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16. Abstract Project This report provides an analysis of public-private partnering options for future Advanced Traveler Information System (ATIS) development in the Houston region. The analysis focuses on the ATIS market packages from the National Intelligent Transportation Systems (ITS) Architecture that the Houston transportation stakeholders gave either high or medium priorities for the region. Researchers examined the potential applicability of four major types of public-private partnering arrangements previously identified through past research as having potential applicability to ATIS activities (public-centered operations, contracted operations, franchise operations, and privatized operations). The analysis showed that several of the ATIS market packages could see more than one type of partnering arrangement evolve in the Houston region in the future because trends have yet to be established regarding revenue potentials, market penetration, etc. for the various packages. Nevertheless, the options shown for each market package can be taken as a first cut of feasible alternatives (and those not feasible) for fostering future public-private partnerships of ATIS activities in the Houston region.					
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ANALYSIS OF ATIS PARTNERING OPTIONS IN HOUSTON, TEXAS

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1. INTRODUCTION

As in most major metropolitan areas nationwide, the various transportation agencies in the Houston region are working together to deploy an intelligent transportation system (ITS). The goal of ITS is to allow agencies to provide more efficient and effective solutions to transportation problems in the region through the proper application and integration of technologies and management/control strategies. A key component of the ITS vision for Houston is an Advanced Traveler Information System (ATIS). An ATIS is a set of tools that provides travelers with information they desire about travel options (1). Typically, an ATIS involves the collection, collation, and dissemination of traveler information before and during trips (2). Exactly how these functions are carried out (and by whom) will vary dramatically by region depending on user needs, the institutional characteristics of the agencies, funding limitations, and interest by private-sector vendors.

In most locations, including Houston, the ATIS is envisioned to eventually be a partnership between the public agencies and various private-sector entities. However, exactly how this partnering is to come about is not yet clear. ITS in general, and ATIS in particular, require transportation agencies to do business in new ways. These business processes are still evolving at this time.

NATIONAL ATIS DEVELOPMENT EXPERIENCES

To date, most experiences regarding ATIS have come as parts of federally funded field operational tests (FOTs) or model deployment initiatives (MDIs) designed to investigate technological feasibility/proof-of-concept of particular aspects of ITS. Examples of these tests and initiatives include the following:

- TravTek (Orlando FOT),
- Advance (Chicago FOT),
- SmartTraveler (eastern Massachusetts FOT),
- Genesis/Guidestar (Minneapolis FOT),
- TravInfo (San Francisco/Bay area FOT),
- Smart Trek/SWIFT (Seattle MDI/FOT),

- AZTech (Phoenix MDI), and
- iTravel (New York MDI).

In addition to the above, an ATIS was initiated in Atlanta (Navigator) to assist tourists in the 1996 Olympics and in Washington, D.C. (Partners in Motion) as part of a congressionally mandated ITS system deployment. A previous Texas Transportation Institute (TTI) report summarized some of these ATIS development experiences (3).

For the most part, these systems have been able to demonstrate technical feasibility in providing information to travelers both before and during their trip, using a variety of devices inside and outside of a vehicle. However, it is not yet apparent whether ATIS will be capable of generating significant user interest and an eventual consumer market for traveler information. A number of factors have contributed to difficulties in estimating and ultimately developing a true consumer market. These include the following (3, 4):

- a lack of a complete and reliable data infrastructure in some regions upon which to base the ATIS,
- the testing of end user products that did not offer significantly better information than that obtained for free (via commercial media or through traditional transportation agency information dissemination tools such as dynamic message signs or highway advisory radio), and
- inadequate marketing and publicity efforts to create awareness and generate interest in ATIS.

Whereas public-sector transportation agencies can influence changes that address the first factor listed above, the latter two factors are dependent heavily on private-sector interest and activity. It is known that the private sector is better equipped for identifying, developing, and delivering marketable products and services than typical public-sector agencies. Furthermore, private-sector companies are much more skilled when it comes to marketing and promoting goods and services.

To date, the private sector has indeed demonstrated a willingness to be a part of ATIS research and development. In fact, the private sector has been heavily involved in most of the FOTs and MDIs nationwide. This involvement has allowed various companies to gain valuable

knowledge about consumer interests and to leverage some development costs for various ATIS components. However, as the various FOTs and MDIs draw to a close, the public funds available to support private-sector activities are dwindling. Companies are being forced to realign themselves and refocus efforts in an attempt to remain solvent and competitive. For example, traditional private-sector participants in traffic information (i.e., SmartRoutes, Incorporated and Metro Traffic, Incorporated.) were often involved in the actual collection of traffic data, using their own equipment and personnel to supplement existing infrastructure of the public sector. In recent months, however, these companies have found new competition from “pure” information service providers (ISPs) who are involved only in the data dissemination function (that is, they do not collect any of their own data directly) (5). These new companies have further increased the competition in an already difficult market. Shareholders of one of the traditional traffic information companies have become impatient recently and have placed pressure on company personnel to demonstrate profitability in ATIS ventures in the near future (6).

THE FUTURE OF ATIS IN A REGION

Attempting to examine where ATIS may head in the future may seem to some a bit premature. Indeed, much work remains to be done on the basic infrastructure needed to support ATIS activities in most areas. Similarly, the true consumer market revenue potential for ATIS components and services is still relatively unknown. However, it is apparent that public agency decisions made now and in the near future will have ramifications as to how ATIS matures in a region, just as roadway driveway access decisions made many years ago now significantly affect the success of many urban arterial widening and operational improvement projects.

One of the biggest issues facing transportation agencies is the long-term sustainability of ITS. Unlike many other types of capital improvement projects, ITS components and services require substantial ongoing operations and maintenance funds through their service life in order to keep them useful and producing the intended benefits. It will be not only desirable, but most likely necessary, for the public and private sector to work together in unique ways to both share the costs and reap the benefits of ITS on an ongoing basis.

The above-referenced TTI report (3) highlighted basic business partnering arrangements possible for ATIS that have been identified in previous research. These arrangements include the following:

- purely public-centered operations;
- contracted operations;
- franchise operations; and
- privatized, competitive operations.

One point suggested in that report is that an eventual ATIS may not be limited to a single arrangement, but may include several (or even all) of them in some form in the overall system depending on how private-sector interest in the various ATIS market packages evolves over time. An understanding of the characteristics of each of these in relation to the ATIS goals and objectives of the public sector can ultimately provide valuable guidance into the types of partnering arrangements the public sector may desire to orchestrate.

CONTENTS OF THIS REPORT

This report presents an assessment of possible long-term ATIS public/private partnering alternatives in the Houston region. The analysis focuses on the set of ATIS market packages defined in the National ITS Architecture as prioritized by the regional stakeholders. In particular, this report examines the applicability of the possible partnering arrangements identified in past ATIS business model research on the eventual implementation of those market packages. Recommendations at the end of the analysis are intended to assist the stakeholders in their decision-making regarding future ATIS-related partnering agreements or contracts. These recommendations are also possibly useful to other metropolitan areas in Texas.

2. ASSESSMENT OF ATIS PARTNERING ALTERNATIVES IN HOUSTON

ATIS REGIONAL PRIORITIES

As noted in the previous report (3), stakeholders in the Houston region have defined the goals, objectives, and member roles for ITS through the Regional Intelligent Transportation System (RITS) Strategic Plan (7). The plan has been organized around the guidance provided from the National ITS Architecture program. The architecture uses a systems engineering approach to match the region's transportation problems with potential solutions. Specifically, the RITS plan is its integration of transportation problems, user services (defining ITS solutions to the identified problems), and market packages (defining equipment packages required to work together to deliver needed services and information flows between each other and with various external systems). A brief description of these market packages is provided below.

Summary of National ITS Architecture ATIS Market Packages

The National ITS Architecture identifies a total of nine market packages that address ATIS user services. These market packages include the following (8):

- broadcast traveler information,
- interactive traveler information,
- autonomous route guidance,
- dynamic route guidance,
- ISP-based route guidance,
- integrated transportation management/route guidance,
- yellow pages and reservations,
- dynamic ridesharing, and
- in-vehicle signing.

The following paragraphs that describe each of these packages in more detail also come directly from National ITS Architecture documentation (8).

Broadcast traveler information involves the collection of traffic conditions, advisories, general public transportation, toll and parking information, incident information, air quality, and weather information. It focuses on the near real-time dissemination of this information over a wide area through existing infrastructures and low-cost user equipment (e.g., FM subcarrier, cellular data broadcast). It differs from traditional public agency information dissemination (i.e., basic highway advisory radio and dynamic message sign capabilities) by providing more sophisticated digital broadcast service. Information flow occurs in one direction only, from the source to the end user.

The *interactive traveler information* market package provides tailored information in response to a traveler request, and so involves two-way communication flows (a request for information and the requested information itself). Both real-time interactive request/response systems and information systems that “push” a tailored stream of information to the traveler based on a submitted profile are envisioned under this market package. Using these technologies, the traveler obtains current information regarding traffic conditions, transit services, ride share/ride match, parking management, and pricing information for a specific lot or roadway. A range of two-way, wide-area wireless and wireline communications systems may be used to support the required digital communications between traveler and an information service provider (public or private). A variety of interactive devices may be used by the traveler to access information prior to a trip or en route. These devices include phones, alphanumeric pagers, kiosks, personal digital assistants, personal computers, and other in-vehicle devices.

Autonomous route guidance relies on in-vehicle sensory, location determination, computational, map database, and interactive driver interface equipment to enable route planning and detailed route guidance based on static, stored information. No communication with the infrastructure is assumed or required. Identical capabilities are available to the traveler outside the vehicle by integrating a similar suite of equipment into portable devices.

Dynamic route guidance offers the user advanced route planning and guidance that is responsive to current conditions. The package combines the autonomous route guidance user equipment with a digital receiver capable of receiving real-time traffic, transit, and road condition information that is considered by the user equipment in provision of route guidance.

ISP-based route guidance also offers the user advanced route planning and guidance that is responsive to current conditions. Different than dynamic route guidance, though, this market

package moves the route planning function from the user device to the information service provider. This approach simplifies the user equipment requirements and can provide the infrastructure better information on which to predict future traffic and appropriate control strategies to support basic route planning with minimal user equipment. The package includes the potential for turn-by-turn route guidance, as might be used in a vehicle, and also pre-trip route information. The package includes two-way data communications and optionally equips the vehicle with the databases, location determination capability, and display technology to support turn-by-turn route guidance.

Integrated transportation management/route guidance (including infrastructure-based route selection) allows a traffic management center to continuously optimize the traffic control strategy based on near-real-time information on intended routes for a proportion of the vehicles within their network, and offers the user advanced route planning and guidance that is responsive to current conditions. It utilizes the individual and ISP route planning information to optimize signal timing while at the same time providing updated signal timing information to allow optimized route plans. The use of predictive link times for this market package will be made possible through traffic forecast and demand management algorithms and data processing at the traffic management center.

The *yellow pages and reservations* market package enhances the interactive traveler information package by making infrastructure-provided yellow pages and reservation services available to the user. This market package provides multiple ways for accessing information either while en route in a vehicle using wide-area wireless communications or pre-trip via wireline connections.

Dynamic ridesharing also enhances the interactive traveler information market package by adding an infrastructure-provided dynamic ridesharing/ride matching capability.

In-vehicle signing supports distribution of traffic and travel advisory information to drivers through in-vehicle devices. It includes short-range communications between roadside equipment and the vehicle and wireline connections to the traffic management subsystem for coordination and control. This market package also informs the driver of both highway-highway and highway-rail intersection status.

In the above descriptions, it is important to recognize that the market packages describe which ATIS activity is to be accomplished by each (i.e., its functions), not the specific

technologies by which it is implemented. A functional-based description provides important flexibility to adapt to changes in infrastructure and technology over time.

Stakeholder Ratings of ATIS Market Packages in Houston

Houston region transportation stakeholders assigned high, medium, or low priorities to each of the 30 user services defined as part of the National ITS Architecture. The various market packages (including those for ATIS) were then correlated to the user service rankings to estimate stakeholder priorities of the market packages in the region. As a result of that analysis, five marketing packages received a high priority ranking from the Houston stakeholders:

- broadcast-based ATIS,
- interactive ATIS with driver and traveler information,
- interactive ATIS with infrastructure-based route selection,
- interactive ATIS with yellow pages and reservations, and
- interactive ATIS with dynamic ridesharing.

Meanwhile, the following market packages received a medium priority rating by the Houston region stakeholders:

- route guidance (autonomous, dynamic, and ISP-based packages combined), and
- in-vehicle signing.

In effect, these priorities represent the overall ATIS goals and objectives of the public agencies of TranStar, as well as the other public and private stakeholders in the region, defining in general terms the types of traveler information services envisioned and, thus, the focus areas for future growth. This definition is the first step required in development of an overall ATIS plan for a region (9).

ALTERNATIVE PARTNERING ARRANGEMENTS

Both the RITS plan and TxDOT's own information-sharing policy emphasize the desirability of fostering private-sector participation in ATIS and of exploring the opportunity of obtaining value from the information being collection and shared. That is why the emphasis was made during the conduct of this research to focus on the alternative partnering arrangements identified from national research as having potential applicability to ATIS (9). The previous TTI report (3) described the four basic options with respect to ATIS partnering. These are:

- public-centered operations;
- contracted operations;
- franchised operations; and
- privatized, competitive operations.

Public-centered operations involve a relationship where one or more agencies have exclusive responsibility for developing, operating, and maintaining the ATIS. *Contracted operations* represent a typical “fee for service” arrangement that commonly occurs between the public and private sectors. Technical specifications for a service are prepared and sent out to interested parties who prepare proposals and bids to do the work specified. The public agency reviews the proposals and bids and then selects a contractor. Meanwhile, *franchised operations* generally involve the public sector giving a private sector participant the exclusive right to fuse, market, and sell the data from the public sector for some given period of time (9). A competitive process is used to select the private-sector participant, based in large part on the amount that the participant is willing to pay for the exclusive rights to the data. The private sector then develops products to meet the market needs of the users. A variation on this type of arrangement is the use of competitive licensing agreements, whereby the public sector allows two or more private firms access to the data for some fee. Finally, *privatized operations* represent the most market-driven arrangement available. In this approach, public agencies make data available to several private-sector firms willing to provide data fusion and/or dissemination services. The companies add value to the data according to their own business approaches and then resell the data to the public directly or to other information service providers (ISPs). The public sector may or may not receive monetary compensation for the data.

It should be apparent that the first and last options above really involve little actual partnering between the public and the private sectors. This is an important distinction, and indicates that although partnering is a desirable (and most likely necessary) option as ATIS development continues to move forward, it is not necessarily a forgone requirement for all activities in all systems. In fact, depending on the status of product and market development, funding availability, and other factors, it may be most beneficial for both public and private entities to move along separate paths. Of course, this separation does not imply that coordination or communication should not continue to occur. Rather, it simply means that whatever partnering arrangements arise should do so because they result in benefits to all involved. Partnering for the sake of partnering should not occur, since it contradicts an overall systems engineering approach to the problem being addressed.

There are key differences between the partnering arrangements along the following parameters:

- degree of public sector control required over operations,
- amount (and type) of public expenditures required,
- potential amount of revenue to be generated,
- amount of technical expertise required in-house by the agency,
- potential continuity of the system from year to year, and
- typical complexity of agreements.

A summary of the various potential arrangements in terms of these parameters is shown in [Table 1](#). As shown, the level of control, amount of technical expertise required in-house, and amount of expected agency expenditures all tend to decrease as emphasis moves from the public-centered to the privatized operations arrangement (1). Conversely, the potential for agency revenue is seen as nonexistent for public-centered arrangements, higher for franchise (or license-type) arrangements, and unknown for totally privatized arrangements. The assessment of operational continuity refers to the potential risk of the private-sector partner becoming insolvent and having to shut down its (and the ATIS's) operations. Whereas the potential for discontinuities exists for any arrangement in which a private-sector partner is involved, the contract mechanism (and associated payment of fees by the public sector) appears to minimize

this potential by guaranteeing the company some revenues regardless of how successful it is in creating revenues elsewhere.

Table 1. Comparison of ATIS Partnering Options.

Key Differences	Public-Centered Operations	Contracted Operations	Franchise Operations	Privatized Operations
Degree of Agency Control	Highest	High	Low	None
Public Expenditures	High	High	Low/None	Low/None
Revenue Potential for the Agencies	None	Low-Moderate	Moderate-High	None
In-house Technical Expertise Required	High	Moderate	Low	Low
Risk to Private Sector	None	Low-Moderate	Moderate-High	High
Agreement Complexity	None	High	Low	None

ASSESSMENT OF PARTNERING MODELS FOR EACH MARKET PACKAGE

Given the above distinctions in the alternative partnering arrangements, the following sections critique the applicability of the arrangements for each of the priority ATIS market packages. First, current ATIS-related activities are discussed. This discussion defines the current consumer market and provides insight into potential future revenues. Then, the other parameters that influence the potential partnering arrangements are considered in relation to the potential future activities and functions of the market package.

Broadcast Traveler Information

Current Regional Activities

Broadcast traveler information (involving the unsolicited, one-way flow of information from the source to the traveler) is already prevalent within the Houston region. It is accomplished at a fairly basic level, though, via the traffic reporting services (who sell that information to the media) or by the commercial radio and television stations themselves. The schedule of presentation is dictated by the media outlets, as is the actual content in some cases (i.e., which bits of information are presented). For example, a construction roadway closure may

or may not be mentioned during a report if more serious traffic events must be mentioned within the short time period allotted for that activity.

For the most part, the information being provided in broadcast format consists of the following:

- incident location;
- incident type (accident, stalled vehicle, roadway underpass flooded, traffic signal malfunction, etc.);
- approximate severity (described in terms of number of vehicles, types of vehicles, emergency medical services (EMS) on scene, or other qualitative measures); and
- extent of impacts upon traffic (generally in terms of length of traffic backups, although some estimates of travel times may be provided [presumably from the Houston real-time traffic map]).

Parking information may also be provided during special events such as baseball or basketball games, the annual Houston Livestock Show and Rodeo, etc. Also, although considered separately from broadcast traveler information in the National ITS Architecture (8), it is important to acknowledge the presence of the large dynamic message sign (DMS) infrastructure that has been installed by TxDOT for use by TranStar agencies. These signs also provide information very similar to that listed above for freeway-related incidents in the vicinity and provide it to the large number of motorists passing by the sign.

Assessment of Parameters Influencing Potential Partnering Arrangements

Figure 1 presents the TTI researcher ratings of the various partnering parameters in Table 1 as applied to the broadcast traveler information market package in the Houston region. As is the case of most major metropolitan areas in the U.S., basic broadcast-based information about roadway travel conditions in the Houston region is already accessible for “free” by travelers (assuming that users do not associate the costs of having radios and television or paying for subscription cable service to this market package). Although public perception of the lack of timeliness and accuracy of media traffic reports is fairly well documented and has been for some time (2), evidence elsewhere suggests it would be difficult to add enough value to this market

package to encourage consumers to purchase this type of information (4). Consequently, there appears to be little potential for revenue generation or sharing with the public sector agencies from this package. As noted above, current activities related to this market package are essentially a privatized operation, and will likely continue to be so in the foreseeable future.

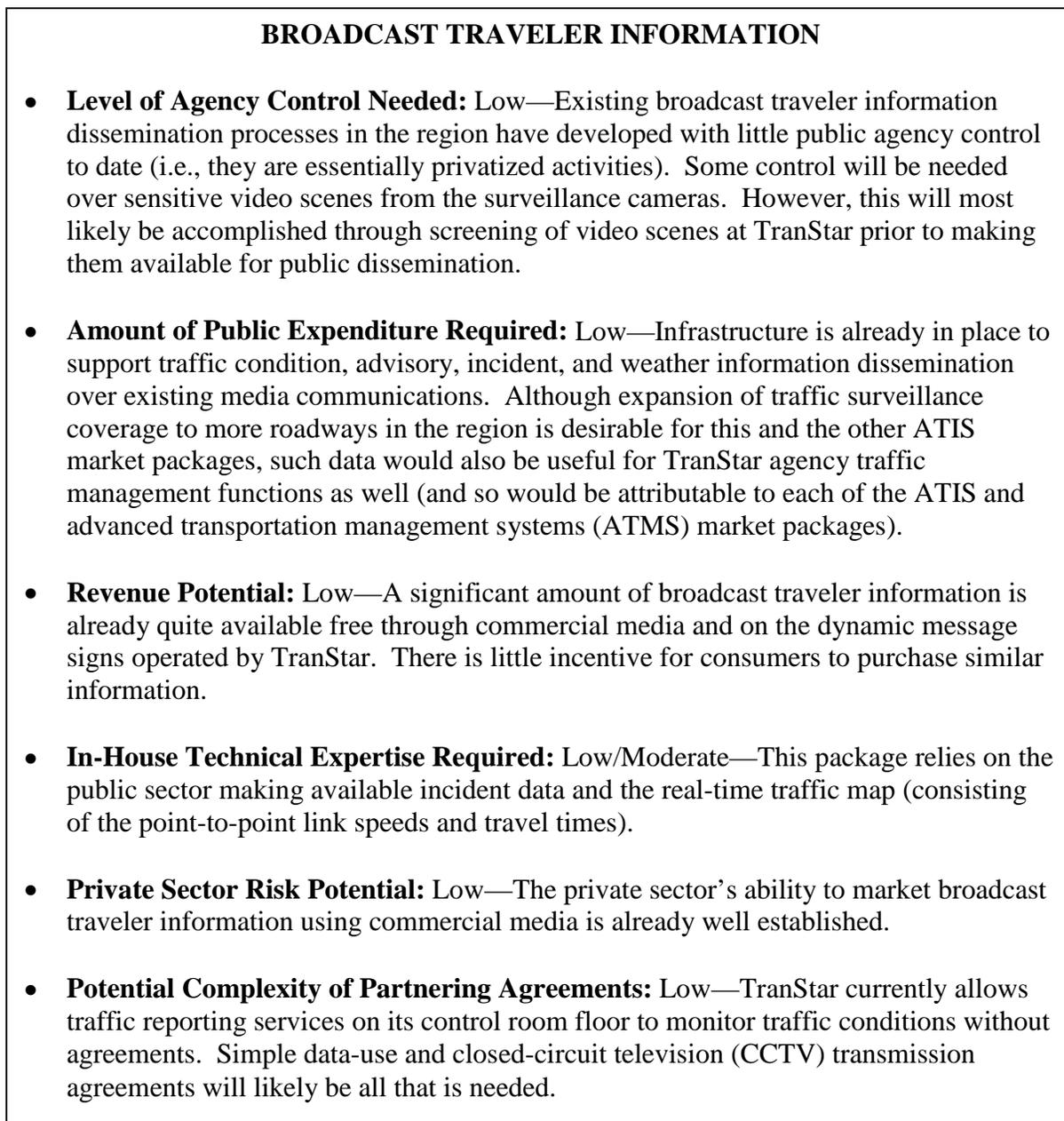


Figure 1. Assessment of Parameter Ratings of the Broadcast Traveler Information Market Package.

Interactive ATIS with Driver and Traveler Information

Current Regional Activities

The TranStar web site (<http://traffic.tamu.edu>) is by far the most significant activity ongoing in the Houston region that is related to the interactive traveler information market package. The web site currently includes the real-time traffic map (graphically displaying average link speeds), text data on average point-to-point travel times, incident data (location, severity, status), construction lane closures, and an interactive route builder utility to estimate total travel times for a specified travel route.

According to recent estimates (10), the web site is being accessed by well over 40,000 users per month. Each user is accessing the site 11 to 12 times a month (two to three times per week). Extrapolated out over a one-year period, this translates to nearly one-half million visits, or web site “hits,” per year.

Experts indicate that the private sector is readying itself to move into interactive traveler information in several major markets (such as Houston) in the near future (fastline interview). For example, TranStar agency personnel already receive incident information from the system via alphanumeric pagers. It is likely that the private sector will begin to market similar services for the general public fairly soon.

Assessment of Parameters Influencing Potential Partnering Arrangements

Figure 2 presents the assessment of the partnering parameters for the interactive traveler information market package in the Houston region. In many cases, the assessments are very similar to those for broadcast traveler information, since there is significant overlap regarding the type of information available via these two market packages. There still appears to be little need for agency control, or for significant public agency expenditures, prior to initiation of this particular market package. Revenue potential is rated slightly better than for broadcast traveler information. Researchers believe that the popularity of the TranStar web site indicates a regional market for tailored traffic information that is more timely and accurate than the market now available through media traffic reports. If this market package becomes an opportunity to partner with the private sector on ATIS, the agreement drafting process is likely to take some time in developing the language for the sharing of revenues and how the public sector portion will be managed by the appropriate TranStar agencies.

INTERACTIVE ATIS WITH DRIVER AND TRAVELER INFORMATION

- **Level of Agency Control Needed:** Low/Moderate—Some control will still be needed over sensitive video scenes from the surveillance cameras if these are to be disseminated through interactive traveler information technologies such as PDAs or via the internet. However, this will most likely be accomplished through screening of video scenes at TranStar prior to making them available for public dissemination. Some control may be needed if a decision is made to privatize the current TranStar traffic web site (see Revenue Potential).
- **Amount of Public Expenditure Required:** Low/Moderate—TranStar is currently maintaining the web site using public funds, and could continue to do so in the future. Meanwhile, the private sector appears quite capable of moving into interactive traveler information dissemination activities without extensive additional expenditures by public agencies (other than for the surveillance infrastructure improvements that would improve basic traffic management and information dissemination coverage areas and accuracy).
- **Revenue Potential:** Moderate—A potential market for interactive traveler information does exist based on recent TranStar web site statistics. This implies some revenue potential through both advertising and/or internet subscription fees. However, the private sector will likely need to operate and manage the TranStar site or one similar in order to realize these revenues. Other interactive technologies such as alphanumeric pagers may also offer revenue potential in the region, but the actual size of the market has not yet been explored.
- **In-House Technical Expertise Required:** Low—Web site operations to date have been achieved using technical resources outside of the TranStar agencies.
- **Private Sector Risk Potential:** Low/Moderate—The web site is a fairly significant and established consumer market at this time. Other interactive traveler information technologies are not, however.
- **Potential Complexity of Partnering Agreements:** Low/Moderate—If this market package is where the first partnering agreements are pursued for the region, there will likely be some difficulties early on in developing the language regarding the sharing of revenues and how they will be managed by the appropriate TranStar agencies.

Figure 2. Assessment of Parameter Ratings of the Interactive Traveler Information Market Package.

Interactive ATIS with Infrastructure-Based Route Selection

Current Regional Activities

At the present time, the only interactive ATIS activity in the region is the TranStar web site. No infrastructure-based route selection activities are in place.

Assessment of Parameters Influencing Potential Partnering Arrangements

Figure 3 presents the assessment of parameter ratings for the interactive ATIS with infrastructure-based route selection market package in the Houston region. The interaction between route selection recommendations and traffic management and control decisions envisioned with this package implies a significant amount of public agency control. Whereas expected public-sector expenditures are seen as low to moderate (algorithm development and possibly for some roadside equipment), revenue potential is also seen as somewhat limited in order to achieve the desired traffic operational objectives system-wide. This package will likely require some degree of technical expertise in-house to deal with the traffic management decisions to be made. Also, technical expertise will be needed to handle the fairly substantial partnering agreements that will probably be needed because of public-sector liability concerns that will likely exist due to route selection endorsements (even though these endorsements may be only implied by the public agencies).

Interactive ATIS with Yellow Pages and Reservations

Current Regional Activities

At the present time, existing interactive traveler information activities in the region (i.e., the TranStar web site) are not linked directly with yellow page or reservation-making capabilities, although the internet does allow a computer user to browse many sites and access this information for certain establishments.

Assessment of Parameters Influencing Potential Partnering Arrangements

Figure 4 presents the researchers' ratings for the assessment parameters as they pertain to this market package. This particular package increases traveler convenience and provides a convenient coordinated advertising venue for private businesses (just as current hard copy yellow page directories do). The impact upon TranStar agency responsibilities will likely be minimal

INTERACTIVE ATIS WITH INFRASTRUCTURE-BASED ROUTE SELECTION

- **Level of Agency Control Needed:** High—Some control will still be needed over sensitive video scenes from the surveillance cameras if these are to be disseminated through interactive traveler information technologies such as personal data assistants (PDAs) or via the internet. In addition, a key feature of this market package will be the ability to make route selection recommendations that take TranStar traffic management and control decisions into consideration. Likewise, TranStar knowledge and control of route recommendations will (theoretically) result in improved overall system operation.
- **Amount of Public Expenditure Required:** Moderate/High—Significant investments will be needed in algorithm development to eventually achieve the proposed benefits of this market package.
- **Revenue Potential:** Low/Moderate—The potential revenue for interactive traveler information was discussed under the analysis of the previous market package. The primary advantage to this market package is for the improved management of transportation system operations. To do this, the number of consumers provided this information will have to be managed, which could limit its marketability significantly.
- **In-House Technical Expertise Required:** Low/Moderate—The expertise needed for algorithm development activities related to this market package could be brought in from outside the agencies. Some degree of expertise will likely be needed in-house, however, to decide upon appropriate traffic management actions in response to the route selection information that would be available to the public sector.
- **Private Sector Risk Potential:** Moderate/High—The market size appropriate for this package appears to be limited (by necessity) to achieve the operational objectives of the system.
- **Potential Complexity of Partnering Agreements:** Moderate/High—Route selection recommendations may imply some level of liability for the public agencies. Consequently, partnering agreements may be more difficult to implement to protect both public and private sector interests.

Figure 3. Assessment of Parameter Ratings of the Interactive ATIS with Infrastructure-Based Route Selection Market Package.

INTERACTIVE ATIS WITH YELLOW PAGES AND RESERVATIONS

- **Level of Agency Control Needed:** Low/Moderate—Agency control requirements will be similar to those for the basic interactive traveler information market package. Some control will still be needed over sensitive video scenes from the surveillance cameras if these are to be disseminated through interactive traveler information technologies such as PDAs or via the internet.
- **Amount of Public Expenditure Required:** Low—The additional functionality of yellow page and reservation support is expected to be achieved primarily through private sector endeavors.
- **Revenue Potential:** None/Low—The potential revenue for interactive traveler information was discussed previously. There does appear to be revenue potential through yellow page and reservation support, but that will likely be realized primarily in the private sector. Private sector financial success does offer increased potential for TranStar agencies to recoup revenues for its support of the interactive traveler information market package, however.
- **In-House Technical Expertise Required:** Low—The public agency technical expertise needed for this package will be identical to that for the interactive traveler information market package.
- **Private Sector Risk Potential:** Low/Moderate—The TravTek test in Orlando showed that there was a market for this type of information, particularly among tourists and business travelers.
- **Potential Complexity of Partnering Agreements:** Low/Moderate—The partnering agreements between the private and public sector will likely be limited to the interactive traveler information functions of this market package and so will be similar to those for that package (discussed previously).

Figure 4. Assessment of Parameter Ratings of the Interactive ATIS with Yellow Pages and Reservations Market Package.

(slightly reduced traveler confusion, reduced extraneous travel, etc.). Consequently, the level of public agency control required for this package will be fairly low. TTI researchers also estimate that this market package will not require significant TranStar public agency expenditures to implement. Rather, it will likely be primarily a private-sector driven effort. Previous research (11) suggests that this package may offer some revenue potential above and beyond the basic

interactive traveler information package, particularly within the rental vehicle market. However, researchers expect these to be realized primarily within the private sector. TTI researchers also believe that there will be little need for additional public agency technical expertise in-house above that to support the interactive traveler information market package. Likewise, partnering agreements to support this market package are likely to be nearly identical to those needed to support the basic interactive traveler information market package.

Interactive ATIS with Dynamic Ridesharing

Current Regional Activities

Static ridematching support for travelers currently exists as part of METRO's activities in the region (see <http://www.hou-metro.harris.tx.us/METVAN.HTM>). Dynamic ridesharing operational test activities scheduled as part of the Smart Commuter demonstration project were cancelled (3).

Assessment of Parameters Influencing Potential Partnering Arrangements

Figure 5 presents parameter ratings for the interactive ATIS with dynamic ridesharing market package. Public agency control will likely differ depending on whether it is a completely private venture or involves one or more TranStar agencies. If the latter, personal safety liability concerns will dictate that this particular market package will have considerable public agency control. If the former, TranStar agencies will have no control. In addition, the potential market size for this particular functionality may be fairly limited. This situation implies both relatively low revenue potential for the private sector and relatively high public agency expenditures to establish and maintain this activity. This particular market package may involve functionality that the private sector participates in only from the standpoint of allowing it to be included in their user communication devices employed for overall interactive traveler information.

The need for significant public agency involvement in this market package also implies that some expertise will be needed in-house amongst the TranStar agencies to develop, monitor, and/or operate the activities included in this market package. Partnering arrangements may be fairly difficult as well, since issues pertaining to liability for public safety will have to be resolved.

INTERACTIVE ATIS WITH DYNAMIC RIDESHARING

- **Level of Agency Control Needed:** Low or High—Personal safety concerns associated with linking potential strangers together for the purpose of sharing vehicles for trips will likely require public agency control and oversight if any agency involvement occurs. Obviously, if the activity is completely privatized (including no provision for a potential rider database), no public agency control will be exercised.
- **Amount of Public Expenditure Required:** Moderate/High—If the package can be implemented utilizing private sector personal communication devices, public agency expenditures could be limited primarily to database software development and maintenance. Costs could be significantly higher if the public sector has to subsidize or pay for the communication devices themselves in order to achieve the operational goals of that market package.
- **Revenue Potential:** Low/Moderate—The potential revenue for interactive traveler information was discussed previously. However, it is not apparent from operational tests elsewhere to date whether a significant enough market for dynamic ridesharing activities exists to create a revenue stream for that particular function.
- **In-House Technical Expertise Required:** Moderate/High—Implementation and operation of the dynamic ridesharing function will require expertise consistent with that now possessed for managing the static ridesharing activity. Additional expertise in related fields (in tort liability, for example) may be needed as well.
- **Private Sector Risk Potential:** High—Personal safety concerns coupled with an unknown (but likely fairly small) market will probably make this package relatively risky for the private sector to participate in at a significant level. It may be a functionality that the private sector allows to be included in their user communication devices employed for overall interactive traveler information.
- **Potential Complexity of Partnering Agreements:** Moderate—Liability concerns may make agreements pertaining directly to the dynamic ridesharing functionality somewhat difficult.

Figure 5. Assessment of Parameter Ratings of the Interactive ATIS with Dynamic Ridesharing Market Package.

Route Guidance (Autonomous, Dynamic, and ISP-Based Packages Combined)

Current Regional Activities

A few automobile manufacturers are marketing autonomous navigation (route guidance) systems as part of their new vehicle equipment packages. Plans to implement in-vehicle navigation systems in north Houston as part of the Priority Corridors program were cancelled because of the recent advancements of internet technology and the likelihood of in-vehicle access to the internet via technologies such as Auto-PC (12). This market package was rated as having medium priority by the Houston stakeholders (7).

Assessment of Parameters Influencing Potential Partnering Arrangements

Figure 6 presents the assessment of the route guidance market package. TTI researchers expect that both autonomous and dynamic/ISP-based route guidance systems will develop and occur separate from TranStar agency operations and so will require little or no public agency control over activities. With regard to the expected public agency expenditures required, the same infrastructure that will support interactive traveler information will serve as the basis of dynamic and ISP-based route guidance operations early on. However, additional infrastructure may be needed on arterial streets in the region to better support this package.

Research suggests a sizeable potential market for autonomous route guidance systems nationwide (2). Similar expectations exist for dynamic and ISP-based systems as well. Consequently, a few private-sector consortiums are already moving forward with development of dynamic route guidance systems (5). The fact that route guidance is envisioned as a private sector activity implies that there will not be a strong demand for additional technical expertise within the public agencies to either develop or operate systems for this package.

Although a sizeable market does appear to exist for route guidance capabilities in the region, its potential for success depends on ability to deliver credible, accurate, and timely guidance information to users. Furthermore, in-vehicle equipment costs may need to decrease before consumers will select options that will support route guidance capabilities. Consequently, researchers estimate that this market package has a moderate level of risk for the private sector.

ROUTE GUIDANCE (AUTONOMOUS, DYNAMIC, AND ISP-BASED)

- **Level of Agency Control Needed:** Low—Route guidance recommendations are expected to occur separately from TranStar agency operations but will require TranStar data (for the dynamic or ISP-based guidance functionality).
- **Amount of Public Expenditure Required:** Low/Moderate—The same public agency infrastructure that will support interactive traveler information will serve as the basis of dynamic and ISP-based route guidance recommendations early on. However, additional infrastructure may be needed on arterial streets in the region in order to take full advantage of the potential benefits of route guidance. This infrastructure may require some public sector funding.
- **Revenue Potential:** Moderate—Research suggests a sizeable potential market for autonomous route guidance systems nationwide (2). Similar expectations exist for dynamic and ISP-based systems as well.
- **In-House Technical Expertise Required:** Low—Expertise needed to develop and operate these systems is expected to reside in the private sector.
- **Private Sector Risk Potential:** Moderate—Success in this market depends on ability to deliver credible, accurate, and timely guidance information to users. In-vehicle equipment costs may need to decrease before consumers will select these systems.
- **Potential Complexity of Partnering Agreements:** Low/Moderate—Agreements will be needed to obtain real-time traffic condition information from TranStar,

Figure 6. Assessment of Parameter Ratings of the Route Guidance Market Package.

In-Vehicle Signing

Current Regional Activities

There are no activities relating to this market package in the Houston region at this time.

Assessment of Parameters Influencing Potential Partnering Arrangements

Figure 7 summarizes the assessment of the in-vehicle signing market package in terms of the partnering parameters being considered in this analysis. Researchers estimate that this package will require a fairly high level of public agency control to ensure compatibility between

in-vehicle and external signing systems and to put into place appropriate safeguards that ensure that in-vehicle signing displays are consistent with existing national and state standards.

The need for compatibility and coordination between in-vehicle and external signing also implies that public agencies will likely be responsible for a significant portion of the costs associated with implementing this package. Furthermore, it is not known whether these systems will provide enough convenience or comfort (in terms of reduced crash risk potential, perceptions of improved overall safety, etc.) to create a user market that will financially support the system. Researchers do believe that there will be a need for in-house expertise within the public agencies to ensure compliance with existing signing standards and to look out for the public's safety interests (requiring a high degree of accuracy and reliability in the system).

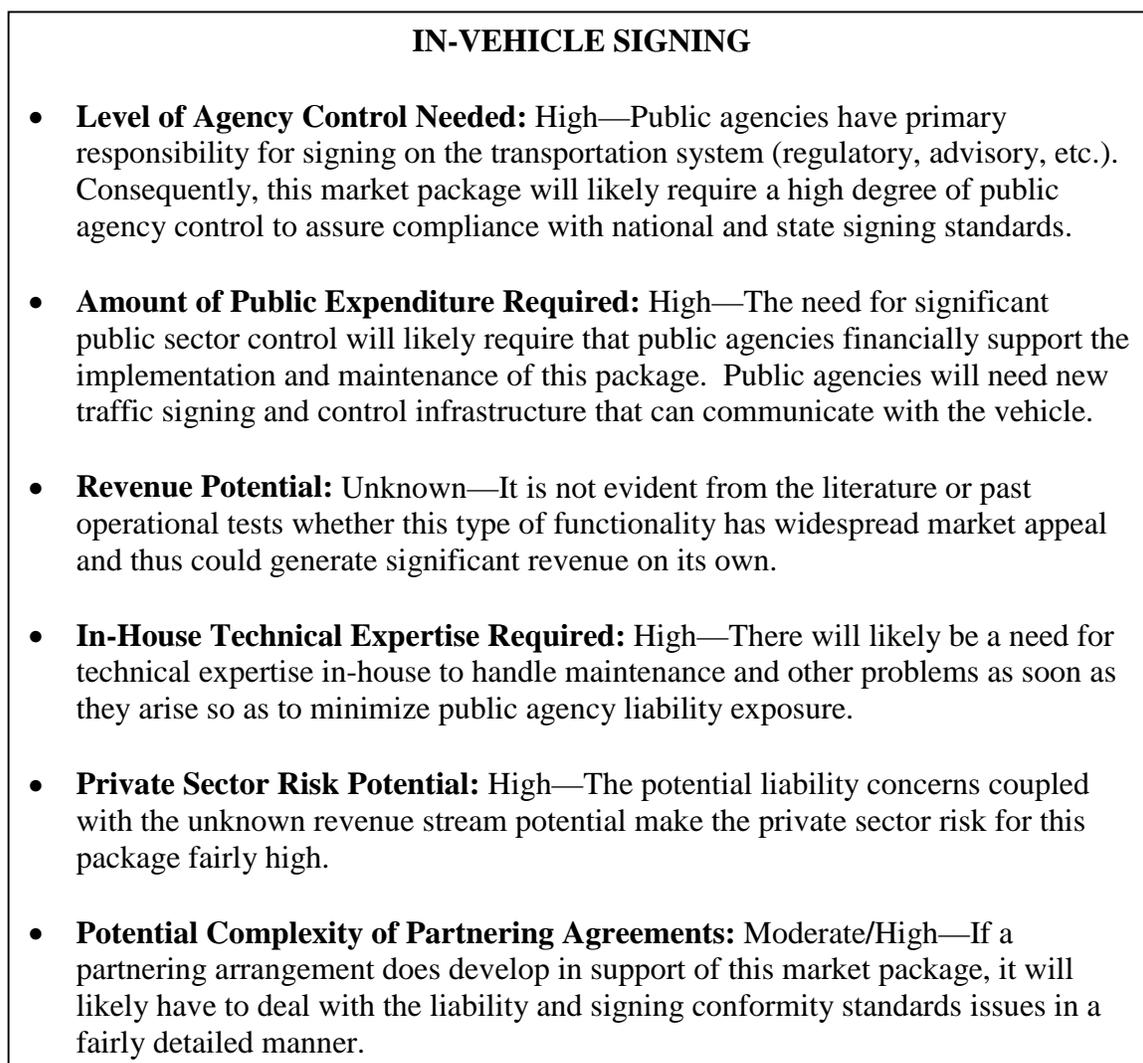


Figure 7. Assessment of Parameter Ratings of the In-Vehicle Signing Market Package.

In terms of the last two assessment parameters, researchers believe that in-vehicle signing will involve a high degree of risk to the private sector and fairly complex partnering agreements if the private sector does participate in this market package. As with the dynamic ridesharing package, this market package has both unknown revenue potential and substantial liability concerns associated with system malfunctioning or failure that make it relatively risky for private sector participation. In turn, these risks are expected to manifest themselves in fairly cumbersome partnering agreements with the private sector to achieve the functionality of this package.

MATCHING PARTNERING OPTIONS TO ATIS MARKET PACKAGES

The ratings assigned to the various assessment parameters for each market package in [Figures 1 through 7](#) are summarized in [Table 2](#). As the table illustrates, significant differences in ratings are evident amongst the market packages, lending support to the researchers' contentions that several different partnering options may be appropriate and eventually develop in the Houston region as the various ATIS market packages evolve. It should be noted that the ratings shown for some of the packages are likely to change significantly in the future, depending on how the technologies and the market for traveler information evolve further over time. As an example, the ratings shown of revenue potential for each market package are probably fairly conservative. Researchers estimated the ratings this low because none of the previous ATIS attempts nationwide have demonstrated significant revenue potential. If and when actual user markets and revenue streams do manifest themselves, these ratings would then improve.

The purpose of going through the previous rating exercise was to develop a basis for comparing how the four different partnering options shown in [Table 1](#) "fit," or complement, the ATIS priorities identified by stakeholders for the Houston region. Generally speaking, the following represent a reasonable matching of partnering options to the ATIS market packages:

- broadcast traveler information—privatized operations;
- interactive traveler information—franchise operations;
- interactive ATIS with infrastructure-based route selection—contracted or franchise operations;
- interactive ATIS with yellow pages and reservations—franchise or privatized operation;

Table 2. Summary of Parameter Assessments for ATIS Market Packages.

Market Package	Assessment Parameters					
	Agency Control	Agency Expenditures	Revenue Potential	In-House Expertise	Private Sector Risk	Agreement Complexity
Broadcast ATIS	Low	Low	Low	Low-Moderate	Low	Low
Interactive ATIS	Low-Moderate	Low-Moderate	Moderate	Low	Low-Moderate	Low-Moderate
Infrastructure-Based Route Selection	High	Moderate-High	Low-Moderate	Low-Moderate	Moderate-High	Moderate-High
Yellow Pages and Reservations	Low-Moderate	Low	Low-Moderate	Low	Low-Moderate	Low-Moderate
Dynamic Ridesharing	Low ¹ or High ²	Moderate-High	Low-Moderate	Moderate-High	High	Moderate
Route Guidance	Low	Low-Moderate	Moderate	Low	Moderate	Low-Moderate
In-Vehicle Signing	High	High	Unknown	High	High	Moderate-High

¹ If the initiative is completely privatized (no public agency involvement of any kind)

² If any public agency involvement at all is envisioned

- interactive ATIS with dynamic ridesharing—public-centered or contracted operations;
- route guidance—franchise or privatized operations; and
- in-vehicle signing—public-centered operations.

Except for the broadcast or interactive traveler information market packages, the above list shows that more than one partnering option has a potential role with each of the various ATIS market packages of interest to Houston stakeholders. That is, a market package may have a few assessment parameters that are consistent with a one type partnering arrangement, but also may have a few parameter ratings that mesh better with another arrangement. This result is not totally unexpected, given that trends have yet to be established regarding revenue potentials, market penetration, and so on. Nevertheless, the options shown for each market package can be taken as a first cut of feasible alternatives for fostering future public-private partnerships of ATIS activities in the Houston region.

Perhaps equally important, the above list also suggests which options are not very feasible at this time. For example, both dynamic ridesharing and in-vehicle signing activities appear to have high private sector risks and a need for a high degree of public agency control that make private sector participation in these ATIS activities more unlikely. For these market packages, partnering options that include significant private sector participation and leadership (i.e., franchise operations, privatized operations) are not shown to be feasible alternatives. On the other hand, the interactive traveler information market package does not appear to be appropriate as either strictly public-centered operations or as strictly privatized operations (i.e., only contracted or franchise operations are shown as good matches to this market package in the above list).

IMPLICATIONS TO FUTURE TRANSTAR ACTIVITIES

Real-Time Traffic Map Web Site

Because the research objectives were to consider longer-term concerns regarding the eventual development of sustainable ATIS operations in the Houston region, the discussion of partnering options and ATIS priorities to this point in the report has been at a fairly generic level. It is believed that the analysis results described in this chapter will be useful to TranStar agencies

as a basic guide about which priority ATIS market packages should be targeted for public-private partnering in the future and which should not.

Given the private-sector volatility and market uncertainties regarding ATIS, researchers believe that TranStar agencies should, in general, be patient and let the private sector determine what it believes to be good opportunities for ATIS partnering with the public sector in the future. The only exception to this might be with respect to the TranStar web site, or more specifically, the real-time traffic map and data of the Houston region. Currently, the web site provides interactive traveler information to a demonstrated user market of nearly 40,000 customers per month, each accessing the system two to three times per week (for a total of nearly 500,000 visits to the site per month). At the present time, the site is being financed totally by the public sector. However, many private-sector ATIS companies have demonstrated their ability to deliver high-quality traveler information web sites as well. It may be beneficial to TranStar agencies to consider the possibility of allowing the private sector to take over the dissemination of the real-time traffic map on the internet.

There are several advantages to changing the current operation of the traffic map from a totally public agency activity to one that is private or a public-private venture. First, many ATIS company officials see public agency sponsored traffic information web sites (such as the TranStar site) as competing unfairly (using public funds) with similar sites that exist or could exist in the private sector (5). Second, the private sector has a distinct advantage over public agencies with regard to its ability to advertise or otherwise raise revenues as part of web site operations. Third, with the appropriate arrangement established between TranStar agencies and a private sector vendor, requests for TranStar data could be funneled through the vendor, reducing in-house labor and future equipment costs spent on accommodating those types of requests.

There would be some perceived disadvantages to the proposed change of web site operations as well. For example, TranStar agencies currently receive good public-relations benefits for the web site. This recognition could be reduced or lost if the dissemination of this information is turned over to the private sector. Second, the ramifications of hardware or other problems causing a temporary loss of available traffic data from the public agencies could be significantly greater when the livelihood of a private sector company is dependent upon that data. These types of issues would need to be addressed through appropriate terminology in

agreements between the public and private sector entities. Third, significant public expenditures have already been expended to develop and maintain the site as it currently exists. It can be argued that taxpayers should not have to pay for such development again. Consequently, any shift in web site operations would have to occur without the private sector receiving public-sector funds for web site development.

3. SUMMARY AND RECOMMENDATIONS

SUMMARY

This report has provided an analysis of public-private partnering options for future ATIS development in the Houston region. The analysis focused on the following ATIS market packages from the National ITS Architecture that the Houston transportation stakeholders gave either high or medium priorities for the region:

- broadcast-based ATIS,
- interactive ATIS with driver and traveler information,
- interactive ATIS with infrastructure-based route selection,
- interactive ATIS with yellow pages and reservations,
- interactive ATIS with dynamic ridesharing,
- route guidance (autonomous, dynamic, and ISP-based packages combined), and
- in-vehicle signing.

Researchers examined the potential applicability of the four major types of public-private partnering arrangements previously identified through past research as having potential applicability to ATIS activities:

- public-centered operations,
- contracted operations,
- franchise operations, and
- privatized, competitive operations.

These alternative partnering arrangements were evaluated using six key parameters. These are as follows:

- degree of public sector control required over ATIS operations,
- amount (and type) of public expenditures required,
- potential amount of revenue to be generated,

- amount of technical expertise required in-house by the agency,
- potential continuity of the system from year to year, and
- typical complexity of agreements.

Each of these parameters was assigned a rating of high, moderate, or low in terms of how relevant they were to each particular market package. The resulting ratings matrix for a particular market package was then compared to the typical ratings matrix of each partnering option to determine the most appropriate “fit.”

Based on this analysis, the following partnering arrangements were identified as most feasible for each of the market packages:

- broadcast traveler information—privatized operations;
- interactive traveler information—franchise operations;
- interactive ATIS with infrastructure-based route selection—contracted or franchise operations;
- interactive ATIS with yellow pages and reservations—franchise or privatized operation;
- interactive ATIS with dynamic ridesharing—public-centered or contracted operations;
- route guidance—franchise or privatized operations; and
- in-vehicle signing—public-centered operations.

RECOMMENDATIONS

The above list illustrates that several of the ATIS market packages could see more than one type of partnering arrangement evolve in the Houston region in the future, because trends have yet to be established regarding revenue potentials, market penetration, etc. for the various packages. Nevertheless, the options shown for each market package can be taken as a first cut of feasible alternatives (and those not feasible) for fostering future public-private partnerships of ATIS activities in the Houston region.

Regarding specific recommendations for the TranStar agencies, the researchers offer the following:

- Given the current private-sector volatility and market uncertainties regarding ATIS, researchers believe that TranStar agencies should, in general, be patient and let the private sector determine what it believes to be good opportunities for ATIS partnering with the public sector in the future.
- The above recommendation notwithstanding, researchers believe that TranStar agencies should consider the possibility of eventually letting the private sector take over dissemination of the real-time traffic map on the internet. TranStar agencies could utilize a non-exclusive franchise arrangement or possibly a no/low-cost contract arrangement with one or more private sector vendors to accomplish this. Based on experiences of other ATIS initiatives nationwide, such an arrangement could include stipulations to provide any value-added data back to TranStar and to other public agencies at no cost. The agreement could also include a provision that would have the licensee handle other requests for data from private sector vendors (such that TranStar agencies would not have to deal with the arrangements directly).
- As opportunities to partner and to privatize ATIS activities (such as the real-time traffic map web page) develop, there is a possibility that TranStar agencies could recoup some expenses for providing traffic data from private sector revenues. Researchers recommend that the agencies begin working on establishing an escrow account or similar mechanism for holding any revenues that are recouped through ATIS activities. Given the difficulties TxDOT has in retaining funds in the District where they are received, researchers suggest that one of the local Houston transportation agencies establish the account. However, all TranStar agencies should be involved in deciding how the funds are to be utilized to support ITS operations in the region.
- Past ATIS experiences nationally have continued to point to data limitations as key to hindering further ATIS market development. Researchers recommend that TranStar agencies continue working to complete the data collection and fusion infrastructure currently planned and look for opportunities to further expand traffic monitoring and surveillance onto major arterial streets in the region.

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