Advanced Traveler Information Systems (ATIS) White Paper for the Metropolitan Washington Region

Prepared for:
Virginia Department of Transportation

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<th>Definition</th>
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<tbody>
<tr>
<td>ADOT</td>
<td>Arizona Department of Transportation</td>
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<tr>
<td>ARTIMIS</td>
<td>Advanced Regional Traffic Interactive Management and Information System</td>
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<td>ATIS</td>
<td>Advanced Traveler Information Systems</td>
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<td>ATMS</td>
<td>Advanced Traffic Management Systems</td>
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<tr>
<td>CHP</td>
<td>California Highway Patrol</td>
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<tr>
<td>DMO</td>
<td>Destination Marketing Organization</td>
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<tr>
<td>FCC</td>
<td>Federal Communications Commission</td>
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<td>FHWA</td>
<td>Federal Highway Administration</td>
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<tr>
<td>GPS</td>
<td>Global Positioning System</td>
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<td>HAR</td>
<td>Highway Advisory Radio</td>
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<td>ISP</td>
<td>Information Service Provider</td>
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<tr>
<td>ITS</td>
<td>Intelligent Transportation Systems</td>
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<tr>
<td>IVR</td>
<td>Interactive Voice Response (System)</td>
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<tr>
<td>KYTC</td>
<td>Kentucky Transportation Cabinet</td>
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<tr>
<td>NWS</td>
<td>National Weather Service</td>
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<tr>
<td>ODOT</td>
<td>Ohio Department of Transportation</td>
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<tr>
<td>OKI</td>
<td>Ohio-Kentucky-Indiana Regional Council of Governments</td>
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<tr>
<td>PSAP</td>
<td>Public Safety Access Point</td>
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<td>RCRS</td>
<td>Roadway Closures and Restrictions System</td>
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<tr>
<td>RITIS</td>
<td>Regional Integrated Transportation Information System</td>
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<tr>
<td>SHENTEL</td>
<td>Shenandoah Telecommunications</td>
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<tr>
<td>TATS</td>
<td>Traffic Advisory Telephone Service</td>
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<td>USDOT</td>
<td>US Department of Transportation</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>VDOT</td>
<td>Virginia Department of Transportation</td>
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<tr>
<td>VMS</td>
<td>Variable Messaging Signs</td>
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<tr>
<td>VRAS</td>
<td>Voice Remote Activated System</td>
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<td>VSP</td>
<td>Virginia State Police</td>
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EXECUTIVE SUMMARY

The Metropolitan Washington Region faces a number of issues regarding traveler information. The Partners in Motion project expires in December 2002 and public sector representatives need to explore options and make appropriate choices and decisions regarding what traveler information services to provide, how to provide them, and how to finance the chosen approach.

This White Paper presents details on the technical elements common to all traveler information systems (data collection, data fusion, and information dissemination), a summary of both the national traveler information market and the Metropolitan Washington Region’s traveler information market, a deployment summary of what other public and private sector organizations have done, and a summary of potential approaches that the Metropolitan Washington region could consider.

Traveler information systems consist of three major technical elements: data collection, data fusion, and information dissemination.

Multiple technical methods are available to perform data collection including:

- Cellular telephone tracking
- Toll tags as probes
- License plate matching
- Satellite surveillance
- Point detection
- Probe vehicles reporting via cell phone
- GPS equipped probe vehicles

No one approach to data collection or a single technology can provide all the data collection needs of traveler information systems. Data comes from multiple sources and multiple technologies. However, the use of multiple data sources poses significant issues that participants must address. These issues include certifying the accuracy and timeliness of the data and coordinating data collection standards throughout the region.

In order to certify the data, the public sector will need to develop, agree upon, and follow specific standards regarding what it means to certify data, what accuracy the public sector is willing to support for speed and volume data, how the public sector will coordinate data collection and data accuracy across jurisdictional boundaries, and how the public sector will resolve differing accuracy levels associated with different data collection techniques.

Without certified public sector data, the participating organizations will have a difficult time convincing the private sector that public sector data has value.

One private sector company, Mobility Technologies, has taken a different approach to data collection. Under sponsorship of the Federal Highway Administration, Mobility Technologies deploys sensors for point detection, shares the information with the participating public sector
agencies, and also resells the information to media outlets for traveler information and traffic reports.

This approach has some significant benefits to the public sector.

1. Most funding is federal. Mobility technologies won a competitive procurement (under FHWA’s ITOP program) to participate in a public private partnership. Under this partnership, the Federal Highway Administration and local jurisdictions subsidize the sensor deployment for that region. FHWA contributes $2 million for the region; the local partners must match an additional $500,000. Mobility Technologies uses the funding to deploy over 100 sensor sites throughout the region to collect speed and volume information on specific roadways.

2. The private sector operates and maintains the sensor system. Mobility Technologies is responsible for operating and maintaining the sensor system, with no additional public sector funding.

3. The public sector gains the benefit of data for traffic management.

Working with Mobility Technologies also has some significant disadvantages for the public sector.

1. Local partner must provide $500,000 in matching funds
2. Mobility Technologies has exclusive ownership of the data and the sensor infrastructure
3. Public Sector has significant limitations upon its use of the data received - it cannot use the data to compete against Mobility Technologies in the traveler information marketplace. (For example, the data cannot be input into a regional 511 system without negotiating some form of compensation for Mobility Technologies.)
4. The area of coverage desired by Mobility Technologies may not be the same area of coverage desired by the public sector.
5. The sensor system and infrastructure are a corporate asset of Mobility Technologies and ownership may not pass to the public sector if Mobility Technologies goes bankrupt.

The public sector faces a June 1, 2002 deadline regarding whether to participate with Mobility Technologies.

In order to make an informed decision regarding whether (and if so, how) to participate with Mobility Technologies, public sector agencies need to determine their role in data collection. The public sector can be a wholesaler of data or a retailer of data. Each approach has particular responsibilities that the public sector must meet.

Under a data wholesaler approach, the public sector collects and fuses data for distribution through different retail outlets – usually media outlets. The public sector is responsible for implementing, maintaining, and operating the technical sensor system to collect transportation data.

Under a data retailer approach, the public sector is responsible for disseminating information to the traveling public. Under this approach, the public sector still has the responsibility for
collecting and fusing data, and it has the added responsibility of disseminating the information via different media outlets such as internet, radio, and public service announcements.

Once the data collection issues are identified and addressed, data fusion issues come to the forefront. Under sponsorship of the Metropolitan Washington Council of Governments, the region has already examined approaches to collating and using regional ITS data. Based on this work, the region has two basic options: centralized data fusion or distributed data fusion.

Centralized data fusion has one regional entity collating data from all participating regional partners. Distributed Data Fusion has multiple entities collecting data from local regional partners. These distributed entities must share data and work together to provide a consistent view of the transportation network throughout the region. The region has already programmed and requested funding for projects that use centralized data fusion. If participating agencies decide to change the technical approach to data fusion, current projects must be redirected.

Public sector agencies have multiple information dissemination outlets available to them. These outlets include:

- Internet Web Sites
- Public Sector Traffic Advisory Infrastructure
- Media Outlets
- 511/Telephone Delivery Systems

To take maximum advantage of available media outlets, participating agencies need to make decisions regarding the business model to follow for information dissemination.

Regardless of the exact role the public sector decides to perform, technology deployed, or business model used, one thing is clear – the lack of reliable, quality real-time sensor information must be addressed immediately.

The current traveler information market is media driven. An understanding of the region’s media market and how that market relates to both other markets and other traveler information system deployments can help participating agencies decide how best to proceed. The most recent Arbitron national ranking of major radio markets places Washington in the eighth spot, with a 12-years-of-age and older population of 3.862 million. The Washington, D.C. television market looks remarkably similar to the radio world portrayed by Arbitron, though in the TV market the metric of choice is different. In this case, Nielsen measures TV households. Washington D.C. is in the #8 spot with 2.128 million TV households.

A number of deployments similar to the Partners in Motion project have encountered different levels of success and offer some significant lessons learned that can help participating organizations decide how best to proceed. These deployments include

- TravInfo
- ARTIMIS
- 511 service in Virginia, Arizona, and Northern Kentucky
Research on numerous deployments across the United States has generated a summary of public sector best practices and lessons learned. These findings include

- Agencies have two major objectives in sharing their data with private sector and other public sector recipients: improving transportation operations through better interagency coordination and optimizing the use of the transportation system by providing information to travelers. (Enhancing interagency coordination was the top-ranked motive for data sharing.)
- Even though their motives are different, public and private sectors are active participants in the use of traveler information as a transportation management tool. Almost all agencies directly provide information to the public, typically with VMS, Highway Advisory Radio (HAR), kiosks, and interactive voice response telephones. Although agency data is a fundamental source, private providers generally need to enhance public data before it is marketable. The most common types of information provided are traffic and road conditions, incident information, and planned construction information. Transit data is generally less useful to private providers, and only a third of them report transit delay information.
- Agencies who have data to share protect their interests by placing restrictions on access to data, but firms generally do not find these conditions to be onerous. Two or more conditions on access are common, the most frequent being acknowledgement of the agency as the source of the data when distributed to the public.
  - Formal policies on data sharing were reported by half the surveyed agencies and several more have plans to issue one. The principal advantage of a formal policy is that it provides a process for handling requests for agency data.
  - In addressing the costs associated with the data sharing process, agencies frequently employ two or more cost recovery mechanisms in data sharing relationships. Most frequently, agencies require the receiving party to cover its own cost, such as hardware, software and communications cost to connect to agency data sources. The second most popular mechanism involves a private firm sharing its "value-added" information with the agency.
- The two most controversial topics in the private sector's relationships with agencies regarding agency data are revenue sharing and exclusivity.
  - The idea of revenue sharing is optimistically viewed by many agencies, although in practice, it has not had much success. The private sector tends to oppose revenue sharing, either because of practical difficulties in administering it or because it violates the principle that public data should be available to all taxpayers for free.
  - Exclusivity is the model used by only about 15% of the surveyed agencies, which see its value in assigning the burden of data dissemination to some other entity. Private firms are generally opposed to exclusive arrangements, because they constitute monopolistic, anti-competitive franchises and because they violate the principle of right-of-access to data collected at taxpayer expense.
Public sector agencies have a number of choices regarding their role in ATIS and what services they desire to offer. Public sector agencies may act as a data wholesaler, a data retailer, or a combined wholesaler/retailer.

As a data wholesaler, the public sector faces the following issues:

- **Level of service**
- **Quality of data**
- **New maintenance requirements**
- **Exclusivity of Data**

As a data retailer, the public sector faces the following issues:

- **Competition with private sector**
- **Multiple media management skills**

One possible approach to avoiding many of these issues is to follow a hybrid approach where the public sector provides information through distribution outlets which are familiar to the operating agencies (e.g. HAR and VMS), provide data to other organizations, and concentrate on supporting a 511 service where the private sector cannot compete or conflict with the public sector.

Based upon the role that the public sector chooses to adopt, the participating agencies must choose an appropriate business model for providing traveler information service. Available options include:

- **Public sector funded model**
- **National Weather Service Model**
- **Subscription Model**
- **Pay-per-call Model**
- **Advertising and Sponsorship Model**
- **Loss Leader or Franchise Model**
- **Hybrid Model**

Table 6 identifies the resource requirements for each approach and is copied here.
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<thead>
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<th>Activity</th>
<th>Estimated Cost</th>
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<tr>
<td>Mobility Technologies Sensor Coverage</td>
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<td>Data Quality Standard</td>
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<td>Extend Partners-in-Motion</td>
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**Table 6: Estimated Costs for Different Approaches to Traveler Information Services**

Section 5.3 presents a decision tree as a framework for public sector representatives to use in addressing the numerous issues that must be resolved.

By addressing these questions and deciding the role of the public sector, the appropriate business model, and the types of service to be provided, operating agencies can determine how best to proceed forward with a regional traveler information service for the Metropolitan Washington region.
1. INTRODUCTION

The Metropolitan Washington Region faces a number of issues regarding traveler information. The Partners in Motion project expires in December 2002 and public sector representatives need to explore options and make appropriate choices and decisions regarding what traveler information services to provide, how to provide them, and how to finance the chosen approach.

In 1996, the Virginia Department of Transportation, on behalf of the region, entered into a public private partnership with Batelle. The original plan for this public private partnership was for Batelle’s subcontractor SmartRoutes to take over the project as prime contractor once the private sector business model for repackaging and reselling the public sector data proved successful. For a number of different reasons, the business model did not prove financially viable. Through the VDOT contract, the operating agencies in the Metropolitan Washington region provided seed funding for the first two years of the effort. Batelle and SmartRoutes have covered the project’s operating costs for the last three years.

Because the business model failed, the public sector needs to address a number of questions and make decisions in the very near future. If there is going to be a new contract, a new contracting agency must come forward and funding sources must be identified. This White Paper presents information to help make these decisions.

This White Paper presents details on the technical elements common to all traveler information systems (data collection, data fusion, and information dissemination), a summary of both the national traveler information market and the Metropolitan Washington Region’s traveler information market, a deployment summary of what other public and private sector organizations have done, and a summary of potential approaches that the Metropolitan Washington region could consider.
2. TECHNICAL ELEMENTS OF TRAVELER INFORMATION SYSTEMS

Traveler information systems consist of three major technical elements: data collection, data fusion, and information dissemination. Figure 1 illustrates how these three technical elements relate to each other. Data concerning the status of the transportation network is collected by a number of different technologies and by a number of different organizations. Data is collated, organized, or “fused” to create meaningful information regarding the status of the transportation network. The resulting information is disseminated to different customers through multiple communication and/or media outlets. In each technical element, one or more organizations may perform activities related to that element.

![Figure 1: Technical Elements in Traveler Information Systems](image)

While this White Paper concentrates on information dissemination, it also reviews details regarding data collection and data fusion to show how all three aspects are interrelated. The White Paper demonstrates the linkage between public sector decisions in collection and fusion and their impact on information dissemination.

2.1 Data Collection

Data collection is the collecting, retrieving, gathering, and/or collating of real-time status information about the transportation network.
2.1.1 AVAILABLE TECHNOLOGIES
Multiple technical methods are available to perform data collection. This section describes different methods that have been used (or considered for use) by transportation organizations.

2.1.1.1 Cellular Telephone Tracking
Cellular Telephones have become widespread. According to some studies, over 80% of all cellular telephone calls occur in a vehicle while driving. By locating and tracking cellular telephone calls while the call is in progress, transportation professionals could infer current traffic conditions. The speed with which a cell phone travels reflects the speed of the transportation network.

Cellular telephone tracking looked promising from 1996 – 2002, because the Federal Communications Commission published requirements for Enhanced 911 service requiring telephone companies to deploy geo-location technologies to better locate 911 calls. The FCC requirements followed a two-phase approach. Phase 1 required telephone companies to provide the following information to the Public Safety Access Point (PSAP):

- Callback number
- Address of cell site
- Orientation of antenna (if directional).

The local telephone company is required to provide this information within six months of receiving a written request from the local PSAP. The PSAPs must also meet certain requirements. The PSAP must be able to use the data and the PSAP must have a cost recovery mechanism to implement the necessary infrastructure to use the data. In many jurisdictions, the PSAPS have not been able to request Phase 1 Compliance from the telephone companies, because the PSAP does not have a cost recovery mechanism.

Phase 2 requires the same information as Phase 1, with the addition of location information for the cell phone itself (i.e. the latitude and longitude). The accuracy of the location depends upon whether the telephone company uses a network-based solution or a handset-based solution. Table 1 presents the accuracy requirements for Phase 2 compliance.

| Handset Solution | •50 m. accuracy 67% of the time  
|                  | •150 m. accuracy 95% of the time |
| Network Solution | •100 m. accuracy 67% of the time  
|                  | •300 m. accuracy 95% of the time |

**Table 1: Accuracy Requirements for Enhanced 9-1-1 Location Information**

The deadline for deploying these technical systems was October 1, 2001. However, most telephone companies requested waivers delaying the date and the FCC granted all the waivers.
Third party manufacturers of telecommunications equipment were relying on the October 1 deadline to force telephone companies to buy their products to meet the location requirements.

In the Metropolitan Washington region, U.S. Wireless Corporation performed a pilot project on part of the Capital Beltway to demonstrate their network solution to locating cellular telephones. The pilot project is complete, although the final report is still being developed. Prior to the project’s completion, U.S. Wireless Corporation filed for bankruptcy and sold all its assets to TrafficMaster, a company based in the United Kingdom.

Based on the state of the Enhanced 911 industry, the postponement of FCC requirements for locating cell phones, and the particular results of the region’s pilot project, commercial implementation of cellular telephone tracking is at least 3 – 5 years away. This technical approach to data collection will not significantly enhance the Metropolitan Washington Region traveler information activities in the near future.

2.1.1.2 Toll Tags as Probes
Another option for detecting vehicles is to use electronic toll tags as vehicle probes. This technical approach places toll tag readers along roads of interest. As a vehicle equipped with an electronic toll tag passes the reader, the tag identifier, date, and time are recorded. A computer matches tag identifiers, examines the associated time stamps, and calculates the travel time for the distance between the tag readers.

The technology to use toll tags as probes is available. However, a number of traffic engineering and cost issues must be addressed before such a system is implemented in the Metropolitan Washington region. Toll tag readers work on a per lane basis. Using this technology on freeways requires additional deployment of tag readers. If the tag readers are limited to individual lanes, traffic engineering issues regarding infrastructure between lanes must be resolved. Many of these issues can be alleviated by limiting the tag readers to exits, but this approach could affect data accuracy. Toll tags as vehicle probes work best on toll roads (where the readers are already used to collect tolls). PB Farradyne is examining the use of toll tags as vehicle probes for the TravInfo® project in the San Francisco Bay area.

2.1.1.3 License Plate Matching
Another technical approach for data collection (similar to toll tags as vehicle probes) is license plate matching. Under this approach, video cameras record vehicle license plates at particular locations, associate a time stamp with the license plate number, and attempt to match the license plate to an image taken from another video camera at a separate location. By matching license plate numbers, calculating the time difference for the two images, and knowing the distance between the video cameras, travel time estimates can be calculated. This technical approach requires significant camera coverage, significant data storage capability, and extremely significant computational power in order to provide prompt and accurate travel time estimates.

License plate matching also presents the issue of public acceptance. Most of these systems read the middle four digits of the license plate number in order to assure anonymity; however, using license plate matching for vehicle tracking could raise privacy issues for members of the traveling public.
2.1.1.4 Satellite Surveillance
The Federal Highway Administration has investigated the use of earth observing satellites (developed by the Department of Defense) to identify and track traffic congestion. This approach is experimental and no transportation-related pilot projects or trials have been performed. This approach to traffic monitoring would be very expensive to maintain.

2.1.1.5 Point Detection
Point detection for traffic monitoring is the most commonly used form of traffic monitoring. Point detection can be performed by using embedded or non-embedded sensors. Embedded sensors place part of the sensor in the pavement or roadway to detect vehicles as they pass. Loop detectors are a good example of an embedded sensor. Non-embedded sensors monitor traffic without placing part of the sensor in the pavement. Non-embedded sensors can be active (meaning that they send a signal and detect the signal return off of a vehicle) or passive (meaning that they detect some form of energy, radiation, or noise coming from the vehicle).

Technologies used for point detection include:

- Inductive Loops
- Radar
- Microwave
- Video
- Active Acoustic
- Passive Acoustic

To receive enough data to perform traveler information and estimated travel times, a significant number of sensors must be used. Mobility Technologies, a private sector company that deploys point detectors to detect traffic and calculate travel times, deploys sensors approximately every one-half to 1.5 miles over roads that they monitor.

Point detection may be the best technical approach for public sector agencies, because the traffic sensors can be used for other applications (such as traffic counts, emergency management, evacuation monitoring, etc.) as well as traveler information.

2.1.1.6 Probe Vehicles that Report via Cell Phone
Commercial traveler information providers, especially commercial radio stations, often use a fleet of volunteer or paid probe vehicles to provide information regarding the transportation network. WTOP in the Metropolitan Washington region has a number of volunteers who call the station daily to report congestion and incidents. The Triangle Traffic Network in Raleigh, NC pays a monthly fee to a collection of drivers who provide twice daily reports regarding their commute.

Commercial traveler information providers use probe vehicles because the commercial provider is either unwilling or unable to rely upon public sector data.
2.1.1.7 GPS Equipped Probe Vehicles

Another approach to collecting traffic and transportation data is to use public sector fleets of vehicles equipped with Global Position System Receivers. Many cities in Europe use roaming probe vehicles driven at all hours of the day by public sector staff to collect traffic data. Many European agencies refer to this data as “floating car data.”

Under this approach, any public sector organization (such as a transit provider) could monitor and manage the operations of their vehicle fleets and share the location and travel time information for traveler information purposes. This approach works very well when transit providers already plan to equip their vehicles for transit operation purposes. The disadvantage of this approach is the difference between passenger vehicles and truck or bus fleets. For example, the information gathered from a fleet of buses does not accurately reflect travel conditions experienced in a passenger car.

2.1.2 Data Certification

No one approach to data collection or a single technology can provide all the data collection needs of traveler information systems. Data comes from multiple sources and multiple technologies. However, the use of multiple data sources poses significant issues that participants must address. These issues include certifying the accuracy and timeliness of the data and coordinating data collection standards throughout the region.

In order to entice the private sector to participate in information dissemination, the private sector must be convinced that the data has commercial value. Public sector representatives have historically believed that the public sector data has significant commercial value. Experience with partners in motion and other deployments have not supported this belief. The private sector places extreme emphasis on the reliability and timeliness of the data. If the public sector cannot meet the reliability or timeliness needs of the private sector, the private sector is likely to ignore the public sector and find other means to get the required data. Data certification can add value to the public sector data.

The public sector should seriously consider using the private sector for information dissemination, because private sector participation would significantly lower total costs. The public sector would not have to duplicate existing information dissemination outlets, such as radio and television.

Data certification would have to address a number of different issues, including:

- A defined accuracy level
- A defined timeliness level
- Authentication that the data is from an authorized source

In order to certify the data, the public sector will need to develop, agree upon, and follow specific standards regarding what it means to certify data, what accuracy the public sector is willing to support for speed and volume data, how the public sector will coordinate data collection and data accuracy across jurisdictional boundaries, and how the public sector will resolve differing accuracy levels associated with different data collection techniques.
Without certified public sector data, the participating organizations will have a difficult time convincing the private sector that public sector data has value. Under the Partners in Motion project, the public sector agreed to provide particular pieces of information to the Batelle Team. The public sector failed to live up to this agreement and has created a credibility problem with other private sector entities. The public sector history in providing accurate, timely information to the private sector does not lend any credibility to public sector claims that public sector data has value.

2.1.3 **Partnering with Mobility Technologies**

One private sector company, Mobility Technologies, has taken a different approach to data collection. Under sponsorship of the Federal Highway Administration, Mobility Technologies deploys sensors for point detection, shares the information with the participating public sector agencies, and also resells the information to media outlets for traveler information and traffic reports.

This approach has some significant benefits to the public sector.

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5. The sensor system and infrastructure are a corporate asset of Mobility Technologies and ownership may not pass to the public sector if Mobility Technologies goes bankrupt.

The public sector faces a June 1, 2002 deadline regarding whether to participate with Mobility Technologies.
2.1.4 **PUBLIC SECTOR ROLE AS DATA WHOLESALER OR DATA RETAILER**

In order to make an informed decision regarding whether (and if so, how) to participate with Mobility Technologies, public sector agencies need to determine their role in data collection. The public sector can be a wholesaler of data or a retailer of data. Each approach has particular responsibilities that the public sector must meet.

Under a data wholesaler approach, the public sector collects and fuses data for distribution through different retail outlets – usually media outlets. The public sector is responsible for implementing, maintaining, and operating the technical sensor system to collect transportation data. If the public sector acts as a wholesaler of data, upon which resellers build a business, the public sector must commit to maintaining a high level of service and availability for the data. Without such a commitment, private sector retailers will be less willing to accept the risk of relying upon public sector data. In addition, the public sector would need to maintain data collection equipment, and the maintenance of data collection/sensors must become a higher internal priority, regardless of business model or form of ATIS.

Under the data wholesaler approach, the public sector is on the critical path of the dissemination outlets. If the public sector does not make the necessary commitment under this approach, the retailers are left with anecdotal reports.

Under a data retailer approach, the public sector is responsible for disseminating information to the traveling public. Under this approach, the public sector still has the responsibility for collecting and fusing data, and it has the added responsibility of disseminating the information via different media outlets such as internet, radio, and public service announcements. Private sector entities that provide traffic reports will end up copying public sector information, augmenting the public sector information with private sector information, and competing against the public sector. As a retailer, the public sector could receive more attention from the traveling public regarding the success of its traveler information activities. Likewise, as a retailer, the public sector could face more severe public criticism if it fails to be as efficient and effective as other private sector entities providing traveler information.

2.2 **Data Fusion**

Once the data collection issues are identified and addressed, data fusion issues come to the forefront. The Metropolitan Washington region has multiple operating agencies generating data, and multiple dissemination outlets requesting data. Under sponsorship of the Metropolitan Washington Council of Governments, the region has already examined approaches to collating and using regional ITS data. Based on this work, the region has two basic options: centralized data fusion or distributed data fusion.

Centralized data fusion has one regional entity collating data from all participating regional partners. Centralized data fusion provides a single location for receiving data and a single location for retrieving information. The significant drawback to centralized data fusion is that the central location presents a single point of failure. If the centralized data fusion entity fails or goes off-line, the entire region loses information about the region’s transportation network.
Distributed Data Fusion has multiple entities collecting data from local regional partners. These distributed entities must share data and work together to provide a consistent view of the transportation network throughout the region. Distributed data fusion helps to prevent a single point of failure. If one of the data fusion entities fails or goes off-line, the remaining entities may be able to continue service (albeit at a lower level of accuracy).

Regardless of which approach the public sector chooses, the region must address a number of technical, institutional, and financial issues. The participating agencies must agree upon specific data formats for sharing data, agree upon data accuracy and quality standards, and must commit to continued funding for regional data fusion.

2.3 Information Dissemination

The final technical element for traveler information systems is the information dissemination component. Public sector agencies have multiple information dissemination outlets available to them. These outlets include:

- Internet Web Sites
- Public Sector Traffic Advisory Infrastructure
- Media Outlets
- 511/Telephone Delivery Systems

**Internet** - the Internet has proven an effective means to disseminate information to a large audience. Many departments of transportation currently display traffic video and speed information on their web pages. In the metropolitan Washington region, Maryland State Highway Administration and Montgomery County display video information on the world wide web. The Virginia Department of Transportation has entered into a public private partnership with Trafficland.com to provide real-time streaming video to the general public via the web. Some commercial traveler information providers use the web to collect traffic information, repackage the information, and disseminate the new information via traffic reports on commercial radio.

**Public Sector Traffic Advisory Infrastructure** – Departments of Transportation can use their existing traffic management infrastructure to disseminate traveler information. Variable Message Signs and Highway Advisory Radio, managed by local traffic management centers, can use regional information to provide information to the traveling public.

**Media Outlets** – Media outlets reach the largest audience at the least cost. Media outlets include commercial radio and commercial television. (The Internet can also be considered a media outlet.) Media outlets are an excellent mechanism for disseminating traveler information. For example, commercial radio is one of the best means for receiving information while in a vehicle. Commercial radio is free to the traveler, and usually in use while traveling.

To take maximum advantage of available media outlets, participating agencies need to make decisions regarding the business model to follow for information dissemination. Section 5.2
describes business models that the public sector should consider and the issues associated with each approach.

**511/Telephone Delivery Systems** - Another potential method for disseminating traveler information is through a 511 service. The Federal Communications Commission has reserved 511 on the telephone for a nationwide traveler information service. The FCC has specified a deadline of 2005 for a review of the deployment of 511 and reserves the right to reclaim 511 for other purposes if traveler information services are not deployed in a timely manner. Once fully implemented, any traveler could dial 511 and receive real-time traveler information for the area from which the 511 call is made.

The services to be provided under 511 are still being defined by many public sector agencies. As the public sector has examined services such as real-time traffic information, tourist information, and interactive directions to a requested destination, agencies have discovered significant cost and technical issues. The best approach identified to date is for a 511 service to act as a speed dial number to an existing telephonically delivered traveler information system. This approach is more affordable than other services and can be deployed in a reasonable amount of time.

Stakeholders in the Metropolitan Washington Region recognize the importance of 511 as a nationally known delivery mechanism.

While 511 is a great concept, a number of technical and institutional issues must be addressed in order to provide this service.

**One of the key issues is defining the service area.** The Metropolitan Washington Region is a highly urbanized area that covers a large geographic region. Travelers commute to many different business clusters throughout the region. Some travelers even commute from areas outside the region to jobs inside the region, or from areas inside the region to jobs outside the region.

Defining the service area for a 511 service is difficult for two major reasons. First, the geographic coverage for the region must be defined, and second, approaches for dealing with travelers in the region who commute to locations outside the region must be addressed. For example, Columbia, Maryland is in the Metropolitan Washington region, but commuters in Columbia travel to Washington, Baltimore, and Annapolis. Therefore, the coverage area needs to be defined and the proper mechanism for coordinating with other regions such as Baltimore, must be determined.

**Quality data and information must be used in the 511 service.** As the 511 service is used by the traveling public, the public will have greater insight into the accuracy and quality of public sector data. The method and business model for data collection will have a significant affect on the 511 service. Because the 511 service will be the main point of contact between the public and the operating agencies, any errors in the data will be viewed as errors in the 511 service and the fault of the operating agency.
One solution to the quality of data issue is to develop a quality standard for all data used in the system. This standard could develop four levels of data:

1. Unacceptable data – data that may be used for some other purpose, such as fleet management or maintenance that has a potential impact on travel, but is not accurate or timely enough for use in a 511 system.
2. Good data – data that is minimally acceptable for use in a 511 system. Incident information is an excellent example of good data. Incident information has value for a particular duration of time. If the incident information is a few minutes out of date, the data still has value to the system.
3. Better data – data that provides accurate and timely information regarding the status of the transportation system. Sensor data that reflects the real-time status of the transportation network could be an example of better data.
4. Best data – data that provides accurate and timely information regarding the status of the transportation system, has significant value over time, and gives an indication regarding the future conditions of the transportation network.

Establishing a Quality of Data standard brings some additional considerations to light. If the public sector chooses to participate in a public private partnership with Mobility Technologies or some other private sector entity, the public sector would need to hold the partner to the Quality of Data standard. Under a time and materials contract, the Quality of Data standard becomes part of the technical requirements. Under a fee for service approach, both parties would have to agree upon the standard and associated fee. If the public sector establishes the Quality of Data standard, participating agencies in the region would also have to meet the requirements of the standard. Some agencies may need to spend additional resources to make their data meet the standard and may have difficulty meeting the standard in a timely manner.

Regardless of the quality of data, a 511 service provides no value if there is no data. For a regional 511 service to succeed, the participating agencies must commit to providing data in a timely manner and commit to maintaining the infrastructure necessary to provide the data. One significant cause for failure in the Partners in Motion project was the public sector’s inability to meet the commitments made for providing public sector data to the Batelle team in a timely manner. If this experience is repeated for a 511 service, the 511 service will fail.

For a 511 service to succeed, the public needs to be informed that the service exists and the service needs to be continuously marketed. If the public sector commits to providing the service, the public sector should also commit the necessary resources to market the service to the traveling public. Past experience with the Partners in Motion project demonstrates that the project must have an adequate marketing budget for the project to succeed.

Once participating agencies achieve consensus that they want to provide a 511 service, one of the public agencies must accept responsibility for becoming the contracting agency. The Virginia Department of Transportation acted as the contracting agency for the Partners in Motion project and has stated that some other agency must come forward to be the contracting agency for the next traveler information contract or agreement.
3. MARKET SUMMARY FOR INFORMATION DISSEMINATION

This section describes the Metropolitan Washington Region as a traveler information market.

3.1 National Market Summary

The collection, fusion and distribution of traffic information (or traffic news if you are in the media) is a big business, in terms of revenue. Nationally, it is dominated by a handful of players.

Sprawl, an increasing reliance on the automobile, environmental concerns and revenue shortfalls tend to indicate that urban traffic conditions will only worsen. In mid-2001, UBS Warburg estimated that the "traffic data market" could, "with the development of high-quality real-time traffic data on a national level," grow to "$7 billion per year within 10 years."

That same report indicated that Westwood One (Metro Traffic, Shadow Traffic, SmarTraveler), was the dominant player, and picked Mobility Technologies (Traffic.com), CUE and US Wireless as other major players. Since that report was prepared, however, one of those players has disappeared -- US Wireless has filed for bankruptcy.

Westwood One, an organization that traces its corporate parentage up to the entertainment industry giant Viacom, is the dominant player in the national market, and uses a variety of methods to gather its information. These range from a combination of traditional collection methods -- phone calls to local traffic, law enforcement, and emergency services authorities, and their own airborne observers -- to public video and flow data, where available.

Westwood One, through one of its affiliates (Metro, for example) packages this information and barters it, for advertising airtime, to its clients (radio and TV stations). In most instances, the service is complete with talent -- an on-air personality who gives the report from a location remote from the broadcaster's studio. The various TV stations are usually paired with a single separate personality. This can serve to provide the illusion that the information services are unique, when they are not. The same can be true with their radio clients.

Some stations prefer to use their own employees to deliver the news. Westwood One could still be the basic provider of the information -- again in exchange for airtime -- but is often never mentioned on the air under such a "private label" arrangement.

At the opposite end of the spectrum are broadcasters who choose to use their own resources. These radio and TV stations, groups, and chains have often made the decision that they can gather and report traffic news at least at a level they consider adequate, while maintaining control of all of their advertising inventory. Such stations frequently have excellent sales departments and their time sells at a premium. Barter deals such as those involving Westwood One's subsidiaries, many times involve a discounting of the advertising spots' value as part of the deal. In essence, time that Westwood One must sell itself, with its related expenses, is not valued as highly (were the deal all cash).
In the instances where a broadcaster chooses to "go it alone" in the traffic news business, the basic decision has been made that greater revenue can be achieved on its own. This will be either through more effective use of the advertising inventory, an enlarged audience due to a superior report, or some combination of these two factors.

Audience size is of primary importance to all such decisions, because it is a principal determinant of the basic rates a broadcaster may charge for its premium spots. That audience size is, in turn, determined by two firms using a variety of proprietary surveying techniques in almost all the broadcasting markets across the country. Nielsen is the standard for the TV world and Arbitron is the standard for radio.

Mobility Technologies is a recent entry into the traveler information marketplace, and is gaining a national presence. Supported by approximately $50 million of federal money through a Congressional earmark, Mobility has embarked on an ambitious program in many of the nation’s largest markets to add large deployments of traffic sensors to the more traditional information collection systems. This "enhanced" service is then sold to a variety of broadcast clients in barter arrangements like those used by Westwood One, but in competition with them.

3.2 Washington, D.C. Region Traveler Information Market Summary

The current traveler information market is media driven. This section provides an overview of the size of the market, the significant participants in the market, and a description of their current operations. An understanding of the region’s media market and how that market relates to both other markets and other traveler information system deployments can help participating agencies decide how best to proceed.

3.2.1 Metropolitan Washington Region Media Summary

From the radio perspective, the most recent Arbitron national ranking of major radio markets places Washington in the eighth spot, with a 12-years-of-age and older population of 3.862 million.
<table>
<thead>
<tr>
<th>Rank</th>
<th>Market Name</th>
<th>Metro 12+ Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New York</td>
<td>15,060,900</td>
</tr>
<tr>
<td>2</td>
<td>Los Angeles</td>
<td>10,195,600</td>
</tr>
<tr>
<td>3</td>
<td>Chicago</td>
<td>7,470,100</td>
</tr>
<tr>
<td>4</td>
<td>San Francisco</td>
<td>5,835,100</td>
</tr>
<tr>
<td>5</td>
<td>Dallas-Ft. Worth</td>
<td>4,314,800</td>
</tr>
<tr>
<td>6</td>
<td>Philadelphia</td>
<td>4,229,200</td>
</tr>
<tr>
<td>7</td>
<td>Houston-Galveston</td>
<td>3,973,100</td>
</tr>
<tr>
<td>8</td>
<td>Washington, DC</td>
<td>3,862,000</td>
</tr>
<tr>
<td>9</td>
<td>Boston</td>
<td>3,846,100</td>
</tr>
<tr>
<td>10</td>
<td>Detroit</td>
<td>3,825,600</td>
</tr>
<tr>
<td>11</td>
<td>Atlanta</td>
<td>3,526,800</td>
</tr>
<tr>
<td>12</td>
<td>Miami-Ft. Lauderdale-Hollywood</td>
<td>3,360,100</td>
</tr>
<tr>
<td>13</td>
<td>Puerto Rico</td>
<td>3,303,500</td>
</tr>
<tr>
<td>14</td>
<td>Seattle-Tacoma</td>
<td>3,067,200</td>
</tr>
<tr>
<td>15</td>
<td>Phoenix</td>
<td>2,647,600</td>
</tr>
<tr>
<td>16</td>
<td>Minneapolis-St. Paul</td>
<td>2,494,400</td>
</tr>
<tr>
<td>17</td>
<td>San Diego</td>
<td>2,384,200</td>
</tr>
<tr>
<td>18</td>
<td>Nassau-Suffolk (Long Island)</td>
<td>2,308,400</td>
</tr>
<tr>
<td>19</td>
<td>St. Louis</td>
<td>2,183,500</td>
</tr>
<tr>
<td>20</td>
<td>Baltimore</td>
<td>2,156,700</td>
</tr>
</tbody>
</table>

Table 2: Top 20 Radio Markets According to Arbitron

The entire 286 markets surveyed by Arbitron may be viewed at: http://www.arbitron.com/home/content.stm. The site also explains that many of the largest markets contain other, smaller markets.

The Washington, D.C. television market looks remarkably similar to the radio world portrayed by Arbitron, though in the TV market the metric of choice is different. In this case, Nielsen measures TV households. Washington is in the #8 spot with 2.128 million TV households.
<table>
<thead>
<tr>
<th>Rank</th>
<th>Designated Market Area (DMA)</th>
<th>TV Households</th>
<th>% of US</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New York, NY</td>
<td>7,301,060</td>
<td>6.924</td>
</tr>
<tr>
<td>2</td>
<td>Los Angeles, CA</td>
<td>5,303,490</td>
<td>5.030</td>
</tr>
<tr>
<td>3</td>
<td>Chicago, IL</td>
<td>3,360,770</td>
<td>3.187</td>
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<tr>
<td>4</td>
<td>Philadelphia, PA</td>
<td>2,801,010</td>
<td>2.656</td>
</tr>
<tr>
<td>5</td>
<td>San Francisco-Oakland-San Jose, CA</td>
<td>2,426,010</td>
<td>2.301</td>
</tr>
<tr>
<td>6</td>
<td>Boston, MA (Manchester, NH)</td>
<td>2,315,700</td>
<td>2.196</td>
</tr>
<tr>
<td>7</td>
<td>Dallas-Ft. Worth, TX</td>
<td>2,201,170</td>
<td>2.088</td>
</tr>
<tr>
<td>8</td>
<td>Washington, DC (Hagerstown, MD)</td>
<td>2,128,430</td>
<td>2.019</td>
</tr>
<tr>
<td>9</td>
<td>Atlanta, GA</td>
<td>1,990,650</td>
<td>1.888</td>
</tr>
<tr>
<td>10</td>
<td>Detroit, MI</td>
<td>1,878,670</td>
<td>1.782</td>
</tr>
<tr>
<td>11</td>
<td>Houston, TX</td>
<td>1,831,680</td>
<td>1.737</td>
</tr>
<tr>
<td>12</td>
<td>Seattle-Tacoma, WA</td>
<td>1,647,230</td>
<td>1.562</td>
</tr>
<tr>
<td>13</td>
<td>Minneapolis-St. Paul, MN</td>
<td>1,573,640</td>
<td>1.492</td>
</tr>
<tr>
<td>14</td>
<td>Tampa-St. Petersburg (Sarasota), FL</td>
<td>1,568,180</td>
<td>1.487</td>
</tr>
<tr>
<td>15</td>
<td>Miami-Ft. Lauderdale, FL</td>
<td>1,549,680</td>
<td>1.470</td>
</tr>
<tr>
<td>16</td>
<td>Phoenix, AZ</td>
<td>1,536,950</td>
<td>1.458</td>
</tr>
<tr>
<td>17</td>
<td>Cleveland-Akron (Canton), OH</td>
<td>1,513,130</td>
<td>1.435</td>
</tr>
<tr>
<td>18</td>
<td>Denver, CO</td>
<td>1,381,620</td>
<td>1.310</td>
</tr>
<tr>
<td>19</td>
<td>Sacramento-Stockton-Modesto, CA</td>
<td>1,226,670</td>
<td>1.163</td>
</tr>
<tr>
<td>20</td>
<td>Orlando-Daytona Beach-Melbourne, FL</td>
<td>1,182,420</td>
<td>1.121</td>
</tr>
</tbody>
</table>

*Estimates used throughout the 2001-2002 television season, which started on September 17, 2001*

**Table 3: Top 20 TV Markets According to Nielsen Media Research**

The entire 210 TV markets surveyed by Nielsen Media Research may be found at: http://www.nielsenmedia.com/.

### 3.2.2 Current Traffic and Traveler Information Service Providers

#### 3.2.2.1 Westwood One

The basic gatherer of traffic information in the Washington area is Westwood One/Metro/Shadow. Using multiple aircraft, radio scanners and phone banks to talk to a wide variety of traffic and law enforcement sources, Westwood One is the basic source for the majority of traffic broadcasts on radio and television.

Lucy Caldwell, Public Information Officer for the Virginia State Police in Northern Virginia, lauds the information collection effort of Westwood One. She says that in recent years it is only a rare exception where she can give them information about an incident that they have not already collected.

The downside to Westwood One's efforts is still the inevitable delay in processing that information and broadcasting it, via their clients, to the public. Though the delay might only be a
matter of minutes, it can still pose problems along a route where a major accident can lead to traffic backing up at rates approaching a mile a minute.

3.2.2.2. TrafficLand
The Internet has brought other significant distribution channels for traffic information into play that are as close to real-time as possible. The VDOT traffic cameras on TrafficLand.com, the MDSHA cameras and speed sensor data on the CHART web site, and the Montgomery County traffic cameras are being used to augment the lower tech methods.

Registration of users at the TrafficLand site also shows that individual commuters are making use of that information to a significant, if as yet unmeasured, extent. In essence, these individuals are crafting their own personalized traffic reports (that are only accessible, however, outside their automobiles). Lawrence Nelson, TrafficLand's CEO, reports that in the months after the site went live on the Internet he had several thousand registrations by users who had found the site without the benefit of outside marketing.

3.2.2.3. WTOP
Bob Marbourg, the traffic reporter for WTOP radio, uses all of the above sources, including access to Westwood One's service and a radio link directly to their personnel, to craft his own traffic reports every ten minutes for a loyal corps of listeners. That loyal corps provides Marbourg with the information he regards as most valuable -- a constant stream of wireless phone calls reporting problems around the metro area. The calls, at least 150 every afternoon to dedicated numbers provided by two of the dominant local wireless providers, give Marbourg what he believes is a superior picture of events in near real-time.

His 20+ years of experience reporting traffic in the region also comes into play, as he admits he has to interpret his callers’ information at times. For example, most of his callers don't know precisely where they are, but by telling Marbourg precisely what they see he can come up with a location. Marbourg’s superior familiarity with traffic conditions throughout the region gives WTOP an asset unmatched by any other operation.

WTOP radio takes pride in the quality of its traffic reports and invests in them to an unusual extent; and its audience is not inconsiderable -- according to Arbitron WTOP has been among the top three stations in the market over the past two years.

Marbourg has little use for the speed data as relayed on the CHART website - in his experience, it often does not match the conditions his callers tell him about. Indeed, he is critical of much of the public sector for, in many cases only monitoring conditions and, in his opinion, not actually managing traffic for better outcomes.

He is also critical of the public sector’s ability to effectively disseminate information. He believes that, as a rule, the public sector does not hire enough people or adequately train their employees to provide good information or to resolve incidents.

Given these beliefs, it is not hard to understand that Mr. Marbourg is unsure of the proper role of the public sector in the provision of traveler information, other than providing better and more
reliable operation of the existing video and traffic detection systems. Mr. Marbourg can point to particular video cameras that have been out of operation or partially defective for weeks at a time.

Currently, radio is the dominant provider of traffic information to commuters who are in their vehicles and making their trips to or from the workplace. Radio is the only existing medium that gives commuters such direct access. For obvious reasons, TV cannot, and to date neither can the Internet. Bandwidth problems in pushing such information into a car notwithstanding, there are safety issues and the problems of coping with the sheer volume of video information.

There are already hundreds of cameras monitoring the region's highways and there will be hundreds more in the coming months and years.

The sheer size of the region also raises questions about the efficacy of any broadcast of traffic information, via either traditional radio station or TV channel. How likely is it that a commuter on State Route 28 at the Prince William County line is going to be concerned with conditions at the intersection of the Baltimore-Washington Parkway and the Capital Beltway? The sheer volume of data across such a wide area begs the question of how useful traditional broadcast can be in the future.

3.2.3 EMERGING TECHNOLOGIES AND SERVICES FOR THE METROPOLITAN WASHINGTON MARKET

On the horizon are several technologies that will enable commuters to access individualized traffic reports in their car. In recent weeks, wireless telephone providers have rolled out SMS (Short Message Sets) services for subscribers with enabled digital telephones. It would theoretically be possible to use these systems, limited to text messages of about 60 characters or so, to deliver digital data to identifiable telephones whose users had registered their commuting routes and times.

The initial problem is the scarcity of such digital flow data. With the exception of the flow data available on the CHART website (http://www.chart.state.md.us/travinfo/speedData.asp), and a few other scattered deployments of traffic sensors along the Beltway and other freeways, there is little hard, quantified data available. The traditional anecdotal reports, as gathered and delivered by Westwood One and its clients, for instance, do not lend themselves to transmission over the restricted bandwidth of an SMS service without considerable processing.

Another problem with the SMS service is the potential danger of requiring a commuter to observe his or her personalized traffic report on a relatively tiny 1-inch-by-1-inch LCD screen. One potential solution is delivering the data through voice technologies that are already widely prevalent.

The economics of traffic news, as provided by the private sector, revolve around audience size, as those outlets that deliver the largest audience can charge the highest prices for their time. As a result, even given the already-mentioned deficiencies of TV for delivering traffic conditions to commuters in their cars, TV stations generally generate more dollars for their reports than radio
stations. This is simply because there are fewer TV stations in the market and the audience is not as fragmented as it is with radio.

Complicating valuations of the various radio and TV traffic reports, however, is the preference of broadcasting executives for barter when acquiring traffic information. As already mentioned, time is not as valuable a currency as cash when evaluating the worth of traffic reporting. A considerable number of radio executives around the country also believe that they must have traffic reports on their stations because "their audience expects it," even though they privately believe those reports are of limited use. Those circumstances further confuse an already complicated situation.

This, of course, is the exact opposite of the belief of WTOP's management, who think traffic reports are in the public interest and an important factor in building audience.

The only current alternative to the advertising-driven model employed by broadcasters delivering traffic news is a subscription-based service. Such efforts to date have generally failed.

Nationally, research supports the idea that commuters would pay as much as $4 a month for reliable, personalized, real-time data about their commutes. In addition to the lack of real-time, quantitative data that can be processed and sent to commuters, the technology to accomplish this on a large-scale is only now being widely marketed. Whether the public will embrace such a system can only be known if and when enough data to satisfy the audience becomes available and it proves truly useful to them. Subscription services to date have not proven to be sufficiently more effective than the traditional advertising-supported efforts, because they have not delivered on the promise of being truly useful to the extent of what they cost.

The advent of the Internet, as both a medium and an application, has given rise to several possible approaches to traveler information that can be seen as hybrids between a purely advertising-driven model and the purely subscriber-driven model.

In such an approach, basic, self-selected, non-automated information might be available to all website visitors where they would be exposed to traditional website banners as they look for pertinent information. They would also receive suggestions that, for a modest investment, they could automate their search for information and arrange to have it delivered on a pre-determined schedule. Delivery might be accomplished in a variety of ways, ranging from HTML email to a private Internet-accessible mail address, to a PDA, or to an SMS service on a cell phone. The actual delivery technology would determine the form of the data and its cost.

Such a model could even become multi-media in approach, with radio or TV stations giving basic information over the air and "pushing" their viewers and listeners to various websites where they can sign up for more personalized service.

In their study of the traveler information marketplace, UBS Warburg visualizes a business model where traditional broadcast traffic reporting methods start to be supplanted by personalized, quantified traffic data that are delivered in real-time and in concert with in-car navigation.
devices. UBS Warburg sees the process taking many years. Other observers believe market forces will accelerate the process.
4. DEPLOYMENT SUMMARY

The Metropolitan Washington Region can take some significant lessons from other traveler information system deployments across the country. The purpose of this section is to illustrate what other public agencies have done and take lessons from their success and failure.

4.1 ATIS Deployments

A number of deployments similar to the Partners in Motion project have encountered different levels of success and offer some significant lessons learned that can help participating organizations decide how best to proceed.

4.1.1 TravInfo®

Since 1996, the San Francisco Bay Area Metropolitan Transportation Commission (MTC) has operated TravInfo® as a comprehensive system to gather, organize and disseminate timely information on San Francisco Bay Area traffic and road conditions, public transit routes and schedules, carpooling, highway construction and road closures, van and taxi services for disabled travelers, park-and-ride facilities, and bicycle programs.

The project's day-to-day management team operates with policy direction from the Freeway Management Program Executive Committee (MTC, Caltrans District 4, and the Golden Gate Division of the California Highway Patrol (CHP)). The historical focus of TravInfo®’s data dissemination has been the Traveler Advisory Telephone System (TATS). Callers anywhere in the Bay Area can reach the TATS by dialing the same seven-digit number, 817-1717, without the need to dial an area code (there are presently six area codes in the area). Call volumes average 65,000 per month, with 70% of the calls routed to transit agencies. The service is free to callers, though local toll charges may apply.

The project entered into a new business model and technical approach with PB Farradyne. MTC has decided to invest up to $40 million over 5 years under a fee-for-service approach. MTC is focusing the project on four major areas: (1) data collection (covering a specific number of road miles with specific performance criteria), (2) marketing (with $1 million budgeted annually for marketing purposes), (3) a Wide Area Network for data sharing, and (4) information dissemination.

For this next stage of TravInfo®, the public sector has postponed any requests for cost sharing or revenue sharing and has insisted on public sector control over the web site and telephone system used to disseminate information.

TravInfo® is examining how to support a 511 service and pursuing four significant activities:

1. Call Routing: MTC is working with SBC/Pacific Bell, the dominant landline carrier, to determine the most cost-effective and fairest method, technically and contractually, to route calls via 511. Additionally, MTC is determining the most efficient Interactive Voice Response system architecture to cost-effectively serve the nine-county, six-area-code region.
2. Information Enhancements: Upgrades in data collection, data fusion, agency coordination and information dissemination will occur between now and Summer 2002.

3. Marketing: Significant resources (over $1M annually) have been allocated in the coming years to market TravInfo®, with the phone service being the principal focus.

4. Statewide Coordination: MTC is working closely with Caltrans and other regions in California to facilitate an orderly, coordinated deployment of 511 throughout the state.

The TravInfo® project offers a number of significant lessons learned for planning 511 service.

For a regional agency seeking to promptly implement 511 access, it is helpful to find a state agency to support the regional agency’s intentions.

Key steps along the critical path for 511 access are to gain a commitment of resources by local telecommunications carriers and to have them develop appropriate service offerings.

Substantial marketing is required to create awareness and usage of the service.

4.1.2 ARTIMIS

The Advanced Regional Traffic Interactive Management and Information System (ARTIMIS) is a regional traffic management system provided by the Kentucky Transportation Cabinet (KYTC), Ohio Department of Transportation (ODOT), Federal Highway Administration (FHWA), Ohio-Kentucky-Indiana (OKI) Regional Council of Governments, and the City of Cincinnati.

ARTIMIS has two major functions - Advanced Traffic Management Systems (ATMS) and Advanced Traveler Information Systems (ATIS). The ATIS service, known as SmarTraveler, is but one component of the ATIS function, and is referred to as the ARTIMIS Traveler Advisory Telephone Service or ARTIMIS TATS. Originally, all landline callers to ARTIMIS TATS dialed 333-3333. In November of 1995, 311 was introduced in the Kentucky ARTIMIS area. In March of 1998 the three-digit number 211 was introduced in most of the ARTIMIS area in Kentucky and Ohio. The 211 and 311 numbers are not a part of the SmarTraveler component, but an enhancement provided by the KYTC and ODOT, and 333-3333 remains available (long distance callers can dial 513-333-3333).

To determine how useful a 3 digit dialing code is, the public sector undertook a survey to examine how the public used ARTIMIS. The results of this survey can be used for lessons learned for other implementations.

The 118 people who used the ARTIMIS TATS were asked which phone number they used to contact the service. While 23% indicated 211 and 5% indicated 311, only 1 person indicated 333-3333. The vast majority of people, 62%, simply did not know what number they used. A few others gave random wrong numbers. These results indicate the importance of having an easy number for travel information so that users can easily recall it when needed.

The survey respondents were asked which of the numbers 211 or 333-3333 they would prefer to dial and which they would find easier to remember. The interviewers read 211 first half of the...
time and 333-3333 first half of the time. Half of the time 333-3333 was shortened to “seven threes”. A large majority, 81.8% preferred 211 for dialing and recall.

This survey has demonstrated that a relatively large portion of the public in Greater Cincinnati and Northern Kentucky (55%) is aware of the ARTIMIS TATS. Furthermore, a relatively large portion of the public (12%) makes use of the service. The results of the random survey in the Boston metropolitan area in 1994 concluded that 47% of the respondents were aware of SmarTraveler, 16% had heard of SmarTraveler, but did not know what it was, and 22% were aware of SmarTraveler, but did not use it. Only 9% of the Boston respondents used the SmarTraveler services.

In Washington, D.C., approximately 11% of the respondents were aware of SmarTraveler in the Partners in Motion program. Of these, only 10% said they used the telephone information system. The finding of slightly higher awareness in Cincinnati and Northern Kentucky could be due both to ongoing successful advertising campaigns in OKI, as well as the increase in public awareness nation-wide for traffic issues and services between the previous studies and this one.

4.2 511 Deployments

On July 21, 2000, the Federal Communications Commission assigned the 511 abbreviated dialing code on a national basis for the provision of transportation information. The FCC ruling has left it to state and local transportation agencies, telecommunications carriers, and regulators to determine the appropriate courses of action to make these services available.

Providing traveler information through a 511 service appears very attractive to many public sector agencies. The development and deployment of 511 services is not trivial. Significant lessons can be learned from the initial deployments of 511 service in Virginia, Arizona, and Northern Kentucky.

4.2.1 Virginia

The 511 Virginia service grew out of Travel Shenandoah which was originally launched in July 2000. The Travel Shenandoah service covers a 35 county, 325-mile long section of the I-81 region in Virginia, from the West Virginia state line south to the Tennessee state line, the entire length of Skyline Drive, and short sections of I-64, I-66, and I-77 (see Figure 2). Travelers can access traffic and construction alerts, weather forecasts, information about hotels, food, and special events, and more through the 511 service. This information is obtained through various project partners: VDOT, the Virginia State Police (VSP), local and state Destination Marketing Organizations (DMOs), and local phone books. VTTI collects the information, organizes it in a central clearinghouse and disseminates the information to the public. Shenandoah Telecommunications (SHENTEL) provides essential support to the service through awareness marketing and the sale of advertisements and placement on the website and phone service. The revenues generated from the sales help to ease VDOT’s cost of supporting the service.
In its current form, information is available 24 hours a day, 7 days a week via:

- The Internet (www.travelshenandoah.com)
- Voice Actuated Mobile and Landline Telephone (511 or 1-800-578-4111)
- Cable Television (SHENTEL Cable TV)

The service is designed to meet the needs of several audiences:

- Travelers, both before they set out and while traveling in their vehicles
- Tourists planning a trip and visitors staying in the area
- Travelers needing non-life threatening emergency assistance (e.g., dentist or veterinarian)
- Local residents
- Local businesses offering goods and services to the traveling public
- Government agencies responsible for providing safe and convenient travel conditions

511 Virginia was developed as an ITS demonstration project, funded by VDOT under the Department's Smart Travel program. Both SHENTEL and VTTI have made significant additional financial and in-kind contributions. The future intent is that the service will be financially self-sustaining, with on-going operating costs supported by a mix of revenues, including:

- Limited Subscriptions
- Service Sponsorship(s)
- Tailored Information Services
- Advertisements
• Sale of Data
• Governmental 'Fees for Service'

To make this business model successful, SHENTEL has employed a sales staff of three full time employees under the management of a full time project manager. This staff works to sell advertisements as part of a series of sales packages involving both the website and the phone system. All revenue generated from sale activity will flow back to SHENTEL to recover sunk costs in investments in initial infrastructure needs. After all costs are recovered, the revenue will flow to the Traveler Information program, helping to support the ongoing costs of operations and to alleviate VDOT's financial obligations.

A number of lessons have been learned from the implementation of 511 in Virginia.

• **Customer feedback is a necessity to shape your service.** During operation of the current phone service, VTTI conducted usability testing of the service, both with actual users and with phone system experts. Based on these findings, the user interface was modified.

• **Having a telecommunications carrier on your team is invaluable.** SHENTEL has proven to be an invaluable partner in the project. Their knowledge of the telecommunications carrier industry enabled them to expedite coordination with carriers over 511 call routing. Also, the SHENTEL marketing team leveraged experience in yellow pages and Internet advertising to develop and market plans for telephone service placements.

• **Be flexible to anticipate modifications that could be needed during system operations.** The partners have come to recognize that the service will continue to evolve and the project is structured to accommodate this evolution. Areas of likely evolution include: continual changes in the business listing in the traveler services portion of the service; changes in real-time data acquisition and integration; updates to the user interface; and changes in the coverage area.

### Arizona

Arizona has a number of telephone-based traveler information systems and launched 511 service in March 2002. The Arizona implementation envisions using 511 as the mechanism to access these telephone-based systems.

The 888-411-ROAD toll-free phone system, Voice Remote Access System (VRAS), operated by Arizona DOT (ADOT) is the most relevant in terms of 511 services. The VRAS is an automated interactive voice response (IVR) system that handled over 100,000 phone calls in 2000, more than a 100% increase from 1999. The VRAS often becomes overloaded with demand during inclement weather or holiday weekends.

The Roadway Closures and Restrictions System (RCRS) provides information to the VRAS. The RCRS collects statewide information about construction locations, traffic-related maintenance activities, weather-related road closures, and traffic incidents from various authorized agencies for both local arterial streets and urban/rural highways. Presently, data is inserted from 89 locations ranging from ADOT Districts, several cities, the Highway Patrol, National Forest and Weather Services, and Grand Canyon National Park, as well as neighboring states. The RCRS software is available to other public agencies through a free license from Arizona DOT.
In the near-to-mid-term, Arizona DOT will continue to operate the VRAS as the gateway to traveler information in the state. The service will continue to be free to callers. Key elements of the Vision of the Arizona 511 approach are:

- Reprogram switches to point 511 calls to the VRAS
- Expand system capacity to meet anticipated demand
- Include a call forwarding option to reach the appropriate transit agency and where available, dial-a-ride services
- Deploy roadside signage to "advertise" 511

An Arizona 511 Task Force has been established to coordinate the conversion of existing phone systems to 511 and facilitate their functional expansion. The Task Force identified several key issues and steps needed to roll out 511 services, with an initial focus on wireline calls. However, Qwest, the largest wireline carrier, has not been as responsive as hoped to requests to work out the necessary technical and financial agreements to enable call routing. Activities to date have resulted in a number of lessons learned:

- Task Forces for multi-agency coordination work.
- If procuring IVR system, direct communications with vendor's technical resources is strongly encouraged.
- Public Sector representative should carefully understand system pricing.
- Standards or guidelines for menu tree design would be helpful.
• Standards or guidelines for roadside signage would be helpful.
• Public Sector staff should not be afraid to ask for technical assistance from the regulatory commission.

4.2.3 CINCINNATI/NORTHERN KENTUCKY

Cincinnati and Northern Kentucky is implementing 511 service as a part of ARTIMIS.

In conjunction with the Ohio Department of Transportation, the Kentucky Transportation Cabinet (KYTC) has implemented the ARTIMIS Traffic Advisory Telephone Service (TATS) in the Cincinnati/Northern Kentucky metropolitan area, to provide real-time, route specific multi-modal traveler information. Since May 1998, 211 has been used as the access number area-wide (211 locally, 513/333-3333 everywhere) and call volume averages 70,000-80,000 calls per month. The ARTIMIS TATS has shown that a three digit number generates 73% more calls than a seven digit number.

When completed, the Commonwealth of Kentucky envisions four regional 511 services overlaid on a statewide system. Plans call for services such as those offered in Northern Kentucky to be available in the Louisville and Lexington metropolitan areas and the Cumberland Gap region of Southeast Kentucky. Each of these systems would offer connectivity to the Statewide Road Report that would be the default system in all other areas of the state. It is also envisioned that callers to the Road Report could be routed to any of the four regional areas at their option. The system routed to would depend upon caller’s location. KYTC plans to continue the service as a free call to users for the foreseeable future.

This deployment offers a number of lessons learned:

• Find and contact your state telephone association.
• Make early, informal contact with the public utilities or service commission.
• Most of the cost is to gather and format the information provided, not the cost of calls.
• Consider human factors when designing the telephone system.

4.3 Public Sector ATIS Best Practices

Under sponsorship of the United States Department of Transportation, Batelle and PBS&J compiled a summary of the best practices and policies developed by public sector agencies in developing, operating, and maintaining technical elements of traveler information systems. Major findings of the effort include:

• Agencies have two major objectives in sharing their data with private sector and other public sector recipients: improving transportation operations through better interagency coordination and optimizing the use of the transportation system by providing information to travelers. (Enhancing interagency coordination was the top-ranked motive for data sharing.)
• Even though their motives are different, public and private sectors are active participants in the use of traveler information as a transportation management tool. Almost all agencies directly provide information to the public, typically with VMS, Highway Advisory Radio (HAR), kiosks, and interactive voice response telephones. Although agency data is a
fundamental source, private providers generally need to enhance public data before it is marketable. The most common types of information provided are traffic and road conditions, incident information, and planned construction information. Transit data is generally less useful to private providers, and only a third of them report transit delay information.

- Agencies who have data to share protect their interests by placing restrictions on access to data, but firms generally do not find these conditions to be onerous. Two or more conditions on access are common, the most frequent being acknowledgement of the agency as the source of the data when distributed to the public.

- Formal policies on data sharing were reported by half the surveyed agencies and several more have plans to issue one. The principal advantage of a formal policy is that it provides a process for handling requests for agency data.
- In addressing the costs associated with the data sharing process, agencies frequently employ two or more cost recovery mechanisms in data sharing relationships. Most frequently, agencies require the receiving party to cover its own cost, such as hardware, software and communications cost to connect to agency data sources. The second most popular mechanism involves a private firm sharing its "value-added" information with the agency.

- The two most controversial topics in the private sector's relationships with agencies regarding agency data are revenue sharing and exclusivity.
  - The idea of revenue sharing is optimistically viewed by many agencies, although in practice, it has not had much success. The private sector tends to oppose revenue sharing, either because of practical difficulties in administering it or because it violates the principle that public data should be available to all taxpayers for free.
  - Exclusivity is the model used by only about 15% of the surveyed agencies, which see its value in assigning the burden of data dissemination to some other entity. Private firms are generally opposed to exclusive arrangements, because they constitute monopolistic, anti-competitive franchises and because they violate the principle of right-of-access to data collected at taxpayer expense.
5. POTENTIAL APPROACHES FOR THE METROPOLITAN WASHINGTON REGION

This section presents the results of the contractor’s analysis regarding services that the public sector can offer for traveler information systems, available business models, and potential technical and institutional approaches.

5.1 Services that the Public Sector Could Offer

Public sector agencies have a number of choices regarding their role in ATIS and what services they desire to offer. Table 4 summarizes the potential roles and services that the public sector could provide.

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<th>Data Retailer</th>
<th>Combined Wholesaler/Retailer</th>
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<td>Internet Services</td>
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<td>Provide Fused Data</td>
<td>511/Automated Telephone Service</td>
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Table 4: Potential Public Sector Roles and Services

The public sector can act as a data wholesaler, providing either raw or fused data to any interested party. The public sector can act as a data retailer and compete against the private sector in providing traveler information to the public. The public sector can also follow a hybrid approach, providing data to private sector entities that want data while also providing information to the traveling public through various distribution channels.

Each approach or role presents a set of issues to be addressed.
Data Wholesaler

As a data wholesaler, the public sector faces the following issues:

- **Level of service** – Since the private sector will be basing their livelihood on the use of public sector data, private companies will want some commitment regarding the continued availability of data. Transportation organizations in the Metropolitan Washington region cannot currently guarantee the continued availability of data twenty four hours a day seven days a week. Private sector companies will require a minimum level of service.

- **Quality of data** – public sector organizations often attribute a higher value to their data than private organizations attribute to it. In most cases, private sector companies must augment or enhance the data received from the public sector. If the public sector wants to act as a data wholesaler, the public sector should commit to a minimum standard for the quality of the data to be provided.

- **New maintenance requirements** – The public sector faces significant issues in maintaining its traffic monitoring infrastructure. In order to provide a consistent level of service, public sector organizations would have to place a higher priority on maintenance of traffic sensors and provide some commitment regarding the level of service to be provided by the operating agencies.

- **Exclusivity of Data** – In some implementations, public sector agencies have explored providing data to specific private sector organizations on an exclusive basis. Under such an approach, the public sector can offload the work required to service multiple requests for data. The issue with exclusivity is that data collected using public funds should be available to the public, and private companies will attempt to bypass the exclusive “franchisee” to get the data directly from the operating agencies at little to no cost.

Data Retailer

As a data retailer, the public sector faces the following issues:

- **Competition with private sector** – Depending upon which information distribution channels the public sector chooses to use, public sector organizations risk competing against the private sector. Participating organizations should be prepared to explain why they are competing against the private sector in the traveler information market.

- **Multiple media management skills** – As a data retailer, the public sector would be responsible for actively managing different media outlets such as the Internet, telephone systems, and radio. The public sector has significant experience, through public information officers, in providing information to media outlets, but the public sector does not necessarily have as broad a skill set in actively managing media outlets.

One possible approach to avoiding many of these issues is to follow a hybrid approach where the public sector provides information through distribution outlets which are familiar to the operating agencies (e.g. HAR and VMS), provide data to other organizations, and concentrate on supporting a 511 service where the private sector cannot compete or conflict with the public sector.
5.2 Potential Business Models

In January of 2002, the 511 deployment Coalition released the report “511 America’s Traveler Information Number - Business Models and Cost Report”. The business models described apply not only to 511 systems, but also traveler information systems in general.

As described in the report, business models may vary from market to market, depending on a number of factors, some of which directly correlate to what is currently available to the implementer:

- Implementers must first determine what stage of deployment their systems are in. The stages are defined as:
  - Stage 1 - Implementer has no data gathering, data fusion engine or telephonic dissemination platform.
  - Stage 2 - Implementer has data gathering, but no fusion engine or telephonic dissemination platform.
  - Stage 3 - Implementer has data gathering and fusion, but no telephonic dissemination platform.
  - Stage 4 - Implementer has data gathering, fusion and telephonic dissemination platform, and would like to implement the 511 code for the latter.
  - Stage 5 – Implementer has deployed the system, and now MUST enter into a continuing marketing campaign for the 511 service.
- Availability of real time data from public or private installed resources (level of effort for the Information Service Provider - ISP).
- Existence of a data fusion mechanism, which are used to drive an Internet web site or data archiving system.
- Availability of existing traveler telephone service (conversion vs. new service) for data dissemination.
- Marketing investment on the part of the agencies or the ISP (variable depending on whether the ISP is expected to generate revenue from the service), applies to public sector available resources (highway signs, Highway Advisory Radio, etc.) as well as commercial advertising paid for through public or private funds.
- Agreeability of wireless carriers to participate in providing 511 service access, and at what cost (to the implementer or the user). Wireless carriers are generally not subject to landline tariff issues. Landline carriers are, in some cases, assessing either one-time charges to the implementers or per-call/per-minute costs to the users¹.

Over the past 10 years, the public and private sectors have discovered that the business models that have been implemented for recovering deployment and operating costs through revenue and profit sharing have not been viable. It must be noted that business conditions change rapidly, and the past is not necessarily a barometer of future conditions. However, one thing appears certain— in order to provide at least the basic level of service desired, the public sector must expect to fully pay most or all costs. All business models, including those expected to generate their own revenue, will require some level of funding from the public sector. This may be seed money to

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¹ Under the FCC decision designating 511 for ATIS, wireless carriers are obligated to comply with offering access to the ATIS service through the 511 code, but are not restricted from charging for such access.
insure that an ISP, at the start of operation, meets a level of service, or continued funding to insure that a basic service level is always available to the general public regardless of the availability of premium services.

Additionally, it should be understood that specific and continued marketing tie-ins are necessary to build visibility and usage of the service. Specific tie-ins with available traveler information services (radio and television broadcast, “cross-connect” telephone links from existing services such as airport or transit numbers) are all essential for building the service. A higher number of users leads to a greater value of service, which in turn leads (possibly) to higher premiums that can be charged for advertising or services in order to make the system more financially stable.

There are many varied business models that have been applied to traveler information, most of which have yet to prove themselves viable. It is important not to dismiss the less successful models, as they were pursued amid rapid technological change, volatile information technology markets, extremely volatile financial markets, and evolving telecommunications availability. *Simply put, the jury is still out on innovative cost and revenue sharing approaches to ATIS service delivery.* An important realization that has emerged in the past decade is the public sector’s role providing most of the data and a stable stream of resources and the private sector role of developing and operating the traveler information system.

The public sector has a number of business models to consider.

**Public Sector Funded Model** - Constituents, such as Government agencies, may elect to pay for most or all of the service provided to the end user. This would reduce the hurdle rate for other cost recovery methods (like selling advertising) and provide a valuable service to the end user. This model places the financial responsibility on the public sector and assumes that the call costs no more than a local call to the user. Delivery of services to the end user is more likely to be public oriented and, as with all models, the cost of telecommunications or other delivery methods will vary widely.

**National Weather Service Model** - The National Weather Service provides weather information to private sector entities on a not-for-profit basis. The NWS minimizes the control it exercises on its data when used by others, and does not seek to profit from its dissemination. The economic benefits of the booming private sector weather information business are seen as validation of the NWS policy. The data sharing practices of the NWS could serve as a useful model for transportation agencies which generate data in the course of performing their planning and operations functions and, at the same time, share data with private entities to create economic benefits.

Underlying NWS’ approach is the view that good weather data is valuable because it reduces the monetary and non-monetary costs of weather events for businesses and individuals and provides raw material for profit-making businesses, such as those that supply weather-related information to the public. The highly successful Weather Channel on cable television is an example of the benefits of making data freely available to the private sector. The parallels for transportation data are the potential for reducing costs associated with transportation congestion and delays, and the potential for private transportation information companies.
The policy of the NWS is based on the Federal policy of open and unrestricted access to taxpayer-funded government information. Federal policy flows from the idea that the way to maximize the benefits of data is to provide it at the cost of dissemination to as wide an audience as possible.

Consequently, the National Weather Service provides data in a variety of different ways to a variety of audiences, from simple to sophisticated. With respect to the costs of obtaining NWS data, a user pays for transmission costs only if NWS has to recover any costs incurred in setting up the dissemination mechanism to feed data to the user. No attempt is made by NWS to profit on its data, because they view their relationship with the private sector as a strategic partnership. That is, the public should be able to take advantage of many channels for data dissemination, including private for-profit, private not-for-profit, academic, etc. The NWS discourages government giving exclusive rights to a private organization for a fee in the hopes that the revenue produced can be used to make data more accessible. They argue that such monopolistic arrangements dampen competition, hurting data production and dissemination in the long run.

In the area of controlling how the data are used, NWS relinquishes all control once it leaves NWS -- with a couple of exceptions. They do not allow data to be modified and then presented as official government material. Moreover, users producing copyrighted materials based on data and/or products from the NWS must provide notice identifying the NWS material and state that such material is not subject to copyright protection.

Liability is handled in a straightforward manner: the NWS does not assume any liability with regard to the use of the data. They caution users to be aware of the date and time of the data and products being used and state that NWS provides the data "as is." The user assumes any risk related to its use, and "in no event is NWS liable to you or anyone else due to your use of [this] data."

**Subscription Model** - (Note: This model conflicts with the 511 Policy Committee decision of making a 511 call "no more than the cost of a local call to the user.") The subscription model suggests that the end-user of the service subscribe or become subscribed to the 511 or ATIS services for a fixed monthly or yearly fee. For this fee, the subscriber should have access to the service on an unlimited or bulk basis. This service can either be offered on an opt-in or an opt-out basis. In the opt-in scenario, the service provider can market the services in order to entice the end-user to sign up for it. An example of the opt-in scenario would be Qwest Wireless, who charges $4.95 per month to subscribers who want the service. An opt-out scenario is one where a caller is automatically subscribed to a service by completing the call unless they take some action to cancel the subscription. (Magazine publishers and credit card companies often use this method to lure new customers. A customer agrees to a “sample” of the service, but must take direct action informing the provider that they wish to cancel the subscription before being charged for it.)

**Pay-per-Call Model** – (Note: This model conflicts with the 511 Policy Committee decision of making a 511 call “no more than the cost of a local call to the user.”) The per-call model charges the end user for the service on a call-by-call basis. This allows the Service Provider to
charge for the specific cost of the call and then bill the end user through their existing phone service. As an example, Verizon in Massachusetts charges $0.35 each time an end user accesses Directory Assistance.

**Advertising and Sponsorship Model** - Under this model, advertisers and sponsors would have the ability to place ads throughout the service, covering the costs of the service itself. Services that have the potential to drive sufficient call volume will be able to command a higher price for ad placements. As an example on the Internet, information-based services such as Yahoo’s website generate 90% of their revenue from selling ads onto their service. However the prices that these high-traffic web sites were able to command in the late 1990’s have themselves been reduced dramatically in the last two years.

It should be recognized that models based on non-traditional media – those other than radio, print, and television – are often very difficult to sustain, and either have significant costs associated with the sales cycle or may require at least regional to national coverage before reasonable revenue projections can be met. For example: Wal-Mart is approached to purchase advertising on or to sponsor a 511 service. In order for Wal-Mart to “get their monies worth,” the service would need to guarantee a minimum number of callers and cover a geographic area larger than one metropolitan area. Otherwise, the advertising department would more than likely spend their money buying radio or television advertising time instead, as many radio stations and some TV stations cover more than one market by virtue of their broadcast power, and carriage on cable and satellite services.

Finally, the service provider would need (and be willing to pay) a sales force to sell these advertisements. True, salespeople are traditionally paid from commissions on sales they make, but there would need to be enough revenue from the advertising to support this staff on a continuing basis.

**Loss Leader or Franchise Model** - Under this model, the 511 service provider (ISP) would underwrite all or a portion of delivering the service, in exchange for the opportunity to market and up-sell additional services to the caller and/or the opportunity for other special privileges associated with a franchise agreement. This model was used by SmartRoute Systems in Detroit, wherein SmartRoutes agreed to deploy and operate an ATIS and traffic management system in exchange for the exclusive right to market public sector data. It was also used by Trafficstation to secure an agreement in the New York tri-state area, wherein Trafficstation was to build and operate an Internet web site whose operation would be sustained through advertising and subscriptions to enhanced services.

**Hybrid Model** - If innovative models are used to support traveler information services, it is likely they will occur in a hybrid fashion. It should be noted that public sector support would very likely be needed for the basic level of service. Hybrid models could include both public

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2 WCBS in New York can be heard from Rhode Island to Pennsylvania, while WBZ (1030 AM) in Boston can be heard across 40 states in the evening hours, as can WLW (700 AM) in Cincinnati. Their advertising rates can include these “long reach” capabilities.

3 SmartRoutes has publicly stated that they will not enter into an agreement of this type in the future.

4 Trafficstation has not been able to fulfill its obligation in New York due to funding and revenue issues.
sector expenditures and private sector investment. In the late 1990’s, governmental agencies discovered that the likelihood of recovering the costs of deploying and operating advanced traveler information systems (ATIS) through revenue and profit sharing have been significantly reduced.

The following are examples of hybrid models, which may be applicable in certain areas to help offset costs to implement an ATIS service. In any of these and other examples, telecommunications carriers may have an unspecified role in the process. If the telecommunications carrier sees a light at the end of the tunnel (such as billing or consuming more wireless minutes, offering advertising, or up-selling to a premium service), then they may offer to fund a portion of the service. This has chiefly been successful in markets where the carriers could see the benefit of “partnering” with a government agency.

**Example 1 – Public sector funded basic services + Sponsorship or Advertising.**
Basic content is provided for free to the traveling public, with the expense of the service being funded by public agencies in the service area. Short sponsorship messages and advertising may partially defray the subsidy by feeding revenue back into day-to-day operations or system upgrades and maintenance.

**Example 2 – Public sector funded basic services + Per-use premium services (Up-Selling).**
A private ATIS service operator is funded by public agencies, underwriting basic service delivery. The service provider offers travelers the option of premium services that generate revenue by charging the traveler and/or by obtaining a commission for services provided to a traveler by another service provider (e.g. reserving a cab). Revenue from the premium services may be shared between the service provider and the public agencies on a negotiated basis to further defray public agency subsidy of the basic services.

**Example 3 – Public sector funded basic services+ Subscription for personalized services.**
The ATIS service operator offers a personalized service option for a monthly fee. Subscribers can receive personalized information services that tailor the “broadcast” information available in the basic service, to provide subscriber specific information; information at a specific time or information at a threshold level set by the user. One example would be chaining route segments together on a subscriber’s regular route and giving a full report along a multi-segment route without requiring subscriber input. Another might be providing pro-active messaging, should there be a problem along the subscriber’s route that is causing a delay of more than “X” minutes. Revenue from the subscription services may be shared between the service provider and the public agencies on a negotiated basis to further defray public agency subsidy of the basic services.

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5 The term “Up-Selling” refers to the offering of a basic service (either free or fee based), and within that service offering still another service that requires the payment of an additional fee. This could be either a one-time charge or a subscription offering. An example of an “up-sell” is calling a Directory Assistance number and then being offered to “connect your call for an additional 35¢.” The price of the first call does not matter; the “up-sell” is the additional revenue potential to the provider.
Example 4 – Public sector funded basic service for Wireless customers as a service differentiator.

The ATIS service would be offered through wireless carriers either free of airtime and landline charges (as a service differentiator), or as a “premium” service. In the first case, the carrier would connect the callers to the same landline service without charging against their monthly airtime allotment or per minute charges. This might be different from what other carriers would provide and could be used as a marketing tool for the carrier. The carriers could connect to a 7 or 10-digit “back door” number and be offered special handling by the ISP in exchange for providing the (airtime) free call. Carriers might add per call or monthly fees to provide access to the service in a manner similar to wireless carriers charging for 411 information calls using their own services.

This model would need to be fleshed out more, as callers should be able to connect to the landline number regardless of the wireless carrier’s offering. For example by dialing 511, a caller should be connected to the landline 511 number, in the same manner they should be able to connect to 911 in emergencies.

In order to select an appropriate business model, public sector agencies should reconsider who their customer actually is, the associated cost for supporting that customer, and the responsibilities that the public sector must meet in supporting that customer. Most operating agencies view the traveler as their customer, however, each business model potentially has a different non-traditional customer for the public sector agency.

<table>
<thead>
<tr>
<th>Business Model</th>
<th>Public Sector Customer</th>
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<tbody>
<tr>
<td>Public Sector Funded Model</td>
<td>Traveling Public</td>
</tr>
<tr>
<td>National Weather Service Model</td>
<td>Private Sector Service Providers</td>
</tr>
<tr>
<td>Subscription Model</td>
<td>Individual Travelers</td>
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<tr>
<td>Pay-per-Call Model</td>
<td>Private Sector</td>
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<tr>
<td>Advertising and Sponsorship Model</td>
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</tr>
<tr>
<td>Hybrid Model</td>
<td>To Be Determined</td>
</tr>
</tbody>
</table>

Table 5: ATIS Business Models and Associated Customer

If the public sector customer ends up being the private sector, the private sector will place demands on the public sector that the public sector is not used to meeting.

5.3 Potential Technical and Institutional Approaches

The Metropolitan Washington Region has relied upon the Partners in Motion project to serve the traveler information needs for the area. However, at the same time, many agencies have developed or expanded their own in-house traveler information services. The original intent of the project was to use public sector funding as seed funding and have the private sector continue the service once the business proves to be self-sustaining. For a number of different reasons, the project has not proven to be self-sustaining and the private sector has chosen not to continue the service.
Participating public sector agencies in the region now must make decisions regarding whether (and if so, how) to continue a traveler information service in the Metropolitan Washington region.

There are a number of issues to address in making these decisions and often these issues seem circular, i.e. the solution to one issue depends upon the solution to a second issue, which in turn depends upon the solution to the first issue. Figure 3 presents a decision tree that attempts to lay out the issues and possible solutions in a framework that can be used to address the issues and develop answers to the questions faced by the region.
Q: Who is Customer?

Q: What is Data Quality Standard?

Q: How to Perform Data Fusion?

Q: Which Retailer Business Model?

Q: How Resolve: level of service, maintenance requirements & quality of data?

Q: How Deal with Competing With Private Sector?

Q: Provide 511 Services?

Q: Who is Contracting Agency?

Q: How to Provide Interim Service?

Q: How to Fund Activities?

Do Nothing

YES

NO

Use Mobility Technologies

Public Media Outlets

Other Private Sector Deployment

Expand Public Sector Sensors

Hybrid

Certified Data

Centralized Data Fusion

Q: How to Expand Data Gaps?

Q: What is Quality Standard?

Q: How to Perform Data Fusion?

Uncertified Data

Detail/Enriched Data Fusion

Q: How to Expand Sensor Coverage?

Cell Phone Tracking

Toll Tags as Probes

License Plate Matching

Point Detection

Probe Vehicles

Satellite Surveillance

Public Sector Funded Model

Franchise Model

Subscription Model

Advertising Model

Pay per Use Model

NO

YES

Public Sector Funded Model

NWS Model

Subscription Model

Advertising Model

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Centralized Data Fusion

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Q: How to Fund Activities?
Figure 3 uses circles to identify the question or issues under consideration. Arcs or lines coming out of each circle identify the possible answers or solutions to the question or issue. In many cases, the chosen solution brings up additional issues that also have a number of solutions from which to choose. By working through the decision tree from left to right, the decision tree can help determine which approach to take and the future choices that must be made, based on the selected approach.

The initial question to answer is “Should the public sector provide Advanced Traveler Information services?” If the answer is “no”, public sector representatives can let the current Partners in Motion project run its course and operating agencies can concentrate on other priorities. If the answer is “yes”, then we must wrestle with a host of issues related to data collection, data fusion, and information dissemination.

The next question is “Who is the customer of the traveler information services?” Requirements for data collection, data fusion, and information dissemination vary, depending upon who the customer is. The traditional customer is the traveling public. However, in traveler information services, the operating agencies often partner with media outlets to disseminate information. It is possible that the customer of the operating agency is actually the media outlet or a value-added reseller of the data and then the media outlet or value-added reseller has the traveling public as their customer.

The next question, “How does the public sector fill the data gaps?” has three possible answers, each with different resource requirements.

One approach is to work with Mobility Technologies to deploy at least 100 sensors throughout the metropolitan Washington region. To use this approach, the operating agencies must complete an application to the Federal Highway Administration by June 1, 2002 and provide $500,000 in matching funds. The FHWA provides $2 million. Mobility Technologies uses the $2.5 million to deploy at least 100 sensors throughout the region. Locations for the sensors and the priority for different roads must be negotiated with Mobility Technologies.

A second approach is to rely upon other private sector deployments of sensors and systems to fill the data gap. Media outlets or competitors to Mobility Technologies could partner with the operating agencies to deploy sensors and share the data with the agencies.

A third approach is to use public sector resources to expand sensor coverage and fill the data gap. If this approach is chosen, the operating agencies must select from a host of different technologies. According to estimates developed as a part of the Metropolitan Washington Council of Government’s unfunded opportunities list, the cost of expanding sensor coverage throughout the region could be as high as $16 million.

Once the data gap has been addressed, the next question is “What is the Data Quality Standard that the data must meet?” All customers of traveler information services have certain expectations regarding the quality of the data provided. If the customer is the media or a reseller of the data, that customer expects the data to have a certain level of quality and reliability. If the customer is the traveling public, the public has a particular expectation that the data is timely and
reliable. The public sector should consider developing a quality standard based on the identified customer and commit to meeting that quality standard. Resources required to develop the Data Quality Standard are approximately $250,000. The Data Quality Standard can be used to certify that the data provided to the customer is correct, reliable, and accurate. If the operating agencies choose not to develop a Data Quality Standard and certify data, they can provide the uncertified data on a best effort basis.

The next question is “How should the operating agencies perform data fusion?” One of two basic approaches can be selected: centralized data fusion or decentralized data fusion. Participating agencies have already expressed a preference for centralized data fusion by submitting the FY02 ITS earmark application for the Regional Integrated Transportation Information System (RITIS) project and submitting the FY03 ITS Earmark proposal for RITIS Phase 2. Estimated resource requirements for RITIS Phase 1 are $3.2 million and estimated resource requirements for RITIS Phase 2 are also $3.2 million. If operating agencies want to change course and perform decentralized data fusion in the region, the estimated resource requirements are approximately $9 million across the region. (This estimate includes $2 million each for the State of Maryland, the State of Virginia, and the Washington Metropolitan Area Transit Authority; $1.5 million each for the District of Columbia and Montgomery County.)

After addressing issues associated with data collection and data fusion, the operating agencies need to address the question “What is the public sector role in information dissemination?” In part, the answer to this question depends upon who the customer is and how the operating agencies choose to fill the data gap. The operating agencies can choose to be a data wholesaler, a data retailer, or they can follow a hybrid approach. Resource requirements for each information dissemination approach depend upon the business model.

Once the public sector defines its role as either a wholesaler, a retailer, or a hybrid of both, the operating agencies can select an appropriate business model.

As an information wholesaler, the operating agencies can follow a public sector funded approach, an approach similar to the National Weather Service, a subscription approach, a franchise approach, or an advertising approach. To fully fund the data wholesaler activities under a public sector funded approach, the estimated resource requirements are approximately $2 million per year per data fusion outlet. (If the region chooses a centralized data fusion approach, the estimated costs for distribution are $2 million per year. If the region chooses a decentralized data fusion approach, the estimated costs are $2 million per year per decentralized data fusion node.) The resource requirements for the National Weather Service Approach are also $2 million per year. The difference between the two approaches is in how the agencies operate at a policy level and the technical means for disseminating information. The other approaches could reduce the amount of money that the public sector must spend if the public sector can generate revenue from the retailers; however, the total resources required of the public sector is the same across all wholesaler business models – approximately $2 million per year.

As an information retailer, the operating agencies directly serve the traveling public and encounter significant added costs. The business models available include a public sector funded approach, a pay-per-use approach, a subscription approach, and an advertising approach. The
resources required as an information retailer increase significantly as you take on more distribution channels. As an example, the TravInfo® project for the San Francisco Bay area has allocated $40 million over 5 years to act as an information retailer. To provide a real-time traveler information web site and an automated telephone call-in service, the resource requirements could be as high as $4 million per year. Operating agencies could reduce their costs if they are allowed to charge the public a subscription fee or on a per-use basis. Agencies may also be able to reduce their expenses if they could generate advertising revenue. The policy issues that need to be overcome in order for the operating agencies to charge the public for service could be insurmountable.

Another approach is the hybrid approach, where the public sector acts as both an information retailer and wholesaler. The operating agencies can provide services directly to the public and make information available to media outlets and information service providers. While this approach provides the best of both worlds to the operating agencies, it also presents the highest cost. Agencies bear the burden of providing both wholesale and retail services. Resource requirements could be as high as $6 million per year.

If the operating agencies choose to act as an information retailer in any form, the operating agencies risk competing with the private sector. Operating agencies act for the public good. Acting as a retailer may be the best approach for serving the public. If the operating agencies choose to act as an information retailer, the agencies should be prepared to answer potential criticism for “taking away business from the private sector”.

Regardless of which role the operating agencies choose to support, the agencies must answer the question of “How do we meet the level of service requirements, the maintenance requirements, and quality of data requirements that the business model requires?” Providing a specific level of service and meeting the necessary maintenance requirements to guarantee a specific quality of data may require that the agency change priorities internal to the organization. Maintenance of infrastructure should become a higher priority for each agency and may require increased priority within each participating organization.

Once the public sector role and business model have been chosen, operating agencies should determine if they plan to provide a 511 service in the immediate future. If the agencies choose to implement a 511 service as a part of the traveler information services, the agencies must resolve a host of issues related to deploying such a service. Many of these issues are identified in “511 America’s Traveler Information Number - Business Models and Cost Report” published by the 511 Deployment Coalition in January 2002. If the agencies choose to postpone a 511 service until later, the operating agencies have three remaining issue to address: Who is the contracting agency, how to provide an interim service, and how to fund the activities?

The Virginia Department of Transportation was the contracting agency for the Partners in Motion project. Representatives of VDOT have stated that another agency in the region should step forward as the contracting agency for the next ATIS and/or 511 project.

The Partners in Motion project ends in December 2002. The amount of time needed to resolve the issues related to a regional traveler information service could take longer than the time
remaining in the current project. Public sector agencies should determine if they want to extend the current project while developing the next service. Resource requirements needed to extend the current project are on the order of $100,000 per month or $1.2 million per year.

The final issue to address is how to fund the selected activities. Operating agencies in the region will have to determine how much funding each participant can bring to bear and enter into or amend the interagency agreements to forward the necessary funding to the contracting agency. Table 6 illustrates the approximate costs for the different approaches.

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Table 6: Estimated Costs for Different Approaches to Traveler Information Services

By addressing these questions and deciding the role of the public sector, the appropriate business model, and the types of service to be provided, operating agencies can determine how best to proceed forward with a regional traveler information service for the Metropolitan Washington region.
6. SUMMARY

The Metropolitan Washington Region faces a number of issues regarding traveler information. The Partners in Motion project expires in December 2002 and public sector representatives need to explore options and make appropriate choices and decisions regarding what traveler information services to provide, how to provide them, and how to finance the chosen approach.

Traveler information systems consist of three major technical elements: data collection, data fusion, and information dissemination.

Multiple technical methods are available to perform data collection including:

- Cellular telephone tracking
- Toll tags as probes
- License plate matching
- Satellite surveillance
- Point detection
- Probe vehicles reporting via cell phone
- GPS equipped probe vehicles

No one approach to data collection or a single technology can provide all the data collection needs of traveler information systems. Data comes from multiple sources and multiple technologies. However, the use of multiple data sources poses significant issues that participants must address. These issues include certifying the accuracy and timeliness of the data and coordinating data collection standards throughout the region.

In order to certify the data, the public sector will need to develop, agree upon, and follow specific standards regarding what it means to certify data, what accuracy the public sector is willing to support for speed and volume data, how the public sector will coordinate data collection and data accuracy across jurisdictional boundaries, and how the public sector will resolve differing accuracy levels associated with different data collection techniques.

Without certified public sector data, the participating organizations will have a difficult time convincing the private sector that public sector data has value.

One private sector company, Mobility Technologies, has taken a different approach to data collection. Under sponsorship of the Federal Highway Administration, Mobility Technologies deploys sensors for point detection, shares the information with the participating public sector agencies, and also resells the information to media outlets for traveler information and traffic reports. The public sector faces a June 1, 2002 deadline regarding whether to participate with Mobility Technologies.

In order to make an informed decision regarding whether (and if so, how) to participate with Mobility Technologies, public sector agencies need to determine their role in data collection.
The public sector can be a wholesaler of data or a retailer of data. Each approach has particular responsibilities that the public sector must meet.

Under a data wholesaler approach, the public sector collects and fuses data for distribution through different retail outlets – usually media outlets. The public sector is responsible for implementing, maintaining, and operating the technical sensor system to collect transportation data.

Under a data retailer approach, the public sector is responsible for disseminating information to the traveling public. Under this approach, the public sector still has the responsibility for collecting and fusing data, and it has the added responsibility of disseminating the information via different media outlets such as internet, radio, and public service announcements.

Once the data collection issues are identified and addressed, data fusion issues come to the forefront. Under sponsorship of the Metropolitan Washington Council of Governments, the region has already examined approaches to collating and using regional ITS data. Based on this work, the region has two basic options: centralized data fusion or distributed data fusion.

Centralized data fusion has one regional entity collating data from all participating regional partners. Distributed Data Fusion has multiple entities collecting data from local regional partners. These distributed entities must share data and work together to provide a consistent view of the transportation network throughout the region. The region has already programmed and requested funding for projects that use centralized data fusion. If participating agencies decide to change the technical approach to data fusion, current projects must be redirected.

Public sector agencies have multiple information dissemination outlets available to them. These outlets include:

- Internet Web Sites
- Public Sector Traffic Advisory Infrastructure
- Media Outlets
- 511/Telephone Delivery Systems

To take maximum advantage of available media outlets, participating agencies need to make decisions regarding the business model to follow for information dissemination.

Regardless of the exact role the public sector decides to perform, technology deployed, or business model used, one thing is clear – the lack of reliable, quality real-time sensor information must be addressed immediately.

The current traveler information market is media driven. An understanding of the region’s media market and how that market relates to both other markets and other traveler information system deployments can help participating agencies decide how best to proceed. The most recent Arbitron national ranking of major radio markets places Washington in the eighth spot, with a 12-years-of-age and older population of 3.862 million. The Washington, D.C. television market looks remarkably similar to the radio world portrayed by Arbitron, though in the TV
market the metric of choice is different. In this case, Nielsen measures TV households. Washington D.C. is in the #8 spot with 2.128 million TV households.

A number of deployments similar to the Partners in Motion project have encountered different levels of success and offer some significant lessons learned that can help participating organizations decide how best to proceed. These deployments include

- TravInfo
- ARTIMIS
- 511 service in Virginia, Arizona, and Northern Kentucky

Research on numerous deployments across the United States has generated a summary of public sector best practices and lessons learned. These findings include

- Agencies have two major objectives in sharing their data with private sector and other public sector recipients: improving transportation operations through better interagency coordination and optimizing the use of the transportation system by providing information to travelers. (Enhancing interagency coordination was the top-ranked motive for data sharing.)
- Even though their motives are different, public and private sectors are active participants in the use of traveler information as a transportation management tool. Almost all agencies directly provide information to the public, typically with VMS, Highway Advisory Radio (HAR), kiosks, and interactive voice response telephones. Although agency data is a fundamental source, private providers generally need to enhance public data before it is marketable. The most common types of information provided are traffic and road conditions, incident information, and planned construction information. Transit data is generally less useful to private providers, and only a third of them report transit delay information.
- Agencies who have data to share protect their interests by placing restrictions on access to data, but firms generally do not find these conditions to be onerous. Two or more conditions on access are common, the most frequent being acknowledgement of the agency as the source of the data when distributed to the public.

- Formal policies on data sharing were reported by half the surveyed agencies and several more have plans to issue one. The principal advantage of a formal policy is that it provides a process for handling requests for agency data.
- In addressing the costs associated with the data sharing process, agencies frequently employ two or more cost recovery mechanisms in data sharing relationships. Most frequently, agencies require the receiving party to cover its own cost, such as hardware, software and communications cost to connect to agency data sources. The second most popular mechanism involves a private firm sharing its "value-added" information with the agency.

- The two most controversial topics in the private sector's relationships with agencies regarding agency data are revenue sharing and exclusivity.
  - The idea of revenue sharing is optimistically viewed by many agencies, although in practice, it has not had much success. The private sector tends to oppose revenue sharing,
either because of practical difficulties in administering it or because it violates the principle that public data should be available to all taxpayers for free.
- Exclusivity is the model used by only about 15% of the surveyed agencies, which see its value in assigning the burden of data dissemination to some other entity. Private firms are generally opposed to exclusive arrangements, because they constitute monopolistic, anti-competitive franchises and because they violate the principle of right-of-access to data collected at taxpayer expense.

Public sector agencies have a number of choices regarding their role in ATIS and what services they desire to offer. Public sector agencies may act as a data wholesaler, a data retailer, or a combined wholesaler/retailer.

As a data wholesaler, the public sector faces the following issues:

- **Level of service**
- **Quality of data**
- **New maintenance requirements**
- **Exclusivity of Data**

As a data retailer, the public sector faces the following issues:

- **Competition with private sector**
- **Multiple media management skills**

One possible approach to avoiding many of these issues is to follow a hybrid approach where the public sector provides information through distribution outlets which are familiar to the operating agencies (e.g. HAR and VMS), provide data to other organizations, and concentrate on supporting a 511 service where the private sector cannot compete or conflict with the public sector.

Based upon the role that the public sector chooses to adopt, the participating agencies must choose an appropriate business model for providing traveler information service. Available options include:

- **Public sector funded model**
- **National Weather Service Model**
- **Subscription Model**
- **Pay-per-call Model**
- **Advertising and Sponsorship Model**
- **Loss Leader or Franchise Model**
- **Hybrid Model**

Table 6 identifies the resource requirements for each approach and is copied here.
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Table 6: Estimated Costs for Different Approaches to Traveler Information Services

Section 5.3 presents a decision tree as a framework for public sector representatives to use in addressing the numerous issues that must be resolved.

By addressing these questions and deciding the role of the public sector, the appropriate business model, and the types of service to be provided, operating agencies can determine how best to proceed forward with a regional traveler information service for the Metropolitan Washington region.
BIBLIOGRAPHY

(DRAFT) Closing the Data Gap: Guidelines for Quality ATIS Data, ITS America, The United States Department of Transportation, April 2000


(DRAFT Final Report) On-time Reliability Impacts of Advanced Traveler Information Services (ATIS) Volume II: Extensions and Applications of the Simulated Yoked Study Concept, Federal Highway Administration, Department Q020, Project No.:0900610D-01, Contract No.: DTFH61-00-C-00001

511 America’s Traveler Information Number - Business Models and Cost Report, 511 Deployment Coalition, January 2002


Metropolitan Model Deployment Evaluation Reports, 1999


Partners in Motion Push Technology Evaluation Report, 2001

Partners in Motion and Traffic Congestion in the Washington D.C. Metropolitan Area, Dr. Laurie A. Schintler, center for Transportation Policy and Logistics, School of Public Policy, George Mason University, Prepared for: Federal Highway Administration, Virginia Department of Transportation, Partners in Motion Evaluation Subcommittee, 2001


Artimis Telephone Travel Information Service: Current Use Patterns and User Satisfaction, “Evaluation of ARTIMIS Telephone Information System”. Report No. KTC-99-24, Jill Clemons, Lisa Aultman-Hall, Sarah Bowling, Department of Civil Engineering and Kentucky Transportation Center, University of Kentucky, June 1999

Artimis Telephone Travel Information Service: Overall Public Awareness, “Evaluation of ARTIMIS Telephone Information System”. Report No. KTC-99-66, Lisa Aultman-Hall, Department of Civil Engineering and Kentucky Transportation Center, University of Kentucky, December 1999