

I-95 Corridor Coalition

Concept of Operations for the Administration of Mileage-Based User Fees in a Multistate Environment



April 2012

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This report was produced by the I-95 Corridor Coalition. The I-95 Corridor Coalition is a partnership of state departments of transportation, regional and local transportation agencies, toll authorities, and related organizations, including public safety, port, transit and rail organizations, from Maine to Florida (with affiliate members in Canada). Additional information on the I-95 Corridor Coalition, including other project reports, can be found on the Coalition's website at www.i95coalition.org.

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Foreword

The predominant means of funding federal and state surface transportation programs in the U.S. – motor fuel taxes – is unsustainable for the long term. On that point virtually all policymakers agree. How best to move forward given that reality remains a matter of serious debate.

Mileage-based user fees (MBUFs), or as termed by some, vehicle miles traveled (VMT) charges, have emerged as a primary candidate to replace or supplement motor fuel taxes. Such fees hold great appeal given their direct link to highway use and the potential to charge users based on the time and/or place of travel. Technology already exists to record mileage and to collect fees, and the pace of technological evolution suggests that even more sophisticated and less costly approaches will be available in the near future.

Yet no consensus has emerged on implementing this approach. Many questions and issues remain unaddressed, ranging from legal issues to privacy concerns to administrative issues to the transition from our current highway finance system. All agree that additional research and testing will be necessary to satisfactorily address concerns that have arisen around mileage-based user fees.

The transition to a new surface transportation funding approach in the U.S. should be viewed as part of a continuing evolution of the overwhelmingly successful “user pay” model. Though many aspects of this transition will be complex and controversial, the challenges are not insurmountable. Decisions on how best to move forward must be based on the best information available, and the study team believes that this report meaningfully contributes to that body of knowledge through its examination of administrative and institutional issues associated with mileage-based user fees.

This report does not advocate mileage-based user fees as the only potential solution to the nation’s surface transportation funding dilemma nor does it represent a commitment to this approach by the members of the I-95 Corridor Coalition. The study team wishes to thank the I-95 Corridor Coalition Project Working Group and the Member Advisory Committee for their direction and significant contributions to the completion of this report.

I-95 Corridor Coalition Mileage-Based User Fee Phase 2 Study: Project Working Group and Member Advisory Committee Members

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Member Advisory Committee (MAC):

- Alliance for Toll Interoperability
- American Association of Motor Vehicle Administrators
- Chittenden County Metropolitan Planning Organization
- Connecticut Department of Transportation
- Delaware Department of Transportation
- Delaware Valley Regional Planning Commission
- Florida Department of Transportation
- Maine Department of Transportation
- Maryland Department of Transportation
- Maryland State Highway Administration
- Maryland Transportation Authority
- Massachusetts Department of Transportation
- Metropolitan Transportation Authority Bridges & Tunnels
- New Hampshire Department of Transportation
- New Jersey Department of Transportation
- New Jersey Turnpike Authority
- New York City Department of Transportation
- New York Metropolitan Transportation Council
- New York State Department of Transportation
- North Carolina Department of Transportation
- Port Authority of New York & New Jersey
- Rhode Island Department of Transportation
- South Carolina Department of Transportation
- South Jersey Transportation Planning Organization
- University of Massachusetts
- Vermont Agency of Transportation
- Virginia Department of Transportation
- Virginia Transportation Research Council

Executive Summary

Why Is the I-95 Corridor Coalition Conducting Research on Mileage-based User Fees?

User financing has been the foundation for federal and state highway programs in the United States for over a half century. All states and the federal government currently collect taxes on the use of motor fuel, and the vast majority of proceeds from those taxes are used to support highway or other surface transportation construction, operations, and maintenance. However, average fuel economy for automobiles, other light-duty vehicles, and trucks is projected to increase substantially in coming years, reducing the revenue produced per mile of travel. In addition, vehicles powered by alternative fuels, hybrid vehicles, and electric vehicles will pay little or no motor fuel tax. Given that reality, the current state and federal surface transportation funding structure will not be sustainable in the long term.

As vehicle types and fuel options increase, a consensus is emerging that state and federal surface transportation funding eventually should be based on more direct “user pay” charges in the form of a fee for each mile driven – rather than on fuel consumed. Such a mileage-based user fee (MBUF) system would be both more sustainable and more equitable since it would not be influenced by increasing vehicle fuel efficiency or the use of alternative energy sources.

The types of MBUFs under study in the U.S. range from constant charges for vehicles of a certain configuration per mile of travel on all roads, to charges that may vary by facility or by time of day or other variables such as vehicle type. Several projects are addressing MBUF systems at an individual state level. Given the nature of I-95 Corridor Coalition membership and based on guidance from a Member Advisory Committee (MAC), this research report considers MBUF system approaches that are multistate in nature. At a minimum, any MBUF system considered in this research must provide for cross-state reporting and payment for miles driven within each participating state.

The MAC also directed the research team to consider mileage-based user fees that maximize individual states’ opportunity to pursue various policy objectives by having the full capability to render charges based on facility, time of day, and other variables. Charges varying by facility and time of day may be able to reshape travel patterns and reduce congestion, offering potential benefits not obtained with constant charges per mile of travel. Examination of those travel demand-related benefits of MBUFs was not a part of this research, but administrative requirements to include time of day charges in an MBUF system were assessed.

In contrast to other projects analyzing MBUFs, the I-95 Corridor Coalition has sought to make its contribution in advancing the MBUF dialogue through a research program that focuses on the administrative and institutional aspects of potential mileage-based user fees in a multistate context, and by considering some of the challenges associated with the transition toward an MBUF system long-range vision.

This report is not intended to advocate mileage-based user fees as the only funding approach to meeting the nation’s future surface transportation investment needs. There are many other options that should and must be considered.

How Did the Coalition Get to This Research Phase?

In December 2009, the I-95 Corridor Coalition launched a research project entitled, “Multistate VMT-Based Fee Initiative: Institutional, Administrative and Legal Analysis.” The project focused on the functional requirements options for institutional arrangements and state and federal legal and regulatory issues associated with adoption of a vehicle miles traveled (VMT)-charge based system, now called a mileage-based user fee (MBUF) system. The Coalition’s intent was to raise the level of understanding of the challenges that the adoption of a multistate MBUF system would pose to state and federal government agencies involved in the collection and distribution of funds. The research findings also raised key issues requiring further review and analysis. This Phase 1 research report was completed and released in November 2010.

The Phase 1 research project addressed a wide range of issues including:

- The perspectives of I-95 Corridor Coalition member agencies relative to the functions to be included in a multistate system, including the potential inclusion of tolls and facility pricing;
- A review of broad administrative requirements for managing a multistate system. A multistate system is envisioned as one that would involve administrative and institutional changes necessary to implement an MBUF system across many states, up to and including a federal MBUF. Key administrative requirements would include enrollment, accumulating mileage and charges due by state and agency, calculating and billing the fees to users, maintaining user interface and communications, auditing, security and enforcement, calculation and reconciling state and agency mileage and distributing revenues among the states and other agencies;
- The identification of key issues surrounding basic requirements unique to administering a multistate system, such as vehicle identification and registration and a financial clearinghouse function;
- The potential for building upon the experience of existing systems such as the National Motor Vehicle Title Information System (NMVTIS) and other current models such as the International Registration Plan (IRP) for commercial vehicles and the E-ZPass electronic toll collection system;
- High-level estimates of the cost of system administration;
- The perspectives of member agencies relative to the nature of the institution(s) that would be responsible for administering the system; and
- State and federal legal and legislative issues to be resolved before such a system could be adopted.

The Phase 1 MBUF project characterized above established the foundation for more detailed case studies and analyses in selected states as part of a Phase 2 research project.

The Phase 2 Project – A Three State Case Study

In December 2010, the I-95 Corridor Coalition Executive Board approved the second phase MBUF research. It began with an analysis of the operating environments and current conditions in three contiguous states - Delaware, Maryland and Pennsylvania. A central component was a “gap analysis” to compare the alignment of required future MBUF administrative functions to the existing administrative functions and configurations within state departments of transportation, departments of motor vehicles (DMVs), toll authorities and state revenue agencies. Key elements of the Phase 2 research portrayed in this report include a long-range concept of operations, discussion of issues associated with the transition from the current highway tax structure to this long-range vision, a perspective on MBUF system operating costs, and consideration of next steps to be undertaken in the research of MBUF administrative and institutional issues. The development of each element was based on extensive interviews with representatives of the three case study states, other stakeholders, private sector

practitioners and entrepreneurs, and guidance and direction from a Project Working Group, a Member Advisory Committee and the I-95 Corridor Coalition's leadership.

Context and Assumptions for an MBUF System Long-Range Vision

A key finding of this research is that the transition period during which individual states adopt an MBUF will be lengthy, and incremental steps toward a *long-range vision* will likely be taken. However, it is important from the outset to keep a long-range vision in view as technology evolves and initial administrative, institutional, and legal changes are made to implement an MBUF system. The Concept of Operations (ConOps) described in this report constitutes a vision of how a multistate (or national) MBUF system might operate at some time in the future.

The ConOps is intended to take full advantage of already emerging technology trends and systems evolution including:

- Communications networks that enable the rapid sharing of pertinent information among participating entities;
- Replacement of toll charges based on complex rate structures (e.g., tolls based on points of entry and exit) with an equivalent per mile charge;
- Availability on all vehicles of equipment capable of recording mileage by state, jurisdiction, facility, date and time of day and transmitting this information via wireless communications;
- Reliable wireless communications systems that obtain and send information from/to vehicles; and
- Prevalence of commercial electronic billing and collection system usage (although not necessarily by all users).

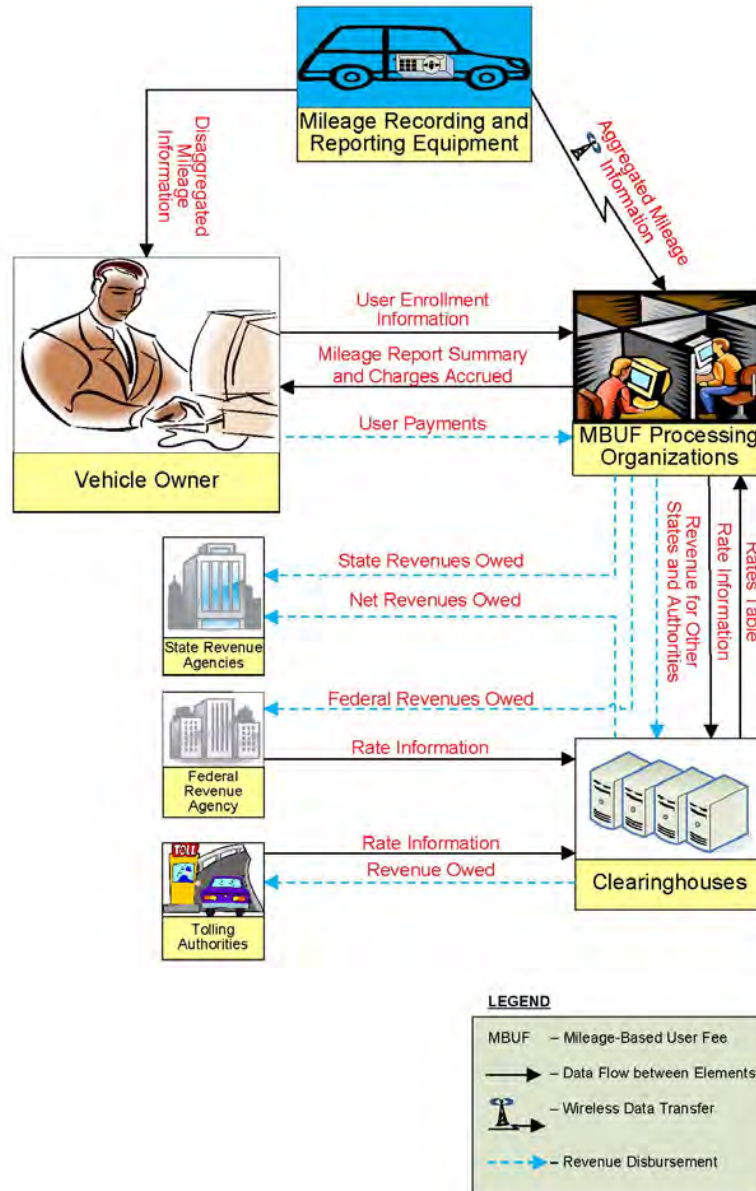
The ConOps also assumes important evolution in institutional policy and capacities including:

- The concept of MBUF has been adopted by states and generally applies to all vehicles traveling on all roads (with the exception of some vehicle types specifically excluded by individual states);
- New institutions or institutional arrangements exist within and among the states to accomplish the required functions. This includes enactment of enabling legislation within the states for the collection and disposition of the fees collected, and agreements among the states to take necessary enforcement actions for amounts owed for travel outside of host state borders;
- Vehicle titling and registration information in all states is being collected and stored electronically, greatly simplifying the process of MBUF system enrollment and the processing of vehicle ownership changes;
- A process is in place to certify that equipment on or in vehicles meets open national standards for interoperability and performance; and
- The capability to collect a federal MBUF is an integral part of the multistate system.

Operating Concept for an MBUF System Long-Range Vision

The (ConOps) described in this report is built around key administrative functions that were identified in the Phase 1 project, though they are organized for presentation in a different fashion to associate the functions with owners, vehicles, MBUF processing organizations, and clearinghouses. Key characteristics and interrelationships are depicted in Figure ES.1.

Figure ES.1: Data and Revenue Flows in Mileage-Based User Fee System



Enrollment and Payment – Owner Responsibilities – A vehicle owner would be required to enroll his/her vehicles with a designated MBUF processing organization in his/her state. The term “processing organization” recognizes that the enrollment responsibilities within each state could be handled differently, with some states opting to house more functions within state agencies than others. Some or all MBUF processing organization functions for a given state might be outsourced to a private entity, to another public entity or to a non-profit entity on either an individual state or multistate basis. These arrangements could involve either direct payment by the state(s) or cost recovery through enactment of a transaction fee.

Each vehicle owner/user/lessee would select a method of account pre-payment/replenishment. Comprehensive payment options would be available, including cash, check, and credit or debit cards, and incorporating automated account deductions for periodic replenishment.

Recording and Reporting Mileage – Vehicle Functions – Given the desire, at a minimum, to identify travel between and among states, all vehicles would be required to have equipment capable of:

- Recording mileage by date, time of day, state, jurisdiction and facility.
- Aggregating the raw mileage information collected into accumulated distance traveled by date, time of day, state and jurisdiction, with the miles traveled on priced-facilities (toll roads or facilities where congestion-based pricing applies) specifically identified.

All equipment would be certified as meeting open national interoperability and performance standards and carry certification numbers. The equipment would store the disaggregated recorded mileage information for a period of time as chosen by the owner. Communication protocols and access to information are described in the full report.

Billing, Collecting and Processing Vehicle Ownership Changes – MBUF Processing Organizations – Individual owner agencies and authorities would have full flexibility to establish MBUF rates and rate structures that might differ significantly among states and other jurisdictions. The MBUF processing organization designated by each state would:

- Maintain databases containing owner/user/lessee account information.
- Accept pre-payments and account replenishments from registrants.
- Receive communications from certified devices in enrolled vehicles containing aggregated distance traveled by date, time of day and jurisdiction since the last communication, with the miles traveled on priced facilities specifically identified.
- Upon receipt of information from a vehicle device, process the equipment certification number and e-commerce security information to ensure validity of the transmission.
- Calculate the user fee associated with the aggregate data received. The calculation would be based upon a table maintained by a clearinghouse that would contain all state, jurisdiction and facility charges by date and time of day.
- Apply the calculated user fee to the owner's account and update the account record.
- Make available to each owner a summary of the mileage reported and the charges that accrued to the account.
- Identify and investigate delinquent accounts and take enforcement actions provided for in state law. Administrative enforcement actions may include registration revocation and denial, reinstatement fees and other fines and penalties.
- Notify the vehicle owner that they have a certain period of time to have equipment repaired or replaced if that equipment is reported as being defective.
- Identify cases of potential equipment tampering and report these to the appropriate state agency for further investigation and to take administrative enforcement actions provided for in state law.
- Upon notification of sale or disposal of a vehicle or transfer of title, create and modify the owner-specific records that associate the owner with that vehicle (through the VIN) and with that owner's MBUF account and payment information. The date of the new title would identify when the responsibility for paying mileage fees ends (for the old owner) and begins (for the new owner).
- Receive uploads of new vehicle registration records from the state registration agency and compare these with its records as a check to help ensure that changed vehicle ownership information has been reported by previous vehicle owners.

- Periodically sum up all accumulated miles by state and by each individually priced facility and transmit this accumulated mileage information to a clearinghouse.
- Periodically sum up all amounts owed to other states and to each individually priced facility and transmit amounts owed to a clearinghouse.
- Collect payments associated with the federal MBUF and transmit amounts owed to the federal government.
- Consistent with state laws and policies and interstate agreements, maintain electronic records to support auditing requests made by individual owners, toll authorities, other states/ jurisdictions and the federal government.
- Manage a process for verifying the accuracy of the mileage information being collected.
- Maintain and manage a customer service organization that responds to issues raised by enrolled individuals.

Data Sharing and Reconciling Amounts Owed – Clearinghouse Functions – Financial clearinghouses would be established to operate systems that meet interoperability and performance standards in order to reconcile records transmitted by each state and distribute net revenues owed to each participating state or authority. These clearinghouses would cooperate with state processing organizations to maintain a table of applicable MBUFs and other rates (such as tolls) by state, jurisdiction and facility by date and time of day. They would make records of mileages and fees accrued due to travel on their facilities by vehicles registered in each state available to each processing organization and authority as well as to the federal government if states collect federal MBUFs.

As with state processing organizations, no specific assumption is made regarding by whom multistate clearinghouse functions might be executed. The clearinghouse functions might be provided by a private or non-profit organization with oversight by a governmental board and with financial support provided either directly by the states or through transaction fees.

User Scenarios

Chapter 5 of this report describes a range of scenarios illustrating how the system described in the ConOps might work from the perspectives of vehicle owners, government agencies and others entities involved in an MBUF system.

The Transition to a Mileage-based User Fee System

The ConOps describes how an MBUF system might operate and what functions it could serve. It does not presume specific technologies or systems – but rather identifies the functions that must be served among the organization participants. Importantly, it is “institution neutral;” it does not prescribe for any state how to implement the system in terms of institutional, administrative and business arrangements. This approach permits considerable flexibility in how elements of the ConOps would be implemented in a complementary fashion with actions necessary to achieve public acceptance.

Developing a long-range vision is only one step toward implementing an MBUF system. The systems and institutional complexities identified have led some to advocate that MBUF systems should be gradually phased in, allowing time to prove the concept and demonstrate key features of the system, while simultaneously gaining the political support required to fully implement an MBUF system long-range vision. This evolutionary approach is consistent with the gradual political and fiscal pressure likely to be created by the erosion of fuel tax revenues and a stepwise approach to phasing in MBUFs while continuing to impose fuel taxes.

States are currently taking the lead in exploring issues associated with the creation of an MBUF system in the U.S. However, federal leadership in developing technology standards and communications protocols for an MBUF system would reduce many uncertainties in the development of technologies and systems. And federal leadership in continued research and the implementation of an MBUF system will be critical.

Many challenges to implementing an MBUF system are related to multistate issues such as the distribution of revenues among states, the exchange of vehicle ownership and use information, MBUF enforcement, MBUF rate structures, etc. Consequently, it may be desirable for several cooperating states to begin the process of transitioning to an MBUF system on a multistate basis – as reflected in the I-95 Corridor Coalition research program. Early consideration of multistate issues will prevent having to superimpose new mechanisms on systems designed originally for single state applications. Several on-going programs or activities including NMVTIS, electronic vehicle registration, and the Alliance for Toll Interoperability's efforts to promote nationwide tolling interoperability and increased cooperation among states in toll violation reciprocity and enforcement will lay a strong foundation for many of the administrative mechanisms that will be required for an MBUF system regardless of how that system evolves.

Even with a multistate coordinated approach, each state could retain significant autonomy on the details of implementing MBUFs. Specifics such as transition from the current administrative mechanisms designed to collect revenues to the administrative mechanisms required to fully implement an MBUF system may vary by state, but interoperability must be achieved at the multistate (and ultimately federal) level. The overall framework for an MBUF system must recognize and accommodate this need for flexibility and diversity. In light of this reality, state representatives on the Coalition Project Working Group generally agreed that implementation of an MBUF should be incremental, both in terms of the functionality of the MBUF and the number of users who would initially be enrolled in the new system.

There are several key decisions facing state policymakers including:

- Whether to assess fees for travel on all roads or only currently “non-priced” roads;
- What vehicles to enroll first in the MBUF system;
- How to collect the MBUF revenues;
- What minimal functional and technical requirements the system must meet;
- What equipment is able to meet the system requirements and how it will be certified;
- What standards are required for database structures, and what file formats and communication protocols to use for accurate and efficient data exchange;
- What new customer service functions are required to support motorist needs and payments;
- How MBUF payment will be enforced; and
- How the MBUF system will be administered, including potential clearinghouses to reconcile fees owed to the various participating states.

Most of the administrative structures established during initial stages will carry forward to full implementation of the MBUF system, although requirements will become more complex and may have to be modified based on experience during initial stages of implementation.

After states have gained experience implementing an initial MBUF system involving only a subset of users and a portion of the potential MBUF system functionality, they will need to consider how to expand their MBUF system and move toward full implementation. Differences can be expected among states in how this transition will progress. Some will want to move more quickly than others to full

implementation of the MBUF system and some may want to have several intermediate stages in the process. If anticipated from the outset, these differences should not have a significant effect on how a multistate MBUF system is administered.

In moving toward full implementation, states will have to include more and more vehicles in their MBUF systems. Ideally, strategies for expanding MBUF system participation should have been developed early in the implementation process, although those strategies may have to be modified based on public acceptance and other experience along the way. Strategies will vary depending on whether initial implementation was mandatory or voluntary. Payment mechanisms, enforcement strategies, equipment and communications requirements, and other administrative mechanisms all will have to be assessed and modified as necessary to improve operations.

Until all vehicles in all states are enrolled in MBUF systems, individual states may elect to retain the fuel tax to help ensure that transportation revenue streams are not diminished during the phase-in of MBUF systems. There are significant administrative complications associated with operations under a dual MBUF/fuel tax system. The more quickly states can move away from a dual MBUF/fuel tax system, the better, but that decision may well depend in part on the amount of out-of-state travel and decisions by other states on the timing of their transition to an MBUF system.

Projected Administrative Costs of a Mileage-based User Fee System

There are no general purpose mileage-based user fees now being collected anywhere in the world. This fact in itself makes cost projections highly uncertain, because costs are usually estimated from comparable experience. Costs associated with administering an MBUF system are uncertain for other reasons as well. First, implementation is likely to occur well in the future involving many unknowns about available future technologies and what they will cost. Second, there is a reasonable likelihood that future vehicles will be manufactured with more of the functionalities necessary for the collection of MBUFs, thus minimizing “after market” equipment costs.

It is unlikely that any MBUF system will be less costly to administer than the current motor fuel tax system which is collected from major fuel suppliers, who then pass on the fees to those who use fuel on the highways. However the current motor fuel taxation system faces the challenge of sustainability. Furthermore, it has limited functionality and does not directly distinguish miles, location of travel, or vehicle type - information necessary to achieve a range of other transportation policy objectives. And though an MBUF system is necessarily more expensive, it does provide equity and sustainability, and supports a greater range of policy functions.

The Phase 1 research, which drew heavily on published cost estimates from a proposed MBUF system in the Netherlands, concluded that an MBUF system in the U.S. might cost about \$40 annually per vehicle if MBUF administration functions were fully integrated with state registration functions that now cost an average of \$11 annually per vehicle in the I-95 Corridor Coalition states. Additional savings of up to \$10 per vehicle might be possible with reduced functionality MBUF systems, reducing the annual administrative costs to about \$30 per vehicle.

The total amount collected from highway users and the amounts spent on highways in the U.S. are now about \$120 billion to \$130 billion per year. Given that this equates to approximately \$500 per year per vehicle, replacing all current highway sources of revenue with mileage-based user fees would result in annual administrative costs of 8 percent of all highway revenues at \$40 per vehicle or 6 percent of all highway revenues at \$30 per vehicle. These percentages would increase proportionately if only some current revenue sources were replaced.

Substantial proportionate cost savings could be realized if some administrative costs associated with vehicle registrations and toll collections were integrated into MBUF systems, particularly in states where tolls represent a large portion of state and local highway revenues. The recent NCHRP research report on *“Costs of Alternative Revenue-Generation Systems”* estimated average administrative and collection costs for motor fuel taxes to be just under 1 percent of total fuel tax revenues, compared to a lowest percentage of 4.1 percent for mileage-based user fees and a lowest percentage of 16 percent for tolls. Based on these estimates, states in which tolls account for a significant percentage (over 25 percent) of highway revenues could possibly see a reduction in total administrative costs by implementing mileage-based user fees that include the collection of toll revenues and absorb the parallel toll collection and vehicle registration costs.

In summary, if mileage-based user fees replace only motor fuel taxes, overall administrative costs will likely increase as a percentage of total revenues, but if mileage-based user fees also incorporate the collection of tolls, thereby eliminating the need for toll agencies to collect tolls themselves, administrative costs could potentially decrease as a percentage of revenues in those states with a very high percentage of toll revenues.

What Are the Next Logical Steps in the MBUF Research Process?

Most states are not actively considering an MBUF system at this time. Mileage-based user fees are far from accepted or well understood by the general public, state and federal legislators, and transportation professionals, and fuel tax erosion is a gradual process. For these and other reasons, more research and testing will be necessary to address the legitimate issues and ease the concerns that MBUFs raise. I-95 Corridor Coalition states could take several actions now to support informed decisions should they decide to implement an MBUF system in the future. These actions include additional research, preliminary feasibility studies, and other activities that do not necessarily suggest a near-term intention to implement MBUFs. Some of these short-term actions could yield benefits even if an MBUF system is never implemented.

A potential key contribution that Coalition states could pursue would be to develop the framework for a pilot project to demonstrate how key elements of an MBUF system might work on a multistate basis. Small-scale pilots already have been conducted in four Coalition states – Maine, Maryland, North Carolina, and Florida – as part of the MBUF demonstration project conducted by the University of Iowa under the federal Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU), but a more comprehensive approach addressing multistate issues is much needed. Federal funding assistance would be required to conduct such a pilot, as has been the case with all previous MBUF pilots in the U.S.

Another important short-term action would be to develop a comprehensive MBUF transition strategy. This report addressed many transition issues and options, but stopped short of developing an implementation roadmap. Clearly, not all the transition issues and options need to be addressed immediately in order to begin MBUF implementation. High priority strategic issues that should be addressed early in the process might include:

- Identifying the initial functionality of an MBUF system;
- Developing a strategy for phasing in MBUFs, including the potential for early stage voluntary opt-in;
- Developing a strategy to enforce payment of MBUFs;
- Developing strategies for operating under a dual fuel tax/MBUF system;
- Developing a strategy to protect privacy; and
- Assessing the applicability of existing administrative structures to an MBUF system.

A final important action would be the development of requirements upon which MBUF equipment and communications standards could be based. While final development of equipment and communications standards or specifications would be premature, it is not too early to begin the process of ensuring equipment and communications interoperability. Appropriate responsibility for development of such standards is unclear at this point. One option would be for the federal government to develop standards for MBUF systems. Another option would be for a standards setting organization to set the standards and have them accredited by the American National Standards Institute (ANSI). Before this is likely to happen, however, a significant number of states will likely have to agree on the desired functionality of an MBUF system to serve as the basis for equipment and communications standards.

Conclusion

Implementing an MBUF system in the U.S. will be technologically, administratively, and politically complex. But the challenges are not insurmountable. In the current political environment, any tax change is difficult, especially one that so fundamentally alters the way surface transportation improvements have long been funded. Virtually all those interviewed for this research project advised that initial MBUF system implementation should be simple and phased. However as one private sector interviewer advised, states should have a long-term vision for a coordinated, multistate MBUF system, and then move incrementally toward that vision. Other private sector representatives emphasized the value of federal leadership, but acknowledged that it may be desirable for several cooperating states to begin the process of transitioning to an MBUF system on a multistate basis – as reflected in the I-95 Corridor Coalition program.

Ultimately, implementation of MBUF systems in the U.S. will be driven by how well transportation policymakers address key issues of concern to the traveling public.

1.0 Context and Introduction

1.1 Why Mileage-Based User Fees?

User financing has been the foundation for federal and state highway programs in the United States for over a half century. All states and the federal government currently collect taxes on the use of motor fuel, and the vast majority of proceeds from those taxes are used to support highway or other surface transportation construction, operations, and maintenance. All told, motor fuel taxes account for 75 percent of state highway funding and about 50 percent of all funding, including funding for local roads. Yet vehicles powered by alternative fuels, hybrid vehicles, and electric vehicles, as well as the average fuel economy for automobiles, other light-duty vehicles and trucks are projected to increase substantially in coming years. Motor fuel use per mile of travel may decline as much as 50 percent over the next 25 years, as greater fuel efficiency is achieved due to increased fuel efficiency standards, higher fuel prices, and the global nature of the vehicle market in which more fuel efficient vehicles are already mandated and are being sold elsewhere in the world. Greater fuel efficiency has enormous economic benefits to U.S. consumers and to our international balance of payments, but it directly reduces funds available for surface transportation investment. Given that reality, the current state and federal surface transportation funding structure that relies primarily on taxes imposed on motor fuels is not sustainable in the long term.

There is no clear consensus on the revenues state and federal motor fuel taxes would generate in the future if the current structure were to be maintained. Due to the cents-per-gallon structure of current taxes, revenue generation is a direct function of fuel consumption. Fuel consumption is driven by two factors – miles traveled and vehicle fuel efficiency.

The United States Department of Energy's *Annual Energy Outlook 2011* (April 2011) forecasts that vehicle miles of travel by light and commercial vehicles in the U.S. will grow 1.61 percent per year from 2011 through 2035, but that motor fuel consumption will grow only 0.61 percent per year in that period. During a period of dire need for transportation investment, the U.S. will face minimal revenue growth under the current funding structure. The gap between highway user revenues and documented needs will only grow larger as the vehicle fleet becomes more fuel efficient and further turns to other power sources.

Increasingly, a consensus is emerging among transportation professionals that the user pay philosophy should be maintained, but that state and federal surface transportation funding systems should be based on more direct “user pay” charges in the form of a fee for each mile driven, commonly referred to as a mileage-based user fee or MBUF system. The revenue stream from MBUFs is more sustainable, since it is not influenced by increasing vehicle fuel efficiency or by the use of alternative fuels. However, as with motor fuel taxes, MBUFs would continue to suffer from a loss of “buying power” due to inflation unless they were inflation indexed.

The types of MBUFs under consideration in the U.S. range from constant charges for vehicles of a certain configuration per mile of travel on all roads, to charges that may vary by facility used or by time of day. The guidance provided to this project by the state agency advisors was to consider mileage-based user fees that include the full capability to render charges based on facility, time of day, and other variables. Charges which vary by facility and time of day may be able to reshape travel patterns and reduce congestion, with some potential benefits that will not occur with constant charges per mile of travel. Examination of the travel-related benefits of MBUFs was not a part of this research. Other research,

including research for the U.S. DOT under the Connected Vehicles Initiative, may identify and quantify such additional benefits from applying various types of charges or from utilizing the associated technologies for other purposes, such as enhancing safety. These other benefits should be considered in deciding if and how states, the federal government, or others will collect future revenues from vehicle users.

Though there is a wide array of issues to be addressed as U.S. transportation funding evolves toward MBUFs, the I-95 Corridor Coalition has sought to make its contribution to the MBUF dialogue by specifically addressing the administrative and institutional issues associated with potential mileage-based user fees, and by considering some of the challenges associated with the transition toward an MBUF system long-range vision. This report does not intend to advocate mileage-based user fees as the only funding approach to meeting the nation's future surface transportation investment needs. There are many other possibilities that should and must be considered. And as the I-95 Corridor Coalition members have sought to make a contribution to the overall research record on this important topic, their interest in the subject in no way represents a commitment to implement a mileage-based user fee system.

1.2 Background

In December 2009, the I-95 Corridor Coalition launched a research project entitled, "Multistate VMT-Based Fee Initiative: Institutional, Administrative and Legal Analysis." The project focused on the functional requirements, options for institutional arrangements and state and federal legal and regulatory issues associated with adoption of a vehicle miles traveled (VMT) charge based system or mileage-based user fee (MBUF) system. The Coalition's intent was to raise the level of understanding of the challenges that the adoption of a multistate VMT-based road-user charging system would pose to state and federal government agencies involved in the collection and distribution of funds. It also intended to raise key issues that require further review and analysis. This Phase 1 research report was completed and released in November 2010.

Most previous work on MBUF systems has focused on technology options, public acceptance and communications, and on small-scale single-location demonstrations of concepts. A compendium of other known research and tests conducted on MBUFs in the U.S. may be found at www.i95coalition.org. This project was the first MBUF-related effort to focus specifically on business models, institutional and administrative arrangements, and legal issues – state and federal – critical to real-world application on a regional or national scale. The Coalition's multi-agency structure provides a unique platform and important perspective for informed consideration of these key issues.

The Phase 1 research project addressed a wide range of issues including:

- The perspectives of I-95 Corridor Coalition member agencies relative to the functions to be included in a multistate system, including the potential inclusion of tolls and facility pricing;
- A review of broad administrative requirements for managing a multistate system including enrollment, accumulating mileage and charges due by state and agency, calculating and billing the fees to users, maintaining user interface and communications, auditing, security and enforcement, calculation and reconciling state and agency mileage and distributing revenues among the states and other agencies. A multistate system is envisioned as one that would involve administrative and institutional changes necessary to implement an MBUF system across many states, up to and including the capacity to administer a federal MBUF;
- The identification of key issues surrounding basic requirements for administering a multistate system, such as vehicle identification and registration and a financial clearinghouse function;

- Potential for building upon the experience of existing systems such as the National Motor Vehicle Title Information System (NMVTIS) and current models such as the International Registration Plan (IRP) for commercial vehicles and the E-ZPass electronic toll collection system to meet the administrative requirements;
- High-level estimates of the cost of system administration;
- The perspectives of member agencies relative to the nature of the institution(s) that would be responsible for administering the system; and
- State and federal legal and legislative issues to be addressed before such a system could be adopted.

The Phase 1 research report provided an overview of system functionality options. It addressed the administrative functions needed to collect MBOFs and highlighted the key issues and concerns that Coalition members and others would need to consider in a multistate MBOF arrangement. The project considered potential institutional arrangements and used existing, limited information to develop estimated costs for administering MBOFs. A copy of the full text of the executive summary and Phase 1 research report is available at www.i95coalition.org.

1.3 Summary of Key Phase 1 Findings

1.3.1 System Functionality

In the Phase 1 research, functions that might be served by a mileage-based user fee system were examined. The range of functions to be served would influence administrative, institutional and legal requirements for an implementable MBOF system. Potential functions were recognized to range from assessing a flat per-mile charge on all miles traveled without concern for where that travel occurred to using the MBOF to achieve a range of policy goals such as reducing congestion, road wear, and harmful emissions by varying the per-mile charge based on certain vehicle, facility, or system performance characteristics. An MBOF that would be useful for toll authorities or for congestion-related charges would require the capability to identify the specific facility and time of travel by a vehicle.

These options closely correspond to those considered in other studies and cover the full range of system functionality. They range from “simple” – deployment of a system designed to accommodate only the mandatory system function of recording and reporting miles driven, to “moderate” – deployment of a system that achieves some of the optional functionality associated with general location variability, e.g., travel by time of day or by jurisdiction or by small geographic area (cordon-based congestion charges) – to “advanced” – deployment of a system designed to accommodate the full range of optional system functions. The Coalition’s Member Advisory Committee (MAC) directed that further work, including case studies to be conducted in Phase 2, focus on the advanced option and identify administrative, institutional and legal requirements necessary to implement a system that would allow jurisdictions to use MBOFs to address congestion, facility used, time of day, road wear, emissions, and other policy issues. In making this statement of research scope, neither the MAC nor any state is suggesting intent to implement MBOFs or any MBOF system.

1.3.2 Identification and Analysis of Administrative Requirements

Given the assumptions made for this research project regarding the objectives of an MBOF system and the characteristics of the most promising technologies, specific administrative functions and institutional arrangements necessary to collect MBOFs were identified as part of the Phase 1. Administrative requirements include:

- Enrolling user participants;
- Accumulating mileages and charges due by state and by agency;
- Calculating and billing charges to users;
- Maintaining user interface and communication;
- Auditing, security, and enforcement;
- Calculating and reconciling state and agency mileages; and
- Distributing revenues among the states and other agencies.

These requirements and their place in an MBUF system concept of operations are discussed in much greater detail in Chapters 3 and 4 of this report.

The Phase 1 research found that several possible approaches may be taken to the efficient allocation of administrative functions among existing (or newly created) entities. Approaches would likely differ by state. Efficient systems designs must distribute functions among units and define an overall management structure for the integration of all functions. The Phase 1 research found that these units will need to have the functionally-required administrative capabilities and systems, including the data collection technologies and the information management systems.

Several key policy and governance roles must be fulfilled at both the intra and interstate levels, both for resolving issues between states and for defining multistate agreements. Many of these administrative and institutional requirements are already in place for state administration of motor vehicle registrations, motor fuel taxes, and with toll authorities. The Phase 1 report identified the key parameters and opportunities for transferability of processes and process adaptation. States in the three state Phase 2 research were asked to assist the research team in identifying roles and responsibilities for governance of a multistate MBUF system.

1.3.3 Applicability of Current Operational Environments

A key challenge associated with this potential new approach to roadway charges is management of the transition from the existing systems of fuel and related motor vehicle taxes and fees to a new MBUF system. Initial Phase 1 interviews conducted with state department of transportation officials, state department of motor vehicle officials, (DMVs), the American Association of Motor Vehicle Administrators (AAMVA), the E-ZPass Group, the International Registration Plan (IRP) and toll authorities' representatives, as well as interactions with the MAC, revealed a number of issues and concerns that must be addressed for a successful transition to MBUFs. Key concerns included potential costs, institutional and systems capacity, data confidentiality and information privacy. In the case of the DMVs, officials noted that MBUF administration would constitute another diversion from their core business. These noted challenges were a starting point in the Phase 2 research to further determine gaps in existing systems, processes and staffing that may constitute barriers to the implementation of a multistate MBUF system.

1.3.4 Preliminary Cost Estimates

It comes as no surprise that costs associated with administering an MBUF system will be a major concern. The current motor fuel taxation system is very simple and does not directly distinguish miles, location of travel, or vehicle type, and is therefore very inexpensive to administer. An MBUF system – with its increased range of functions – is necessarily more expensive and must be justified by its greater range of policy functions as well as the emerging shortcomings of the existing motor fuel taxation approach. While cost is definitely not the only important factor in comparing potential MBUFs to motor fuel taxes, it will certainly receive attention in deliberations over future revenue sources at the state and

federal level. A key challenge is to weigh the increased costs against the importance of the additional functions in a cost-benefit context. Projected MBUF system costs are discussed in greater detail in Chapter 7 of this report.

1.3.5 Institutional Arrangements

The Phase 1 report concluded that the most promising institutional arrangements for administering an MBUF system will balance continued strong state or toll facility involvement and control with management efficiency. States wish to maintain their administrative responsibilities for revenues within their borders, but they would have a range of choices as to how much assistance for MBUF administration they would contract out to third parties, including private contractors or non-profit organizations with the appropriate back office capabilities. In such a state-centered approach, a state agency or agencies might be responsible for the administrative and legal functions necessary to monitor and administer MBUF's, including reconciliation and coordination with other states. Other administrative functions might either be performed in-house or contracted out. Given the scale of the data handling, systems requirements, and administrative complexity, Phase 1 concluded that it is likely that contracting approaches would be used. This implies an institutional arrangement within which states maintain full policy, legal and administrative control, but have options to use private contractors or multistate cooperative entities to handle some or all of the administrative functions related to monitoring and collecting MBUFs.

1.3.6 Legal and Regulatory Issues

As part of the Phase 1 research, key state legal issues were identified and reviewed through a survey of legal counsels representing transportation agencies within the I-95 Corridor. Respondents were asked a series of questions related to a hypothetical MBUF system applied to all motorists and facilities within participating states. The limited existing legal precedents – supplemented by professional opinions – were used as the basis for the identification of the likely key issues including: the impact of characterizing MBUFs as taxes, fees, or tolls; current legal limitations on use of motor vehicle-related revenues; roles and authority in rate setting; transition from fuel taxes to MBUFs; legal authorities for multistate collection and redistribution, delegation of program administration, enforcement and penalties; and data sharing and privacy.

The following observations summarize state legal issues related to implementation of an MBUF system:

- A statewide MBUF system would not be likely to face insurmountable state constitutional or other legal issues.
- Specific authorizing legislation will need to be carefully drafted to address issues related to use of MBUF revenues, rate setting, characterization of MBUFs, enforcement provisions and adjudication processes and mechanisms – and would be desirable even for a pilot program.
- There are available powers and precedents associated with a multistate system, although a formal interstate compact related to MBUFs could facilitate implementation.
- Existing state privacy laws related to the sharing of data for enforcement purposes and the protection of personal information from use for non-governmental purposes appear to be adequate, especially in combination with federal privacy laws applicable to the use of motor vehicle information. In a few cases, additional strengthening or clarification was recommended.

The following observations summarize federal legal issues related to implementation of a new MBUF system:

- It is unlikely that constitutional restraints exist for states seeking to implement a system of MBUFs. Reasonable MBUFs are sufficiently similar to taxes and tolls collected under current law and have been tested repeatedly before the United States Supreme Court.
- The collection of MBUFs is significantly more complex than current taxes on motor fuel, and involves transactions with millions of taxpayers each year, rather than with the several thousand fuel wholesalers who currently pay fuel taxes.
- It may be efficient to collect state and federal MBUFs simultaneously via a single system. FHWA already relies on states to assist with efforts to implement and enforce various highway programs, and – with state assent – could use grant conditions and other incentive programs to encourage state cooperation in collection and enforcement.
- Current law protects personal information from release for non-governmental purposes. Federal laws are already supplemented by state laws in this regard.

1.4 Conclusion

The Coalition's Phase 1 work succeeded in raising the level of understanding of the challenges that the adoption of a multistate mileage-based user fee system would pose to state and federal government agencies involved in the collection and distribution of funds. But the Phase 1 report findings also raised key issues requiring further review and analysis, resulting in the research that is the primary subject of this report.

2.0 Study Background and Approach

2.1 Introduction

This chapter outlines the three-state case study approach, building from Phase 1 findings as outlined in Chapter 1. It provides background on the I-95 Corridor Coalition's efforts surrounding mileage-based user fee (MBUF) research, describes the role of the Project Working Group (PWG) and Member Advisory Committee (MAC), and outlines the project approach deployed with state agency representatives, toll authority officials, and private sector parties who have expertise and involvement in related technologies or administrative systems.

2.2 The Phase 2 Project: A Three-State Case Study

In December 2010, the I-95 Corridor Coalition Executive Board approved a second phase MBUF study to expand on the work begun in Phase 1. This second phase consisted of a case study that considered actual operating environments and current conditions in three contiguous states – Delaware, Maryland and Pennsylvania. A central component of the Phase 2 study was an analysis to compare the alignment of required future MBUF administrative functions to the existing administrative functions and configurations within state departments of motor vehicles (DMVs), toll authorities and state revenue agencies. Key elements of the Phase 2 report include a long-range vision concept of operations (ConOps), discussion of issues associated with the transition from current functions to this long-range vision and a cost analysis for an MBUF system. The development of these core report components is based on extensive interviews with representatives from the three case-study states, interviews with other stakeholders, interviews with private sector representatives and guidance and direction provided by the PWG, the MAC and the Coalition's leadership.

2.2.1 Phase 2 Project Objectives

Recognizing that limited research work had been performed on issues associated with the administrative aspects of an MBUF system, the objectives of the Phase 2 Project were to:

- Further refine the administrative requirements identified in the Phase 1 Project;
- Identify current state and agency functions and systems that could be or would need to be changed to accommodate an MBUF system and its required multistate information exchange;
- Assess current interagency arrangements, especially the E-ZPass Group and arrangements between state transportation departments (DOTs) and their sister revenue agencies;
- Develop a concept of operations for a multistate MBUF system that would meet the needs of the states and relevant agencies;
- Further assess the potential use of the National Motor Vehicle Title Information System (NMVTIS) as the potential interconnectivity system for exchanging vehicle ownership information among the states as a consideration to share and transfer both MBUF and registration information;
- Further refine costs based on actual cost information for similar functions from the selected states and with general input from industry;
- Keep Coalition members informed on MBUF-related research and its potential impacts and implications; and
- Consider any federal role applications and integration in a multistate environment.

2.2.2 Phase 2 Project Key Assumptions

Several key assumptions guided the research surrounding this project and the development of the ConOps, transition issues and cost review. Those assumptions included:

- The MBUF system must be multistate in nature as established and, at a minimum, it must provide for cross-state reporting and payment for miles driven within each participating state;
- The MBUF system must provide not only for the collection of fees associated with miles accrued by state, but also by local jurisdiction, priced-facility and time of day to accommodate the potential for collecting mileage-based user fees, tolls and congestion-based charges or achieving other policy objectives within a single integrated system. The direction that set forth this assumption was provided by the MAC in the Phase 1 project and a recognition that advanced functionality would be necessary to achieve system-wide collections based on specific location;
- Administrative functionality and requirements used in the study include: user enrollment, recording and reporting mileage, billing and collection, security, and reconciling amounts owed to each participating state and authority;
- The recognition that the transition period during which various states decide to adopt any MBUF in lieu of a fuel tax may be lengthy and it may be some time before all vehicles will be equipped with technologies needed to implement even a basic MBUF; and
- The project is a research initiative and is designed to better inform the discussion and highlight the administrative and institutional issues surrounding an MBUF system implementation for the members of the I-95 Corridor Coalition and the transportation community. It should not be interpreted as intention in those states to implement an MBUF now or in the future.

2.2.3 Project Scope

The specific tasks of the Phase 2 scope of work included:

- Formation of a Project Working Group (PWG) consisting of representatives from relevant departments and agencies from the three case study states to guide the project and assist the project team;
- Interviews with agency personnel and review of current operating environments and state requirements;
- Stakeholder outreach with toll agency representatives, association representatives and private sector representatives;
- Review of the characteristics and limitations of the National Motor Vehicle Title Information System (NMVTIS) as part of the potential infrastructure for a multistate MBUF system;
- Development of a long-range vision concept of operations;
- Identification of transition issues and considered alternatives;
- Development of an administrative cost review based on contemporary and current information; and
- Completion of a final report.

2.2.4 Project Working Group (PWG) and State Participation

Representatives from the three case study states (Delaware, Maryland and Pennsylvania) were asked to serve on a PWG. The study team asked the states to consider representation from a wide variety of disciplines including department of transportation executive leadership, department of transportation finance and fiscal experts, department of motor vehicles leadership, operational and technical experts, department of transportation chief information officers, department of finance/comptroller and revenue agency representatives, representation from the state planning office and toll authority representatives. The PWG also received input and information from the Alliance for Toll Interoperability

(ATI) as this organization continues to advance initiatives to promote toll interoperability for the benefit of customers and member agencies, many of whom are situated along the I-95 Corridor. As well, ATI has begun initiatives that could potentially be integrated with an MBUF system.

The role of the PWG was to provide input based on their expertise to the study team, to assist in the study team in identifying interviewees and, most importantly, to review and provide feedback on materials as they were developed. In some cases, the work group members also served as interviewees based on their positions in the case study states. Working group members participated in monthly conference calls and face-to-face meetings with the project team.

The PWG was a valuable asset and played an instrumental role in the progression of this project. The membership and its discipline diversity – from public policy to practical front-lines operations - provided grounding and contemporary input into the issues and implications of an MBUF system. In particular, the PWG contributed substantially to the development of the long-range vision ConOps and the transition chapters of this report. The Coalition leadership, staff and project team appreciate the time, talents and valuable experience-based contributions provided by the PWG over the course of this project.

2.2.5 Member Advisory Committee Participation

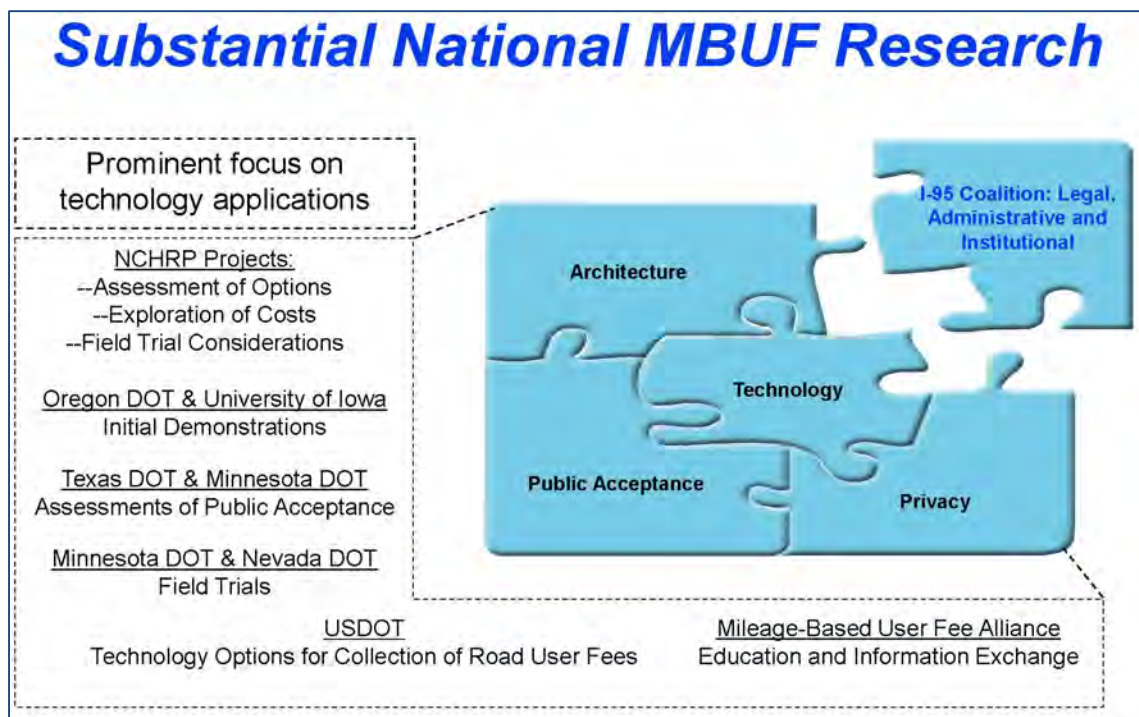
As part of the I-95 Corridor Coalition’s work on MBUF administrative requirements and its overall strategic considerations of the impact and potential for these systems on its members, the Coalition assembled a Member Advisory Committee (MAC) in the summer of 2009. The MAC consists of senior representatives from Coalition member state departments of transportation and toll authorities. The committee charge is to guide the Coalition’s work activities in the MBUF area. Advisors in specialty areas, such as administrative and legal issues, were also consulted during both the Phase 1 research study and this Phase 2 project. The MAC provided input into the interviews and interview process as well as the development of the ConOps and Transition chapters of the Final Report.

2.3 Relationship of this Project to Other MBUF Research

Figure 2.1 shows how research conducted in this project relates to other MBUF research that has been conducted to date. Substantial research has been conducted in the areas of public acceptance, privacy, MBUF technology and architecture, but very little research has been conducted on the administrative issues addressed in this project. While considerations and decisions related to these other areas will affect some administrative requirements of an MBUF system, the Coalition membership recognizes that the administrative complexities surrounding an MBUF system are foundational and must be considered independent of these other areas.

For purposes of a baseline, this study assumes that mileage-based user fee charges could accommodate the advanced functionality identified in the Phase 1 research project. The ConOps addresses only the administrative functionality required for multistate MBUF systems while recognizing that the technology would need to gather robust data, transmit periodically, and be interoperative. Research efforts relating to the considerations not addressed in this study are referenced on the I-95 Corridor Coalition’s website at www.i95coalition.org.

Figure 2.1: Relationship of this Project to Other MBUF Research



2.4 Study Approach

2.4.1 Project Kick-Off Meetings

In each of the three states, a project kick off meeting was held and used as an overview session to highlight findings from the Phase 1 study, outline planned activities for this project and provide a forum for general input and discussion regarding the administrative functions of an MBUF system. These sessions included department of transportation leadership and staff representing operational disciplines. Separate interview sessions were held with state transportation secretaries.

2.4.2 Interviews with States

With the PWG and the MAC as the guiding bodies for this research, interview instruments were developed and used for on-site interviews, observations and assessments in each of the three case study states. The interview instruments for the three states were segmented by administrative functionality and also by agency discipline. For example, operational questions related to enrollment and collection activities were primarily focused on entities such as departments of motor vehicles that play a significant role today in these areas. Questions relating to finance and cash flow from a collections perspective were targeted to departments of transportation fiscal or finance areas and questions relating to current fuel tax collections were targeted to comptrollers and departments of revenue. Questions were also geared at a high-level assessment of the current gaps that exist in agencies today between current operations and the administrative requirements for an MBUF system. In many instances, state officials completed the interviews' questionnaires in advance allowing the actual face-to-face interviews to focus on broader themes surrounding the administration of an MBUF system.

2.4.3 Interviews with Toll Authorities

Interviews were conducted with toll authorities in the three case study states. These interviews were tailored to toll operations in the state with a unique set of questions surrounding the administrative functions of an MBUF system. Questions focused on the potential use of existing toll infrastructure and any possible alignment to MBUF enrollment and collection, back office operations, the role of the private sector and evasion and collection. The interviews also covered planned changes to current toll operations and systems, including, but not limited to, all-electronic tolling systems.

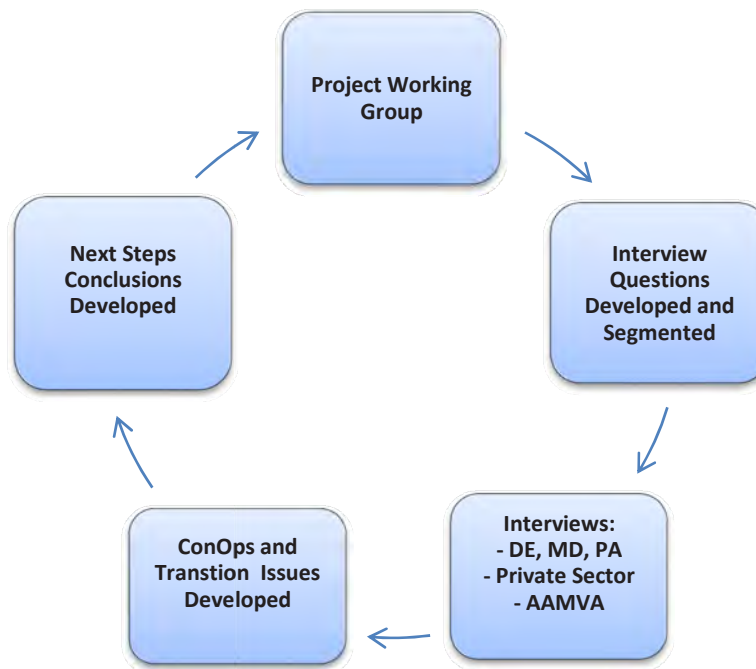
2.4.4 Interviews with the Private Sector and the American Association of Motor Vehicle Administrators

Private sector representatives were interviewed based on their current role and contractual responsibilities for toll collection and also based on their continued interest in an MBUF system. The interviews with the private sector representatives were focused on gauging their reaction to the concept of operations and the role the private sector might play in an MBUF system, systems interoperability and clearinghouse functionality. The American Association of Motor Vehicle Administrators' interview also focused on the ConOps and the roles the Association might play in an MBUF system, including potentially leveraging current systems such as NMVTIS.

2.4.5 Development of Key Project Components

The interviews, along with input from the PWG and the MAC, served as foundational materials for the development of key project components including the long-range concept of operations, cost estimate, transition issues and next step considerations.

Figure 2.2: Key Project Components



2.5 Conclusion

This study provides additional information to assist I-95 Corridor Coalition members and the larger transportation community in broadening their understanding of the impacts, issues, possibilities and opportunities of implementing an MBUF system in the future. The multistate cooperative nature of the Coalition, the diversity of its transportation infrastructure and its broad membership provide the path to a proof of concept and potential test bed environment for any future MBUF pilots. The project approach, with its focus on extensive interviews with transportation professionals in states and others having broad and specific interests, revealed both diverging viewpoints and common interests as highlighted in Chapter 3 of this report.

3.0 State and Private Sector Perspectives on MBUF Administrative Functions

During Phase 2 of the I-95 Corridor Coalition’s multistate mileage-based user fee (MBUF) analysis, the consultant team interviewed agency leadership and management representatives from three states – Delaware, Maryland and Pennsylvania – and also interviewed knowledgeable personnel from private sector firms and management personnel from the American Association of Motor Vehicle Administrators (AAMVA).

Interviews were conducted with a wide range of department of transportation representatives, department of motor vehicle representatives, toll officials, department of revenue officials and the private sector. Interviews included:

State Officials

Delaware

- Delaware Department of Transportation:
 - Office of the Secretary
 - Finance and Policy Office
 - Transportation Management Program Office
 - Office of Planning
 - Technology and Support Services
 - Department of Motor Vehicles (including toll operations and fuel tax administration)
- Office of Attorney General (Delaware Department of Transportation Counsel)

Maryland

- Maryland Department of Transportation
 - Office of the Secretary
 - Office of the Assistant Secretary for Policy
 - State Highway Administration
 - Maryland Transportation Authority (MDTA)
 - Motor Vehicle Administration (MVA)
 - Office of Planning and Capital Programming
 - Chief Financial Officer and Office of Transportation Technology Services
 - Chief Financial Officer and Office of Finance
- Office of the Comptroller of Maryland

Pennsylvania

- Pennsylvania Department of Transportation
 - Office of the Secretary
 - Policy Office
 - Chief Information Office
 - Office of the Deputy Secretary for Administration
 - Office of Fiscal Management
 - Office of the Deputy Secretary for Safety Administration (DMV)
- Pennsylvania Department of Revenue
- Pennsylvania Turnpike Commission

Private Sector Representatives

- Affiliated Computer Services, Inc., A Xerox Company
- Federal Signal Technologies Group
- IBM Global Business
- Egis Projects Canada Inc.
- TollPlus Inc
- Cofiroute USA

American Association of Motor Vehicle Administrators (AAMVA)

Interview questions were provided to the state agencies prior to the on-site interviews. This approach allowed the state agencies to provide detailed responses and data on the questionnaire prior to the interviews, while allowing interviews to focus on broader themes and ideas surrounding the administration of an MBUF system. The key findings discussed below do not reflect every idea, opinion, and perspective of each individual or agency, but rather provide a summary of interview findings.

The concept of operations (ConOps) and the potential transition strategy were not yet developed at the time of the interviews with state representatives. Their input was received in a face-to-face meeting and through calls with the Project Working Group. An outline of the concept of operations had been developed when interviews with AAMVA and private sector representatives were conducted, and was discussed with those representatives.

The interviews are initially summarized in terms of high level interview findings and then in terms of more specific findings regarding the specific functions needed to administer mileage- based user fees, as well as findings about other issues and concerns.

3.1 High Level General Interview Findings

High level findings from the state agency and toll agency interviews include:

3.1.1 Future Viability of an MBUF System

- Leaders noted that a sustainable solution to transportation financing is needed. State leaders recognize that a user fee system is the proper future direction, but that the current fuel tax system is no longer working as well as it did in the past. They noted that revenues have been impacted by more fuel-efficient vehicles and by reduced travel. Those issues, coupled with aging infrastructure and inflation, have resulted in a significant erosion of state resources.
- An MBUF system is viewed as viable in the future and is considered to be, along with tolling or other options, among the next generation of funding mechanisms for transportation. The possibility of an MBUF system is viewed as a long-term vision and is not expected to be realized fully at least until (as one leader noted) perhaps the year 2030.
- They also noted that while a flat MBUF does have merit, the greatest benefits of an MBUF system would be derived from a system that allowed for variable pricing and which could potentially generate other types of benefits.

3.1.2 Mileage-Based User Fee System Design

- Leadership in all three states noted that the design of an MBUF system must be simple and not overly complex. It was noted that complexity could result in additional public and legislative concern and hinder acceptance and understanding. It was recognized that an MBUF system has to be customer-friendly and as nearly invisible to the highway user as the gas tax is today.
- Most interviewed emphasized that incorporating full MBUF system functionality into existing administrative systems would not be feasible. State leaders emphasized that an MBUF system cannot be modeled around archaic billing systems. While DMVs in the three states have enhanced their vehicle registration systems, state officials believed the costs would be prohibitive to modify the existing registration systems to handle all functions required for an MBUF system.
- Most interviewees suggested that the design of an MBUF system start with a “clean slate.” They recommended that the concept of operations for an MBUF system begin with a definition of the program from the ground up and not be constrained by what the states have in place today to administer fuel tax collection, vehicle registration, and toll collection.
- While leaders did not favor adapting existing processes to handle administration of an MBUF system, they did believe that an MBUF system should be integrated with existing processes if possible and not be a stand-alone system. This is particularly true for vehicle titling as it relates to ownership changes. States are at various stages in integrating electronic vehicle transactions into their motor vehicle activities. At least two of the states have electronic titling and registration and electronic lien applications, but none have yet incorporated electronic transactions into all aspects of motor vehicle administration.
- The American Association of Motor Vehicle Administrators (AAMVA) and the states, including those involved in this study, are studying the implementation of electronic titling through a proof of concept. While the proof of concept only addresses the titling of new vehicles, this is a major step forward in developing one of the key features of any future MBUF system that would rely on electronic transactions.
- The states see value in the AAMVA and NMVTIS systems and think that they may be useful to an MBUF system. Some representatives anticipate that information about vehicle sales could be shared through NMVTIS.

3.1.3 Major Issues and Concerns with an MBUF System

- State leaders noted that there are many issues and important considerations surrounding the implementation and ongoing operations of an MBUF system. Some of these issues include: the predictability of revenues, the equity of charges, cost of collection and administration of the system, revenue collection in a multistate environment, retrofitting of vehicles, public and legislative education and acceptance, privacy concerns, implementation costs and the pricing or rate setting mechanisms.
- State representatives emphasized that the collection of revenues from other states would be similar to IRP and IFTA collections today and that enhanced audit measures and standardized collection, apportionment and distribution processes would have to be put in place. One state

noted that trust in multistate collections would be expected, but a “trust but verify” approach would be needed.

- State leaders recognize that privacy must be protected and that any MBUF system would need to be designed with privacy and data protection as key elements. Even though privacy and issues surrounding the use of GPS or other technologies in an MBUF are contemporary concerns, state leaders recognize that these types of issues may not necessarily be as prevalent in the future. These concerns do, according to state leaders, require stakeholder involvement in system design, as well as public information and education. One state leader noted that “the younger generation” may be more comfortable with GPS technology.

3.1.4 State and Agency Roles

- Agency leadership views the state agencies’ role in an MBUF system as the program and data owner, but not necessarily as the system operator or maintainer. They see the states working with the federal government to develop a system that works for the states. They recognize that state DOTs and associated toll agencies must set rates, and they recognize a potential to use toll agencies as enrollment, payment and collection entities for an MBUF system. In all three states, it was noted that the DOT/DMV would be responsible for maintaining and sharing vehicle information and noted that most likely the DMV would be responsible for some types of enforcement, such as registration denial or registration suspension for unpaid MBUF’s. One state noted that taxing agencies should also be responsible for enforcement.
- State representatives identified numerous MBUF system administrative functions that could be accomplished by state agencies, but also noted that existing information technology (IT) systems would need to be replaced because current systems could not handle all of the requirements. State representatives also identified possible roles that state DOTs and DMVs might serve, noting that agencies may provide the following:
 - Administrative enforcement for failure to pay fees, such as vehicle registration suspension or registration denial;
 - Facilitation of public or commercial participation;
 - MBUF system infrastructure;
 - Information to the public through outreach campaigns,
 - Collection of revenues; and
 - Management of the transportation network.

3.1.5 Federal Government Role

- State leaders said that ideally the federal government should take a leadership role in the advancement of an MBUF system, with any federally-developed framework leaving ample flexibility for states to determine how best to build on that framework. State officials believe that it is unlikely that the federal government will take any leadership role in the near term in transitioning to an MBUF. However, they noted that interoperability and equipment standards are key roles the federal government should be considering in order to avoid inconsistent state-based systems. The lack of interoperability of transponders used in tolling today was cited as an example of the need for interoperability standards across all states.
- Absent a clear federal role in implementation, state officials believe that it is critical for the federal government to continue to fund MBUF research and pilot projects, that more federal

study is important, and that the next decade is a good time to conduct additional pilots. State leaders noted that the I-95 Corridor provides a potential multistate trial opportunity.

3.1.6 Toll Authority Roles

- Toll authorities could play a key role in MBUF system implementation. State DOT leadership and toll authority leadership interviewed recognize that some of the administrative functions required for an MBUF system are similar to the functions performed by toll agencies. States noted that toll agencies have significant subject matter expertise that could be incorporated into an MBUF system implementation. They noted that there are many lessons to be learned from the E-ZPass history.
- Toll authority leadership also discussed the successful coordination between states and the private sector as a possible model for an MBUF system. Each toll agency uses private vendors to handle various back office functions including:
 - Managing a customer service center to open/maintain/close all accounts;
 - Operating a call center to handle incoming calls;
 - Maintaining an E-ZPass website;
 - Managing interagency processes and settlements;
 - Managing a violations processing center to issue notices, process appeals, and process payments;
 - Completing financial reconciliations and reports to the toll agency; and
 - Maintaining all hardware and software required to support the operations.Vendors are paid through a combination of monthly fees, fees per transaction, and fees per account, depending on the type of activity.
- Toll authority officials were asked what type of entity might logically administer an MBUF system. The reactions were mixed. Representatives from two toll agencies suggested that private sector firms might be good candidates to administer an MBUF system since they have experience in back office operations with E-ZPass. Another suggested that state motor vehicle administrations might be a logical choice since they currently maintain vehicle ownership records. Considerable resources would be needed, however, to handle the additional functions associated with administering an MBUF system.

3.1.7 Private Sector Roles

- State leaders recognize that the private sector could play a role in the administrative functions of an MBUF system including system requirements development, system design and construction, enrollment, collection and, to some degree, enforcement. States also pointed out that the private sector could play a role in clearinghouse functions.
- Leaders also noted that there might be a role for the private sector in equipment installation and verification.
- One state pointed to a current private/public sector model in use for auto emissions testing whereby the state administers a contract for services and provides program direction and sanctioning, but a contractor handles equipment certification, data collection, call center functions and many program administrative functions.

- Those interviewed noted that security would need to be addressed and private vendors would need to meet all statewide standards as defined by state information technology (IT) departments and offices. For example, requirements for the private sector would include background checks, use of nondisclosure forms, agreements to securely maintain data, audit procedures, encryption, and other security features.
- State officials also noted that there might be a possible role for insurance companies, as some have already implemented or are considering pay-as-you-drive insurance applications which provide for mileage-based fees.

3.1.8 Continued Role of the I-95 Corridor Coalition

- State leaders see a role for the I-95 Corridor Coalition in continuing to inform the discussion surrounding MBUFs. States leaders noted that they need information to consider an MBUF system and view the I-95 Corridor Coalition as a critical leader in working with states on a regional approach, including future studies and any pilot implementations.
- One state noted that the Coalition’s involvement in rail freight initiatives serves as a good model for regional cooperation and that the Coalition helps bring all stakeholders to the table.

3.1.9 Transition to an MBUF System

- State leaders noted that an MBUF system would ideally be phased in with each state making its own determination on a phase-in approach. One state noted that a phase-in could be tied to vehicle registration renewal and another state noted that a transition with a date certain would be preferable.
- Some states noted that IRP vehicles would be a possible first phase and some also noted that initially charging electric vehicles and other alternative fuel vehicles would be a possible phase-in approach.
- State leadership also suggested that incentives could be used to encourage vehicle owners to opt-in to an MBUF system. No clear phase-in direction was asserted by the state leaders.
- State and toll authority interviewees suggested that transition to an MBUF system should use lessons learned and directions being considered by the Alliance for Toll Interoperability (ATI). It was noted that similar issues regarding data transfer and data sharing, as well as enforcement, are items that ATI has considered.
- Interview findings suggest that states would find model legislation useful, and that states would see a role for the legislature in a transition to an MBUF system that would likely require legislative “buy-in.” As with gas taxes, MBUF rates would also be set by a state legislature, which may develop enforcement laws to accompany the MBUF.

3.1.10 Private Sector Interview Findings

In addition to soliciting reactions from private sector interviewees on the overall concept of operations, private sector representatives were asked specifically about the roles that private sector firms might play in operating an MBUF system.

- Handling some or all the back office operations for the MBUF processing center was mentioned as one role that private sector firms might play. They already perform such functions for toll agencies and for some DMVs as well. While statewide MBUF operations would be much larger than toll operations, many of the functions are similar and scalable. One representative suggested that each state having its own back office operations might not be necessary and it might be more efficient to have fewer back office operations.
- Providing support for an MBUF clearinghouse established as part of a multistate MBUF system is another function that private sector firms could play. They already have experience in operating similar clearinghouses for E-ZPass.
- Beyond simply operating processing centers or clearinghouses under contract to state agencies, a larger role for the private sector might involve operating the entire MBUF system as a concession. States and toll agencies could set the broad terms and conditions of the concession, but private firms would have considerable discretion in how they actually operated the MBUF system. This, of course, would entail the greatest risk for the private sector, and they would require appropriate compensation for assuming that risk. An issue under such a concession model would be the rate of return to the private sector and potential adverse public reaction to what might be perceived as too great a return. Clearly the public agencies would have to show that they were receiving value for their investment and that operating the MBUF system as a concession was cheaper than operating the system using more traditional methods.
- Several representatives from the private sector suggested that federal leadership in terms of setting standards and perhaps setting a date by which all states would have to transition to an MBUF system would be helpful. Caution was expressed about the federal government being too prescriptive on the technologies to be used in an MBUF system, but a role for the federal government was recognized in helping states to overcome some of the institutional barriers to implementing an MBUF system.

3.1.11 AAMVA Interview Findings

- Representatives from AAMVA pointed out that the current NMVTIS system might be scalable and useable for an MBUF system in the future depending on MBUF business and system requirements. These opportunities could be more apparent as system requirements and business use cases are developed and the “how” of implementation of an MBUF system is determined. It was also noted that the NMVTIS, as currently designed, is a foundational infrastructure to address current titling components.
- AAMVA recognizes that its organization can provide a means for managing more information regarding vehicles, including the needed data elements to support an MBUF system.
- AAMVA could potentially play a role in the implementation and administration of an MBUF system; however, currently there are technological, policy, governance, privacy, and funding gaps that need to be addressed to maximize the utilization of NMVTIS and the system operator in an MBUF system.
- AAMVA also noted that a current impediment to electronic titling is the federal odometer disclosure requirements. The National Highway Traffic Safety Administration (NHTSA) and their current regulations require a signed (hard copy) odometer disclosure statement from all states for all titling transfer transactions when a vehicle’s ownership changes.

3.2 Interview Findings Related to Specific MBUF Functions

Specific functions and institutional arrangements necessary to administer an MBUF system were identified in Phase 1 based on objectives of the MBUF system and characteristics of the most promising technologies. In Phase 2 these functions and potential institutional arrangements were discussed with officials from the state DOTs and DMVs, toll agencies, and private sector firms that have been involved in discussions of MBUF systems.

The interviewees were asked their views on a series of issues regarding current administrative arrangements in DOTs, DMVs, toll authorities and revenue agencies, and the gaps that would have to be filled to administer an MBUF system. They also were asked where they thought various administrative functions should be housed – in existing state agencies, in new agencies created to administer an MBUF system, or in some other entity. Several different approaches were suggested, and interviewees recognized that approaches could vary from state to state.

Many of these administrative and institutional requirements for an MBUF system are already in place for state administration of motor vehicle registrations, motor fuel taxes, and with toll authorities. The Phase 1 report identifies the key parameters and opportunities for transferability of processes and process adaptation. States in the Phase 2 interviews were asked to assist the team in identifying roles and responsibilities for administering a multistate MBUF system.

Administrative functions which were discussed specifically include:

- Enrolling user participants;
- Accumulating mileages and charges due by state and by agency;
- Calculating and billing charges to users;
- Maintaining user interface and customer communication;
- Auditing, security, and enforcement;
- Calculating and reconciling state and agency mileages;
- Distributing revenues among the states and other agencies; and
- Data preservation.

3.2.1 Enrolling User Participants

Description of the Administrative Requirement - Enrolling vehicles and their owners in the MBUF system will be essential to virtually all other administrative processes. Vehicle registration programs in most states include many of the enrollment functions that would be required to implement an MBUF. The Phase 1 report advises that enrollment should be integrated with state registration processes. Before vehicles could be enrolled in the system, equipment to record miles traveled and to communicate that data to administrative agencies would have to be installed. That equipment would have to be linked to the vehicle so that data transmitted electronically could be attributed to the appropriate vehicle. Equipment installers may play a role in enrolling vehicles by informing administrative agencies that certified equipment has been installed and providing identifying information to allow mileage data to be attributed to the correct vehicle. Changes in vehicle ownership will present challenges since it will be essential to know precisely when the change in ownership occurs in order to assign miles traveled to the correct party. The Phase 2 interviews gleaned information from three states regarding their current registration enrollment processes or other similar adaptations. It also considered current toll collection enrollment processes such as E-ZPass.

State Interview Findings - The state interviews showed that the vehicle registration process is inconsistent from state to state. Across the states interviewed, current registration and renewal options include mail, internet, contracted agents and counter services. Some states are using electronic registration whereas others have found highly automated but non-electronic registration to meet agency needs. Some states' renewal periods are one year; other states typically offer renewals every two years. Two states identified that a large number of new registrations (up to 50 percent) are processed by third parties, while one state does not allow third parties to process renewals.

The state representatives agreed that for an MBUF system to function effectively, registration must be electronic to provide real time information and to accommodate third parties who provide varying registration services for a state, including dealers, agents, and auctions. The state representatives also noted that staffing deficiencies have increasingly led to new, more efficient ways of doing business, including use of email and online options for registration and license renewal. This trend toward use of electronic options would facilitate MBUF system implementation.

Regarding the registration process, the interviewees offered several specific observations and ideas, and identified challenges in integrating registration into an MBUF system, including the following:

- Real time titling and account information is desirable for current systems, but becomes even more important for an MBUF system.
- Temporary registration (which can be valid for 30-90 days in the interviewed states) will be a larger problem for an MBUF system because there may not be an electronic record of ownership during that time. There is also no way for a DMV to know how long vehicles are on dealers' lots.
- Electronic-only registration would provide the advantage of no lapse of ownership information in processing.
- Some state representatives believe it is necessary to fully integrate MBUF systems with registration systems, and although it does not have to be one system, a means is needed to coordinate data in the registration system and the MBUF system.
- Under an MBUF system, timely updating of address changes as well as ownership changes would be essential.
- There may be a role for AAMVA in helping to advance electronic titling and registration standards that would support MBUF implementation across the states.

Summary of Gaps and Needs - All interviewees were in agreement that a mileage-based user fee will increase the needs for timeliness and accuracy of user enrollment. Current state titling and registration processes may require substantial time before a new user is associated with a vehicle, and may not be electronic at all (or at any) stages of the process. The three states in which interviews were conducted are all enhancing their titling and registration processes, and all recognize that their legacy systems are out of date whether for future titling and registration or for mileage-based user fees. The interviewees in all three states were consistent in identifying the need for parallelism between the administration of user enrollment and vehicle ownership changes for registration and the administration of user enrollment and vehicle ownership changes for mileage-based user fees. There was not agreement among all interviewees about whether these needs were to be addressed by the same agency or were to be coordinated with other agencies/organizations.

Both the Phase 1 research and the state interviews identified the need for flexibility of payment methods. A fairly large percentage of households, up to 15 percent or 20 percent in various estimates, do not have bank accounts or credit cards, and therefore MBUF payment methods and rules cannot be restricted severely. For current registrations or other payments to motor vehicle agencies, the payments can now be made by cash and it will be necessary to have such flexibility with mileage-based user fees.

3.2.2 Accumulating Mileage Due by State and Agency

Description of the Administrative Requirement - Accurate mileage information by jurisdiction or by agency will be needed for each vehicle. Data collection and assurance of data quality will be a challenging aspect of administering MBUFs. The Phase 1 report recognizes models such as the International Registration Plan (IRP), the International Fuel Tax Agreement (IFTA), and the E-ZPass Group that could be expanded and adapted to an MBUF system. However, none of those models involves the number of users or the range of functions that might be covered under an MBUF system. In order to eliminate one potential source of evasion, it is assumed that data on miles traveled by jurisdiction and toll facility will be electronically transmitted from the vehicle to administrative agencies using on-board communications equipment. The ConOps assumes that converting miles to fees would be done outside the vehicle. Since the assumption has been that calculation of fees would be separate from accumulation of mileage, maintaining up-to-date rate information is not part of this function.

State Interview Findings - States were questioned about their current practices of collecting information on miles traveled by individual vehicles, and were asked to consider what methods could be employed to collect miles traveled for an MBUF system. Interview findings show that all three states track mileage, but in a very limited fashion. For the states interviewed in Phase 2, mileage is currently tracked in the following ways:

- Mileage is reported customarily at registration, the time of a sale, during emissions inspections, or during safety program inspections;
- Mileage is entered though not necessarily permanently stored in vehicle records, but is not updated when a vehicle is sold; and
- For commercial fleets, DMVs or revenue offices are in charge of the collection of commercial vehicle motor fuel fees and registration fees and also collect information on mileage.

None of the toll agencies in the three study states currently collect or maintain information on miles traveled by individual customers.

The state agency representatives interviewed during Phase 2 discussed several different concepts of how their agencies might collect mileage information in the future for an MBUF system. Ideas offered by the state agency representatives include the following:

- Mileage data by jurisdiction, facility, and time of day could be collected and reported electronically using GPS technology installed in the vehicles;
- Electronic mileage reporting could tie into an existing vehicle registration system but new data tables and fields would need to be added to store this information;
- Online systems for customer account viewing and processing, as well as a call center to address questions about accrued mileage would be required;
- Mileage data would need to be reported at least on a monthly basis, and data would have to be downloaded to calculate the amount owed by a user;
- The most efficient way to receive mileage and travel data for uploading would be received via a file transfer protocol (FTP) process;

- It may be necessary to include cross-referential capabilities to ensure that equipment functions in all jurisdictions within a state, or possibly beyond state borders; and
- Consideration should be given to a system that will allow for congestion pricing and variable rates.

Summary of Gaps and Needs - This administrative function necessary for mileage-based user fees is not currently performed for the vast majority of highway users other than those heavy commercial vehicles subject to IRP or IFTA. Most users keep no record of their mileages. For agencies themselves, the Phase 1 research and the interviews with the three states indicate that mileage information is not recorded and monitored systematically.

Some mileage information may be documented for titling or for vehicle safety or emissions inspections, but accrued mileages are not systematically tracked by agencies. The three states identified emissions inspections more as an example of the potential for contracting out required services rather than as a place where mileage information could be accrued. This is based on the requirement that emissions inspections may only occur in select areas of the states, most notably non-attainment areas and in some instances only in multi-year intervals.

The recording and reporting of mileage represents perhaps the most substantial administrative change and the most substantial additional cost that will be associated with a mileage-based user fee system. The Phase 1 research for I-95 Corridor Coalition and the interviews with the three states indicated that reading existing odometers or self-reporting were not considered to be viable approaches to recording and reporting mileage. All have concluded that new equipment and new procedures are needed. All also agreed on the need for interoperability on a multistate and multi-agency basis.

The recording and reporting of mileage is also the element that raises the greatest privacy concerns. The need under a mileage-based user fee system will be to respect privacy concerns while also enabling users to review and challenge or affirm the legitimacy of all charges, which may include charges for the use of particular facilities at particular times. Whether this information is only accessible from equipment on the vehicle and only at the request of the user is an important issue. Toll agencies will have a parallel need to review and affirm or challenge whether all charges, which are owed to the toll agency, have been accurately recorded and reported.

3.2.3 Calculating and Billing Charges to Users

Description of the Administrative Requirement - The mode and frequency of collecting MBUFs will impact the cost and complexity of the system. If collection as part of registration or the re-registration of a vehicle were acceptable, then billing would be simplified. More frequent or more complex billing will require greater effort, and may involve the private sector. States and toll agencies do not all have the same cash flow or revenue distribution requirements and, thus, billing requirements may differ. Cooperation will be required to ensure charges are collected in a timely fashion that meets the needs of all participating states and toll agencies. It is assumed that states and toll agencies would rely to the greatest extent possible on electronic payment systems, but they will also have to deal with the estimated 15 to 20 percent of households that may not have bank accounts or credit cards. The Phase 1 report recognizes that toll authorities have extensive experience in this administrative function. The Phase 2 interviews examined current fee calculations and billing arrangements, the processes and systems used to bill users for registration and toll system usage.

State Interview Findings - The interview findings reveal that the state representatives share several ideas about when and how billing, payment and collections should occur. They indicated that more

frequent billing for smaller amounts is better than less frequent bills for larger sums. Most suggested at least monthly billing if billing technology supporting the system made that possible. States' leadership agreed that shorter time frames are best from a collectability standpoint, as the less frequent, larger bills increase the likelihood of evasion. Toll agencies were also concerned about cash flow under an MBUF system and indicated that monthly collection would be preferable to quarterly collection.

Private sector representatives were asked whether they believed prepayment of fees similar to what is done under E-ZPass would be preferred to post payment of fees. In their view, prepayment would be preferred both to reduce administrative costs and deter evasion. Strategies would be needed to allow those without bank accounts or credit cards to easily prepay their fees, but this generally was not believed to be a difficult issue. One noted that prepayment is not a guarantee that fees will be paid; those who are intent on not paying their bills simply will not replenish their accounts unless there is effective enforcement. Another noted that prepayment is a policy decision and an MBUF system could work as well with post payment as with prepayment.

Several toll agency representatives suggested that consideration be given to pay-at-the-pump systems as an alternative to billing users. State agencies had varying viewpoints on whether payment should be stand-alone or incorporated into other payments such as registration fees. Some state representatives questioned whether there should be different charges for periodic payments versus paying in a lump sum once a year.

The state representatives also agreed that revenue from any MBUF system must be predictable to state revenue agencies. There is a concern that there could be a long lapse between when vehicle miles are driven and when MBUF fees are collected. This could be problematic compared to the current gas tax that is collected before the gas is purchased by the end user. The state representatives largely agreed that a collection system which collects after miles are driven rather than in advance is likely to become a major administrative issue. The state agencies prefer that payment be required "before use" as with the gas tax.

E-ZPass Collections

Toll agencies in the three states provide multiple ways for customers to pay their bills and officials emphasized how important this would be for an MBUF system.

For those toll agencies that could provide a breakdown of E-ZPass payments by type, approximately 95% were paid through either credit cards or automatic bank account debiting, with the remainder being paid through either cash or check. One agency provides an incentive for electronic payment, but the others do not. Between 60 and 65 percent of total revenues are collected through E-ZPass in all three states.

All three agencies require prepayment for E-ZPass accounts, although one agency allows commercial motor vehicles the option of having a post-paid account. None of the agencies indicated that prepayment has caused any problems or that there has been adverse public reaction to prepayment. Administrative costs to collect tolls through E-ZPass are much lower than administrative costs to collect cash tolls.

For revenue collection and distribution, all interviewed states see, at a minimum, some role for private vendors in billing and collections. The state representatives see a need for both online, automated payments as well as cash payments to accommodate people that do not have banking and credit card access. The state representatives also agreed that customers will want to be able to verify billing data and see accounts online and that a customer service center would be required to handle revenue collection related inquiries.

State representatives were concerned with how to transition to MBUF if the gas tax is still being collected during a transition period. States also noted:

- The steps required to collect and distribute MBUFs would be much the same whether a public agency or a private sector provider were responsible;
- There is some tension between the competing objectives of making the MBUF as nearly invisible to the user as possible and still making the fees transparent;
- Some state representatives wonder if they should focus only on the fuel efficient vehicles and not a full MBUF system; and
- The administrative cost of collecting MBUFs from each individual user will be substantially greater than the cost of collecting fuel taxes from a relatively small number of wholesale distributors.

Summary of Gaps and Needs - The Phase 1 research and the interviews with the three states indicated that current user payment and billing and collection will be fundamentally different under a mileage-based user fee system than with the current mix of revenue sources. User payment, billing and collection now occur very indirectly for motor fuel taxes, with states billing and collecting from a very limited number of fuel suppliers, usually high up the distribution chain from the individual user. Motor fuel taxes and E-ZPass tolls are prepaid before use. Registration and titling actions involve the individual user, but are very periodic and also require prepayment. A mileage-based user fee would impose needs for billing and collecting from individual user accounts more frequently than registration or titling fees, perhaps with intervals resembling E-ZPass tolls. Current billing and collection systems for motor vehicle administrative agencies do not involve the complexity of billing or the frequencies of billing that may be required for mileage-based user fees. The current, more complex, billing applications of IRP and IFTA apply to heavy vehicles operating on an interstate basis, but the frequency of collection is annually and quarterly, respectively. In addition, the IRP and IFTA apply to businesses that are accustomed to and organized for billing and collection.

3.2.4 Maintaining User Interface and Customer Communication

Description of the Administrative Requirement - Public understanding and system transparency will be essential for acceptance and appropriate customer service. System administration must include provisions for rapid response to customers and clear communication regarding where, when and how charges will be incurred. The Phase 1 report recognizes that customer service facilities and programs similar to current DMV call centers and toll authority customer contact centers will be needed for any MBUF system. The Phase 2 interviews examined call center and other customer contact avenues used currently in the states and toll authorities and the costs and issues associated with customer interface and communication.

State Interview Findings - During the interviews, state representative were asked to consider what information should be provided to MBUF participants and what billing and payment services would be required. The interview findings identify that MBUF system participants will want to be able to verify the number of miles they traveled and how this data was collected. State representatives recommend

both an online tool which program participants could use to view their mileage history, billing, payment, and other account information and a customer service call center to respond to participants' inquiries.

State representatives identified possible customer issues, including the following:

- Potential for higher administrative costs;
- Increased user effort to pay fees (versus fuel taxes paid at the pump);
- Increased traffic at DMV offices if the DMV collects MBUF payments; and
- Increased collection burden for delinquent accounts or non-payment of fees

Summary of Gaps and Needs - All of the states and toll authorities place very heavy emphasis on customer interface and communications. While there would be additional requirements for dealing with the specific customer aspects of MBUF, these would not be different in any significant respect from current operations. States already have procedures for dealing with all vehicle owners, and toll authorities have procedures for dealing with millions of customer accounts.

3.2.5 Auditing, Security & Enforcement

Description of the Administrative Requirement - The credibility of the system, and ultimately its public acceptance and political feasibility, will depend on consistent and reliable system operations and verifiable user compliance among agencies. Monitoring will be required to determine that in-vehicle systems are functioning while a vehicle is in use and that mileage traveled in each jurisdiction or on each facility is reported correctly. Other research has given considerable thought to ways to provide redundancy in tracking mileage if equipment is tampered with or malfunctions. These capabilities have been demonstrated in recent MBUF pilot projects. While more work remains, it is assumed that advanced technology will be the primary method for assuring that all mileage is recorded and that security is maintained. Administrative and legal procedures will be necessary to enforce collection of charges due on vehicles with non-functioning or malfunctioning systems. Likewise, auditing will be necessary to assure that the reporting and payment of MBUFs are legitimate.

State Interview Findings - There is concern among the state representatives that revenue collection activity will experience fraud and lost revenues due to evasion. Each state will need to determine how much lost revenue is acceptable and if the benefits of enforcement and auditing are worth the incurred costs. These decisions, however, will affect other states since a portion of the uncollected fees in one state will be owed to other states. Private sector representatives noted that being able to audit and verify that states and toll agencies are receiving all fees they are due will be important. Some state representatives suggested that states should use a "trust but verify" approach, identifying audits, controls and peer reviews (as used for IRP) as essential. Legal representatives also think that tampering would have to be addressed. Odometer tampering is still believed to be a problem even with the steps that have already been taken to reduce that practice. The incentives to tamper with MBUF equipment would be at least as great.

For MBUF enforcement, it will be necessary to determine whether the evasion would be considered a civil or criminal violation under state laws. Without picture identification, a criminal violation cannot be issued; however, federal law considers non-payment of taxes a criminal violation. If MBUF evasion is not a criminal violation, law enforcement would not play a significant role in enforcement.

Interview findings suggest that there is a limit to administrative authority and that a state agency's role might not include law enforcement functions or activities related to the installation, replacement and repair of MBUF components installed in vehicles. To address non-payment of fees, the police would most likely be needed. Evasion violations would need to be integrated with law enforcement to address

tampering and to deal with issues the states experience with E-ZPass customers, such as ownership switching.

State representatives largely agree that new law enforcement responsibilities are not foreseen; they would continue current enforcement activities such as lifting plates, sticker enforcement for inspection and registration, suspension and fines. However, law enforcement would need an interface with the current system. The current system would have to be restructured to accommodate new fields and data. Some representatives also anticipate that state police will regulate the inspectors and stations that would perform the inspections of MBOF equipment. State police might also perform a visual inspection of a vehicle stopped for a primary violation to verify that the equipment is present in the vehicle. If the equipment was missing or obviously defective then a citation could be issued. Some representatives think that law enforcement is the best-suited entity to deal with tag pickups (as they do now) and equipment compliance (as some do now with emissions stations).

Another issue related to minimizing revenue leakage relates to the equipment used to record and report mileage. Several private sector representatives said states should expect that a certain portion of users will take advantage of any weakness in the security of equipment or other opportunities to avoid paying the MBOF. When asked whether they thought equipment should be dedicated to the vehicle or whether personal devices such as smart phones that are not dedicated to the vehicle could be used to record and report mileage, most private representatives endorsed having equipment dedicated to the vehicle. One representative noted that since technology is evolving so rapidly, the ConOps should not preclude equipment that could meet the various standards established for MBOF equipment. One respondent noted that European officials had experimented with allowing transponders to be used in more than one vehicle and ran into evasion problems.

To enforce payment of MBOFs, state representatives have discussed two primary approaches - use of policy tools such as withholding registration for those that do not pay, and active enforcement combined with use of advanced technologies. There is some level of agreement among the states that vehicle registration denial could be used as an enforcement tool. For example, a result of evasion could be to prevent a vehicle owner from renewing registration, in the way that a history of bad checks or non-payment of parking tickets prevents registration in some states today. Some state representatives also suggested it might be possible to arrange for unpaid MBOFs to be withheld from an MBOF evaders' tax returns.

Other enforcement alternatives include utilizing a qualified vendor to prevent evasion and use of technology such as license plate readers (LPRs) placed at the roadside. License plate reader data is now used for toll violations as well as for open road tolling. Similar programs that exist today are ignition interlock and red light running enforcement programs, where enforcement is primarily handled by contractors.

One option to address evasion would be to work with existing toll authorities and expand the existing back office infrastructure that currently exists for E-ZPass. Some state representatives see the need for model legislation to allow for enforcement and violations processing of MBOF, similar to what is currently being developed with the Alliance of Toll Interoperability. MBOF compacts would be required to deal with interstate and federal/state enforcement issues.

Enforcement is also a very significant issue for each of the toll agencies. Toll evaders have creative methods to avoid paying tolls including license plate cover-ups, ticket swapping and other means. This is more common with commercial motor carriers because they pay higher or more frequent tolls than passenger car drivers. Incentives would be even greater to evade an MBOF. Collecting from out-of-

state violators is generally more difficult than collecting from in-state violators. One toll agency representative noted that enforcement of MBUF payments would require strong laws concerning collection, as well as strong state reciprocity agreements.

If tolls were collected through an MBUF system and existing toll collection equipment was removed, toll agencies would be concerned about their ability to verify that they were receiving all the fees they were due since they would have no independent data on usage of their facilities.

Summary of Gaps and Needs - Although security of data is important under all these other systems, security for mileage-based user fees is more intrinsically associated with privacy concerns. Individual users may not want any data even to be accumulated and stored, much less be subject to the potential for distribution to others or for use in legal proceedings.

Enforcement challenges with the collection of mileage-based user fees were identified in both Phase 1 research and in interviews. No particular change from current practices is suggested, but rather the information being collected for enforcement will be mileage-based. Current registration files will have accounts flagged if there are payment issues. Denial of registration renewals or suspensions of current registrations may be the actions applied for those user accounts that have problems. Some also cited interlock requirements, such as those that are used for prevention of drunk driving, as a current sanctioning process. An interlock prevents the use of a vehicle if conditions for use are not met. In the case of drunk driving, this could be a sobriety check, whereas in the case of non-payment of fees, an interlock would potentially prevent a vehicle's operation unless accounts were free of problems. None of the interviewees recommended that interlocks should be used to prevent the use of vehicles under a mileage-based user fee as they are viewed as draconian measures that should be reserved for very serious driving offenses.

3.2.6 Calculating and Reconciling Fees and Distributing Revenues among States and Agencies

Description of the Administrative Requirements – MBUFs must be accurately assessed by vehicle and appropriately allocated to the state (or facility or sub-state jurisdiction) in which the travel occurred. As noted above, it is assumed that mileage by state and tolling agency will be calculated and reported by the on-board equipment. States will want to ensure, however, that total miles traveled as reported by individual vehicles is consistent with estimates of total travel from traffic monitoring systems. The E-ZPass Group provides an existing arrangement that allows reconciliation of toll collections among participating agencies and integrated billing for the account-holding users of the participating facilities. IRP and IFTA reconcile charges among heavy vehicle accounts. The Phase 1 report identifies some instructive lessons from these two organizations for an MBUF system. Current processes, systems and procedures were examined in the Phase 2 interviews to determine how states are currently reconciling multistate revenue collection.

System efficiency and equity depend on appropriate distribution of the MBUF revenues. It is assumed that fees due to all jurisdictions will be paid to the base state in which a vehicle is registered. Information on fees owed to other states would be sent to MBUF clearinghouses that would electronically reconcile funds owed to each state. The Phase 1 report identifies existing E-ZPass Group, IRP and IFTA procedures that handle revenue allocations smoothly and efficiently. However, the volume of data to be reconciled in an MBUF system substantially exceeds any current model.

State Interview Findings - The IRP and IFTA provide examples through which these functions are performed successfully today, although these apply only to heavy vehicles. Some representatives note

that IFTA and IRP are good models in that they are national standards with state administration- much like an MBUF system might operate. Others do not feel either IFTA or IRP is a good place to start.

Some state representatives believed that heavy trucks should be the starting place for an MBUF system, or an MBUF pilot program, if the diesel and excise taxes were eliminated and it could be shown to the truckers and the American Trucking Associations (ATA) that the net would be cost neutral. There was a suggestion that an MBUF system could operate as IRP operates now. However, some state leaders are concerned that the ATA may not be willing to support this option. There would need to be an incentive to make it easier for truckers in order to encourage them to accept this fee.

Despite the split opinion on IRP as a model for administering an MBUF system, most agency representatives expected that any such change to IRP would require extensive system programming and application changes, including changes to DOT/DMV policies, manuals and informational documents. Some of the DOT/DMV legacy systems do not capture individual vehicle mileage for non-commercial or commercial vehicles - mileage is captured based on the total distance traveled by the carrier's entire fleet. There is no disagreement that IRP could not be used as is to administer an MBUF system, but that does not mean that it is not a good model for some elements of an MBUF system. Some aspects clearly would have to be changed, but many basic concepts carry over to an MBUF system.

Lessons learned from IFTA program and the IRP program that could be applied to an MBUF system include the following:

- It would be difficult and cumbersome to utilize the current manual account assignment system and the current apportioned database;
- Governance and dispute resolution among states could follow the successful IRP model;
- Reciprocity for IRP and IFTA allows agencies to enter into information sharing. The legislation is broadly written, and could provide a base for a reciprocal agreement; and
- IRP and IFTA have many clearinghouse procedures.

Summary of Gaps and Needs - The E-ZPass Group has established procedures for reconciling amounts owed and distributing accrued toll revenues among toll agencies from the E-ZPass account holders. These reconciliation arrangements and enhancements now being advocated by the Alliance for Toll Interoperability (ATI) provide examples that can be applied to the needs associated with the administration of mileage-based user fees. Because E-ZPass use is voluntary, an individual account holder's data sharing and security concerns can be addressed by not participating, whereas a mileage-based user fee system is unlikely to be voluntary in its ultimate configuration.

The data sharing and amounts owed reconciliation arrangements of IRP and IFTA are also examples of the approaches needed for mileage-based user fees. The scale of data that could be shared, and the security concerns of individual account holders, may be substantially different under an MBUF system.

3.2.7 Data Preservation/Dissemination

Description of the Administrative Requirement - Data preservation will be necessary for some aspects of enforcement and is also desirable for making some MBUF data available for planning applications.

State Interview Findings - Regarding the storage of data, at least one state would prefer to house data within the state, noting that there would be some concern about keeping data outside of state borders. The states would need to be cautious about how data is used and shared for purposes of enforcement. State representatives also made other comments, including:

- Storage capacity would need to be determined, including how much data should be stored, how detailed and for how long the data would need to be kept;
- Backups would be required in case of server malfunctions or crashes;
- State representatives expect that data preservation and dissemination would need to be determined within each state, and set in legislation;
- Some representatives think that a vendor should be responsible for housing and maintaining most of the data, and that an interface to the vendor could communicate MBUF data; and
- State IT experts noted that Secure File Transport Protocol (SFTP) file transfers would be the best way for a third party to make data available to public agencies.

The NMVTIS database might provide a foundation for an MBUF system's summary data. It contains data on almost 90 percent of the vehicles in the U.S., including information on the state of title, the Vehicle Identification Number (VIN) which theoretically could be used to set up user accounts, and information on vehicles that are no longer registered because they have been junked, salvaged, or declared total losses by insurance companies. In addition, the system currently provides the infrastructure needed for jurisdictions to access the NMVTIS data utilizing AAMVA's network for real-time access, as well as the Internet to provide connectivity with state DMVs and third parties such as junk/salvage yards, auto recyclers, insurance carriers, and consumers. The NMVTIS database and connectivity could be used to facilitate an MBUF system by adding the capability to record data on the installation of MBUF technology in the vehicle record, and by timely recording of changes in vehicle ownership and state of registration.

Summary of Gaps and Needs – Data storage and dissemination systems on the scale needed for a mileage-based user fee system are largely non-existent. Current systems for data storage and dissemination among the states are recognized to be extremely limited. Both the Phase 1 research and the interviews in the three states identified and discussed the limited data activities underway now.

3.3 Other Issues Addressed in the Interviews

Besides the administrative functions themselves, other important issues were addressed in the interviews, including privacy, technology, equity, legal issues, and implementation/ phasing.

3.3.1 Privacy

The interview findings show that there will be privacy concerns associated with an MBUF system, but some interviewees expect that these will lessen over time. The state representatives recommended a system that would mitigate the privacy concerns some people will have – this would include limiting the specificity of geographic data and providing an extensive communications campaign to educate people about the new program.

State representatives noted that the younger generation is more comfortable and adept with technology – and will expect to use it. The level of detail of MBUF data would need to balance citizens' desire for privacy with the desire of users to view their own account data. Given that information is secured, state representatives think that over time access to account data will be more important than privacy.

To protect privacy, states would need to set restrictions on data, which may include:

- Information protected by the Driver Privacy Protection Act (DPPA);
- Specific travel and route location information would likely have to be protected/encrypted; and,

- Polygon fencing could limit data for an MBUF system to show only in which state the miles were traveled, but not show details within that border – data limitations such as this could eliminate many privacy concerns.

While NMVTIS seems to provide a workable framework that could be used to facilitate the administration and enforcement of MBUF systems by state agencies, the Anti Car Theft Act and the Department of Justice's (DOJ's) Final Rule currently preclude the provision of personal data from NMVTIS to private entities. This could prove problematic if a private or quasi-private entity was designated as the administrator of an MBUF system. Federal statutes, such as the DPPA, and individual state privacy statutes preclude motor vehicle agencies from providing personal data to private-sector entities unless the intended use of the data meets specific conditions.

3.3.2 Technology

Technology necessary to support MBUF administrative functions was discussed in several interviews. Ideas generated during these discussions were incorporated in the development of the concept of operations.

During the interviews, state agency and toll representatives were asked if their current information technology (IT) systems and current staffing would be able to handle the functional requirements of administering an MBUF system. State interview findings show that incorporating MBUF functions into the existing state agency legacy systems would be problematic and not advisable. The states largely agree that the current IT systems cannot handle an MBUF system.

Some representatives felt that state agencies could administer the system, but that these agencies would need new technology and additional staffing. Others found that it is too early to determine if the transportation agency could build the systems in-house or contract them out, but states do anticipate that contracting with the private sector would be necessary to acquire the required technology. State IT specialists explained that if variable data from drivers in an MBUF system was to be reported, the data load would be massive and could not flow directly into existing DMV systems.

The states' technology experts noted that system design for this type of process would not be overly difficult. Key items would include the data elements that would need to be captured, the communication networks to share data (such as NMVTIS) and a central clearinghouse. Some state representatives think that data transfer would not require a new technology to be developed, but that technical issues would have to be resolved. State representatives found that NMVTIS is a good platform to consider for any MBUF system to share and transfer information among states. Some state representatives think there may be an advanced system available that could accommodate DMV and MBUF system requirements, such as an interface that could pull data from vehicles but that also can provide the DMV functions. This may be an interface modification that coordinates with NMVTIS.

There was agreement among states that using an automated in-vehicle communication system to send data would be better than a customer self-reporting system, as is commonly used by the IRP. Some state representatives suggested that cell phones could be equipped with an application that could handle the mileage reporting function for an MBUF system. All private sector interviewees stressed a need for dedication of equipment to the vehicle rather than the use of non-dedicated devices such as smart phones.

State representatives noted that consideration should be given to building an MBUF platform for use with other states, such as a Government Off-the-Shelf Solution (GOTS). Off-the-shelf solutions would be

convenient, and standardization would simplify any MBUF implications of driving from one state to another.

Toll authorities noted that the ease of providing users with transponders allows toll agencies to offer several ways for customers to enroll in E-ZPass. If the equipment used to record and report miles traveled under an MBUF system had to be physically installed on the vehicle by a certified installer, this would require more effort than reliance on original equipment manufacturers.

The private sector believes that interoperability will be essential in a multistate MBUF system. Standards should promote an open system that allows competition among different private sector vendors. It also will be essential for the ConOps to accommodate different state business rules. One private sector representative recommended not making too many assumptions about what functionality would be handled by the MBUF equipment on the vehicle and what would be done in the back office.

3.3.3 Equity

State leadership identified several equity concerns related to billing and collection. Despite the preference of an automated online payment system, the states noted that an MBUF system would need to offer a cash payment option, as there are residents (in the range of 15 to 20 percent) who do not have credits cards or banking accounts. Additionally, if an MBUF system were to require the purchase of some technological device, such a requirement may pose additional hardship on low-income populations. Some state representatives also raised the concern that if the new system meant that low-income populations could not pay - it might prevent people from driving, causing additional hardship.

3.3.4 Legal Issues

Interview findings show that implementing an MBUF system could cause legal issues related to taxation, privacy, data transfer, billing and collections, evasion, and enforcement. The interview findings identified several issues and concerns states would need to address, including the following:

- States may not have the legal authority to incentivize non-cash payments;
- State representatives would like to clarify the obligation to protect or provide MBUF data in legal cases. For example, data might be used to identify hit and run drivers, if legally allowed; however, citizens may be concerned about this type of data use;
- The MBUF system would have to pass through each state's department or office of technology, which commonly sets standards for firewalls to protect data systems;
- A private contractor working under contract to a state agency is typically going to be held to the same data protection standards as the state agency;
- Although the use of MBUF data for planning purposes would strengthen planning data sets, and would drive down the costs of planning, privacy concerns may prevent it from being used except on a voluntary basis; and
- There is concern that marketing companies would want the data, therefore the data would need to be very secure.

An MBUF system may require a multistate agreement or agreements. Some state legal representatives find that the best multistate arrangement would be a compact, with Congress in agreement that an MBUF system can be regional but does not have to be national. Otherwise there will be agreements state-by-state and entity-by-entity, such as with E-ZPass. It was also suggested that for a multistate program, the technology could apply in a regional context – but at the same time must be able to deal with mileage not within the program area. The representatives noted that E-ZPass started with toll

agencies entering into a multistate consortium that had the legal authority to issue bonds. This may be a good approach for an MBUF financial model.

3.3.5 Implementation/Phasing

The interviewees were asked if it would be better to phase in implementation of an MBUF system or implement full scale on a date certain. All preferred a phased approach for implementation. However, it was noted that if technology was not an issue (requiring installation of hardware in millions of vehicles), bringing all vehicles into the system at one time would eliminate the need to maintain two fee systems – the gas tax and MBUF system. One way to address phasing would be by setting a compliance date with incentives to comply in advance, and penalties for not meeting the date. Some state representatives noted that phasing would allow for any possible problems to be addressed early on. There is a concern about running a dual system and the state representatives identified key transition issues, including the following:

- The MBUF system should not be constrained by business as we know it today – there needs to be a paradigm shift;
- The MBUF system needs to consider the impact on people who drive different types and ages of vehicles;
- Vehicles traversing the system that are not part of an MBUF system (e.g. vehicles from out of state) will need to be accommodated in some fashion;
- A variable fee, compared to a flat fee, will mean that program administrators will be responsible for managing significantly more data; and
- Some state representatives suggested that it is a good direction to start with heavy vehicles, while others disagreed.

Some Suggestions by Interviewees for Phasing in an MBUF System:

- 1) First, the efficacy and accuracy of the MBUF system would have to be demonstrated through a pilot or paper audit exercise. This would include demonstrating that the MBUF system will work without breach of confidential information or inaccuracies in the system.
- 2) Second, a very clear and comprehensive education campaign is needed to gain support for the program among the public.
- 3) Third, the federal government should work with automakers to ensure that any necessary technologies are placed in vehicles to facilitate new vehicle integration into an MBUF system.

Private sector representatives were also asked about the transition to an MBUF system and whether they thought an opt-in strategy would be desirable. Responses were somewhat mixed. All recognized the benefits of an opt-in strategy over one in which users are forced to participate, but not all could see the value proposition that would entice users to switch from paying the fuel tax to paying an MBUF. Among the incentives mentioned that could be offered were free GPS equipment, access to traffic, parking, and other motorist service information, and lower rates than are being charged for the fuel tax. Such incentives could not be offered indefinitely and ultimately all users must be brought under the MBUF. A major question would be how long the opt-in strategy would be pursued before requiring all users to pay the MBUF. Several noted how much cleaner it would be if everyone started paying the MBUF at the same time.

The interview findings support that an extensive public relations campaign would be needed to educate the public about the new MBUF system well in advance of implementation. The message would need to come from all governmental levels involved in system implementation and it would need to be clear, concise and consistent. The same type of public relations information campaign would need to occur to educate the public on the MBUF plan whether it is run by a public agency or a private entity. The program would need to address concerns about privacy. There would need to be a component with a local message in terms of showing benefits to the local transportation system.

Some state representatives find that the rationale for moving to an MBUF system emphasizes the need for more revenue - the public should not interpret it as “they want more of our money.” The message should be about use, usefulness, and fairness. However, using mileage as the metric will raise questions about vehicle size, fuel, and other factors, such as the value to society of having a more fuel efficient vehicle or one which produces fewer emissions.

3.4 Conclusions

The results of the Phase 1 research and interviews in the three states show that there are needs for the development of a mileage-based user fee administrative system which will require substantial evolution from current administrative arrangements and capabilities, or perhaps a clean slate approach to the administration of mileage-based user fees. There are, in fact, substantial gaps to fill in order to administer an MBUF system. There was substantial lack of agreement among those interviewed in the three states on whether the existing systems needed to be adapted or augmented or whether a clean slate approach was needed. However, there was more agreement on the nature of the administrative needs that a mileage-based user fee system would impose in comparison to the administrative needs imposed by current fees.

Interview findings show that most agencies and organizations believe it would be possible to implement and administer an MBUF system, but do not necessarily advocate for an MBUF system at this time considering possible costs and political challenges.

The review of administrative requirements and current state systems indicates that there are needs for substantial changes in order to implement MBUF systems in a multistate environment. The gaps between current administrative procedures and the administrative procedures needed for MBUF systems are wide but not impossible to address.

State leadership, toll agency representatives, representatives from the private sector and organizations such as AAMVA and NMVTIS largely agree on the following:

- An MBUF system is one potential future option for addressing the problems with current transportation revenue systems;
- Electronic, real-time titling and registration will be a critical component;
- New information technology systems will be required, because the current legacy systems used by states are not equipped to handle all of the requirements of an MBUF system;
- GPS will likely be the base technology used for tracking mileage;
- Billing and collection should be timely, balancing the need for cash flow against the administrative costs of billing; it should be possible for MBUF payment to be made in cash, credit, or online, but ideally, a pre-payment system will ensure timely revenue;
- Online account information and a customer service call center will be required to support users;
- Auditing and enforcement of an MBUF system will be critical to its success;

- Reconciling mileages and revenues among states and toll agencies can be accomplished using procedures and clearinghouses modeled on current IRP, IFTA, and toll agency practices;
- Phased implementation would be preferred, in conjunction with setting dates for full compliance;
- Communications to the public, including a major educational campaign about MBUF would be essential prior to implementation;
- Privacy must be addressed in system design and system operations;
- The role of the federal government may be to set standards, provide research and demonstrations, and provide guidance;
- There may be a significant role in an MBUF system not only for the states but also for AAMVA, NMVTIS, toll agencies and the private sector;
- An MBUF system may be integrated into or built upon current NMVTIS and toll system technologies and information systems; and
- Legislation will be required for implementation, including MBUF rate setting and enforcement.

4.0 Operating Concept for the Long-Range Vision

This concept of operations, or ConOps, provides a general view of a high-level, long-range vision of a transportation revenue collection system based on mileage-based user fees (MBUFs). A ConOps is the first step in the systems engineering process. It defines “what” a system needs to do including system functions and information flows and the roles of the key players, both end users and system operators. While it does include definitions of basic technology applications, systems and needed administrative functions and institutional arrangements, it is not based on specific technologies or specific organizational configurations.

Thus, the ConOps remains flexible regarding many details significant to successful implementation (e.g., specific technologies, frequency of communications with vehicles, frequency of payments, privacy and security protections, etc.). It also recognizes the complex political, administrative, technical and public acceptance transition processes that will be necessary to achieve this long-range vision. Work is ongoing nationally and in several states to address these technological and public acceptance issues.

The Phase 2 case studies have characterized the current operating environments in the relevant public agencies in Delaware, Maryland, and Pennsylvania, and analyzed specific administrative, institutional and legal adaptations that would be needed to implement MBUFs should such a policy choice be made in the future.

This analysis suggests that the transition period during which various states decide to adopt any MBUF in lieu of a fuel tax will be lengthy and it may be some time before all vehicles will be equipped with technologies needed to implement even a basic MBUF. Incorporating the advanced functionality necessary for congestion pricing or for integrating toll facility charges into a payment system may lie even farther in the future. However, it is important to keep the long-range vision in mind as administrative, institutional, and legal changes are made to begin implementing an MBUF system. The ConOps thus constitutes the ultimate vision of how a multistate (or even national) MBUF system would operate at some point in the future, taking full advantage of advances such as electronic vehicle titling and registration in all states and technology evolution that provides reliable wireless communications to and from vehicles.

4.1 Context

The ConOps reflects the consensus perspective of multiple stakeholders whose input was obtained through the interviews summarized in the previous chapter. It also emerged out of the following contextual considerations:

- The system must be multistate in nature as established in the project objectives. At a minimum, it must provide for cross-state reporting and payment for miles driven within each participating state.
- The system must provide not only for the collection of fees associated with miles accrued by state, but also by local jurisdiction, priced-facility and time of day to accommodate the potential for collecting mileage-based user fees, tolls and congestion-based charges within a single integrated system – as directed by the Member Advisory Committee in the Phase 1 project.
- The system must provide for implementation flexibility as follows:

- **State implementing agencies.** Many functions are identified for a mileage- based user fee “processing organization.” This generic term explicitly recognizes that the responsibilities within each state could be handled differently, with some states opting to house more functions within state agencies than others.
 - **Outsource functions.** Aside from a governmental oversight role, it is certainly possible and perhaps probable that some or all MBUF processing organization functions for a given state might be outsourced to a private entity, another public entity or to a non-profit entity on either an individual state or multistate basis, involving either direct payment by the state(s) or cost recovery through enactment of a transaction fee. Similarly, no specific assumption is made regarding how multistate clearinghouse functions might be handled. The clearinghouse functions might also be provided by a private or non-profit organization with oversight by a governmental board and with financial support provided either directly by the states or through transaction fees.
 - **User payment method choices.** A range of user payment options is available, consistent with interview discussions that emphasized the importance of consumer choice in payment methods. It must be recognized that a significant segment of the population does not currently have bank accounts or credit cards and may not have them in the future.
 - **Rates and rate structures to be assessed** by owner agencies/authorities. Individual owner agencies and authorities must have full flexibility to establish MBUF rates that might differ significantly among states and other jurisdictions.
- The ConOps should describe *a long-range vision*, assuming continuing evolution of already emerging trends in technology and systems including:
 - Communications networks that enable the rapid sharing of pertinent information among participating entities.
 - Replacement of toll charges based on complex rate structures (e.g., tolls based on points of entry and exit) with an equivalent per mile charge.
 - Availability on all vehicles of equipment capable of recording mileage by state, jurisdiction, facility, date and time of day and transmitting this information via wireless communications.
 - Reliable wireless communications systems that obtain and send information from/to vehicles.
 - Prevalence of commercial electronic billing and collection system usage (although not necessarily by all).
 - The ConOps also presumes important evolution in institutional policy and related capacities including:
 - The concept of MBUFs has been adopted by all states and generally applies to all vehicles traveling on all roads (with the exception of some vehicle types specifically excluded by individual states).
 - New institutions or institutional arrangements within and among the states to accomplish the required functions. This includes enactment of enabling legislation within the states for the collection and disposition of the fees collected, and agreements among the states to take enforcement actions for amounts owed for travel outside of host state borders.
 - All vehicle titling and registration information in all states is being collected and stored electronically.

- A process is in place to certify that equipment on or in vehicles meets open national standards for interoperability and performance.
- A federal MBUF system has been adopted with federal fees collected as an integral part of the multistate system.

4.2 Concept of Operations (ConOps) Framework

The material that follows is organized around the following functions. These represent the same administrative functions identified in the Phase 1 project, though organized differently to be associated with owners, vehicles, MBUF processing organizations and clearinghouses.

- Enrollment and Payment – Owner Responsibilities
- Recording and Reporting Mileage – Vehicle Functions
- Billing, Collecting and Processing Vehicle Ownership Changes – MBUF Processing Organizations
- Data Sharing and Reconciling Amounts Owed – Clearinghouse Functions

4.3 Enrollment and Payment – Owner Responsibilities

1. A vehicle owner would be required to enroll his/her vehicles with the designated MBUF processing organization in his/her state. Dealers would be required to enroll vehicles they acquire and would incur charges on miles traveled by these vehicles until they are sold. Fleet owners (e.g., trucking companies, taxis, etc.) and leasing organizations would be given the option of being recorded as an owner of all of their vehicles or of providing information on individual users/lessees to the MBUF processing organization. Each owner/user/lessee would be required to provide contact information, the VINs and the certification numbers associated with the equipment that will be used to collect, aggregate and communicate mileage information of all owned or leased vehicles.
2. Each owner/user/lessee would select a method of account pre-payment/replenishment. Comprehensive payment options would be available, including cash, check, credit or debit cards and electronic bank account deductions, including automated account deductions for periodic replenishment.
3. Upon sale, the previous owner of a vehicle would be responsible for ensuring that the MBUF processing organization in his/her state is notified electronically of the sale in order to avoid incurring charges after the transaction date – defined as the date on the new title. Fleet owners and leasing organizations would be required to notify the MBUF processing organization of changes in vehicles owned and leasing agreements (e.g., termination, change in vehicle, etc.).

4.4 Recording and Reporting Mileage – Vehicle Functions

1. All vehicles would be required to have equipment capable of:
 - a. Recording mileage by date, time of day, state, jurisdiction and facility.
 - b. Aggregating the raw mileage information collected into accumulated distance traveled by date, time of day, state and jurisdiction, with the miles traveled on priced facilities (toll roads or facilities where congestion-based pricing applies) specifically identified.
2. The equipment would be certified as meeting established open national interoperability and performance standards and carry certification numbers.

3. The equipment would store the disaggregated recorded mileage information for a configurable period of time as chosen by the owner. Owners would have access to this information for use in checking/verifying MBUF's. Information could not be deleted until after it had been aggregated and securely stored for subsequent communication to the MBUF processing organization. Deleting the disaggregated data would be *prima facie* evidence that the owner agreed with the mileage records. Owners could also choose to provide this disaggregated information (with identity removed) to government agencies for transportation analysis purposes.
4. The equipment would periodically communicate its stored, aggregated information to the MBUF processing organization in the state in which the vehicle is titled and registered, either directly or through a commercial communications device.
5. Each communication would contain the VIN, the equipment certification numbers, evidence that the equipment has been operating properly since the last communication and e-commerce security information.
6. The equipment would have the capability to self-diagnose and report possible malfunctions to the owner and MBUF processing organization. Redundant equipment and/or methods for collecting and reporting mileage information would be available and activated in cases where a malfunction has been detected. Vehicle owners would be given a defined period within which to have the equipment repaired or replaced.

4.5 Billing, Collecting and Processing Vehicle Ownership Changes – MBUF Processing Organizations

The MBUF processing organization designated by each state would:

1. Maintain databases containing owner/user/lessee account information (name, address, contact information, payment information, VIN and equipment certification numbers).
2. Accept pre-payments and account replenishments from registrants via multiple methods (e.g., cash, check, credit or debit card, automated account debiting, etc.).
3. Receive communications from certified devices in enrolled vehicles containing aggregated distance traveled by date, time of day and jurisdiction since the last communication, with the miles traveled on priced facilities specifically identified.
4. Upon receipt of information from a vehicle device, process the equipment certification number and e-commerce security information to ensure validity of the transmission.
5. Cooperate with other MBUF processing organizations to manage the process of providing for e-commerce security.
6. Calculate the user fee associated with the aggregate data received. The calculation would be based upon a table maintained by a clearinghouse that would contain all state, jurisdiction and facility charges by date and time of day. The rates could vary by state, by jurisdiction, by facility, by time of day and by vehicle class. Discounts or premiums to be provided according to individual state law or policy (e.g., fuel efficient vehicles, commuter discounts, etc.) could also

be applied. Charges involving dynamically priced facilities (where price varies according to the current level of congestion) require that each priced facility provide its clearinghouse with daily records of the rates charged by direction of travel and time of day/day of week/date for those facilities or facility segments. The clearinghouses would cooperate to combine this information into a single integrated table which is then provided to the MBUF processing organizations on a daily basis for use in determining the correct charges.

7. Apply the calculated user fee to the owner's account and update the account record.
8. Make available to each owner a summary of the mileage reported and the charges that accrued to the account.
9. Identify and investigate delinquent accounts and/or refer to the appropriate authorities to take enforcement actions provided for in state law. Administrative enforcement actions may include registration revocation and denial, reinstatement fees and other fines and penalties.
10. Notify the vehicle owner that they have a certain period of time to have equipment repaired or replaced if that equipment is reported as being defective.
11. Identify cases of potential equipment tampering and report these to the appropriate state agency for further investigation and to take administrative enforcement actions provided for in state law.
12. Upon notification of sale or disposal of a vehicle or transfer of title, create or modify the owner-specific records that associate the owner with that vehicle (through the VIN number) and with that owner's mileage-based user fee account and payment information. The date of the new title would identify when the responsibility for paying mileage charges ends (for the old owner) and begins (for the new owner).
 - a. If the transaction is within the same state, that MBUF processing organization would update all records as appropriate.
 - b. If a sales or titling transaction crosses state boundaries, electronic notification processes will enable previous owners to avoid incurring charges after the date of the title change. The MBUF processing organization in the old owner's state would be notified of the transaction and in turn notify the MBUF processing organization in the new owner's state and provide the necessary vehicle equipment information. A message would be sent from the MBUF processing organization in the new state to the vehicle instructing it to send previously accrued mileage information to the MBUF processing organization in the old state and subsequent mileage information to the new state. Collections will then start in the new state and cease in the old state. Vehicle mileage will be recorded and reported by date to enable collections to be calculated accurately.
13. Receive uploads of new vehicle registration records from the state registration agency and compare these with its records as a check to help ensure that changed vehicle ownership information has been reported by previous vehicle owners. Take appropriate follow-up actions to ensure that ownership and enrollment information remains accurate.
14. Periodically sum up all accumulated miles by state and by each individually priced facility and transmit this accumulated mileage information to a clearinghouse.

15. Periodically sum up all amounts owed to other states and to each individually priced facility and transmit amounts owed to a clearinghouse.
16. Collect payments associated with the federal MBUF and transmit amounts owed to the federal government.
17. Consistent with state laws and policies and interstate agreements, maintain electronic records to support auditing requests made by individual owners, toll authorities, other states/ jurisdictions and the federal government.
18. Manage a process for verifying the accuracy of the mileage information being collected.
19. Maintain and manage a customer service organization that would respond to issues raised by enrolled individuals.

4.6 Data Sharing and Reconciling Amounts Owed: Clearinghouse Functions

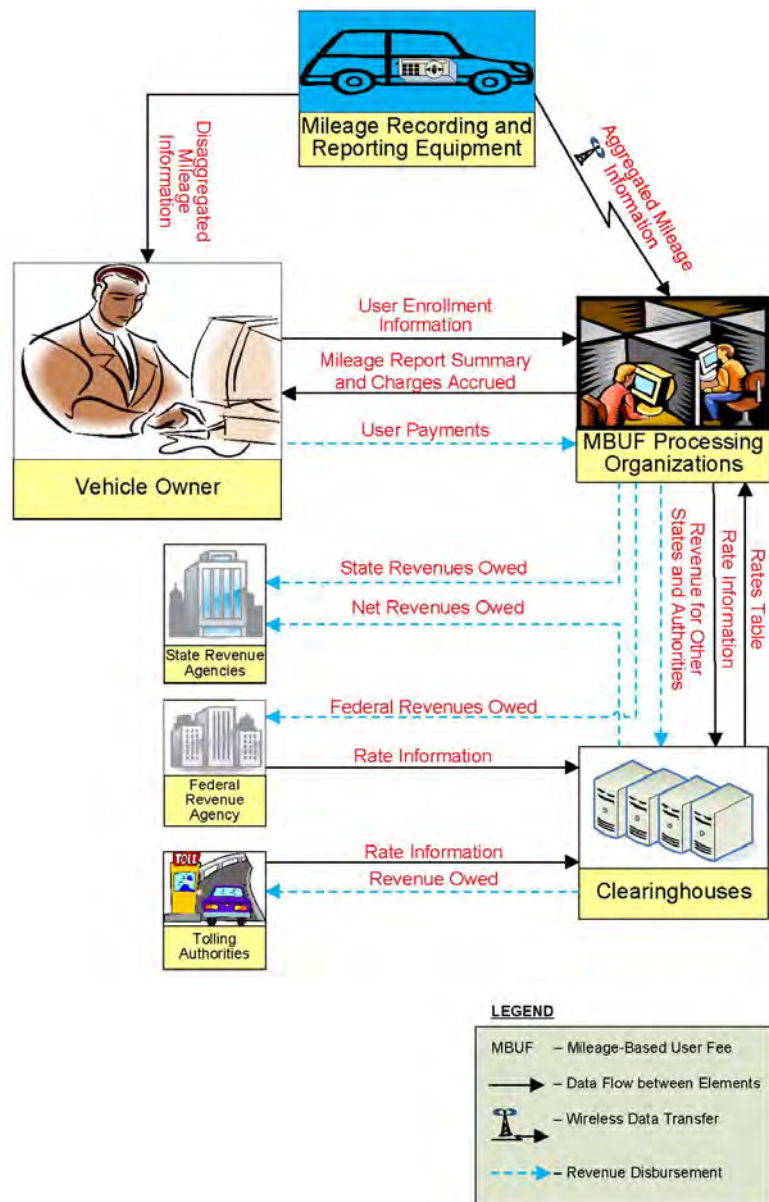
Clearinghouses would be established that would operate systems that meet interoperability and performance standards that would:

1. Cooperate to maintain a table of rates by state, jurisdiction and facility by date and time of day and provide an updated rate table to each participating MBUF processing organization on a daily basis. The participating states and toll authorities would be responsible for the public processes of establishing and revising rates and for reporting changes to the clearinghouses when these occur.
2. On a periodic basis, reconcile the amounts transmitted by each state and distribute net amounts owed to each participating state or authority.
3. Make available to each participating MBUF processing organization and authority and to the federal government summary records of mileages and fees accrued due to travel on their facilities by vehicles registered in each state.

4.7 Illustrating the Concept of Operations

The diagram below (Figure 4.1) depicts how information and revenue would flow among the major entities in the system as described above: the owner, the vehicle (and equipment on or in the vehicle), the MBUF processing organizations, and clearinghouses, as well as the federal government, state revenue agencies and toll authorities. An illustration of how the system might be used by various entities is described through a series of user scenarios in the next chapter.

Figure 4.1: Data and Revenue Flows in a Multistate Mileage-based User Fee (MBUF) System



5.0 User Scenarios

This chapter describes a range of scenarios that illustrate how the system described in the long-range vision in the previous chapter might work from the perspectives of various owners and government agencies. Discussion in the next chapter then focuses on a strategy for transitioning to the long-range vision, and presents ideas for how the system might be progressively implemented.

The examples presented below are illustrative, not prescriptive. All possible scenarios are not described. The selected examples were chosen to illustrate certain features of the system and the implementation flexibility provided by the operating concept described in the long-range vision.

5.1 Owner Interactions – Vehicle Equipment and Payments

The following examples briefly describe how several different owner types might interact with the system in terms of vehicle equipment and payment arrangements.

Example #1: Barbara is the owner of a newly purchased private vehicle. The vehicle that Barbara purchased came with certified vehicle data collection and communications equipment pre-installed by the Original Equipment Manufacturer. The vehicle was enrolled with the mileage-based user fee (MBUF) processing organization under the dealer's account. As part of the purchase transaction, the dealer notifies the MBUF processing organization that it has sold the vehicle to Barbara. The MBUF processing organization makes the appropriate record changes and notifies Barbara that the new vehicle is now linked to her account where she had previously enrolled and provided credit card information. If Barbara had not had a pre-existing account, she would have had to enroll with the MBUF processing organization. Via automatic credit card charges, Barbara pre-pays an estimated monthly MBUF. The MBUF system automatically adjusts the amount of each subsequent payment to maintain a minimum balance in her account based on her typical monthly MBUF's. Barbara periodically checks her payment and balance information via her registered account on the MBUF website, or via a call to the interactive telephone system maintained by the MBUF processing organization's customer service center.

Example #2: Andy is an independent commercial vehicle operator. Andy purchased certified data collection and communications equipment from an after-market supplier and had it installed by a certified service provider. When Andy enrolled his rig with his home state's MBUF processing organization, he indicated that he would pre-pay an estimated quarterly MBUF via check. He receives reminders from the MBUF processing agency through email and through his vehicle equipment when his account is running low and his next estimated quarterly payment is due.

Example #3: Andy received several notifications from his MBUF processing organization that he had not made his quarterly payment and that his account was now in arrears. As per state law, the MBUF processing organization notified Andy that his commercial vehicle registration had been suspended until amounts owed were paid. In addition, under the terms of a service contract that it has with the state, the contracting team operating the collection system referred the matter to a collection company that will pursue payment from Andy.

Example #4: The Wagner Trucking Company owns a fleet of commercial vehicles. It established an account with the MBUF processing organization in the state in which its business is registered for tax purposes. It uses that account to pre-pay its estimated quarterly MBUF for all of the currently enrolled vehicles in its fleet via an automated bank transaction. The MBUF system initiates an estimated

quarterly fee transaction whenever Wagner's account is running low and sends a notification to Wagner that this has occurred. Wagner has a contract with a certified service provider that installs certified after-market equipment on all of its newly acquired vehicles.

Example #5: The Harris Automotive Dealer sells new and used vehicles. The vehicle data collection and communications equipment on all of its new vehicles is pre-installed by the Original Equipment Manufacturers. Before selling a used vehicle, Harris ensures that the data collection and communications equipment on it is operating correctly. It has an open contract with a certified service provider to repair or install new after-market equipment on a vehicle when necessary. Harris established an account with the MBUF processing organization in its home state and uses that account to pre-pay an estimated monthly MBUF for all of the vehicles that it currently owns via an automated bank transaction. The MBUF system initiates an estimated monthly fee transaction whenever Harris' account is running low and sends a notification to Harris that this has occurred.

Example #6: Roberto's GPS unit malfunctions such that it is not able to identify where travel has occurred. The vehicle's equipment diagnoses the problem and provides an in-vehicle notification to Roberto and sends a notification to the MBUF processing organization which then also notifies Roberto of the problem and provides a date by which repairs are to be made. The vehicle equipment sends a notification to the MBUF processing organization when the GPS unit is again working properly. If Roberto had not made the repair in the timeframe provided, the MBUF processing organization would have initiated administrative actions available to it under state or local law. In the interim, built-in redundancies enable mileage data from the odometer to be accessed while the GPS unit is not working. Total mileage data is communicated to the MBUF processing organization, but charges are necessarily limited to a flat per mile fee in Roberto's home state during the time that the GPS unit is down.

5.2 State Administration – Rates and Institutions

The following examples describe several possibilities for how states may choose to administer the collection of MBUFs consistent with the long-range vision.

Example #1: State A established an MBUF processing organization within its state revenue agency. That organization contracted for MBUF systems and services that operate under state oversight. The contract terms include a base monthly payment with a variable fee structure that accounts for performance incentives and disincentives. The rate per mile is set to capture the cost of administering the system and includes the federal per mile fee. The rate per mile varies according to several vehicle classes. State A and neighboring State B also operate several dynamically priced facilities on which the rates vary as a function of the current congestion level. On a daily basis, the MBUF processing organization system obtains the rates that applied on those priced facilities for each day/time/direction of travel trip from its clearinghouse. The priced facility management systems provide this information on a daily basis to their clearinghouses. The clearinghouses cooperate to combine information from all priced facilities into an integrated rate table which is provided to the MBUF processing organizations for their use in determining the correct mileage charges.

Example #2: State B established an MBUF processing organization within its department of motor vehicles. State B contracted with a supplier to purchase a license to use its MBUF processing software system. State B operates the system and provides services with a staff of public employees. It also has a contract with the system supplier to provide software system administration and support services. State B's rate structure involves a flat per mile fee that includes the federal flat per mile fee and that varies by vehicle classification.

Example #3: States C and D decided that it would be cost-effective to integrate their MBUF processing functions. They conducted a joint procurement for MBUF systems and services that operates under oversight provided by a committee of representatives from both states. The MBUF system operated by the contracting team was designed to reflect the different business rules in the two states. The contracting team provides distinct customer service organizations for each state. The states' MBUF rates per mile include the federal flat per mile fee and transaction fees that are retained by the contractor to cover the cost of services (with appropriate accountability to the states).

5.3 State Administration – Sales Transactions

The following are examples of how various sales transactions might be processed in the MBUF system described in the long-range vision.

Example #1: The Harris Automotive Dealer sold a new private vehicle to Shirley. The transaction involved a trade-in of Shirley's old vehicle. As part of the sales service it provides, and with Shirley's authorization, Harris handled the on-line process of notifying the state's MBUF processing organization that it now owned the old vehicle, and that Shirley now owned the vehicle she purchased. As a result, MBUFs attributable to the old vehicle began to accrue to Harris' account (rather than to Shirley's account), and MBUFs attributable to the new vehicle began to accrue to Shirley's account (rather than to Harris'). These changes were effective the same day that the electronic titling process made the ownership change on the titles to the two vehicles. Shirley received a notification from the MBUF processing agency of the changes to her account and was provided with an opportunity to appeal the change if she believed that any of the information was incorrect.

Example #2: Mario purchased a used vehicle from Terry in a transaction between two private owners who reside in the same state. Terry followed instructions available on the DMV website and went on-line to notify the MBUF processing organization of the sale of the vehicle to Mario. The MBUF processing organization electronically obtained the date of the title transfer from the DMV. On that same day, the MBUF system started to accrue fees for miles driven by that vehicle to Mario rather than Terry. Mario received a notification from the MBUF processing organization and was provided with an opportunity to appeal the change if he believed that any of the information was incorrect.

Example #3: Sharon purchased a vehicle from Ying in a transaction between two private owners who reside in different states. Ying followed instructions available on his DMV's website and went on-line to notify his MBUF processing organization of the sale of the vehicle to Sharon and her state of residence. In turn, Ying's MBUF processing organization's system generated an electronic message that was sent to Sharon's MBUF processing organization notifying it of the transaction, the date that the title change was effective and providing the pertinent contact and vehicle equipment certification and communications information. Sharon's MBUF processing organization communicated with the vehicle's equipment to notify it to send previously accrued mileage information to Ying's MBUF processing organization, and to send subsequently accrued mileage information to it, and provided the new communications destination address. Therefore, on the same day as the title change was effective, the MBUF system in Sharon's state started to accrue fees for miles driven by that vehicle to Sharon. Ying received a notification from his MBUF processing agency about the transaction and was provided with an opportunity to appeal the change if he believed that any of the information was incorrect.

5.4 Toll Authority Interactions

The following are examples of several possible interactions with toll authorities.

Example #1: A toll authority in State D no longer operates a back office collection system since all tolls are now collected by the MBUF system. The toll authority receives payments daily from the clearinghouse used by State D along with an accounting of total miles driven broken down by the state in which the vehicles are enrolled. The toll authority periodically conducts its own field studies to count traffic flows and to identify the home state of passing vehicles in order to compare its field data with the information being reported by the clearinghouse. The toll authority in State D has taken advantage of the opportunity available to request an audit of the MBUF processing agency/clearinghouse system and operation.

Example #2: The toll authority in State D instituted a set of rate changes to go into effect one month hence. While informing the public, the toll authority has also notified its state's MBUF processing organization of the rate change, which in turn, notified its clearinghouse. In turn, the clearinghouse has notified all other clearinghouses and MBUF processing organizations across the country of the toll authority's rate changes and effective date so that the correct mileage fee can apply to miles drive on that toll facility.

Example #3: Chuck reviewed his account on his MBUF processing agency website. He questioned a charge for total miles driven on a toll facility. He downloaded detailed trip by trip information that was stored by his vehicle equipment since he had not yet deleted it. He compared the detailed information to the summary information in his account and concluded that the charges were, in fact, correct.

5.5 Federal Government Interactions

The following are examples of several possible interactions with the federal government.

Example #1: The federal government no longer collects fuel taxes. That source of revenue has been completely replaced with revenue based on a per mile fee that is included in the per mile fees charged by the state MBUF processing organizations. The federal fee varies by the vehicle's registered weight. The federal government receives its portion of the total revenue collected each day via electronic transfers from the state MBUF processing organizations. The federal government periodically conducts audit reviews of MBUF processing organizations to investigate whether their processes and systems are accurately collecting and transmitting the federal government's revenue share.

Example #2: In addition to transmittal of the revenue owed, the state MBUF processing organizations are also transmitting accumulated miles by state, jurisdiction and by individually priced facility to the federal government. This is providing comprehensive and accurate data that is being used to monitor travel demand and as a variable in its program funding allocation formulas.

6.0 Transition to a Mileage-Based User Fee System

6.1 Introduction

The ConOps indicates how the system might operate and what functions it could serve. However, developing a ConOps is only one step in moving toward implementing an MBUF system. It does not presume specific technologies or systems – simply the functions that must be served. Furthermore, it does not inform decision-makers on how to implement the system in terms of specific institutional, administrative and business arrangements. Thus, many uncertainties surrounding how specific elements of the ConOps would be implemented must be resolved, as well as the public acceptance of MBUF technologies and administrative mechanisms.

Obstacles to implementing MBUFs have led some to advocate that MBUF systems should be phased in over time to prove the concept, demonstrate key features of the system, and ultimately to gain the political support required to fully implement an MBUF system. State and private sector representatives interviewed for this project generally agreed that an MBUF system should be phased in. There is time for such a phase-in since the erosion of fuel tax revenues due to improved vehicle fuel efficiency will be gradual, but phasing in an MBUF while continuing to impose a fuel tax would present its own set of challenges.

While this analysis assumes that the federal government will not play a leadership role in implementing an MBUF system, federal leadership in developing technology standards and communications protocols for an MBUF system would reduce many uncertainties. Several private sector representatives emphasized the value of such federal leadership, but states must continue to take initiative, both individually and collectively, if further progress is to be made on resolving MBUF issues.

In this context, it may be desirable for several cooperating states to begin the process of transitioning to an MBUF system on a multistate basis – as reflected in the I-95 Coalition program. Many challenges in implementing an MBUF are related to multistate issues such as the distribution of revenues among states, the exchange of vehicle ownership and use information, MBUF enforcement, MBUF rate structures, etc. Considering those multistate issues from the outset will prevent having to superimpose mechanisms to address multistate issues on systems designed originally as single state systems.

Even within such a multistate coordinated approach, each state could retain a significant amount of autonomy on details of how it chose to implement MBUFs. State DOT and toll agency officials emphasized the importance of having the flexibility to adapt administration of an MBUF system to their unique circumstances. While interoperability must be achieved at the multistate (and ultimately federal) level, specifics such as transition from the current administrative mechanisms designed to collect fuel taxes, registration fees, tolls, and other highway use taxes and fees, to the administrative mechanisms required to fully implement an MBUF system may vary by state and jurisdiction. The overall framework for an MBUF system must recognize and accommodate the need for flexibility in how states and other jurisdictions would administer an MBUF system, as well as the ability to construct the system in a manner that supports independent policy and financial objectives.

Activities are already underway that may lay the foundation for administrative structures needed to implement an MBUF system. Among those activities are the development of National Motor Vehicle Title Information System (NMVTIS), electronic titling and registration systems, and mechanisms to enable nationwide toll interoperability and enforcement.

As noted above and in the appendix, the NMVTIS is a system operated by the American Association of Motor Vehicle Administrators (AAMVA) in conjunction with the U.S. Department of Justice that gives states, law enforcement officials, and others access to nationwide motor vehicle title information. Currently the NMVTIS database contains titling information on nearly 90 percent of all vehicles in the U.S. Soon it is expected to contain title information on virtually all vehicles in the U.S. NMVTIS could play a key role in an MBUF system by (1) providing the information needed by MBUF processing organizations to reassign responsibility for MBUF payments to the new owner when a vehicle is sold or otherwise changes ownership; and (2) providing the IT infrastructure needed for real-time access to the NMVTIS data. Another benefit of NMVTIS is that it will accustom states to sharing information needed to implement an MBUF system. The appendix discusses issues that would have to be resolved before NMVTIS could be used to support an MBUF system. Addressing some of those key issues now could provide an opportunity to more thoroughly consider potential roles for NMVTIS in an MBUF system, and to institute changes that might be required before NMVTIS could fulfill those roles.

Electronic vehicle titling and registration systems are being developed by many states to make vehicle registration processes more efficient. This direction and work underway by AAMVA to possibly use NMVTIS as a framework for electronic titling information will make updating vehicle registration information much easier and quicker and may provide a foundation for vehicle enrollment requirements under an MBUF system.

The International Registration Plan (IRP) and the International Fuel Tax Agreement (IFTA) also may provide a framework for considering how to collect and distribute MBUFs through a base-state arrangement where all fees are paid initially to the state in which a vehicle is registered. Fees then are distributed through one or more clearinghouses to other states in which a vehicle has traveled based on the amount of travel and the tax rates in each state. IRP and IFTA use base-state arrangements to collect and distribute motor carrier registration fees and fuel taxes respectively among the states. They have been in operation for many years and generally are considered to operate efficiently.

In discussions with toll industry representatives and others during this project, it became increasingly clear that many back office operations that are required to administer E-ZPass and other electronic toll systems are directly relevant to back office requirements for an MBUF system. Many toll agencies are implementing and pursuing all-electronic toll collection applications that eliminate cash collection from the roadside. These applications are advancing new DMV relationships for license plate look-ups, as well as a supporting business infrastructure of new payment channels, new invoicing and collection systems with vehicle owners, and new enforcement and adjudication mechanisms. All of these functions may provide a foundation from which future MBUF systems may draw.

The Alliance for Toll Interoperability (ATI) currently is evaluating different methods for operating an interoperability “hub” that could allow seamless toll collection operations among member agencies even if they use different tolling technologies. Among the back office functions that the hub would have in common with an MBUF system are (1) maintaining a current customer database with regular and frequent updates; (2) processing transactions for vehicles based outside the state in which the toll transaction was recorded; (3) reconciling amounts owed to each participating agency; and (4) allowing for coordinated enforcement of toll payments. Because many of these activities involve state department of motor vehicle (DMV) records, ATI has formed a partnership with AAMVA to address DMV interactions with toll authorities in four key areas: (1) a license plate directory to facilitate toll violation processing and potentially toll collection using license plate recognition; (2) toll violation reciprocity and enforcement; (3) access to the DMV data bases; and in the future (4) development of a consolidated data base for toll enrollment and other functions.

Many of the activities being undertaken by the toll industry may provide a strong foundation for states to build on as they develop the user enrollment, revenue collection, interstate reconciliation, and enforcement procedures necessary for even the initial stages of an MBUF system. Currently, toll collection uses different technologies than those envisioned to record and report mileage under the long-range MBUF concept of operations, but future toll collection technology alternatives may be better aligned to support the functions required for an MBUF system, further strengthening potential linkages between toll collection and MBUF collection. As toll facilities become more prevalent, the number of toll operators participating in interoperable programs and systems will increase, and more and more drivers will be exposed to electronic toll collection. All of these factors will make it easier to begin implementing MBUF systems when states are ready to transition to that new revenue collection mechanism. They may also help expedite the transition process, making it easier and faster for states to move from initial implementation to full implementation of an MBUF system.

6.2 Critical Issues for Transitioning to a Mileage-based User Fee

State representatives on the Project Working Group generally believe that implementation of an MBUF would have to be incremental, both in terms of the functionality of the MBUF and the number of users who would initially be enrolled in a new system. At this point in the Coalition's research, it would be premature to suggest a definitive transition strategy that states might use to begin implementing an MBUF. By identifying some of the critical issues involved in a transition strategy, states can begin to understand the administrative requirements that would be needed from the outset and how those requirements might change as states move toward eventually implementing the long-range vision described in the ConOps.

No time frames for moving from initial implementation to full implementation are suggested, and each state could move at its own pace. Once they have made the difficult decision to begin implementing an MBUF system, however, states may want to move as quickly as possible to full implementation since during the interim they would have to administer a dual MBUF/fuel tax system, which will be difficult, as discussed below.

6.2.1 Initial Transition Considerations

The most important administrative decisions relating to MBUF systems will have to be made during initial implementation. Among those decisions are:

- Whether to assess fees for travel on all roads or only currently non-priced roads;
- What vehicles to enroll first in the MBUF system;
- How to collect the MBUF revenues;
- What minimal functional and technical requirements the system must meet;
- What equipment is able to meet the system requirements and how it will be certified;
- What standards are required for database structures, and what file formats and communication protocols to use for accurate and efficient data exchange;
- What new customer service functions are required to support motorist needs and payments;
- How MBUF payment will be enforced; and
- How the MBUF system will be administered, including potential clearinghouses to reconcile fees owed to the various participating states.

Most administrative structures established during the initial stage will carry forward to full implementation of the MBUF system, although requirements will become more complex and may have to be modified based on experience during early stages of implementation.

6.2.1.1 Functionality

Since the focus of this project is on administrative requirements associated with a multistate MBUF system, it is assumed the lowest functionality that states would consider would include metering mileage traveled in each participating state and allocating revenues based on the relative travel in each state. State representatives participating in this study did not necessarily see including the full functionality outlined in the MBUF system concept of operations from the outset. If tolls and congestion charges are to be collected through an MBUF system, that functionality likely would be added some time after the basic functionality of collecting MBUFs on overall travel within the state had been implemented.

The I-95 Corridor Coalition's Member Advisory Committee clearly recognized the need for a system design that is scalable from the standpoint of adding transaction volume, geographic coverage, and added functionality to allow the MBUF system to evolve. For instance, administrative and cost efficiencies may be possible if toll facilities are included in an MBUF system at some point in the future, so the basic system architecture and design must be open and flexible to allow states the option of evolving an initial MBUF system to include toll collection. Likewise, some local jurisdictions may eventually seek added functionality including local/regional MBUF charges on top of state fees, congestion charges by time of day or level of service; lane-level charging for managed lanes, etc. While these are all transition issues to be addressed as part of evolving an initial system deployment to future functionalities, the initial base system architecture must be structured in a manner to recognize and facilitate such growth in the system over time.

MBUF pilots conducted to date have demonstrated that existing equipment can summarize and report miles of travel by state, but such capabilities are not available on even high-end vehicle navigation systems being installed in vehicles today. States participating in an initial multistate MBUF system will need to work together to define a set of system requirements that not only accommodates identification of miles driven by state, but also anticipates the need for future system expansion related to recording and reporting travel by jurisdiction, by route (as would be required when toll facilities are included), and by lane (as would be required for some pricing systems). States participating in a multistate MBUF will need to decide how to establish system requirements and on-board unit (OBU) standards in a manner to, at a minimum, identify the jurisdiction of travel, and also to allow for added functionality to collect other road-user charges, such as tolls, for states that would like to pursue that course of action in the future.

In addition to issues associated with the required geographic resolution, other system requirements must address the accuracy of distance measurements, how mileage by jurisdiction is stored and reported, how much storage capacity is required on the OBU, how tamper-resistant the OBU and its in-vehicle connections are required to be, how the equipment interfaces with the vehicle, how mileage would be recorded should the on-board equipment stop operating, how privacy would be protected, etc.

Establishing these standards and specifications would be difficult enough to develop for a single state, but reaching agreement among a group of states will be even more difficult, especially without federal involvement. Adding to the complexity of developing requirements and standards is the issue of maintaining as much flexibility as possible for different private sector firms to compete in the provision

of the elements of the system and the required equipment. Despite the challenges, institutional models such as the interoperable E-ZPass electronic toll collection system may provide valuable insights into how to develop a multistate revenue collection system and standards.

Even if only the minimum functionality needed to support the sharing of state MBUF revenues is initially incorporated in the MBUF system, most of the administrative features needed to support the advanced functionality outlined in the ConOps would still be required from the outset. Each state would still have to designate an MBUF processing organization to implement the functions required for those organizations as outlined in the ConOps. Cost savings potentially could be realized if several states share MBUF processing organizations, but vehicle ownership information would have to be protected in conformance with state privacy laws. States participating in an initial multistate MBUF system should explore this possibility as they consider how MBUF processing organization functions will be administered.

MBUF Clearinghouses. Once more than a few states are participating in the MBUF system, one or more clearinghouses would be required to efficiently handle the reconciliation of revenues among states. The basic reconciliation process would be the same regardless of the number of entities participating, but starting with only a few states would provide the opportunity to ensure that the process was working to all states' satisfaction.

Clearinghouses have been established for similar purposes in connection with both the International Registration Plan and the International Fuel Tax Agreement, and there also is a clearinghouse for reconciling E-ZPass receipts due to each toll agency. While clearinghouses operated in conjunction with E-ZPass and the International Registration Plan may serve as models in designing MBUF clearinghouses, there will be several significant differences between MBUF clearinghouses and these other clearinghouses including:

- The MBUF clearinghouse may be the best entity to maintain up-to-date rate schedules for all participating jurisdictions and toll agencies and to share those schedules with members when there are any changes; and
- The clearinghouse may have to interact with other regional MBUF clearinghouses as MBUFs are adopted by states across the country.

The nature and composition of MBUF clearinghouses is likely to evolve during the MBUF transition process. Initially, clearinghouses may include only a few states, but as additional states adopt MBUFs, the clearinghouses will likely add members. It may be desirable to have more than one clearinghouse operation to ensure open systems interfaces, competition among private service providers, and choice for states that choose to adopt MBUFs. If initial deployment of MBUFs occurs in different regions of the country, a business model of multiple clearinghouses may facilitate integration efforts in the future. Cooperative agreements among participating states will be necessary to establish the legal basis for the collection and distribution of revenues among participating states and to specify how the clearinghouses would function to reconcile revenues owed to each jurisdiction. There clearly are opportunities for involving the private sector in operating MBUF clearinghouses, and several private sector firms noted opportunities to provide for competition in offering clearinghouse services.

6.2.1.2 Initial Users

Many of those interviewed for this project recommended beginning to implement an MBUF with only a portion of the road users in any given state rather than trying to enroll all users from the outset. Unless states have undertaken a comprehensive pilot, they almost certainly will have to be prepared to modify

administrative procedures as both they and the users learn from early experiences in operating under an MBUF. Modifying a system that applies only to a portion of users would be easier than if the system applies to all users. Also, states could begin implementing an MBUF system sooner if they did not have to wait until the entire vehicle fleet had the necessary equipment, and public opposition might be lower if only a portion of the population initially was required to enroll in the new MBUF system.

Two options for phasing in an MBUF are discussed below. One would require all vehicles that meet certain criteria to enroll in the system and the second would allow users to voluntarily enroll in the MBUF system.

Required Enrollment in the MBUF System. There are several ways that states could begin enrolling vehicles in an MBUF system. An approach often suggested is to begin with electric vehicles and perhaps hybrid-fuel vehicles. The rationale for beginning with these vehicles is that today they pay much less fuel tax per mile of travel than other vehicles. Requiring them to pay an MBUF would make up for the fact that those vehicles do not share equitably with other vehicles in paying the costs of providing, maintaining, and operating the highway system. However, these vehicles are expected to be a relatively small portion of the total fleet over the next decade and, at the same time, conventionally fueled vehicles are approaching hybrids in fuel economy. One option would be to transition vehicles with fuel efficiencies greater than some pre-determined threshold into the MBUF system. Policy makers would have to trade off this approach against the potential impact on sales of those fuel-efficient vehicles at a time when the nation is trying to promote energy conservation and greenhouse gas emission reductions. Such an approach may also engender resistance from vehicle manufacturers trying to provide fuel-efficient options to customers in the face of rising and volatile gasoline prices.

Another option for required enrollment might be to enroll all new vehicles purchased after some pre-determined date – potentially equipped for MBUF collection – and perhaps to include vehicles that newly register or renew their registration after that date, assuming that MBUF equipment could be retrofit to those vehicles. The drawback of these approaches is the length of time it could take to enroll all vehicles in the MBUF system since registration turnover is as long as five years, and turnover of the entire fleet takes 20 years or more. Nevertheless, these extended time periods might not be an unreasonable period for some states to consider transitioning to an MBUF.

A factor that will affect any mandatory transition approach, and potentially voluntary transitions as well, is the cost of installing the equipment needed to record and report miles traveled. In the absence of federal leadership to require that such equipment be installed in all new vehicles, aftermarket equipment will almost certainly have to be retrofit in vehicles. The cost will depend on the standards established for the equipment itself and how long it takes to install the equipment in the vehicle. As discussed below, important considerations are the security of the equipment, its resistance to tampering by those seeking to evade MBUFs, and whether redundancy is provided should the equipment stop working. All of these factors can be expected to add to the equipment cost, but ultimately would also reduce revenue losses due to evasion.

The question of who would pay the cost of installing the equipment needed to record and report mileage will be another issue to resolve. Requiring the vehicle owner to pay for the equipment will be difficult, especially if there is widespread adverse reaction to the new fee in the first place. The cost likely will be considerably higher than the cost of E-ZPass transponders that customers pay for today, but unless bundled with other value-added services, there would be little benefit from the perspective of the user as there is with E-Pass. In the case of E-ZPass, while market penetration rates are impressive across the system, adoption has been purely on a voluntary basis, and many toll agencies have paid for the cost of the transponder, although, of course, the ultimate payment comes from the users of the toll

facility. If states must pay to have the MBUF equipment installed in each vehicle, the cost would be substantial. One option might be to impose a surcharge for one or more years on the vehicle registration fee to cover all or part of the cost of installing the needed equipment. Another option would be for states to borrow the money required to install equipment in each vehicle and pay back the funds with future MBUF revenues.

Voluntary Enrollment. An alternative to initiating MBUF systems by requiring mandatory enrollment of part of the vehicle fleet would be to give vehicle owners the choice of enrolling in the MBUF system or continuing to pay the fuel tax. Toll agencies now give users the choice of whether to participate in E-ZPass, and in many cases, also provide monetary incentives to encourage customers to enroll in E-ZPass, including free transponders and toll discounts. Conceivably the same kind of flexibility could be provided to users by allowing them to choose whether to pay the MBUF or continuing to pay the fuel tax.

The value added of E-ZPass adoption, in the form of convenience of non-stop tolls, reduced delays at toll plazas, the ability to use the products at many facilities and jurisdictions, and the ease of a single account and single statement of charges have all added to the public's voluntary adoption of the E-ZPass electronic payment option. Few users could be expected to voluntarily switch from paying fuel taxes to paying an MBUF without financial or value-added incentives. Those who drive fuel inefficient vehicles might pay less under an MBUF than under the current fuel tax, but even they might be reluctant to change to the new tax system. Some form of incentives would almost certainly be required to entice some users to voluntarily begin paying MBUFs. Some have suggested that monetary incentives could be provided by the state, either in the form of reduced MBUF rates for those who voluntarily agree to participate in the MBUF system or higher fuel tax rates for those who wish to continue paying fuel taxes. MBUF discounts might be acceptable for a short period to encourage users to enroll in the MBUF system, but discounts could not be sustained for many years. Raising the fuel tax to create a differential between that tax and the MBUF would be equally problematic given the current reluctance to raise taxes.

Alternatively, the equipment needed to implement the MBUF could be bundled with other value-added services that users desire and are willing to pay for such as in-vehicle navigation and wireless information services. Several private sector representatives mentioned this as a potential mechanism to get users to opt-in to an MBUF system. Public-private partnerships between private providers and the states could provide such service bundles. An extension of this concept would involve defining MBUF functional and technical requirements and allowing any certified service provider the freedom to incorporate MBUF collection in its offerings to subscribers who opt-in for its service. Since the equipment and communications service would be primarily used for commercial purposes, public costs associated with system deployment and operation could be avoided. While this approach may enable more expedient initial implementation, it is questionable whether it could evolve to the all-vehicle implementation encompassed by the concept of operations since it is very unlikely that all road users would be willing to pay for the value-added services that are central to this approach. Some plan for moving from voluntary to mandatory enrollment would have to be developed. Each state ultimately will have to decide how to transition to full enrollment, but there may be some efficiencies if states follow similar paths, especially if they adopt a voluntary approach with substantial private sector involvement.

State and private sector representatives interviewed during this project generally favored a voluntary approach to begin assessing MBUFs although many had not thought through exactly how this voluntary approach would be structured. Issues that would have to be resolved about voluntary payment of the MBUF include (1) whether lawmakers would allow tax payers to choose to pay one tax or another; (2)

how incentives needed to entice tax payers to switch to paying MBUFs would be structured and financed; and (3) how long voluntary enrollment would be allowed before all users would be required to pay the MBUF. Given their understandable interest in initiating an MBUF through voluntary enrollment, states could explore that option in more detail to determine what the public would require to entice them to begin paying the MBUF. There may be lessons available from insurance industry experience in enrolling vehicle users into pay-as-you-drive programs. If the voluntary approach appears to be feasible, states could pursue that, but they should be prepared to move to mandatory enrollment of a portion of the vehicle fleet if they conclude that the incentives required to entice users to voluntarily begin paying MBUFs are simply too great. In either case, states eventually will have to develop a strategy to move all users into the MBUF system, including those who are adamantly opposed.

Operating Under a Dual MBUF/Fuel Tax System. In deciding to initiate an MBUF system with only a portion of the vehicles enrolled, states also must be prepared to operate under a dual MBUF/fuel tax system where some users continue to pay the fuel tax while other users pay the new MBUF. Administrative mechanisms associated with the fuel tax must remain in place while new administrative mechanisms to support the MBUF system must be created. Not only does this increase overall administrative costs, but it also increases the potential for evasion since any time that there are exemptions or exclusions from a tax, the opportunities for evasion increase.

Currently, federal and state fuel taxes are paid in the first instance by wholesalers and distributors of the fuel, not by motorists when they purchase fuel. Because motorists purchase fuel with the tax already embedded in the price, those who are enrolled in the MBUF system will have to have fuel taxes they pay rebated to them in some fashion. Otherwise, they will pay both the MBUF and the fuel tax. Several options are available including (1) implementing a pay-at-the-pump payment mechanism (described in more detail below); (2) establishing a mechanism for vehicles enrolled in MBUF systems to communicate with pumps at the service station and reduce the price of fuel for those vehicles by the applicable fuel tax rate; (3) having motorists enrolled in the MBUF system file for refunds of the fuel taxes they paid; and (4) offsetting MBUFs owed by the fuel taxes paid. Each of these options has its own unique advantages and disadvantages, but all create significant complexities and opportunities for evasion.

Out-of-State Vehicles/Travel. Today the fuel taxes that users pay when traveling from state to state are not perfectly correlated with the relative travel in each state. Drivers may travel considerable distances in a state without actually purchasing fuel and thus paying fuel taxes in that state. This situation would not change during the transition to a national or regional MBUF system and potentially could get worse if states that have transitioned completely to an MBUF system do not retain a fuel tax to be applied to out-of-state vehicles that are not enrolled in an MBUF system in their state.

Another issue will be how to treat mileage traveled by in-state vehicles in other states that do not have MBUFs. Options include (1) not charging for out-of-state travel in states that do not have reciprocal MBUFs, or (2) charging users for all out-of-state travel regardless of whether drivers might have purchased fuel and paid a fuel tax in another state. Neither option will perfectly charge users for out-of-state travel and assign revenues to the proper jurisdiction, but as noted above, the fuel tax does not do this perfectly today. Once all vehicles are enrolled in MBUF systems, the correlation between travel in a state and revenues received will be much closer than it is today, but until that time there will continue to be issues with matching travel in each state with the user revenues each state receives.

6.2.1.3 Payment Mechanisms

Another major consideration in developing an initial MBUF implementation strategy is how users would actually pay the MBUF. Differences in how MBUFs are paid compared to the fuel tax will be highly

visible to the user and could affect the initial public acceptance of an MBUF system. Three general payment options were discussed with state and private sector officials during this project: pay-at-the-pump; prepayment through user accounts much like is done under E-ZPass; and post-payment much like is currently done with utility bills.

Pay-at-the-pump

Under a pay-at-the-pump system such as was employed in the Oregon MBUF pilot project, equipment would be installed in each fuel pump that would receive information from vehicles identifying those vehicles as paying MBUFs and indicating the miles driven in each jurisdiction and potentially the travel on toll facilities as well. This mileage information would be transmitted to an MBUF processing organization where MBUF fees owed would be calculated and transmitted back to the pump. Fuel taxes owed on the fuel purchased would be replaced by the MBUFs owed. Such a system has several advantages compared to other payment methods for the initial implementation of an MBUF.

As highlighted by several state officials, pay-at-the-pump would involve minimal change for users. Unlike other methods for paying MBUFs, users would not have to set up a special account from which MBUFs would be debited or receive a separate bill for MBUFs owed. MBUFs would simply be included in the price that users pay for fuel, just as fuel taxes are today. Also, in cases where both MBUFs and fuel taxes are being charged, there would be no need to refund fuel tax payments to those users paying MBUFs. Such refunds would be costly for state tax agencies to administer and unpopular with users.

Another major benefit mentioned by state and private sector officials is the fact that MBUFs would have to be paid at the time fuel was purchased, thereby easing collection and eliminating the problem of some users refusing to pay their MBUFs. Eliminating the non-payment issue is a major advantage of pay-at-the-pump.

Offsetting these advantages, however, are several disadvantages to implementing a pay-at-the-pump system. First, such a system initially would be more costly to implement since each pump would have to be equipped to receive information from the vehicle on miles traveled. If pay-at-the-pump is viewed only as an interim system to be deployed during the transition period while both MBUFs and fuel taxes are still in place, the additional annualized cost of equipping pumps could be significant, depending on the length of the transition period. If pay-at-the-pump is assumed to remain in place beyond the transition period, the additional cost of equipping pumps would be less significant.

A second potential disadvantage of pay-at-the-pump is that special arrangements would have to be made for electric and other alternative fuel vehicles that do not purchase gasoline or diesel fuel at traditional service stations. These vehicles are not expected to be a significant part of the fleet for many years, but alternative ways for those vehicles to pay MBUFs would still have to be developed.

Third, pay-at-the-pump has not been as extensively tested as other payment methods in field tests conducted to date. There are more uncertainties about how a pay-at-the-pump system might be implemented than with other payment mechanisms. These uncertainties can be overcome with further testing, but at this point, the costs and other potential issues associated with a pay-at-the-pump system cannot reliably be assessed.

Fourth, in the Oregon field trial, service delays associated with the pay-at-the-pump system were a concern of the service station operators. During the transition period, service station operators could also be concerned about having to file for fuel tax refunds since they would have paid tax on all fuel they purchased from wholesalers. Service station operators would also be responsible for sending the

MBUFs they collect from motorists to state tax agencies. Currently service station operators do not have to send fuel taxes to the government since those taxes were paid higher in the fuel distribution chain.

During the course of interviews and other discussions with state officials in conjunction with this project, alternative approaches to implementing pay-at-the-pump were identified. One suggestion was to use a card that could be read by a pump's credit card reader to identify vehicles that pay MBUFs rather than fuel taxes. For those vehicles paying MBUFs, the fuel tax would not be included in the purchase price of the fuel. Such a card system could reduce problems associated with other means of communication between the vehicle and the pump and potentially could be used to not only identify those vehicles paying MBUFs, but also to transmit mileage information to the MBUF processing organization. Another idea was to continue using pay-at-the-pump, even after a complete transition had been made to an MBUF system.

During the transition period when states were charging both MBUFs and fuel taxes, some states could use pay-at-the-pump while others used other types of collection systems. However, after a complete transition to MBUFs and the elimination of fuel taxes, it would be difficult for some states to collect MBUFs using pay-at-the-pump while other states collected MBUFs by other methods – the pumps would need some method to identify out-of-state vehicles purchasing fuel in a state that uses pay-at-the-pump.

Exploring in detail these potential issues associated with collecting MBUFs at the pump was beyond the scope of this project. Given the interest of several states in this method of collecting MBUFs and the potential benefits in terms of enforcement, it is an option deserving consideration as states develop strategies to begin implementing an MBUF system.

Prepayment or Post-payment of MBUFs

If states decide not to implement a pay-at-the-pump mechanism initially, motorists would have to pay MBUFs to the MBUF processing organization on either a prepaid or post-paid basis. The issue of whether users should pay MBUFs in advance or after travel has occurred has not been discussed extensively to date, but it is an important consideration to be resolved before implementing an MBUF system.

The majority of state and private sector representatives interviewed for this project favored prepayment, primarily to promote collection of fees in a timely fashion and to reduce evasion. The success in realizing these objectives will depend in part on enforcement. While there was a clear recognition that prepayment will not totally eliminate collection problems, there was an expectation that prepayment could reduce overall collection costs. Disadvantages of requiring prepayment include (1) some users may resist, particularly if the prepayment amount is perceived as too high; and (2) lower income users may lack relationships with financial institutions, making prepayment more difficult.

Verifying MBUF Bills. Regardless of the type of payment mechanism, most users will want to be able to verify that the amount they are being charged is correct, particularly during the initial implementation of MBUF systems. To protect privacy, only the minimum amount of travel information required to allow funds to be distributed to jurisdictions based on total travel in each jurisdiction is assumed to be transmitted to MBUF processing organizations in each state. The only detail users will receive back from the state to allow them to verify that they were charged correctly will be the summary of miles traveled by jurisdiction. For many users this level of information will be adequate, but others may desire more information. For instance, phone companies provide detailed information on the date, time, and

number for each call made, and E-ZPass statements include detailed trip information that will not be available from MBUF systems.

Detailed information on individual trips is assumed to be stored in the equipment that records and reports aggregate information to MBUF processing organizations. Providing access to this information would allow users to verify their MBUF bill, but it also might subject that detailed information to subpoena or other legal actions that some users might want to avoid. One option would be to allow users the option of accessing detailed trip information if they wished or to erase that information from the on-board equipment as soon as aggregate information has been transmitted to the MBUF processing organization. Allowing users to access the information, of course, would create another opportunity for evasion, so if this option were provided, safeguards would be necessary to prevent users from erasing or altering the data before it has been transmitted to the processing organization.

Allowing the vehicle owner to download detailed trip level travel data would also provide a mechanism for providing that data to state agencies for transportation planning purposes. Many owners might not want to provide detailed records of their travel to state agencies, but others likely would be willing to do so, particularly if they were paid for the data. This might be one option for allowing transportation planning agencies access to at least a sample of detailed travel data without violating the privacy of those who do not want to make those data available.

6.2.1.4 System Standards and Interoperability

As noted above, before initial implementation of an MBUF system can begin, detailed system requirements must be developed. These detailed requirements will lead to specifications and eventually to standards for the equipment and services used to collect, communicate and process MBUFs. The participating states will have a role to play in defining requirements such as what information to collect and report, how frequently to collect the information, and how accurate the information must be. Further requirements will be needed related to equipment redundancy and self-diagnostic capabilities included in the ConOps. Eventually, standard setting organizations will use their established processes to set standards for the in-vehicle equipment and communications protocols used to report MBUF information. The pace at which standards will be established will depend on the number and size of initial MBUF deployments and the level of interest in further deployments. The participation of multiple states and the federal government in a deployment would speed the standards development process and ensure interoperability.

One option for states that do not wish to wait for equipment standards to be developed by an outside group would be to stipulate in specific terms the functionality to be provided by equipment to be used by the first group(s) of enrollees, along with communications and data exchange standards. Those states would need to recognize that the initial equipment they require may have to be replaced at some point as national standards are developed and determine that the benefits of beginning to implement an MBUF system sooner outweigh the costs associated with having to replace equipment once broader standards have been developed.

An important consideration related to the development of standards and system requirements during early stages of the transition to an advanced MBUF system is how long the transition is expected to take. If the transition is expected to be relatively short (less than 5 years), states may wish to require equipment that could support all elements of the advanced functionality so that new equipment would not be required to move to more advanced functionality. If the transition to an advanced MBUF system is expected to take longer than 5 years, replacing the equipment may be cost effective since technology is changing rapidly and the original equipment will have served a relatively long life.

Most MBUF field trials conducted to date have used equipment physically connected to the vehicle to record and report miles traveled. A pilot project currently underway in Minnesota is testing an alternative approach that uses MBUF-dedicated smart phones rather than fixed on-board equipment to record and report miles traveled. That demonstration is receiving considerable interest because of the ubiquity of smart phones and the relatively low cost of developing applications that could perform many of the necessary functions required in an MBUF system. Many issues would have to be resolved before decisions could be made concerning the potential for smart phones or similar personal devices to be used as part of a long-term system for collecting MBUFs. These issues are significant enough that it is premature to assume at this point that such equipment ultimately could be used for collecting and communicating MBUF information. Further field tests would be required to address these issues not only from a technology perspective but also from an administrative perspective.

Private sector representatives were asked their opinion regarding whether equipment used to record and report mileage information should be linked to the vehicle or whether multiple devices such as smart phones could be used to record miles traveled by a single vehicle. Most felt strongly that devices should be linked to the vehicle to make auditing and enforcement easier, but it was noted that technology in this area is changing rapidly and standards should not preclude options that may be feasible in the future. It may be better to consider the use of smart phones and similar personal devices as potential candidate technologies for MBUF systems in the future and begin implementation of MBUF systems with more secure devices that are physically connected to the vehicle.

6.2.1.5 Enforcement

Enforcement will be an important administrative function associated with MBUF systems. Currently, fuel taxes, registration fees, and motor carrier fees have relatively low levels of evasion, due to the administrative processes associated with collections from known vehicle owners for most fees, and the initial payment of most fuel taxes by a relatively small number of fuel distributors rather than by individual motorists. Some toll facilities have higher evasion levels, particularly those that capture license plate images and obtain vehicle owner information from DMVs based on those images. Toll collection is further complicated by risks associated with the strength or weakness of legislative and adjudication mechanisms required for effective collection, particularly for out-of-state vehicles that unlawfully use E-ZPass lanes. Concerns are that evasion rates for an MBUF system, without effective enforcement measures, could be more like those for toll facilities than for fuel taxes or other fees.

Enforcement has two basic components. The first is to ensure the equipment used to record and report miles traveled and the associated data exchange processes are accurate, secure and tamper-resistant, and that redundant mechanisms to record mileage when the on-board equipment is not working and to serve as a check on primary reporting systems are available. Private sector representatives interviewed for this project emphasized that some segment of the population could be expected to try to avoid paying MBUFs by tampering with the on-board equipment. To prevent revenue loss from equipment tampering and malfunction, mechanisms would be needed to prevent tampering with the on-board equipment, to detect when the on-board equipment was not working properly, and to provide for alternative recording of mileage when the on-board equipment is not working. Such mechanisms have been demonstrated in previous MBUF field demonstrations and should be considered for implementation.

The second enforcement challenge will be collecting revenues from those who for one reason or another do not pay their MBUFs. This will require establishing robust collection processes and adequate penalties for non-payment supported by legislation and adjudication mechanisms. Putting a hold on renewal of a vehicle's registration is widely used today for failure to pay tolls or traffic fines that are

owed for in-state vehicles and could be used as an enforcement mechanism for payment of MBOFs as well. A more immediate penalty would be to suspend or revoke a vehicle's registration. These sanctions are somewhat effective, but it is widely recognized that many owners continue to drive after their vehicle registration has been suspended..

Fines and escalating late fees have been used to encourage more prompt payment of delinquent tolls and could be used for MBOFs as well. Some toll agencies turn uncollected toll bills over to private firms for collection, and this too may be an option for collecting MBOFs, although in the end the sanctions available to such private collection agencies are no greater than those available to the public sector. Other more aggressive options may be available to enforce payment of MBOFs, although politically they may not be viable. When customers fail to pay utility bills, the utilities have the authority to cut off service until overdue bills are paid. When persons are convicted of certain crimes, their vehicles may be impounded. Such measures are likely to be too drastic for public agencies to apply to persons who fail to pay MBOFs, but more aggressive enforcement than has been used in the past may be warranted when beginning to implement a new MBOF system.

Private sector representatives all mentioned enforcement as a critical issue in implementing an MBOF system. State and private sector officials suggested that MBOF enabling legislation might have to address the issue of enforcement and establish sanctions for tampering with on-board equipment or failure to pay MBOFs owed. Enforcement may also have to be addressed in cooperative agreements among states related to the collection of MBOFs. Lax enforcement affects not only the state responsible for enforcement, but all other states that are owed fees by motorists who fail to pay their MBOFs. The administrative impacts of any enforcement action also have to be considered. Work currently underway by the Alliance for Toll Interoperability, the E-ZPass Group, and the International Bridge, Tunnel & Turnpike Association (IBTTA) on enforcement, violation processing interoperability and related issues may be pertinent to issues associated with enforcement of MBOF systems.

6.2.2 Longer-Term MBOF Transition Considerations

After states have gained experience implementing an initial MBOF system involving only a subset of users and a portion of the potential MBOF system functionality, they will need to consider how to expand their MBOF system and move toward full implementation. Differences can be expected among states in how this transition will progress. Some will want to move more quickly than others to full implementation of the MBOF system and some may want to have several intermediate stages in the process. If anticipated from the outset, these differences should not have a significant effect on how a multistate MBOF is administered.

In moving toward full implementation, states will have to include more and more vehicles in their MBOF systems. Ideally, strategies for expanding MBOF system participation should have been developed early in the implementation process, although those strategies may have to be modified based on public acceptance and other experience along the way. Strategies will vary depending on whether initial implementation was mandatory or voluntary. Payment mechanisms, enforcement strategies, equipment and communications requirements, and other administrative mechanisms all will have to be assessed and modified as necessary to improve operations.

Until all vehicles in all states are enrolled in MBOF systems, individual states may elect to retain the fuel tax to help ensure that transportation revenue streams are not diminished during the phase-in of MBOF systems. As noted above, there are significant administrative issues associated with operations under a dual MBOF/fuel tax system. The quicker states can move away from a dual MBOF/fuel tax system, the

better, but that decision will depend in part the amount of out-of-state travel and decisions by other states on the timing of their transition to an MBUF system.

Another significant change in moving from the initial MBUF system to a more comprehensive system will be the issue of including other road user charges and vehicle fees, such as the collection of tolls. Collecting toll revenues as part of the MBUF system potentially could reduce overall operating and administrative costs since it would eliminate duplicative collection and reconciliation functions. MBUF processing organizations and clearinghouses would already be doing many of the same administrative functions being performed by E-ZPass toll operators and their various Customer Service Centers, which reconcile payments among the various toll agencies, suggesting that economies of scale could be pursued.

If tolls and congestion charges on priced lanes are collected under an MBUF system, on-board equipment would have to be able to record and report mileage by facility, time of day and potentially even the lane where travel occurs if high occupancy toll lanes are included. The ability to record travel by facility and time of day has been demonstrated in an MBUF pilot project in the Puget Sound region in Washington State, but the ability to reliably locate travel by lane has not been demonstrated to date. During the transition period toll operators would have to continue to collect tolls from vehicles that are not enrolled in an MBUF system. Ultimately, however, when all vehicles are enrolled in MBUF systems, toll facilities may no longer need to have separate toll collection equipment, although some dedicated short-range communications (DSRC) may be a desirable element of an MBUF system design.

Currently, many toll agencies do not set toll rates based on distance traveled, or if they do, it is based on interchange-to-interchange travel on closed highway systems such as turnpikes. Average rates paid per mile of travel can vary significantly on different parts of the same facility. Requiring on-board equipment to store miles traveled on each separate section of toll roads across the country would be very difficult. In discussions with state officials interviewed for this project, they indicated that toll rates could be put on a per mile basis if toll facilities were included in an MBUF system so long as it had no adverse effect on total toll revenues collected. This issue would need to be explored with a fuller set of independent tolling authorities and private operators, including bridge, tunnel, and managed lane operators, to ensure that the financial, legal and policy issues are better understood.

Before toll collection through an MBUF system could be pursued, other policy matters related to enforcement, adjudication, and audit would have to be considered. As with back office functions, both enforcement and adjudication of those not in compliance with payment may present opportunities for cost and process efficiencies among toll operators and MBUF systems.

The requirement for toll operators to audit revenue receipts could be complicated if only aggregate mileage on travel on each toll facility is transmitted from vehicles to MBUF processing organizations. This audit concern highlights the importance of fully defining functional and business requirements of both initial and future systems early and in concert with toll operating organizations. Some of these toll-related business requirements will need to be balanced against privacy concerns.

Another issue that points to the need for a comprehensive consideration of future functional requirements early in MBUF deployment is the ability of equipment installed during the initial deployment to determine whether a vehicle is traveling on a toll facility or a parallel non-tolled facility. If the initial equipment cannot discriminate between tolled and non-tolled facilities, it would have to be replaced to advance certain tolling applications. Software may also have to be upgraded to include the capability to store miles traveled on each toll facility separately from travel on non-tolled facilities in each state.

6.2.3 Long-Range Vision

The long-range vision represents implementation of the advanced MBUF system discussed in the ConOps. Not all states may reach this stage at the same time, but it is assumed that eventually all vehicles will be enrolled in an MBUF system. Decisions by the federal government with respect to a national MBUF system can be expected to influence whether and when all states fully adopt an MBUF system.

The long-range functionalities that states may incorporate in their MBUF system include the collection of congestion tolls that vary by time of day and the potential extension of MBUFs to local or regional jurisdictions that may wish to impose their own charges. This additional functionality will not apply to all states, but to the extent that such charges can be incorporated into the overall MBUF system, administrative costs could be reduced.

As noted above, once all vehicles are enrolled in MBUF systems, toll agencies should be able to remove their own toll collection equipment and cease toll collection operations. Likewise, states should be able to eliminate fuel taxes and realize significant savings in not having to administer a dual MBUF/fuel tax system.

6.3 Summary of MBUF System Transition

Implementing an MBUF system will be complex technologically, administratively, and politically. Any tax change in today's environment is difficult, but one that so significantly changes the way users pay for surface transportation improvements, and the visibility of those fees in comparison to today's fuel taxes, is particularly challenging. Virtually all those interviewees who discussed transition issues advised to keep the initial implementation simple and to phase in an MBUF system. The transition issues discussed above illustrate one way that state MBUF systems might evolve, but there are many other ways that those systems might be implemented. Several on-going activities including NMVTIS, electronic vehicle titling and registration, and efforts to advance nationwide tolling interoperability and increased cooperation among states in toll violation reciprocity and enforcement will provide a foundation and model for many of the administrative mechanisms that will be required for an MBUF system regardless of how that system evolves. Advice from one private sector representative seems particularly appropriate, however. States should have a vision for the long-term MBUF system and then move incrementally toward that vision in a way that suits their own unique situation.

7.0 Administrative Costs

7.1 Introduction

Without question, the costs associated with establishing and administering a mileage-based user fee (MBUF) system will be a key decision factor in the future of MBUFs in the U.S. Arguably, the most important factor to consider in assessing the administrative costs of an MBUF versus other revenue sources is the comparisons of those costs in the context of the entire range of functions and benefits which can be associated with MBUFs. MBUFs, as described in the concept of operations (ConOps), have inherently different functions and benefits than current highway revenue sources, including:

- Allowing for variable charges by facility and by time of day to manage congestion;
- Allowing collection of fees that directly reflect travel on the highway system;
- Incorporating communications and location identification capabilities which can allow faster emergency responses to accidents or incidents, with demonstrated benefits to users;
- Allowing coordination with other mileage-based fees, such as pay-as-you-drive (PAYD) insurance; and
- Facilitating the achievement of social or policy objectives, such as differential pricing for different types of vehicles.

Administrative costs are defined as all of the costs that an agency incurs to collect MBUFs, including costs for enforcement and for the allocation of revenue on a multistate, multi-agency basis. It is particularly difficult to assess the likely administrative costs of MBUFs imposed on all vehicles, because there are no such fees now being collected anywhere in the world and because the likely full implementation of an MBUF system may be far in the future. Of course, the future administrative costs of all other revenue generation systems are also uncertain, and thus any comparisons based on current information will be only approximate.

The research undertaken to prepare this report illustrates that the simple comparison of the relative administrative costs of MBUFs to existing highway user revenues depends very much on what other revenue sources the MBUF might replace. If MBUFs replace only the motor fuel tax, overall administrative costs will be higher. However, if mileage-based user fees can also be integrated with or replace registration fees, tolls, and IRP and IFTA collections, the overall administrative costs as a share of revenues collected may be lower for MBUF systems in some future circumstances. However, this conclusion is highly tentative.

Costs of the equipment needed to record and report miles traveled are not included in the administrative costs discussed in this report. Technology specifications and costs for this type of equipment have been addressed in a wide range of other studies and demonstrations, including studies by the University of Iowa and research in other countries. The uncertainties associated with future equipment costs are even greater than the uncertainties associated with future administrative costs. We do not know, for example, whether location identification and communications equipment that might be useful for an MBUF system will become standard for future vehicles sold by automobile manufacturers. And private sector representatives have noted that per vehicle or per transaction costs for toll applications have tended to decline over time and as traffic volumes increase.

There are also many uncertainties about future technologies and about whether or not some of the capabilities necessary for an MBUF system will already be installed in vehicles or will otherwise be available to users through applications for other purposes. For example, if all future vehicles being sold

already have location identification equipment and wireless communications systems, then the costs of preparing those vehicles to record and report mileage traveled for MBUF purposes might be only the marginal costs of modifications to existing features. When states are closer to making decisions on whether to implement MBUF systems, equipment costs will become more important. However, those costs are not included in the administrative costs discussed in the remainder of this chapter.

7.2 Administrative Cost Estimates

7.2.1 Phase 1 Estimate of Administrative Costs for Mileage-Based User Fees

Since there are no mileage-based user fees for general purpose traffic anywhere in the world, there is no real-world experience to draw upon in estimating MBUF administrative costs in the U.S. or elsewhere. The best starting point for estimating MBUF administrative costs are the published cost estimates by private vendors for a proposed and then canceled Netherlands national MBUF system. The system was to have had high functionality, similar to the long-range vision described in this study, but the system was to have been fully outsourced to the private sector with no linkages to vehicle registration and other administrative systems and data maintained by the Netherlands' government. The annual administrative costs, based on the Netherlands' private sector system estimates, were included in a recent NCHRP project 19-08 study (NCHRP Report #689), "Costs of Alternative Revenue Generation Systems", which was prepared by Battelle. Those annual administrative costs ranged from \$51 to \$115 per vehicle, not including the initial equipment costs, which were estimated by the various vendors to be \$254 to \$283 dollars per vehicle.

The I-95 Corridor Coalition's Phase 1 MBUF research, which drew heavily on the Netherlands' cost estimates, concluded that the \$51 annual administrative cost per vehicle for 2007 represented the lowest cost that could currently be expected in the U.S. for a similar fully functional, stand-alone MBUF system fully outsourced to the private sector. However, the costs per vehicle might be reduced to about \$40 per vehicle by fully integrating the MBUF administration functions with the state registration functions that now cost an average of \$11 per vehicle in the I-95 Corridor Coalition states. This assumes that all functions could be performed without duplication. The administration of an MBUF system might be done by either a private vendor or a public agency, but the key to reducing costs is to integrate MBUF functions with existing administrative functions such as vehicle registration, toll collection, IRP, IFTA, and related programs.

Additional savings of up to \$10 per vehicle could be possible if a lower functionality MBUF system was implemented, reducing the annual administrative costs to about \$30 per vehicle. Such lower functionality systems, however, would not integrate toll collection into the MBUF system, and thus, states or toll agencies could not realize the efficiencies of collecting tolls through the MBUF system.

In the Coalition's Phase 1 report, it was estimated that savings from integrating MBUF collection with IRP and IFTA collections would probably not be substantial, because vehicles subject to these fees are a very small percentage of total vehicles. The Phase 1 research also concluded that neither heavy vehicle users nor states would incur significant added costs under an MBUF system since for all practical purposes these users already compile miles traveled by state for their fleets in order to report under IRP and IFTA. However, the current IRP and IFTA records of the various firms are a mixture of paper records and electronic files in different formats. Thus, some efforts to reconcile and standardize these reporting systems will be needed to automate the administration of heavy vehicle MBUFs. Such reconciliation and electronic standardization may have benefits to carriers and states under IRP and IFTA even if there are no MBUFs. Heavy vehicles constitute seven percent of total miles traveled and just over one percent of

total vehicles, so the lack of savings of costs or of net new costs for these vehicles will not substantially affect total administrative cost estimates.

7.2.2 Phase 2 Administrative Cost Estimates

The MBUF system proposed in 2009 in the Netherlands still represents the best available starting point for an analysis of the costs of implementing mileage-based user fees. The costs estimated in this research are largely based on the costs estimated for the Netherlands project by private service providers, in what was basically a national “turn-key” administrative model in which all functions would be performed by a single private contractor team. The Netherlands is not proceeding on a system, primarily because of a change in government leadership, so the actual costs of the system remain uncertain. Other countries such as Germany have mileage charges which apply only to heavy trucks and only on designated roadways; both the administrative costs of approximately \$1,200 per vehicle in Germany, and the amounts collected per vehicle mile of travel are very high in relation to any charges that have ever been proposed for light vehicles.

The cost analysis reported below is based on the Netherlands costs as compiled for the NCHRP 19-08 task reports, which utilize somewhat different though comparable breakouts of cost categories than have been utilized by this I-95 Corridor Coalition study. The cost analysis is augmented with observations from current state experiences with the administrative costs of their current fees, including their experience with administering registration fees, the IRP, IFTA, and motor fuel taxes.

Table 7.1 shows the overall annual administrative costs as estimated in the NCHRP report for the three estimates that were examined in depth. The NCHRP report does not estimate overall administrative costs, but has a subcategory termed “administrative” costs that appears to reflect those costs referred to as “enrollment” costs in this report. Estimates in this report are based on estimates from Siemens, which had the lowest costs in relation to any unit of measurement among the bidders for the Netherlands system.

Table 7.1: Overall Annual (Administrative) Cost Comparison Among Vendors

Cost Item	Average over Providers	Siemens	T-Systems	Vodafone
<i>Per Unit of Total Operating Cost</i>				
\$ per 1,000 VMT	6.26	4.72	10.99	6.90
\$ per vehicle	75.16	51.33	114.66	61.05
% of total revenue	6.6%	4.1%	9.6%	6.0%

Source: “Costs of Alternative Revenue-Generation Systems, Interim Report #1, for NCHRP Project 19-08, December 2009 (NCHRP Report #689)

Siemens’ estimates for various administrative cost items for the proposed Netherlands MBUF system were compared to state administrative costs for vehicle registration, IRP and IFTA systems, and toll collection to determine if there is any evidence that state MBUF costs might be lower than the Siemens’ estimates. Since the Coalition’s Phase 1 report had already estimated that combined registration/MBUF systems could avoid duplicating the enrollment costs that would be incurred under the Netherlands cost estimates, no other potential savings were deemed to be available in the enrollment category. For IRP and IFTA, the Phase 1 study found that administrative costs in the states range from over \$40 to over \$100 per account. It is difficult to compare IRP/IFTA costs with those estimated for the Netherlands system, but in total, IRP/IFTA administrative costs are no lower than costs for the Netherlands system.

7.2.3 Details of the Administrative Cost Categories – Enrollment and Collection Categories

Table 7.2 focuses on the most important categories for administrative costs in the Netherlands information. The “administrative” and collection costs identified in Table 7.2 correspond most closely to the enrollment and collection functions examined in this study. For the Siemens’ estimate, which is the basis for further refinement of MBUF cost estimates, administrative costs were evenly divided between enrollment and collection. Enrollment costs represented a higher portion of total administrative costs for the other two bidders. As noted above, it is difficult to determine exactly what is included in each vendor’s costs for enrollment and collection, so the total administrative cost estimate is more important than the amount estimated for individual functions.

A significant cost driver for MBUFs is whether state motor vehicle titling and registration data and processes are used or whether a duplicative effort is required to enroll vehicles in the MBUF system. The cost to establish a separate entity to enroll and bill customers should not be minimized. States or their contractors could use the department of motor vehicles (DMV) titling and registration process as the MBUF enrollment mechanism. This analysis does not imply that these functions need to be accomplished by the DMV itself. The functions could be performed by another state agency or contracted to a state processing organization as noted in the ConOps, as long as full cooperation is maintained on registration and mileage files. Processing organizations could be new government agencies, private entities, or toll agencies.

States are moving to electronic registration renewals on the Internet to save time and money and to reduce the need for users to travel to motor vehicle offices. States and the American Association of Motor Vehicle Administrators (AAMVA) are also moving forward in the electronic titling arena, which would pose significant synergies in an MBUF system and is noted as a critical component in the long-range vision ConOps presented in Chapter 4. Such electronic titling and registration systems would be most desirable for an MBUF system and remain critical transition components.

Table 7.2: Netherlands “Administrative” (Enrollment) and Collection Cost Comparisons Among Vendors

Cost Item	Average over Providers	Siemens	T-Systems	Vodafone
<i>Per Unit of “Administrative” or Enrollment Cost</i>				
\$ per vehicle	\$38.59	\$13.64	\$60.12	\$40.65
<i>Per Unit of Collection Cost</i>				
\$ per vehicle	\$15.06	\$13.62	\$27.24	\$ 5.89

Source: “Costs of Alternative Revenue-Generation Systems, Interim Report #1, for NCHRP Project 19-08, December 2009 (NCHRP Report #689)

User enrollment will have some additional costs over and above current registration enrollments due to two factors: (1) more information is required and (2) more frequent and more accurate updating of accounts is required, including both prompt information on new registrations and transfers of registrations or deregistration of vehicles.

Vehicle ownership changes will pose major challenges for MBUF administration (as they do to current state titling procedures) and will be a significant cost driver. It is important to recognize that vehicle ownership turnover occurs frequently. An administrative mechanism must be included as part of

enrollment that immediately notifies appropriate MBUF state processing organizations of changes in vehicle ownership, including dealers who take ownership of vehicles and subsequently resell those vehicles. It is uncertain the extent to which cost estimates for the Netherlands system included such enrollment considerations. Again, the motor vehicle community's movement towards electronic titling is an important development in addressing ownership changes and administrative cost requirements of an MBUF system as well as current systems.

Billing and collection costs are a substantial portion of total administrative costs. In Phase 1, it was noted that states are doing more with electronic payment methods, but a Federal Deposit Insurance Corporation (FDIC) 2009 "National Survey of Unbanked and Underbanked Households" indicated that 7.7 percent of U.S. households had no checking or savings accounts and another 17.9 percent are underbanked (in that they have a savings or checking account but also rely on other non-bank methods). Basically, some portion of households must rely on cash-based transactions and would typically pay cash for their registration fees. There is likely to be some overlap between those households that do not own autos and those that do not have bank accounts. Toll agencies are already exploring the use of kiosks and prepaid cards and other ways to address this issue.

One cost saving opportunity is to move away from face-to-face transactions. One state agency quantifies the administrative costs for titling as \$9.65 per transaction if done in person and only \$1.93 if done through the mail, and registration renewal processing costs of \$0.50 if done in person versus \$0.11 through the mail and \$0.87 through the Internet (due to credit card fees.) Credit card fees could be eliminated or reduced by opting instead for direct deductions from bank accounts for those users with bank accounts. This research assumes (although without perfect evidence) that considerations of this type were included by the private companies that made the estimates for the Netherlands contract. If not, there could be some minor additional savings compared to the Netherlands estimates, but given these uncertainties, we have not assumed that such savings in comparison to the Netherlands estimates are achievable.

7.2.4 Details of the Administrative Cost Categories - User Interface, Enforcement and Auditing Categories

Enforcement and auditing cost drivers will include (1) monitoring the operation of all user equipment associated with MBUFs; (2) monitoring the payment status of accounts, and collecting unpaid fees; and (3) auditing MBUF accounts. Monitoring equipment status is assumed to be done through cellular communications. Administrative procedures will be necessary for collection of fines levied for tampering with MBUF equipment, and for ensuring that malfunctioning equipment has been repaired in a timely manner. Monitoring and acting on late or incorrect payments will be a large cost driver. User appeals and grievances with billing will need to be addressed and will require considerable back office administrative support to resolve fairly and quickly. Experience with the procedures currently in place under IRP and under E-ZPass may offer some guidance on the administrative efforts and costs of appeals and grievance resolutions for multistate MBUFs.

Auditing will be another important function to ensure that reporting and payment of MBUFs are legitimate. The IRP has recordkeeping requirements to enable audits rather than a regular reporting requirement. For light duty vehicle owners, automated procedures are considered to be the only option for recordkeeping that would not add an unreasonable burden and would be acceptable to the general public. Procedures to protect privacy could severely limit recordkeeping. As with emissions reductions programs, an MBUF system must rely on the equipment working properly.

The preliminary estimate for user interfaces, enforcement and auditing is based on information from those estimating costs to operate the Netherlands system; on a per vehicle basis it is \$1.46 to \$9.51 per vehicle per year, which is a portion of the total costs shown in table 7.1, ranging from \$51 to \$115 for the vendors. The fairly wide range is due partly to how costs were allocated by the three vendors. The Netherlands estimates for these functions may be low for U.S. agencies, which tend to place a very high premium on customer responsiveness.

Costs related to addressing privacy concerns in the U.S. may increase these costs. Neither the NCHRP 19-08 study nor this study reviewed detailed privacy-related costs that may have been embedded in the Netherlands bids. Efforts to reduce costs in all of these areas would be focused on automation of enforcement and auditing. Lower costs of user interface will occur if users have no problems with billing and collection.

7.2.5 Details of the Administrative Cost Categories - Calculating Mileages and Distributing Revenues and Preserving Data

The Netherlands was not concerned with calculating and reconciling mileages among jurisdictions, or with distributing revenues. However, these are very low cost functions, as demonstrated by the experience of the clearinghouses under IRP, IFTA, and E-ZPass. The annual costs of these reconciliation and revenue distribution functions will be minor as long as there is a clearinghouse and agencies do not need to reconcile and distribute revenues on a one-for-one basis. State fees for the IFTA clearinghouse, for example, are \$11,000 per year. Thus, this study did not find that the costs of these functions not included in the Netherlands estimates would materially affect overall costs.

Preserving data is addressed in the ConOps with an emphasis on user privacy, wherein users can check on the accuracy of billings and may also volunteer to provide data for planning purposes. Providing this capability will be included in the cost of mileage recording and reporting equipment and is not included as a separate administrative costs.

7.3 MBUF Administrative Cost Estimate in Perspective

7.3.1 Important Caveats about Cost Estimates

Costs associated with administering a mileage-based user fee system are highly uncertain for several reasons. First, implementation is likely to be well in the future and there are many unknowns as to technologies that will be available, what they will cost, and how they will affect MBUF administrative costs. Second, there is some likelihood that future vehicles will be manufactured with more of the functionalities necessary for the collection of MBUFs. Third, the extent to which other applications using location identification and wireless communications capabilities needed for MBUF systems will already be operating between vehicles and information hubs is unknown, but is likely to be extensive.

An MBUF system will always be more expensive to administer than the current motor fuel tax system under which only a relatively small number of major fuel suppliers actually pay the tax. An MBUF system will include many more administrative functions and several orders of magnitude more taxpayers than the fuel tax.

7.3.2 Administrative Costs In Comparison To Current Revenues

The average annual total U.S. federal fuel tax paid (at 18.4 cents per gallon) by a motorist today who drives a light duty vehicle 10,000 to 12,000 miles per year at 20 miles per gallon (the current national

average as estimated by FHWA for on-road fuel consumption) is around \$100 per year. With the addition of an average state fuel tax just above 20 cents per gallon, the light duty vehicle owner pays about \$200 per year in total motor fuel taxes, or about 2 cents per mile. The heaviest combination trucks, which average about 65,000 miles per year at about 6 miles per gallon (and pay a federal diesel tax of 24.4 cents per gallon and a comparable state tax rate), pay about 8 cents per mile.

In the U.S., federal and state highway user revenues total about \$120 billion annually, including fuel taxes, motor vehicle revenues, and toll revenues. If all these sources were replaced by MBUFs spread across 240 million registered vehicles, about \$500 per vehicle per year, or an average of 4 cents per vehicle mile in MBUFs would be collected. Given their impact on the cost of constructing and maintaining highways and bridges, it would be appropriate to charge heavier vehicles higher fees per mile. This study has not addressed and does not make recommendations about the relative payments of MBUFs by different class of vehicles.

7.3.3 Comparative Administrative Costs of Mileage-Based User Fees, Motor Fuel Taxes, and Tolls

The National Cooperative Highway Research Program (NCHRP) Report #689, (*Costs of Alternative Revenue-Generation Systems*) represents the most comprehensive recent examination of the relative costs of major highway revenue systems. The NCHRP report states:

“In conclusion, among three revenue systems analyzed, the motor fuel tax system is the most cost effective system with the lowest operating costs by all measurements. Though subject to adjustment when implemented, the costs in Netherlands’ proposed VMT fee systems are in a reasonable range in terms of the share of cost to total revenue. The costs for tolling systems based on tolling agencies examined are much higher, though manageable, than the other two systems.”

Because MBUFs can replace toll administrative systems as well as fuel tax systems, MBUFs should be examined in the context of the mix of motor fuel taxes, tolls, and other highway user fees they might replace. Table 7.3 is derived from a combination of data from [Highway Statistics](#) for the I-95 Corridor Coalition states and from the NCHRP 19-08 interim report (Report #689) for tolls and mileage based user fees, and summarizes the costs of the four major revenue systems: registration fees, fuel taxes, tolling, and MBUF fees. This table provides a highly useful starting point for framing the analysis of the administrative costs of mileage-based user fees in relation to the administrative costs of other revenue sources.

Table 7.3: Relative Administrative Costs of Alternative Revenue Systems

Category or Type of Cost	I-95 Costs for Registration Fees	I-95 Costs for Motor Fuel Taxes	NCHRP 19-08 Costs for Tolls	NCHRP 19-08 Costs for MBUF
Average Administrative Costs per Vehicle	\$12	NA	NA	\$75
Lowest Administrative Costs per Vehicle	\$6	NA	NA	\$51
Average Percentage of Administrative Costs per Vehicle	12.8%	0.9%	37 %	6.6%
Lowest Percentage of Administrative Costs per Vehicle	4.0%	0.4%	16%	4.1%

For all systems, the average administrative cost and the lowest administrative cost are shown. It is likely that agencies will seek to limit these costs in the future, and thus the lower range of costs may be more representative of cost expectations in the future. The motor fuel tax and registration estimates in Table 7.3 are taken from FHWA's Highway Statistics for the I-95 Corridor states, and the toll and MBUF estimates are from the NCHRP 19-08 interim report (Report #689). In each case, the lower costs are substantially less than the average costs as a percentage of revenues.

The estimates in Table 7.3 exclude equipment and other capital costs associated with collecting the various types of revenue, which can be substantial for toll facilities and MBUF systems. There are no likely new capital costs for continuing to collect motor fuel taxes. In the NCHRP study, capital costs for the Netherlands' system were estimated at \$254 to \$283 per vehicle, consisting mostly of on-vehicle costs. Capital costs for MBUF systems in the U.S., of course, could range up to these amounts or could be virtually zero if communications and other required equipment becomes standard on all vehicles at some point in the future. For toll systems, while Battelle gathered selected capital cost data, no conclusions could be reached about averages or ranges for the capital costs of toll systems. The addition of the capital costs could change the comparisons for MBUF versus toll systems and other revenue systems.

One strikingly applicable finding of the NCHRP study is that the comparison of the annual administrative costs for mileage-based user fees versus current revenue systems is highly dependent on the mix of revenues from tolls versus motor fuel taxes and registration fees. It is likely that MBUFs could be less costly to administer than current revenue sources for those states that have a very high percentage of toll collections in relation to their total revenues. Given the similarities in functions between MBUF and interoperable toll collection systems, it is also likely that the systems, agreements, institutional relationships and business practices developed for toll interoperability will provide a promising basis for administering MBUF effectively and at a lower administrative cost than shown in the Netherlands bids. On the other hand, toll agencies could find that communications and other equipment required to implement MBUFs could be more cost-effective for them than current toll collection systems which rely on roadside and transponder technologies. Under all options, toll agency revenues are assumed to remain fully dedicated or allocated as they are today; there would be no commingling of toll revenues and other MBUFs.

A comparison of the administrative costs of combined toll collections and motor fuel taxes to the administrative costs of mileage-based user fees can be simulated on the basis of the percentage of revenues which tolls represent in a state. For all future systems, it is assumed that the costs of administering registration fees will continue to be incurred, whether or not these fees are integrated with MBUF. Therefore, the costs of motor vehicle registration are assumed to be common parts of the costs of all future revenue systems.

As Table 7.1 illustrated, estimated administrative costs of MBUFs ranged from 4.1 percent to 9.6 percent of total revenues in the Netherlands estimates, with an average of 6.6 percent. Administrative costs for toll agencies range from 16.5 percent to 92.6 percent of total revenues. The lower ends of these ranges are the most appropriate comparisons, since all agencies will seek to perform these functions at increasingly lower costs in the future using all electronic systems for tolling, registration, and other functions. Using the lower ends of these ranges, 4.1 percent for MBUF and 16.5 percent for tolls, the breakeven point where the administrative costs of MBUF systems that include the collection of tolls as well as basic MBUFs would equal total current administrative costs of tolls plus motor fuel taxes occurs when tolls are approximately 25 percent of total revenues.

Table 7.4 shows the relationship of administrative costs for each current revenue source and for an MBUF system that includes motor vehicle registration functions and the toll collection. Under the MBUF system, vehicle registration and toll functions would not need to be duplicated, but would be performed as an integral functionality of the MBUF system.

Table 7.4: Relative Administrative Costs of MBUF Versus Current Revenue Systems

Category or Type of Cost	Costs for Registration Fees	Costs for Motor Fuel Taxes	Costs for Tolls	Costs for MBUF
Lowest Administrative Costs per Vehicle	\$6	NA	NA	\$51
Lowest Percentage of Administrative Costs – Current	4.0%	0.4%	16%	NA
Lowest Percentage of Administrative Costs – with MBUF	(Included in MBUF)	(included in MBUF)	(included in MBUF)	4.1%

If the administrative costs of an MBUF system were 8 percent rather than 4.1 percent of revenues, the breakeven point at which MBUF administrative costs would be equivalent to administrative costs for fuel tax and toll collection would occur when tolls were approximately 50 percent of total revenues. If tolls represented less than 50 percent of revenues, administrative costs for current revenue collection methods would be lower than MBUF administrative costs.

The breakeven point for when MBUF becomes less expensive than tolls could also decrease if toll collections are more costly than 16 percent of toll revenues. For example, the breakeven point would be around 20 percent of revenues for tolls if the average of 37 percent of administrative costs for tolls (from the NCHRP survey) were to be assumed.

Based on these comparisons, if mileage-based user fees replace only motor fuel taxes, overall administrative costs will likely increase as a percentage of total revenues, but if mileage-based user fees also incorporate the collection of tolls, thereby eliminating the need for toll agencies to collect tolls themselves, administrative costs could potentially decrease as a percentage of revenues in those states with a very high percentage of toll revenues.

In addition, each ratio is highly dependent on the rates being charged for either tolls or for MBUF miles of travel. Thus, the relationship between the administrative costs of MBUFs versus fuel taxes plus tolls spans a very wide range of values, and each particular circumstance must be examined.

The examples calculated here should be related to current data for states and localities. Table 7.5 shows information from the Federal Highway Administration publication Highway Statistics for 2009 on state proceeds from motor fuel and vehicle taxes, and tolls, and the percentage of total revenues from tolls. This table presents state revenue only. The inclusion of local revenues and local tolls would substantially alter these values, and of course specific states and regions are different. The New York metropolitan area, for example, has a very heavy reliance on tolls from both state agencies and from multistate agencies. Eleven states are at or above the breakeven percentage using the lowest administrative cost percentages for each revenue source, including eight states in the Coalition. Thirteen states are at or above the breakeven percentage using the average administrative cost percentages. The U.S. as a whole is almost halfway to the breakeven point using the lowest percentages and two-thirds of the way to the breakeven point using the average percentages. Because this is a hypothetical calculation of a breakeven percentage using the NCHRP report percentages, or average U.S. percentages, and because the administrative costs of mileage-based user fees are uncertain, no conclusions should be reached with regard to any individual state based on these figures.

Table 7.5: State Motor Fuel and Vehicle Taxes and Tolls 2009 Highway Statistics

State	Fuel Taxes	Motor Vehicle Fees	Tolls	Total	Percent Tolls
Alabama	697,010	167,725	-	864,735	-
Alaska	7,331	36,190	21,409	64,930	33
Arizona	459,283	236,636	-	695,919	-
Arkansas	392,517	148,689	-	541,206	-
California	5,239,858	5,937,943	344,450	11,522,251	3
Colorado	460,840	808,979	-	1,269,819	-
Connecticut	253,744	128,590	161	382,495	0
Delaware	65,927	67,674	254,158	387,759	66
Dist. of Col.	23,384	74,489	-	97,873	-
Florida	1,535,672	783,253	1,001,075	3,320,000	30
Georgia	836,561	184,748	19,491	1,040,800	2
Hawaii	78,223	87,917	-	166,140	-
Idaho	196,529	142,531	-	339,060	-
Illinois	844,383	857,823	665,687	2,367,893	28
Indiana	793,884	214,744	149,246	1,157,874	13
Iowa	411,494	443,471	-	854,965	-
Kansas	331,620	92,967	79,589	504,176	16
Kentucky	534,759	493,689	-	1,028,448	-
Louisiana	596,301	181,504	38,730	816,535	5
Maine	231,369	54,849	132,842	419,060	32
Maryland	564,787	577,737	275,715	1,418,239	19
Massachusetts	588,395	317,559	380,423	1,286,377	30
Michigan	803,857	732,352	33,660	1,569,869	2
Minnesota	533,873	392,029	-	925,902	-
Mississippi	368,623	144,108	-	512,731	-
Missouri	677,287	287,087	-	964,374	-
Montana	92,861	105,845	-	198,706	-
Nebraska	305,979	61,157	-	367,136	-
Nevada	436,131	205,863	649	642,643	0
New Hampshire	131,461	121,482	104,788	357,731	29
New Jersey	281,555	462,054	1,152,093	1,895,702	61
New Mexico	175,942	215,268	-	391,210	-
New York	1,204,390	896,954	1,187,354	3,288,698	36
North Carolina	1,384,845	599,849	2,106	1,986,800	0
North Dakota	130,590	75,306	-	205,896	-
Ohio	1,600,371	713,338	186,824	2,500,533	7
Oklahoma	68,218	90,710	206,431	365,359	57
Oregon	266,419	262,278	-	528,697	-
Pennsylvania	1,256,277	446,579	793,886	2,496,742	32
Rhode Island	47,993	21,974	10,630	80,597	13
South Carolina	501,363	172,839	12,374	686,576	2
South Dakota	106,644	2,974	-	109,618	-
Tennessee	703,203	316,467	36	1,019,706	0
Texas	1,113,441	1,824,260	413,599	3,351,300	12
Utah	329,243	111,175	1,221	441,639	0
Vermont	53,004	100,560	-	153,564	-
Virginia	630,807	574,348	20,545	1,225,700	2
Washington	1,163,235	411,664	161,856	1,736,755	9
West Virginia	381,091	242,378	53,673	677,142	8
Wisconsin	771,167	479,059	-	1,250,226	-
Wyoming	32,415	37,221	-	69,636	-
Total	30,696,156	22,146,885	7,704,701	60,547,742	13

7.4 Current Administrative Costs of Fuel Tax Collection and Registration Fee Collection

Nationally, administrative or collection expenses for motor fuel taxes constitute an average of 0.82 percent of motor fuel tax receipts over the past decade, based on information compiled from FHWA's annual report Highway Statistics. The figure is comparable for I-95 Corridor Coalition states, estimated at an average of 0.86 percent. Nationally and for the Coalition member states, collection expenses constitute 11.0 percent and 12.8 percent of the motor vehicle registration receipts, at an average cost of almost \$13 per vehicle nationally, and almost \$12 per vehicle for Coalition states.

Table 7.5 shows that the share of motor fuel and motor vehicle revenues used for collection expenses and the cost per vehicle fluctuates across Coalition member states. For instance, in Delaware, less than 4 percent of the motor vehicle receipts pay for collection expenses, compared to over 27 percent in South Carolina. These variations are again due both to differing requirements, such as for vehicle inspections, and the differing protocols used in reporting administrative costs. Variations also are due to different vehicle registration fees. Some states simply try to cover administrative costs while others view the registration fee as a revenue source that may be easier to increase than the fuel tax.

In some states, localities perform some of these collection functions, so costs are not comparable to those of other states. The NCHRP 19-08 report did not compile the administrative costs for registration fees, since their focus was on alternatives to motor fuel taxes. As noted, the costs of registration fee collections are assumed to continue under all future alternatives. Those costs may be reduced, but they will be similar if current revenue systems are continued or if MBUF systems are implemented.

Table 7.5: Collection Costs as a Percentage of Total Receipts for Motor Fuel Taxes and Motor Vehicle Fees, and Cost of Motor Vehicle Fee Collection per Registered Vehicle (1997-2007)

States	Admin-Fuel Tax Percent	Admin-Veh Reg Percent	\$/Registered Vehicle
Connecticut	0.95%	16.35%	\$16.30
Delaware	1.10%	3.96%	\$5.79
District of Columbia		12.01%	\$40.99
Florida	1.13%	7.34%	\$5.72
Georgia	1.07%	20.89%	\$8.85
Maine	0.38%	26.81%	\$22.49
Maryland	0.89%	13.76%	\$34.55
Massachusetts	0.90%	14.84%	\$9.12
New Hampshire	0.49%	17.52%	\$16.63
New Jersey	1.00%	15.70%	\$16.64
New York	1.00%	17.97%	\$14.45
North Carolina	1.40%	14.41%	\$9.39
Pennsylvania	0.86%	8.97%	\$8.12
Rhode Island	0.36%	21.62%	\$18.76
South Carolina	1.39%	27.11%	\$13.95
Vermont	0.92%	10.09%	\$21.55
Virginia	0.84%	14.79%	\$19.84
I-95 Corridor	0.86%	12.79%	\$11.88
National	0.82%	11.04%	\$12.89

7.5 Summary

Administrative costs are an important factor when considering whether to replace current highway revenues with an MBUF system. Most prior analyses have limited the comparison of administrative costs to motor fuel taxes versus MBUFs and found MBUFs much more costly to administer. When motor vehicle fees and tolls are also considered, however, the picture is much less clear. With no real world experience to draw upon in estimating MBUF administrative costs, estimates in this chapter are subject to considerable uncertainty. However, even if MBUF administrative costs were a higher percentage of revenues than the 4.1 percent estimated in the NCHRP study, they still may not be higher than the percentage costs to collect the entire combination of motor fuel taxes, motor vehicle registration fees and tolls in some states.

8.0 Conclusions and Next Steps

8.1 Potential Next Steps to Prepare for Implementing a Mileage-Based User Fee System

An issue highlighted in interviews and other discussions during the course of this project has been the difficulty of getting started in implementing an MBUF system. Any kind of tax-related proposal is difficult to initiate in the current environment, especially one that is as misunderstood by and unfamiliar to the general public as an MBUF. Given this environment and the continuing need for large-scale demonstrations to assess administrative and other issues that states would need to consider to implement an MBUF, many states are not actively considering MBUFs at this time. But these states may want to keep options open for an MBUF in the future. Coalition states could take several actions now to prepare for implementing an MBUF system should they decide to pursue that option in the future. These actions, which will be needed to make informed decisions about MBUF systems, include research, preliminary feasibility studies, or other activities that do not suggest a near-term intention to implement an MBUF, but which, nonetheless, would help address key administrative issues that must be resolved before an MBUF could be proposed. In addition, some of these short-term actions could yield benefits even if an MBUF system is not eventually implemented.

8.1.1 Develop Framework for MBUF Pilot Project

One important action that Coalition states could pursue would be a pilot project to demonstrate how key elements of an MBUF system might work. Small-scale pilots already have been conducted in four Coalition states – Maine, Maryland, North Carolina, and Florida – as part of the MBUF demonstration project conducted by the University of Iowa using federal funding from the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). Those pilots, however, included only 200-250 participants each and did not address many of the administrative and institutional issues associated with implementing an MBUF that have been identified in this project.

The RAND Corporation recently conducted a project titled “System Trials to Demonstrate Mileage-Based Road Use Charges” under the National Cooperative Highway Research Program (NCHRP) in which they recommended the types of MBUF pilot projects that should be conducted to lay the groundwork for implementing federal or state MBUFs. Many of the high priority issues they recommended be addressed in MBUF pilot projects correspond to administrative issues identified in this project, including:

- Charges that vary by vehicle characteristics, facility, and time of day;
- Alternative methods for collecting payments, protecting privacy, and preventing evasion;
- Alternative institutional configurations for collecting and distributing revenues;
- Integrating MBUF systems with existing tolling systems;
- Mechanisms for rebating fuel taxes to early adopters;
- Interoperability among different state systems and among devices and services provided by different vendors; and
- Standards for enforcement, data storage, communications and security.

Other important recommendations in the RAND report were that future pilots have many more participants than previous pilots – on the scale of tens of thousands of participants rather than hundreds of participants – and that at least one trial be multistate.

Conducting an MBUF pilot project almost certainly would require federal funding, as have all previous MBUF pilot projects. It is unclear when federal funding for further MBUF pilots might be forthcoming, but Coalition states certainly could prepare for an eventual pilot by scoping out the framework for a potential multistate pilot. Future federally funded pilots are likely to be awarded on a competitive basis, so a detailed description of the proposed pilot would be required. Like other MBUF pilot projects conducted to date, a future pilot could be characterized as research with no commitment to pursue MBUFs following completion of the pilot.

8.1.2 Develop An MBUF Implementation Strategy and Roadmap

A number of transition issues and options have been identified in this project that will have to be considered when implementing an MBUF system, but developing an actual transition strategy was beyond the scope of the current project. Representatives of private sector firms interviewed for this study suggested that one set of actions that states and toll agencies could take to prepare for implementing an MBUF would be to develop an implementation strategy and roadmap. With so many political and institutional uncertainties surrounding MBUFs, any timeframes included in a roadmap would have to be flexible, but going through the thought processes needed to put timeframes on specific elements of the roadmap would be useful nonetheless.

Clearly not all the transition issues and options need to be addressed immediately. High priority issues that should be addressed early in the process of developing an overall strategy for potential implementation of an MBUF system include:

- **Identify the initial functionality for an MBUF system.** The initial functionality of MBUF systems will have significant implications for other elements of the transition to an end-state system. If implementing all elements of the end-state system is determined to create too much complexity or raises questions that cannot be answered immediately, starting with a lower level of functionality could make initial implementation easier. Individual states might start with different levels of functionality, although discussing the advantages and disadvantages of alternative levels of functionality in a multistate context would be valuable. Including toll agencies in discussions from the outset would be very important, even if the decision is made not to include toll facilities in the initial MBUF system.
- **Develop a preliminary strategy for phasing in MBUFs:** A preliminary strategy for phasing in MBUFs will have implications for other transition issues and will be of immediate interest to legislators, interest groups, and the general public. Several options for phasing in MBUFs are discussed in Chapter 6. States will have to assess the various options and select one or two for further development. If the decision is to phase in an MBUF system, a preliminary timeframe for moving to mandatory participation by all users should be developed. Private firms have thought extensively about how opt-in strategies for MBUF participation might be provided. Detailed discussions of how such opt-in strategies might work could be conducted to determine the feasibility for individual states or groups of states. Again, some states might choose to pursue an opt-in approach while others might choose to phase in MBUFs in other ways.
- **Develop a preliminary strategy to enforce payment of MBUFs:** Another issue that states could begin addressing immediately is how to enforce payment of MBUFs. As with electronic registration and titling, this could have benefits for enforcing payment of registration fees and tolls, even if an MBUF system is not implemented for some time. Enforcement of MBUF payments will present some unique challenges to state agencies charged with administering the fees. Problems are similar to those experienced by toll agencies when users do not pay tolls

they owe. Officials from two states interviewed for this project indicated that enforcement of E-ZPass for violations by out-of-state drivers is difficult; if those drivers do not voluntarily pay bills sent to them, there is little recourse on the part of the state. Similarly, a major enforcement issue for an MBUF system will be those who refuse to pay their bills. States will have to decide how strictly to enforce MBUF payments and what mechanisms will be most effective. Best practices of other states and other countries should be considered as well as strategies being developed by the Alliance for Toll Interoperability and the potential for contracting enforcement to private collection companies. Since failure to pay MBUFs would have implications for all states in which a violator travels, this is truly a multistate problem that deserves consideration of multistate solutions. Evasion of motor fuel taxes has been a topic of great concern to state transportation agencies and transportation committees in state legislatures. Careful scrutiny of efforts to minimize evasion of MBUFs can also be expected.

- **Develop preliminary strategies for operating under a dual fuel tax/MBUF system:** One complexity of transitioning from the fuel tax to an MBUF is how states would avoid double taxation of vehicles that pay the MBUF but also purchase motor fuel whose price includes a prepaid tax. Several options are discussed in Chapter 6. The choice of option could have implications for other MBUF administrative functions and for the operation of multistate MBUF systems. Strategies should consider not only in-state vehicles, but out-of-state vehicles that must purchase fuel in the state as well. Implementation of a dual fuel tax/MBUF system will have direct and significant implications for users; the more transparently this element of the system is administered, the more readily users will accept it. Simplicity of use, however, will have to be balanced against the potential for evasion.
- **Develop a preliminary strategy to protect privacy:** Privacy will be one of the most contentious issues in moving from the fuel tax to an MBUF system. There is much misinformation about location identification and communication equipment and its ability to “track” where a motorist drives. Public education and partnering with privacy groups could address that issue. Another privacy concern is that information stored on the vehicle could be subject to subpoena. If the information stored on the vehicle is limited simply to miles traveled by jurisdiction and perhaps by date, concerns about whether an individual’s movements could be tracked would be reduced, although perhaps not eliminated for all. The inclusion of toll facilities in an MBUF system, especially those with congestion charges, would increase privacy concerns because information on exactly when and where a vehicle was on a particular toll facility would have to be transmitted to the MBUF processing organization. An investigation of privacy issues was outside the scope of this project, but considerable work has been done on privacy by those involved in earlier MBUF pilot projects.

One tradeoff in the privacy area comes from users’ desire to be able to verify their bills on the one hand and their concern about releasing details of their trips on the other hand. One option noted in Chapter 6 would be to allow users to erase detailed information on individual trips at any time after the aggregate mileage had been transmitted to the MBUF processing organization. This would allow those who wished to check their bill to do so while allowing those concerned about protecting the privacy of their information to erase the data. Users would have to be prevented from erasing information that had not been sent to the processing organization.

Allowing individuals the ability to retain detailed mileage records could also provide a mechanism for sharing that information with transportation planners to improve data on travel

characteristics. Unless route-specific information was collected for each trip, however, that information would be of limited value. Most concepts of operations that have been developed to date have not included recording detailed route level data for all trips, because that detail is not needed to calculate MBUFs owed to each jurisdiction. If states desired detailed route level data for all trips, that capability would have to be designed into the system.

- **Assess the applicability of existing administrative structures to an MBUF system.** In interviews conducted for this project, many state officials recognized similarities between administrative requirements for an MBUF system and administrative functions already being carried out in connection with vehicle titling and registration and toll collection programs. One current program that may be particularly applicable to aspects of an MBUF system is the National Motor Vehicle Title Information System (NMVTIS). That program is discussed in the appendix to this report, but states need to address several key issues as they develop an MBUF implementation strategy and roadmap. First, the existing NMVTIS communications network to exchange vehicle ownership and title information among states may be a platform on which to build similar capabilities required for an MBUF system, but the scalability and flexibility of the NMVTIS network for use in administering an MBUF needs to be explored in greater detail.

Second, NMVTIS may provide a platform for the further development of electronic vehicle registration and titling systems that will be required for an MBUF system. Many states already are moving toward electronic registration and titling, but as they do so, they could consider how those functions might support user enrollment requirements for an MBUF system. Factors that states and multistate groups might consider include (1) how user enrollment might interface with vehicle registration systems; (2) how toll facilities might be integrated into an MBUF system; and (3) how vehicle ownership information can efficiently be transferred among states in a multistate environment. This activity is especially valuable since it has immediate benefits even if an MBUF system is not implemented for many years. Since this activity is somewhat independent of other MBUF activities, setting target dates and milestones should be possible, although activities in other states will influence the completion date.

Third, legal and institutional impediments would have to be overcome to use NMVTIS as a platform for implementing an MBUF system. The statutory purpose of NMVTIS is limited and it is unclear whether NMVTIS could be extended for use in an MBUF system. Also, the Driver Privacy Protection Act restricts the use of motor vehicle-related information; explicit legislative language allowing the use of certain data in connection with administering an MBUF system might be required. If NMVTIS is found to be a suitable platform for implementing an MBUF system, these and other potential impediments likely could be overcome, but first states must develop a more detailed set of administrative requirements to assess more precisely how NMVTIS might help meet those requirements.

Similarly, many of the administrative functions required to implement an MBUF system already are being performed by toll agencies. These include enrolling participants in electronic toll collection systems such as E-ZPass, collecting revenue for travel on toll facilities, reconciling fees owed to different toll agencies, and enforcing payment of tolls owed. Administrative mechanisms being used by toll agencies to perform these functions could serve as models for MBUF implementation.

8.1.3 Equipment Standards

The issues noted above are ones that legislators, interest groups, and others generally will have the greatest concern about when considering the potential implementation of an MBUF system. Without having considered how these various issues would be handled, state officials would not be able to effectively present a case for an MBUF system that could stand up to the scrutiny of those who oppose such fees.

These issues can all be considered without knowing exactly what technologies might be used to record and report mileage. They all have implications for the functionality of the equipment to be used, but many different types of equipment could meet the required functionality. Legislators and others interested in MBUF systems will be anxious to know the technologies to be used to measure travel by jurisdiction, facility, and potentially time of day, and exactly how the privacy of that information will be protected. It will be important to have considered how to address questions about on-board equipment before meeting with various interest groups. However, since technology is evolving so quickly in this area, and since there may be benefits to providing flexibility to equipment manufacturers in how they meet the required functions, it may be premature to settle on a specific technology very far in advance of actual deployment, and even then maintaining some flexibility to incorporate new technologies as they are developed will be desirable.

While equipment specifications should not be determined too early in the planning process, equipment and communications standards will be required. Who would develop such standards is unclear at this point. One option would be for the federal government to develop standards for MBUF systems. Another option would be for a standards setting organization to set the standards and have them accredited by the American National Standards Institute (ANSI). Before this is likely to happen, however, a significant number of states will have to agree on the desired functionality of an MBUF system to serve as the basis for setting equipment and communications standards. The RAND report on potential MBUF field trials suggested that standards could come out of a series of trials, but it is not clear whether the federal government is prepared to fund sufficient trials to serve as the basis for developing standards.

Before a multistate field trial involving Coalition members could be conducted, the participating states would have to agree on the equipment to be used in the trial. They could choose to use the same equipment in all vehicles such as been done in previous pilot projects or they could choose to test several alternative types of equipment. This latter option, however, could divert resources and attention away from the administrative functions associated with implementing an MBUF system. To the extent possible, these issues should be examined in collaboration with other Coalition members interested in developing a strategy and roadmap for moving toward MBUFs.

8.1.4 Issues for Later Consideration

A number of other issues will have to be addressed in developing an overall strategy and roadmap for implementing an MBUF system. These include:

- **Develop a strategy for accepting various types of MBUF payments:** States will have to resolve several issues related to how users will pay MBUFs including the types of payment that will be accepted. As noted in Chapter 6, user preferences regarding MBUF payment will vary and not all users will be able to use some mechanisms. For instance, a significant portion of the population does not have bank accounts or credit cards so cash options almost certainly will have to be available, at least in the near term. The experience of toll agencies participating in E-

ZPass should be instructive and in fact states might want to include toll agency officials in discussions about payment mechanisms for MBUFs.

- **Develop preliminary strategy for collecting payments:** Another issue to be decided related to payments is whether mileage fees would be prepaid or postpaid. Prepaid fees are relatively easy to administer when users' credit cards or bank accounts can be automatically debited as is done for E-Pass. Mechanisms would be needed to allow users wishing to pay by cash or check to set up accounts and periodically replenish those accounts when they have been depleted. E-ZPass has such mechanisms that may serve as models. Postpaid accounts would be analogous to telephone, electric, or credit card bills where customers receive a statement, either on line or through the mail, for charges they have incurred during the billing cycle. As with prepaid accounts, some users will simply have fees debited from their credit card or bank account, while others will pay by cash or check.
- **Develop preliminary business rules for operating under a multistate MBUF system:** Each state eventually will have to develop business rules specifying how it would administer an MBUF including the method and frequency of collection; the protection of privacy; auditing and verification of revenues; collection of delinquent payments; and the treatment of out-of-state vehicles that do not participate in an MBUF system. Details of these rules may vary among states, but there are certain key elements that must be consistent to allow a multistate MBUF system to operate efficiently. States should discuss these rules with neighboring states to assess whether there are any rules that would impede the efficient operation of a multistate MBUF system.
- **Develop a concept for how a multistate MBUF clearinghouse might function:** A key aspect of a multistate MBUF system will be sharing revenues based on miles traveled in each jurisdiction. Participating states will have to agree on a mechanism to efficiently distribute revenues to each jurisdiction and toll agency. Existing clearinghouses that have been established to facilitate the sharing of revenues under the International Registration Plan, the International Fuel Tax Agreement, and E-ZPass all work well and could serve as models for an MBUF clearinghouse. Issues that could be discussed include how it would interface with agencies that would administer MBUFs at the state level; how it would interface with toll agencies; and what roles the clearinghouse might play to support MBUF systems such as maintaining databases containing MBUF rates in each state and toll rates for each toll facility.
- **Develop a public outreach and marketing plan:** At some point, public outreach on key aspects of a potential MBUF system would be highly desirable, but this could be sensitive politically until elected officials have approved plans for moving forward with an MBUF system. Initially this outreach could be characterized as research, but ultimately it will have to go beyond research to educate the public about the need to move to an MBUF system and to begin addressing the most important issues of key interest groups.

8.2 Conclusions

This report has presented a long-range concept of operations (ConOps) for a multistate MBUF system, and a potential transition strategy to move from current surface transportation funding mechanisms to an MBUF system that ultimately could replace all existing highway user fees including tolls. Throughout, the focus has been on administrative functions required to implement a multistate MBUF system as opposed to specific technologies that might be used. Extensive conversations about the ConOps and

transition strategy were held with officials from departments of transportation and toll agencies in Delaware, Maryland, and Pennsylvania as well as representatives of the American Association of Motor Vehicle Administrators and private sector companies that have experience in some or all of the functions that would be required under an MBUF system. The extensive interviews summarized in Chapter 3 and the Appendix provided real-world context to the operational issues and concerns as well as the practical, political and programmatic considerations of an MBUF implementation. In particular they pointed to the need for a transition roadmap as an important next step.

Numerous studies and opinion surveys have documented a range of public views about potentially replacing the fuel tax with an MBUF system. Some individuals recognize the eventual need to move away from the fuel tax as more and more alternative-fueled vehicles enter the vehicle fleet. Many, however, are skeptical about various aspects of an MBUF, especially the use of location identification and communications equipment to record where individuals travel. Others, without knowing any facts about MBUFs, adamantly oppose the idea of an MBUF system. With such widespread public mistrust, the political challenge of building a consensus for an MBUF system is particularly daunting. Public education will be critical, but before extensive public education can begin, states must have a firm grasp of what a potential MBUF system might look like and how it might work so they can answer questions that often will be intended to discredit the whole idea of an MBUF system. Several next steps noted above are intended to develop the conceptual framework for an MBUF system that ultimately would have to be presented to the public.

While to some the complexities of an MBUF system seem overwhelming, many administrative aspects of MBUFs are quite similar to what currently is done under E-ZPass. In fact much more detailed information about an individual's travel, at least on toll roads, is known for an E-ZPass user than would be the case under an MBUF system. MBUF system enrollment methods, payment mechanisms, and reconciliation procedures would all be similar to what is done under E-ZPass. The scale of an MBUF system, and differences in the equipment used to record and report mileage would require some modifications to the way E-ZPass operates, but those changes would be manageable. A major difference between an MBUF system and E-ZPass is that participation in the MBUF system eventually would be mandatory. Those with privacy or other concerns would not be able to opt out of an MBUF system as they can for E-ZPass and other electronic tolling systems. But as toll facilities become more common and more and more facilities move to electronic tolling, the number of motorists who have not been exposed to electronic toll collection will diminish.

The potential costs to implement an MBUF system will be an issue when considering the feasibility of an MBUF system. Costs are difficult to estimate since no other country has implemented an MBUF system that encompasses all travel by all vehicles. In Chapter 7 the best available data was used to compare potential administrative costs of an MBUF system with the costs to administer current highway user fees including tolls. The conclusion, which may be surprising to some, is that costs to administer an MBUF system could actually be less than the cost to administer existing highway taxes and fees, especially as states move more and more toward tolling, which is currently more expensive to administer than an MBUF system might be. Clearly more work is needed to refine the cost estimates, but the conclusion is that administrative costs should not preclude an MBUF system.

Much more work remains to be done before firm proposals could be put forward to implement a multistate MBUF system. In the short term, one or more individual states may pursue limited applications of an MBUF, but those efforts will have limited applicability to issues that remain to be resolved regarding a multistate MBUF system. As noted above, perhaps the most important activity to advance the understanding of how a multistate MBUF system would work is a large-scale pilot involving

several adjacent states and thousands of participants. The cost of such a pilot is prohibitive, however, without federal assistance. Federal assistance would also be particularly helpful in setting standards for equipment that could be used to record and report mileage. This point was made by virtually all the private sector officials interviewed for this project.

Until a large-scale pilot is initiated, several other steps that states could take are discussed in the first part of this chapter. These steps would help frame specific issues that should be addressed in a pilot and inform decisions on how the pilot might be conducted to provide the greatest benefit. They also will provide state officials with a greater understanding of what must be done to begin implementing a multistate MBUF system and some of the issues that will have to be resolved before beginning any kind of public education campaign. With the many uncertainties, it is unlikely that a multistate MBUF system that could replace all or a significant part of existing highway user revenues will be implemented in the near future. States should not wait until an MBUF system is ready for large-scale implementation to address immediate surface transportation revenue needs. But while they look to other solutions for short-term revenue enhancements, they still can be exploring issues regarding implementation of MBUF systems in the intermediate to long term.

As noted in the Foreword, this report does not advocate adoption of an MBUF system, and it does not represent a commitment to mileage-based user fees by members of the I-95 Corridor Coalition. The report does, however, address key administrative issues related to mileage-based user fees that states may wish to consider in assessing future methods to fund their surface transportation systems.

9.0 Appendices

9.1 Summary of Interviews with Toll Agency Officials

The study team conducted interviews with officials from the Delaware Department of Transportation, the Pennsylvania Turnpike Commission, and the Maryland Transportation Authority to solicit views on major issues associated with including toll collection in a mileage-based user fee (MBUF) system.

General Reaction to Including Toll Collection in an MBUF System

Reactions to the concept of including toll collection under an MBUF system were mixed. All of those interviewed understood the rationale of replacing the fuel tax with an MBUF, but some were concerned about including toll collection under an MBUF system. It was noted that relationships between toll facilities and departments of transportation vary considerably. In some cases toll revenues are simply lumped with other state revenues. In other cases toll revenues are dedicated to toll facility improvements, but fuel tax and other state user revenues supplement toll revenues in funding toll facility improvements. Funding for other toll facilities is completely separate from funding for other highways and toll revenues must be adequate to meet toll facility funding requirements. A major concern expressed by toll agency officials was that toll agencies often operate under bond covenants that have strict requirements concerning revenue collection and how those revenues are used. If toll collection was included in an MBUF system, some toll agency officials worried that they would have less direct control over the revenues. In general those officials saw the inclusion of toll collection as a feature that might be included in the future, not one that should be included at the outset.

One potential reason for including toll collection under an MBUF system is to reduce overall administrative costs, but several officials were not convinced that cost savings would be real. Another potential benefit cited for including toll facilities in an MBUF system is the potential to reduce evasion of tolls.

Strong interagency agreements among the various participants in an MBUF system will be critical to the system's success.

Issues and Practices Related to User Enrollment

The ease of providing users with transponders allows toll agencies to offer several ways for customers to enroll in E-ZPass. If the equipment used to record and report miles traveled under an MBUF system had to be physically installed on the vehicle by a certified installer, fewer enrollment options would be available.

Toll agency officials were asked what kind of entity might logically administer an MBUF system. Again the reactions were mixed. Representatives from two toll agencies suggested that private sector firms might be good candidates to administer an MBUF system since they have experience in back office operations with E-ZPass. Another suggested that state motor vehicle administrations might be a logical choice since they currently maintain vehicle ownership records. Considerable resources would be needed, however, to handle the additional functions associated with administering an MBUF system.

The primary use of DMV data in the administration of E-ZPass is in locating toll violators, not in the initial enrollment process.

Officials from each of the toll agencies indicated that their databases were highly scalable and could be expanded to include all vehicles in the state. None of the toll agencies currently collects information on miles traveled by individual customers.

Revenue Collection and Distribution

Between 60 and 65 percent of total revenues are collected through E-ZPass in all three states. Toll agencies in the three states provide multiple ways for customers to pay their bills and officials emphasized how important this would be for an MBOF system. For those toll agencies that could provide a breakdown of E-ZPass payments by type, approximately 95% were paid through either credit cards or automatic bank account debiting, with the remainder being paid through either cash or check. One agency provides an incentive for electronic payment, but the other two do not. All three agencies require prepayment for E-ZPass accounts, although one agency allows commercial motor vehicles the option of having a post-paid account. None of the agencies indicated that prepayment has caused any problems or that there has been adverse public reaction to prepayment.

Toll rates are not set on a per-mile basis on toll facilities in the three states and average rates per miles on different sections of the same facility can vary significantly. Trying to use existing toll rate structures within the context of an MBOF system would be complicated, but officials in each state indicated that they believed toll rate structures could be modified in the future to have a consistent rate per mile if toll collection were included in an MBOF system. Rates per mile would vary by facility, however.

Each toll agency provides frequent user discounts although one agency only provides those discounts to commercial motor vehicles. Continuing to provide such discounts under an MBOF system would provide another layer of complexity to the system.

Administrative costs to collect tolls through E-ZPass are much lower than administrative costs to collect cash tolls.

None of the toll agencies currently collect or maintain information on miles traveled by individual customers.

Toll agencies were concerned about cash flow under an MBOF system and indicated that monthly collection would be preferable to quarterly collection. Several toll agency representatives suggested that consideration be given to pay-at-the-pump systems as an alternative to billing users.

Toll agencies recognized the difficulty of collecting tolls that vary according to the level congestion since rates could vary throughout the peak period and would not be the same from day to day. One toll agency representative suggested that it might be easier to collect such dynamic tolls outside the MBOF system. Otherwise equipment would have to be specifically designed to handle such variable rates.

Role of the Private Sector

Each toll agency uses private vendors to handle various back office functions including:

- Manage a Customer Service Center to open/maintain/close all accounts;
- Operate a Call Center to handle incoming calls;
- Maintain an E-ZPass website;
- Manage interagency processes and settlement;
- Manage violations processing center to issue notices, process appeals, process payments;
- Complete financial reconciliations and reporting to the toll agency; and

- Maintain all hardware and software required to support the operations.

Vendors are paid through a combination of monthly fees, fees per transaction, and fees per account, depending on the type of activity.

Auditing, Security & Enforcement

Enforcement is a significant issue for each of the toll agencies. Enforcement practices vary among agencies in part because of differences in laws covering enforcement. Law enforcement agencies cannot participate in enforcing payment of tolls in two states. Toll agencies refer toll violators to collection agencies in all three states and, in two states, departments of motor vehicles (DMVs) can put a hold on or suspend vehicle registration for serious toll violators. Those measures are only partially effective. Collecting from out-of-state violators is generally more difficult than collecting from in-state violators. One toll agency representative noted that enforcement of MBUF payments would require strong laws concerning collection, and strong reciprocity agreements would be needed as well.

If tolls were collected through an MBUF system and existing toll collection equipment was removed, toll agencies were concerned about being able to verify that they were receiving all the fees they were due since they would have no independent data on usage of their facilities. They also would have no way to prove that a user traveled on their facility if the user denied doing so, particularly if a parallel non-tolled road was nearby.

Toll evaders have taken creative efforts to avoid paying tolls including license plate cover-ups, ticket swapping and other means. This is more common with commercial motor carriers because they pay higher tolls than passenger car drivers. Incentives would be even greater to evade an MBUF. AN MBUF system would have to ensure a high degree of confidence that the equipment cannot be tampered with, the information is accurate and that revenues that are due are collected.

Toll agencies within the E-ZPass Group share data needed to transact business based on a set of reciprocity agreements.

9.2 Summary of Private Sector Interviews

In recent research and MBUF conferences, there has been a consensus that private firms potentially can play a significant role in implementing MBUFs. Private firms already handle many back office functions for toll agencies, and some state DMVs contract activities such as call centers to private firms as well. Private firms also have had large roles in implementing ongoing and planned mileage-based fees in Europe.

To learn more about potential roles that private sector firms might play in administering MBUFs, interviews were conducted with several private sector firms that have experience in tolling and related activities in the U.S. and abroad. A list of individuals and the firms they represent who were interviewed for this project is included at the end of this summary. Several of these firms are members of the Mileage-Based User Fee Alliance, a consortium of public and private sector agencies interested in promoting MBUFs. This section summarizes key points discussed in those interviews.

General Reaction to the Concept of Operations (ConOps)

A major objective of the interviews was to get feedback from private sector firms on the overall ConOps developed for this project and specific elements of that ConOps. Each of the individuals interviewed

agreed with the overall scope of the ConOps. Several specifically mentioned that they agreed with the approach of developing the ConOps for an end-state system that included the collection of toll revenues and congestion charges as well as general mileage fees.

A key point made by private sector representatives was the need to **minimize revenue leakages** in MBUF systems. Toll agencies, in particular, have legal requirements related to debt service and other essential uses of revenues, but states and users also have strong interests in assuring that evasion and other sources of revenue leakage are minimized. Toll agencies often accept a certain level of leakage in recognition that costs of collecting those revenues would be prohibitive, but they can adjust toll rates to collect the amount of revenues needed to meet their legal requirements. State legislatures, however, will have difficulty approving MBUF systems if they believe unacceptable percentages of revenues will not be collected since that would mean having to impose higher MBUF rates to collect the same amount of revenue. Users would recognize that they were paying more, on average, than they were paying under the fuel tax and mount strong campaigns against the new MBUF system.

The private sector representatives emphasized that **strong enforcement will be critical**, but they also recognized the limitations public agencies face in imposing sanctions that are viewed as too severe. In designing MBUF equipment, as much attention should be devoted to preventing tampering with the equipment as is devoted to providing the basic MBUF functionality. They noted that enforcement measures currently vary across states and some suggested that those variations would have to be reduced before a multistate MBUF system could be approved. One representative noted that even sanctions such as suspending vehicle registrations may not be adequate since many people currently drive unregistered vehicles.

Private sector representatives were asked whether they believed **prepayment of fees** similar to what is done under E-ZPass would be preferred to post payment of fees. Prepayment would be preferred both to reduce administrative costs and deter evasion. Strategies would be needed to allow those without bank accounts or credit cards to easily prepay their fees, but this generally was not believed to be a difficult issue. One noted that prepayment is not a guarantee that fees will be paid; those who are intent on not paying their bills simply will not replenish their accounts unless there is effective enforcement. Another noted that prepayment is a policy decision and an MBUF system could work as well with post payment as with prepayment.

Another issue linked to minimizing revenue leakage relates to the equipment used to record and report mileage. Several private sector representatives said states should expect that a certain portion of users will take advantage of any weakness in the security of equipment or other opportunities to avoid paying the MBUF. When asked whether they thought **equipment should be dedicated to the vehicle** or whether personal devices such as smart phones that are not dedicated to the vehicle could be used to record and report mileage, most representatives endorsed having equipment dedicated to the vehicle. One representative noted that since technology is evolving so rapidly, the ConOps should not preclude equipment that could meet the various standards established for MBUF equipment. Among the reasons given for preferring dedicated equipment were the ease of auditing and enforcement. One respondent noted that European officials had experimented with allowing transponders to be used in more than one vehicle and ran into evasion problems.

Private sector representatives noted that being able to audit and **verify that states and toll agencies are receiving all fees they are due** will be important. Likewise, many users will want to be able to verify that they are being charged correctly for their travel. The ConOps assumes that only summary data will be reported to the MBUF processing center. Detailed travel records would only be maintained in the on-board equipment and users could erase those records once summaries had been reported to the

processing center. Reporting only summary data addresses privacy concerns that have been raised about MBOFs and ensures that details of individual trips could not be determined from MBOF data provided to the processing center. No specific recommendations were made on how to verify the data, but having confidence in the equipment will be quite important.

Private sector representatives were asked about the transition to an MBOF and whether they thought an **opt-in strategy** would be desirable. Responses were somewhat mixed. All recognized the benefits of an opt-in strategy over one in which users are forced to participate, but not all could see the value proposition that would entice users to switch from paying the fuel tax to paying an MBOF. Among the incentives mentioned that could be offered were free location identification and communication equipment, access to traffic, parking, and other motorist service information, and lower rates than are being charged for the fuel tax. Such incentives could not be offered indefinitely and ultimately all users must be brought under the MBOF. A major question would be how the opt-in strategy would be pursued before requiring all users to pay the MBOF. Several noted how much cleaner it would be if everyone started paying the MBOF at the same time, but they concluded it would be very difficult to simply “flip a switch” and instantly move from the fuel tax to an MBOF system.

Interoperability will be essential in a multistate MBOF system. Standards should promote an open system that allows competition among different private sector vendors. It also will be essential for the ConOps to accommodate different state business rules; states cannot be expected to implement MBOFs in exactly the same ways.

One representative recommended not making too many assumptions about what functionality would be handled by the MBOF equipment and what would be done in the back office. It might be possible for virtually all the calculations of fees owed to different jurisdictions and toll agencies to be done on the vehicle which would simplify what would have to be done in back offices and MBOF clearinghouses.

Potential Private Sector Roles

In addition to soliciting reactions to the overall ConOps, private sector representatives were asked specifically about the roles that private sector firms might play in operating an MBOF system.

Handling some or all the back office operations for the MBOF processing center was mentioned by all respondents as one role that private sector firms might play. They already perform such functions for toll agencies and for some DMVs as well. While MBOF operations would be much larger than toll operations, many of the functions are similar and scalable. One representative suggested that each state having its own back office operations might not be necessary. It might be more efficient to have fewer, more robust back office operations.

Providing support for an MBOF clearinghouse established as part of a multistate MBOF system is another function that private sector firms could play. They already have experience in operating similar clearinghouses for E-ZPass, IRP and IFTA. Several private sector representatives noted that clearinghouse functions could entail substantially more risk than simply operating MBOF processing centers. The added risk would come in part from variations in state practices concerning enforcement of MBOFs and the need to ensure that each jurisdiction and toll agency got the revenues owed to them.

Beyond simply operating processing centers and clearinghouses under contract to state agencies, a larger role for the private sector might involve **operating the entire MBOF system as a concession**. States and toll agencies could set the broad terms and conditions of the concession, but private firms would have considerable discretion in how they actually operated the MBOF system. This, of course,

would entail the greatest risk for the private sector, and they would require appropriate compensation for assuming that risk. An issue that would have to be resolved under such a concession model would be the rate of return to the private sector and potential adverse public reaction to what might be perceived as too high a return. Clearly the public agencies would have to show that they were receiving value for money and that operating the MBUF system as a concession was cheaper than operating the system using more traditional methods.

Other Comments

In addition to offering opinions about various aspects of the ConOps and commenting on potential roles that private firms might play in an MBUF system, the private sector representatives were encouraged to offer other views on key issues that would have to be faced in implementing an MBUF system.

Several private sector representatives noted the potential difficulty in **getting legislative approval of an MBUF**. While the fee makes sense to many familiar with transportation issues, it represents such a departure from the simplicity of the fuel tax that it may be difficult for legislators to support. Concerns about privacy, administrative costs, potential evasion levels, and other issues must be resolved before legislators are likely to vote for an MBUF system.

Related to the issue of legislative approval is the issue of **gaining user acceptance**. The same issues of concern to legislators will be of concern to users, especially protecting the privacy of their travel patterns, not having to pay higher fees because of increased evasion, and not having burdensome administrative requirements associated with paying the MBUF.

Several private sector representatives recommended that one way to help garner user acceptance is to **keep the MBUF system as simple as possible**. Few specifics were offered as to how to keep MBUFs simple, however. One comment was to make the system seem as practical as possible. Don't strive for the perfect system, especially during the transition period, if that results in a system that is burdensome to the user and just cannot be understood. Another private sector representative recommended not trying to implement the full functionality right away. Incremental implementation could still achieve many of the benefits while reducing the complexity associated with some of the more advanced functionality.

Another comment was that there will be almost **zero tolerance for errors**. If users are incorrectly charged, if their privacy is compromised, if state or toll agencies do not get the revenues that are owed to them, the system almost certainly will fail.

The amount of data that would have to be processed under the end-state ConOps is substantially greater than data processing requirements for any other transportation activity. This suggests that transportation agencies try to draw analogies to other industries such as banking that have comparable data processing and storage requirements. Data security will be a major issue and redundant systems will be required to allow continuity of operations in the event of business interruptions.

Several representatives suggested that **federal leadership** in terms of setting standards and perhaps setting a date certain by which all states would have to transition to an MBUF would be helpful. Another potential role for the federal government could be setting standards for back office functionality. Caution was expressed about the federal government being too prescriptive on the technologies to be used in an MBUF system, but a role for the federal government was recognized in helping states overcome some of the institutional barriers to implementing an MBUF system.

Interviewees:

- Rosa Clausell Rountree, Chief Executive Office and General Manager, Egis Projects Canada Inc.
- Ken Philmus, Senior Vice President, Transportation Solutions Group, Affiliated Computer Services, Inc., A Xerox Company
- Jon M. Ramirez, Vice President Business Development and Marketing, Federal Signal Technologies Group
- Randy Durow, CEO, TollPlus Inc.
- Suresh Kakarla, Chief Technology Officer, TollPlus, Inc.
- Jeff Hall, Vice President, Business Development, Cofiroute USA
- Naveen Lamba, Industry Lead, Smarter Government, Transportation and Public Safety, IBM Global Business Services

9.3 Summary of Interviews with the American Association of Motor Vehicle Administrators (AAMVA)

The ConOps vision and context, including the multistate and administrative requirements focus of the project, were provided to the AAMVA leadership interviewees. It was noted that guidance provided by the Member Advisory Committee specified the need to consider advanced functionality. It was also noted that it is the advanced functionality expectations that was used as the basis for the ConOps. It was also pointed out that the research team needed to make a decision regarding a point in time when the ConOps could be implemented, and that while many transition issues needed to be considered, the approach of a long-range vision would be used. It was also pointed out that the research direction is technology agnostic but with a focus on administrative functionality. Lastly, the research team noted that while the project focuses on a three state case study in three of the Coalition's member states, that the focus should not **be interpreted as state intention to implement an MBUF system now or in the future.**

General Reaction to ConOps

AAMVA representatives noted that the ConOps highlights the issues very well, especially those that relate to transition. They also noted that it will be important to continue to provide additional details and requirements surrounding the administrative functions of an MBUF system, especially those regarding data transmission across state lines, system requirements including transaction volume and connectivity expectations.

Potential to Leverage the National Motor Vehicle Title Information System

AAMVA sees opportunities to leverage current systems such as the National Motor Vehicle Title Information System (NMVTIS). These opportunities could be more apparent as system requirements and business use cases are developed and the "how" of implementation of an MBUF system is determined. However, they noted no "red flags" with the material so far and the references to the NMVTIS. It was also noted that the NMVTIS, as currently designed, is a foundational infrastructure to address current titling components. However, AAMVA recognizes that it can be a tool for managing more information surrounding vehicles including the needed data elements to support an MBUF system.

It was also pointed out that the current NMVTIS system might be scalable and useable for an MBUF system in the future depending on MBUF business and system requirements. They noted that using the existing network that AAMVA has with the states could cost much less than the construction of a new network. They also pointed out that data use and privacy issues would need to be addressed.

Electronic Titling

AAMVA noted that electronic titling is a key component in a direction that the Association's Board leadership has coined Vehicle Lifecycle Administration (VLA). They pointed out that electronic titling fits very well with the MBUF ConOps as developed for the Coalition, and a future MBUF system. They noted that it is a critical component. AAMVA pointed out that that electronic titling has been a community vision for at least 20 years. However, they noted that it is a vision that can overwhelm some states if not properly considered in the context of other aspects of titling and registration and the current varying environments that exist in the states. It was pointed out that all states are very different in how they could approach current titling transactions, are at very different levels of electronic sophistication in their process and have significant differences in laws and regulations. AAMVA noted that the Vehicle Lifecycle Administration approach includes such items as electronic titling and registration, electronic lien, and current interfaces with banks, manufacturers, insurance companies, auctions, dealers and salvage dealers. The key message that AAMVA believes is important in the vehicle lifecycle administrative concept is that all vehicle functions fundamentally fold together from "birth to death," but states cannot implement all at one time.

AAMVA noted that some states have many of these vehicle lifecycle components in place to varying degrees and other states do not have any of the basic components. These levels of electronic sophistication, the regulatory and legal requirements that would be needed, and varied stakeholder interests are all potential impediments to electronic titling. AAMVA noted that there are many parallels to implementing an MBUF system. AAMVA representatives noted that the differences in states regarding title transaction processes prompted the Association's Board to systematically approach electronic titling as part of Vehicle Lifecycle Administration and to issue a Request for Proposal for an E-Titling Proof of Concept that addresses only a finite set of titling transactions (new car titling).

AAMVA noted that a current impediment to electronic titling is the federal odometer disclosure requirements. The National Highway Traffic Safety Administration (NHTSA) and their current regulations require a signed (hard copy) odometer disclosure statement from all states for all titling transfer transactions when a vehicle's ownership changes. AAMVA also noted that budget and information system modernization (or lack thereof in both cases) are two other major impediments to electronic titling. AAMVA is very optimistic of electronic titling implementation in the future and noted that the approach and transition are important. AAMVA is confident that the proof of concept will result in evidence of cost savings, greater efficiencies and reduced fraud for the states, similar cost savings and efficiencies for other stakeholders and potentially cost savings for customers.

Role for the Association

AAMVA representatives noted that they see a role for the Association in an MBUF system in the future. They referenced the Commercial Driver License Information System (CDLIS) and the National Motor Vehicle Title Information System (NMVTIS) as past examples of implementations where AAMVA and its interoperable all-state network have been used. They noted that states need to access vehicle related data, and it makes the most sense to use the AAMVA network to link all the state DMVs. The AAMVA interviewees also indicated that there might be other roles for AAMVA in an MBUF system implementation from an institutional perspective and based on their Board's interests. The interviewees noted their current roles in governance of both CDLIS and NMVTIS. However, those interviewed noted that they recognize that a key foundational element in those cases is the oversight and involvement of federal agencies. For CDLIS, it's the Federal Motor Carrier Safety Administration and for the NMVTIS, it is the Department of Justice. Absent any federal involvement or regulatory oversight from a federal agency for an MBUF system implementation, a governance model would need to be state

driven, most likely through compacts or reciprocity agreements. It was also pointed out that from an association standpoint, AAMVA understands how states do things and recognizes the challenges that state DMVs face.

AAMVA representatives noted that AAMVA membership is a key to the NMVTIS current operation and any future use of the network. They can envision a role for AAMVA and the NMVTIS generally now but would not be able to determine how it may be used until future MBUF system requirements were determined. They noted that the Department of Justice remains interested in the regulatory requirements of the NMVTIS, and are supportive of AAMVA's role as operator and of future strategic uses of the NMVTIS on behalf of states.

Issues and Concerns/Challenges

In addition to the political issues surrounding potential MBUF system implementation, the AAMVA representatives noted that an equally important question is how states will obtain the resources to implement an MBUF system. Other key issues include regulatory and legal challenges, as well as measures to address privacy concerns. However, it was pointed out by the interviewees, that AAMVA members have been faced with major regulatory issues in the past regarding major changes to DMV-related programs and those programs have (over time) come to fruition. They noted that examples of major changes included programs such as the International Registration Plan (IRP), motor carrier safety related regulations and commercial driver regulations. AAMVA representatives noted that one of the greatest challenges to an MBUF system implementation is that there is not a high profile champion at the federal executive level or at the congressional level. They pointed out that AAMVA could play a role in informing the discussion and engaging a dialogue with their members to make them more aware of the MBUF arena. It was noted that the work currently underway with the Alliance for Toll Interoperability (ATI) and the completion of this study will allow for a "heartier and less esoteric dialogue" of the issues, especially those related to the administrative requirements of an MBUF system and any DMV involvement. AAMVA representatives recognize that enforcement issues are elements that the DMV community will have to consider. They pointed out that some of the work that is currently being done also by ATI regarding toll evasion collection in a multistate environment could be foundational to any future MBUF system implementation.

Private Sector Role

AAMVA did note that there could be a private sector role for MBUF system implementations and referenced the private sector's role in the NMVTIS – sharing of data and use of the data. Stakeholder involvement will be critical. The interviewees noted that the Department of Justice is using an advisory board regarding the use and future directions of the NMVTIS.

DMV Role

AAMVA recognizes that any DMV role should be as limited as possible in the implementation and ongoing operation of an MBUF system and sees enforcement and information exchange as key DMV roles. They noted that those DMVs that are part of departments of transportation (DOT's) have a better overall understanding of the MBUF discussion and the integration of their roles. The AAMVA interviewees noted that there are many DMVs that are not part of DOT's, and therefore the administrative impact to their operations must be considered in any implementation or transition. It was also noted that in many states, county governments or elected officials are integral parts of the titling and registration process, and any change to those processes could be politically charged. In this type of local-based titling model, local jurisdictions often receive revenues based on the type of transactions they perform and this structure can be politically charged.

Transition and Next Steps

AAMVA leadership could envision an MBUF system as outlined in the ConOps. They noted, however, that like other major initiatives (such as the current AAMVA E-Titling or Vehicle Lifecycle Administration Initiative), it is comparable to “staring at a huge elephant” and that any approach would need to be phased, include a roadmap outlining possible implementation options and segmented into doable pieces. AAMVA interviewees noted that the ConOps assumption and concept of real-time ownership information and real-time information regarding cross-state title changes is on target and an assumption that makes sense from a motor vehicle administration perspective. AAMVA can envision electronic titling in the future and has taken steps to further develop this concept.

AAMVA is interested in continuing to be involved in the research surrounding the administrative requirements of an MBUF system as it parallels work currently underway on the Vehicle Lifecycle Administration initiatives. They noted that MBUF concepts and titling concepts are both dependent on the “birth to death” history of a vehicle.

9.4 Background Information on the National Motor Vehicle Title Information System (NMVTIS)

History of NMVTIS

Title II of the Anti Car Theft Act of 1992 (Public Law No. 102–519) required the U.S. Department of Transportation (USDOT) to establish an information system intended to enable states and others, such as law enforcement and individual or commercial prospective purchasers, to access vehicle titling information. This information system, known as the National Motor Vehicle Title Information System (NMVTIS), was created to address the growing issues associated with auto theft and vehicle fraud. Specifically, NMVTIS was designed to:

- Prevent the introduction or reintroduction of stolen motor vehicles into interstate commerce;
- Protect states, consumers (both individual and commercial) and other entities from fraud;
- Reduce the use of stolen vehicles for illicit purposes including funding of criminal enterprises; and
- Provide consumer protection from unsafe vehicles.

In accordance with 49 U.S.C. 30502, NMVTIS is required to provide a means of determining:

- Whether a title is valid;
- Which jurisdiction has issued the current title for a vehicle bearing a specific vehicle identification number (VIN);
- The vehicle’s reported mileage at the time of titling;
- Whether a vehicle is titled as a junk or salvage vehicle in another state; and
- Whether a vehicle has been reported as a junk or salvage vehicle under 49 U.S.C. 30504.

NMVTIS includes records for automobiles, buses, trucks, motorcycles, recreational vehicles, motor homes and tractors. Trailers, mobile homes, special machinery, vessels, mopeds, semi-trailers, golf carts, and boats are excluded from this system.

Under the Anti Car Theft Act of 1992, USDOT was authorized to designate a third party operator for NMVTIS. The American Association of Motor Vehicle Administrators (AAMVA) has and continues to act in that capacity.

In 1996, Congress amended the Anti Car Theft Act of 1992 by enacting the Anti Car Theft Improvements Act, Public Law No. 104-152. These amendments, in part, transferred responsibility for implementing the NMVTIS system from USDOT to the U.S. Department of Justice (DOJ). On January 30, 2009, DOJ published the National Motor Vehicle Information System Final Rule (28 CFR part 25).

NMVTIS Requirements

In accordance with 49 U.S.C. 30503(a), states are specifically required to make the following information available for use in NMVTIS:

- An automobile's VIN;
- Any description of the automobile, including all brand information;
- The name of the individual or entity to whom the title certificate was issued;
- The odometer reading information of such vehicle on the date its certificate of title was issued and such later odometer information, if noted by the State; and
- Information from junk or salvage yard operators or insurance carriers regarding their acquisition of junk or salvage automobiles, if such information is being collected by the state.

Although the Anti Car Theft Act requires states to provide odometer mileage on the date the certificate of title is issued and "any later mileage information, if in the state's title record for that vehicle", currently the only odometer readings included in NMVTIS are those recorded by the jurisdictions at the time of titling and/or re-titling. Although some jurisdictions capture and record odometer readings with each registration renewal, these subsequent odometer readings currently are not reported to NMVTIS. A system modification would be needed to comply fully with the requirements for reporting odometer readings.

The Final Rule prohibits the system operator from releasing any personal information to any entities other than state titling agencies, law enforcement entities, and other government agencies. It should be noted that currently there is no mechanism for states to provide owner name to NMVTIS and no personal data is stored in the NMVTIS records. In order to fully comply with the reporting requirements of NMVTIS, AAMVA is exploring the feasibility of modifying NMVTIS to allow each jurisdiction to maintain owner data on their files but pass it through NMVTIS as part of queries from other jurisdictions or law enforcement.

The Final Rule requires that the operator develop a privacy policy to ensure appropriate privacy protections consistent with DOJ's Privacy and Civil Liberties Policy, the Driver's Privacy Protection Act of 1994, and other relevant laws. The operator is required to ensure that NMVTIS and associated access services meet or exceed technology industry security standards – most notably any relevant Global Justice Information Sharing Initiative (GLOBAL) standards and recommendations and to use the National Information Exchange Model or any successor information-sharing model for all new information exchanges established.

State Participation

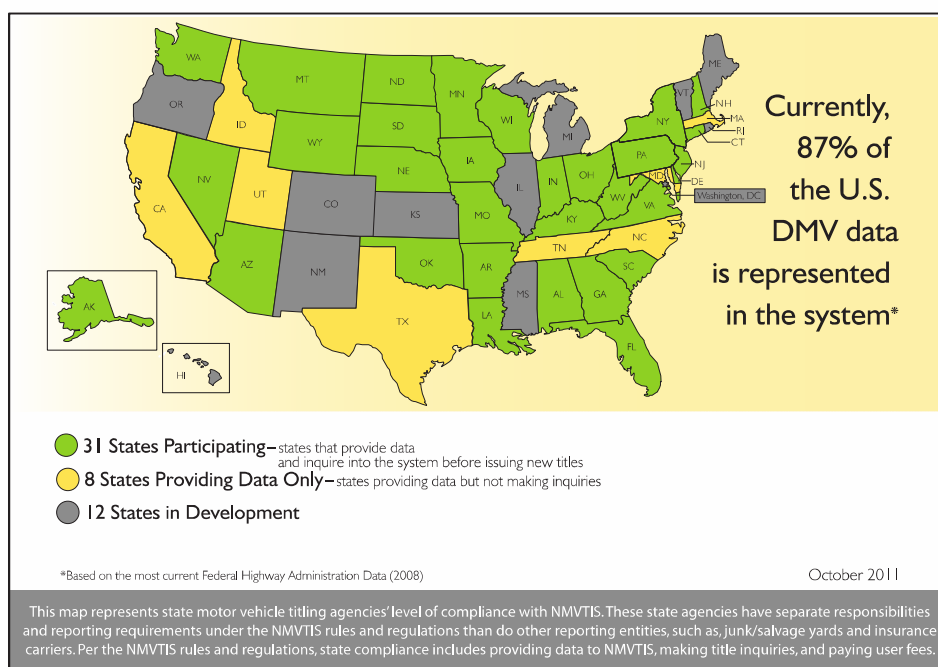
To meet the federal NMVTIS requirements, AAMVA currently supports the provision of title information to NMVTIS through online integrated implementation and batch updates to the NMVTIS Central File. AAMVA offers three methods by which jurisdictions can complete the requisite "instant" title verification checks. These methods include online integrated implementation conducted through AAMVA's network (AAMVAnet), state web inquiry conducted through the internet, and batch inquiry conducted by submitting to AAMVA an inquiry file containing multiple vehicle identification numbers (VINs).

All three of the Phase 2 MBUF case-study states use NMVTIS. Pennsylvania uses online integrated access that allows for the immediate availability of title information and “instant” title verifications in real time. NMVTIS is integrated with the PA registration system and the system operates in real time. Delaware utilizes the state web inquire method of access to NMVTIS which allows the state to conduct “instant” title checks prior to issuing new titles but the state currently does not provide any records to NMVTIS. Maryland uses the batch updates and/or inquiry access method utilization of NMVTIS. The state provides records to NMVTIS, but currently does not conduct “instant” title verifications.

The map in Figure 9.1, created by AAMVA in October of 2011, shows the level of participation among the 51 U.S. jurisdictions at that time. According to AAMVA’s second annual report on NMVTIS issued in September of 2011, the NMVTIS master file contained records on 87 percent of the total vehicle population in the U.S. There were 31 states in full compliance with the NMVTIS statutory and regulatory requirements – providing data to NMVTIS and making the requisite title verification inquiries. Another 8 states were providing data to NMVTIS but were not making the requisite inquiries. Twelve additional states were in the process of developing the capability to provide data and/or make inquiries. It is important to note that once these 12 jurisdictions complete their development efforts, all jurisdictions will be providing vehicle records to NMVTIS.

For the period of October 1, 2009 through September 30, 2010, there were over 104 million state program transactions processed through NMVTIS. These transactions included title inquiries, title updates and brand updates.

Figure 9.1: State Motor Vehicle Administration Overall Compliance



NMVTIS Funding/Cost to Operate

Section 202.a.3 of the Anti Car Theft Act requires the operation of NMVTIS to be paid for by a system of user fees and not dependent on federal funds. The user fees collected by the system operator (AAMVA) cannot exceed the costs of operating the system. The total fees charged to the states is to be reduced by transaction fees received by the operator for access to vehicle records housed in NMVTIS, as well as by future funds awarded by the U.S. Government to the system operator to assist in implementing the

system. Effective October 1, 2012, each jurisdiction will be invoiced at a rate of \$0.02 for each vehicle registered in the jurisdiction, as reported by FHWA, to fund NVMTIS. Based on AAMVA's annual report on NMVTIS for October 1, 2009 through September 30, 2010, NMVTIS program costs for that period totaled over \$5.2 million.

NMVTIS Governance

DOJ is fully responsible for the NMVTIS policy and operation. Pursuant to DOJ's Final Rule governing NMVTIS, an NMVTIS Advisory Board (NAB) was created to provide input and recommendations to the Office of Justice Programs in the Bureau of Justice Assistance regarding the administration and operation of NMVTIS. The NAB includes representation from all stakeholder communities affected by the NMVTIS program, including states, consumers, insurance carriers, auto recyclers, junk and salvage yards, law enforcement agencies, the auto industry, technology partners, independent organizations focused on reducing vehicle-related crime, and AAMVA. The goals of the NAB are: to implement a system that is self-sustainable with user fees, to identify options for alternative revenue-generating opportunities, to determine ways to enhance the technological capabilities to increase the system's flexibility, and to identify options for reducing the economic burden on current and future reporting entities and users of the system.

NMVTIS Nexus to MBUF Systems

NMVTIS and/or AAMVA could potentially play a role in the implementation and administration of an MBUF system. However, currently there are technological, policy, governance, privacy, and funding gaps that need to be addressed to maximize the utilization of NMVTIS and the system operator in any future MBUF system. Certainly, the NMVTIS system is not the only option to consider as a means of state-to-state interoperability for MBUF ownership data and associated administrative functions that require vehicle ownership knowledge. A newly constructed system in the future, based on future technology, may be more optimal to address MBUF functionality. The Alliance of Toll Interoperability (ATI) has also implemented a hub to advance interoperability among toll operators. The ATI hub has corollaries to elements of an MBUF system and will provide additional administrative functionality study elements as its use and operations continue.

The NMVTIS was reviewed as part of this Phase 2 study based on the cursory review completed as part of the Phase 1 study, the system's use by all three case study states and many other departments of motor vehicles and its maturity. Again, other options should be considered to accommodate the concept of operations long-range vision.

In its current form, NMVTIS has significant gaps in system and business requirements and functionality that would need to be addressed if this interoperable system or any of its components were to be used as administrative elements of an MBUF system. Some of those gaps are noted below.

Technological Gaps

The NMVTIS database provides a potential foundation for an MBUF system. It contains a wealth of data on almost 90 percent of the vehicles in the U.S., including information on the state of title, the VIN which theoretically could be used to set up user accounts, and information on vehicles that are no longer registered because they have been junked, salvaged, or declared total losses by insurance companies. This foundation is important as a fully functioning MBUF system requires vehicle information and/or ownership information for enrollment, payment, enforcement and other administrative requirements.

In addition, the system currently provides the infrastructure needed for jurisdictions to access the NMVTIS data utilizing AAMVA's network for real-time access, as well as the Internet to provide connectivity with state DMVs and third parties such as junk/salvage yards, auto recyclers, insurance carriers, and consumers. For many years, AAMVA and its network AAMVAnet have provided the state-to-state interoperability for data sharing and data exchange among DMVs.

The NMVTIS database and connectivity could be used to facilitate an MBUF system as follows:

Storing Data on Installation of Vehicle Technology: In an MBUF transition, in advance of the long-range vision ConOps, there would be a need to track and retain data on which vehicles have complied with the requirement to install any technology needed to track and report mileage and travel data. As a repository for all motorized vehicles that travel on the highways of the U.S., NMVTIS could be expanded to include data field(s) that could reflect such installations. Those who install the requisite on-board vehicle technology could report such installations to NMVTIS using connectivity similar to that used today by data consolidators to report the requisite data from junk/salvage yards, auto recyclers, and insurance carriers. Using the VINs for the compliant vehicles to match existing NMVTIS records, installation could be added to individual vehicle records stored in the NMVTIS central file. Law enforcement could then access NMVTIS, as it does today through the Department of Justice network, to assist in the enforcement of MBUF fees.

Changes in Vehicle Status and State of Title: Both in an MBUF transition and in the long-range vision outlined in the ConOps, the state processing organization administering an MBUF system have a need to know:

- When vehicles have been junked or demolished because MBUF's would no longer accrue; and
- When vehicles have moved into and out of their states to determine the appropriate charging and allocation of MBUF fees.

While state DMVs obtain reports from junk/salvage yards, auto recyclers and insurance companies located in their jurisdictions, these reports are typically paper-based and must be manually entered onto motor vehicle databases. Electronic access to this data through NMVTIS would help ensure more up-to-date recognition of changes in vehicle status. In addition, this type of information would prove useful in determining if a vehicle owner had tampered with the onboard vehicle technology for tracking mileage and travel data in an MBUF system.

Most states also receive back their titles when vehicle owners title vehicles in new jurisdictions and surrender the original titles to the new states. However, these are typically received in batches of hard copies. Some states shred these surrendered titles without updating their vehicle databases; other states manually enter the surrendered status on their files. NMVTIS contains active vehicle records that contain the current state of title, and the system also contains history records that contain information on previous states of title. This type of information would prove useful in determining when a specific vehicle should have been accruing MBUF's. Electronic access to these changes in state of title would help ensure that MBUF fees are collected and then allocated to the appropriate jurisdictions.

Use of these types of NMVTIS data to support an MBUF system could be accomplished through the online integrated interface with NMVTIS or through the standalone state web inquiry methods offered today for conducting "instant" title verification checks. The NMVTIS central files could be used to determine if specific VINs are titled in states with MBUF systems. Junk/salvage yard data, reflecting vehicles that have been junked, demolished, or deemed to be a "total loss" by insurance companies, could be used to determine if a change in vehicle status is why there may be unreported mileage or travel data.

Furthermore, the NMVTIS database would need to be expanded to include data on the installation of the in-vehicle technology needed to collect the mileage and travel data required for an MBUF system. AAMVA would also need to implement an enhancement that supported the provision of vehicle owner data from their files in response to MBUF inquiries for billing and collection purposes.

It is unclear, however, how scalable the NMVTIS system may be. AAMVA has recognized the potential of the NMVTIS to include expanded functionality and has also recognized the role of the system in any potential and future MBUF system.

Policy Gaps

There are policy gaps that would need to be addressed if the NMVTIS database were to be used to facilitate the administration of an MBUF system. If an MBUF system depended upon NMVTIS to obtain vehicle owner names and addresses, AAMVA would need to modify the current NMVTIS query applications to receive this data from the state of title and pass it on to the MBUF billing and collection system. However, this modification will likely be completed by AAMVA in order to meet the owner name requirements in DOJ's Final Rule.

Perhaps more importantly, the AAMVA Board and DOJ would have to agree that NMVTIS data and the system could be used for MBUF purposes. Language in the current federal Driver's Privacy Protection Act (DPPS) states that information collected for one purpose by a motor vehicle agency cannot be used for a different purpose unless the planned use meets the criteria of the exceptions delineated in the Act or unless the data subject is provided an opportunity to "opt out." It could be that, from a legal perspective, use of NMVTIS data and/or the system itself to support an MBUF system necessitates adding an additional exception to the DPPA. Many state statutes are more restrictive than the DPPA and an analysis of all state statutes would be needed to determine if amendments to state laws would be needed to utilize the data provided to NMVTIS for MBUF purposes. These decisions would likely need to be considered in total with legislation needed for an MBUF system implementation along with many other important policy considerations.

AAMVA could theoretically serve as a third party entity administering elements of an MBUF system. However, the AAMVA Board of Directors would have to approve this role and if the NMVTIS is used, so would the Department of Justice.

Lastly, DOJ's Final Rule does not require states to provide odometer readings to NMVTIS on a regular, recurring basis. If the intent was to use NMVTIS odometer readings to calculate MBUF's, states that currently do not record updated odometer data in NMVTIS after initial titling would have to change their state statutes to require vehicles owners to provide up-to-date odometer readings. AAMVA and the states would have to modify the existing NMVTIS programs to support the provision and storage of updated odometer readings in the database.

Governance Gaps

Governance responsibility for the NMVTIS currently rests with DOJ because the system and database were originally created to support law enforcement. Use of NMVTIS data to facilitate an MBUF system falls outside of the original statutory intent of the NMVTIS database, i.e., to deter and detect vehicle theft, title fraud, and brand washing. At a minimum, expansion of the scope of NMVTIS could necessitate an amendment to the Anti Car Theft Act and/or DOJ's Final Rule. Governance of the system would have to be considered based on use of the system in an MBUF environment both at the state and federal level.

Privacy Gaps

While NMVTIS seems to provide a workable framework that could be used to facilitate the administration and enforcement of MBUF systems by state agencies, the Anti Car Theft Act and DOJ's Final Rule currently preclude the provision of personal data from NMVTIS to private entities. This could prove problematic if a private or quasi-private entity was designated as the administrator of an MBUF system, as owner names and addresses would be needed for MBUF billing and collection. It should be noted, however, that this same gap would exist if a private or quasi-private entity administering MBUF had to rely on the state department of motor vehicles to obtain owner names and addresses. Federal statutes, such as the DPPA, and individual state privacy statutes preclude motor vehicle agencies from providing personal data to private-sector entities unless the planned use of the data meets specific conditions.

Funding Gaps

Both AAMVA and the NAB have acknowledged that the biggest challenge for NMVTIS is the financial sustainability of the system. AAMVA noted in its first annual report on NMVTIS that, as the system operator, it needs to develop and implement a strategy to generate user fees from all possible sources to eliminate the current reliance on federal and AAMVA funds. DOJ has encouraged AAMVA to be creative in utilizing NMVTIS to develop new revenue streams. AAMVA released an RFP the end of March 2011 to procure the services of a third party to assist them identifying the marketability of the system.

Conclusions

NMVTIS could play a key role in an MBUF system by (1) providing the information needed by MBUF processing organizations to reassign responsibility for MBUF payments to the new owner when a vehicle is sold or otherwise changes ownership; and (2) providing the IT infrastructure needed for real-time access to the NMVTIS data. Another benefit of NMVTIS is that it will accustom states to sharing information that will be needed to implement an MBUF system.

The NMVTIS database could be used as the central repository of data reflecting which vehicles have had the requisite in-vehicle technology installed during an MBUF transition. NMVTIS also could be used to capture, store, and disseminate the mileage and travel data provided via the in-vehicle technology. And, AAMVA could also theoretically serve as the clearinghouse for an MBUF system.

Many of these potential opportunities or options for uses for NMVTIS in an MBUF system still require considerable consideration and review, as well as critical linkage to the MBUF functionality ultimately determined by states. Addressing some of the key issues now could provide an opportunity to more thoroughly consider potential roles for NMVTIS in an MBUF system, and to changes that might be required before NMVTIS could fulfill those roles.