America's Travel Information Number

Implementation and Operational Guidelines for 511 Services

Version 3.0
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I. Introduction

On March 8, 1999, the U.S. Department of Transportation (USDOT) petitioned the Federal Communications Commission (FCC) to designate a nationwide three-digit telephone number for travel information. On July 21, 2000, the FCC designated 511 as the national travel information number.

The FCC ruling leaves nearly all implementation issues and schedules to state and local agencies and telecommunications carriers. There are no federal requirements to deploy 511 and currently no dedicated federal program to pay for 511. Consistent with the national designation of 511, the FCC expects that the transportation industry will provide the traveling public with a quality service that has a degree of uniformity across the country. Finally, the FCC stated that it would review progress in implementing 511 in five years.

While the flexibility provided in the FCC ruling is highly desirable, it also presents a challenge. Although there is a great deal of interest in using 511 throughout the U.S., if not thoughtfully planned, 511 services could devolve into an inconsistent set of services widely varying in type, quality and cost.

As of March 2005, twenty-six 511 services in twenty-three states are operational. All but four states and Puerto Rico have requested and received 511 planning and deployment grant funds from USDOT. In addition, transportation officials in Canada have asked that 511 be designated the Canadian travel information number. The individuals and organizations of both the public and private sector that are making 511 a reality are directly responsible for its success to date and the future of delivering 511 to the traveling public across the county.

A. 511 Deployment Coalition Program

In early 2001, mindful of both the opportunity and challenge that 511 presents, the American Association of State Highway and Transportation Officials (AASHTO), in conjunction with many other organizations including the American Public Transportation Association (APTA) and the Intelligent Transportation Society of America (ITS America), with the support of the USDOT, established a 511 Deployment Coalition (Coalition).

The goal of the Coalition is "the timely establishment of a national 511 travel information service available to a majority of Americans by 2005 that is sustainable and provides value to users." The intent is to implement 511 nationally using a bottom-up approach facilitated by information sharing and a cooperative dialogue through the organizations represented on the Policy Committee consisting of senior executives of organizations involved with 511 deployment which serves as the governing body of this program. The mission of the Policy Committee is to provide guidance on how to achieve the Coalition's goal.

A Working Group of managers involved in 511 and travel information service delivery has been supporting the Policy Committee. The Working Group has extensively studied existing 511 and other telephone-based travel information systems and the experienced and projected

technological, political and economic environments in the near future to develop recommendations for these Guidelines.
This document is one of many products developed by the Coalition to support those deploying and considering 511 systems. The Coalition recognizes the efforts of all its volunteers on both the Policy Committee and Working Group without whom the national 511 program would not be where it is today.

See http://www.deploy511.org for materials developed or used by the Working Group and Policy Committee in its deliberations, as well as the rosters of the Policy Committee and the Working Group.

B. Purpose of the Guidelines

The Coalition recognizes that 511 services have, and will continue to be, developed in a bottom-up fashion by state and local transportation agencies – with the close collaboration of the private sector – establishing services in areas and timeframes determined by them. The positive benefits of this approach are that it enables resources from many organizations to be harnessed to deploy 511 as well as providing many opportunities for innovation in 511 service delivery.

To reduce the chances of service confusion and inconsistency, the Coalition is enhancing the established Guidelines in the areas of content and consistency, as well as providing additional assistance in other areas that 511 deployers should be concerned with. 511 service consistency will be established through implementers continuing to utilize these Guidelines, and, as an increasing number of compliant services are established, a nationwide 511 service will emerge.

The Coalition is cognizant that the quality of systems developed has varied in content and consistency, mostly due to the availability of information / data and financial constraints. Although twenty-six systems have been implemented across the country, there is still the possibility that if quality systems do not become commonplace, the transportation industry may lose the privilege of the exclusive use of the 511 number. On the other hand, if the Guidelines suggests services that are cost-prohibitive and unsupportable, the result could be an invisible cap in the number of operating systems, also leading to losing the FCC designation of the number. Thus, these Guidelines try to balance both the needs of customers for systems that are easy to use and have sufficient information with the needs of agencies for cost-effective, efficient systems.

The transportation industry has been afforded a tremendous opportunity to better serve its customers through 511. As with previous versions of these Guidelines, the purpose of Version 3.0 is to assist transportation agencies in establishing this “customer service” in the best possible manner. The Coalition and its member organizations strongly recommend that implementers carefully review and consider these Guidelines in their implementation planning.

Finally, the document is designed to help make the 511 Vision (discussed in Section II.B) a reality. If implementers have suggestions for improvements to the Guidelines or 511 services in general, please provide this information electronically to 511feedback@aashto.org.

C. Evolution of Guidelines

The Guidelines document has evolved from a group of "best guesses" and suggestions on what was needed to launch a successful 511 service to a document for those planning, and already operating, 511 services. This change is also reflected in the name of the document, from *"Implementation Guidelines for Launching 511 Services"* to *"511 Implementation and Operational Guidelines"*. The document now provides additional information and background, as well as operational examples and experiences. Any future versions of this document will provide additional specific information, parameters and recommendations as services gain valuable operational experience within their states, regions and / or metropolitan areas.

D. How to Use this Document

This document is intended to serve multiple purposes and audiences, which include distributing the updated content Guidelines, serving as a basis for developing and planning a 511 system and as a resource document for existing deployers that wish to begin focusing on enhancements, evaluations and other activities that may not have been obvious or possible when 511 systems were first launched.

The primary purpose of the document is to distribute the updated Guidelines, Version 3.0, as they have evolved since Version 2.0 was released in September 2003. These updates are both for potential deployers and those with operating 511 services. The document is also intended to be a reference guide highlighting critical issues and noting successes achieved.

For those new to 511 and in the process of deploying, Version 3.0 should serve as the basis for developing and deploying a 511 system. After reviewing the document a potential deployer should know: who the key participants in the 511 field are; the difference between Basic and Enhanced content; the business environment most deployers are operating in; and the importance that consumer research, marketing and national consistency play in developing a customer-oriented service. While a potential deployer will not find all of the information they need to develop a 511 system, the Guidelines offers an opportunity to learn from years of deployment experience and provides additional insights developed over time.

For those organizations and / or individuals that have already deployed a 511 system, the Guidelines offers additional information about such things as: the different options for achieving interoperability; new elements to use in 511 user interfaces; and new types of content, such as driving times.

This introductory section is followed by the 511 Vision and the 2005 and 2010 Goals. The sections following, Frequently Asked Questions About 511 (FAQ) and the 511 Implementation and Operational Guidelines, are the heart of this document. The FAQ section is intended to allow deployers and potential deployers to find answers to specific questions, along with references to where in the body of the Guidelines to find additional information. The Guidelines section is similar in structure to the Version 2.0 of the Guidelines. Finally, this document lists some key operational lessons learned.

E. Additional Information

Additional information is available at the Coalition's 511 website, at http://www.deploy511.org. This site includes significant information on all aspects of 511, as well as contact information for 511 deployers and members of the Coalition, and links to other 511 resources on the Internet. Among the key links at that site is one to the Yahoo Group dedicated to 511. This group, at http://groups.yahoo.com/group/511_coalition/, includes a listserv that allows deployers and potential deployers to ask questions to their fellow deployers about any 511-related topic.

II. 511 Vision: An Essential and Sustainable Service by 2010

The creation and adoption of a national vision by the Coalition is a major step in creating a sustainable service to assist travelers across the country. The Vision helps to focus the Coalition's and deployer's goals, and it establishes key milestones for the creation and adoption of a service that may one day become as widely known and commonly used as 411 or the Internet. Attainment of the Vision will help carry 511 from a little known and sometimes misunderstood "frill" or option in a few locations to a mature necessity adopted by the general public.

A. Why Do 511?

In 1999, the USDOT envisioned using an abbreviated N11 (where N is a digit from 0 – 9) dialing code to provide a simple, easy to remember and use telephone number to disseminate multi-modal travel information to the public. It was clear to those in the travel information sector of the transportation industry that there were too many potential sources of information for travelers, each having its own different ten-digit telephone number. Travelers rarely knew these telephone numbers and often there were multiple numbers for one metropolitan area, region or state. The N11 solution was viewed as a way to cut through the "number" clutter, and enable a widely known source of information on a multi-jurisdictional or regional basis. In this regard, 511 has been, and continues to be, a success. Through the May of 2005, nearly 35 million 511 calls have been answered. Unlike many intelligent transportation system (ITS) technologies, 511 is easy for consumers to understand and provides a direct service to its users. To provide quality customer service, 511 brings ITS, traffic and incident management, public transportation and weather information all together at a single access point.

B. 511 Vision

The national vision for 511 adopted by the Coalition consists of a Vision Statement and specific elements and milestones to ensure its attainment.

1. Vision Statement

After considering a full range of consumer, business, technical and policy issues associated with 511, the Coalition established a national vision for 511 which states that:

> ***511 will be a customer-driven, multi-modal travel information service, available across the United States, accessed via telephones, and other personal communications devices, realized through locally deployed interoperable systems, enabling a safer, more reliable and efficient transportation system.***

2. Vision Elements

The elements of the Vision can be separated in the three parts: the characteristics of 511 services; specific coverage and operational goals for 2005; and a significant increase in adoption and continued focus on improving customer service by 2010.

The key characteristics of 511 services are:

- A customer focus
- Service for local users, visitors and through travelers
- Ubiquitous brand awareness and coverage
- Timely, accurate and reliable information
- Consistency in content, interface and quality of service
- Mission critical to travelers / users, transportation system operators, emergency and homeland security providers and the information services industry
- A mix of "public good" and "value added" information
- Sustainable and permanent
- Continually improving
- Complete customer satisfaction
- Nationally interoperable

By 2005:

- 511 will be operating in 25 or more of the states. *Available in 23 states as of publication*
- At least 30 of the top 60 major metropolitan areas and more than 50 percent of the nation's population areas will have access to 511. *Available in 21 of the Top 60 metropolitan areas and to almost 30 percent of the population as of publication*
- More than 25 percent of the nation's population will be aware of 511. *There has not been a national assessment of 511 awareness since 2001. In 2004, awareness of 511 was measured in Montana at 58 percent and in Utah at 47 percent. In 2004, awareness of 511 was measured in Orlando at 26 percent.*
- More than 90 percent of 511 users will be satisfied with the service provided. *In 2004, satisfaction of 511 callers was determined in the San Francisco Bay Area to be 92.3 percent and at 90.3 percent in Montana, while 99 percent of callers to the Virginia service in the I-81 Corridor would call again.*

Additional 2010 Goals:

- 511 will be operating throughout the United States
- Over 90 percent of the nation's population will be aware of 511
- All of the users will be satisfied with the service provided
- 511 systems will receive more than 40 million calls per year
- Road information on major road systems and metro areas will include travel time, events and weather
- Transit information will be available on most systems
- Individual systems will be linked together into an integrated, seamless network
- There will be a sustainable business model – public sector supported with funds to enhance and grow

Continued leadership and active participation from: the Advanced Traveler Information Systems (ATIS) industry; the USDOT; related industry associations; state, regional and local government

agencies; and private firms will be essential in making the vision a reality and achieve the 2005 and 2010 goals.

III. Frequently Asked Questions about 511

A. Planning and General Program Questions

1. Questions Especially for New Deployers

What is 511? 511 is the national 3-digit telephone number for travel information. Like 411 and 911, it is an easy to remember way to access important information, in this case information on highway conditions, transit agencies and other important travel information.

What are the key elements of success for a 511 system? The key elements are high-quality data, a way to process the data to make it usable over the telephone and a system designed to answer and route calls successfully. Many 511 deployers are also establishing co-branded 511 websites to offer similar information in a more detailed manner over the Internet.

Who prepared these Guidelines and for what purpose? These Guidelines were prepared by the, along with its 511 Working Group – a group made up of representatives from AASHTO, APTA, the USDOT and ITS America. This Coalition is interested in increasing the breadth and depth of 511 deployments nationwide and prepared these Guidelines to assist new deployers at the beginning of their projects and also to provide the latest information to existing deployers.

Will I need to interact with the FCC? Probably not, although at times the Coalition may recommend that agencies with deployed systems participate in proceedings before the FCC.

Will the FCC take 511 away? It is highly unlikely that they will. When the FCC authorized the use of 511 for travel information, the Report and Order said that the FCC could revisit that designation in 2005. The review time-frame is upon us and the Coalition has not received any information that would indicate that the FCC is considering changing its original decision. 211 was designated in the same Report and Order for use by community service organizations (like the United Way) and, at publication, 211 deployments are serving approximately 119 million Americans (over 40 percent of the population) with 156 active systems in 31 states plus Washington, DC, Puerto Rico and Canada.

What if I have an existing travel information telephone number? In that case, it is possible to keep the existing number and work with the appropriate telecommunication providers and agencies to deploy 511 and have it point to your existing number.

Which agency should take the lead on 511 in my region? It depends on the institutional capacities within your region. The statewide 511 programs in operation have been deployed by state departments of transportation (DOTs) alone or in partnership with state highway patrols / police, while the metropolitan area services have been deployed in some cases by Metropolitan Planning Organizations (MPOs) and in some cases by the DOTs. Both of these are options, as would be a 511 system for which a transit agency is the lead deployer. In any case, the deploying agency might need to work with internal control boards or Information Technology (IT) departments to develop and launch a 511 phone system or webpage.

How much will it cost? Costs vary widely and it is not possible to provide a generic cost estimate. The key cost elements are labor, equipment, 511 content upgrades, telecommunications and marketing. *The Value of Deploying 511* (available at http://www.deploy511.org/docs/511_Value.pdf) suggested that deployers track certain costs, which should allow for more representative cost information to be assembled in the future.

Where can I find the funding for a 511 system? There is currently no one source of established funding for 511, but there are many options that can be used. Deployers have used a wide assortment of funding, ranging from ITS earmarks, Congestion Mitigation and Air Quality (CMAQ), Surface Transportation Program (STP) funds and state or local funds. In addition, there may be some funding for 511 in the next transportation act reauthorization, which is pending before Congress as of publication of this document.

What kind of commitment does it require to operate a 511 system? The deploying agency should plan on committing several years for the planning, development and initial operation of the 511 service. During that time, the agency will need to fund the system and likely provide at least one full-time staff person to manage the 511 service.

Will my staff need additional training? It depends on your existing staff and on the deployment model that you choose. If you hire a consultant or contractor to develop and operate the system, then your staff will primarily need strong project management skills. If, however, you plan to do any of the development (such as setting up the telephony, designing a webpage, etc.), you will need staff with those skills.

What are the benefits of 511? Agencies currently operating 511 systems find a broad range of benefits from having these services in their regions including benefits to the 511 customer (convenience, time savings, peace of mind), to the deploying agencies (reducing 911 calls and increasing the partnership opportunities) and to the overall transportation system (helping to take travelers off of congested facilities at peak times).

How can I market 511 for drivers in light of safety concerns about driving while using a cell phone or when my state / city has hands-free legislation? Marketing materials and calls to action should make clear that the implementing agency encourages callers to use 511 only when they can do so safely.

What about 511 websites? Many regions that have deployed 511 utilize co-branded websites. While the FCC Report and Order designating 511 applies to telephone services, a website and phone number together can provide significant complementary benefits. Through this "co-branding," 511 may become the "brand" that travelers recognize for transportation information.

2. Questions for any 511 Deployers

Should I let private companies have access to the data? Some regions have done so, under the theory that, if the goal is ensuring that as many people as possible have access to travel information, providing it to the private sector simply increases the ways in which the public can get information.

How do I make sure that callers get my system and not the system from my neighboring region? Generally, careful cooperation with telephone providers, both wireless and landline, will ensure that your callers get to your system. In some cases, the wireless companies may need to program individual cellular towers to route calls to the correct system. In addition, the ability to transfer calls from your system to bordering systems will minimize the effect on a caller if the call is routed incorrectly. It may also be advisable to cross-promote the underlying seven- or ten-digit numbers in areas where callers might reach the wrong system.

What tools are available to help me? The Coalition has developed a webpage at http://www.deploy511.org with contact information, marketing materials and other information about deploying and operating 511. In addition, there is a Yahoo! Group, with an accompanying email listserv, available at http://groups.yahoo.com/group/511_coalition/.

Should I accept advertising and sponsorship? The decision to incorporate advertising or sponsorship into a 511 service is an implementation decision. These Guidelines accommodate doing so, as long as the user experience is not harmed and the content is consistent with the public nature of the service. Websites might be better vehicles for advertising. In making the decision to include advertising, deployers should not count on advertising and sponsorship covering much of the costs related to 511.

What are the possibilities for revenue recovery? To date, there has been no substantial revenue recovery in 511 systems or other government-run travel information programs, although opportunities may be developing with the Virginia system. While the possibility may exist in the future, deployers should not assume that complete or substantial revenue recovery will be possible when they plan their systems.

Do the National ITS Architecture and / or standards help guide 511 deployments? Particularly in the realm of data transfers, standards and the National ITS Architecture provide useful guidance to deployers.

How do I make my 511 service interoperable with my neighbors? The three major ways to make systems interoperable are through call transfer, data transfer or application sharing.

B. Content Questions

1. General Questions

How do I decide which content to include? In large part, this is driven by what is available in your region. Typical roadway content includes information on construction, incidents, special events and congestion. Transit content is typically schedule and fare information and service disruptions, along with call transfers and website links to transit agencies. Weather information can include current conditions that are affecting travel (flooding, high winds, etc.), as well as forecasts.

Where do I get the data? Data sources generally include the state DOT, the highway patrol and police departments, transit agencies and sometimes local jurisdictions and private companies.

How do I convert the data from its existing format into a format that can be used on 511? This work is generally done by adhering to national standards for ITS data. This will generally be done by the contractor that you hire to build and / or operate your system.

How do I ensure data and information quality? This requires an ongoing data evaluation or audit. The planning for this should be done along with the planning for the system in general.

2. Roadway Content

Which roads should be covered? At the very least, 511 should provide information on interstates, other freeways and roads on the National Highway System. If possible, expressways and major arterials should be covered as well.

What level of roadway information should I have? At a minimum, a 511 system should have information on major incidents, construction, weather and other events that could significantly impact traffic.

What other roadway information could be included? Depending on the level of information in your region, you could also include congestion and speed information or travel times along a corridor or from point to point.

What about including variable message signs (VMS) messages and / or HAR messages on 511? If the messages would provide relevant information to callers and it is feasible to include them, there is no reason not to. Keep in mind that different media, such as websites, VMS and highway advisory radio (HAR) can provide more detailed information than a message designed for easy comprehension on a telephone service.

What if the data needs to be "massaged?" Data will often need some modifications before it can be used on 511. This will generally be done either by the existing data fusion and validation functions in your advanced traffic management system (ATMS) or by the contractor that you hire to build and / or operate your system.

What level of data do I need to be able to provide driving times? Driving times require some kind of automated data collection system over the entire area for which you want to provide the information. It could be existing loop sensors (or other spot speed detectors), or it could be a probe-based system, such as one that either reads license plates or electronic toll transponders.

Is it possible to create content if my region is missing something? Yes, it is possible, but it could be costly depending on what is needed. Some regions have deployed probe systems specifically for 511 driving times; it is also possible to install low-cost spot-speed detectors. A schedule of regular upgrades / enhancements should be developed to allow for additional content. User feedback is an excellent means of determining additional content for 511 systems.

What is the best way to include ongoing, long-term construction information? Generally, a 511 system should include current, useful information. Thus, if construction is ongoing, but may or may not be happening on any given day, it is probably best to not include it. Deployers are encouraged to work with construction and maintenance divisions to ensure that they have accurate, current information. Construction information could also include the date when the construction project will end, if it is in the near future.

Should callers be able to report incidents? While allowing callers to report incidents to 511 or traffic management center (TMC) operators may increase the accuracy of the system, doing so can place a heavy demand on the deployer to ensure that the operations staff is large enough to handle the calls, regardless of whether callers speak to the operations staff directly or leave voice mail messages for them. If the experience of 911 dispatch centers is comparable, callers are likely to overwhelm a 511 system with calls reporting incidents. Consequently, we recommend using extreme caution if implementing this function.

3. Transit Content

What level of transit information should I have? For each transit agency in the region, a 511 system should include, at a minimum, a description of the agency's service area, schedule and fare information, information about service disruptions and a connection to the agency's customer service center.

What other transit information could be included? Some systems include additional transit information, such as tips for taking bicycles on transit or how to use tax-free commuter benefits. Information about parking at transit agencies can also be provided.

Should I include real-time transit information on my 511 system? If the information is available in your region, you should at the least explore whether it could be provided over 511.

What about transit trip planning information? Trip-planning can be accomplished over an interactive voice phone system, but it is a complex process. An alternative way to provide this service is to provide connections to the transit agencies' customer service centers.

4. Weather Content

What level of weather information should I have? Generally, weather information that is specific to certain areas or facilities and that will negatively affect traffic and transit schedules should be included.

What other weather information could be included? It is also possible to include weather information that might affect travel plans later in the current day and / or in the next few days to assist in travel planning.

5. Other Content

How do I include airport information? Airport information could include such things as: homeland security alert level; ground transportation to and from airports; traffic conditions around airports; parking availability at airport parking facilities; etc. Coordination with the

airports is essential, however; without their cooperation, it will be difficult, if not impossible, to get accurate information.

Does 511 support tourism information? Some systems include travel services such as food, gas and lodging. Depending on the types of tourist information and travel services in your region, you may want to include it.

Can I or should I include other sources, such as national parks, ferries, DOT public information operators, private companies such as taxi and shuttle services, etc.? You can include it and the decision to do so depends on your specific situation and agency goals.

C. Telephony Questions

1. General Questions

How are 511 calls routed and what are the costs? For landline calls, the 511 code is translated to your system's 10-digit number and then sent to the telephony system for the Interactive Voice Response (IVR) system. Some telephone carriers charge for the initial translation setup and, in some cases, carriers may assess recurring charges as well. The process is similar for wireless calls and carriers, although most wireless companies are less likely to charge a fee for the initial routing or any recurring charges. If they do institute recurring charges, the costs vary and are often part of the negotiation between the 511 implementer and the carrier.

How do I make sure that callers can access 511? The key to successful telephone access to 511 is working with the state public utilities commission and telephone or telecommunications association, the Incumbent Local Exchange Carriers (ILECs) and the major wireless providers. Competitive Local Exchange Carriers (CLECs) are also important. They are often more cumbersome to deal with individually given that there are very many CLECs, but they tend to have small shares of the local telephone market.

What are the biggest drivers of call volume? The biggest drivers of typical, daily call volume are the population of the region, the quality of the data and the amount of marketing. The biggest drivers of call volume spikes are weather, major incidents and holiday travel.

How should I size my system? 511 systems should be able to handle most callers. Systems should be able to handle all callers during normal loads and most callers during peak periods. A useful rule of thumb is that the system should be able to handle all calls up to the 90^{th} percentile of hourly call volumes. At the same time, several deployers have made the decision to increase the capacity of their systems to handle all calls in nearly all situations. While this is an option, it has cost implications and could result in significant idle capacity much of the time. One way around that is to share telephony infrastructure across several states or systems. As long as the states are in different regions and not prone to the same peaking events (such as blizzards, hurricanes, etc.), this solution can provide states with excess capacity when they need it while not concurrently increasing costs.

How do I make 511 accessible to the hearing-impaired and to non-English speakers? 511 can be accessible to the hearing-impaired either through a parallel Telecommunications Device for the Deaf (TDD) teletypewriter (TTY) service or, in some states, by using the 711 relay services that have been established to enable the hearing-impaired to call any phone number, regardless of whether it is TDD-TTY-equipped. 511 deployers should also publish the backdoor service number to ensure access by the hearing impaired community (and others as well). For callers who may be unable to speak English but can understand it, a touch-tone system that is parallel to the voice recognition system can often suffice. In order to serve those who neither speak nor understand English, separate menus and messages in additional languages can be utilized.

Is it OK to have callers get a busy signal? This is a decision that each deployer must make. Many deployers recognize that with huge spikes in demand, it may not be feasible or cost-effective to attempt to serve every single call at all times under all conditions. Other deployers, however, have sized their systems so as to handle all calls under nearly every situation. There are significant cost implications to doing so, however. Some innovative options, such as shared telephony infrastructure between multiple states, have proven to be successful, cost-effective solutions. .

How high will usage go up during extreme weather or other emergencies? Experience shows that usage often spikes as much as four to five times higher than the typical call volume during extreme weather conditions, when there are special events, during AMBER alerts or when there are severe transportation incidents.

Is there an easy way to keep up with changes in the telecommunications world (such as new wireless providers, VoIP, new local telephone companies, etc.)? The short answer is that there is no simple way to do so, although having in-house staff or a contractor who is knowledgeable about telecommunications can remove some of the burden from your agency. In all cases, agencies deploying 511 must weigh the costs of making 511 accessible via new technologies with the benefits (i.e., number of travelers with these technologies).

Where and how should calls be transferred? Calls should be transferred, at the least, to all transit agencies in the region and to neighboring 511 systems. (Note, however, that transfers to neighboring systems are not needed if those systems share the underlying application.) In addition, calls may be transferred to other transportation agencies (such as rideshare agencies), public information departments of state DOTs and to special-purpose numbers established for specific construction projects.

How should I decide whether to have 511 routed to a local number, a statewide toll-free number or a national toll-free number? This depends on where your IVR servers are located. If they are within your state, it is possible to have local routing for those areas within the local calling area of the jurisdiction where the servers are located and toll-free routing for the rest of the region or state. It is recommended that you use a national, rather that statewide, toll-free number to enable transfers to your system from other 511 systems. If your servers are not in your state, the 511 number must be routed to a national toll-free number.

Will carriers charge their customers for the call? Most carriers understand that 511 is a public service and will have no charges beyond the cost of a local call. Reminding the carriers that the implementing agency is not making a profit from 511 can help make this case. If, however, a carrier does charge for a toll call, it is suggested that you have marketing in place to inform customers of that.

What does the state Public Utility Commissions (PUCs**) have to do with 511?** State PUCs may offer assistance in establishing 511 within the state. The PUC (in most states) regulates the rates that a carrier may charge and it may also be helpful in guiding the process should the carriers have questions regarding the FCC Report and Order. In some cases, deployers have found the PUC to be most helpful, going even as far as announcing (ordering) that all carriers respond to a DOT's requests for implementation. While in other cases, the PUC has simply stated that the FCC order is correct, but that it is up to the DOT and the carriers to work out the details of the implementation.

Will I be required to sign agreements with the carriers? In some cases, the carriers will request a formal agreement, even if there is a tariff on file. In other cases, no signed agreement will be needed. Be prepared to have substantive and legal reviews of the agreements with carriers and to negotiate costs when there is no tariff.

Why are some people unable to access 511? There are two main reasons that someone might be unable to access 511. First, their telephone provider, either wireless or landline, has not enabled access by programming the switches. While it will generally be easy to get the ILECs and the large wireless companies to provide access to 511, some of the smaller landline companies (CLECs) and wireless companies may not be aware of 511 or may have chosen not to enable access, though this is becoming less common. More likely, the larger carriers might be slow to negotiate with the implementer or, in the case of a CLEC, might not respond to calls and letters regarding 511 programming until after their customers have called to complain about not having access. The second reason is that a caller could be using a Private Branch Exchange (PBX) that has not been programmed to provide access to the 511 code.

2. Wireless Questions

What do I need to do to make sure that cell phone callers can access my 511 system? You will need to contact the wireless providers and work with them to make sure that their systems recognize 511 and translate it to your 10-digit terminating number.

Are there costs involved? Depending on the carrier and the geography, there may be costs either at the network level or at the switch or individual tower level.

Will I need someone on my staff with specialized knowledge about cell phone switching? Carrier coordination is an important issue in making 511 available to all callers in your service area. Some agencies have telecommunications expertise on staff while others have contracted with consultants who have experience working with the wireless (and even landline) carriers on 511 call routing.

3. Landline Questions

What do CLEC and ILEC mean and why do I need to know this? ILEC stands for Incumbent Local Exchange Carrier and is the "traditional" local telephone company in your area. These carriers were in the local telephone marketplace prior to the 1996 Telecommunications Act. CLEC stands for Competitive Local Exchange Carrier. (In some regions, they are called Alternative Local Exchange Carriers or Ales.) These carriers provide alternative service to the ILECs. Since the 1996 Telecommunications Act, CLECs have proliferated and most regions have many CLECs who together tend to have a very small market share.

How do I know if there is a tariff filed with my PUC and how will that affect my deployment? Tariff filings usually go through the State PUC and information on what is filed can be obtained from them. Additionally, most telephone carriers will be very forthcoming with any tariff information that they have filed and, if they are not able to provide you with a copy, they will most likely be able to provide information as to where and when the tariff was filed and how a copy can be obtained. (Note that in some cases, a carrier may wish to simply use an existing tariff for the 511 service implementation. Deployers are advised to review any tariff to insure that all elements of such tariff apply to the 511 service).

How much will the phone companies charge me for providing 511? It varies from company to company. For some, it is a charge based on the number of central offices or Local Calling Areas, while others will charge an hourly rate for project management and to update software in telephone switches. In most cases, these are one-time-only charges, while in others carriers may attempt to assess recurring charges as well.

D. 511 User Interface Questions

How should the menu be structured? 511 telephone menus should be intuitive and easy to use to enable efficient use by callers. At the top level, callers should hear, at a minimum, options for traffic / roads, transit / public transportation, weather and help. If you have important options in addition to these, they may be called out explicitly or categorized under "other information" (if appropriate).

Should information be time-stamped? If your data is current, it is valuable to time-stamp it so that users will know when, for example, an incident was entered into the system. If, however, the bulk of your data is long-term construction information, or other similar information, time-stamping could confuse the caller.

Should I use a voice-recognition system or a touch-tone system? 511 systems should utilize voice recognition systems with touch-tone access as a back-up. A touch-tone backup option allows callers who are unable to use the voice system (such as people in noisy environments, those with very heavy accents or those who are unable for some other reason to be understood) to access information.

What are the different types of voice recognition? There are three main types of voice recognition: Directed Speech, Natural Speech and Mixed Initiative. Directed Speech is when a system asks a direct question and offers the user the specific answers it is expecting (e.g. "for

highway information, say 'traffic,' for public transportation, say 'transit,'" etc.). Natural Speech will listen to all elements of a person's response and pick up the key phrases from within a natural sentence (e.g. "I'd like to hear about traffic conditions."). In Mixed Initiative, the system will guide the user to the proper response, but will not give them the specific words to say. ("I can give you information on traffic, transit or airports. What would you like?" The user may then say "I'd like to hear about traffic conditions" and be properly recognized.)

Of the various options (text-to-speech, concatenated messages, pre-recorded messages and near-real-time recorded messages) what is the best way to present information? This depends on the type of information that you have, the number of different possible conditions and your desire (or need) to have operators on duty. Concatenated messages often offer the best of both worlds, the convenience of text-to-speech with the sound of a human voice. Many systems use various combinations of these options in their systems.

What are floodgate messages and what are the best ways to use them? Floodgate or broadcast messages are played at the beginning of the call (or upon reaching certain menus in the 511 system) before any other information or instructions are given. They should be used for information that is critical for travelers to know in a defined area or for a certain transportation agency. Floodgate messages should be kept short as the information may not apply to all users of the system.

Should I include AMBER Alerts on 511? If so, where should they go? Many services include AMBER Alert information as a floodgate at the main menu. Some state DOTs use 511 as the primary call to action for AMBER Alerts.

How do I use voice short-cuts? Short-cuts may be utilized to get to certain highly-used features on a 511 system without having to go through the entire menu structure. They are a way of making it easier for callers to get the information they want as they become familiar with the system and its menu options.

E. Webpage Questions

Does 511 have a web component? The FCC Report and Order designated the 511 dialing code as a telephone access number. Deployers have co-branded websites using 511 in the address and, at some future time, 511 will be recognized by consumers as the "brand" for transportation information.

What is the best way to co-brand a webpage? To start with, the URL for the website should be some combination of "511" and the region that is covered. Additional synergies can be developed by referring 511 callers to the web for more information and including phone instructions on the website.

Should the web and the phone have the same content? They should have the same basic content but also can take advantage of the different dissemination strengths. For example, a webpage can include graphical images, such as speed maps and traffic cameras, which are more difficult or impossible to provide over the telephone.

F. Monitoring Questions

What statistics / performance metrics for 511 should we track and who collects that information? It is important during the development phase to determine what types of performance should be measured. Key metrics are usage, system reliability and data accuracy. The information can be collected by the contractor, by your staff or by an independent verifier.

How do I measure the overall performance of the system from data collection through data dissemination? The first step is to determine exactly which performance to measure and to develop a monitoring plan. It is important both to focus only on the key metrics that are of interest and to build the system in such a way that data is easily extractable; otherwise, performance monitoring and measurement can take significant time and money. Suggested 511 performance measures may be found in Appendix C.

G. Marketing and Outreach Questions

Can I change the national 511 logo? While the national 511 logo enables travelers to recognize 511 marketing throughout the country, the logo is not required and regions with good reasons to use other logos may do so. Absent a compelling reason to do so, however, it is recommended that deployers use the national logo, which is available at the http://www.deploy511.org website.

What is the most effective means of marketing 511? Radio advertising campaigns have proven effective at increasing usage temporarily, but it is unclear if they have a significant long-term effect. Making 511 a mission-critical way to communicate with customers and the promotion of 511 a priority at your agency are the first steps to effectively marketing the service.

Has paid radio and television advertising and public service announcements been used anywhere? Where can I find examples? Deployers have used both radio and television advertising. Sample scripts, audio files and a television advertisement are available at http://www.deploy511.org/marketingmatial.htm. Others might be available through a request made to the 511 Working Group or 511 listserv at http://groups.yahoo.com/group/511_coalition/.

H. Evaluation Questions

How do you test the usability of 511 systems? Usability depends on the ease of navigating through the menus and it can be tested much as other consumer products are tested for usability. Deployers have convened usability focus groups prior to and following a launch to understand how consumers use the service and to tune their system and make adjustments.

How do I learn about customer satisfaction and awareness? The best way to learn about your users' satisfaction and about overall awareness in your region is through surveys. Surveys can be built into the system to assess satisfaction, but overall awareness depends on a survey that samples the entire population. Some deployers include questions about 511 awareness in general surveys that they are doing for other purposes.

Should I include a feedback option in my system? This is a matter of local choice, but is generally considered to be good practice. Not only does it provide direct information to system

deployers about what is working and what is not working, it also allows callers to feel that they have a stake in the system. There are two ways to get feedback: through a voicemail recording in the system or a survey with pre-defined options. Voicemail recordings allow the most flexibility, but listening to the messages is time-consuming and callers may expect to get a response to their comments. If you use this method but do not have the resources to respond to individual calls, this should be made clear by including a message to the effect of: "Thank you for your comment. We value your feedback, but due to the volume of calls that we receive, we cannot respond individually."

IV. 511 Implementation and Operational Guidelines

The next sections of this document lay out the Guidelines for implementing a 511 system. They begin with overarching Guidelines that focus on the policy questions that need to be addressed in advance of a 511 deployment and also during 511 operations. These are then followed by Guidelines addressing content, telephony, the 511 user interface, webpage development, system monitoring, marketing and evaluation.

A. Overarching Guidelines

The Coalition considers many issues associated with the successful development, deployment and operation of a 511 service to be important. However, there are several overarching Guidelines that each deployer must give serious attention to: business environment; system interoperability; privacy; system architecture; standards; evaluation; and customer satisfaction and awareness.

1. Business Environment Guidelines

Basic 511 telephone services should be no more than the cost of a local call and websites are to be made available to all Internet users. The deploying agencies should expect to fully fund the 511 service and its level of information for the foreseeable future. Advertising and sponsorship are acceptable, as long as they do not interfere with the user's primary intent for interacting with the service. Fee-generating premium or enhanced services are also acceptable, though a market for these services has not developed yet.

a) Basic Services Charges

In 2001, the Coalition established the guideline that when accessing the basic services of a 511 system, the call should be no more than the cost of a local call. This does not mean that the call is "free." Instead, this means that a caller would pay exactly what they would normally pay to make a local call in that area. For example, if one was calling from home on a landline phone then the call would be included in the monthly local phone bill, typically a monthly fee or message unit. If it were a person from out of state calling 511 on their wireless phone, but physically in the local area when placing the call, then the duration of the call would be applied to their monthly calling plan (typically deducted from a large number of minutes) and roaming charges might apply depending on the service plan and / or the carrier.

Most importantly, for the user, there is a consistent business environment for the basic services available from 511 whether in Miami or Nebraska and that there is no "marginal cost" (additional per usage fee like 411) to use the 511 service.

The implementing agency (or agencies) should expect to cover nearly the full cost of delivering the basic level of service on a 511 system. Historically, ATIS-based revenue sharing models and other creative funding approaches have not been successful. *Deployment Assistance Report (DAR) #1: Business Models and Cost Considerations,* covers issues for migrating a planned or existing travel information service to utilize the 511 dialing code, including a review of business models and cost recovery and is available at http://www.its.dot.gov/511/511_Costs.htm. For many years, deployers sometimes assumed that there would be opportunities to cover significant

portions of their costs from the operations of travel information services like 511. While it is now generally understood that those opportunities are limited, this is not to say that there are no opportunities to generate some revenue.

b) Advertising and Sponsorship

Commercial advertising and sponsorship of 511 services, either in an initial greeting or in conjunction with a specific element, such as a message or content category heading, of a 511 service is acceptable. However, care should be given to ensure that the length of advertising messages does not overly inconvenience callers and that the content of these messages is consistent with the public service nature of 511 and agency image. This guidance applies in particular to the initial greeting and messages prior to the caller getting the information that they are seeking.

As of publication of this document, the only 511 service collecting any revenue from advertising or sponsorships is 511 Virginia statewide service. Virginia has plans for placing advertisements or sponsorships in the initial greeting or in category headings. Additionally, they have chosen to generate revenue from listings, by Interstate exit and category, under the Travel Services menu choice for individual listings of commercial establishments. The key to being able to provide this type of service is having staff establish contacts within the business community, making sales and having the systems in place to track usage of the 511 service down to the lowest sub-level data request, as well as being able to perform all necessary accounting activities. In Virginia's case, these activities are all performed by its contractor at no cost to VDOT.

c) Fee-generating Premium Services

Fee-generating premium services are allowed and can be a way to provide additional services for the caller and possibly off-set costs for the deployer. As of publication of this document, no premium service market has been clearly identified or established and no 511 system has implemented premium services.

In the fall of 2002, Minnesota DOT (MnDOT) asked 511 users to rank five fee-based services that they would be interested in having on 511. Minnesota's 511 users top three choices were: driving directions to a specified location; information about local tourist attractions, tourist centers or visitors' bureaus; and personalized travel reports for problems on the usual route of travel. The Arizona 511 Model Deployment had a planned demonstration of premium services with over 250 inquiries for its RFP. Only two proposals were received and neither was deemed viable by ADOT.

d) Business Models

The majority of 511 services across the country operate under one of three general business arrangements: operated in-house; fee for service contract; or a blend of the two – some features and services performed in-house and some contracted.

2. 511 System Interoperability – Call vs. Data Transfer

Interoperability deals with how 511 services with adjacent borders interrelate to give callers seamless information and affects both how callers perceive different systems as well as how deployers build their systems. This issue is relevant primarily for roadway and weather content

as it is not uncommon for callers to seek information on what is happening over a state border on a certain roadway or in a travel corridor. Without either hearing information about those roadways or being transferred to the neighboring 511 service, the caller is essentially "traveling blind." Without system interoperability there is merely a patchwork of unconnected 511 systems scattered around the country, not what the FCC envisioned and not in accordance with the national vision for 511.

N11 systems, by design, are not national in scope. Only 411 gives the appearance of being national in scope and that is accomplished with an integrated database, supported by its business model, behind the systems. With the overlap and varied boundaries of agencies, regions, travel patterns and the unknowns of cellular routing, 511 deployers need to look beyond their borders to make 511 a success with the traveling public. If 511 developers, deployers and operators accomplish regional interoperability through data sharing, then we may achieve national interoperability ultimately as well. This national interoperability may ultimately yield a 511 system where the caller may be asked, "City and state, please," like the 411 system. *DAR #4 - 511 Regional Interoperability Issues* addressing this issue may be found at http://www.deploy511.org/docs/511-dar4regioninterissues.pdf. In addition, the Coalition is developing Interoperability Quick Tips, which will also be available at http://www.deploy511.org.

There are three basic options for interoperability: call transfer, data transfer and application sharing. Call transfer interoperability means that one 511 system will transfer calls to another 511 system or systems at some point in its menu and those systems will do the same. North Carolina and Virginia operate in this manner. Data transfer interoperability, on the other hand, takes place up stream of the 511 system itself. Under this framework, the underlying data systems are accessible to other 511 systems, enabling those systems to provide information from neighboring jurisdictions without transferring calls. Finally, under application sharing, deployers actually use the same underlying application to run their 511 systems, which allows them to share deployment and development costs as well as to balance load when call volumes peak in one state. Kansas, Montana, Nebraska, North Dakota and South Dakota, among others, have taken this approach.

Many factors must be addressed when dealing with the issue of interoperability and determining which option best fits the needs of a particular 511 service. Most of these factors determine how a system would work and / or which standards are in use or available to make the transfer seamless to the user. The following is a list of some actions that deployers can take to improve 511 interoperability:

- Identify travel corridors that overlap with or extend into other regions and work with neighboring jurisdictions to understand their needs and constraints.
- Attempt to assess the number of calls that your system will get in which the caller will want information on neighboring jurisdictions and the cost of transferring the calls.
- Estimate the number of "outside" information sources to be incorporated based on logical travel patterns in the region and the effort needed to incorporate them.

If an implementer determines that call transfers are preferred, then the following items need to be addressed:

- The wireless calling areas at the boundaries of your system. Develop a plan for dealing with misrouted calls. Be especially mindful of the placement of advertising signage near a border, because it might lead someone to call 511 and either not get through or get routed to another region's 511 system.
- "Dead-ends" (i.e., calls that are transferred out of your system and may not be able to return) in the transfer process. Inform callers when they will occur.
    - Consider only transferring calls to bordering states with 511 systems.
- The existence of 511 and other "outside" telephone systems for calls to be transferred to and the suitability of those systems to accept and handle transfers.

If an implementer determines that data sharing is preferred, then the following items need to be considered:

- Use the SAE ATIS J2354 standard, discussed in more detail below, when developing and upgrading information databases and system communications to facilitate the exchange of information.
- Recognize the need to parse and size information to match your system.
- Be careful in menu design not to overload your system with "outside" focus.

Finally, as noted above, some deployers have used "application sharing" to provide for interoperability. Under this framework, different states or regions use the same 511 provider, which enables those systems to, in essence, function as one system without having to address either data transfers or call transfers.

3. Privacy

In the United States, state and national legislators have heard complaints from individuals who feel that their privacy has been invaded without their knowledge or permission. Evidence of this is the establishment of the national "Do Not Call List" which has prompted millions of Americans to submit their name and telephone number in the hopes of reducing the number of telemarketing telephone calls to their residence.

People calling a 511 service are accessing the system, typically, through a home or office landline phone or a wireless phone. It is the duty of the implementing agency (or agencies) to protect this newly created database of information. Callers using a 511 service expect the deploying entities to protect their individual privacy. If their privacy is invaded, or even perceived to be, the users' confidence in and comfort with using the service will wane and overall usage will drop.

To prevent any privacy issues from arising, 511 services should adhere to ITS America's Fair Information and Privacy Principles, which can be found on the ITS America website at

http://www.itsa.org/committe.nsf/0/82d672ca035826558525620e006901c4?OpenDocument. Some states have included the statement via a link on their co-branded 511 website.

4. National ITS Architecture

The National ITS Architecture is the framework for deploying an integrated Intelligent Transportation System. This framework identifies the stakeholders and interrelationships involved in ITS, the activities or functions required to deliver the ITS User Services and the interdependencies between different systems – the interfaces. In support of 511 and the advent of sophisticated voice portals, the traveler information portion of the National ITS Architecture was updated in October 2003 to include the Telecommunications System for Traveler Information (TSTI) entity and connecting information flows.

This entity represents the caller interface and voice processing (voice recognition / synthesis) that supports voice-enabled telephone traveler information systems. It lays on the boundary of the National ITS Architecture where a call is received and processed. Implementations of this TSTI could include voice portal capabilities in scenarios where a distinct voice portal exists between ITS Centers and telecommunications provider(s) and uses this information to support voice-based interactions with the traveler. The TSTI also supports voice-based alert notification to the traveling public regarding major emergencies such as natural or man-made disasters, civil emergencies, severe weather or child abduction. These capabilities are reflected in two market packages: Interactive Traveler Information and Wide-Area Alert.

The TSTI entity and voice-based architecture flows can be used in regional or project ITS architectures to represent the 511 voice system interface to the transportation information service provider (ISP). Additional details on the TSTI, the corresponding information flows and market packages can be found on the National ITS Architecture website at http://www.its.dot.gov/arch/arch.htm by clicking on "National ITS Architecture."

5. Standards

Significant resources have been invested to develop ITS standards that will simplify and expedite the deployment of interoperable systems. 511 implementers should review the full range of standards available and consider using those that will aid in cost-effective system development and / or inter-system interoperability. The ITS-related National standards are designed to facilitate the efficient exchange of information and, as a result, have developed standard data elements and standard messages.

Some of these standards, consistent with the National ITS Architecture, are quite beneficial to system implementers in reducing the time and resources required to share information between transportation management systems and the 511 support systems. Existing standards that should be examined include:

- ATIS and ATMS message sets and data dictionaries as well as several "business area standards" from the Transit Communications Interface Profiles (TCIP) family of standards. An example of how these standards can help is the ATIS produced International Traveler Information Systems (ITIS) Phrase List standard (SAE J2540-2), which includes textual

phrases and binary codes for over 1,500 types of highway event "descriptors." These codes could be programmed into both the management systems and 511 equipment and only binary codes would need to be transferred between systems to provide information necessary to create route-segment reports. This also has the benefit of largely standardizing the reports that callers hear and aiding their understanding of reported information. The central focal point for learning about ITS standards information is http://www.standards.its.dot.gov/standards.htm.

- The primary standard for exchanging traveler information between various systems and users is the J2354 ATIS message set standard developed by the Society of Automotive Engineers (SAE). The messages of this standard are implemented in both Abstract Syntax Notation number One (ASN.1) and in eXtensible Markup Language (XML) and include formats for various events, incidents and weather occurrences.

  The J2354 standard has many other important components for 511 systems, including transit information and vehicle routing. Implementing agencies should provide their data sets in the J2354 message sets, available at: http://www.sae.org/technicalcommittees/atishome.htm. To obtain the latest draft version of the standard from the SAE ATIS committee contact Joel Markowitz (JMarkowitz@mtc.ca.gov) or committee consultant David Kelley (davidkelley@ITSware.Net). The Institute of Transportation Engineers (ITE) outreach and training program can provide a day long summary of the ATIS standard and how to use it along with various support materials developed for system builders.
- Current 511 systems can receive data from TMCs in a standard format developed by the AASHTO / ITE Traffic Management Data Dictionary (TMDD) Committee. "Message Sets for External Traffic Management Center Communications" (MS/ETMCC) contains the approved ASN.1 message sets which are currently at Version 2.1 which also includes XML versions of its messages alongside ASN.1. The website for this standard is located at http://www.ite.org/tmdd/index.asp.
- NTCIP center-to-center standards may also be relevant. Information about them can be found at http://www.ntcip.org/library/groupstatus/default.asp?groupid=2.
- Regional systems employing incident management systems may be using the message set standards of the Institute of Electrical and Electronic Engineers (IEEE) Incident Management 1512 family of standards. These standards allow for multi-agency conduction of incident events and express public summaries of these events using the same formats developed in the SAE ATIS J2354 work. Regional deployment using this set of standards can receive data in this format using either the ASN.1 or XML formats as defined by this standard.
- All of these message set standards re-use many of the same data elements in defining their component parts to increase the coordination between them and leverage the development investment. One key data dictionary in this effort is the TMDD data dictionary that was produced by the AASHTO / ITE TMDD Committee.
- A User-Comment draft of the NTCIP 2306 Application Profile for XML Message Encoding and Transport in ITS Center-to-Center communications standard is currently available and defines the XML-based transport protocol and provides guidance to each message set implementation. In addition, evolving standards in Voice XML should be considered.

Not all of these standards have been fully tested in the field and some may experience changes in the future. However, more transportation agencies are choosing to use these standards in 511 systems. An example of a system using multiple standards is the San Francisco Bay Area, which uses the TMDD, MS/ETMCC and ATIS XML in various places within the overall TravInfo® system.

6. Safety

As cell phone use has become more prevalent, so have concerns about the safety of using a cell phone while driving. The Coalition recognizes these concerns and recommends to deployers that their marketing messages remind callers to always use 511 safely, such as at rest areas, while parked, before departing or to have a passenger in the car call 511.

B. Content Guidelines

This section provides Guidelines on basic content for traffic and transit information. In addition, it discusses the possibilities of including various kinds of enhanced content. Before turning to the specific types of content, however, it discusses general issues related to content quality and accuracy.

1. Issues for Content Quality and Consistency Across Systems

The accuracy, timeliness and reliability of information on 511 is an important issue for the 511 community and users as well. In an increasingly advanced information society, callers are generally accustomed to high quality information. 511 content must be no different. In 2001, ITS America, in its national consumer research on 511, determined that "those surveyed said that if they used 511 and found the information to be inaccurate in their first few uses, they would be unlikely to give the service another chance." 511 deployers in market research in their regions have also uncovered similar findings.

Therefore, 511 implementers must focus on the following five quality parameters:

- *Accuracy* – Reports are recommended to contain information that matches actual conditions. If the system reports construction events that are not occurring (or worse, does not report a construction event that is occurring) or a road closure is not reported, callers will come to distrust the information provided. If inaccuracies persist, callers will discontinue their use of 511.
- *Timeliness* – Closely related to accuracy, information provided by 511 is recommended to be timely to the greatest extent possible in accordance with the speed of changing conditions. While it is recognized that non-urban areas may have more difficulty collecting, inserting and updating information quickly, it is recommended that every attempt be made in both urban and non-urban areas to update information as soon as there is a known deviation from the current route segment or service report. Thus, the timeliest reports are based on changing conditions and not on regular interval updates.
- *Reliability* – Often, transportation management systems are staffed during limited working hours, but travelers use highways 24 hours a day, 7 days a week. In fact, often the most challenging travel conditions are at nighttime and on weekends. Methods must be developed to provide callers with a reliable stream of information 24 / 7.

- *Consistency of Presentation* – It is recommended that reports use the same, or similar, terminology to describe conditions. Lack of consistent terminology leads to misunderstanding and confusion amongst callers; consistent terminology will make the system more usable as users move from system to system. The use of existing and evolving standards, such as the TMDD and SAE J2354, for messages enables this consistency.
- *Relevancy* – The information that is provided needs to be relevant to the caller given their location, modal choice and / or actions that they may need to take as a consequence of weather, road conditions or service disruptions.

Information quality is a major concern of the Coalition. The quality of basic content information will largely determine the success of 511. This is why the information is recommended to be tailored to the travelers' needs along their route. It is recommended that 511 services give callers the ability to gauge the quality of the reported information to enable them to properly weigh the information in their decision-making (e.g. "There is a report of an avalanche…" vs. "An avalanche has occurred…"). However, the Coalition has not included specific quality parameters as part of this version of the Guidelines. This is for two reasons:

1. More collective deployment experience, user feedback and objective analysis of travelers' information needs / requirements is needed prior to determining optimal quality parameters.
2. The Coalition hopes that a special focus on information quality by implementers will lead to quality services.

a) The Need for Increased Data Collection

Many of the individuals and agencies early in their 511 development and deployment process found that there was a large misunderstanding common throughout the country – that transportation departments and agencies already possessed all of the data and information necessary to provide a quality 511 service. While the concept of dialing an easy to remember telephone number and providing quality decision-level information to the traveling public was easy to grasp, the complexities of the systems behind the service and the difficulty in developing the services, were not.

The USDOT Vehicle Infrastructure Integration (VII) initiative has a clear tie to providing quality information to travelers be it through 511, ATIS or ATMS. The deployment of roadside detectors, wireless communication devices and other systems is key to the development of a nationwide 511 service. In fact, many states are presenting 511 as the "face of ITS" to elected officials and the public and are using 511 as a way to increase the coverage area of detection and systems. The more detection and base-level of technological investment there is, the better the 511 service and the more consistent the level of information provided can be. If every state or region has a similar level of detection and integrated networks for collection of information, then the products could also be similar. At the same time, however, many successful 511 programs either started with, or still use, basic incident, weather and construction information and do not have robust ITS data.

b) Emergency Alerts / Broadcast Messages (Evacuations, Major Incidents, Homeland Security, AMBER Alerts)

Since the early deployers launched their 511 services, most have found additional ways to use this valuable resource. Some of these ways include broadcast messages in emergency situations, working in conjunction with traffic and incident management and including AMBER Alerts. 511 is also seen as an additional dissemination tool for Homeland Security needs.

Broadcast or floodgate messages can be a critical tool for disseminating information to the traveling public during a major incident, be it weather, event or security-related. Floodgate messages can be implemented in various ways, but the two basic types are uninterruptible and interruptible – meaning a caller can override or skip the message.

In times of emergencies, uninterruptible broadcast messages can deliver a brief, important message at or after the greeting of a 511 service, conceivably allowing the caller to then end the call, thus creating a 511 system that has short call durations and is able to disseminate the most critical information to all callers and nothing else. Some services play these messages while callers are queued to access the system, which may allow them to hang up after receiving this important information without putting more load on a system at its capacity. This can alleviate some of the peak capacity issues that deployers are experiencing. The uninterruptible message relating to a lesser service disruption with a large impact requires a caller to hear the whole message before they may continue to additional, selectable information. Other forms of the message type are broadcast by service, mode or geographic area. Interruptible messages can be placed in the same areas of the system, but are typically used for less important information.

VDOT found that 511 is a welcome asset during incident and traffic management situations. The 511 service is being used in conjunction with permanent and portable VMS to relay critical information to travelers during major incidents, typically hazardous material spills that can close an Interstate. Because VMS are limited due to comprehension issues and multiple detour listings describing complex situations are generally not possible. The VMS convey the necessary information as they normally would in these situations, but they also prompt travelers to call 511 for additional information. In one situation, VDOT used VMS up to 100 miles from an incident to alert drivers to call 511 where they received information on up to three detours depending on their desired destination. VDOT has documented that by using the VMS and 511 together, call volumes to the service doubled almost immediately.

AMBER Alerts are a child abduction response system that uses radio, television, VMS and emergency broadcast systems to disseminate information about kidnapping suspects and victims soon after the crime is committed. The system is designed to solicit aid from the public to look for victims by providing known details such as descriptions of vehicles and individuals. 511 services have become an important tool for disseminating AMBER Alert information quickly and completely. In fact, many states have realized a significant increase in unsafe driving from the amount of information displayed on the message boards. This seems to be supported by University of Minnesota research that recommended changes to the Minnesota AMBER Alert messages on VMS, including referring drivers to other information sources to retrieve more detailed information. As a solution, Utah DOT is using less detailed AMBER Alert messages on its VMS and prompting drivers to call 511 where they can receive accurate detailed information

about the situation. This process was recognized by the AMBER Alert representatives in Utah with the designation of the 511 system as a "certified" source of AMBER Alert information.

c) Timestamping

Caller expectations are for timely information. Providing a time / date identifier to provide callers with a sense of reliability and accuracy of the information provided is desired by some deployers and some customers. If, however, content does not change, there is a risk that an old time stamp might lead a caller to believe the information is out-of-date, even if it is in fact still valid. Whether to timestamp is a local choice, to be made based on the type of information included in the system and on how frequently information will be updated. If a system includes timestamps, the time used should be the time that it was updated, not the time that an incident occurred. Moreover, it is vitally important, when timestamping, to have monitoring procedures to ensure that the timestamps remain current.

d) Tailoring Content to Telephonic Media

The tailoring of content to telephonic media poses some issues. Often, the data available for inclusion in a 511 service is from a traffic management center software package or data available on an agency website. Reading information on a website or looking at a graphical user interface is a much different experience than listening to the same information over the telephone.

To convert these types of data into usable information for dissemination through the telephone, a deployer should try to eliminate the use of free form text. This may require a database modification that forces operators to use pull-down menus where blank text boxes were formerly used. Since most operational 511 services deliver information using concatenated speech or text to speech technologies, voice eXtensible Markup Language (XML) has become the de facto standard for interpreting and delivering the information. This means that most data feeds to 511 are being provided in an XML format.

Another way that deployers have provided content via telephone is to treat the medium as if it were an on-demand radio report, complete with recordings made by professional voice talent. The Central Florida 511 service covering I-4 disseminates its information in this manner as will the statewide 511 available later in 2005. Most travelers are accustomed to hearing radio-style traffic reports and have made the system one of the most heavily used in the country.

The design of the 511 system and how the caller will interact with the menu options must also be taken into consideration. This issue should not be taken lightly, for a poorly designed system will lead to unhappy users and a decline in usage. A quality design is best achieved by using experienced personnel and thorough system testing. It is not easy to design a comprehensive, easy to use automated phone system, however, it can and has been achieved. A well-designed system will be intuitive to use, simultaneously easy for new users to navigate while allowing experienced users to get to their desired information quickly.

e) Recognition of Regional Variation

Striving for a consistent 511 service across the United States is very important to the Coalition and was also clearly stated in the FCC Report and Order designating 511 for travel information. While consistency is vital, meeting a travelers' needs should always be the top priority.

However, those needs change from place to place and from caller to caller. Variations in systems are shown in the Attributes of Existing 511 Services table in Appendix E. Sometimes variations are by a deployer's choice and other times are due to a lack of quality information or resources available.

Another reason why variations exist, or why information need varies, is that the same caller may have completely different needs depending on the trip type, season or geography.

For example, Joe, a daily commuter in the Seattle area may call 511 regularly to check on his commuting routes to and from work. On the weekend he may need to know information on available transit service to Safeco Field. The following week, while driving through northern Arizona on vacation, Joe may be most interested in the weather-related road conditions. While daily commuting and transit service to a baseball stadium may not be relevant in northern Arizona, early-spring road conditions are.

2. Basic Roadway Content

Because roadways are the primary means of travel in the United States, information about them should be a principal part of a 511 system. The core of many existing telephone-based travel information services is highway conditions reporting. As these systems migrate to 511 access and new systems are established, the following guidance should be considered.

a) Principles

There are five key principles associated with roadway content:

1. *Regional Overviews or Summaries are Available* – Regional overviews or summaries that allow users to get important information quickly, (i.e., incidents or service disruptions that may impact one's trip) without having to go through the menu system should be available. Upon hearing the overview, the caller would be able to select the specific route or segment to obtain detailed information. Thresholds for determining what content is placed in a regional overview should be determined regionally.
2. *Content is Route / Corridor-based* – 511 services should provide information that is retrievable by route number and / or name. In certain circumstances, if one or more principal roads run parallel, it may be acceptable to provide information on a corridor-basis. However, providing information on major roadways on a broad geographic basis (FHWA "roads in the Northwest portion of the state will be…") is not recommended. When a route / corridor is operated by multiple agencies, these agencies should work together to provide an integrated description of conditions.
3. *Limited Access Roadways and the National Highway System Should Be Covered by the Basic 511 Highway / Roadway-related Content* – With 40 percent of the nation's travel, including 75 percent of truck traffic and 90 percent of tourist traffic, the 160,000 mile National Highway System (NHS) should be the focus of basic 511 content. Limited access roadways, which are not part of the NHS and likely to exist in urban areas, should also be part of the basic content. State-by-state maps of the NHS can be found at http://www.fhwa.dot.gov/hep10/nhs/index.html#maps

4. *More Detail Needed in Urban Areas* – Given the increased traffic volumes and congestion levels in urban areas, even minor events could have large impacts on travel. Thus, greater content detail is recommended in urban areas.
5. *Content is Automated* – Whether the information provided to the caller is a human recorded message, synthesized or digitized speech, this information should be stored and automatically provided to callers. There need not be any direct contact between callers and human operators to provide basic highway content.

b) Guidelines

The fundamental structure of a telephone system design matches highways very well. Telephone systems are usually accessed through a "menu tree" that is navigated by voice commands or by touching a phone's keypad. A caller reaches their desired destination in the system and either gets a recorded or digitized voice message. When seeking highway information, a caller will first find the specific highway or corridor for which they desire information, unless a regional overview is available and selected. The caller will then find the specific segment of highway or corridor that they are interested in, especially if it is a lengthy road.

1. *Regional Overview* – while not applicable in all areas, regional overviews can provide the caller with general, high-level information on a region, helping to determine if they should seek additional detailed information by going to the routes / corridor and continuing through to the content.
2. *Routes / Corridors* – Information on all NHS facilities / corridors should be available to callers. In urban areas, information on all non-NHS limited access highways, as well as major arterials, should also be available to callers.
3. *Segments* – In non-urban areas, long routes should be sub-divided into segments. Segment specification is left to the implementer, but should follow logic with segments defined between major towns, landmarks or roadways and taking climatological differences into consideration. In urban areas, segments should be defined between major interchanges and will generally be smaller in length than non-urban segments.
4. *Content* – For each segment, specific types of content should be provided. These should include:

    - *Construction / Maintenance* – Current information on active projects along the route segment that may affect traffic flow and / or restrict lanes.
    - *Road Closures and Major Delays* – Unplanned events, major incidents or congestion that shut down or significantly restrict traffic for an extended period. In urban areas, information on all incidents and accidents, both major and minor and congestion information along each route should also be provided.
    - *Major Special Events* – Transportation-related information associated with significant special events (fairs, sporting events, etc.).
    - *Weather and Road Surface Conditions* – Weather or road surface conditions that could impact travel along the route segment. This is discussed in Section 4 below.

For each of these highway content types, it is necessary to provide details that enable callers to assess travel conditions and make travel decisions associated with a route segment. Table 1 illustrates the detailed information needed for each content type.

- *Location* – The location or portion of route segment where a reported item is occurring, related to mileposts, interchange(s) and / or common landmark(s). If there are dual routes in your region, identify both routes. Also note if the information is for a location out of the service area, such as North Dakota reporting an incident on I-94 in Montana.
- *Direction of Travel* – The direction of travel where a reported item is occurring.
- *General Description and Impact* – A brief account and impact of the reported item.
- *Days / Hours and / or Duration* – The period in which the reported item is "active" and possibly affecting travel.
- *Travel Time or Delay* – The duration of traveling from point A to point B, a segment or a trip expressed in time (or delay a traveler will experience).
- *Detours / Restrictions / Routing Advice* – As appropriate, summaries of required detours, suggested alternate routes or modes and restrictions associated with a reported item.
- *Forecasted Weather and Road Surface Conditions* – Near-term forecasted weather and pavement conditions along the route segment.
- *Current Observed Weather and Road Surface Conditions* – Conditions known to be in existence that impact travel along the route segment.

Table 1—Detail Needed for each Highway Content Type

Content Type			Content Detail							
	Non-urban	Urban	Location	Direction of travel	General description and Impact	Days / Hours and / or duration	Travel time or delay**	Detours / Restrictions / Routing advice	Forecasted weather and road surface conditions	Current observed weather and road surface conditions
Construction / Maintenance	✓	✓	✓	✓	✓	✓	✓	✓		
Road Closures / Major Delays	✓	✓	✓	✓	✓	✓	✓	✓		✓
Major Special Events	✓	✓	✓			✓	✓	✓		
Weather and Road Conditions	✓	✓	✓		✓				✓	✓
Incidents / Accidents (Minor)*		✓	✓	✓	✓					
Congestion Information*		✓	✓	✓	✓		✓			

* Major congestion information and incident / accidents are considered part of the "Road Closures/Major Delays" content type

** Desirable if the deployer has the capabilities to include this information as part of the service

c) Additional Implementation Considerations

The following "implementation considerations" address content topics that have been demonstrated to provide value to callers, but are recognized as difficult to uniformly implement. Thus, providing the following content is recommended to be included when launching services if possible, but not explicitly part of the basic content package for highways. As services improve and evolve towards the long-range vision, these items should be incorporated into the service if not done so at the outset.

- *Segment Travel Times or Delay* – Particularly in urban areas, estimated travel times across a route segment have proven highly desirable by callers. Travel times could be provided each in absolute terms ("segment travel time is 24 minutes") or in terms of delay from normal conditions ("segment travel time is delayed 5 minutes"). In the case of absolute travel times, it is recommended that the provided travel times not be faster than what travel times would be at the speed limit. In urban areas, multi-segment or corridor travel times would also be acceptable. Segmented travel times offer an opportunity for the private sector to serve as a data provider. For example, the Tampa, Florida area purchases data from a private entity to provide travel times to the public, which still leaves personalized travel information as a potential premium service for the private sector.
- *Observed Weather and Road Surface Conditions* – Observed or measured weather information may, when combined and processed with other road and weather data, form the basis in predicting and providing callers with segment or route-specific weather-related travel conditions.

3. Basic Transit Content

Regardless of the size and nature of a 511 service area, there will likely be one or more public transportation service providers in operation. In many cases, these public transportation operators already have established methods of communicating with the public about their services, including websites and customer service centers accessible by telephone. If these existing communications methods are properly utilized and coordinated with, 511 can assist public transportation operators in better serving their customers and even attract new customers. The following Guidelines should be considered when developing the public transportation information component of a 511 service.

There are many different approaches that agencies can take to implement the transit portion of 511 services. These Guidelines are intended to maintain this implementation flexibility.

a) Principles

Telephones and web-based information services have proven to be extremely important for transit agencies. The principal use of these services is to provide general agency and service information, news about service disruptions and changes and assistance with trip planning. At the basic content level, 511 should help callers get general agency and service information and communicate service disruptions and changes. Additionally, it should assist them in obtaining more detailed information and trip planning.

The following basic principles should be followed:

1. *Information on All Transit Agencies in the Area Should Be Available* – Often, one or two dominant public transportation agencies exist in an area, but many more exist that collectively make up a region's public transportation system. All of these operators should be accessible via 511. In complex or large geographic areas, it may be necessary to subdivide areas before identifying specific agencies. For example, the San Francisco Bay Area does not use sub-regions; one of the benefits of having a voice recognition system. The system asks callers to say the name of the transit agency that they want or, if they do not know, the name of the city or county in which they are traveling. The 511 system lists the agencies serving that city or county. If the caller still does not know which agency to say, the system takes the caller to the menu of the predominant local transit agency for the selected city or county.
2. *511 Works in Conjunction with Transit Customer Service Centers* – 511 is not intended to replace these operations, but to (a) provide compatible and supplemental information, usually in the form of recorded messages and (b) connect callers to transit agency customer service centers, if so desired by the specific agency.
3. *511 Should Minimize Additional Customer Service Center Overload Via Automated Messages* – Collective wisdom is that 511 access could increase the number of callers seeking public transportation information. If 511 were merely designed as a shorter number to access the service center, this could significantly increase total calls to the customer service center. However, 511 systems can and should be designed to provide automated messages described in these Guidelines that will answer many callers' questions prior to seeking assistance from customer service center operators. Ideally, thoughtful design will reduce the number of calls to be fielded by operators thereby allowing them to handle only the calls that require their expertise and increasing the total number of calls successfully managed. 511 services must work in concert with the existing transit information call centers for it to be useful to the operating agencies.
4. *Each Agency is Responsible for its Information* – To ensure information quality and agency autonomy, any information provided via 511 for a particular public transportation operator must be provided or quality-checked by that agency. Callers will perceive agency specific information as coming from that agency, thus the agency must either directly provide or ensure the accuracy of the information.

b) Guidelines

The fundamental structure of a 511 telephone system design matches public transportation operations. Telephone systems are usually accessed through a "menu tree" that is navigated by voice commands or by touching a phone's keypad. A caller reaches the desired destination in the system and gets either a recorded or digitized voice message, or possibly a live operator. In complex or large areas, the 511 service area may be segmented in sub-areas to simplify agency identification. Sub-areas may be dealt with by using voice recognition as described in the San Francisco example above.

Once the 511 service knows the specific public transportation agency that the caller is interested in, it then provides the caller with a report of the relevant basic content.

1. *Geographic Sub-area* – In large or complex 511 service areas, the service area can be subdivided for navigating and providing transit reports. This subdivision should be developed locally and represent a logical characterization of the service area, such as by travel corridor, geography (Internet, "The Northwest Suburbs," the "Southeastern Part of the State," etc.) or common name or nickname of a given sub-region (Internet, "Long Island"). Of course, 511 services that utilize sub-areas in their menu will require callers to make at least two navigating commands to select their agency, thus care should be taken so callers can reach their desired report as swiftly as possible.
2. *Agency* – Each agency that provides public transportation services in the 511 service area or sub-area should be accessible. A single report for each agency is the basic guideline. Agencies have the option to add more layers and depth to their content. For public transportation agencies with large or complex operations, a single automated report may either be too long and cumbersome or potentially confusing for callers. Therefore, basic content as described in the following section should be provided in a logically segmented fashion (Internet, by mode or by region).
3. *Content* – For each public transportation agency, the 511 system should have at least a single automated report that provides:

- *A Brief Description of the Agency's Operations* – Quickly address the type of transportation services provided and the geographic area served by the system. For example, "XYZ Transit agency, providing bus service in the greater ACME region." This element must be brief to minimize caller wait time.
- *Major Service Disruptions, Changes or Additions* – Provide information on temporary changes in services (specific routes, vehicles or access), alerts and / or summaries of scheduled service changes and details of extra services being used for current or upcoming special events.
- *Where Appropriate, an Option to be Transferred to the Agency's Customer Service Center.*
    - Convey the hours of operation of a customer service center before transferring a caller to it, since it may not be operational at the time. Attended transfers allow the call to return to 511 should the transferring agency's phone be busy or unavailable.
    - It is recommended that direct attended transfer options be established so that callers will directly transfer to an agency's customer service center without hanging up, essentially creating a seamless system from the caller's perspective.
- *Other "Broadcast" Information at Discretion of Agency* – Static information such as fare and pass information, real-time parking availability information and the agency's Internet address are a few of the examples of the information that an agency could provide via automated messages on 511.
- *Agencies may add More "Layers" to Reports at their Option*

4. *Weather and Road Surface Conditions* – Weather or road surface conditions that could impact travel along the route segment.

c) Additional Implementation Considerations

The following implementation recommendation addresses a content topic that has been demonstrated to provide value to callers, but is recognized as difficult to uniformly implement. Thus, providing the following content is recommended if possible, but not explicitly part of the basic content package for public transportation.

- *Regional or Corridor Specific Transit Information* – The basic content guideline for public transportation indicates that each public transportation agency should have automated reports. As technical capabilities and information collection techniques improve, it is desirable in areas served by multiple public transportation providers to allow 511 callers to request information based on location, instead of by public transportation provider. Infrequent users may not be familiar with the transit properties that serve their area and allowing them to request the availability and status of services based on location would permit them to make wiser travel choices. In addition, frequent users may be able to access status information about their usual routes more quickly than hearing a report for the entire transit property.

    - Where multiple agencies operate, enable search / sort by region or corridor in addition to by agency.
    - In complex areas, callers may not know what agency they are seeking information from.
    - This may result in additional complexity to the 511 system in some regions.

- *Observed Weather and Road Surface Conditions* – Observed or measured weather information may, when combined and processed with other road and weather data, form the basis in predicting and providing callers with segment or route-specific weather-related travel conditions.
- *Arrival Times or Travel Times* – Although no 511 system currently provides this information, systems are under development that would allow transit agencies and 511 to provide actual transit travel times or information about the arrival of the next transit vehicle based on actual conditions rather than the schedule.

4. Basic Weather Content

a) Principles

The overriding basic principle for providing weather information is simple: if weather will impact a person's trip, then they should be alerted to that actuality or possibility. Weather information is a basic component of 511 information provision and it is recommended that deployers provide travelers whatever weather information is available to them that may affect travel. This includes weather information provided by the National Weather Service and private sector value-added meteorologists, as well as roadway weather or surface conditions, both observations and forecasts, which can be provided by sensor data information gathered by maintenance and operations personnel. These reports should be segmented by route or trip where appropriate.

It is recommended that 511 services provide information on current and changing travel conditions and forecasts for upcoming weather phenomena that are likely to impact the ability to travel. This also includes the weather impacts on transit operations – on guideways, railways, pathways – and related passenger information such as wind chill effects on those waiting at bus stops. Deployers may look to various market packages in the National ITS Architecture for the origins for this type of information including: Environment Information Collection; Weather Information Processing and Distribution; Winter Maintenance; Maintenance and Construction Vehicle Tracking; Roadway Automated Treatment; and Maintenance and Construction Activity Coordination.

The gathering of weather data for maintenance efforts can be a prime source of information to be shared with travelers via 511.

Some 511 deployers may believe that there is no "weather" in their area and its impact on travel is not uniform across the country, but indeed there is "weather" in each area of the country. Weather impacts are different in the summer and winter months and a new realization on weather's regional impacts is arising. As part of an effort to determine road weather observing needs, the FHWA's Road Weather Management Program has stratified the country for weather conditions and by season.

The FHWA worked to divide the country by the effects of summer and winter weather by looking at a handful of weather elements within the top 61 metropolitan areas. Summer and winter indices were developed for each and the cities were then ranked. Based on the rankings, the country divided up into categories – 5 for winter and 6 for summer. Category 1 areas are those in which weather events are most likely to have a more pronounced impact on travel. The categories give deployers a good idea as to the priority that weather information should take on their 511 system depending upon their location in the country. For more information on this stratification, see
http://ops.fhwa.dot.gov/weather/best_practices/WeatherInInfostructure2003.pdf

- Summer categories are a function of:
  - Days with measurable **precipitation** (summer)
  - Average number of days with **thunder** (summer)
  - Average amount of liquid **precipitation** (annual)
  - Probability of any named **tropical cyclone** (hurricane or tropical storm)
  - Average number of days with **heavy rain** (=> 2") (summer)
  - Average number of days with large **hail** (annual)

Because of the highly localized nature of fog and other factors affecting visibility, the factor analysis used to develop the indices was unable to incorporate visibility data.

- Winter categories are a function of:
  - Average number of days that the daily **temperature** falls to or below freezing (annual)

- Average number of days where measurable **precipitation** occurs (winter)
- Average amount of **snow** (annual)
- Average number of times peak **wind** speeds were > 50 mph (annual)
- Average number of hours that **ice** occurred per year

There may be specific geographic or climatological locations within these stratification categories where weather events have more pronounced or seasonal impacts, such as mountain passes in the winter months. In these cases, it is recommended that the 511 system serving those areas devote particular attention to these localized areas and conditions.

b) Guidelines

Weather information on a 511 system can range from a regional alert (hurricane, winter storm, etc.) to a route specific observation or alert (low visibility, icy pavement, high winds, etc.). Deployers should include any available weather-related information that could impact a person's travel and attempt to package and deliver the information in a consistent manner. The two keys to weather are relaying impacts and providing navigational references to aid the traveler.

- *Weather Related Impacts* – When current or predicted weather conditions might cause accidents, incidents and delays, it is recommended that this be noted on 511. For example, there is a ten-minute delay at the bridge crossing due to high winds. This is at the heart of weather information provided on 511. In other words, it is not direct weather that is important to 511; it is the related impact that is important. This is why future generations of 511 will include weather in the context of travel rather than simply providing the "data."
- *Navigation Reference* – Weather information should be presented with a navigation reference such as: road segment; cities / towns; milepost; exits; major intersection / interchange to major intersection / interchange; landmarks; and rest areas.

c) Additional Implementation Considerations

The following recommendations address a content topic that has been demonstrated to provide value to callers, but is recognized as difficult to uniformly implement and may vary slightly based on local or seasonal need. Thus, providing the following content is recommended for inclusion in the launch of a service if possible. As services improve and evolve towards the long-range vision, these items should be incorporated into the service. It is recommended that 511 weather information be assembled and presented through a 511 system in the following manner:

- *Format for Depicting Road Condition* - The Society of Automotive Engineers (SAE) ATIS standard / message sets are appropriate for the sharing and presenting of weather information on 511. The ATIS and Traffic Management Data Dictionary (TMDD) – standards for center-to-center communication – committees are coordinating message set structures and coding to ensure commonality. See the section on standards below for more information.
- *Observed vs. Forecasted* - 511 users want to get more timely, accurate and relevant (e.g., location- or route-specific) forecasted information than they might on the nightly news or radio. There is a need for route-specific weather forecasts and the operational weather community is working on providing this data. It is recommended that a 511 deployer include

weather conditions and forecasts likely to impact the ability to travel. One way to accomplish this is through "Nowcasting"- a zero to three-hour statement of what is happening and the changing conditions that are important to travelers.

- *Frequent Updates* - It is recommended that weather condition information on 511 be updated frequently so that the information presented is the best available at the time. Weather forecasts and current conditions are available through a variety of means (RWIS, radar, etc.) and in a number of time frames. Weather conditions may change slowly or quickly and a 511 deployer needs to convey the impact of these changes to travelers. Thus, 511 deployers need to be cognizant of the time frame that weather conditions and forecasts may be ascertained and the resultant impact on travelers.
- *Road Surface Conditions* - Road conditions can change swiftly. Atmospheric and pavement sensor data can provide indications of conditions affecting traffic flow and roadway safety (e.g., low visibility, slippery pavement). Environmental sensor station (ESS) data are typically collected by Road Weather Information Systems (RWIS) deployed by maintenance managers. These managers can supplement observed data from ESS with information on maintenance operations (e.g., snow plowed, sand applied) to provide data on actual surface conditions. Route-specific road condition data are currently provided, through traveler information websites, by 39 state agencies. Deployers of 511 systems should coordinate with state and local agencies to access existing data from advanced road condition reporting systems.
- *Metropolitan / Rural Differences* - In non-urban areas, it is important to provide weather information on road segments before logical decision points along a route. If there is snow in the pass and chains are required, this needs to be conveyed to travelers well in advance so that they may put on chains, use an alternate route or delay passage. In urban areas, segments are more proximate to other areas and there is more information available on many segments that are relatively close to one another.

5. Enhanced Content

The Coalition recognizes that additional content beyond the basic content described in the previous section could be provided by a 511 service. In fact, so long as quality basic content is being provided, the Coalition encourages that 511 implementers consider providing additional content that will benefit callers.

Again, this enhanced content is up to the discretion of the system implementers and can include additional content supported by the public sector and / or private sector supported services. Based on local demographics or geography, some of these enhanced content categories would be expected by local callers. Implementers should factor in these expectations into their service planning process.

In providing additional content, implementers have essentially two choices:

1. *Go Deeper* – A richer set of basic services could be provided via 511. For example, information on more highway routes, such as major arterials, could be added to the basic system. More detailed content could be provided on public transportation services (e.g., detailed choices for automated messages could be provided – service disruptions may be a

different selection than parking availability at a rail station for instance – as opposed to a single automated message). Another possibility is that an agency or region could choose to greatly improve the accuracy, timeliness or availability of their information, improving its quality but not adding further content.

2. *Go Broader* – Many additional content categories have been considered for inclusion in 511 services, but are not part of the basic content package.

The following list is representative, but not complete, of the possible enhanced content categories. Implementers may choose to implement these and other types of content *(Please note that the Coalition is not assessing the merits of each of these content options, merely providing them for deployer's consideration)*:

- *Tourist Information* – Specific information about local tourist attractions, tourist information centers, convention and visitors bureaus, etc. could be recorded messages or connections to live operators.
- *Special Events* – Information pertaining to major special events occurring in a service area. The information may go beyond transportation-related information to include event-related information such as times, locations, event descriptions, etc.
- *Parking* – Parking location and possibly parking lot status information.
- *Local Information / Points of Interest* – Information such as restaurant locations, gas stations, taxis, etc. could be extended to include reservation services.
- *Interregional Information* – Information pertaining to transportation conditions in other, perhaps adjacent, regions. Examples include extension of an interstate travel corridor, a major city in an adjacent state and multi-state hurricane evacuations. Depending on how your "region" is defined, this may be "basic" content accomplished by a call or data transfer.
- *Driving Directions* – In a voice-activated 511 service, callers can provide their location and their desired destination and obtain driving directions. These directions could be based upon real-time conditions and / or can include estimated trip travel time if such information is available.
- *Public Transportation Trip Itinerary Planning* – In either a voice activated or operator-assisted environment, callers can obtain transit trip plans that could include routes, transfers, costs and trip times.
- *Multimodal Routing and Trip Planning* – Integrating information from multiple modes (highways, transit, rail, air, etc.), callers can obtain a complete trip itinerary that is as efficient as possible, regardless of mode.
- *Incident Reporting* – 511 is intended primarily as an information source for callers. However, systems can be designed such that callers could report incidents through 511 as well, either by communicating directly with an operator or by leaving a voice message. Doing so, however, can place a significant burden on operators and should only be undertaken if there is excess capacity within the operations staff.
- *Local Transportation Facilities Information* – Callers can obtain information about major transportation facilities in the 511 service area, including airports, train stations, ferry, freight and cruise ports. Information could include parking and traffic conditions associated with the facilities.

- *Local Transportation Services Information* – Callers can obtain information on transportation programs in the 511 service area, such as carpools and vanpools.
- *Concierge Services* – Operators can provide any of the above information to callers. These operators could also handle additional services, such as reservations and purchases.
- *Personalized Services* – Callers can provide profiles of their normal travel patterns and the system, by recognizing the phone number of the caller or some other method, can provide a complete report along the caller's route (e.g., the conditions on a commuter's complete normal route), without requiring callers to locate and review reports on multiple route / corridor segments.
- *Caller Reports* – Callers can report conditions that require a response by the transportation agency, such as hazardous road conditions, dead animals or potholes.
- *Motorist Aid* – Some states are considering using 511 to allow transfers to motorist aid services. While this might provide a convenience to some motorists, many callers might try to get current traffic information from the motorist aid dispatch center, putting an undue burden on them.

In examining the addition of enhanced content, system implementers should be careful to design a system that complements – rather than diminishes – the impact of the basic content services. Also, each of the options listed above may require extra and complex interactions to provide via 511. As these are intended to be illustrative examples, assessments of the relative practicality or merits of each enhanced content category are not provided

Across the country, enhanced content has been limited in its use, to date. The first 511 service to provide enhanced tourism and travel-related services was the I-81 Region 511 service in Virginia, which included information on lodging, restaurants and "things to do" in the I-81 corridor. On average, 8 percent of the callers each month accessed the available travel services section of the menu, with approximately 90 percent of those callers selecting lodging. With the statewide launch of the service in February 2005, calls requesting travel services decreased to 2 percent of total calls with lodging selections at 58 percent, food at 36 percent and gas and attractions and shopping both at 3 percent. The Auto Connect feature is dual purposed: safety and convenience. This system uses voice recognition for the queries and is fully automated using both text to speech and recorded messages. Virginia is now testing a cost-effective approach to expand travel services statewide since beginning to serve the entire state in February 2005.

The Metropolitan Transportation Commission (MTC), operator of the 511 service for the San Francisco Bay Area, has included enhanced services that are expected by their callers. Those enhanced services include information on bicycling and carpools / vanpools. The carpool / vanpool information is provided via a call transfer to a regional or local rideshare operator, depending on the jurisdiction that the caller is interested in.

Kentucky has travel and tourism information available through the Southern and Eastern Kentucky Tourism Development Association. Their service allows callers to speak to a live agent who has access to a large database of specific information relating to the amenities,

attractions, events and other activities found in the 42 county Southern and Eastern Kentucky region.

Other states, such as Vermont, have a strong desire to provide tourism-related information through their 511 services. Many states see the solution being a call transfer from the 511 service to an existing statewide tourism call center, thus eliminating the need to incorporate outside data feeds or upgrade databases.

C. Telephony Guidelines

1. Description of 511 Phone Service

The key telecommunication elements of a 511 service allows the system to accept calls, interact with the users, process queries and commands and provide useful information back to the callers. Each of these system elements must be properly planned and must function consistently to have a successful 511 service.

a) Accepting Calls

The service should be capable of accepting calls from both wireless and landline phones and do so without extensive delay to the caller. The call should go through and be routed to the proper answering point, be it a local or toll-free number. See additional related information on System Access Quality and Call Routing in later sections.

b) User Interface

To most callers, the user interface is the system. For most 511 services today, the interface is a voice recognition system with a touchtone back up. If the interface does not work properly, does not recognize commands consistently or is cumbersome to use, then the 511 service is not meeting the needs of the caller, no matter how good the underlying information is. The User Interface Guidelines can be found in section D below.

c) Data Storage / Management and System Logic – Processing Commands

Data for 511 systems is typically stored in one or more computer servers, which can be located on-site at the implementing agency or off-site with a contactor. Both system arrangements have proven to work effectively. Currently, there is no specific guideline for how data is stored or how commands should be processed. However, the system should be designed to minimize the delay in processing the command to reduce the amount of time that the caller is required to stay on the phone. Most of the systems deployed today, typically, process a command within one to three seconds. Any delay longer than a few seconds is very noticeable to the user and may prompt them to terminate the call.

d) Output – Providing Information

Information should be provided in a succinct message, which conveys all the necessary information to allow the caller to determine if an action needs to be taken on the caller's part to improve the quality of their trip (reduce delay, avoid hazardous conditions, etc.). The result of the command, or query, should be delivered in a consistent voice and manner and should be of high-quality.

2. Call Routing

A successful 511 service has seamless and reliable call routing, which should go virtually unnoticed by the user. Simply put, the call goes through and the call gets answered. The early deployers have taught the rest of the country that call routing and carrier coordination is not a trivial matter, be it for landline or wireless carriers.

a) 511 Call Routing Basics

The routing of the 511 dialing code is completed in two basic ways – landline and wireless. When 511 is called on a landline phone, the call is received by the telephone company Central Office and translated into a 7 or 10-digit number. The call is then sent to that "terminating" number, where it is answered by an automated IVR system.

For wireless calls, when 511 is called at the handset, the call is received by a cellular tower, carried to a switch (and in some cases to the mobile telephone switching office) and then sent to the public switched telephone network (i.e., the landline network). At nearly any point along this path, the 511 code can be translated into the 7 or 10-digit terminating number for routing it to the automated IVR system. Each of these routings may have various cost implications associated with them.

In either of the above cases, the translation should be seamless to the caller. The caller calls 511 and the call is routed to whatever terminating number will answer the call at the information service.

Routing charges associated with translating one phone number to another for the purposes of connecting a call to the 511 service generally come in two varieties:

- **Translation to a Local Designated 7 or 10-digit Number.** This translation must occur, as all systems will reside on the phone network as a "regular" phone number. This terminating number may be on-site at a DOT facility or off-site at a call center facility operated by, or under contract, with the IVR service provider.
- **Translation to a Toll-Free Designated Number Prior to Termination.** This translation occurs for each call in a system where the calls are translated to a toll-free number and then carried to the IVR 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 (in the case of an on-site solution). Combining this approach with use in urban centers of a local number as described above enables the system to provide free calls to rural callers while minimizing the cost of the toll-free system by reducing the number of toll-free calls. Arizona has designed its system in this manner.

b) Call Routing Coordination

Call routing coordination primarily consists of number allocation and service coordination. Implementing the 511 dialing code is based on negotiations with both landline and wireless carriers and, as necessary, discussions with the Public Utilities Commission (PUC) or Public Service Commission (PSC). Costs for "turning on" a 511 code are highly variable and depend on, among other things: whether there is a tariff in place for 511; the implementer's use of a

single statewide number or multiple regional numbers; the implementer's use of local numbers, toll-free numbers or both; the implementer's ability to work with local wireless carriers to match landline carriers in implementing the 511 code; and, perhaps, using a separate "local back-door" number for wireless calls in order to minimize toll-free or tariff charges based on the configuration deployed.[1]

The PUC or PSC in your state can be a tremendous asset when planning a 511 service. The Commission can assist the deployer in identifying all of the carriers in the state and is typically knowledgeable on what role they play in delivering 511. However, 511 deployers have experienced a wide range of interest from Commissions ranging from casual observer or advisor to an active partner in the process characterized by attending meetings with carriers and reviewing telecommunication-related materials.

The Commission can also determine if any formal documents need to be filed, the 511 number has to be officially assigned to a particular state agency or the FCC order is sufficient. The early deployers experienced all of these extremes.

Contacting all of the landline and wireless carriers within a state is a large undertaking. Experience has shown that deployers should be prepared to communicate directly with three individuals per carrier to reach the appropriate person to provide the call translation. An average state may have as few as one and as many as 40 landline carriers (ILEC and CLEC) and ten or more wireless carriers. The number of payphone operators in a state can be in the hundreds. See Section 3.E below for additional discussion.

Carrier coordination is one area where most deployers experience their biggest delays in developing a 511 service. Many deployers have discovered that a carrier can require up to six months or more to complete the necessary discussions, paperwork and perform the required programming to properly route calls. Some deployers have been forced to launch systems without having all major carriers on-board. While business decisions made by some carriers have impacted access timelines, deployers have also run into issues due to underestimating the time and level of effort required to incorporate all carriers into the 511 service. In particular, many agencies may need to have their legal offices (either within their departments or in the state attorney general's office) review and approve of any agreements with the carriers. Failure to account for the time needed for legal review can either delay a launch or lead to a launch with only some carriers providing access to 511.

Another element to the number allocation process is determining if any entity or business is already using the 511 code, typically through a wireless provider. If the deployer discovers that the 511 code is being used, then the entity must be allowed an appropriate amount of time (typically six months) to migrate to a new number. While most deployers have not run into this

[1] The use of a local back-door number is only beneficial when a wireless carrier's calling plans allow for local calling over a wider area than a landline carrier's. 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, are considered local calls and no toll charges apply. Using a local back-door number for wireless can thus alleviate some of the local 511 tariff associated with landline translations, as well as certain toll-free charges that might apply.

issue, the Southeast Florida and Central Florida 511 services did. During the planning stages, it was determined that the 511 code was being used by a dating service in the Miami area, which had contracted for the number through BellSouth. The contract stated that the user of the 511 number would have six months to migrate to a new number should the 511 code be assigned for another purpose. In addition, the 511 number in Louisiana was being used by an ambulance service. Instead of asking the company to vacate the number, Louisiana Department of Transportation and Development (LaDOTD) is considering the possibility of allowing the company to remain as a menu choice on 511 – in effect, sharing the number. While we do not recommend this approach, as it may lead to caller confusion, it is an option if there are political issues or other compelling reasons to allow the incumbent to continue using 511.

3. 511 Service Access

For many potential users, access to 511 can depend on how the deployer addresses key regulatory issues, including access for those with disabilities, limited English skills and environmental justice principles. All of these access-related decisions need to be considered in the planning stage and implemented when and where appropriate. Landline and wireless phone services are the primary access points to 511 systems and will continue to be for the foreseeable future. Deployers should also be prepared to handle issues related to Private Branch Exchanges (PBX), payphones and other new technologies. Figure 1 shows the various types of phone services that can feed into a 511 system.

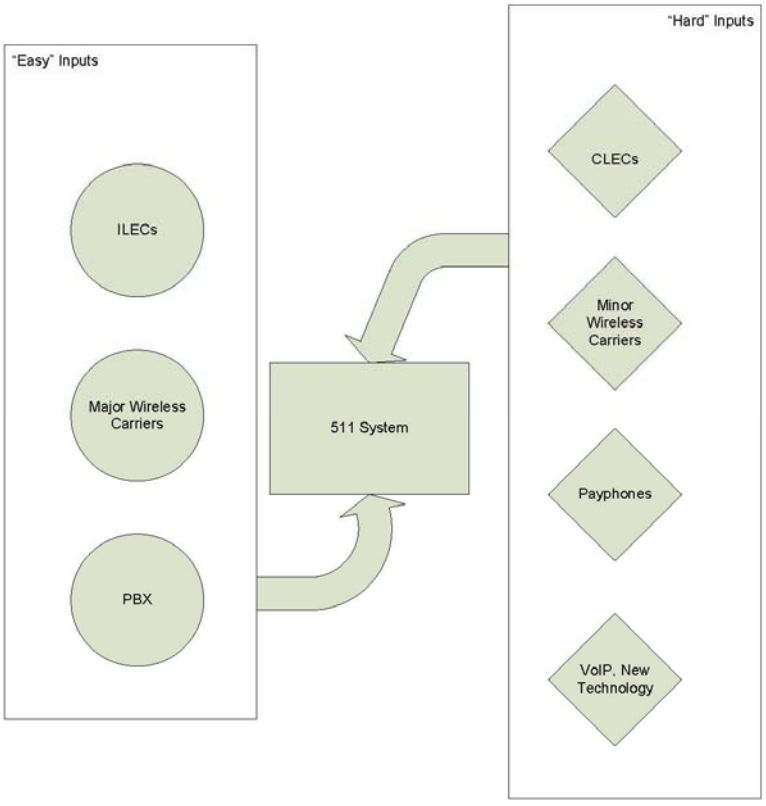

Figure 1—Telephone System Inputs

Many deployers assume that their 511 service will be used primarily by people on the move utilizing wireless phones. In reality, the limited data available show that landline callers make up a significant portion of 511 calls. Based on this limited data, a deployer should recognize that choosing to launch a wireless-only service will greatly reduce the utilization of the system and, if left in that access mode too long, may discourage people in the future from placing a landline call to the system once the system can receive those calls. Engaging both landline and wireless carriers as early as possible in the planning process is critical.

a) Landline

There are two types of traditional landline phone service providers: ILECs and CLECs – also known as ALECs. ILECs are successors of the traditional "Baby Bell" phone companies, having been licensed to provide local telephone services prior to the Telecommunications Act of 1996; these carriers dominate the market in nearly every state and region. CLECs are new, "competitive," telephone companies, having entered the local telephone market in 1996 or later. Most states have dozens, if not hundreds, of CLECs registered to do business, but their total market share is usually less than 5 percent. Realistically speaking, if a 511 deployer makes arrangements with the ILECs in its region, it should have sufficient coverage. ILECs may, however, charge deployers for the costs of reprogramming their systems to recognize 511 and some ILECs also ask for recurring charges based on the number of translations of the 511 code they have to make.

While it is not necessary to get all of the CLECs to offer 511, it is likely worth the investment in time to do some basic outreach to them. The state PUC should have a list of all CLECs and they can be sent a letter asking them to recognize 511. Some deployers have received phone calls from citizens whose phone service is provided by a CLEC, wondering why they cannot access 511. In that case, the customers themselves can raise the issue directly with the CLEC. Finally, information on a co-branded 511 webpage can inform users and CLECs about this issue. Moreover, as the discussion below makes clear, there are an increasing number of ways in which local telephone customers can be served. Eventually, the cumulative market share of these alternatives may call for more activity from deployers to ensure that the maximum number of callers can access 511.

b) Wireless

There are five major wireless carriers (Verizon, Cingular / AT&T Wireless, Sprint PCS, Nextel and T-Mobile) and many regional and local wireless carriers with whom to coordinate routing of 511 calls; all the major carriers have implemented 511. With the exception of Cingular, the major wireless carriers usually have not charged a set fee for cell tower programming. Currently, Cingular has a standard charge of $400 to program a state or region, and between $25 and $100 per tower, although it is unclear how the Cingular / AT&T merger will affect this pricing structure. It is also unclear whether Sprint's proposed purchase of Nextel will have any effect on 511 services. Programming of individual cell faces on a tower to address bordering 511 services would incur a charge from the wireless company. Depending on a specific request for tower-level programming, some carriers may assess charges based on the number of hours required to perform the associated engineering and project management work.

c) Other Access Methods

While most 511 calls will come over traditional landline phones or wireless phones, there are other access methods to consider as well. These are PBXs, payphones, Voice over IP (VoIP) and other new technologies.

1. Private Branch Exchange

Many businesses, and some home offices, have their own PBX systems, which switch calls between internal users and external telephone lines. These systems require the caller to dial an access code (typically a "9" or "8") to reach an outside line and also cannot recognize 511 unless explicitly programmed to do so. Because 511 is relatively new, it is to be expected that some businesses will either not be aware of 511 or need time to enable 511 calls to be made directly by their employees through a PBX. In the meantime, deployers may consider encouraging callers to call the 10-digit terminating number for the system when calling from a PBX. While the reprogramming of a PBX is an issue, most implementers have not addressed it in a formal manner. As an option, some have placed programming information on their 511 website while most others have addressed PBX questions as they arise. In addition, deployers could work through chambers of commerce in their regions to provide information to businesses.

2. Payphones

To date, most 511 services have not aggressively pursued payphone providers to translate the 511 dialing code to a 7 or 10-digit number. The main reasons are that (1) there are many payphone operators in a given state or region, some of whom operate only one phone; (2) payphone operators are free to pass very high per-call costs onto the 511 system; and (3) it is unclear how many 511 users would call from payphones even with universal accessibility. As recently as a decade ago, payphones were seen as the primary way to keep in contact while away from the home and office or a way to link to family and services in case of an emergency, a role that has been subsumed now by the ubiquitous availability of cellular phones across all socioeconomic groups. Given these issues, most deployers are spending their time and resources on working with the landline and wireless carriers first. Deployers who wish to attempt to reach payphone providers may try to do so through a statewide association, having the dominant ILEC for the region provide 511-related information to staff who deals directly with payphone providers or having ILECs send informational letters to the payphone operators that they serve.

3. Voice over IP

The last few years have seen the rise of VoIP services. These telephone services, which can serve both homes and offices, bypass traditional phone lines completely and instead offer telephone service using the customer's existing high-speed Internet connection. These services generally do not recognize 3-digit dialing codes, as most 3-digit codes are both associated with regulated carriers and are specific to the service's geographic locations, neither of which applies to VoIP. While the number of total subscribers to these services is currently minimal, it is growing rapidly. Some VoIP providers are starting to try to define the locations associated with their subscribers' locations, in order to provide 911 services and, conceivably, other N11 services. In such cases, the subscriber must register their location with the VoIP provider. Other options for reaching these callers include publicizing the 10-digit number, possibly in cooperation with VoIP providers or cross-marketing the 511 webpage for the region, since VoIP

subscribers, by definition, have high-speed Internet access. The Working Group's Future 511 Technologies and Services Task Force is tracking the VoIP issue and is developing a white paper exploring its impact on 511. This white paper will be available on the http://www.deploy511.org website in the future.

4. Call Transfers

Call transfers can play an important role in providing a comprehensive and useful 511 service. There are multiple reasons to provide such transfers, including coverage issues due to cell tower and wireless switch location issues, cross-border travel and services not typically provided by the implementing department or agency.

a) Bordering 511 Systems

Transferring calls across regional coverage areas or state lines between 511 services is one way to offer callers additional relevant information. Some states have chosen to eliminate the issue entirely by banding with bordering states and seeking a single service provider. This feature, sometimes called "Application Sharing," allows the call to be transferred internally within the structure of the overall, multi-state service application (or application transfer). However, other states are working with bordering states to determine the best way to handle call transfers.

b) Other Call Centers / Services

Having the ability to transfer to other call centers or service providers is important in providing a comprehensive 511 service and meeting user's needs. For example, a state DOT may be the lead developer and operator of a 511 service and wish to provide information on city-based transit systems, coastal ferries or tourism information. Without adding content to the DOT database, the system can simply transfer callers to the responsible agency or service provider capable of maintaining accurate and timely information. MTC is operating this type of service in the San Francisco Bay Area.

c) Transfer Recommendation

Deployers should use call transfers to provide a comprehensive 511 service when appropriate and / or necessary either functionally or financially. When transferring the caller out of the 511 service, either to another state's service or a call center of some type, the caller should be notified that they are leaving the 511 service and may not be able to return without making another phone call. As an option, the system could be designed so that the caller can be transferred back from the receiving service's menu tree which does have cost implications. This applies to transfers across borders or between modal systems and service providers. For example, because North Carolina DOT and VDOT share a long contiguous border, with resulting coverage issues, the two states have agreed to offer their 511 callers the opportunity to transfer to the neighboring state's 511 service. Virginia is a menu option in the NCDOT 511 service and North Carolina is a menu option in the Virginia 511 service. A 511 system can also be designed so that it does not release callers to the transferee system until that system picks up. Known as an "attended transfer," this feature provides that, if the receiving system does not answer, or if the line is busy, the call is taken back into the original 511 system.

d) 911 Linkage

While it is technically feasible to transfer a 511 call to a 911 call center, implementers should examine a number of key issues that must be considered before choosing to do so. Any region considering this capability must research the liability and privacy issues associated with 911 call processing. The liability protection currently offered the telecommunications industry and 911 call centers does not apply to transportation agencies or their contractors. Also, there would be both non-recurring and recurring costs to the implementer for this capability. To date, no 511 services offer a direct linkage or call transfer capability to any 911 call centers. DAR #2, addressing this topic, may be found at: http://www.its.dot.gov/511/511to911.htm.

D. 511 User Interface Guidelines

This section addresses the elements of 511 most apparent to the user: the way in which the system interacts with callers; menu structure; and additional ways to get information.

1. Choosing a User Interface

It is recommended that implementers use voice recognition as the primary user interface. While touch-tone systems are still common, people in general are getting much more accustomed to voice-based systems. It is recommended that systems also have a parallel touch-tone menu as a back-up to the interactive voice menu. This menu can be either a full parallel menu or a series of more limited menus designed to help the caller during error handling. Providing these options allows people who are unable, for whatever reason, to use the voice system to access 511 information. This includes not only people with speech impairments but also those who have strong accents and those trying to use 511 in a noisy environment.

There are three general ways in which the messages containing information can be generated: text to speech, pre-recorded and concatenated. In a text-to-speech system, the messages are provided in a computer-generated voice that has converted textual information into speech. While these offer flexibility and relatively low costs, callers tend to not like the quality of the speech. In a pre-recorded system, live operators record entire messages ("Slow traffic on Interstate 41 through Centerton. Please use caution") that are inserted into the 511 system depending on conditions. These can either be recorded in advance or on an as-needed basis. These messages often sound the best but, unless live operators are available to make recordings, they limit the flexibility of the system. Finally, concatenated speech systems have recordings, usually in .wav file formats, of all of the components of traffic messages (including such things as road names, types of incidents, directions, the effect of incidents, etc.). The system then combines these .wav files to create reports on 511. Many systems use more than one of these options.

2. Greeting and Menu Structure

The initial greeting should be short and to the point, along the lines of "Welcome to [program name] 511 for Travel Information." Customers expect a short verification that they dialed correctly, but do not want a lengthy introduction or catalog of agency names. Supplemental information such as website addresses or complete help instructions should not be included in the initial greeting, but rather provided through menu selections. Some services name the

sponsoring departments or agencies to add credence to the information being distributed, but care must be taken to keep this and any advertising message short.

For voice activated systems, the following top-level commands should be used when a system has the relevant information available: “Highways”; “Public Transportation/Transit”; “Weather,” and “Help.” Top-level menu commands beyond these basic services are acceptable but care should be taken when adding additional top-level commands to select descriptive terms that do not conflict with the basic terms used here and also do not provide too many top-level options. Five to seven is considered the maximum number of options that should be available on the main menu. It is possible that the specific top-level menu commands may change in future updates of the Guidelines based on information collected through user input and system evaluations.

Systems with touch-tone back-up should use the following top-level menu tree: 1 for “highways,” 2 for “transit,” 3 for “weather,” and 9 for “help using the system.” Although not defined as part of the basic content package, 4 should be reserved for “airport and other major terminal and transportation facility information.”

Below the main menu, overly complicated menu trees should be avoided. Systems should not require the user to make more than 3 entries or replies before providing the desired information. At each level, no more than 6 options should be listed. Systems should allow users to request that messages be repeated and to “go back” in the menu tree.

3. Floodgates, Short-cuts and Barge-Ins

These are all tools for either providing additional information or allowing callers to improve their navigation of a 511 menu. Floodgates are used primarily at the main menu but can also be placed anywhere in the system, as long as the system is so designed. The main use of floodgates is for major emergencies or events of region-wide significance, in which case a floodgate will be placed just after or just before the initial greeting. If floodgates are enabled for specific facilities, such as bridges or tunnels, then significant information about that facility can be put in a floodgate that will play before the ordinary information that a caller might hear upon requesting information about that facility. Floodgates can either be interruptible or not, depending on the system design. In some cases, they are set universally in the system (i.e., every floodgate is either interruptible or not) while in other cases, the interruptible feature can be set for individual floodgates.

“Shortcuts” are built into systems to enable repeat callers to jump directly to the level of the menu they want. When a shortcut is enabled, the 511 system will recognize commands that are not listed on the main menu. Thus, in the menu description above, if shortcuts were enabled, the system could recognize, in addition to the main menu items, lower level menu items such as “traffic conditions” or “transit agencies.” The use of shortcuts is encouraged and they have been successfully employed in many systems.

“Barge-in” is another system design feature that enhances the user experience. When included in a system, callers do not need to wait for the system to finish speaking before saying their choice. Thus, as soon as they hear the option they want, or earlier if they are repeat users, callers can “barge in” to (or interrupt) the system and have their selection understood. This feature is

becoming increasingly common. System performance measures that 511 deployers may be interested in tracking on a regular basis are available in Appendix C.

E. Service Quality and Access Guidelines

The quality and availability of the 511 service are important in attracting and retaining users. Users receive no benefit from a service that contains accurate, timely and relevant content, but is inaccessible. These Guidelines address the system access quality and the hours of operation of a 511 service.

1. System Access Quality

In order for the telephone system to have the ability to reliably and quickly answer calls, a 511 service should be sized to accept all calls for the 90th percentile peak hour load.[2] If live operators are utilized, or connected to, as part of a 511 service, the 90th percentile wait time should not exceed 90 seconds and callers should receive indications that they are on hold. 511 services should have an availability to callers 99.8 percent of the time. This translates to the system being out of service less than 18 hours a year. While the focus here has been on insuring that a 511 system has a sufficient number of incoming lines, this availability guideline also means that the underlying system needs to be running and providing information as designed 99.8 percent of the time.

System performance against these parameters should be measured and monitored. Most implementers are meeting these Guidelines by employing an application service provider (ASP) that operates the telephone answering ports (phone lines) and uses a voice recognition software package, which is all located off-site (even across the country in some cases). By contracting this portion of the 511 service, or all of it, an implementer can benefit from the ASP's existing infrastructure, allowing the system to easily handle enormous peaks in call volumes. Other deployers, however, have been successful by contracting for the full development and operation of their 511 system without the use of an ASP. This solution, while potentially more complex, has offered cost savings in some cases. Finally, some systems share telephony ports in order to meet peak system demand.

2. Hours of Operation

511 services should be available to travelers 24 hours a day, 7 days a week. In the mid and late 1990s, consumer research and anecdotal information showed that travel information systems solely designed for the weekday commuter and only operated during specific business hours were found to have limited use and applicability. Travel information is just as important, or possibly more so, to someone traveling late at night or during the weekend than to a daily commuter. With an automated system, receiving inputs from multiple sources and using non-recorded messages, a 511 service can operate around-the-clock. To date, all 511 services deployed are accessible 24 hours a day. Nevertheless, it is recognized that systems may not

[2] 90 percent of the time (21.6 hours of the day, 7884 hours of the year, etc.), a 511 system should have the system capacity to handle 100 percent of incoming calls. This guideline recognizes that extreme conditions will occur periodically that will increase demand well beyond "normal peak" calling. In those circumstances, it is in not unreasonable to ask callers to re-dial to access the service.

always be "operated" 24 / 7. In instances when the system is providing static, pre-recorded messages, systems should inform the caller that it is outside normal operating hours.

3. Accessibility Concerns of Americans with Disabilities Act (ADA), Multi-lingual and Environmental Justice

When designing a service for the general public, the lead agency must be cognizant of the various federal and state legislative mandates and requirements to ensure access to transportation information by all citizens. The lead agency should therefore review any legislation, regulation or policies (departmental or otherwise) that might impact the service's architecture and design. Such consideration should include, but not be limited to, the ADA, multi-lingual needs and environmental justice issues.

To comply with accessibility laws and regulations, implementers need to consider that under Section 255 of the Telecommunications Act of 1996, carriers and equipment manufacturers must provide access to and make their services and products usable by, individuals with disabilities "if readily achievable." Title II of the ADA prohibits public entities (states, local governments and any department, agency, or other instrumentality of state or local government) from discriminating against those with disabilities in all services that they provide to the public. 511 implementers should include in their design plans how they intend to provide access to these services to the disabled community, such as through the carriers' existing Telecommunications Relay Service (TRS) or TDD-TTY capabilities. In many states, this means making the public aware that they can access the travel information service by dialing 711 for text relay and asking to be connected to the 511 service (either by asking for 511 or, in situations where the relay service serves more than one state, by providing the back-door number for the system).

To address ADA-related concerns in developing the 511 service and co-branded website for the San Francisco Bay Area, MTC hired an ADA consultant and used input from its Elderly and Disabled Advisory Committee (EDAC) staffed by volunteer citizens. MTC was able to make some enhancements to the system while still in development and made additional improvements and system modifications based on additional comments received by EDAC members.

Deployers must be mindful of not only the ADA requirements, but also of how those with disabilities are impacted by the design of a 511 system. This includes using the appropriate tones, voices that are easier to hear and building in an allowable delay for those using text relay services.

Access to 511 services for Limited English Proficient (LEP) callers should be considered when planning a system. 511 implementers should review Executive Order 13166, signed by President Clinton on August 11, 2000 and the supporting "Guidance to Recipients on Special Language Service to LEP Beneficiaries" issued by USDOT on January 22, 2001 to determine its applicability. To date, the only services that are bi-lingual are the Southeast Florida and Sacramento telephone services and the Maine website. SmartRoute Systems, which operates the Southeast Florida service, achieves this by providing instructions to the users in English or Spanish, then subsequently provides recorded messages for key routes, selectable via touchtone, in the selected language.

Regarding environmental justice, the Civil Rights Act of 1964 and a 1994 Presidential Executive Order address the Federal government's responsibilities to assure that programs or activities receiving federal financial assistance adhere to environmental justice principles that prevent discrimination against minority and low-income populations. 511 services that use Federal funds must adhere to these rules.

F. Webpage Guidelines

Motorists, commuters, tourists and other travelers seeking travel information are growing increasingly technology-savvy and have come to expect that information pertinent to their trip is available on the Internet. Websites offer a wealth of pre-trip information to the potential traveler and the availability of accurate, reliable data is critical to many users. A co-branded website, while not previously covered under the Implementation Guidelines, is often considered a standard part of a complete 511 service. In some cases, however, states that do not have a 511 system have pre-existing traveler information webpages. For example, Georgia has branded its traveler information website as NaviGAtor and will likely be unwilling to modify it to call it 511. Creative co-branding options could include "NaviGAtor, powered by 511," or a 511 domain like http://www.511ga.com that points to the NaviGAtor website, if there is a desire to tie the two services together.

One high-level "lesson learned" from past ATIS deployments is that a website must first identify the intended audience in order to best serve that audience's needs. In the past, DOT's have thrown in available ITS elements to a currently operational website otherwise used for internal DOT news and project updates. The result is a lack of focus and a lack of true value to the customer. A 511 website must be user friendly, offering a snapshot of information at a glance and provide more detailed information. The task is not easy; there is a challenge in providing all information pertinent to a traveler's trip in a simple, yet thorough manner.

1. Content

a) General

The content available on a co-branded 511 website will be similar to the information offered on the 511 telephone service. While the structure may not be identical, basic content will be represented textually similar to the 511 phone system; the website will include added graphical representation. The data disseminated via a 511 website will be generated from the same data stream(s) that feed the 511 system, thus resulting in a high level of commonality between the phone service and website.

b) Traffic Cameras

Traffic cameras are a critical part of a travel information website and are a significant feature of many traffic webpages. Still shots and short clips of traffic video should be available, depending on existing infrastructure within each region.

2. Design

The centerpiece of a travel information website is an interactive map of the coverage area, including pop-up icons with event information and / or color-coded congestion, with an

accompanying textual list of events. Some deployments feature maps created using a GIS database and others are "hand-drawn" to better serve a region's particular needs. An interactive map lets the user determine at a quick glance the area covered by the service and allows them to get graphic information related to their route or area.

The interface should be designed to minimize load times and the number of "mouse clicks" necessary to view the desired information. All links and icons should provide context help in the form of "mouse-overs" that describes the function and / or purpose of the corresponding link or icon. The overall visual design of the interface should be easy to read, using brief, non-technical language that is readily understandable by the average user and easy to use for a user with basic computer skills.

On the website, it is not necessary to segment roads as it is with the 511 phone system. While the length of one entire road within the coverage area will often have an overwhelming amount of information from the perspective of a phone users, the same is not true when dealing with an interactive map. A user can glance at an entire roadway and simply choose the area desired. An interactive map will let the user chose the desired area and receive information available for that road / corridor / region.

It is considered good practice to ensure that the website meets ADA guidelines by being accessible to people with various visual impairments. This can involve making the colors changeable, using different textures to denote items on the map and including tags to enable screen readers to navigate the webpage.

511 deployers may also offer additional 511 co-branded websites that are specifically designed for access by Internet-capable mobile devices. The Utah DOT and Utah Transit Authority developed http://www.ut511.com to provide en route information to wireless equipment. Without broadband data access and capability, these mobile websites need to be structured differently to appropriately display 511 information. Other examples of ATIS websites specifically designed for mobile applications are from Washington State at http://www.wsdot.wa.gov/traffic/seattle/products and the GCM Corridor at http://www.gcmtravel.com/gcm/cqt.jsp with the following caveat "this feature is not intended for use while operating motor vehicles."

Finally, state DOTs or other 511 deployers should ensure that they work with their state information technology department. In many cases, those departments have control over the look and feel of state-run websites.

3. Domains

The domain name for a 511 website should include "511" in the title along with something to give a sense of the coverage region. Some examples include:

- http://www.511.ky.gov
- http://www.511mn.org
- http://511.alaska.gov

- http://www.511virginia.org
- http://www.az511.com

4. Website Usage Statistics

Co-branded 511 website statistics are a new endeavor for the Coalition. The Coalition seeks to gather data relating to the usage of co-branded 511 websites on a monthly basis as its does for the 511 telephone services. The Working Group has decided that the sharing of this information is valuable to them and that it should mirror the information gathered on 511 telephone services for comparison and simplicity. The website statistics gathered by the Coalition are available in Appendix B.

G. System Monitoring Guidelines

System monitoring is a crucial function for 511. Not only does it help agencies manage their projects and direct resources more effectively, it also can be useful when seeking funding to continue or expand 511 services. Monitoring can be divided into three primary system categories: Usage; Reliability; and Accuracy.

1. System Usage

The 511 Deployment Coalition asks that 511 deployers report usage statistics from their system each month. This usage information is valuable to the Coalition, other deployers and in marketing and outreach activities. As part of its National 511 Performance Measures, the Coalition reports on: 511 coverage for states; Top 60 metropolitan areas and population; quarterly total 511 usage and for systems operational for more than one year. These, and other usage statistics, help deployers gauge the consumer response to their service and enable comparisons between like systems.

The list of statistics tracked by the Coalition has been modified in this version of the Guidelines (see Appendix A) and were developed by the Working Group's Performance Measures Task Force. All deployers should forward usage data via email to Rubén Díaz at rubendiaz@pbsj.com.

Deployers should report their usage statistics to the Coalition no later that the 15th of the subsequent month, e.g., July's statistics should be transmitted by August 15. This will allow for the Coalition to continue tracking usage statistics as they are of interest to many 511 stakeholders. In the future, the Coalition may request that deployers gather additional statistics based on changing needs.

2. System Reliability

System reliability is the second key component of system monitoring. It is measured primarily by comparing the system availability with a pre-determined standard. These Guidelines recommend that 511 systems be available 99.8 percent of the time. This allows for 17.5 hours of downtime annually. Other metrics that could be used are Mean Time Between Failure (MTBF) and Mean Time to Repair (MTTR). It is important to focus on a few key metrics rather than try to measure every possible indicator of downtime, because system monitoring can demand significant resources if it is not narrowly focused to achieve project-related goals.

3. System Accuracy

System accuracy monitoring is necessary to ensure that the information that 511 provides to users matches actual conditions on the roadway. In many cases, 511 depends on information from external sources, the reliability of which may be uncertain and it will be difficult to ascertain for any given piece of information whether it is accurate. System accuracy monitoring is generally done by taking a sample of incidents (or non-reports) and determining, for a specific period, whether 511 was providing accurate information. If not, the lead 511 agency can work to improve the quality of the data feeds that it receives.

H. Marketing and Evaluation Guidelines

1. Marketing

a) Goals

511 is a true consumer service and effective marketing efforts are needed to ensure its success. The 511 message needs to be delivered to target audiences in the most efficient and effective way. The primary goals of a 511 marketing plan are to create awareness and use of 511 for travel information. During the development phase of a 511 project, the deployer should develop the 511 marketing theme and plan the marketing efforts, including goals for usage and awareness. The first true marketing opportunity, typically, is the system launch. Following that, during the operational phase of a 511 project, marketing needs to ensure that the public continues to utilize the 511 service. Existing 511 services' marketing efforts run the gamut from relatively low-cost efforts, such as roadside signs, to full-blown advertising and multi-media marketing campaigns. Today, 511 nationwide is still in the developmental stages and most travelers, even those who can access the service on a daily basis, do not know of its existence.

b) Logo and Branding

511 deployments can take advantage of existing marketing work done at the national level. AASHTO has registered a 511 logo that deployers can utilize to market their 511 services. This logo has become the de facto 511 "brand" nationwide and, absent a compelling reason not to, new deployers should use it to co-brand the telephone and website (if applicable). This provides a unified theme with consumers for all travel information offerings.

c) Marketing Plan

A 511 deployment should be accompanied by a marketing plan that is developed in concert with the system itself. The plan should lay out goals for awareness and for usage and should identify strategies to meet those goals. Typically, it is recommended that a marketing plan include the following tasks:

- Research
- Theme Development
- Creation of Communications Materials
- Media Tours / Speaking Engagements
- Launch Event

- Advertising
- Direct Mail Pieces and Other Collateral Materials
- Monitoring of Marketing Effectiveness
    - Awareness
    - Satisfaction
    - Usage
- Marketing Plan Update

2. Customer Evaluation

In order for 511 to be a "customer driven multi-modal travel information service," as stated in the national vision, implementers need to evaluate their systems. Users' expectations may change over time, much like they have for cellular phones and the Internet. Evaluations will help deployers meet their customer's needs and determine how successful and useful the service is to travelers. Evaluations can be done formally, through surveys, focus groups or usability studies, or on an ad hoc basis, through soliciting comments directly on the 511 system itself.

Generally, the 511 system should provide the option for callers to leave feedback. The most flexible method available to do so is to simply have a voicemail box within the 511 system on which callers can leave messages. In many cases, the volume of messages will make it very difficult to respond personally to individual callers. If this is the case, then the introductory message for the comment line should make it clear that callers will not receive individual responses. Alternatively, the outgoing message could also give the telephone number for the implementing agency's public information office, in order to make it possible for callers to speak to a live person.

Evaluations tend to be more formal and are designed to answer specific questions related to callers' use of and satisfaction with the system. Surveys, implemented either within the phone system itself or done separately, can provide useful information about satisfaction, usage patterns, perceived quality of the system and the data and so on. Focus groups can be used to gather similar information and can also be used to test marketing messages. Usability studies can provide significant insight into how customers actually use the systems and where they run into problems. To date, only a handful of systems have completed or are performing evaluations. These services include Minnesota, Virginia, Southeast Florida, Arizona, the San Francisco Bay Area, Maine, Montana and Washington State.

The vision for 511 services has clear goals related to customer satisfaction and awareness:

By 2005…

- More than 25 percent of the nation's population will be aware of 511
- More than 90 percent of 511 users will be satisfied with the service provided

By 2010…

- Over 90 percent of the nation's population will be aware of 511
- All 511 users will be satisfied with the service provided

The awareness of 511 was first measured in the ITS America consumer research conducted by the Gallup Organization in the fall of 2001. Deployers also should gauge awareness of 511 when doing surveys and evaluations locally by asking**:**

- Have Consumers Heard of 511? – To gauge overall awareness.
- What Do They Think 511 Is? – To see if consumer know that 511 delivers transportation information.
- Have They Used the Service? – To determine if awareness leads to usage.

In 2004, satisfaction of 511 callers was determined in the San Francisco Bay Area to be 92.3 percent and at 90.3 percent in Montana, while 99 percent of callers to the Virginia service in the I-81 Corridor would call again. In 2005, as part of the 511 Model Deployment evaluation, Arizona saw customer satisfaction at 71 percent. Washington State determined in May 2005 that satisfaction with its 511 service was at 68 percent and that 87 percent of the callers would call again.

To date, gauging customer satisfaction has not been an activity that many deployers have undertaken. The Arizona 511 Model Deployment evaluation effort includes the creation of an evaluation template of survey questions that all implementers can use in their evaluations. By providing the template of questions and procedures, USDOT and the Coalition hope to collect similar data across the country regardless of the 511 system or content available. This will allow the Coalition to better monitor the progress of deployments and the overall customer satisfaction and acceptance. The Core Survey Questions can be found in Appendix D and cover the following areas:

- Satisfaction with Information
- Satisfaction with User Experience
- Overall Satisfaction with Service

The questions were piloted in the Arizona evaluation in late 2004. The 5-point scales used will allow satisfaction to be compared from service to service on an “apples to apples” basis. Deployers are encouraged to assess customer satisfaction and awareness, in the manner above, with their deployments and report the findings to the Coalition.

V. Cross-cutting Issues and Lessons Learned

Many of the operational 511 services have learned valuable lessons on deploying and operating systems. Some lessons take years to learn, while others are immediate and obvious. While not all lessons are applicable to all existing and future implementers, all of the key lessons are important and this section discusses the major cross-cutting issues.

A. Successful Systems are Customer and Market-driven

A 511 service needs to be thought of as an evolving product designed to attract and retain users. Telematics is to the automobile industry as 511 is to transportation operating agencies. Both are based on customer relationship management which entails all aspects of interaction that a company (or agency) has with its customer, whether it be sales or service related. Both also provide users with features and services that are focused on safety and convenience.

The most successful 511 services are, and will be, the ones that listen to their customers and predict, or react to, their needs. One way of offering this interaction opportunity regularly is by having a comment line on the 511 menu tree. A standard customer feedback mechanism allows the deployer to track user's needs regularly, instead of only through irregular, but necessary, evaluations, which may include various survey methods.

B. Marketing and Branding is Critical

In the mid-1990s, ATIS projects were developed around the country with the goal of providing travelers with information that would assist them in their daily travels. For most of these systems, the focus was on using new technologies and hoping that the users would discover the service and continue to use it after some initial marketing efforts. Typically, as discovered by TravInfo in the San Francisco Bay Area, about 10 percent of the area residents knew about the service and fewer used it. The ITS America consumer research conducted by the Gallup Organization in 2001 also found that about 10 percent of the nation had heard of 511. In a survey by Penn State University, only 13 percent of the respondents had heard of the SmarTraveler telephone and website ATIS services in the Philadelphia metropolitan area.

Part of the issue for ATIS deployers was creating brand awareness; while the names of the services and corresponding logos were always carefully selected, often the message was not simple or short enough to remember. With the abbreviated dialing code of 511, the brand awareness is built in by association (a phone number like 411 or 911) and the marketing message is simple, easy to remember and is similar, or the same, across the country.

Because the brand is the same – 511 – deployers can easily benefit from each others' marketing campaigns and materials. An example of this is the incorporation of the national logo into the roadside signs to create awareness. Roadside sign design specifications and siting policies were shared by deployers through the Coalition.

By using a consistent brand and offering the same access methodology to the service everywhere, a South Dakota resident traveling in Washington State would know the basic information available on 511 by seeing the familiar logo and phone number on a roadside sign.

Marketing assistance can be found at http://www.deploy511.org/marketing.htm. The website offers deployers examples of marketing and awareness tools used across the country, including billboards, rack cards, posters, decals and launch materials.

C. Usage is Event-driven

The majority of 511 services across the country experience usage driven by specific events, and, in particular, by weather. Additionally, severe incidents cause major increases in call volumes, but these are not apparent from examining the national data.

D. Consumer Research Results

The Coalition and implementers have invested significant resources to determine what customers want from 511 services. While 511 services are still relatively new to consumers, several clear trends are emerging.

In late 2001, ITS America conducted the first national 511 market research, through a nationwide telephone survey and multiple focus groups across the country. At the time, there was only one operational 511 service – in Cincinnati / Northern Kentucky – so the findings can be considered a "before" baseline. These baseline results included the following item:

- About 10 percent of those surveyed had heard of 511
- 78 percent said weather-related and road surface condition information was critical or useful for 511 systems to provide
- 75 percent thought that road incident reports were critical or useful
- For transit riders, information on delays was most critical followed by travel time estimates

The results of this research effort are often echoed in local research efforts and are reflected in the design of many of the systems in operation.

Some implementers have performed their own consumer research to determine: what potential users want in a 511 service; how the users will react to the service; and what benefits people expect to get out of the service. Consumer research is most effective when performed during the planning stage, once a demonstration system is available or six months to one year after the service is implemented and then every 12 to 18 months.

An early example of 511 consumer research, by Utah DOT, held focus groups to gauge consumer reaction to the system that UDOT envisioned. One of the strongest reactions that the focus group provided was to the thought of using an automated system. The majority of the participants thought the only way to deliver the information in a quality, easy to use manner would be through live operators. However, after hearing a demonstration of what a voice activated system with concatenated speech outputs would sound like, the participants found it more than acceptable and were surprised at the system's quality and ease of use. This is the type of system that Utah has in place today.

E. Exact Deployment Costs Will Vary

Deployment costs are variable and are based on the: size of the system; number of calls estimated or received; duration of the call; number of transfers made between answering points (e.g., transit, tourism call centers); and routing of calls. The Coalition has published *The Value of Deploying* 511 (available at http://www.deploy511.org/docs/511_Value.pdf). This document breaks costs into the following categories:

- Labor, including consultants to develop systems, deployer staff time and operations staff, if needed.
- Equipment, including all hardware and software
- Telecommunications, including tariffs, switching fees, central office programming fees and ongoing line charges
- 511 content upgrades, if necessary
- Marketing

The Coalition asks that deployers track these costs, so that in the future, more reliable estimates of total deployment costs will be available.

F. 511 As a Tool in Major Events

511 is a capable tool in assisting in the management of major events. While most major events around the country tend to be weather or incident-related, some are planned events, like the Winter Olympics held in Salt Lake City, Utah in 2002. Utah DOT developed the 511 service with special content features designed specifically for the Olympics. These features included driving directions to venues, event schedules and tips for commuters. The service also offers a link to transit services and provided roadway conditions for the area. In all, the Olympics were a significant and immediate successful test for the system.

Major events, such as bridge collapses that completely shut down roadways, also offer an opportunity to use 511 in conjunction with traffic and incident management tools familiar to DOTs such as VMS.

As discussed in *DAR #3 – 511 and Homeland Security*, 511 systems offer the potential to become a valuable medium to provide travel information in support of homeland security emergency management. This potential is likely to increase in the coming years as more systems are deployed and familiarity with such systems continues to grow across the nation. Put simply, 511 has the potential to be a national asset in the event of homeland security emergencies.

G. On-going Financial Support Critical to System Success

The financial commitment that a lead agency makes to a 511 service is critical to the continued success of the system. For this reason, the department or agency must not rely on costs being significantly offset, wholly absorbed by the private sector, or through revenue sharing partnerships. While those business models have had some limited success in the past, the majority have failed, leaving the lead agency unprepared to accept the additional financial burden of operating a system (historically a metropolitan area ATIS). This has resulted in the

service reducing its content, hours of operation or even completely shutting down, as with the Partners In Motion ATIS for the Washington, DC region.

The lead agency also should recognize that, much like providing transit service, 511 does not get cheaper with more usage unless costs are being significantly offset by revenue sharing. While a significant usage increase may reduce the cost per call or per minute, the overall cost of providing the service should be expected to rise.

Along with providing quality, timely, decision-level content, 511 services, like any customer service, need to be reliable and consistent. Consistency and reliability begin with a financially sound, multi-year funding program.

H. Performance Measures

Since 511 is a collective product of many separate services, national performance measures are needed to gain an understanding nationally of the full scope, impact and effectiveness of 511. Recently, the Coalition has focused on the establishment and monitoring of a few key measures, so that the Policy Committee and Working Group can assess the nation's overall progress towards meeting the 511 Vision described previously in this document. The Coalition has chosen to focus on Coverage, Usage, Awareness and customer satisfaction as national measures and is currently developing a process to collect and present the necessary data. Optional System Performance Measures that focus on the design, operations and maintenance aspects internal to any 511 system, have also been developed for deployers to consider tracking their system performance (see Appendix C).

Although performance measures need to be compiled on a national level, the collection will be a bottom-up effort. Each local 511 deployer will assist in the process of collecting and providing the relevant information. While some of the information is fairly easy to collect and can be achieved through the proper design of a telephone dissemination system, other collection efforts will be more sporadic and more dependent on funding.

On the national level, additional information on awareness and customer satisfaction may be collected through national surveys and techniques, like those used in 2001 by the Gallup Organization for ITS America.

VI. Appendices

A. 511 Call Statistics

Currently, all 511 deployments report usage information to the Coalition. Only a few are able to report all the information desired below and with the release of this version of the Guidelines more of this information should be available in the future.

The statistics below are hypothetical and are for illustrative purposes. The "total" exceeds 100% because callers may make more than one content choice on their 511 call.

Calls Per Month	333,333
Peak Call Day	1-Jan
Peak Call Day Count	28,900
Peak Call Day Reason	Snowstorm
Peak Call Hour	3:00 PM
Peak Call Hour Count	8,000
Peak Call Hour Date	1-Jan
Peak Call Hour Reason	Snowstorm
Highest Simultaneous # of Ports	120
# of Regular Users	85,000
Average Call Length (seconds)	125.6
Maximum Call Length	10.0
Total Minutes Per Month	697,777
% Wireless	55.00%
% Wireline	45.00%
% Calls From Service Area	70.00%
% Calls From Outside Service Area	30.00%
% Category	
Construction	*11.32%*
Ferry	*5.12%*
No Selection / Information	*7.00%*
Other Language	*4.00%*
Road Conditions	*60.65%*
Segment Reports	*66.00%*
Traffic	*72.39%*
Transfers	*4.00%*
Other 511 Services	*2.00%*
Other Agencies	*2.00%*
Transit	*9.00%*
Weather	*57.45%*
Other Categories	*29.00%*
Airports	*2.00%*
Bicycling	*0.70%*
Carpooling/Vanpooling	*1.10%*
Commuter Incentives	*0.30%*
Paratransit	*0.30%*
Parks	*1.10%*
Services	*8.00%*
Spare the Air	*0.50%*
Tourism	*4.00%*
Travel Times	*11.00%*
TOTAL	*332.61%*
Caller Comments	1,222
Positive	823
Negative	399
Suggestions	151

The following describes the type of information needed and a rationale for providing it:

- *Calls Per Month* – the total number of calls to the 511 system. This information is gathered as of the date of the launch of 511 services by the deployer. Some systems have an official public launch ceremony while others choose to slowly roll out the service as carriers reprogram switches.
- *Peak Call Day, Count and Reason* – the day of the month that the system received the most total calls, the number of calls received that day and the reason for the influx of calls. Over time, the peak call day usually has been caused by holiday travel, a major incident or weather phenomena.
- *Peak Call Hour, Count, Date and Reason* – the hour of the month that the system received the most total calls, the number of calls received, the date and the reason for the influx of calls. Over time, the peak call hour usually has been caused by holiday travel, a major incident or weather phenomena, but it is not necessarily on the peak call day.
- *Highest Simultaneous # of Ports* – the peak number of simultaneous ports (or calls) during a calendar month. This measure can assist a deployer in making decisions to expand or contract the maximum number of simultaneous calls that their system can handle.
- *# of Regular Users* – those service users who access information five or more times per calendar month.
- *Average Call Length (Seconds)* – the total length of all calls in seconds divided by the total number of calls to 511. An increasing average call length may indicate that consumers are having problems accessing information. Deployers usually see their average call length decrease when switching to a voice response system and as users become familiar with the barge-in feature, menu structure and shortcuts.
- *Maximum Call Length* – some deployers have a time limit established while others allow "unlimited" access which can become a cost issue.
- *Total Minutes per Month* – the total number of minutes that calls to 511 were connected to the system. The rationale for total minutes per month is similar to average call length above.
- *Percent Wireless and Landline* – the number of calls received via wireless and landline calls divided by the total number of calls. These percentages are useful in determining the effectiveness of 511 marketing campaigns as new billboards and road signs should see a increase in wireless usage and bill inserts may increase landline usage. A decrease in wireless usage may indicate that there is a problem with switch programming or call routing.
- *Percent Calls From Service Area* – determined by the area codes or area code and exchange where the service is designed to be available.
- *Percent Calls From Outside Service Area* – all other calls other than those above with some deployers tracking the states from which these callers "originate."
- *Percent Category* – the Coalition currently asks deployers the percentage of calls to the following categories: Construction, Ferry, No Selection / Information, Other Language, Road Conditions, Segment Reports, Transfers (to other 511 services and agencies), Traffic, Transit, Weather, and Other Categories (Airports; Bicycling; Carpooling / Vanpooling; Commuter Incentives; Paratransit; Parks– information on transportation options or activities at national, state and local parks; Services; Spare the Air; Tourism – information specifically

designed for tourists; and Travel Times– segment or point to point information). These categories are based on actual menu choices for systems around the country and enable comparisons between like systems. An increase in the No Selection / Information category may indicate problems that customers are experiencing with the system dropping calls or recognizing voice inputs.

- *Caller Comments* – not all user comments are positive relating to service availability or content and there can be negative comments where callers do not "like" the service or voice recognition system. Some comments can be suggestions for improving the service such as by adding coverage or having information available in a different manner (by mile marker, for example)

B. 511 Website Statistics

Monthly Unique Visitors	14,995
Monthly Page Views	111,111
Peak Unique Visitors Day	1-Jan
Peak Unique Visitors Count	740
Peak Page View Day	1-Jan
Peak Page View Count	8,000
% Category	
Camera Views	*60.00%*
Construction	*10.00%*
Ferry	*5.00%*
No Selection / Information	*26.00%*
Other Language	*4.00%*
Road Conditions	*71.00%*
Segment Reports	*34.00%*
Traffic	*68.00%*
Transfers	*8.00%*
Other 511 Services	*3.00%*
Other Agencies	*5.00%*
Transit	*14.00%*
Weather	*78.00%*
Other	*53.00%*
Airports	*3.00%*
Bicycling	*1.00%*
Carpooling/Vanpooling	*2.00%*
Commuter Incentives	*2.00%*
Paratransit	*3.00%*
Parks	*4.00%*
Services	*8.00%*
Spare the Air	*1.00%*
Tourism	*7.00%*
Travel Times	*22.00%*
TOTAL	*393.00%*
Website Comments	22
Positive	15
Negative	7
Suggestions	3

The website statistics collected by the Coalition are to mirror the telephone service statistics as closely as possible for “apples to apples” comparisons. Information category and comment “definitions” are the same as those relating to 511 telephone service information provision established by the Coalition above and previously.

The statistics above are hypothetical and are for illustrative purposes. The "total" exceeds 100% because website visitors may make more than one content choice at the co-branded 511 website.

The following Internet terminology may be new to 511 deployers:

- *Unique Visitors* – measured according to their unique IP addresses, which are like online fingerprints, and counted only once no matter how many times they visit the site.
- *Page Views* – a webpage that has been viewed by one visitor.

C. 511 System Performance Measures

System performance measures are meant to help monitor 511 reliability from the following standpoints:

- *System Design / Engineering* – overall system design point of view and meeting of design expectations
- *Operational* – related to the workings of the system
- *Maintenance* – as the system is designed to operate

These measures are optional and in addition to the above 511 usage measures regarding content quality and the effect of traveler information on consumer travel modes and choice. The 511 usage measures that the Coalition currently tracks focus on objective measures of how often users call, what information they access, etc.

These performance measures provide a more detailed manner for 511 deployers to consider tracking their system performance to ensure that their customers receive reliable access to 511. Another outcome is to provide tools and resources for reliable system upgrades and development.

When designing a 511 system, deployers should undertake a systems engineering approach to ensure quality of performance and to document performance management. The 511 deployer should undertake a total system monitoring application, or collection of applications, with reports that document system performance and that are clearly labeled and contain the date and time of data capture according to the deployer's needs. Some of the measures below are related to the system itself and others are related to enabling the system's operations and availability.

Note that where 511 services are embedded within a more comprehensive, multimodal, or multi-agency ATIS, many of these measures will apply more broadly than just to the 511 system portion.

Examples of system performance monitoring follow:

- 511 system's network and facility infrastructure shall be monitored for temperature, disk space, phone lines, data acquisition, power interruption and usage. Monitoring shall occur at all times (24 / 7 / 365), with the availability of personnel on-call to support system needs. While on-call, personnel shall have remote access to systems for immediate action.
- Contact information for appropriate personnel for notification at any time (24 / 7 / 365) of system problems or emergencies should be available.

System Design / Engineering

- To ensure that messages being provided by the 511 systems contain the latest information, software monitors shall be maintained in locations of data flow including:
    - Data acquisition, data fusion and message generation
    - Message data transfer to the 511 systems
        - Time entered to availability on 511
    - Message delivery to the customer
- System backup and recovery action shall include a network environment consisting of a set of systems designed to share capacity across a number of systems. In the event of power interruption, Uninterruptible power supply systems should supply power to all systems until back-up power is available.
- Network backup shall consist of the following layers:
    - General network access to each system
    - Modem backup in the event of network failure
    - Should all remote access to systems be lost, final backup shall include portable media ingest, from disk or other means, on a recurring basis until remote access is restored.
- Mean time between failures for each component, and for the entire system, shall be determined and measured with actual system performance and availability.

Operational

- System Performance Reporting should be monitored on a basis determined by the 511 deployer, at least monthly, and could include:
    - Number of data (incident, road condition, construction, etc.) transfer requests
    - Number of successful data transfers – from database to 511 system, these could be from the deployer to the ASP, from the ASP to the 511 Database and from the database to the 511 system IVR
    - Number of batch data transfers – there could be several different batch data transfers, depending on the system design
    - Transfer of information (from database) to IVR for dissemination
    - Average age of incident messages (from generation to clearance)
    - Average age of non-incident messages – such as an airport floodgate message with changing homeland security alert levels
    - Average age of the message set transferred to the 511 system – this may vary with various data sets, etc.
    - Comparison to source data – quality control to ensure that data is not corrupted and messages are developed properly
    - System CPU usage / capacity – to monitor the amount of data to check system availability and performance
    - System data storage – also for overall system performance
    - Peak number of simultaneous users – to gauge appropriate system sizing

- Unscheduled system downtime – when the system went down, when it came back online, the reason for the failure and how it was fixed to gauge system operations according to contract terms
- Maintenance downtime – when the system went down and when it came back online to gauge system operations according to contract terms

Maintenance

- Functionality of:
  - Telephone System
    - XML data feed – is information current and correct?
    - Voice recognition software – is tuning required to enable customer access to information?
    - Data transfers / regional interoperability – is information exchange from neighboring 511 services available?
    - Call transfers – are calls being routed to the proper agency and service numbers?
    - Touchtone access – available as a back up, or primary in some cases, method of accessing information?
    - Multilingual message coordination – are translations proper and conveying appropriate information?
    - Call in reporting function – are floodgates and other messages available on the service?
  - Website
    - XML data feed – is information current and correct?
    - Website hyperlinks – are Internet users being routed to the proper agency and service websites?
    - "Static" databases – is this information still available and accurate?

D. 511 Core Survey Questions

The following set of "Core Questions" is recommended for use by all evaluators conducting 511 customer satisfaction surveys in their states. While a number of the questions can be used "off the shelf," others will have to be revised, depending on the specific 511 service and the type of information it provides.

Evaluators will want to include additional questions tailored to their specific 511 service. In particular, questions should be designed to address aspects of the service that are problematic or to obtain customer feedback with recently implemented enhancements. The 511 customer survey fielded in Arizona (2004), for example, included a series of questions assessing the user interface (voice recognition versus phone buttons), as customers had complained about the voice recognition feature of the service.

For guidance in designing the study approach and questionnaire, evaluators should consult the report, "Implementing a Standard Evaluation Approach and Standard Measures in 511 Customer Satisfaction Surveys," sponsored by the Intelligent Transportation Systems Joint Program Office, United States Department of Transportation.

For additional assistance, please contact the following staff at the Volpe National Transportation Systems Center:

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CORE QUESTIONS SURVEY

We will begin with a few questions about your use of 511.

A1. When did you first call 511? Was your first call to 511 the time you were invited to participate in this survey; was your first call some other time within the past month; would you say it was between 2 and 6 months ago, between 7 and 12 months ago, or would you say your first call to 511 was more than a year ago? [RECORD ONE]

1. It was the first time when recruited for survey
2. Within the past month
3. Between 2 and 6 months ago
4. Between 7 and 12 months ago
5. Over a year ago
9. CAN'T REMEMBER/DON'T KNOW/REFUSED [DO NOT READ]

A2. How did you first hear about 511? [RECORD ONE]

[IF RESPONDENT VOLUNTEERS MORE THAN ONE, ASK: Which of those did you see/hear first?]

<***NOTE: evaluators should add or delete response categories as appropriate***>

1. Saw it on electronic sign over the road
2. Saw it on a sign beside the road
3. From friend/coworker
4. Newspaper
5. TV
6. Radio
7. DOT website
8. Other. Please describe: _____
9. DON'T KNOW/REFUSED [DO NOT READ]

[IF A1 ANSWER WAS "FIRST TIME," SKIP TO B. OTHERWISE, CONTINUE.]

A3. How many times have you called 511 in the past month? [IF RESPONDENT UNSURE, PROBE: What would be your best guess?]

_____ [RECORD ESTIMATE OF NUMBER]

998 = 998 Times or More

999 = DON'T KNOW/REFUSED [DO NOT READ]

A4. Would you estimate that you place more of your calls to 511 from your cell phone, from a landline, or would you say you call 511 about equally from a cell phone and landline? **[RECORD ONE]**

1. **Most from Cell Phone**
2. **Most from a Landline**
3. **About Equally cell phone and landline**
9. **DON'T KNOW/REFUSED [DO NOT READ]]**

A5a. Have you ever called 511 in a different city in this state? [RECORD ONE]

1. Yes.
2. **No**
9. **Don't know or can't remember [DON'T READ]**

<NOTE: Evaluators should only ask Q5a if they live in a state that provides separate 511 service for different metropolitan regions i.e. Florida offers 511 service in Orlando and Miami>

A5b. Have you ever called 511 in a different state? [RECORD ONE]

1. Yes. Which states would those be? [RECORD STATES] _____
2. **No**
9. **Don't know or can't remember [DON'T READ]**

B. Now I'd like to ask you about the call you were making to 511 when we intercepted you on **___ [CATI- INSERTED DATE AND TIME FROM INTERCEPT SURVEY] ____:**

B1. Where were you when you phoned? Were you at home, at work, driving, a passenger in a private vehicle, a passenger on a bus or commuter rail, waiting at a bus or commuter rail stop, or were you somewhere else? **[RECORD ONE]**

<NOTE: evaluators should add or delete response categories as appropriate, depending on the transportation facilities available>

1. **At Home**
2. **At Work**
3. **Driving**
4. **A passenger in a private vehicle**
5. **A passenger on a bus**
6. **Waiting at a bus stop**
7. **A passenger on commuter rail**
8. **Waiting at a commuter rail stop**
9. **Somewhere else [ASK: Where was that?] [RECORD RESPONSE]**
   _____
99. **DON'T KNOW/REFUSED [DO NOT READ]**

B2. Did you call 511 for information regarding a specific trip you were making? [RECORD ONE]

1. Yes
2. No (E.G. "I WAS JUST EXPLORING 511.") [SKIP TO C]
9. DON'T KNOW/REFUSED [DO NOT READ] [SKIP TO C]

B3. Did you call before a trip or while you were traveling? In other words, were you already traveling when you called, was your call within 15 minutes of leaving on the trip; was it more than 15 minutes in advance of the trip, but on the same day; or, was it a day or more in advance of the trip when you called? [RECORD ONE]

1. While traveling

2. Within fifteen minutes before setting out
3. More than 15 minutes in advance of your trip, but on the same day
4. A day or more in advance for a trip you were planning
9. CAN'T REMEMBER/DON'T KNOW/REFUSED [DO NOT READ]

B4. What type of transportation did you use for this trip? **[SELECT ALL THAT APPLY] [IF R SAYS, "CAR" CLARIFY: Were you driving the car or were you a passenger? Was that a private or commercial vehicle?] [PROBE: For example, did you drive a private vehicle, were you a passenger in a private vehicle, did you use a bus or commuter rail, did you use a commercial vehicle, did you bike, did you walk or did you use some other means of transportation?]**

<NOTE: evaluators should add or delete response categories as appropriate, depending on the transportation facilities available>

1. **Drove Private Vehicle**
2. **Passenger in Private Vehicle**
3. **Bus**
4. **Commuter rail**
5. **Commercial Vehicle. [PLEASE SPECIFY TYPE] _____**
6. **Bike**
7. **Walking**
8. **Some Other Means, SPECIFY: _____**
9. **DON'T KNOW/REFUSED [DO NOT READ]**

B5. What was your primary purpose for making this trip? [IF NECESSARY: Were you commuting to or from work or school; was it a work or school related trip other than commuting; was the trip for family or personal reasons such as shopping or medical appointments; was the trip for social, religious, or recreational reasons; or was there some other purpose for your trip?] [IF R SAYS "WORK," CLARIFY: Were you commuting to work, or were you making a business trip?] [RECORD ONE]

1. **Commuting to or from work or school**
2. **Work- or school-related travel, but not a commute trip**
3. **Family or personal reasons such as shopping or medical appointments**
4. **Social, religious, or recreational**
5. **Other (PLEASE SPECIFY: _____]**

9. DON'T KNOW/REFUSED [DO NOT READ]

B6. When we interrupted your call on [CATI INSERT DATE FROM INTERCEPT] **you indicated that you called 511 for information on** [CATI INSERT ANSWER FROM B6 OF INTERCEPT QUESTIONNAIRE]**. Is that correct?** [RECORD ONE]

1. Yes
2. No. What information were you seeking? (SPECIFY: _____)
9. DON'T KNOW/REFUSED [DO NOT READ]

B7. In general, how satisfied were you with the information you got for the trip you were taking? Would you say you were very satisfied, somewhat satisfied, neither satisfied nor dissatisfied, dissatisfied, somewhat dissatisfied, or very dissatisfied with the information you received? [RECORD ONE]

1. Very Satisfied
2. Somewhat Satisfied
3. Neither Satisfied nor Dissatisfied]
4. Somewhat Dissatisfied
5. Very Dissatisfied

9. DON'T KNOW/REFUSED [DO NOT READ]

B8. Now, I'd like to find out if you made any changes to your trip or travel plans as a result of the information you got from 511. I'm going to read a list of possible changes and would like you to say yes or no to each. Did you: [READ EACH AND CHECK ALL THAT APPLY.] [RANDOMIZE ORDER B10a-B10i]

	YES	NO	DK/REF [DO NOT READ]
B10a. Did you decide to leave earlier	1	2	9
B10b. Did you decide to leave later	1	2	9
B10c. Did you take a different bus	1	2	9
B10d. Did you decide to take a different type of transportation?	1 **What type was that?** _____	2	9
B10e. Did you decide to take a different route	1	2	9
B10f. Did you decide to make stops on the way that	1	2	9

you wouldn't otherwise have made			
B10g. Did you slow down or change speed	1	2	9
B10h. Did you change lanes	1	2	9
B10i. Did you make another type of change?	1 **What change was that? _____**	2	9

[IF A2 WAS "FIRST TIME," SKIP TO FIRST-TIME CALLER QUESTIONNAIRE]

C. Now I'd like to ask you about all calls you've made, not just for this one trip.

C1. First, have you used 511 to obtain road information in the past?

1. Yes
2. No
9. DON'T KNOW/REFUSED

C2. Have you used 511 to obtain bus information in the past?

1. Yes
2. No
9. DON'T KNOW/REFUSED

<NOTE: Question series C should cover each of the different types of information provided by the 511 service (i.e. commuter rail, Amtrak, subway, ferry, tourist, etc.). For example, if 511 provides information about commuter rail, add question C3, as follows: Have you used 511 to obtain commuter rail information in the past?>

D. Now, I'd like you to rate your level of agreement with a several statements. For each statement, please tell me if you strongly agree, agree, are neutral, disagree, or strongly disagree.

Please say "not applicable" or "don't use" if I ask about an aspect of the 511 service that you do not use.

D1. [IF C1 WAS NO OR DON'T KNOW, SKIP TO D2] [IF C1=2 OR 9, SKIP TO D2] [IF NECESSARY, AFTER EACH STATEMENT READ: Would you say you strongly agree, agree, are neutral, disagree, or strongly disagree with the statement, or is this an aspect of 511 that you do not use?] [RANDOMIZE ORDER D1a-D1d]

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Aspect Not Used	DON'T KNOW/REFUSED [DO NOT READ]
D1a. The traffic information I get from 511 is accurate and timely.	1	2	3	4	5	6	9
D1b. 511 covers the areas and routes I'm interested in	1	2	3	4	5	6	9
D1c. Information on traffic delays and incidents is provided in sufficient detail to be useful to me.	1	2	3	4	5	6	9
D1d. Information from 511 helps reduce the stress of driving.	1	2	3	4	5	6	9

D2. [IF C2 WAS NO OR DON'T KNOW, SKIP TO D3] [IF C2=2 or 9, SKIP TO D3] [IF NECESSARY, AFTER EACH STATEMENT READ: Would you say you strongly agree, agree, are neutral, disagree, or strongly disagree with the statement, or is this an aspect of 511 that you do not use?] [RANDOMIZE ORDER D2a-D2d]

	Strongly Agree	Agree	Neutral [VOLUNTEERED]	Disagree	Strongly Disagree	Don't Use/No Opinion [DO NOT READ]
D2a. I only check 511 to see if buses are operating normally	1	2	3	4	5	6
D2b. 511 covers all of the bus services I'm interested in	1	2	3	4	5	6
D2c. 511 makes it more convenient for me to take the bus	1	2	3	4	5	6
D2d. Getting bus information from 511 is easier than any other way	1	2	3	4	5	6

<NOTE: Questions series D should cover each of the different types of information provided by the 511 service. For example, if 511 provides information about commuter rail, ask QD2 (items a-d) with reference to "commuter rail."

D3. [for all users] [IF NECESSARY, AFTER EACH STATEMENT READ: Would you say you strongly agree, agree, are neutral, disagree, or strongly disagree with the statement, or is this an aspect of 511 that you do not use?] [RANDOMIZE ORDER D3a-D3e]

	Strongly Agree	Agree	Neutral [VOLUNTEERED]	Disagree	Strongly Disagree	Aspect Not Used	Don't Use/No Opinion [DO NOT READ]
D3a. It is easy to navigate through the 511 menu to get the information I need	1	2	3	4	5	6	9
D3b. I am more likely to take the bus due to information on 511.	1	2	3	4	5	6	9
D3c. I call 511 most often when the weather is bad	1	2	3	4	5	6	9
D3d. I am able to get through to 511 without any busy signals	1	2	3	4	5	6	9
D3e. I can easily understand the information on 511	1	2	3	4	5	6	9

E1**.** Now, I'd like you to rate your level of agreement with several statements about the potential benefits you might experience from using 511. For each statement, please tell me if you strongly agree, agree, are neutral, disagree, or strongly disagree. Please say "does not apply" if I ask about a benefit that does not apply to you**. [IF NECESSARY, AFTER EACH STATEMENT READ: Would you say you strongly agree, agree, are neutral, disagree, or strongly disagree with the statement?] [RANDOMIZE ORDER E1a-E1g]**

	Strongly Agree	Agree	Neutral [VOLUNTEERED]	Disagree	Strongly Disagree	Does Not Apply [DO NOT READ]	Don't Use/No Opinion [DO NOT READ]
E1a. 511 saves me time	1	2	3	4	5	6	9
E1b. 511 helps me decide when to leave	1	2	3	4	5	6	9
E1c. 511 helps me decide whether to take a different route	1	2	3	4	5	6	9
E1d. 511 helps me arrive on time	1	2	3	4	5	6	9
E1e. 511 helps me decide whether to take a different mode of transportation	1	2	3	4	5	6	9
E1f. 511 helps me avoid traffic congestion	1	2	3	4	5	6	9
E1g. 511 provides roadway weather information that helps me avoid unsafe driving conditions	1	2	3	4	5	6	9

E1g. Is there some other important benefit you obtain from using 511 that we have not mentioned? [RECORD ONE]

1. Yes: Specify _____
2. No [SKIP TO E2]
9. DON'T KNOW/REFUSED [DO NOT READ] [SKIP TO E2]

<Note: Previous research provides data on this question. If constrained by space, this question can be omitted.>

E2. Now, I'm going to read a list of potential improvements to 511 and ask you to rate each one as a high, medium, or low priority change you'd like to see. [IF NECESSARY, AFTER EACH STATEMENT, READ: In your opinion, should that be high, medium, or low priority change for the 511 system?] [RANDOMIZE ORDER E2a-E2e]
<NOTE: Evaluators should revise the list of improvements, as appropriate, for the particular service being evaluated>

E2a. improvements to the speech recognition feature	High (1)	Medium (2)	Low (3)	DK/REFUSED (9)
E2b. adding more roads that currently aren't covered	High (1)	Medium (2)	Low (3)	DK/REFUSED (9)
E2c. providing information on when a bus will arrive at a particular stop	High (1)	Medium (2)	Low (3)	DK/REFUSED (9)
E2d. providing information on roads in neighboring states	High (1)	Medium (2)	Low (3)	DK/REFUSED (9)
E2e. providing more detailed information on general traffic congestion levels and delays	High (1)	Medium (2)	Low (3)	DK/REFUSED (9)

E2f. Is there anything more you would like to add to the list of potential improvements? [RECORD ONE]

1. Yes: Specify _____
2. No [SKIP TO E3a]
9. DON'T KNOW/REFUSED [DO NOT READ] [SKIP TO E3a]

E2f1. And, in your opinion, should that be high, medium, or low priority change for the 511 system? [THIS QUESTION REFERS TO RESPONDENT'S SUGGESTED IMPROVEMENT.] [RECORD ONE]

1. High Priority
2. Medium Priority
3. Low Priority
9. DON'T' KNOW/REFUSED [DO NOT READ]

E3a. Have you used radio traffic reports as a source of travel information?

1. YES
2. NO [SKIP TO F]
9. DON'T KNOW/REFUSED [DO NOT READ] [SKIP TO F]

E3b. How many times per month do you use radio traffic reports as a source of travel information?

_____ [998=998 times or more; 999=don't know/refused]

E3c. Do you think the quality of information provided in radio traffic reports is much better than 511's information, somewhat better, about the same as 511, somewhat worse, or are radio traffic reports much worse than 511?

1. MUCH BETTER THAN 511
2. BETTER THAN 511
3. ABOUT THE SAME AS 511
4. WORSE THAN 511
5. MUCH WORSE THAN 511
6. HAVE NEVER USED [VOLUNTEERED]
9. DON'T KNOW/REFUSED [DO NOT READ]

F. These final questions will help us group your answers with the answers of other people in the survey.

F1. [RECORD GENDER OF RESPONDENT WITHOUT ASKING]

1. Male
2. Female

F2. What is your age? [IF NECESSARY: Are you 18 to 24, 25 to 34, 35 to 49, 50 to 64, or 65 and over?]

1) 18 to 24

2) 25 to 34

3) 35 to 49

4) 50 to 64

5) 65 and over

9) DON'T KNOW/REFUSED [DO NOT READ]

F3. What is the highest grade of school or year of college you completed?

1) **Less than HS grad**
2) **HS graduate**
3) **At least two full years of college**
4) **Bachelor's degree**
5) **Postgraduate degree**
9) **DON'T KNOW/REFUSED [DO NOT READ]**

F4. Now, thinking about your family's total income from all sources before taxes during the last twelve months, was your family income less than $25,000, between $25,000 and $40,000, between $40,000 and $60,000, between $60,000 and $100,000 or over $100,000?

1) **Less than $25,000 [SKIP TO F5]**
2) **$25,000 to $39,999 [SKIP TO F5]**
3) **$40,000 to $59,999 [SKIP TO F5]**
4) **$60,000 to $99,999 [SKIP TO F5]**
5) **$100,000 and over [SKIP TO F5]**
9) **DON'T KNOW/REFUSED [DO NOT READ] [ASK F4a]**

<NOTE: If the cost of living is higher than average, evaluators may want to adjust response category 5 to "$100,000 to $149,999" and add the response category "$150,000 and over."

F4a. I understand your hesitance. So we can group people into broad categories, could you tell me if your total annual household income above or below $60,000?

1. Below

2. Above

9) **DON'T KNOW/REFUSED [DO NOT READ]**

F5. What is the zip code where you currently reside? [FOR SNOWBIRDS AND OTHER TWO-ADDRESS PEOPLE, CLARIFY THAT WE WANT THE ZIP CODE WHERE THEY RESIDED ON THE DAY OF THIS CALL.] _____

F6. Finally, are there any comments that you have about the 511 service? [RECORD VERBATIM]

E. Attributes of Existing 511 Services

	Vitals		User Interface					Type of System Content						Type of Roads Covered					Type of Data									Awareness				Main Menu Selections						Connection to Other Systems and Services										
			Commands[1]		Messages																																											
System	Date Operational	Back Door Number	Touchtone	Voice	Text to Speech[2]	Concatenated[3]	Floodgates[4]	Roadway	Transit	Ferries	Car /van pool	Tourist	"Ports"	Interstate	Other Ltd Access	US Routes	State Routes	Other	Weather	Road Cond.	Construction	Incidents	Congestion	Travel Times	Transit Schedules	Transit Fares	Transit Service Disruptions	Transit Real Time Arrivals	Roadside signs	Use VMS[5]	511 web site[6]	Other	Traffic/Highways/Roads	Transit	Ferries	Weather	Tourism	Other Info	Other States/Systems	To which states/systems[7]	Transfer to Transit or other agencies[8]	Call Transfer to other system[9]	Application Sharing with other systems[10]	Data Transfer to other system[11]	Attended Call Transfer[12]	Blind (Unattended) Call Transfer[13]	Call Transfer and Drop[14]	Trombone Call Transfer (uses two ports on main system)[15]	Transfer cost along with call[16]	Reciprocity in call transfers from 511 or other systems[17]
Alaska	4/03	(866) 282-7577	x	x	x	x		x		x					x	x	x	Anchorage Area major arterials	x	x	x	x							x		x		x		x	x			Yukon Road Reports		x					x			
Arizona	3/02	888-411-ROAD / 602-523-0244	x	x	x	x	x	x	x		x	x		x	x	x	x		x	x	x	x	x						x	x		x			x	x							x				
Cincinnati / Northern Kentucky	06/11/01	513-333-3333	x	x	x	x		x	x			x		x		x	x		x		x	x	x	x					x		x	x		x		x		Statewide	x					x				x
Colorado	10/01/04	(303) 639-1111	x		P		P	x	P		P	x		x	x	x	x	x	x	x	x	x	P	P					x	x				x					x								
Iowa	11/15/02	800-288-1047	x	x	x	x		x						x		x	Some	Arterials in cities	x		x	x									x				x			Statewide summary	-										
Kansas	01/04	866-511-KDOT	x	x	P	x	x	x						x	x	x	x	KS Turnpike	x	x	x								x	x	x	Promo, displays, events, print and	x			x			x	Nebraska - shared application, no call transfer			x							
Kentucky	11/26/02	866-737-3767	x	x		x		x				x		x	x	x			x	Severe	x	x							x		x		x			x		Statewide summary, regional summary	x	VA, and numbers given for Ohio and WV							x			x
Maine	05/03	866-282-7578	x	x	x	x	P	x	x	x		x		x	x	x	x	ME Turnpike	x	x	x	x	x	P	P			P	x		x		x	x	x	x	x	x	NH, VT	x	x	x	x			x			
Minnesota	07/01/02	800-542-0220	x	x		x		x (and toll rates planned)	x					x	x	x	x		x	x	x	x	x	P	link to transit				x		x		x			Statewide summary, regional summary, Route reports, region reports, comment, help			x				x				
Montana	01/03	800-226-7623	x	x		x	x	x						x	x	x	x		x	x	x								x	x	x			x			x	North/South Dakota, NE, KS	P	P	x	P						x
Nebraska	10/01/01	800-906-9069	x	x		x	x	x						x	x	x	x		x	x	x	x							x	x	x	Ask for highway number or area					x	Kansas, SD			All Meridian states share	P						
New Hampshire	05/03	866-282-7579	x	x	x	x	P	x				x		x	x	x	x	NH Turnpikes	x	x	x	x	x	P	P			P	x		x		x		x	x		x	Maine, Vermont	x									
North Carolina	08/04	877-511-INNC	x	x	x	x	x	x	x	x		x		x	x	x	x		x		x	x	x						x	x	x		x	x		x		x	Virginia	x	x			x		x			P
North Dakota	02/10/03	866-696-3511	x	x		x		x						x		x	x		x	x	x									x	x				Route specific, regional summary, seasonal load restrictions	x	SD, MT, MN										
Oregon	12/03	800-715-7541	x	x	x	x		x						x	x	x	x			x	x	x							x		x	x					x	Washington, California, and Idaho							x			x
Orlando	06/24/02	866-510-1930		x		x		x						x					x	x	x	x	x						x	Only initial marketing			On I-4 only	P					-									
Rhode Island	03/05	1-888-401-4511	x	x	x	x	P: Only for Amber	x	x	x		x	x	x	x	x	Some	Some arterials	x	x	x	x	x	x	x				x		x	HAR	x	x		x	x	City or town, or hold for Statewide reports	x	Massachusetts (number given)	No transfers; numbers given		x							
Sacramento, CA / Northern California	09/02/04	(877) 511-TRIP	x	P		x		x	x		x	P		x		x	x	AMTRAK	x	x		x			x	x	x		x		x	Banners on poles						All top level menu selections are by region	x	Bay Area. Oregon, Nevada	x	x			x		x			
San Francisco Bay Area	05/04	866-736-7433	x	x		x	x	x	x	x	x		x	x	x	x	x	Incident information is provided on all roadways. Data and travel times only on limited access.			x	x	x	x	x	x	x	P	x		x	Light pole banners, print media, broadcast media	x	x				Ridesharing, Bicycling. Other information is available from the main menu as well: Spare the Air information as well as shortcuts to lower level menus and popular transit agency menus.	P	Sacramento, Statewide	x	P				x				
South Dakota	11/2002	866-697-3511	x			x		x						x		x	x		x	x	x	x							x	x	x			x				Nebraska, North Dakota, Montana			x							
Southeast Florida	7/02	1-866-914-3838	x	P	x	P	P	x	P		x	x	P	x	x	x	x		x	x	x	x	x	P	P	P	P	P	x	x	x		x					P	P	P	P	P	P	P	P	P	P
Tampa	9/04	1-800-576-3886	x	x	x	x	x	x	x			x		x	x	x	x		x	x	x	x	x	x			x		x		x			x		x		Orlando & SE Florida		x	P	P	P	P	P	P	P	P
Utah	12/01	866-511-UTAH	x	x	x	x	x	x	x	x	x			x	x	x	x	Urban Arterials	x	x	x	x	x	x	P	x	P	P	x			x		x	x	x					x						x		
Vermont	5/03	800-429-7623	x	x			x	x	x	x		x		x	x	x	x	Some Local	x	x	x	x	x		x	x			x	x	x	x	x	x	x	x	x	x		NH, ME	x				x				x	
Virginia	2/05	800-578-4111	x	x	x	x	x	x	x	P		x		x	x	x	x		x	x	x	x	x			x			x	x	x		x			x		North Carolina	x	x			x		x		x	x
Washington State	7/03	866-548-6690	x	x	x	x	x	x	x	x				x	x	x	x		x	x	x	x	x						x	x	x			x				Oregon	x	x	x	P		x		x		x

X = Existing
P = Planned

Notes and definitions:

User Interface
1 - When a system has both command types, touchtone is typically a backup interface command mode
2 - Text to Speech - uses software to convert typed text into audible words
3 - Concatenated - the method of parsing previously recorded words or phrases, pieced together to produce sentences.
4 - Floodgates may be used for various levels of information. These include AMBER, Homeland Security and/or General Transportation Alerts

Awareness
5- VMS - variable message signs used for general awareness (I.e., peak travel holidays, weekends, etc.) or incident management-related
6 - 511 web site - this can be a co-branded web site like, Virginia and San Fran/Oakland, or a web site with much of the same information available on the phone system, like Commuterlink in Utah.

Connection to other Systems
7 - List States or 511 Systems to which your 511 system can transfer data or calls
8 - Call transfer to another agency
9 - Telephone Call is transferred to other service/system by simple request from the caller
10 - Information (data) from multiple 511 systems is shared in a single application, allowing callers to retrieve data from multiple systems without a call transfer (and without the systems transferring any data)
11 - Information (data) is transferred between 511 systems and thus must be re-transmitted periodically to remain current
12 - At call transfer, the system waits for the call to connect before connecting the caller to the new system
13 - At call transfer, the system simply dials the "transfer to" number and releases the port, regardless of whether the call is answered at the other end.
14 - After the transfer is completed, the first transferring system drops the call, releasing the port for new inbound callers.
15 - Call transfer is accomplished by connecting two ports together, thus tying up both ports for the duration of the transferred call
16 - On call transfer, the cost of the inbound call is transferred to the new system along with the call coordinated by the telecom provider for each system)
17 - 511 or other systems allow call transfers between one another in both directions.