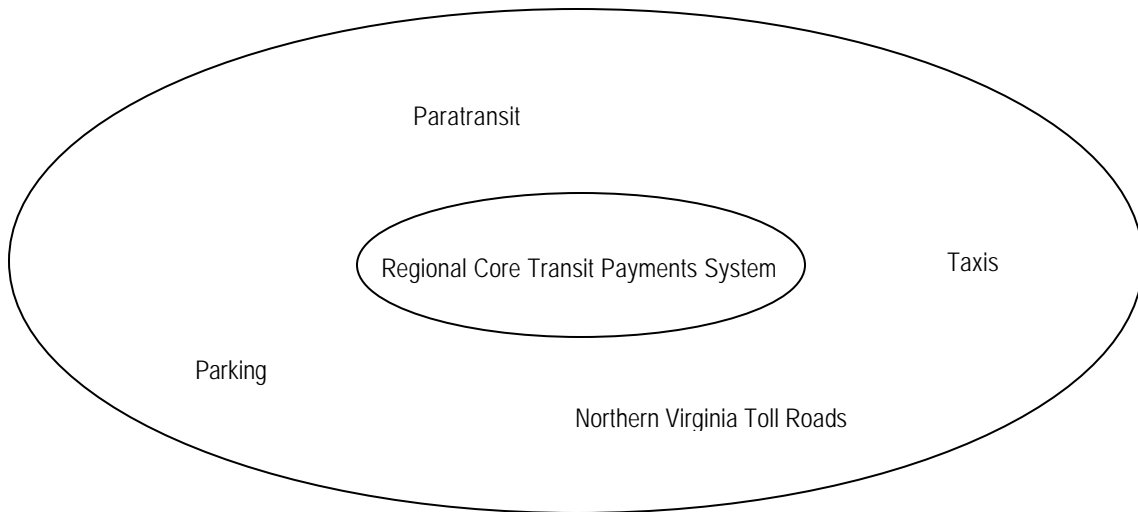
- **Potential to connect the entire Northeast Corridor:** Transportation payments system enhancements are under development throughout the Northeast. Compatible electronic toll systems have already been established from Massachusetts to Delaware, and advanced payment systems have been implemented or are under consideration by Amtrak and by transit agencies throughout the Corridor. For instance, SEPTA in Philadelphia is studying possible fare collection system improvements, and several operators in southwestern Connecticut have begun to investigate the feasibility of developing an integrated payment system arrangement. The study team for this project recently completed a study that developed an action plan for collaboration on regional transportation payment systems in the New York City region. Advanced payment system technologies, including smart card technology has the power to knit the various transit and toll systems together, promoting business and tourism through seamless corridor travel.
- **Opportunities to foster multiple application programs and establish new public-private partnerships:** Many types of organizations, including financial institutions, universities, retailers and telecommunications companies, are introducing smart cards. The creation of joint payment systems can make everyone's payment instruments more useful, while distributing program costs more broadly. Moreover, transit can be an important component of such a program, offering other entities the opportunity to quickly achieve extensive market penetration.

Suggested Ten Year Vision

Operating Concept

The following diagram illustrates the basic concept of how the emerging regional payments system for multiple transit agencies could also be used to support other types of transportation payments in the region:

Figure 1: Regional Transportation Electronic Payment System



The table below provides a more detailed overview of the relationship envisioned between the various emerging transportation payments systems:

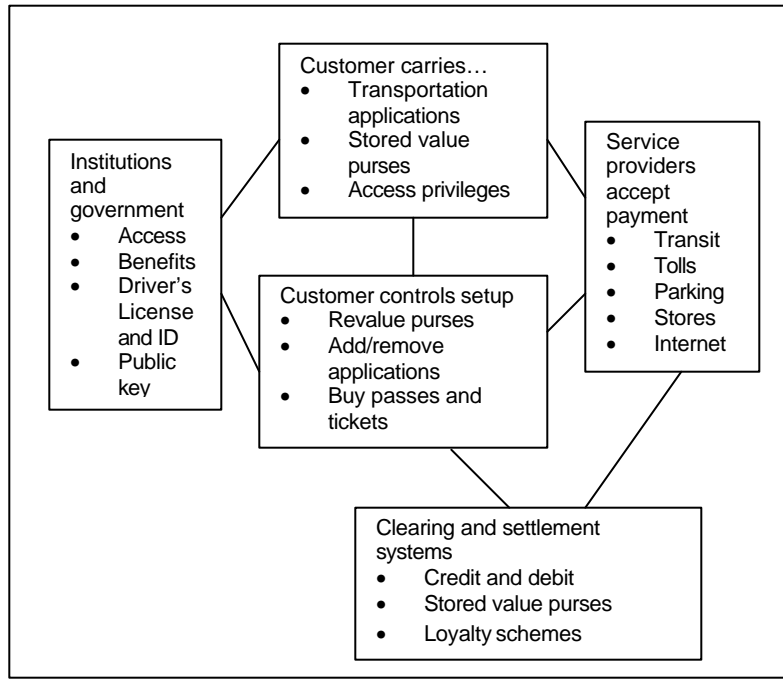
SmartAccess Automatic Revaluing Management System						
Regional Transit Smart Card Clearinghouse System					DC Department of Public Works -Public Parking Fees -Some Private Parking Fees	Smart Tag -Electronic Toll Collection
WMATA SmarTrip System	Local Bus Agencies -Bus Fares -On-Bus Revaluing -Sales Outlet Revaluing	Commuter Rail Agencies -Buy Advance Ticket -Buy Ticket On-Board -Station Revaluing -On-Board Revaluing -Sales Outlet Revaluing	Metropolitan Washington Airports Authority -Parking Fees -Revaluing	Retail Merchants -Revaluing -Retail Purchases		
WMATA -Metrorail Fares -Parking Fees -Metrobus Fares -On-Bus Revaluing -Station Revaluing -Sales Outlet Revaluing						

This type of multimodal transportation payments system may help enable a longer-term customer-focused vision for a multiple application smart card (see the following diagram)

payment system. Such as system could support transportation payments as well as a variety of other non-transportation uses, with important characteristics including:

- Customers may be able to customize their card configuration, including adding or removing card applications. The transit application could be carried on cards from other issuers, and cards issued by transportation agencies could carry third party applications.
- Clearing and settlement systems (that would process individual agency claims against centrally administered prepaid accounts) could involve either a single centralized system or an array of independent systems with bilateral arrangements in place to support reciprocity in accepting each agency's cards.
- Payment devices may have evolved considerably, including more extensive use of a contactless interface and combination of the payment function into other devices (cell phone, watch, in-car computer, etc.).
- The revaluing infrastructure (that allows customers to periodically increase the prepaid stored value on their cards) may be pervasive, involving a variety of devices owned by agencies, companies and individuals, which are connected through the Internet over fixed or wireless connections. There will also likely be extensive use of auto-replenishment for stored value accounts (where revaluing is completed automatically from a credit card whenever the prepaid account balance drops to a predetermined amount).
- As with payment products today, customers will likely expect to be able to choose amongst a competitive range, with both stored value and the method used to fund revaluing transactions.

Figure 2: Customer-Centered Vision



Transitional Stages

The following generalized transitional stages are anticipated:

- **Transit only (2003-2005):** All the major regional transit agencies and some parking facilities will accept the cards issued by agencies, using a central clearinghouse. Each agency may maintain an independent fare policy. Agencies will still accept cash, and some agencies will also use magnetic stripe cards to support occasional users. A few other systems have been set up (such as at universities) and arrangements have been made for some of these cards to support transit use.
- **Expanding system (2006-2008):** The transportation system expands to include private sector operators, more parking facilities and toll roads. Customers will see toll roads involvement as a Smart Tag enhancement, letting them use the card through the transponder. Others (government, mobile phone providers, etc.) will issue non-transportation smart cards, and these cards will often support transportation payments as well. Banks have begun to get involved, issuing their own cards and arranging for the cards of other systems to carry the bank's open purse scheme, and leveraging this base of card users to pressure retail merchants to invest in upgrading their point of sale terminals. Occasional transit users will often have a card for some other purpose that also works with transit, so agencies have begun to phase out magnetic stripe equipment once it reaches the end of its economic life.

Funding

The following table provides a rough cost estimate of capital and annual transaction fees for the expanded regional smart card acceptance system that might develop over the 3-5 year timeframe:

Component	Cost
WMATA SmarTrip Capital Costs	\$30-\$35 million
Other Agencies Regional Smart Card Capital Costs	\$8 million
Regional Smart Card Clearinghouse Transaction Fees (First Year)	\$2-\$6 million/year
Smart Cards Initial Issuance (Excludes Replacement Cards)	\$3 million
SmartAccess System Capital Costs (Phase I)	\$4 million

These estimates only explicitly account for the acceptance of the WMATA SmarTrip cards by non-WMATA agencies. If other agencies also issue smart cards that are to be accepted by agencies throughout the region, the impact on the costs for regional acceptance will depend on the interoperability issues involved. If these other agency smart cards use the same contactless interface technology as the SmarTrip cards, interoperability costs would be limited to enabling the various card readers to communicate with the new card software. If the non-WMATA cards use a different contactless interface technology, more extensive retrofitting of the smart card acceptance equipment could be required.

Key Issues

The suggested recommendations and action plan have been developed to address many of the current issues challenging regional decision-makers. The action plan details a sequence of implementation steps that will continue to facilitate the development and deployment of a coordinated, regional transportation payments system.

- The public view of transportation payments in the region, for transit, parking and toll roads, is that of a fragmented system. Customers need to be familiar with the diverse payment structures of each service provider as well as the various types of valid fare media and payment methods. This is a barrier in particular for transit use, since most commuters need to use services provided from multiple agencies to complete their trip. Visitors will often use Metrorail but find the prospect of a longer journey that would link with other services intimidating. There is a substantial opportunity to improve transit ridership and revenue for all agencies in the region. By simplifying the fare system, and developing a coordinated regional payment system infrastructure that utilizes smart card technology, the public perception will shift to viewing the various services as a seamless transit system that is easier to use and more appealing.
- Movement towards using various types of electronic payments system (EPS) technologies to simplify transportation payments in the region has already begun and public acceptance has been strong. About 50% of the daily toll payments on the Dulles Toll Road use a Smart Tag transponder. The Washington Metropolitan Area Transit Authority (WMATA) recently celebrated the issuance of the agency's 100,000th SmarTrip contactless smart card used to pay fare on the agency's rail system. Additionally, many of the region's bus and commuter rail operators are considering or planning to adopt a smart card based payment system.
- To be successful, a regional smart card based payments system must be developed in a coordinated manner. Smart card equipment from multiple vendors is not always compatible. There is the risk that smart cards might not be accepted with all agencies. Regional decision-makers must commit to taking the necessary steps to ensure regional interoperability when planning their overall programs. Currently, the WMATA SmarTrip system uses proprietary technology only available from Cubic Transportation Systems. Other agencies may choose to purchase smart card equipment from a different vendor, and the path to achieving interoperability under these circumstances is likely to be time consuming and expensive. Establishing an agreement on a regional technology standard could help mitigate this scenario and could facilitate the development of a more "open" payment system supported by multiple vendors.
- Garnering early political support for the further development and deployment of a regional transportation payment system is critical. Transportation decision-makers must be able to clearly articulate a guiding vision and program objectives to the region's political officials. In turn, political officials need to work with key agency officials in establishing a suitable priority for facilitating inter-agency collaboration and establishing mechanisms for setting policy and key decision-making.

- Other sectors of the economy, such as banks and federal government agencies, are currently developing and deploying smart card programs of their own. Smart card technology enables multiple application systems that will make the cards more useful to customers and allows costs to be shared. These potential non-transportation partners are interested in the added value that transportation partners can add to establishing a larger market penetration for their programs. In an effort to leverage this potential market share to the private sector, transportation agencies would benefit from developing a joint system that builds on the economies of scale in the region and would thus be more valuable for establishing a mutually beneficial regional system with non-transportation partners.

Recommendations

Regional Smart Card Acceptance

- At the earliest opportunity all of the regional transit agencies should discuss methods to foster interoperability between SmarTrip and other emerging transit payment systems in the region. The consensus-seeking process between WMATA and other regional agencies on developing expanded electronic payments acceptance, now underway through the Fare Technology Working Group, should address all key issues including:
 - Regional use of smart cards should support all the existing fare media of participating agencies. This coordinated approach will effectively promote smart card market penetration in the region. This approach does not necessarily mean that conventional forms of fare media must be eliminated, although this could be considered as a more extreme approach to enhancing smart card market penetration. However, there may be cost implications if all existing fare media continued to be accepted.
 - Joint discussions should focus early on in resolving some of the key issues associated with developing and supporting a regional revaluing infrastructure (the infrastructure that allow customers to periodically add value to their cards) for the multiple agency bus environment. A coordinated revaluing system will be critical to the success of smart card acceptance in the bus environment.
 - All of the participating agencies should have a voice in developing the operating agreements and business structure that will provide the foundation for the regional clearinghouse operation. If an agency cannot participate in a shared clearinghouse that meets its needs, yet also cannot afford to set up their own clearinghouse to participate as part of a decentralized system, that agency might be deterred from participating in a regional program. The result could be an undesirable fragmentation of a regional program, where customers become confused about card acceptance, lose confidence in the card, and overall market penetration is impaired because some agencies do not accept certain smart cards. The joint planning process for the regional expansion of smart card acceptance needs to focus on developing operating procedures that define an equitable allocation of costs and revenue sharing among all participants.

- Dulles Corridor Rapid Transit should continue to be engaged in the joint planning process for expanded regional smart card acceptance. All of these services will link with Metrorail and will provide an excellent opportunity to emphasize in a high profile setting how regional smart card acceptance can enhance multimodal operations.

Linking Regional Systems

- Transit, parking and toll agencies in the region should work together to structure the regional transit smart card acceptance system, TransPass, Smart Tag and SmartAccess as interrelated and mutually supportive parts of an overall regional electronic payments systems infrastructure.
- Market research and business case assessments should be undertaken that focus on estimating whether there could be measurable benefits to toll and parking agencies from accepting the smart cards used with regional transit agencies. Benefits could include an increased revenue stream or reduced operating costs. Interest in participation based upon the business issues could provide the motivation for the public and private sector participants to resolve the institutional and technical issues.
- Implementation of the SmartAccess program should proceed. As a supplementary system, SmartAccess will enhance the attractiveness of each of the region's electronic payment systems to customers. For customers that use more than one of these payment systems, SmartAccess will help demonstrate that these systems are operating in an integrated manner. The customers who use SmartAccess will tend to be those who use more than one of the many regional electronic payments systems. SmartAccess can also provide useful market research data about the potential demand for smart cards that can be used with all these systems. Even if TransPass and the Northern Virginia toll agencies eventually accept smart cards directly, a SmartAccess system separate from the expanded clearinghouse will continue to be useful, to support automatic account revaluing with transponder accounts that may choose not to adopt the smart card approach.

Action Plan

The following implementation steps should be initiated, in the general time sequence indicated, to move towards a regional payments system and build on the progress of the Fare Technology Working Group:

- **Hold A Stakeholder Workshop:** A workshop should be convened to brief stakeholders on the findings of this study, as well as the experiences of regional integration efforts, such as those in San Francisco, Seattle and overseas (e.g., Hong Kong, Paris, London).
- **Begin to Identify/Establish Funding Requirements and Mechanisms:** Develop high-level cost estimates for building the common vision. Review the funding mechanisms available to the agencies involved and determine which have the potential to support this system.
- **Explore Third Party Partnerships:** Conduct initial discussions with potential private or other public sector partners to explore opportunities to enhance cardholder convenience or reduce costs by synchronizing the visions. The Smart Card Forum is one potential vehicle to facilitate this (for example, Smart Card Forum hosted a dedicated session on smart cards in transportation in June 2000).
- **Seek Political Support:** Work with the offices of local elected officials (in the District, Maryland and Virginia), state legislatures, the two governors and the federal government to establish the support needed by each agency to facilitate a priority effort in this multi-agency project. It will be important to help these officials understand the potential political benefits in establishing themselves as early champions for a system that will significantly increase the convenience of transit for seamless regional travel. The intent would be to achieve political buy-in on the general concept early in the effort and direction for technical staff to develop a detailed implementation plan. It will also be important for the political supporters of the project to be assured that they will be the ones making the policy decisions at critical stages of the effort. This would include assurances that the final decisions on choosing between significant alternatives and whether to proceed with implementation will rest with them.
- **Establish or Designate a Regional Collaborative Organization:** A formal organization for this joint effort will need to be established or an existing organization designated for this purpose. Fundamentals that will allow the members to make progress include:
 - An executive committee to set policies and specific objectives.
 - One or more technical committees to develop details of joint operations and technology standards.
 - A mechanism for pooling funding.
 - Access to additional technical expertise and resources when needed.
- **Establish a Common Vision:** Agree on the general concept of operations, features and participants desired and achievable for the region in the medium to long term.

- **Identify Deployment Issues:** Building on the results of this study, determine specific categories of deployment issues and challenges for which collaborative decisions will be required. This will include all shared services of the system, including: costs and revenue sharing, branding, clearing and settlement rules, marketing, customer service, revaluing networks, third party relationships, etc.
- **Plan Initial Deployment(s):** Select one or more initial deployments that will provide practical experience with implementing the technology beyond the single agency environment.
- **Develop Regional Operating Agreements and Business Structure:** Operating agreements should be developed that identify and define shared services in the system. Shared services could include how clearing and settlement will be operated and how revenues and costs will be shared. The business structure for the expanded clearinghouse will also have to be identified. For example, it could be jointly managed by all the agencies through a consortium or managed by a third party such as the systems integrator.
- **Establish Regional Interoperability Mechanisms:** The group should jointly develop interoperability mechanisms that would allow any agency's smart cards to be accepted at any of the agencies in the system. This effort should be able to benefit from the experience of the TransLink Program in the San Francisco Bay Area, as well as from initiatives to develop multi-application card standards in Europe. Interoperability decisions will obviously be strongly influenced by the choices made by WMATA in the current farebox procurement, as well as by the eventual technology decisions made by other agencies in the region.
- **Define the Migration Path and Implementation Program:** The migration path needs to identify the sequencing of specific implementation efforts. A complete implementation program can then be developed, establishing the specifics such as the scope and timing of each project, programming the funding and determining the most appropriate procurement mechanisms.
- **Expand Private Partnership Outreach:** As the system becomes real, efforts to seek out third party partnerships should be intensified. At this point having developed comprehensive details for a joint regional transportation payments effort will prove valuable, as it will enable the participating agencies to negotiate effectively and as a significant group with potential multiple application card program partners.

To ensure progress on these issues, each participating agency must commit staff resources with the appropriate expertise. In addition, the agencies should consider supplementing their staff with consulting services of experts in electronic payments systems, and should coordinate with related initiatives promoting electronic payment systems in transit, including those of the Federal Transit Administration, ITS America and the American Public Transit Association and others.

The development and implementation of a regional payments system is a complex undertaking and can be expected to take significantly longer than the procurement and installation of the initial single agency Smart Tag or SmarTrip systems. In the San Francisco

and Seattle areas, for instance, the regional consensus development processes have each been underway for several years. Each region undertook extensive research efforts, comparing different payment technologies and determining the full range of system integration and clearinghouse details. Results from the pioneering efforts at these agencies can be leveraged to streamline the timelines for the Washington region. However, it will nonetheless likely take several years to complete the overall effort.