America's Traveler Information Number

Deployment Assistance Report #1: Business Models and Cost Considerations

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Business Models and Cost Considerations for 511 Deployment

I. Introduction

The Business Models and Cost Sub-committee prepared this document to educate the other members of the 511 Working Group and the members of the 511 Policy Group on issues salient for migrating a planned or existing traveler information service to utilize the 511 dialing code. In addition, it is understood that this document may be used to educate other entities (public and private) interested in deploying the 511 dialing code for ATIS.

In March 2001 a 511 Policy Committee Retreat took place in Palm Harbor, Florida. The Policy Committee directed the 511 Working Group to investigate plausible business models and the appropriateness of their application to 511. It was agreed that attempts would be made to bring public and private enterprise together to work cooperatively on 511 solutions. It was also agreed that **a basic 511 service should be available to the end user at no more than the cost of a local call[1],** and that an extended 511 service could be available typically through the private sector, at an additional cost to the consumer. It is these underlying principals that are incorporated into exploration of the business models and cost considerations for enabling these partnerships, and creating the recommendations herein.

Business models and cost recovery are the critical factors for determining the sustainability of the traveler information service, and 511. In the context of 511, the service will be regarded as new from the perspective of callers who previously haven't been exposed to traveler information services. With this in mind, it's important that 511 be sustainable for the long term so that market acceptance and usage can be assured.

Caveats and Assumptions:

1. It must be understood that Business Models and Solution Scenarios presented herein are for *example purposes only.* Solutions that may work in one state or metropolitan area might not be viable in another for a multitude of reasons.
2. Costs noted within this document are not meant to be all encompassing for every market, nor should they all be considered budgetary "line items" for launching an ATIS/511 service. Many of the costs noted are examples of those that an implementer might encounter when deploying a traffic management system, and are not directly attributable to a 511

[1] As defined by the Federal Standard 1037C: Telecommunications: Glossary of Telecommunication Terms: **local call: 1.** Any call using a single switching facility. **2.** Any call for which an additional charge, *i.e.*, toll charge, is not made to the calling or called party. *Note:* Calls such as those via "800" numbers do not qualify as local calls, because the called party is charged.

deployment. Though these costs may be closely related to achieving the proper level of data gathering for an ATIS system, they must be viewed separately for budgetary purposes.
3. Each implementing entity must view these solutions as guides, and perform their own studies to determine which, if any, solutions might be applicable.
4. Though a 511 service is meant to be multi-modal, for the purpose of this document, any mention of transit information assumes only major service disruption or static information. Real-time information such as can be provided through Automatic Vehicle Location (AVL) data is not considered in the costs referenced herein.
5. This paper uses the term “511 Service” and “511 Service provider” as generic terms. In fact, 511 is the dialing code to be used for Advanced Traveler Information Services and using this term in a generic manner is not meant to represent the services themselves.

Knowing the Players:

Any solutions or business models illustrated here attempt to take into account the vast number of “players” involved in “turning on” a 511 dialing code. These include, but are not limited to:

- USDOT; Local or State DOT; Metropolitan Planning Organizations;
- Cooperative agencies (such as transit, airport, ferry providers, etc.);
- Private Information Service Providers (ISPs);
- Local Exchange Carriers[2] (LECs); Long Distance Telephone carriers; Toll-Free telephone carriers; wireless carriers (multiple in each market); and
- Consumers who ultimately decide whether or not the service they are using provides them information of enough value that prompts them to call back a second time.

II. Organization:

With that, this report is organized into six sections:

- Summary of Key Findings
- Potential Business Models
- Other Business Models – How have they fared
- Cost Elements and Issues – Where to begin
- Conclusion
- Other Issues Not Covered

The Summary of Key Findings and Potential Business Models sections come at the beginning of this document in order to illustrate the potential issues that may apply in implementing a 511 code in a particular area. The elements that comprise the implementation process are discussed in detail thereafter.

The Cost Elements and Issues section contains an Implementation Hierarchy explaining how each “stage” of an ATIS service might apply to a particular implementer. Market-to-market costs

[2] **Local exchange carrier (LEC):** A local telephone company that provides ordinary local voice-grade telecommunications service under regulation within a specified service area.

will vary depending on the status of the implementers *existing* systems for data gathering, data fusion, and data dissemination.

III. Summary of Key Findings:

Business models may vary from market to market depending on a number of factors, some of which directly correlate to what is available to the implementer today:

- 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 MUST enter into a continuing marketing campaign for the 511 service.

  (A Summary Table of Costs for the above stages is available in the Costs Elements and Issues section of this document.)

- 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[3] issues. Landline carriers are, in some cases, assessing either one-time charges to the implementers or per-call/per-minute costs to the users[4].

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

[3] **Tariff** – The published schedule of rates or charges for a specific unit of equipment, facility, or type of service such as might be provided by a telecommunications common carrier.
[4] 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.

for now; 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 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.

Telecommunications costs and charges must be considered and accounted in the analysis of 511 implementation. There are a number of scenarios available to bring costs down or maintain these charges/costs at a near-constant usage level, and all should be explored when implementing a 511 service. Again, not every scenario will work the same way in every market, and some may be assumed by a Service Provider as a part of a 511 system deployment under contract to the public agency.

These costs could include:

- 511 Translation Fees[5] - assessed to the implementer;
- 511 tariff (per-call or per minute charges which *may* include translation fees) charged to the implementer;
- Landline costs (to the user) whether local or toll;
- Toll-free charges (to the implementer) if the 511 call rides a toll-free backbone; and
- Call-transfer charges (to the implementer) if calls are routed to other agencies;

Though many implementers are concerned about the safety and legal issues surrounding wireless callers[6], this should not be viewed as a deterrent to encouraging wireless carriers to take part in the 511 program. In fact, it might be seen as an entrée into a new level of service if callers understand that using a cellular phone to access 511 *before* they travel, (either from their home or office), might be "cheaper" and easier for them than using a landline phone. This is especially true for transit riders, who may be seeking information as they walk to their station, or find themselves waiting on the platform in need of updated information. Lastly, the 511

[5] A "translation" occurs when a call is placed to one number, and is then routed to another number. In the instance of 511, a user would dial 511 from their telephone, and the call would be 'translated' to a 7 or 10-digit local or toll-free number where it will be terminated.

[6] In June 2001, the New York State assembly passed a bill banning the use of a handheld cellular phone while driving – effective November 2001. In September 2001, Miami-Dade County Florida passed a similar ban on the use of a handheld cellular phone while driving – effective October 2002. In all, more than 40 states, counties and cities are considering legislation to ban the use of handheld cellular phones while driving.

Implementation Guidelines recommend that an ATIS system capable of voice recognition be used for 511, allowing for “hands free” cellular telephone use[7].

[7] Ibid.

IV. Potential Business Models

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, 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 stabile stream of resources and the private sector role of developing and operating the traveler information system.

Various state Public Utilities Commissions have stated that assessing a monthly surcharge to every consumer's telephone bill is <u>not</u> an option for funding 511. There is no federal mandate accompanying the FCC designation of 511 for ATIS, so this method of cost recovery was not explored and is not recommended.

The following descriptions of business models address the <u>entire ATIS program, not just 511</u>. Throughout this document, however, we will attempt to separate the costs to deliver 511 from overall ATIS delivery. (Please see section VI - Cost Elements and Issues for an implementation hierarchy for those wishing to deploy an ATIS system and make use of the 511 dialing code).

Public Sector Funded Model

(The 511 Business Models Group anticipates that this is the most likely approach for a basic service implementation.)
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 users is more likely to be public oriented and, as with all models, the cost of telecommunications or other delivery methods will vary widely[8].

Subscription Model

(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 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

[8] 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 reduced significantly.

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 you wish to cancel the subscription before being charged for it.)

Pay-Per-Call Model

(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 in the last year.

It needs to be recognized that models based on using non-traditional media – those other than radio, print, and television – often are very difficult to sustain, and 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[9].

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.

[9] 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.

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 the caller additional services 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[10]. 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[11].

Hybrid Business Models

If innovative models are used to support 511 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 511 service. Unless a change is made to the Policy Committee decision on the price being no more than the cost of a local call to the user, funding is required to sustain day-to-day basic operations until such time as private revenue can grow and *perhaps* be used to defray the public sector funding.

The following are examples of hybrid models, which may be applicable in certain areas to help offset costs to implement a 511 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[12] to a premium service), then they may offer to fund a portion of the service. This has been successful mostly in markets where the carriers could see the benefit of "partnering" with a government agency.

Example 1 – Public sector funded basic 511 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 511 + Per-use premium services (Up-Selling).

A private 511 service operator is funded by public agencies, underwriting basic service delivery. The service provider offers callers the option of premium services that generate

[10] SmartRoutes has publicly stated that they will not enter into an agreement of this type in the future.
[11] Trafficstation has not been able to fulfill its obligation in New York due to funding and revenue issues.
[12] 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.

revenue by charging the caller and/or by obtaining a commission for services provided to a caller 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 511+ Subscription for personalized services.

The 511 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.

Example 4 – Public sector funded basic 511 for Wireless customers as a service differentiator.

The 511 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 511 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 511 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 511 landline number regardless of the wireless carrier's offering. 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.

V. The Business Models and ATIS: How they have fared so far?

When looking at the potential business models, one might ask if these models have been tried before, and how they have fared.

The following is an assessment of how these potential business models have been applied to ATIS to date and a qualitative evaluation of their effectiveness. Recognize that the past is not necessarily a barometer of future conditions, as even current ATIS contracts are undergoing changes in revenue and cost recovery expectations. In many places, it has been difficult for agencies to obtain funds to support ATIS.

Detailed Case Studies for metropolitan areas already using an ATIS model (prior to, and in preparation for 511) are available at http://www.its.dot.gov/511/511.htm under the "Lessons Learned" heading.

Public Sector Funded Model.

To date, this is the most successful model for ATIS. At this writing, even ATIS systems that have used public funding ostensibly as seed money have returned to the public sector stating that sustained operations would require continued public sector funding.

Subscription Model.

Personalized traffic information subscriptions have been tried on a limited basis. These services have yet to achieve much success. The barrier for success appears to be that the information provided has been unable to pass the litmus test of "is it that much better than radio reports that I would pay extra for the service." As an example, Trafficstation, a private company that operated a stand-alone web site that offered general (non-subscribed) users access to information by clicking through maps manually, *and* an up-sell subscriber model (with funded operations through some government contracts) that offered subscribers pro-active notification through e-mail, pagers and telephone calls, has recently undergone a financial shakedown leading to a halt in day-to-day operations.

Pay-Per-Call Model.

Per use charges for traveler information have limited if any history in the North America. In Seattle, as an aging "Mountain Pass Information" telephone system was in need of replacement, the legislature decided that the state DOT should attempt some form of cost recovery for replacement and continued operation. The DOT implemented a 35¢ per-call "900" service, but it did not receive the reception they would have liked. Though the service was used, call volume was not as anticipated, and users or potential users began to "dial-around" the DOT number, instead calling directly to the state police. The legislature realized that cost recovery was not likely, and removed the requirement from the DOT, paving the way for a (fully funded) local/toll-free number combination instead.

In Boston, SmartRoute Systems operated a "900" number traveler information service in 1991-92. Even with a tie-in to local radio and television stations, the "take rate[13]" was notably low, and the service eliminated in favor of the Federal and State funding of a Field Operational Test (FOT) begun in 1993, (The inception of the SmarTraveler® service).

Advertising and Sponsorship Model.

This model has mixed results to date as a revenue generator for ATIS and has yet to prove it can entirely support ATIS as it does radio and broadcast television. No ATIS website in operation generates substantial advertising revenue. Mapquest.com generates significant revenues but draws the most people for its driving directions, not traffic information features. While voice portals such as Tellme's 1-800-555-TELL and BeVocal's 1-800-4-BVOCAL offer case studies that indicate it is possible to generate revenue from advertising, it has not come close yet to generating the funds needed to fully support services. As discussed above, a regional or national footprint and significant usage are required to support advertising rates sufficient to generate revenue that will sustain the business.

Loss Leader or Franchise Model.

This model was popular with a leading information service provider – SmartRoute Systems – in the mid-1990s, where it proposed to offer free basic services, a telephone system and a web site, in exchange for exclusive access to public sector data in a region. SmartRoute was unable to successfully sustain this model and, while carrying out current contractual obligations, has publicly stated that it will not enter into such arrangements anymore. With the tight fiscal environment, this model is not being publicly offered by any private firm for ATIS broadly or 511 specifically.

[13] Refers to the number of persons who, after hearing or seeing an advertisement for a service, will decide to pay for and use the service.

VI. Cost Elements and Issues

Implementation Hierarchy

Cost considerations are based on which items are required to advance an existing or planned ATIS deployment to support 511. In order to implement an ATIS system and make use of the 511 dialing code, an implementer must first establish where they are in the hierarchical stages of ATIS deployment. The following *examples* attempt to outline steps and cost elements for implementing facilities leading to and including 511 implementation based on the implementer's position in the hierarchy;

- Stage 1 - Implementer has no data gathering, data fusion engine or telephonic dissemination platform.
- Stage 2 - Implementer has data gathering, but no fusion or processing 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 MUST enter into a continuing marketing campaign for the 511 service.

All stages are additive; Implementing stages 1 and 2 will not provide a telephonic platform without stage 3, nor a 511 dialing code without stage 4. Conversely: implementing stage 3 or 4 without sufficient data gathering or fusion, stages 1 and 2, will not provide a product that is worthwhile to the users. Stage 5, marketing, is required for a successful implementation of the services in both stage 3 and 4.

In the current state of the industry, the implementation of Stage 1 – Data Gathering, will also include the implementation of Stage 2 – Data fusion or data processing. Additional details on how the figures illustrated below were evolved may be found in ***Attachment E - Cost Estimate for Data Collection and Data Processing for a 511 Traveler Information System.***

This summary table below reflects the development of a cost estimate for the data collection and data processing components of a 511 traveler information system. The cost for the data collection and data processing is presented as a range with the low end representing the cost for a generic medium metropolitan area and the high end representing a generic large metropolitan area. The cost estimate is based on a zero baseline. That is, no existing underlying infrastructure is in place.

	Medium [14] Metropolitan Area		Large[15] Metropolitan Area	
Deployment Stage	**Capital Investment**	**Operations & Maintenance (Annual)**	**Capital Investment**	**Operations & Maintenance (Annual)**
Stage 1 – Data Gathering	$16,500,000	$970,000	$40,500,000	$2,400,000
Stage 2 – Data Fusion/Processing	$465,000	$15,000	$485,000	$24,000
Stage 3 – Telephone Dissemination[16]	$100,000 ~ $650,000	$30,000 ~ $100,000	$100,000 ~ $650,000	$30,000 ~ $100,000
Stage 4 – 511 Implementation[17]	$20,000[18]~Unknown	Unknown	$20,000[19]~Unknown	Unknown
Stage 5 – 511 Marketing	Unknown (see detail in explanations)	Unknown (see detail in explanations)	Unknown (see detail in explanations)	Unknown (see detail in explanations)
Total	$17,085,000 – $17,615,000+	$1,015,000 – $1,085,000+	$41,105,000 – $41,635,000+	$2,454,000 - $2,524,000+

Table 1- Summary Table of Costs

Stage 1 - Implementer requires data gathering

An implementer beginning at stage1 must first deploy a level of data gathering infrastructure sufficient to support a data dissemination product (511 service). This data gathering might include automated sensors, CCTV cameras, mobile probes or fixed location traffic "watchers,"

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[14] Population of 1.4~1.6 million persons
[15] Population of 5.2~8.2 million persons
[16] Costs are almost entirely dependant on the product specifications and selected vendor in each market
[17] As outlined elsewhere in this document, the cost of translating the 511 dialing code varies per carrier/per market. Some carriers are creating tariffs for 511, while others are treating each implementation as unique.
[18] This cost can be viewed as a minimum capital investment for converting an ATIS backbone/number to use the 511 dialing code. This cost has as much to do with the size of the market (and number of Central Offices that need to be programmed) as with the tariff and charges the ILEC may levee. For example: The Southeast Florida SunGuide's ATIS service, (under SmarTraveler brand name), covers Miami-Dade, Palm Beach and Broward Counties (and will likely be extended to cover Monroe county and the Florida Keys). But since the entire area falls under a BellSouth tariff, the conversion will cost just over $18,000 in one-time charges for all four counties, with no recurring charges. Conversely, the Orlando metropolitan area falls under three separate ILECs, BellSouth, Sprint and Verizon. Though BellSouth's charges will be only $10,000 for this area's conversion, it is assumed that both Verizon and Sprint may charge the same amount resulting in a $30,000 charge to FDOT for a smaller geographic area than the southeast system.
[19] Ibid.

aircraft and other advanced information-gathering technologies. Deployment (installation) of infrastructure could take place along the DOT right-of-way, or on private buildings, a communications network for data (and voice) may be required, and additional data services might be contracted from an Independent Service Provider (ISP). It should be noted that any transit data gathered during this process would include only major service disruptions or static data and not real-time information such as would be provided through automatic vehicle location (AVL) systems.

Stage 2 - Implementer requires data fusion engine

Often times, stage 2, which involves the deployment of a data fusion engine, goes hand-in-hand with Stage 1. Data gathering by itself does not provide much usable information unless it can be fused and collated with other incoming data such as incident or road/weather information coming from traditional sources (police radios, mobile units, etc.). It is important to recognize that packaging the information for delivery through 511 will have some unique cost centers onto itself.

Stage 3 - Implementer requires telephone dissemination platform

A telephone dissemination platform allows an implementer to present the gathered, fused data to the public. Adhering to the recommended Content and Consistency guidelines, the implementer would have a system capable of providing information to a caller through user interaction (touch-tone) or voice prompts.

From this Stage, an implementer might also deploy, or may have already deployed, an Internet solution for data dissemination. Often times, data from a fusion engine can be formatted to provide an output stream for an Internet web page. This web page could consist of speed and travel time information, as well as incident and other information, depending on the number of sources (including manual entry) accepted by the fusion engine or database.

Information available for use on a web site must be properly formatted and converted into voice-based information for communicating via a 511 ATIS. This may be accomplished by parsing data directly from the database that comprises the web site information; a task that may be performed by the same provider (ISP) or technology that provides the web service.
The cost of an Interactive Voice Response (IVR) system varies based on the system's anticipated call volume and other capabilities (call transfers, back-up systems, text-to-speech or voice recognition vs. announcer recorded messages and touch-tone access. Demonstrated experience is that these deployment costs can range from as low as $100,000 to over $1 million, with the figures based on many factors including size of the region, route listing set-up and programming, hours of operation, ease of translating available information into a format suitable for 511, and the number of staff (live operators or announcers) that must be accommodated and therefore the physical space required for an operations center. Costs associated with maintaining the telephone/IVR service can vary from low activity maintenance contract of $10,000 annually, to $80-100,000 or more annually for dedicated staff to support, monitor and ensure system availability.

Below is a sampling of questions that an implementer should be prepared to answer (for budgeting and functionality purposes) when requesting proposals from an IVR or Voice Portal provider[20]. These questions should by no means be considered exhaustive and due to the unique nature of virtually every implementation, should only be considered a starting point:

IVR System Capabilities

Call Traffic (volume)

- How many daily/monthly calls do you receive? Alternatively, if there is no system in place, how many calls do you anticipate receiving per day/month?
- What percent of daily calls do you receive during your busy hour?
- Are there particular times/days/events during the year where unusual call traffic spikes occur? What is the typical magnitude of these spikes?
- What level of annual call growth do you expect?

Call Processing Technologies

- Please provide a call flow for your existing application. If there is no application in place today provide the planned call flow.
- Do you outsource your current IVR applications?
- For IVR applications in place today, what tools/languages do you use to build these applications?
- For IVR applications in place today, how do they integrate with your back office systems?
- Who in your agency is responsible for this backend integration, and how is it implemented?
- Briefly describe your back office systems (e.g. Oracle/DB2 databases, legacy 3270 with Tuxedo, etc.)
- Do you use an outsourced IVR provider?
- If so, which vendor(s) and for which applications/scenarios (e.g. overflow)?

Outbound Notifications

- Do you perform any outbound notifications via other devices (e.g. e-mail, pager, outbound voice calls)?
- If so, please briefly describe the applications, traffic, and mechanism used to deliver these outbound notifications.
- How do customers register for and/or opt out of receiving all types of available outbound notifications?

As noted previously, these questions should not be considered an exhaustive list, only a starting point toward implementation of a telephonically delivered ATIS system.

[20] Questions courtesy of TellMe®.

IVR System Cost Estimate

Below are examples of the costs an implementer might encounter when deploying an IVR system for ATIS. These estimates are for the IVR platform only, and assume that the system has sufficient data and a fusion engine capable of delivering the data to the back-end of the IVR system (either in automated or manually updated form). These systems are estimated to service a large metropolitan area (population 5-7 million).

These costs are for the IVR system and do NOT include any toll-free, call transfer or other carriage charges from the telephone carrier.

System 1: Company A

- Hardware:
  - Telephony platform (IVR): $50,000
  - Communications lines (4 T1 lines = 96 telephone lines): $15,000 per year
- Software/Voice system (customization and license fees): $600,000
- Annual maintenance for IVR: $16,000
- Total one time costs: $650,000
- Total Annual costs: $31,000 (not including any toll-free, call transfer or other carriage charges)

System 2: Company B

- Hardware:
  - Telephony Platform (IVR): $470, 000
  - Communications lines (4 T1 lines = 96 telephone lines): $15,000 per year
- Software/voice system: TBD
- Annual license fee: $47,520
- Total one time costs: $470,000 +
- Total Annual costs: $62,000 (not including any toll-free, call transfer or other carriage charges)

System 3: Company C

- System cost: $489,000
- Communications lines (4 T1 lines = 96 telephone lines): $15,000 per year
- Voice prompts and concatenated voice (instead of text-to-speech): TBD
- Annual Maintenance: $15,000
- Total one time costs: $489,000 +
- Total Annual costs: $30,000 (not including any toll-free, call transfer or other carriage charges)

System 4: Company D

- Annual cost: $100,000 per million minutes
- No further details were provided

Telecommunications Costs

As outlined in more detail later in this document under the heading Cost Elements "Rules of Thumb", telecommunications costs for this stage are highly variable market to market. Charges might be mitigated based on the implementer's wishes regarding cost to the end-user (local call, toll call or toll-free call). Adherence to the 511 Content and Consistency guidelines would eliminate the possibility of a toll call paid by the user, but the cost of toll-free services or other telecommunications solutions could still be negotiated with the local carrier.

Stage 4 - Implementer requires 511 dialing code

Once the implementer has reached stage 4, they have deployed sufficient data gathering infrastructure, a fusion engine and an IVR system capable of handling and disseminating information based on the aforementioned data.

Implementing the 511 dialing code is then based on negotiations with the local carriers and (as necessary) the Public Utilities or Public Service Commission. Costs for "turning on" a 511 code are highly variable and depend on, amongst other things; whether there is a tariff in place for 511; the implementer's use of a local number vs. (or as well as) a toll-free number; the implementer's ability to work with local wireless carriers to match landline carriers in implementing the 511 code, and perhaps using a separate "back-door" number for wireless calls in order to avoid any toll-free or tariff charges based on the configuration deployed[21].

Figure 1 – Potential 511 Cost Elements illustrates the principal cost elements for providing an ATIS and511 service associated with stages 3 and 4 of implementation. There are two general types of charges:

- ***Stage 3 Dissemination Platform System charges (capital expenses) - Associated*** with establishing an ATIS/511 service and making it available for callers. These costs are largely one-time set-up costs, or monthly/annual costs such as telephone line charges or system operation and maintenance, associated with set-up and day-to-day operations, Some of these charges may be based on regular or predicted call volume (number of phone lines, etc.).
- ***Stage 4 511 Calling charges*** - Associated with completing a call to an ATIS/511 service. These costs include "regular" call routing charges such as toll-free costs, which might be associated with stage3 *and* stage 4. Costs are highly dependent upon call volume as well as the type of telephone interface deployed and system requirements (such as call forwarding or overflow capabilities). Many of these charges are based on a per-call basis, and are highly variable from market to market.

[21] The use of a Back-Door number is only beneficial when a wireless carrier's calling plans allow for local calling over a wider area than a landline carriers. For example: In the San Francisco Bay Area, landline calls from Oakland to San Francisco are considered toll calls. For wireless callers, however, these calls and those for a considerably wider area as well, as considered local calls and no toll charges apply. Using a Back Door number for wireless can thus alleviate some of the local 511 tariff (per call) charges, as well as any toll-free charges that might apply.

Potential ATIS and 511 Cost Elements

Calling Charges to implementer or User Costs

Wireless

Charges to Implementer
- 511 Call Routing (translation)*
- Toll Free charges
- Call Forwarding (if applicable)**

User Costs
- Airtime
- Toll Free***
- Roaming (if applicable)
- Long Distance (if applicable)

Wireline

Charges to Implementer
- 511 Call Routing (translation)*
- Toll Free
- Call Forwarding (if applicable)**

User Costs
- Telephone call costs (depending on service contract)

System Charges

System Deployment
- IVR Hardware & Software
- Route programming & set-up

System Operations
- Incoming Phone lines (Installation, monthly charges, and call-transfer charges) dependant on call volume and system capacity
- Messages and/or operators
- Marketing

System Maintenance/Monitoring
- IVR maintenance and upgrades

* 511 Call Routing charges may include both one-time (set-up) charges *and* per-call translation charges depending on negotiations with telephone carrier
** Call forwarding charges to outside agencies are additional to Call Routing charges
***Calls to toll free numbers are charged as normal airtime calls to wireless users.

Figure 1 – Potential 511 Cost Elements

System Operations- Costs/Savings

Costs to operate the system include the live operators or staff used to create messages, switch programming for 511 call routing, incoming phone lines (these physical lines have a fixed monthly fee per line, generally around $30/line, independent of usage levels), and marketing costs[22]. Operations costs can vary widely, with several operating and performance requirements having an impact on the cost, including:

[22] This assumes that the system will handle incoming calls only. Should the system be required to provide "call transfers" to another provider (call transfer: A switching system service feature that allows the calling or called user to instruct the local switching equipment or switch attendant to transfer an existing call to another terminal.), additional telephone charges would apply. These charges could be flat rate for constant connections (similar to an inside call transfer), or per call depending on predicted volume. These charges may also include toll or long distance fees depending on the destination of the call.

- The acceptable number of calls that go unanswered or busy (impacts the number of phone lines required)
- The average length a caller is expected to stay on the line (impacts the number of phone lines required)
- The availability of an Interactive Voice Response (IVR) system [23]
- Reactivity of the 511 service for short duration events such as incidents, concerts and sporting events (impacts staffing/interface requirements and call volumes)
- Degree of localization of the service provided (impacts staffing/interface requirements, average call duration and call volume)
- Marketing and advertising of the 511 service (impacts call volumes and system operations costs)

Calling Costs/Charges

The actual cost of making a call to a 511 service will depend upon many factors. In both stage 3 and stage 4, an implementer must address a number of factors to determine the best route to their end goal. The following is a listing of the basic types of charges or user costs that may occur for a given call. An aim of the system design and planning process should be to reduce the costs associated with each of these elements for a given call both to the user, and to the implementer that is providing the service (local DOT, MPO, etc.)

<u>*Call routing – (A charge to the implementer)*</u>. These are charges associated with translating one phone number to another for the purposes of connecting a call to the 511 service. In general, these routing charges can come in two varieties:

- **511 translation** to the designated 7 or 10-digit number. This translation must occur, as all systems will reside on the phone network as a regular phone number.
- **Toll-free translation** to the designated 7 or 10-digit number. This translation occurs for each call made via a toll-free system (for instance 511 calls in a rural portion of a state are routed to a toll-free number that is then translated to a local number in the urban area where the 511 system resides. This approach is common as it enables the call to be free to the caller and minimizes the cost of the call to the 511 service provider).

In either of the above cases, the translation should be seamless to the caller. The caller dials 511, and the call is translated to whatever number will take the call to the information service. Examples exist where neither of these routing charges are charged to the 511 service provider, or are charged on a one-time basis during set-up (such as Cincinnati/Northern Kentucky). Examples also exist where per-translation call charges are currently or are planning to be charged (such as those listed below).

[23] Should the implementers require live operators to handle specific customer service calls, this may also impact staffing.

In its operating area, Qwest has filed a tariff for a $0.05 per call charge for 511 translations.

SBC, which operates in California and 12 other states, plans to file a tariff for both 511 and 211. The intention is to have a tariff dependant on whether 511 is translated to a local number or a toll-free number.
The Preliminary charges (components) are:

	One time	Per month
System fees (not fully defined)	$2000	$250
Central office[24] **fees** (switching/translation)	$300	$75

Usage Fees:
If the implementer has the call terminated to a toll-free number, the usual toll-free rates apply, (3-4¢ per minute[25]). However no translation charges will be added to the call.
If the implementer has the call terminated to a local number, a 3¢ per call translation charge will apply to the implementer.

These charges can apply to calls originated from both wireless and wireline telephones. Wireless carriers are also able to establish their own routing systems that may bypass landline translations. In other words, a wireless caller dialing 511 may be routed to a local landline number *without* the call having to be translated by the landline carrier. *Done properly, this can save significant landline and even toll-free charges.*

Please see Attachments A through D for illustrations on how 511 calls are translated using different communications methodology[26].

Toll/Long Distance/Toll Free charges –(May be a cost to the user ***or*** *a charge to the implementer)*. If a caller dials 511 and is routed to a service that is outside his or her local calling area, a common occurrence in statewide or large metropolitan area systems, then toll or long distance charges will apply. These charges can be incurred either as toll or long distance charges to the caller or, when using a toll-free number backbone, as toll-free charges to the 511 service provider.

Toll and long distance charges can vary widely based on calling plans, with the typical charge being in the range of $0.05 to $0.25 per minute. Toll-free charges will vary based on the region of the country, the expected call volume and the type of contract (some service operators leverage a state contract to secure very low rates), with a range of $0.03 to $0.08 cents per

[24] Central office (C.O.)**:** A common carrier switching center in which trunks and loops are terminated and switched, directing calls from area telephone numbers to circuits that will carry the call to it's ultimate destination.
[25] California's current statewide 800 number incurs a $0.032 per call charge from the local exchange carrier to route the 800 call to the California DOT's IVR. SBC has stated that it may be willing to reduce the per minute fee if they are the toll-free provider.
[26] Additionally, USDOT has prepared a paper called "Call Routing and its Implications for 511" which provides an overview of call routing, legislative and regulatory issues, and intellectual property and patent issues. The document can be accessed at **http://www.its.dot.gov/511/Call_Routing.pdf**

minute common. With average call duration ranging from 2 to 5 minutes, this means any average per call cost range of $0.06 to $0.40 per call for toll-free charges.[27]

Toll-free charges can apply to calls originated from both wireless and wireline telephones if they come across the toll-free backbone. In the case of a wireless caller, both the 511 implementer *and* the user incur charges. The implementer through toll-free service charges, and the caller through airtime charges. Depending on the market, some charges can be mitigated both to the caller and the service provider when using a wireless phone. The San Francisco Bay area is a good example of a region where a call from one side of the Bay to the other incurs a toll charge to a landline caller, thus inviting the use of a toll-free number. Yet wireless calls do not incur toll charges anywhere in the Bay area.

Tariff Rates for carriage – (Generally a charge to the implementer, however user costs may apply in some areas). In certain areas of the country a tariff might exist that either applies to or is directed at a 511 service. In these cases, the costs of translating the calls and re-directing them to a 7 or 10-digit number have already been decided. Additionally, carriers will often assess "programming charges" associated with the cost of software programming in each of their central offices.

The number of central offices in a given area is directly relative to the number of telephone numbers (users or potential users) in that area. For example: The Cincinnati/Northern Kentucky area, with a population of ~2 million, has 57 central offices. The nine-county San Francisco Bay Area, with a population of 6.5 million, has approximately 100 central offices that would require similar programming for a 511 implementation.

[27] Implementers may be able to negotiate "per call" rates instead of "per minute" rates from the toll-free providers. These negotiations would likely require a "guaranteed" number of calls to the 511 service per month.

Cincinnati Bell, which services the Greater Cincinnati/Northern Kentucky area, has a tariff rate in place that states the following:

● Nonrecurring charge for programming of central offices - $210 per central office. This totaled around $12,000 as a one-time charge to the Kentucky Transportation Cabinet, the agency implementing the 511 service (ARTIMIS).
● there are no other set-up charges.
● there is <u>no</u> per-translation cost for 511.

Since ARTIMIS' 511 callers are all within the same metropolitan dialing area, the 511 call is the same as a local call. Users do not generally see a charge for local calls on their telephone bill.

In Florida, in preparation for more ATIS services, BellSouth has a 511 tariff in place that states the following:

● Nonrecurring Charge for programming - Per Basic Local Calling Area $389.90
● Central Office Activation- Per Central Office $182.00
● Change of Point-to Number by Subscriber (implementer) - Per Central Office $13.50

● there are no per-call or per-minute charges, however the BellSouth tariff lists a restriction that requires the translation be to a number *local* to the caller or to a toll-free number. This eliminates the possibility of a toll or long distance call being charged to the user when dialing 511.

<u>Airtime – (Generally a cost to the user)</u>. Calls made on wireless phones incur "airtime" charges, generally calculated by minutes. Per minute charges can range from $0.10 to $0.40 per minute. Increasingly, wireless users choose accounts that bundle minutes for a fixed price, thus the marginal cost for airtime, so long as they do not exceed the monthly allocated time, is zero[28]. Wireless callers *may also* incur landline charges depending on the terms of their service contract. Wireless carriers charge for toll and long distance calls as well, however the "local" calling area for wireless is usually much wider than for landline, and increasingly, monthly calling plans are including long distance in the monthly allotment of minutes.

<u>Roaming – (A cost to the user)</u>. Wireless callers who attempt to access 511 outside their local calling area may, depending upon their calling plan, be required to pay "roaming charges" for the right to use the wireless network in another region. An increasing number of wireless subscribers have calling plans that allow "national" use of their phones without incurring roaming charges. However, for those that must pay for roaming, charges are substantial (for example, AT&T Wireless current published roaming rate is $0.60/minute).

Overall, two major conclusions can be drawn from a discussion of calling charges and costs:

[28] Examples exist in which airtime charges have been waived by carriers based upon the demonstrated fact that callers to these services often make additional subsequent wireless calls, and that there is a benefit (usually marketing and good will) to the carrier to "partner" in providing an ATIS service for the public sector. Users of bundled plans *might not* consider airtime used for calling a 511 service a deterrent to usage. Airtime charges apply only to wireless calls.

- *The per-call charge/cost range can vary widely between deployments*. Assuming average call duration ranging from 2 to 5 minutes, the possible cost range for calling charges to the 511 service provider or implementer range from $0.00 to nearly $0.50 per call. Additionally, per-call or per minute costs may apply to landline users (depending on their telephone service contract) as well as wireless users (in the form of airtime and perhaps roaming charges)
- *Call volume is a principal determinant in overall costs to the implementer*. This is especially true when using a toll-free backbone, as these charges are on a per-call and often per-minute basis, the total costs impact is directly proportional to the call volume. It must be understood that the more callers there are to a system using a toll-free scenario, the higher the costs. Scenarios are available to limit these costs, such as using a local number as the "translate to" number, combining the use of a local *and* toll-free number, or by encouraging the use of wireless phones that do not charge toll or long distance charges to connect to the 511 system.

There are a number of methods to reduce or limit the charges associated with a 511 call, as well as the cost of the call to the user.

Some of these methods include:

- 511 landline calls may have their own tariff at the same level as the cost of a local call to the customer.
- Translation fees for 511 calls might be "one time" charges by the telephone companies to program switches to recognize the 511 dialing code.
- 511 landline calls, if they were to be toll or long distance calls, could be billed at a reduced or flat rate (per call instead of per minute). (Though this goes against the 511 Policy Committee recommendation, it is something that an implementer might wish to explore none the less).
- 511 landline calls could ride on a toll-free backbone. Implementers would negotiate with carriers for the best rates, and may also look to have the calls billed on a per-call instead of a per minute basis.
- If the 511 service is performing "call forwarding" (call transfer) to other agencies such as transit providers or live operators, implementers and ISPs might look to minimize or flat rate these charges by using dedicated service circuits (T-1 or other) in order to maintain continuous connections. This would eliminate per call and per minute charges for these connections.
- Implementers should make every effort to bring the wireless carriers into the fold, and take advantage of wireless coverage to level or minimize costs. Using the "non-charges" of "no toll" and "no long distance" market coverage of the wireless industry can substantially limit these distance-based costs, for both the agencies and the users. In most cases, wireless carriers can translate the 511 code to a 7 or 10 digit number allowing them direct access to the 511 system *without having to use a toll-free backbone or accrue toll or long distance charges.*

Stage 5 – Implementer enters into a continuing marketing campaign for 511 service.

The marketing of a 511 service requires a budget for both capital and annual expenses. The Commonwealth of Kentucky is currently using "marketing on a shoestring" with an annual budget of just $50,000 to promote the ARTIMIS system.

In contrast, the Commonwealth of Massachusetts receives $1,000,000 in advertising through a contractual obligation with SmartRoute Systems, operator of the SmarTraveler® service. SmartRoutes avails itself of significant "in-kind" advertising through its relationship with WCVB-TV (who broadcast traffic reports from the SmarTraveler facility) and other broadcasters. This in-kind advertising consists of talent read "mentions" during daily traffic reports at a value of approximately $500,000 annually, and through promotional ads produced by the station, which are valued at another $500,000 (according to the station's advertising prices). Additionally, SmartRoutes adds another $75,000 annually in radio advertising as a part of its contract with the Commonwealth.

The Partners In Motion program in Washington DC spent approximately $1,000,000 over the first three years of the program in marketing. Activities included radio advertising, press kits, collateral material passed out through transit partners and public events, etc. Half of this figure was a requirement of the contract for the system operator, with the other half borne by VDOT or other partners.

Capital expenses may include direct costs of producing highway signs promoting the 511 number, or collateral material that can be passed out at toll booths or other public access facilities such as airports and garages. Highway signs may cost between $1000 and $3000 per sign to produce and erect depending on the market. The decision of how many signs to erect is left to the implementer, but a figure of 50-100 signs in a metropolitan area is not unreasonable.

Examples:

- The Virginia Department of Transportation produced and erected 52 signs for it's 511 service in the I-81 region at a cost of $800-$1000 per sign. Total expenditure on signage was approximately $50,000.
- The Metropolitan Transportation Commission estimates that 130 signs to be erected in the San Francisco Bay Area will cost approximately $400,000 or $3,000 per sign.
- The MassHighway Department initially erected 45 signs in eastern Massachusetts to promote the SmarTraveler service at a cost of $3000 per sign. However any new signs carry an estimated cost of $10,000 per sign (split 80/20 between federal and state funds) due to new regulations for highway signs [29].

Annual expenses may include the cost of radio or television advertising or newspaper ads. The cost of production as well as the cost of the ad placement must be considered.

[29] This cost may escalate as new standards for highway signs go into effect. The Manual of Uniform Traffic Control Devices calls for larger signs with new foundations and support structures than have been used in the past.

Call Volumes: What can be expected?

We do not yet have experience in operating multiple 511 ATIS systems across the country to gain an understanding of call volumes. But we do have a number of other examples from which to draw our own conclusions:

- *Boston*. The first metropolitan multi-modal traveler information telephone system, SmarTraveler® is also the busiest. The United States Census Bureau estimates the population of the Greater Boston area[30] at over 4 million people. SmarTraveler is estimated to have received approximately 4.5 million calls in 2001. That *may be* translated into roughly 1.2 calls per person per year in the Boston metropolitan area[31]. It uses "*1" for wireless access to the service, and 87% of calls are via wireless phones. It must therefore be noted for calculating costs that, of the 4.5 million calls projected, less than 600,000 are envisioned to be from landline telephones. This speaks directly to the cost/benefit that can be realized by routing 511 wireless calls directly to the 7 or 10 digit local landline numbers, instead of through a toll-free or long distance backbone.

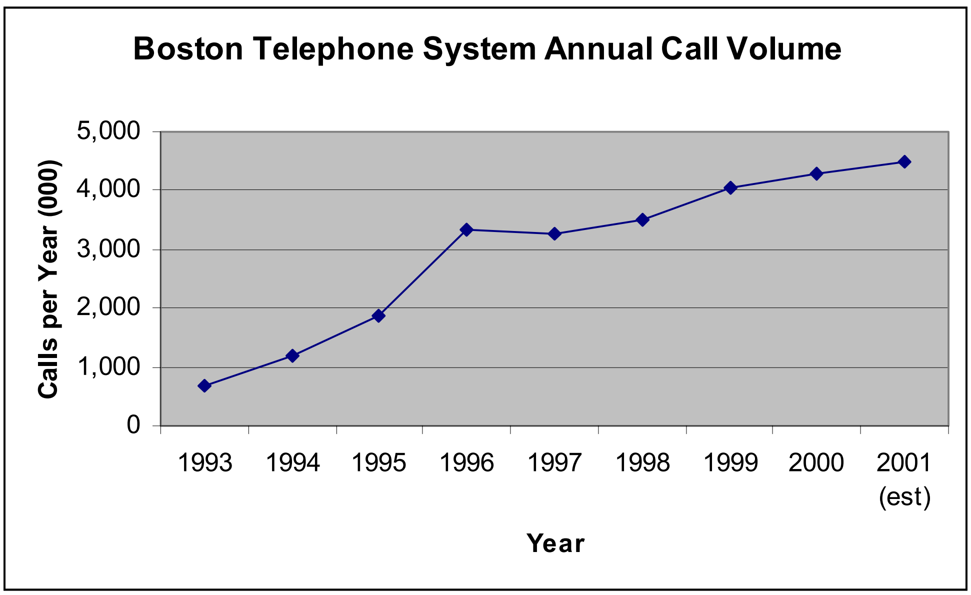

Figure 2 - Boston Telephone System Annual Call Volume

- *New Jersey*. New Jersey Transit's North Jersey Traveler Information Center receives 3.7 million calls annually, or roughly 0.63 call per person per year in the North Jersey metropolitan area. (US Census Bureau statistics indicate over 5

[30] Includes Suffolk, Norfolk, Middlesex, Essex and Plymouth counties

[31] The most recent detailed survey of SmarTraveler users was a 1994 Multisystems report. In the report it was noted that the average user would access the system approximately 3 times per week. One could extrapolate on these numbers and conclude that the SmarTraveler service has approximately 30,000 unique users. However since this data is over 7 years old, a lifetime ago in the product cycle of an ATIS service, and since the service has received as many as 491,000 calls in one month (August 2001), using these extrapolated figures is likely an inaccurate measure of unique users.

million people reside in Northern New Jersey[32]). New Jersey Transit uses a toll-free number in state and a 10-digit number out of state.

- *Cincinnati/Northern Kentucky*. With a population of nearly 2 million[33], calls to the traveler information service ARTIMIS (formerly SmarTraveler) averaged 800,000 to 1,000,000 annually. Launched in 1995, the service averaged 40,000 calls per month while using a highly memorable 7-digit number, 333-3333 *and* a three-digit (311) number for wireless callers. As we can see from **Figure 3 - Monthly ARTIMIS Call Counts**, once a three-digit (311) number was instituted in Kentucky, call volume rose through 50-60,000 calls per month. Once both Ohio and Kentucky Public Utilities Commission and Public Service Commissions approving a three-digit (211[34]) number, call counts surged to over 70,000 to 80,000 calls per month, peaking at over 100,000 calls in April of 1998. Currently, call counts continue to average between 60-80,000 calls per month.

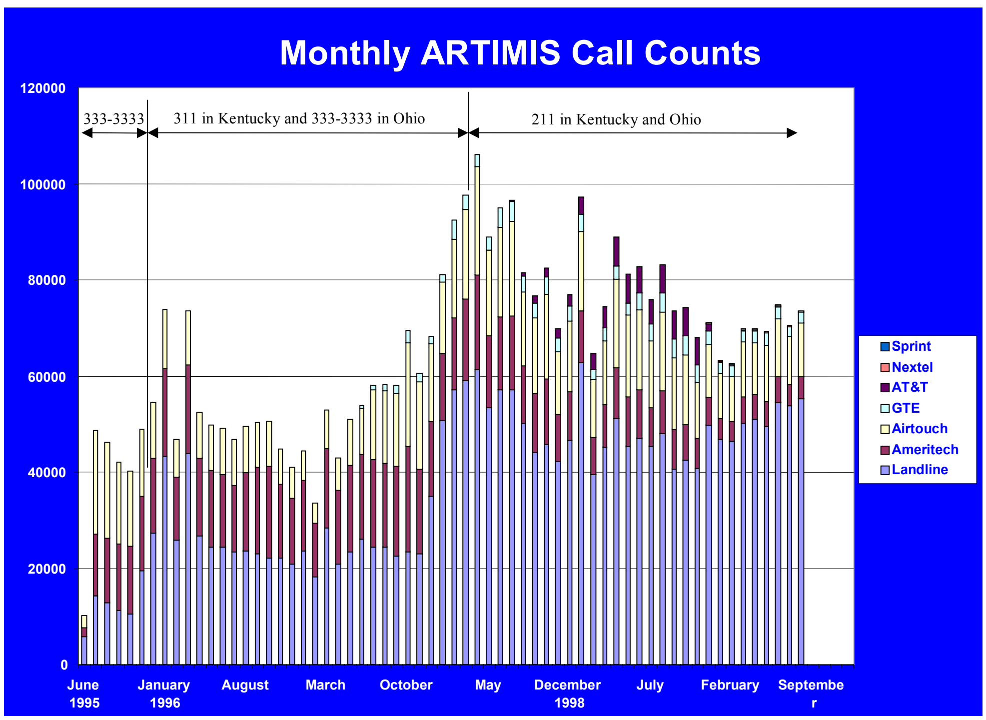

Figure 3 - Monthly ARTIMIS Call Counts

- *Directory Assistance- 411.* We might also use 411 services as a model for possible call volume when using three-digit dialing codes for information services. Though other services are now available, most telephone users understand 411 as the number to dial for Directory Assistance. Over the past decade, 411 has become a revenue generator for both landline and wireless carriers. A recent report published by the Kelsey Group noted that approximately

[32] Includes Bergen, Essex, Hudson, Union, Middlesex, Monmouth, Passaic, Morris and Somerset counties.
[33] Includes Hamilton County Ohio, Boone County Kentucky and portions of Dearborn County Indiana.
[34] The number change from 311 to 211 was necessitated by a 1997 FCC designation of 311 for non-emergency police services.

6 billion calls were made to 411-Directory Assistance in 2000, with projections of over 8 billion calls annually by 2003 and over 10 billion by 2005. In **Table 2 - U.S. Directory Assistance Call Volumes 2000 – 2005**, we can see the projected growth in 411 call volume based on data from 2000, projected to 2005.

(In Millions)	2000	2001	2002	2003	2004	2005	5 yr AAGR[35]
Total Wireline DA	4,900	5,145	5,285	5,415	5,540	5,710	2.7%
Total Wireless DA	1,100	1,500	2,000	2,770	3,760	5,120	36.0%
Total All DA	6,090	6,645	7,285	8,185	9,300	10,830	12. 2%

Table 2 - U.S. Directory Assistance Call Volumes 2000 – 2005[36]

Directory Assistance costs vary from market to market, even within the same carrier's services[37]. The national average for Directory Assistance calls is 80¢ per call.

The volume of 411 calls would indicate that users are willing to pay for information that;

a) They could not get otherwise, or
b) They are able to find but at a far less convenient method than paying a fee (telephone directory or Internet search).

Previous studies of potential and actual users of ATIS indicate that every day callers of traveler information could range from 1.5 to 2.5% of the region's population, depending on the geographical conditions of the area (e.g., are there defined gateways), the configuration of the transportation network (e.g., are there alternative routes?) and how prone the area is to congestion. The examples above give us confidence that this penetration may be within reach. Of course this usage level will build up over time, much as has been the case in Boston.

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[35] Annual Average Growth Rate

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[37] Most carriers charge for 411-information access, though a certain number of calls may be provided for free before the charges apply. For example:
Verizon in Massachusetts charges 34¢ per local information call, with the first 10 calls free to the caller. Nationwide information calls are billed at 95¢ for in-state nationwide (i.e. long distance) information, and $1.25 for out-of-state information. Call completion is available for most calls, at an extra 35¢ charge.
Qwest lists their information as between 85¢ and $1.25 per Directory Assistance call, depending on which of their 15 markets the call is placed from. The charges are the same for both local and national Directory Assistance calls. Local call completion is included at no additional charge in all states except IA, MN, MT, NM, and OR. Qwest local long distance charges may apply if the number is outside the caller's free calling area.

Cost/Benefit of 511 vs. a 7 or 10-digit number

In **Figure 2 - Boston Telephone System Annual Call Volume**, one must also consider that when the service was initiated in Boston, there were only two wireless carriers, and the service was marketed with *three* (3) separate phone numbers (a7-digit number for landline callers, and two separate abbreviated dialing codes for wireless callers). It was not until the summer of 1995 that both wireless carriers began using a uniform access code (*1), allowing for a more uniform marketing approach. It was at this point that call counts began to rise from an average of 100,000-130,000 per month to 200,000-350,000 calls per month, with the majority of the calls coming from wireless callers.

As **Figure 3 - Monthly ARTIMIS Call Counts** indicates, prior to 311/211 service, access to ARTIMIS TATS was about 50% landline and 50% wireless. Roughly 1 million calls are received annually, with over 4 million total since ARTIMIS TATS began operation. Since 311 was introduced, the ratio of calls has moved to 60% landline and 40% cellular. This landline penetration stands in sharp contrast to similar systems in the country. Other systems tend to have free cellular access but do not have a three-digit landline access number, and generally have less than 50% of calls via landline. This even though the wireless providers in Cincinnati offer *free* access to ARTMIS through their networks. Having a uniform, easy to remember dialing code across all platforms may be one reason that more callers are using landline phones.

Cost Elements "Rules of Thumb"

The Cost Issues paper (dated 03/16/01) that was drafted for the 511 Policy Committee Retreat in Tampa Bay, FL at the end of March 2001 cited some general "rules of thumb" for costs encountered in 511 service provision. *Note that some of these costs may include overall costs to operate a traffic management and information facility as well*:

- *Highly automated, limited or no human involvement in operation*: These are the least costly systems to establish and to operate. In Arizona, such a system was created for roughly $100,000. Maintenance costs are minimal, roughly $10,000 annually.
- *Automated system, with human recorded information*: These systems are typical of the metropolitan traffic/multi-modal services. To establish such a service could cost $500,000 to $1 million. A rule of thumb for system operations would be $1 million annually, with that figure varying due to many factors including size of region, hours of operations, etc.
- *Human operator-based system*: Typical of transit information services, these systems are the most costly, as many full time staff could be required to provide the service. Many services are paying in the millions to create a trip itinerary planning system that operators can use to more quickly and accurately respond to caller inquiries. An annual operating budget for a large transit information center can exceed $4 million.
- *Telecommunications costs*: A good rule of thumb is $0.25 per call, though of course it varies based on implementation, mix of calls, etc. However, the cost of any physical telephone lines is <u>not</u> included in these costs.

In a large metropolitan area, with a system that receives between 60,000 and 100,000 calls per day, this could translate into $100,000 and $650,000 for the IVR system alone; $100,000 to operate the IVR, combined with operations costs for data gathering and fusion systems, totaling over $2.4 million in O&M costs annually; and an estimated $6.5 million annually in communications costs for a 250 business day cycle.

It must be noted that the deployment costs in the bulleted list above include a number of items that are not incidental to the system itself such as: real estate leasing and construction and management level staffing that might not be required for an area that already has a traffic management system or other data gathering.

Price a User Pays to Access 511.

The discussion of the cost/ benefit of a 511 number vs. a 7 or 10 digit number is more than just a discussion of calling costs. In fact, any discussion of calling costs must include a discussion and a decision as to whether the overseeing entity wishes to have the call be:

1. **A "free" call to the user**, regardless of where they are calling from;
2. Limited to the cost of a **local call or the "same as a local call"** to the user; or
3. **Paid by the caller** regardless of whether the call is a local or toll call[38], and the information presented has high value and cannot be achieved through other means.

What follows are three "Cases" from which an implementer must choose before implementing any solutions for cost recovery. As noted at the beginning of this document, no single solution will fit every marketplace, and each solution will likely be different, if even slightly, from one market to the next. **Only cases 1 and 2 meet the 511 Policy Committee's recommendation that the price to the user to call 511 be no more than the cost of a local call.**

Case one: A "free call" to the user

In the first case, implementers must consider the cost of a free call. Whether implementing a 511 number or a standard 7 or 10 digit number for ATIS, a "free" call is most often delivered through a "toll-free" backbone. Toll-free calling services are often meant to minimize the cost of calling a service, a catalog merchant or ticketing agency. For example, the cost of the call is more than made up through the sale of wares by the vendor. In cases where the toll-free number leads to a non-sales service, one often finds that the toll-free number is paid for in some other manner, such as a technical support line or help line that is supported by secondary sales of products for which the line is used.

Is there a 511 service that will support itself through other means if the call rides along a toll-free backbone? If not, then the agencies implementing the number must understand that they will be responsible for funding this toll-free number with no return of revenue… and that the more successful the service becomes, the more likely the costs will rise as call volumes increase.

[38] Any telephone call to a destination outside the local service area of the calling station, and for which there is a charge beyond that for basic service

This scenario holds true whether a 511 number is used through a toll-free backbone or whether a toll-free number is used directly. The benefit of a 511 number is that it is more memorable and will likely generate higher usage from the outset, especially when it is associated with a national standard service.

Case two: A local call to the user

The cost of the 511 call is borne by the caller, but on a limited basis. This is the scenario that has been in place in previous years in the San Francisco Bay area. The Metropolitan Transportation Commission, in their original deployment of TravInfo, placed audio text nodes in all of the disparate area codes surrounding San Francisco Bay. This meant that callers to TravInfo would only be charged the cost of a local call no matter what area code they were calling from. Since many (if not most) telephone users in the area have "metropolitan dialing service," where local calls are included in their monthly service charges, callers did not see separate charges for these calls and *presumed* them to be free. When the area codes around the Bay split, MTC placed Remote Call Forwarding[39] circuits in these new area codes to forward calls to existing area codes' hardware nodes for answering. In this case, MTC was responsible for paying the cost of the forwarded call. This can become costly and complicated as it might take a significant number of nodes and circuits to allow a service to cover a large metropolitan area with everyone having access to a local calling circuit.

There are a number of scenarios where some of these charges might be reduced such as; flat rate connections between the area codes (T-1 circuits, etc.); Foreign Exchange and remote call forwarding circuits at negotiated rates; deploying local numbers where possible and using negotiated rate toll-free numbers only where absolutely necessary to reduce overall costs. Regardless of the choice, the decision must be seamless to the caller.

Using a 511 number creates an assumption of limited or explained cost. One need only look at the 411-information industry to see where charges may differ from market to market, but are *expected* by callers using the service.

Case three: Call paid by the user whether local, toll or long distance

The third case uses a number that is a local 7 or 10 digit number, or assigns such a value to a 511 number. One might assume that a service that is highly valued by the users would be "worth the cost of a call" to a regularly dialed number. In the case of SmarTraveler in Boston, the service has been available as a standard 7 or 10 digit number since its inception, and thus a toll call to users outside of the local dialing area to Cambridge, MA. This has not decreased the number of users to a known degree. Though roughly 85-90% of the service's 350,000+ calls per month are from wireless phones, 35,000-52,000 calls per month to the service are via landlines. It is unknown how many of these calls are from an area where toll

[39] **Remote call forwarding:** A service feature that allows calls coming to a remote call-forwarding number to be automatically forwarded to any answering location designated by the call receiver. *Note:* Customers may have a remote-forwarding telephone number in a central switching office without having any other local telephone service in that office.

rates to Cambridge apply. In fact, all SmarTraveler systems with the exception of South Florida use this calling scenario[40].

Case Summary

The questions implementers should ask when considering the costs borne by the caller include:

1. Can a 511 service be implemented in a metropolitan area where the cost of the call is borne by the caller?
2. Can it be marketed or explained to users, that dialing 511 will cost them "the same as a call to location-X" (the location of the ISP's 'node' or call center)?
3. If so, users must believe that there is significant value to the information that they will receive, and implementers should look carefully at taking advantage of wireless calling areas, direct tie-lines at remote locations and other means to minimize the cost of the calls to the end user.

The aforementioned costs could be recouped in a variety of ways from different parties, as discussed in Business Models, Section IV.

[40] In South Florida, a local number is in place for Miami area callers, while a toll-free number is in place for callers from Broward and Palm Beach counties.

VII. Conclusion

This document was prepared to deliver a basic understanding of the business models currently in use or available when implementing the 511 dialing code for ATIS services. Implementers should understand that:

a) The cost for implementation is highly variable from market to market;
b) Public sector funding is likely required for near-term implementation and continued operations (though other models may become available in the future);
c) Market-specific information is required in order to estimate actual costs for implementation in a given region.

For more information, or to endeavor to develop a market specific implementation plan, the following resources may be consulted for information on deployment costs and implementation:

The ITS Peer-to-Peer Program offers free technical assistance for those public agencies considering an ITS deployment. The technical assistance is delivered chiefly through a cadre of public sector people who have experienced similar technical and organizational issues for ITS deployment. The program may be accessed by calling 1-888-700-PEER (1-888-700-7337).

The U.S. DOT maintains a page on 511 developments, deployments and resources. This can be accessed through http://www.its.dot.gov/511/511.htm.

The ITS Benefits and Costs Database is a central site for estimates of ITS costs data that the ITS JPO can use for policy analyses and benefit / cost analyses. In addition, the database can be viewed and downloaded by anyone as a costing tool for ITS implementers. The database can be accessed at http://www.benefitcost.its.dot.gov/.

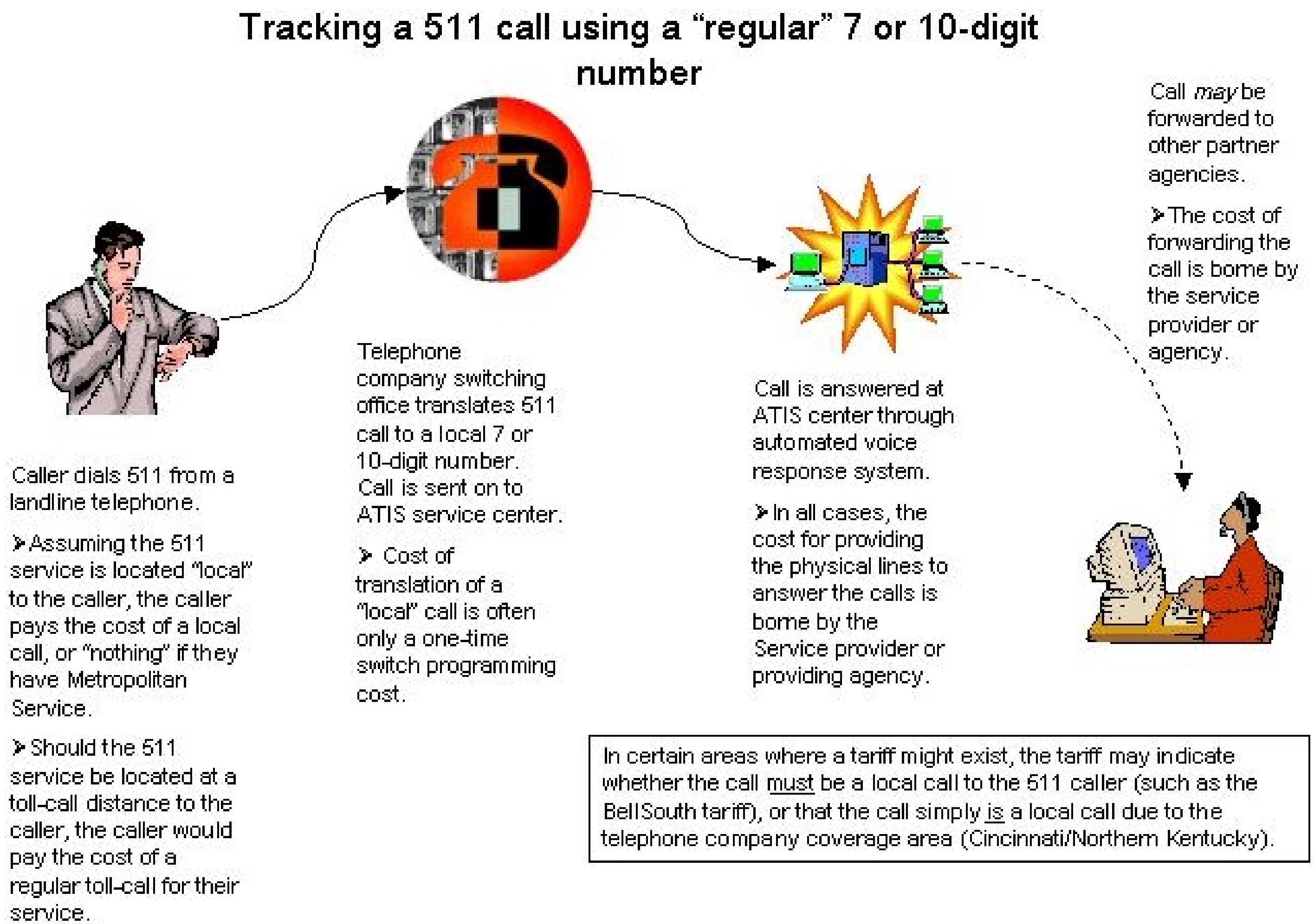
General questions about where to locate U.S. DOT ITS resources, where to find out the status of a particular U.S. DOT ITS or Operations program, or who to contact for information on a U.S. DOT ITS or Operations program can be posed at the Operations/ITS Help Line. The toll-free service can be accessed at 1-866-367-7487.

VIII. Other Issues Not Covered

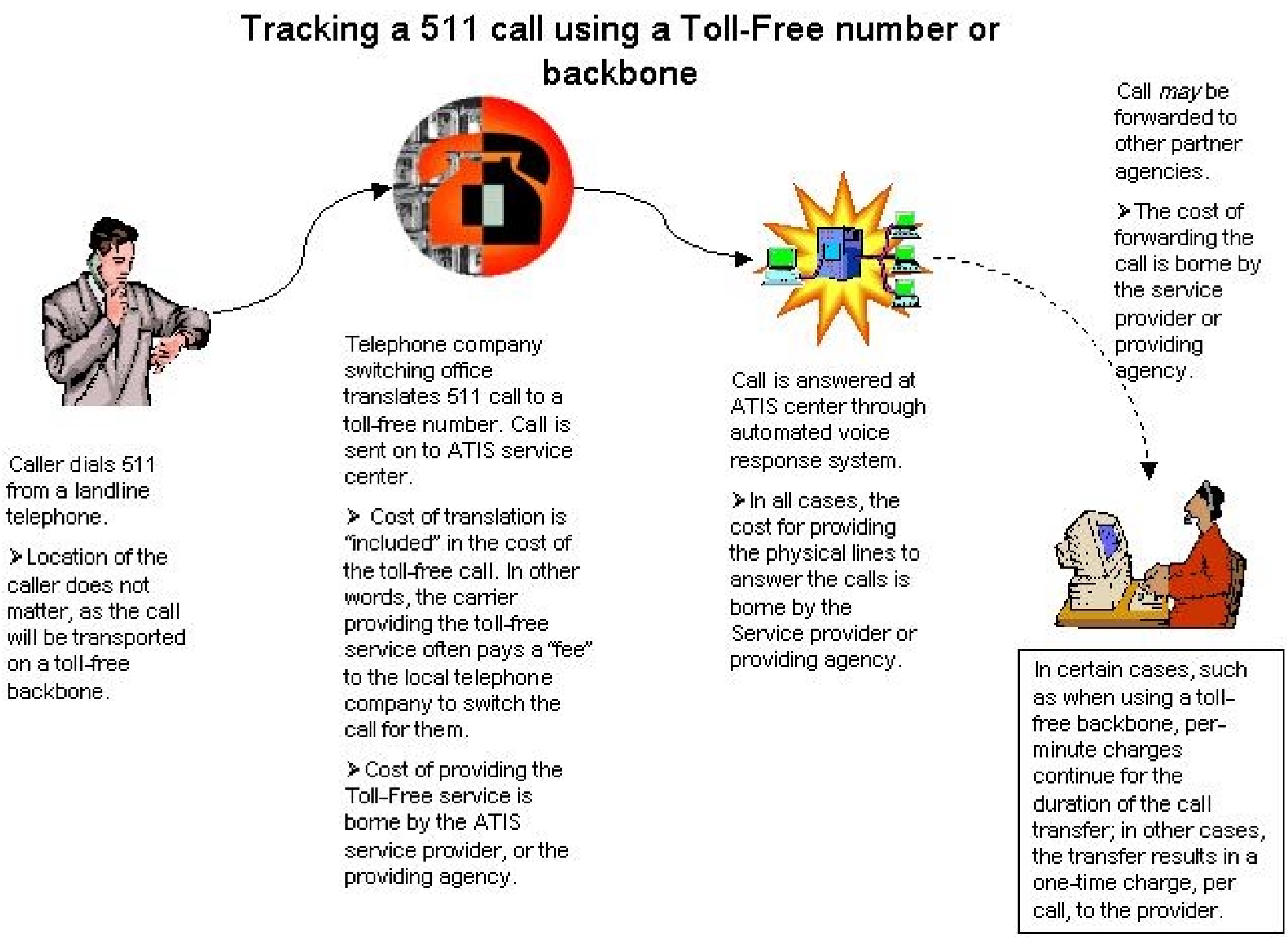
Though this document raises a significant number of issues associated with implementing an ATIS system using the 511 dialing code, much of the detail involved in such an implementation will be accomplished on a statewide, regional or local level. In coming months, the 511 Deployment Coalition will further investigate and report on the following topics:

- Articulating costs for statewide ATIS systems for the 5 stages described in Section VI. The ITS Benefits/Costs database is currently focused on regional or local systems, however experience from newly launched statewide systems such as Nebraska or Utah may aid in providing a better understanding of statewide costs over the next year.
- A follow-up report on long-term operations and maintenance costs for a 511 service, including sources of funding.
- A report on how public sector funding is occurring and how successful it is, including any innovative public funding methods or private sector partnership opportunities.
- Successful marketing plans for 511 systems and growth projections over a 1, 3 and 5 year term.

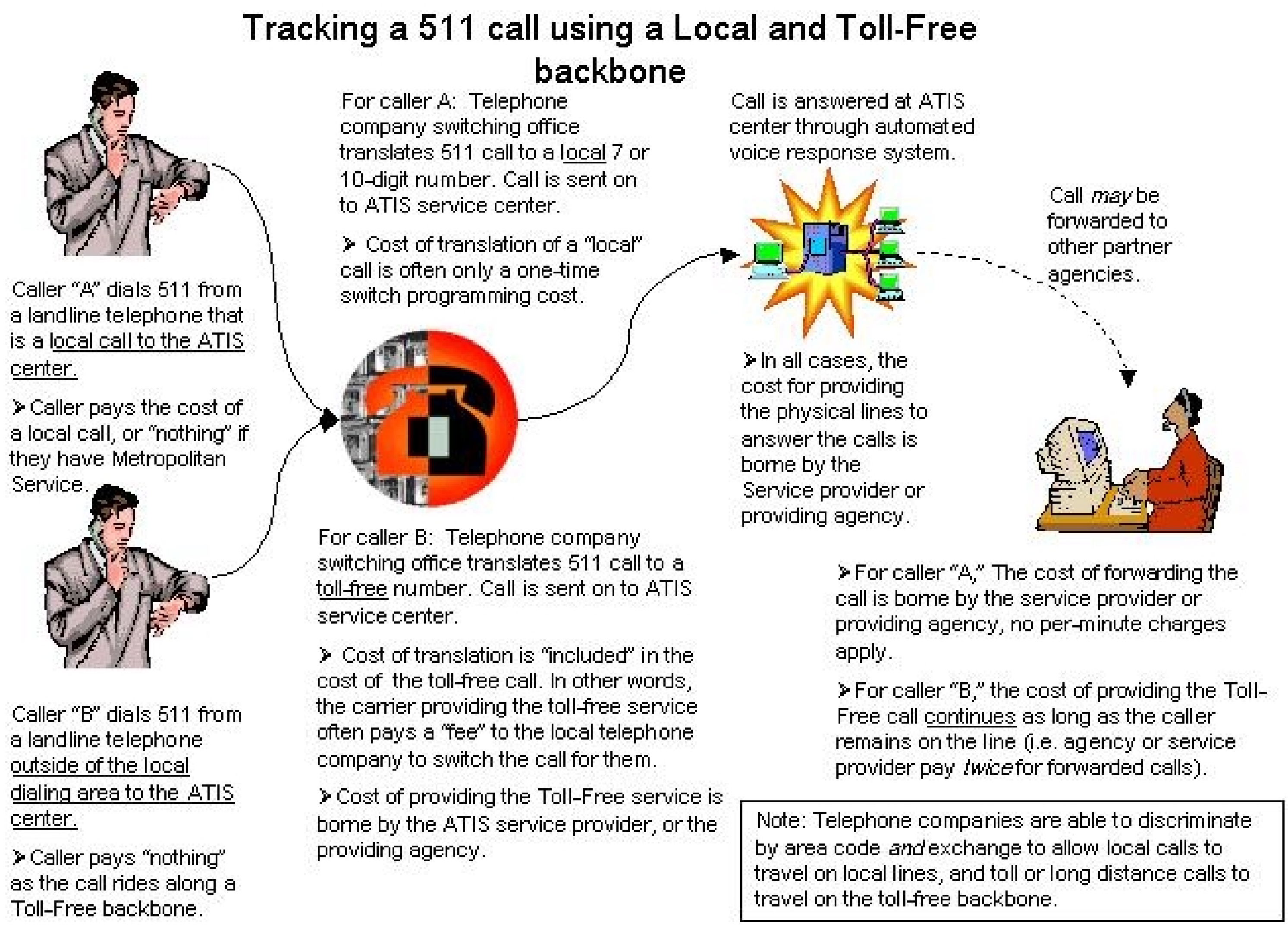
Attachment A - Tracking a Local 511 Call



Attachment B - Tracking a Toll-Free 511 Call



Attachment C - Tracking a Toll-Free & Local 511 Call



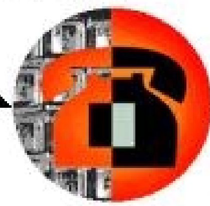
Attachment D - Tracking a Wireless 511 Call

Tracking a 511 call using a wireless phone

Caller dials 511 from a wireless telephone.

- Caller uses "included" airtime minutes to make the call, or "minutes" depending on their calling plan.
- In many cases, there are <u>no</u> toll charges within the metropolitan area.
- Carriers in certain metropolitan areas have been convinced to provide access to ATIS services *free* of airtime charges as a public service.

Wireless telephone company switching office translates 511 call to a <u>local</u> 7 or 10-digit number. Call is sent on to ATIS service center via local landline connection.



- In many areas, wireless carriers do not charge "toll" rates for calls within their "local" coverage area. This area can be much wider than what is considered local for a landline call.
- Wireless callers are therefore able to carry the call a longer distance without charging toll rates to the caller.

Call is answered at ATIS center through automated voice response system.

- In all cases, the cost for providing the physical lines to answer the calls is borne by the Service provider or providing agency.

Using <u>only</u> a Toll-Free backbone for a 511 service will result in wireless calls being charged to the service provider or providing agency *even if* the caller is paying airtime charges for the call.

Call *may* be forwarded to other partner agencies.

- The cost of forwarding the call is borne by the service provider or providing agency.
- Airtime minutes continue to accrue as long as the caller remains on the line. Depending on the calling plan, the caller may be charged for this airtime, or use "included" minutes from their monthly plan.

Attachment E - Cost Estimate for Data Collection and Data Processing for a 511 Traveler Information System

Task Statement

Develop a cost estimate for the data collection and data processing components of a 511 traveler information system. An internal task force of the 511 Coalition is developing a cost estimate for the telephone dissemination and 511 conversion components. The cost for the data collection and data processing is to be presented as a range with the low end representing the cost for a generic medium metropolitan area and the high end representing a generic large metropolitan area. The cost estimate will include component costs and quantities for capital, and operations and maintenance (O&M) costs.

Assumptions

1. The cost estimate is based on a zero baseline. That is, no existing underlying infrastructure is in place. The cost range is based on FY 2000 survey data, which reflects reasonable deployments for FY 2000. The cost estimate includes composite cost data enabling metropolitan areas interested in expanding an existing or implementing a new 511 traveler information system to tailor the cost estimate to their particular region. It is important to note that a 511 system should not bear the total cost of data collection and processing, as typically, data collection devices, the supporting telecommunications infrastructure, and data processing are also functions of other traffic management and traveler information systems.

2. Basic functionality provided by the 511 traveler information system includes:
   - Road closure and restriction information (e.g., construction, maintenance, special events, HOV)
   - Current traffic conditions (e.g., congestion, incidents)
   - Current road conditions (weather)
   - Major service disruptions, changes, or additions for transit

3. The data collection component includes:
   - The various roadside (freeway and major arterial) detection technologies, CCTV video surveillance cameras, and required telecommunications infrastructure
   - Condition Acquisition and Reporting System (CARS) (or similar system)

4. The data processing component includes the database of traffic and traveler information that can be disseminated via various media such as the Internet, variable message signs, operators, and IVR telephone system for 511.

5. Spacing of data collection technologies is one unit per mile. For freeway systems, detection stations cover multiple lanes.

Methodology

Using population data from the 1990 Census, five metropolitan areas in the 8.2 to 5.2 million range were selected to represent a generic large area, and five metropolitan areas in the 1.6 to 1.4 million range were selected to represent a generic medium area. FY 2000 data from the Metropolitan ITS Infrastructure Deployment Tracking Database (http://itsdeployment.ed.ornl.gov/) for the five large metropolitan areas was averaged to determine the data collection characteristics of generic large metropolitan areas. The same process was repeated for the five medium metropolitan areas. Data collection characteristics for both areas include the number of instrumented freeway miles and major arterial intersections as well as the number and type of detection technologies deployed on both types of roadway. The generic characteristic data serve as the quantities for the data collection components.

The data collection sub-components for freeway and major arterial roadways include the various detection technologies deployed (i.e., loops, video image, and microwave radar), CCTV video surveillance cameras, and required telecommunications infrastructure. In addition, data collection via the Condition Acquisition and Reporting System (CARS), an Internet-based road condition reporting system in use by approximately eight state DOTs for traffic and traveler information, was included. The data processing component includes the database in which the traffic and roadway data is processed and stored. (See appendix A, Component Costs worksheet, for details.)

The capital and O&M costs for the data collection sub-components and the data processing component were derived from various sources including the:

- ITS Unit Costs Database (http://www.benefitcost.its.dot.gov/)
- Phoenix Metropolitan Model Deployment Initiative Evaluation Report
- San Antonio Metropolitan Model Deployment Initiative Evaluation Report
- TRANSMIT System Evaluation Final Report
- Phone conversations with Mn/DOT and New Hampshire DOT contacts for CARS

Summary

Based on the assumptions and methodology presented above, the estimated cost to implement the data collection and data processing components of a 511 traveler information system range from \$41 million for a generic large metropolitan area to \$17 million for a generic medium metropolitan area (see table 1). The O&M cost estimates range from \$2.4 million for a generic large metropolitan area to \$1 million for a medium metropolitan area. The O&M costs are approximately 6% of the capital costs.

The data collection component is by far the most expensive piece of the 511 traveler system. The major cost drivers for both generic large and generic medium metropolitan areas are the telecommunications infrastructure and loop detection systems.

LARGE METRO AREA

Data Collection

Freeway

ITS Component	Capital Costs: Unit Costs ($K)	Capital Costs: Quantity	Capital Costs ($K)	O&M Costs: Unit Costs ($K)	O&M Costs: Quantity	O&M Costs ($K)
Loop detector station (per mile)	$55	133	$7,315	$10	133	$1,330
Video image station (per mile)	$70	6	$420	$5.3	6	$32
Microwave radar station (per mile)	$52	9	$468	$5	9	$45
CCTV video camera & tower (per mile)	$29	99	$2,871	$2.4	99	$238
Telecommunications (per mile)	$60	148	$8,880	$0.02	148	$3
			$19,954			$1,647

Major Arterial

ITS Component	Unit Costs ($K)	Quantity	Capital Costs ($K)	Unit Costs ($K)	Quantity	O&M Costs ($K)
Loop detector @ intersection	$16	372	$5,952	$1.6	372	$595
Video image @ intersection	$26	87	$2,262	$0.2	87	$17
CCTV video camera (per mile)	$20	17	$340	$2.4	17	$41
Telecommunications (per mile)	$12	982	$11,784	$0.02	982	$20
			$20,338			$673

	Unit Costs ($K)	Quantity	Capital Costs ($K)	Unit Costs ($K)	Quantity	O&M Costs ($K)
Condition Acquisition and Reporting System	$200	1	$200	$65	1	$65

Data Processing

	Capital Costs ($K)	O&M Costs ($K)
Database	$483	$24
TOTAL	**$40,975**	**$2,409**
	$41 million	**$2.4 million**

MEDIUM METRO AREA

Data Collection

Freeway

ITS Component	Capital Costs: Unit Costs ($K)	Quantity	Capital Costs ($K)	O&M Costs: Unit Costs ($K)	Quantity	O&M Costs ($K)
Loop detector station (per mile)	$55	40	$2,200	$10	40	$400
Video image station (per mile)	$70	0	$0	$5.3	0	$0
Microwave radar station (per mile)	$52	27	$1,404	$5	27	$135
CCTV video camera & tower (per mile)	$29	17	$493	$2.4	17	$41
Telecommunications (per mile)	$60	84	$5,040	$0.02	84	$2
			$9,137			$577

Major Arterial

ITS Component	Unit Costs ($K)	Quantity	Capital Costs ($K)	Unit Costs ($K)	Quantity	O&M Costs ($K)
Loop detector @ intersection	$9	337	$3,033	$1	337	$337
Video image @ intersection	$26	11	$286	$0.1	11	$1
CCTV video camera (per mile)	$20	2	$40	$1.5	2	$3
Telecommunications (per mile)	$12	319	$3,828	$0.01	319	$3
			$7,187			$344

	Unit Costs ($K)	Quantity	Capital Costs ($K)	Unit Costs ($K)	Quantity	O&M Costs ($K)
Condition Acquisition and Reporting System	$150	1	$150	$50	1	$50

Data Processing

		Capital Costs ($K)		O&M Costs ($K)
Database		$463		$15
	TOTAL	**$16,937**	**TOTAL**	**$987**
		$ 17 million		**$ 1 million**