OVERVIEW STUDY 511 Traveler Information Services

for

The Alabama Department of Transportation

By

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For this report, researchers investigated literature relevant to 511 and surveyed a majority of the states with existing 511 systems and states neighboring Alabama regarding their 511 deployments and deployment efforts. The researcher invited the two most prominent 511 system providers to present information on system outlines, start-up costs, and annual operating costs specifically for Alabama. The research team then constructed cost estimates and a deployment timeline for an Alabama 511 system and made recommendations for deployment of 511 in Alabama. Furthermore, the research identified potential funding sources and critical elements for focus during the planning, deployment, and operation of a 511 system. These elements included negotiations with telecommunications companies, incident reporting by the Department of Public Safety, and the Departmental changes within ALDOT to implement a successful system.					the states with existing nt efforts. The researchers nes, start-up costs, and imates and a deployment labama. Furthermore, the ng, deployment, and ompanies, incident to implement a successful
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Executive Summary

On July 21, 2000, 5-1-1 was established as the national traveler information telephone number for the United States. 511 systems are currently deployed in 18 locations (13 statewide systems and five regional or metropolitan systems). A total of 44 states including Alabama have indicated an interest in the deployment of a 511 system and have each received \$100,000 in funding from the Federal Highway Administration (FHWA) to assist with the development of a 511 Deployment Plan.

An initial deployment of a 511 system in Alabama can provide the following types of information to consumers via automated telephone information and a web site:

- Road/construction/work zone information/emergency road closures
- Weather conditions/forecasts and weather-related condition information
- Major traffic incidents

Traffic congestion/travel time data for large Alabama cities can be added to an existing Alabama 511 system relatively easily. However, before those areas can be added to the system, they must first complete ITS infrastructure components that feed information to the 511 system.

Costs

Many states are purchasing 511 system services and are thereby avoiding the costly initial expenses for building their own system as well as avoiding the cost and inconvenience of implementing major technological upgrades. The two major system providers estimated costs for an Alabama 511 system. Their total estimates for services for the first five years of system operation ranged from approximately \$1.1 to \$1.6M. The other major costs of starting a 511 system are listed below:

- One-time fees to telecommunication companies to reprogram switches to allow 511 calls to be placed. Other states have experienced total costs of \$0 to \$75k for reprogramming.
- Hiring a 511 system manager. The estimated salary for this individual is \$40k to \$60k per year plus benefits.
- Advertising the 511 system to the driving public. Other states have experienced costs of \$40k to \$125k for advertising.
- Adding urban traffic/congestion travel time data. Both service providers estimated costs of less than \$50k per urban area to integrate those areas into an existing 511 system. Those figures do not reflect the costs of ITS infrastructure that feeds information to the 511 system.

Funding Sources

The FHWA has determined that existing Congestion Mitigation and Air Quality (CMAQ), National Highway System (NHS), and Surface Transportation Program (STP) funds may be used for the deployment of a 511 system. As mentioned previously, Alabama has already secured \$100k to prepare a 511 Deployment plan. Funds remaining after writing the Deployment Plan may be applied to constructing the system. Additional funding may be available via Alabama's congressional delegation in the form of line item appropriations.

On November 20, 2003, legislation to reauthorize TEA-21 was introduced in the U.S. House of Representatives. This legislation, referred to as the Transportation Equity Act – A Legacy for Users, includes a provision that would allocate \$25M per year for five years for 511 systems. This bill is in the early stages of the legislative process and may be subject to revision.

Timetable

Other states have initiated 511 service within six to twelve months of hiring a service provider. The six month time difference accounts for a test period that some states utilize before opening the system to the public. Thus, Alabama could complete the Plan in 2004 and begin service in 2005.

Personnel

Few additional personnel would be required to operate a 511 system. As mentioned earlier, a 511 system manager is usually the only full-time person required. Central Office personnel will provide updates on road construction sites as they do currently. Division personnel will provide information on road conditions and emergency closures. In other states, these activities take less than 5% of a typical employee's time. Affected ALDOT employees will be trained to operate interactive, internet software that uses pull-down menus to assign standardized messages ("ice on bridges", "work zone with single lane closure", etc.) to segments of road.

Recommendations

The researchers make the following recommendations concerning implementing a 511 traveler information system in Alabama:

- Engage a 511 service provider to provide hardware, software, pavement-level weather information, and technological updates that the state must otherwise provide.
- Work with the Alabama Public Service Commission to negotiate switch reprogramming charges with telecommunications companies.
- Work closely with ALDOT personnel to ensure they understand that accurate and up-todate information must always be available on the 511 system.
- Recognize that Alabama Department of Public Safety does not have the staff and the computer technology to provide timely data concerning traffic crashes and congestion. This weakness may be addressed by the deployment of a statewide incident reporting system currently included in the pending SAFETEA legislation.

Section 1 Introduction

This section provides a brief statement regarding the purpose of this report, presents an overview of 511, and discusses reasons to deploy a 511 traveler information system.

Purpose of Report

The purpose of this report is to provide the Alabama Department of Transportation (ALDOT) with an overview of 511 traveler information services, the status of traveler information services in other states, the potential costs involved in deploying and operating a 511 system, and recommendations for deployment of a 511 system in Alabama.

What is 511?

511 is the telephone number assigned by the Federal Communications Commission (FCC) specifically for traveler information services. The 511 Deployment Coalition, a partnership of several national transportation organizations including the American Association of State Highway and Transportation Officials (AASHTO), the Intelligent Transportation Society of America (ITS America), and the American Public Transportation Association (APTA) has developed the following Vision Statement which defines the purpose of 511 (511 Deployment Coalition, August 2003):

511 will be a customer driven multi-modal traveler 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

There are currently eighteen 511 systems operational in the United States. Thirteen systems provide traveler information services on a statewide basis, while five systems serve regional or metropolitan areas. These systems typically disseminate the following types of traveler information:

- Road conditions
- Weather conditions and forecasts
- Construction (work zone) information
- Non-recurrent congestion (incident) information

This information is ideally available to all wireless and landline callers and should (as per 511 Deployment Coalition guidelines) cost no more to the user than a local call.

Why Deploy 511?

Prior to the assignment of 511 for traveler information, there were a large number of ten-digit traveler information telephone numbers throughout the United States. These numbers were not usually available to travelers, and many numbers provided information only for a portion of a state or metropolitan area. In short, the potential traveler information telephone service user was faced with what could be perceived as a dizzying patchwork of traveler information resources. 511 was established as the traveler information telephone number for the United States to present an easily remembered number that would eventually provide traveler information in any state or region (511 Deployment Coalition, August 2003).

In addition to the standardized-number aspect of 511, the deployment of a 511 system in a state or region presents a highly visible "face" for the Intelligent Transportation System (ITS) deployment efforts currently underway nationwide. While many ITS deployments and services may not be visible or understood by the casual transportation system user, the 511 service is readily understood and provides a clear service to the user (511 Deployment Coalition, August 2003).

Section 2 Literature Review

This section provides a review of the following topics:

- The establishment of 511 as the United States' traveler information telephone number
- The history of 511 deployments
- The current status of 511 deployments nationwide
- National trends related to 511 (call volume trends, etc.)
- An overview of potential funding sources for 511 deployment and operation
- An overview of the technology involved in the operation of 511 systems
- A look into the future of 511 systems

The 511 Federal Communications Commission Ruling

Prior to the assignment of 5-1-1 as the national traveler information telephone number, over 300 separate telephone traveler information numbers were in existence throughout the United States. These numbers provided varying degrees of traveler information services, ranging from road construction and closure information (Example: 888-411-ROAD in Arizona) to transit scheduling and route information (Example: 520-792-9222 for transit information in Tucson, Arizona). The sheer number of traveler information telephone numbers and the varying degrees of services provided via these telephone numbers had great potential to confuse the traveling public.

On July 21, 2000, the Federal Communications Commission (FCC) granted a petition offered by the United States Department of Transportation (USDOT). This petition requested that the FCC designate a national three-digit telephone number for traveler information. With the granting of this petition, 5-1-1 was established as the national traveler information telephone number for the United States.

The granting of this petition made seven specific points regarding the assignment of 511 (USDOT, 2001):

- 1. 511 is assigned to government entities for both wireline and wireless telephone services.
- 2. Technical details of implementation and cost recovery are left for Federal, State, and Local transportation agencies to determine.
- 3. Federal, State, and Local transportation agencies are to determine the type of information to be provided.
- 4. Federal, State, and Local transportation agencies are encouraged to ensure that 511 transcends municipal boundaries and is appropriate to the national designation of the number.

- 5. Transportation agencies are encouraged to determine uniform standards for providing information to the public.
- 6. USDOT is encouraged to facilitate ubiquitous deployment of 511.
- 7. The FCC will assess the deployment of 511 in 2005 to determine if the number is in widespread use.

The FCC order was open-ended in that it left the development, deployment, and funding of 511 systems to Federal, State, and Local agencies with a provision for a 2005 review of the deployment of 511 to take place.

511 Deployment Coalition

Given the open-ended nature of the 5-1-1 number assignment, the 511 Deployment Coalition was created. Its goal is "the timely establishment of a national 511 traveler information service that is sustainable and provides value to users" (511 Deployment Coalition, May 2003). The 511 Deployment Coalition provides guidance and assistance to agencies that are considering deployment of a 511 system. This guidance is compiled into an "Implementation and Operational Guidelines for 511 Services" document as well as a set of Deployment Assistance Reports, all of which are available via the Coalition's public web portal located at www.deploy511.org.

History of 511 Deployments

Figure 2-1 presents a timeline of the history of 511 deployments in the United States (511 Deployment Coalition, May 2003).



Figure 2-1: Timeline of 511 deployments

The first deployment of a 511 system took place in June, 2001 in the Cincinnati/Northern Kentucky metropolitan area. This 511 system emerged as a key piece of the Advanced Regional Traffic Interactive Management & Information System (ARTIMIS) which is a multi-faceted congestion management system that covers 88 miles of freeway in Cincinnati and areas of neighboring northern Kentucky.

The first statewide deployment of a 511 system took place in October 2001 in Nebraska. Nebraska converted an existing toll-free (1-800) road condition information telephone number

operated by the Nebraska State Patrol to 511. Figure 2-1 shows other systems that have been deployed since October 2001.

Current 511 Deployments

As of September 2003, there were eighteen 511 systems operational in the United States, with 13 providing 511 services over a statewide area and five providing 511 services over a regional or metropolitan area. Figure 2-2 shows a map of the United States with each state shaded according to its 511 deployment status. Note that states that are denoted as having received "511 Assistance Funding" were recipients of a \$100,000 grant from the Federal Highway Administration (matched by \$25,000 from the state). This grant provides for development of a 511 Deployment Plan for the recipient state. Grant funding remaining after completion of the Deployment Plan may then be applied to system start-up and deployment costs. Further details regarding this grant are located in Section 3 of this report.

Several small areas Figure 2-2 are shown with circles or parallelograms. These areas represent city or regional 511 systems.



Figure 2-2: 511 Deployment status as of September 2003 (from www.deploy511.org)

National Trends

Through August 2003, there had been approximately 9.25 million national 511 calls since the inception of 511 deployment. There has been a pronounced upward trend in the number of 511 calls received. Figure 2-3 illustrates the number of 511 calls made nationwide from August, 2002 to August, 2003. In August 2002 there were a total of eight 511 numbers in operation in the U.S., while in August 2003 there were eighteen 511 numbers in operation. Figure 2-3 shows the overall upward trend in the number of 511 calls placed (as might be expected as the deployment of 511 numbers nationwide increases). Also, the seasonal variations in the 511 call volumes should be noted. Call volume "spikes" occur during the winter months, during which adverse weather conditions prompt drivers' traveler information requests (Costello, 2003).



Figure 2-3: National 511 calls by month (August 2002 - August 2003)

There are currently several national trends related to of 511 system deployment methods. One such trend is for states to enlist the support of third-party 511 system service providers. These providers operate and maintain the computer and telephonic components necessary to operate the 511 system, thus saving the 511-deploying state the cost of building their own computer and telephonic infrastructure specifically for 511. Examples of these service providers include Meridian Environmental Technology, the Castle Rock Consulting/CARS-511 consortium, and PBS&J/511 Alliance.

Another current trend relates to the coverage area of the 511 system. While many 511 systems provide statewide coverage for the state in which they are implemented, there are also several

511 deployers that have chosen to implement 511 on a citywide/regional basis (e.g., the San Francisco Bay Area, Orlando, Miami/South Florida, etc.). The current trend in 511 deployments appears to be moving away from these citywide/regional systems and towards statewide 511 systems. This trend is likely to be amplified as more states deploy 511 and begin to investigate sharing data to form multi-state systems.

Potential Funding Sources

511 Deployment Coalition Guidelines recommend that states should expect to cover the full cost of a basic level of service for a 511 system. The Guidelines further note that "creative" funding approaches have not been successful. Such creative approaches include the following: (511 Deployment Coalition, January 2002):

- Subscription-based services The caller pays for "personalized" traffic information
- Pay-per-call The caller is charged on a "per call" basis for obtaining traveler information via telephone
- Advertising/Sponsorship Advertising "space" is sold on the 511 system, and callers hear advertisements during their call

Both subscription-based and pay-per-call traveler information telephone system models are in direct contrast to the Deployment Coalition's recommendation that 511 calls be no more costly to the caller than any other local call. The advertising/sponsorship model for 511 has yet to yield substantial revenue for the provider; however, this model may have potential for success in the future.

Funding for the 511 system can come from current federal programs. FHWA has determined that Congestion Mitigation and Air Quality (CMAQ), National Highway System (NHS), and Surface Transportation Program (STP) funds can be used for the deployment of a 511 system. For example, CMAQ funds are designated for non-attainment areas to improve air quality, NHS funds are eligible for any roadway in the state that is part of the National Highway System, and STP funds are flexible funds used for a variety of highway and related improvements. While CMAQ, NHS, and STP funds may be expended for the deployment of a 511 system in Alabama, the 511 system must compete with other Alabama transportation projects for these funds (USDOT, 2003). All of these funding sources conform to the formula requiring 80% federal funds and 20% state or local match.

There are also FHWA discretionary funds or grants available for specific purposes. The 511 Assistance funding is an example of this method. Further grants from the federal government may be available via the newly created Department of Homeland Security (DHS). Such grants may provide funding for states to integrate Homeland Security warnings and notices into traveler information services. Alabama should closely monitor the grant opportunities presented by the DHS for grants that may be applicable to traveler information services.

Additional funding may be available via Alabama's congressional delegation in the form of line item appropriations (individual appropriations added during the annual congressional appropriations process). These funds are typically referred to as "ITS earmarks." Members of

Alabama's congressional delegation should be made aware of Alabama's 511 deployment efforts and the potential need for operating funds.

On November 20, 2003, legislation to reauthorize TEA-21 was introduced in the U.S. House of Representatives. This legislation, referred to as the Transportation Equity Act – A Legacy for Users, includes a provision that would allocate \$25M per year for five years for 511 systems. This bill is in the early stages of the legislative process and may be subject to revision.

511 Technology

The operation of a 511 system involves the use of several well-established technologies, blended with several technologies that could be considered as "emerging." The backbone of any 511 system is the telecommunications infrastructure which has been in place (with the exception of wireless infrastructure) for decades. Figures 2-4 and 2-5 illustrate the telephonic infrastructure elements for landline and wireless networks, respectively.



Figure 2-4: Landline telephone infrastructure and 511



Figure 2-5: Wireless telephone infrastructure and 511

The 511 call routing procedure for a landline phone call and a wireless phone call are similar. The main difference in the two routing procedures concerns the location where the 511 call is translated from 511 to a ten-digit toll free number. In a landline system, this translation takes place at a Central Office, which is the telecommunications company's main call switching and

routing location. The call is then transferred to one or more Central Offices before arriving at the 511 system.

A 511 call placed from a wireless phone experiences a similar routing procedure, with a few distinct differences. When a wireless call is placed, the call typically travels from a cellular tower to the wireless telecommunications company's switching facilities (via the landline telephone network). Translation of the call from the three-digit number (511) to a ten-digit toll free number can occur either at the cellular tower or at the switching facility. At the switching facility, the call is transferred into the regular landline Public Switched Telephone Network (PSTN), and proceeds as though it were a landline phone call.

The wireless call routing procedure allows potential confusion in areas where two 511 systems border each other (e.g., the border of two states with separate 511 systems). Given that wireless calls are handled by the tower nearest the caller, it is possible that the tower nearest the caller could be in a neighboring state. If the translation of the call from the three-digit number (511) to the ten-digit toll-free number occurs at the tower level, then the call would be transferred to the neighboring state's 511 system. If translation of the call takes place at the switch level, it is possible that the nearest switch is located in the neighboring state and the call would be transferred to that state's 511 system. Figure 2-6 illustrates such a scenario.

In the event that a wireless call is routed to a neighboring state's 511 system, there are two possible solutions:

- The neighboring state's 511 system can include a call-transfer feature to allow the caller to request that the call be transferred to the appropriate state's 511 system. This feature would potentially result in additional cost to the neighboring state (in the form of call transfer charges).
- The neighboring state's 511 system can provide the toll-free number of the appropriate state's 511 system, and then the caller can dial the appropriate system directly.



Figure 2-6: Wireless 511 call border issue example

Telecommunications companies (both landline and wireless) took an adversarial position with regard to 511 at the time of the USDOT's petition for the FCC's assignment of 511. In April 2001, the Cellular Telecommunication Industry Association (CTIA) and six of the largest cellular carriers filed motions objecting to the FCC 511 order. Despite the objections by the CTIA and cellular carriers, the FCC has not overturned its 511 ruling, nor does it anticipate doing so.

As states have deployed 511 systems, the reaction of telecommunications companies has varied. The companies' main complaint is that they must reprogram elements of their infrastructure (switches or towers) to accept 511 calls (to translate the 511 call to a "regular" ten-digit number). While switch/tower programming appears to be a simple process, telecommunications companies often charge for this service. A 511-deploying state should emphasize to the telecommunications companies that 511 is a public service. To implement the 511 program the state should insist on low, non-recurring charges for switch/tower programming or ask for the programming to be done at no cost. Table 2-1 provides a summary of the charges paid to telecommunications companies in several other states with 511 systems.

State	Paid to Telecoms	Data Source
NE	PSC ordered telecoms to switch at no cost.	Nebraska Dept. of Roads
ND	Total of \$2,588 for all landline and wireless providers to switch	North Dakota DOT
SD	Total of \$20,000 for all landline and wireless providers to switch.	South Dakota DOT
MT	Total of \$4,000 spent for landline and wireless switching.	Montana DOT
AZ	\$60,000 paid to Qwest (\$400 per switch, 150 switches).	Idaho 511 Report
UT	One time switching fee for landlines. 10 of 11 wireless carriers, no charge. Verizon held out.	Idaho 511 Report
IA	No charge to switch landline or wireless carriers. Verizon held out.	Idaho 511 Report
NH	Unknown at this time.	Idaho 511 Report
MN	\$200-\$400/carrier service establishment fee + \$20-\$50/switch. Some providers, no charge.	Idaho 511 Report
KY	\$84,000 paid to telecom companies to switch	Kentucky Trans. Cabinet

Note: PSC = Public Service Commission

A typical 511 service also relies on the use of computer technology. Computers and computer networks are used to input data into the 511 system, transfer data between system components, and to store data for retrieval. Several specific computerized data transfer techniques are typically used. They include File Transfer Protocol (FTP), Virtual Private Network (VPN), and others.

The technology for entering road, weather, and traffic data to the 511 system is, perhaps, the most critical of the technologies used in a typical 511 system. Data entry is typically accomplished via a web-based computer interface. Such an interface is often referred to as a Road Condition Reporting System (RCRS), but may also go by other names (e.g., HCRS or Highway Condition Reporting System, etc.). An RCRS presents a data entry user with an intuitive graphical user interface, by which the user may report road conditions, weather information, or other types of information. The data entry user can select from a set of preconstructed event/incident descriptions (e.g., Road is icy) and apply this description to a segment of roadway. This description is then reported to the caller via the 511 system. Figures 2-7 and 2-8 present computer screenshots of the RCRS system used by the CARS/CARS-511 consortium. Figure 2-7 shows a sample list of incident descriptions and Figure 2-8 shows how these descriptions can be applied to particular highway segments.



Figure 2-7: Sample screenshot of CARS RCRS computer interface

Because the RCRS is web-based, it is accessible from any internet-enabled computer (i.e., no RCRS-specific software needs to be installed on each computer that accesses the system, with the exception of a standard internet browser). Data entry will typically be conducted by authorized field personnel (e.g., Department of Transportation maintenance/construction employees, Department of Public Safety troopers, local government in urban areas, etc.). The data entry process is password-protected, prohibiting unauthorized personnel from posting data onto the 511 system. The RCRS database is maintained on a centralized computer typically located at a facility within the state in which the 511 system is being operated. The 511 system data typically resides in a simple comma-delimited (or similar format) text file (the size of such file is likely less than 100 kilobytes) and is "fetched" by the 511 service provider (via FTP, VPN, or similar transmission technology) on a regular basis (e.g., every five minutes) and placed into the 511 system.

The computer and telephonic elements of the 511 system are tied together by units referred to as "telephonies." A telephony is a computerized unit that receives the 511 call from the telephone network (i.e., the PSTN) and responds to the caller's requests (i.e., caller presses "1" for a particular type of information which is fetched by the telephony from the 511 database). Telephonies receive calls into the 511 system via ports. A port is the equivalent to a single telephone line, capable of handling only one telephone call at a time. 24 ports are handled by a single T-1 line.



Figure 2-8: Sample screenshot #2 of CARS RCRS computer interface

After 511 data is entered into the system, it is typically delivered to the caller in the form of a hierarchical menu structure. An example of this menu structure is given below (511 Deployment Coalition, August 2003):

"Welcome to East Dakota's Traveler Information Service"

"For specific information, please select from one of the following categories. You can press the desired key or say the desired command at anytime"

Press "1" or Say "Highway Information"

Press or Say the Number of the Route you are interested in:

Please select the following segment of I-99 you are interested in:

Press or Say "1" for the South Dakota state line to Metropolis

Press or Say 2 for Metropolis to Edge City

"Here is the report for I-99 between Metropolis to Edge City. Snow is forecasted for the Edge City area this evening, please proceed with caution as reduced visibility and roadway icing is a possibility. Eastbound travel may experience construction-related delays for roadway resurfacing between mile markers 339 to 342 during the evening hours of 10:00PM to 5:00AM, as traffic will reduce to one lane."

Press or Say "3" for Edge City to Resortville

Press or Say "4" for Resortville to North Dakota state line

Press or Say "9" for help or to repeat the route segments

Press "*" or Say "Previous Menu" to return to the previous menu

Press "9" or Say "Help" or "Available Routes"

Press "*" or Say "Previous Menu"

Press "2" or Say "Public Transportation Information"

Press "1" or Say "East Suburban Transit" Press "2" or Say "Metropolis Transit Agency"

"The Metropolis Transit Agency, MTA, provides scheduled bus service and curb-to-curb service by reservation in the Greater Metropolis area. All routes are reported on schedule except for route 14 which is reporting 15 minute delays due to an accident along Pershing. If you would like to speak with an MTA customer service agent, please press or say "2". All fares for scheduled bus service are \$1. We encourage riders to be at their pick-up point five minutes before scheduled times. Detailed information on fares, schedules, and specific programs are available online at www.metropolistransitagency.com"

Press "3" or Say "East Dakota Commuter Rail" Press "9" or Say "Help" or "Repeat these instructions" Press "*" or Say "Previous Menu"

Press "9" or Say "Help" for system information

The 511 Deployment Coalition strongly recommends that voice recognition technology be used as the primary user interface for 511 systems. This technology allows a caller to navigate a 511 system's menu structure via voice input alone. Voice recognition systems are commonly driven by VoiceXML, a web markup language (like Hypertext Markup Language or HTML) that allows users to interface with web-based voice-enabled applications. Although it is recommended that voice recognition be used as the primary user interface, the more traditional user interface via phone keypad (Dual Tone- Multiple Frequency or DTMF) should still be allowed.

In addition to obtaining information by phone, 511 systems typically feature an internet site to allow travelers to view 511 information via a standard web browser. Such websites are usually linked to Department of Transportation (or equivalent agency) websites and are named in an easy-to-remember manner (e.g., <u>www.511nh.com</u> for New Hampshire's 511 information website). 511 system websites are typically provided and maintained by the 511 service provider. Figures 2-9 and 2-10 illustrate screenshots from the Nebraska and New Hampshire 511 websites, respectively. The user clicks on the road segment of interest and sees the same information that is provided by calling 511 on the telephone.



Figure 2-9: Sample screenshot from New Hampshire 511 website



Figure 2-10: Sample screenshot from Nebraska 511 website

511 System Content

511 systems typically provide information that can be grouped into two distinct categories:

- Roadway Information Defined by the 511 Deployment Coalition as "information associated with particular roadways in a 511 service area." (511 Deployment Coalition, August 2003)
- Weather Conditions and Forecasts Defined by the 511 Deployment Coalition as "information associated with observed and forecasted weather and road surface conditions that may impact travel in the 511 service area." (511 Deployment Coalition, August 2003)

These categories of information are described in detail in the following sections.

Roadway Information

The 511 Deployment Coalition recommends the following specific types of information be provided to callers (511 Deployment Coalition, August 2003):

- Construction/Maintenance Projects: "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"

The 511 Deployment Coalition further recommends that the following details be provided for each content type:

- Location Location where the incident/event/condition is occurring, presented in terms of common landmarks (e.g., mileposts, interchanges, etc.)
- Direction of Travel The direction of travel in which a reported incident/event/condition is having an effect
- General Description and Impact A brief account and the current/potential impact of the incident/event/condition
- Duration The period of time over which the incident/event/condition is expected to occur and to affect travel
- Delay The amount of time that the traveler may expect to be delayed by the incident/event/condition
- Detours/Restrictions A summary of the required travel detours and/or restrictions placed upon travel in the area of an incident/event/condition.

- Forecasted Weather and Road Surface Conditions Short-term weather and pavement conditions along the route segment
- Current Observed Weather and Road Surface Conditions Weather and/or road surface conditions currently being experienced along the route segment

While not specifically considered to be roadway information, transit system information is often presented (where available) via 511. Transit information can be in the form of transit delays, schedules, fares, etc. If specific transit data is not entered into the 511 system, the system can allow call transfers to a transit information telephone number (e.g., subway system operator information line).

Weather Conditions and Forecasts

The 511 Deployment Coalition outlines its vision for the presentation of weather data via a 511 traveler information system in *Deployment Assistance Report #6: Weather and Environmental Content on 511 Services*. This document recommends that 511 systems "provide information on current and changing travel conditions and forecasts for upcoming weather phenomena that are likely to impact the ability to travel". Where relevant, the report also recommends providing information regarding the impact of weather on transit operations (511 Deployment Coalition, June 2003).

The 511 Deployment Coalition recommends that the following types of weather events be presented via 511 (511 Deployment Coalition, June 2003):

- National Weather Service Watches as issued.
- National Weather Service Warnings as issued.
- National Weather Service Advisories as issued.
- Actual conditions location specific road observations.
 - o Rain
 - Heavy
 - First rain after extended dry conditions
 - Freezing Rain
 - o Flooding
 - o Thunderstorm

- Lightning
- Hail
- Tornado or Waterspout
 - Within 5 miles
 - Within 10 miles
 - Storm Cell Location and Track
 - Direction, speed (mph), severity, proximity to route or area
- o Severe Major Storm
 - Blizzard
 - Hurricane
- o Other Winter Storm
- o Snow

- Any to < 2
- > 2 to < 8 inches
- > 8 inches
- Blowing Snow
- Lake Effect Snow (specific to certain areas)
- Drifting Snow
- Snow Accumulation
- o Fog
 - Smoke
- High Winds
- o Frost
- o Ice
 - Black ice
 - Pavement Ice Accumulation
- o Glare
- o Air Quality
- o Ozone Alert
- o Avalanche Danger
- o Seismic Activity
- o Volcanism
- o Fire
- o Nuclear, Biological, or Chemical Release

At a minimum, weather condition reports via 511 should provide the following information (511 Deployment Coalition, June 2003):

- Temperature
- Wind speed and direction
- Precipitation
- Sky condition
- Visibility in miles (and eighths of a mile once visibility is below a mile)
- Accumulation (snow)
- Air quality
- Pavement temperature when below freezing

In addition to reporting current weather events, the 511 system should provide forecasts for the above weather events, especially when such events will have an effect on roadways. Deployment Assistance Report #6 notes that the National Weather Service is developing a National Digital Forecast Database (NDFD) which will enable users to obtain a unique forecast for 2.5 km blocks for any location in the United States. The report mentions that the NDFD provides only atmospheric data, not road condition information. Furthermore, the NDFD provides only a limited set of data for each location for three-hour time periods. It does not provide visibility or precipitation-type information or forecasted pavement temperature data. The report specifically notes that "this experimental program of the NWS may not satisfy needs for 511 weather content."

The Future of 511

According to the 511 Deployment Coalition, 44 states have received funding under the Federal Highway Administration's 511 Planning Assistance program. This high level of interest in 511 suggests that a number of states may deploy 511 systems in the near future. As more states deploy 511, there will likely be a shift away from 511 systems that provide data for only one state and toward the development of multi-state, corridor-based, regionally-intertwined systems. Such systems will presumably allow callers to obtain detailed trip planning information and traveler information for the entire length of their journey, regardless of the number of states/jurisdictions that are crossed during their travels. No such systems exist at this time.

The development of multi-state/multi-regional 511 systems will likely require that 511 data be shared between existing 511 services. To facilitate that sharing, the data must first be stored in a compatible manner. The best current method to ensure that data is compatible between systems is to format the data as a SAE J2354 (Revision 1) Advanced Traveler Information Systems (ATIS) Message Set. These standards are currently being reviewed for approval by the SAE (Society of Automotive Engineers). When approved, they will standardize the way in which 511 data is formatted, potentially allowing data to be easily shared between systems (Rupert, 2003).

In the interim (prior to full 511 data standardization), states wishing to allow callers to access information from other 511 systems may take the following steps:

- Provide the caller with an option to have his/her call transferred to the other 511 system of interest. This option can be costly, as the 511 system transferring the call will have to pay for the minutes incurred, even while the call is on the other system, until the call is terminated.
- Or, provide the toll-free (direct) number for the other 511 system of interest (thereby allowing the caller to dial the other state on his/her own). This is a low-cost option, but potentially inconveniences the caller, who must remember the toll-free number, hang up, and initiate a call to the other 511 system.

As more 511 systems are implemented and traffic/congestion management centers become commonplace, 511 users can expect "value-added" or subscriber-type services. Examples of value-added services potentially include:

- Personalized driving directions
- Tourism information
- Personalized travel information based upon personal commute or frequently traveled route

Such services will potentially be available with a per-use charge or with a monthly/yearly subscription.

Section 3 University of Alabama Surveys and Deployment Conference

This section details the results of surveys completed by researchers at The University of Alabama during the course of this project.

Survey of 511 Deployments and Deployment Planning Efforts

The University of Alabama researchers contacted officials in 12 states regarding their existing 511 systems or their plans to develop a 511 system. Those states are listed below:

- Nebraska
- South Dakota
- North Dakota
- Montana
- Kentucky
- New Hampshire
- Vermont
- Maine
- Mississippi
- Tennessee
- Georgia
- Florida

These states were selected as a representative cross-section of states that have deployed 511 systems plus states contiguous to Alabama. States with existing systems were sent a questionnaire (Appendix 1) and were asked to provide their responses. A similar questionnaire was sent to neighboring states (Note: No state neighboring Alabama has an operational statewide 511 system, although Florida has two regional 511 systems). A sample questionnaire for neighboring states is included as Appendix 2.

The following paragraphs contain summaries of the questionnaire responses and results from discussions and visits for each of the states listed above. Table 3-1 presents a summary of the information gathered from each state, and Table 3-2 presents a summary of 511 deployment efforts in states neighboring Alabama.

State	Coverage Area	Time to Deploy	Start-up \$	Monthly \$
Nebraska	Statewide 10,000 miles	14 months total	\$150,000	\$15,000
South Dakota	Statewide 8,000 miles	12 months total	\$10,500	\$16,000
North Dakota	Statewide, 8,410 miles	2 months total	\$10,500	*
Montana	Statewide, 8,000 miles	24 months total	\$98,795	*
Kentucky	Statewide, 2,200 miles	10 months	\$774,000	*
New Hampshire	Statewide, 4,200 miles	12 months total	*	\$5,830
Vermont	Statewide, 3,200 miles	12 months total	*	*
Maine	Statewide, 8,000 miles	12 months total	\$280,000	\$50,000
Florida	2 Regional Systems	Varied by system	Not available	Orlando - \$33,000
				Miami - Not available

Table 3-1: Summary of 511 information (Part 1)

* Indicates data unavailable or not provided

Table 3-1:	Summary	of 511	information ((Part 2)	۱
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State	Funding	Service Provider	Personnel
Nebraska	FHWA Grant, Earmark	Meridian	171 - Data entry, 1 - Manager
South Dakota	FHWA Grant, Earmark	Merdian	135 - Data entry
North Dakota	FHWA Grant, Safety Funds	Meridian	Several hundred - Data entry
Montana	FHWA Grant, Earmark	Meridian	>200 - Data entry
Kentucky	FHWA Grant, Earmark	CARS	>100 - Data entry, 1 Manager
New Hampshire	FHWA Grant	CARS	Exact number unknown
Vermont	*	CARS	Exact number unknown
Maine	State gas tax	CARS	>100 report, 7 dispatchers enter data
Florida	*	Miami - SmartRoute	Exact number unknown
		Orlando - TellMe	

* Indicates data unavailable or not provided

Table 3-2:	Summary of	511 in	states	neighboring	Alabama
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State	Deployment Status	FHWA Grant	Future
Mississippi	Not Deployed	Received grant	Actively investigating 511 and completing 511 Deployment Plan
Tennessee	Not Deployed	Received grant	In early stages of Deployment Plan development
Georgia	Not Deployed	Not applied for	Unknown
Florida	Deployed - See State Summary Table	Received grant	More regional deployments and statewide system

Nebraska

Nebraska's 511 system became operational on October 1, 2001. Prior to the deployment of 511, Nebraska's State Patrol operated a toll free (1-800 number) telephone number that provided travelers with road condition information.

- *System Coverage*: The Nebraska 511 system is statewide and provides information for 10,000 miles of federal and state roadways.
- Toll-Free Number and System Website: 1-800-906-9069 www.safetravelusa.com
- *Time to Deploy*: The deployment process took approximately 14 months from the initial investigation of 511 until a system was deployed and operational. Once Meridian was hired as the service provider, 4-5 months passed before the system was operational.

- *Start-up Costs*: Nebraska estimates that the system start-up costs were approximately \$150,000. These costss included building the system and purchasing the necessary telephony elements. There was no cost incurred to pay for telecommunications switching.
- *Monthly Operating Costs*: The monthly 511 system operating costs are approximately \$15,000. These costs cover leasing 96 ports and \$0.05/minute for each call to the 511 system.
- *Funding Sources*: Nebraska applied for and received \$100,000 from FHWA for deployment assistance. Additional funding was obtained via congressional earmark to assist in system set-up and currently planned improvements. Nebraska also applied for federal funding for 511 via a grant for integration of the AMBER alert system into the state's 511 system. Nebraska does not sell advertising on the 511 system or operate subscription-based services; thus, no funding is obtained from those sources.
- *511 Service Provider*: Meridian Environmental Consulting is the 511 system service provider for Nebraska.
- *Services Provided*: The Nebraska 511 system currently provides weather conditions and forecasts, road construction information, and road conditions (e.g., the system reports if the road is icy, flooded, etc.).
- *Personnel Requirements*: Nebraska provided the researchers a detailed breakdown of the personnel resources that the state committed to operating the 511 system. In Nebraska, 171 state employees input data into the system. Most of the employees dedicate less than 10% of their time to inputting data. Nebraska did hire a 511 Manager who spends approximately 65% of her time inputting and managing the flow of data into the 511 system.
- *Planned and Potential System Upgrades*: Nebraska plans to integrate a new HCRS, AMBER alert capability, and voice recognition capability into their 511 system.
- *User Feedback*: Nebraska provides callers the opportunity to give feedback about the system during their call to 511. These comments are recorded, reviewed, and responded to promptly.

South Dakota

- *System Coverage*: The South Dakota 511 system operates statewide and covers all federal and state highways for a total of approximately 8,000 roadway miles.
- Toll-Free Number and System Website: 1-866-697-3511 www.safetravelusa.com
- *Time to Deploy*: From the beginning of planning efforts to deployment, the implementation of 511 took about one year.
- *Start-up Costs*: The initial cost to start-up the 511 system was approximately \$10,500 for integration into Meridian's system. Note that this cost is relatively low because South Dakota had a #SAFE (a Meridian product) traveler information system prior to the deployment of 511. Because of the relatively low cost of system start-up, South Dakota spent its 511 Deployment Plan grant (\$100,000 from FHWA + \$25,000 in state match) on marketing. These funds purchased roadside signs (\$15,000), brochures (\$6,500 for 400,000 brochures), and television and road advertising time.

- *Monthly Operating Costs*: South Dakota pays approximately \$16,000 per month to operate the 511 system. This cost includes information assimilation, telephony, and toll-free phone charges.
- *Funding Sources*: South Dakota utilized a \$100,000 FHWA grant matched by \$25,000 of state funding for deployment. In the future, South Dakota anticipates using federal ITS earmark funds for operation.
- *511 Service Provider*: Meridian Environmental Consulting is the 511 system service provider.
- *Services Provided*: The South Dakota 511 system currently provides weather conditions and forecasts, road construction information, and road conditions (e.g., the system reports if the road is icy, flooded, etc.).
- *Personnel Requirements*: Approximately 135 South Dakota state employees enter data into the 511 system via the RCRS. These employees include region engineers, region operations engineers, area engineers, engineering supervisors, highway maintenance supervisors, and lead highway maintenance workers. These individuals are spread throughout 12 geographical areas in the state.
- *Planned and Potential System Upgrades*: South Dakota plans to add voice recognition capability to its 511 system.
- *User Feedback*: Callers have the opportunity to give feedback about the system during their call to 511. These comments are recorded, reviewed, and responded to promptly.

North Dakota

- *System Coverage*: North Dakota 511 provides statewide coverage for approximately 8,410 miles of federal and state roadways.
- *Toll-Free Number and System Website*: 1-866-696-3511 www.safetravelusa.com
- *Time to Deploy*: The deployment of 511 took approximately two months. Prior to 511, North Dakota had been the test bed for Meridian's #SAFE traveler information system. The only delay in changing from #SAFE to 511 was in notifying the phone companies of the telephone number change.
- *Start-up Costs*: Because the #SAFE traveler information system was already in-place, the start-up costs for the 511 system were limited to \$10,500 for an increase in the number T1 lines available to the system.
- *Monthly Operating Costs*: Not provided
- *Funding Sources*: North Dakota has asked for federal funding support for its 511 system via federal funds designated for transportation safety improvements. Because North Dakota does not conform completely to federal transportation safety guidelines (e.g., the 0.08 Blood Alcohol Content limit), the state is eligible for federal funding to enhance safety.
- *511 Service Provider*: Meridian Environmental Consulting is the 511 system service provider.
- *Services Provided*: The North Dakota 511 system currently provides weather conditions and forecasts, road construction information, and road conditions (e.g., the system reports if the road is icy, flooded, etc.).

- *Personnel Requirements*: Several hundred North Dakota state employees enter data into the 511 system. These workers include snowplow operator section leadmen and construction engineers. North Dakota estimates that entering data into the 511 system requires approximately five minutes of a field employee's time each day.
- *Planned and Potential System Upgrades*: North Dakota plans to add voice recognition capability to its 511 system and is investigating implementing "corridor" type travel information (e.g., traveler information will be provided for an entire route instead of on a segment-by-segment basis).
- *User Feedback*: Callers have the opportunity to give feedback about the system during their call to 511. These comments are recorded, reviewed, and responded to promptly.

Montana

- *System Coverage*: Montana 511 provides statewide coverage for approximately 8,000 miles of roadway. Roadways included in the system were selected based upon traffic volumes, winter level of service, and public requests.
- Toll-Free Number and System Website: 1-800-226-7623 www.safetravelusa.com
- *Time to Deploy*: From planning to deployment, Montana required approximately two years. Once Meridian was selected as the 511 service provider, one year passed before the 511 system was deployed.
- *Start-up Costs*: The state paid \$3,795 to have telecommunications companies reprogram their switches to accept 511 calls, \$50,000 for marketing, \$20,000 for hardware and software integration, and \$25,000 as match for the 511 Deployment plan grant from the FHWA.
- *Monthly Operating Costs*: Not provided
- *Funding Sources*: Montana obtained funding for 511 via a congressional ITS earmark appropriation, and the FHWA 511 Deployment plan grant. Montana currently uses federal transportation funds (STP and NHS) and state-provided funding to operate the system.
- *511 Service Provider*: Meridian Environmental Consulting is the 511 system service provider.
- *Services Provided*: The Montana 511 system currently provides weather conditions and forecasts, road construction information, and road conditions (e.g., the system reports if the road is icy, flooded, etc.).
- *Personnel Requirements*: There are over 200 state employees with access to enter data into the 511 system. These employees are winter office staff, snowplow operators, and division-level (there are 11 division offices in Montana with one or two people per office with access to data entry) personnel. Construction information is updated weekly and as changes occur.
- *Planned and Potential System Upgrades*: Montana is currently planning to add voice recognition capability (to allow callers to navigate the 511 system via voice), National Parks information, and load and speed restriction information.
- *User Feedback*: Callers have the opportunity to give feedback about the system during their call to 511. These comments are recorded, reviewed, and responded to promptly.

Kentucky

Kentucky is home to two separate 511 systems. A portion of Kentucky is covered by the ARTIMIS system, which serves the Cincinnati/Northern Kentucky metropolitan area. The summary below addresses only the statewide system.

- *System Coverage*: Kentucky operates and maintains a statewide 511 system which provides coverage for approximately 2,200 roadway miles of National Highway System roads.
- *Toll-Free Number and System Website*: 1-866-737-3767 511.ky.gov
- *Time to Deploy*: After an initial evaluation period, Kentucky required approximately ten months to deploy the state's 511 system.
- *Start-up Costs*: Kentucky paid \$84,000 to telecommunications companies for switch translation to allow 511 calls, \$40,000 for approximately 220 roadside signs advertising the 511 service, and \$650,000 to the CARS and CARS-511 pooled fund efforts.
- *Monthly Operating Costs*: Not provided
- *Funding Sources*: Kentucky obtained \$100,000 from the FHWA which was matched by \$25,000 from the state. This funding was used to pay for the telecommunications switch translation fees, the roadside signage, and some marketing. Kentucky is in the process of making a \$564,265 contribution to the CARS consortium to assist with construction of a CARS call center in Kentucky. This funding will come from earmarked ITS funds matched by state funds.
- *511 Service Provider*: Castle Rock/CARS is the 511 system service provider for the Kentucky statewide 511 service.
- *Services Provided*: The Kentucky 511 system currently provides weather conditions and forecasts, road construction information, and road conditions (e.g., the system reports if the road is icy, flooded, etc.). Kentucky 511 reports major traffic incidents via 511 and uses a threshold of 15 minutes (i.e., if incident will result in restricted flow for more than 15 minutes, then it is reported via 511) to determine if the incident should be reported.
- *Personnel Requirements*: Kentucky hired a full-time 511 administrator who oversees the Kentucky 511 program and trains employees to input data into the 511 system via the state's RCRS. There are a number of employees throughout the state who input data into the 511 system via the RCRS.
- *Planned and Potential System Upgrades*: Kentucky is presently adding approximately 4,000 miles of routes to the 511 coverage area and is working to provide data entry access to 200 more individuals. The state is also working with the CARS consortium (the group of states that operate CARS-provided systems) to construct a call center which will boost the shared call capacity for all CARS states.
- *User Feedback*: Callers have the opportunity to give feedback about the system during their call to 511. These comments are recorded, reviewed, and responded to promptly.

New Hampshire

- *System Coverage*: The New Hampshire 511 system provides statewide coverage for approximately 4,200 roadway miles of interstates, U.S. routes, and state routes.
- Toll-Free Number and System Website: 1-800-918-9993 www.511nh.com

- *Time to Deploy*: From the initial planning and determination to become a member of the CARS consortium until the deployment of New Hampshire's 511 system, approximately one year passed.
- *Start-up Costs*: Not provided
- *Monthly Operating Costs*: Operational cost is estimated to be approximately \$70,000 per year (\$5,830 per month).
- *Funding Sources*: New Hampshire obtained \$100,000 from the FHWA which was matched by \$25,000 from the state. The state intends to pay for 511 system operation via a combination of state and federal funds.
- *511 Service Provider*: Castle Rock/CARS is the 511 system service provider.
- *Services Provided*: The 511 system currently provides weather conditions and forecasts, road construction information, and road conditions (e.g., the system reports if the road is icy, flooded, etc.).
- *Personnel Requirements*: New Hampshire DOT Maintenance and Construction and State Police personnel have access to input data into the 511 system via New Hampshire's RCRS.
- *Planned and Potential System Upgrades*: New Hampshire is currently assisting in funding the construction of a new call center with over 600 bursting (overflow) ports and a text-to-speech software system.
- *User Feedback*: Callers have the opportunity to give feedback about the system during their call to 511. These comments are recorded, reviewed, and responded to promptly.

Vermont

- *System Coverage*: The Vermont 511 system is a statewide system that provides coverage for 3,200 miles of roadway overseen by the Vermont DOT. These roads include federal, state, and local roadways.
- Toll-Free Number and System Website: 1-800-429-7623 www.511vt.com
- *Time to Deploy*: Deployment of the Vermont 511 system required approximately one year.
- *Start-up Costs*: Not provided
- *Monthly Operating Costs*: Not provided
- *Funding Sources*: Not provided
- *511 Service Provider*: CARS is the 511 system service provider.
- *Services Provided*: The Vermont 511 system currently provides weather conditions and forecasts, road construction information, and road conditions (e.g., the system reports if the road is icy, flooded, etc.).
- Personnel Requirements: Not provided
- Planned and Potential System Upgrades: Not provided
- *User Feedback*: Callers have the opportunity to give feedback about the system during their call to 511. These comments are recorded, reviewed, and responded to promptly.

Maine

- *System Coverage*: The Maine 511 system is a statewide system that provides coverage for approximately 8,000 miles of roadway. These roads include federal, state, and local roadways
- Toll-Free Number and System Website: 1-866-282-7578 www.511maine.com
- *Time to Deploy*: Deployment of the Maine 511 system required approximately one year.
- *Start-up Costs*: The system start-up costs included \$125,000 paid for investment in the CARS system (this cost was split by the three TRIO states: Maine, New Hampshire, and Vermont). Maine then paid \$125,000 for investment into the CARS-511 system and \$30,000 to assist with moving the 511 system to CARS' new hosting solution.
- *Monthly Operating Costs*: Maine estimates the first year of 511 will incur an operational cost of approximately \$50,000. Once the 511 system has moved to CARS' new hosting solution, it is estimated that annual system operating costs will be less than \$50,000.
- *Funding Sources*: The Maine state gas tax will provide approximately \$100,000 per year for system operating costs.
- 511 Service Provider: CARS is the 511 system service provider.
- *Services Provided*: The Maine 511 system currently provides weather conditions and forecasts, road construction information, and road conditions (e.g., the system reports if the road is icy, flooded, etc.).
- *Personnel Requirements*: State employees in approximately 100 maintenance camps throughout the state report weather information via radio to a centralized dispatch center, where the data is entered into the 511 system. During the winter months, seven dispatchers work in the dispatch center, while only one dispatcher is present during the summer months.
- Planned and Potential System Upgrades: Not provided
- *User Feedback*: Callers have the opportunity to give feedback about the system during their call to 511. These comments are recorded, reviewed, and responded to promptly.

Mississippi

Mississippi is actively investigating 511, has received FHWA 511 deployment assistance funding, and has hired PBS&J Consulting to develop a 511 Deployment Plan for the state. This plan is expected to be available in late-fall 2003.

Mississippi currently operates a limited traffic information and management system, which provides weather, traffic, and construction information for three areas of the state (Biloxi/Gulfport/Gulf Coast region, the Jackson metropolitan area, and the Southaven region). This information is disseminated via the internet and is available at <u>www.mstraffic.com</u>. This information will be integrated into the future Mississippi 511 system.

While Mississippi has not yet chosen a 511 system service provider (e.g., Meridian, CARS, etc.), initial plans for system deployment likely involve rolling-out a Mississippi 511 system in three stages:

Stage One	511 service in the Greater Jackson area only
Stage Two	511 service expanded to include DeSoto and Tunica counties as well as
	the Hattiesburg area
Stage Three	511 service available statewide

The Mississippi 511 system will likely include an option for customers to have their call transferred to the customer service center of a Jackson-area transit provider. Call transfers will probably be available for callers wishing to have their call transferred to the Mississippi Department of Tourism.

Tennessee

Tennessee has applied for and received a FHWA 511 system deployment plan grant and is in the early stages of deployment planning and investigation. The proposed launch date for the Tennessee 511 system is 2005.

Georgia

There are currently no known plans for 511 system deployment in Georgia. As of October 2003, Georgia had not applied for FHWA 511 deployment assistance funding. However, Georgia's NAVIGATOR traveler information service (www.georgianavigator.com) is a prime example of an ITS-based congestion management system and would likely play a significant role in any future Georgia 511 system. NAVIGATOR utilizes an array of traffic sensors, video cameras, and in-pavement detectors in the Atlanta and Macon areas to report congestion information which is displayed on the system's website and is available via numerous variable message signs placed on major Atlanta and Macon roadways.

Florida

Florida has deployed a unique 511 system that consists of two regional 511 systems. Plans call for the deployment of a third regional system in the Tampa metropolitan area, then the deployment of two more regional systems, and then a statewide system to link the five regional systems.

- *System Coverage*: The current Florida 511 system consists of two separate regional 511 systems covering Miami and the Interstate 4 corridor (39 miles in length) in Orlando.
- *Toll-Free Number and System Website*: The Miami 511 system is accessible via the internet at <u>www.smartraveler.com</u>. The Orlando 511 is accessible via the internet at <u>www.trafficinfo.org</u>. Toll-free numbers were provided for neither system (but are believed to be available).
- *Time to Deploy*: Not provided
- *Start-up Costs*: Start-up costs for the Miami and Orlando system were not available to the research team.
- *Monthly Operating Costs*: The Orlando 511 system has operating costs of approximately \$400,000/year (\$33,300/month). Other operating costs are absorbed within the operating

costs of Orlando's Regional Traffic Management Center. Monthly operating costs are not currently available for the Miami 511 system.

- *Funding Sources*: Not provided
- *511 Service Provider*: The Miami 511 system is hosted by SmartRoute Systems, which is a subsidiary of Westwood One. The Orlando 511 system is hosted by TellMe. No determination has been made at this time as to which provider will host the planned statewide system.
- *Services Provided*: The 511 systems in Florida provide information on travel times and/or delays, accidents/incidents, construction, and road/lane closures. 511 also provides information on public transit and airports/seaports where information is available.
- Personnel Requirements: Not obtained
- *Planned and Potential System Upgrades*: A third regional 511 system for the Tampa metropolitan area is tentatively scheduled to come online during the summer of 2004. Plans call for the expansion of 511 over the next ten years, until statewide coverage is available.
- *User Feedback*: It is presumed that Florida's 511 deployments allows user feedback, but this presumption has not been confirmed.

Call Volumes

The 511 Deployment Coalition reported in November 2003 that the typical 511 call lasts 1 minute, 14 seconds. Monthly call volumes from the 511 systems of several states were obtained and are presented in Table 3-3 and Figure 3-1.

	Nebraska	Minnesota	Kentucky
Nov-01	29106	NA	NA
Dec-01	40263	NA	NA
Jan-02	47562	NA	NA
Feb-02	96018	NA	NA
Mar-02	123740	NA	NA
Apr-02	4354	NA	NA
May-02	3755	NA	NA
Jun-02	2880	NA	NA
Jul-02	24529	NA	NA
Aug-02	2821	NA	NA
Sep-02	1842	NA	NA
Oct-02	46825	NA	NA
Nov-02	15041	21548	18866
Dec-02	8303	42670	114273
Jan-03	46241	39304	127207
Feb-03	88055	57277	138136
Mar-03	41224	32740	28373
Apr-03	46517	41267	32361
May-03	8394	23143	39101
Jun-03	5826	28771	31763
Jul-03	4595	31157	34300
Aug-03	3175	20162	30544
Sep-03	2847	NA	NA

Table 3-3: Sample 511 system monthly call volumes



Figure 3-1: Sample 511 monthly call volumes

Figure 3-1 illustrates the seasonal trends that occur in call volumes experienced by a typical 511 system. Note that call volumes typically spike during the winter months of December to March when severe winter weather can create adverse driving conditions (e.g., icy roadways, closed routes, etc.).

511 Deployment Conference

In addition to visiting and contacting several individual states that had deployed or are planning to deploy 511 systems, a University of Alabama researcher attended the ITS America 511 Deployment Coalition Conference in Fort Mitchell, Kentucky on October 7-9, 2003. This conference featured attendees from across the United States who were brought together to share their experiences with 511.

During the conference, the University of Alabama researcher was able to meet representatives from:

- Meridian Environmental Consulting
- Castle Rock Consulting
- PBS&J
- New Hampshire
- Vermont
- Maine
- Kentucky
- New York
- Mississippi
- Iowa
- North Dakota
- Montana
- Idaho
- Kansas
- Miami
- Nebraska

The conference was an invaluable experience that will likely lay the groundwork for future networking efforts between Alabama and other states that have deployed 511 systems or are investigating 511.

Section 4 511 System Provider Profiles

This section provides an overview of three typical 511 system providers that serve states that are deploying 511 systems. By using these providers and their already-constructed infrastructure, states are able to reduce their deployment costs because they do not have to build their own 511 system "from the ground up".

Meridian Environmental Consulting

Meridian Environmental Consulting was established in 1996 as an outgrowth of University of North Dakota research on the Advanced Transportation Weather Information System (ATWIS). The ATWIS was deployed across North and South Dakota and was the nation's first multi-state advanced traveler information system. ATWIS was further refined into what became known as the #SAFE program. #SAFE consolidated traveler information that had been provided by ATWIS so that callers could obtain that information from a standardized number (#7233 or #SAFE). After the FCC established 511 as the nation's traveler information telephone number, Meridian constructed the nation's first statewide 511 in Nebraska. Since that time, Meridian has deployed statewide 511 systems in North and South Dakota and Montana, with a Meridian-built 511 system scheduled to come online in Kansas in late 2003.

Meridian specializes in weather forecasting and provides several non-511 weather forecasting services in addition to their traveler information services. Meridian weather forecasts are created by blending available weather forecasts and model data to create high-resolution (10 km^2) forecasts and road surface condition predictions. The Meridian weather products are known to be superior to those generated by the National Weather Service, as they provide information concerning the effect of weather events on the roadway surface.

Meridian's 511 system telephony infrastructure is located in an AT&T-owned facility in Fargo, North Dakota. The Fargo facility features multiple redundancy measures, including back-up power, a diesel generator, multiple data transmission methods to facilitate the receipt of 511 data from the Meridian 511 service states (e.g., FTP, VPN, and manual data delivery), up to 15 telephonies, and a secure Sonet ring of redundant telephone lines. 511 data is entered into a Meridian 511 system via a web-based RCRS.

Figure 4-1 depicts the typical system configuration of a Meridian-operated 511 system.



Figure 4-1: Typical 511 system configuration (Meridian)

Meridian's estimate of start-up cost include a one-time telephony infrastructure fee of \$15,500 plus a one-time ASR (Automated Speech Recognition) fee of \$100 per port. According to Meridian, the system start-up process has several components:

- Computer telephony and database systems
- Systems to collect and integrate data
- Weather modeling
- Voice components

The total cost for system construction (for 120 ports, the Meridian-recommended number of ports necessary for Alabama) will be \$102,000 + travel for planning/training and possible meetings with Public Service Commission (regarding telecommunications switch charges) at state approved rates. For the first 18 months (six month build period + twelve months of operation) there is no additional charge for service and/or upgrades to the system. After this initial period Alabama can opt to sign an agreement with Meridian to provide service/upgrades at a cost of \$1,000 per month. The Meridian representative indicated that Meridian would provide system testing if requested/needed by Alabama and is currently doing so for Kansas at a reduced monthly charge. In the event that Alabama wants to integrate traffic information in the future, Meridian estimates the cost to be \$10,000-\$25,000. Meridian notes that Kansas City is actively constructing a traffic data system which would presumably be integrated in Kansas' 511 system.

Operating a 511 system in Alabama, using Meridian as the system provider, has been estimated to cost \$15,000 plus \$0.05/minute plus a Universal Service Charge (for the call volume only) of 7.5% per month. Representatives from Meridian noted that Alabama will only pay for the number of minutes used (i.e., the state is not required to pre-pay for any minutes).

With regard to a toll free (1-800, 1-888, etc.) number that Alabama 511 calls would be switched to, Meridian indicated that either the state or Meridian can take ownership of the number (if Meridian owns the number, the company would send ALDOT a monthly bill for minutes used by the 511 system). Regardless of the toll-free number ownership plan chosen by the state,

Meridian has several potential toll free numbers reserved that would be potentially appropriate and logical for an Alabama 511 system. In the case of Meridian ownership of the number, the contract between the state and Meridian would include a provision to transfer ownership of the number to Alabama, should ALDOT terminate its contract with Meridian in the future.

Generally, the initial contract with Meridian is three years long. This time period includes the six month build period, system testing, and two to two and one half (depending upon the length of the test cycle) years of operation. Cost adjustments can occur during the contract period due to cost-of-living increases or decreases. The contract also allows Alabama to increase or decrease the number of ports the state requires.

The research team has identified several potential "pros" and "cons" of Meridian as a 511 service provider. These are given below.

Pros

- Lengthy experience with deployment of 511 systems
- 511 Deployment Guidelines are modeled on Meridian work
- Excellent weather forecast and road conditions generation
- Low system startup costs

Cons

- High annual operating cost relative to CARS, largely due to higher rates for toll-free lines.
- May not be the first name that comes to mind at state DOTs when 511 systems are mentioned. The CARS consortium may have that distinction.

CARS/CARS-511

In 1998, four state DOTs (Iowa, Missouri, Minnesota, and Washington) joined and pooled funds, along with Castle Rock Consulting, to develop the Condition Acquisition and Reporting System (CARS). This system allows prompt reporting and notification of events such as traffic crashes, road construction, delays, detours, and weather. CARS is a modular system, onto which pooled-fund states have added additional features and functionality. CARS-511 is an offshoot of the original CARS program that involved adding 511 traveler information functionality.

The original CARS pooled-fund group of states has expanded. As of late-2003, there were a total of ten participating states: Alaska, Iowa, Kentucky, Maine, Minnesota, Missouri, New Hampshire, New Mexico, Vermont, and Washington. Of these, all but Washington and Missouri are also members of the CARS-511 consortium.

CARS is a computerized data entry system that allows users to rapidly report events and conditions for particular roadway segments or for broad areas. Data is recorded in a database as it is entered and is made available to other components for presentation via a 511 telephone

information system. Figure 4-2 (provided by Castle Rock Consulting) depicts the typical system configuration, and the interaction between components of a CARS-511-operated 511 system. Overall, the system configuration of the CARS 511 system is similar to the system configuration provided by Meridian; however, CARS relies on National Weather Service-generated condition reports and forecasts which do not present information regarding roadway surface condition.



Figure 4-2: Typical 511 system configuration (CARS-511) (Figure courtesy of Castle Rock Consulting)

Castle Rock Consulting provided data for this publication indicating that initial costs for building a CARS 511 system in Alabama would total approximately \$394,648. This cost includes \$125,000 for licensing, configuration, and membership in the CARS consortium, \$125,000 for licensing, configuration, and membership in the CARS-511 consortium, and \$144,648 to purchase 100 ports for the shared pool of ports owned by the CARS-511 consortium.

Operating a CARS-provided 511 system in Alabama will cost the state approximately \$143,173 per year. This cost includes \$44,531 to host, operate, and maintain the CARS software component of the 511 system. The annual cost to host, operate, and maintain the 511 call center and its components is estimated to be \$16,641. The remaining charge to the state is a per-minute charge for the number of minutes used by callers to the system (charged at a rate of \$0.024 per minute). For example, if 2.5 million minutes were used by callers over a one-year period, the state would pay \$60,000 in per-minute call charges.

The research team has identified several potential "pros" and "cons" of CARS as a 511 service provider. These are given below.

Pros

- Member states continually develop improvements to CARS and share improvements with other member states.
- It uses a refined road condition reporting system (the CARS software package).
- It hosts more statewide 511 systems then any other service provider.

Cons

- It has a high initial cost (largely from joining CARS and CARS-511 consortia).
- Weather forecast and road conditions are not as complete as Meridian's

The 511 Alliance

The 511 Alliance was created in May 2003 and combines the resources of four major ITS firms: PBS&J, Westwood One, Tele Atlas, and Meteorlogix. The 511 Alliance is currently in its infancy and has yet to deploy a statewide 511 service.

Summary of Potential Costs for Alabama

Table 4-1 gives a summary of the potential costs for 511 deployment and operation in Alabama as indicated by Meridian and CARS. The table represents system provider costs only; other costs to initiate and operate a system are provided in Section 5 of this report.

	CARS	Meridian
Deployment Costs		
System Configuration and Integration	\$250,000	\$115,000
Purchase Ports	\$144,648	
Sum	\$394,648	\$115,000
Annual Costs		
Hosting, Operations, and Management	\$83,172	\$175,924
Telephony Charges *	\$60,000	\$125,000
Surr	\$143,172	\$300,924

Table 4-1: Summary of 511 service provider cost estimates

* Telephony Charges = 2.5 million minutes used on the 511 system multiplied by the CARS and Meridian per minute usage rates (\$0.024 and \$0.05, respectively)

Section 5 511 in Alabama

This section describes the current state of traveler information, telecommunications, and Intelligent Transportation Systems in Alabama. Potential 511 system stakeholders are identified, and their potential roles in an Alabama 511 system are discussed. Additionally, a potential 511 system configuration is devised for Alabama.

Federal Highway Administration 511 Deployment Plan Grant

Alabama has no traveler information service at this time. However, the University of Alabama researchers assisted ALDOT with the procurement of a \$100,000 grant from the FHWA. This grant has the following stated objectives (*Federal Register*, 2001):

The goal of the 511 support assistance program is to accelerate the implementation of 511 nationwide for traveler information. Through this program, the Intelligent Transportation Systems Joint Program Office (ITS-JPO) expects to enable every State to develop plans or programs that result in the deployment of traveler information services delivered through the 511 telephone number. The creation of statewide 511 deployment plans will facilitate discussions with telecommunications firms on implementing 511 services, and serve as a key building block for a 511 system available nationwide.

This grant required the state to contribute \$25,000 in matching funds. Thus, a total of \$125,000 is available to ALDOT to construct a 511 Deployment Plan. It is presumed that this Plan will build upon this current project and allow Alabama to continue its preparation for the deployment of a 511 system.

Furthermore, the 511 deployment assistance grant also allows grant funds to be used in the following manner (*Federal Register*, 2001):

Upon completion of a 511 deployment plan, this funding may also be used toward activities to develop 511 services. These activities may include development of basic traveler information services if none exist or are inadequate for delivery by 511.

Any funds remaining after development of the deployment plan will be used for implementation.

Telecommunications in Alabama

This section of the report provides an overview of the telecommunication industry's presence in Alabama.

Landline Providers (LECs)

Local exchange carriers (LECs) are companies that provide service within an FCC regulated "local access and transport area." There are two types of LECs: incumbent local exchange carriers (ILECs) and competitive local exchange carriers (CLECs). ILECs are typically companies that are direct descendents of the original Baby Bells or established regional companies/cooperatives. CLECs are companies that are in direct competition with ILECs. CLECs compete by either reselling ILECs capacity or by establishing their own facilities. There currently are 30 ILECs in Alabama with BellSouth covering the largest geographic and population area. There are also an increasing number of CLECs operating in Alabama (APSC, 2003). Figure 5-1 illustrates the service areas of the 30 ILECs that operate in Alabama.

Figure 5-1 shows that BellSouth provides service to a large area of Alabama, including the major population centers (Birmingham, Montgomery, Mobile, etc.). Therefore, the cooperation of BellSouth in any effort to bring 511 to Alabama is critical to ensure that a majority of landline users in Alabama will have access to the 511 service.

Each landline provider in the state must reprogram its switches to allow calls to the Alabama 511 system to be translated from the three-digit 511 number to the ten-digit toll-free number associated with the 511 system. Without this translation, calls made to 511 will not connect to the state's 511 system.

Although the process of reprogramming switches to accept 511 calls is not a difficult process, telecommunications companies often charge the 511-deploying state for the reprogramming process. BellSouth, the largest ILEC operating in Alabama, has established a tariff (charge) structure for states within its service area to reprogram its switches to accept 511 calls. These tariffs would apply to Alabama should Alabama deploy a 511 system. The tariff structure follows (BellSouth, 2003):

- Service Establishment Charge \$389 per Basic Local Calling Area
- Central Office Activation \$150 per Central Office
- Change of Point-to-Number by Subscriber \$13.50 per Central Office (Note: This charge would only apply if, after 511 service activation, the state wished to change the toll-free number to which 511 calls are directed)



Figure 5-1: Service areas of Alabama ILECs

In Alabama, there are four BellSouth Basic Local Calling Areas and 96 Central Offices. Table 5-1 provides a summary of the BellSouth 511 tariffs and the costs to the state associated with these tariffs.

Type of Charge	Per	C	harge	Total
Service Establishment Charge	Basic Local Calling Area	\$	389.90	\$ 2,339.40
Central Office Activation	Central Office	\$	150.00	\$ 14,400.00
			Sum	\$ 16,739.40
Change of Point-to-Number by Subscriber*	Central Office	\$	13.50	\$ 1,296.00

Table 5-1: Summary of BellSouth 511 tariffs

* The Change of Point-to-Number by Subscriber charge is only paid if the toll-free number to which 511 is translated, is changed after the establishment of the 511 system

Review of 511 deployment initiatives in other states reveals that not all landline providers have requested compensation for switch reprogramming. 511 system deployers in Oregon suggest that each landline provider be a sent a request to reprogram switches at no charge. Often, companies, particularly smaller companies, will accept such a proposal.

Wireless Providers

Wireless telephone providers and their services are not regulated by the Alabama PSC. Instead, wireless providers are administered by the FCC. While the FCC lists a number of companies/entities that are licensed to provide wireless services in Alabama, the major wireless providers in Alabama are listed below:

- Cingular
- AT&T Wireless
- T-Mobile
- Verizon Wireless
- Sprint
- ALLTELL
- Nextel
- Southern Linc

Other 511-deploying states have had varying degrees of success requesting wireless providers to reprogram their switches (or towers, in some cases) to accept 511 calls. Verizon Wireless maintains a nearly universal (among 511-deploying states) stance in which the company requests relatively large one-time and/or recurring charges for switch reprogramming. Given that the Alabama Public Service Commission has limited jurisdiction over wireless carriers, the state may be placed in a position to deploy a 511 system that does not allow access to callers from carriers that have refused to assess reasonable switch programming charges.

If the state were to deploy a 511 system without the participation of all wireless carriers, it may be possible to convince carriers of the potential public relations benefits of allowing callers to

reach to reach the 511 service. Such an approach was applied successfully in Kentucky to bring Verizon Wireless on board.

Payphone Providers

There are approximately 1.9 million payphones in the United States. The majority of these payphones are owned and operated by the ILECs; the rest are operated by approximately 2,000 other companies. More than 150 payphone companies have been certified by the PSC to provide service within Alabama. Interstate and local payphone calls are not regulated by the PSC; however, PSC oversight covers intrastate payphone calls and several other aspects of pay telephone company operation in the state (APSC, 2003).

The Alabama PSC may wish to request that payphone providers allow 511 calls; however, the large number of payphone providers in the state may make such a request a cumbersome task.

Estimated Switch Programming Charges

The estimated cost for landline, wireless, and payphone companies to program their switches to allow 511 calls is less than \$75,000. This estimate may be subject to change if lower tariffs can be negotiated with the telecommunications companies via the PSC.

Alabama ITS Infrastructure

For a future Alabama 511 system to provide traffic information (e.g., projected travel times between two locations, traffic congestion information, etc.), several ITS components must be in-place:

- Traffic sensors (in-pavement detectors or non-invasive detectors such as radar, video detection systems, etc.) to monitor and report traffic flow conditions; the devices should be spaced at approximately ¹/₄ mile (or less) intervals
- A traffic management center (TMC) to receive data from the traffic sensors, compile the data, and generate meaningful information (projected travel times, etc.)
- Linkage between the TMC and the 511 system so that traffic information can be placed on the 511 system

Such systems are normally deployed only in large urban areas. At this time, no location in Alabama has adequate ITS infrastructure (the elements listed above) to provide meaningful and reliable traffic information. Table 5-2 summarizes the ITS efforts currently underway and planned in Alabama. As ITS components come on-line, traffic information should be added to the Alabama 511 system. Meridian and CARS have estimated that their charges for adding traffic information to an existing 511 system is relatively inexpensive: approximately \$10,000 to \$50,000 per urban area.

Table 5-2: Summary of Alabama ITS efforts

ALDOT Division	ITS Deployment Status/Plans
1 - Huntsville	Constructing ITS architecture
2 - Muscle Shoals	Planned ITS Corridor for U.S. 43 incl. CCTV, DMS, TMC
3 - Birmingham	6 TCCs tied into temporary TMC, ATMS featuring CCTV and DMS deployed, Traffic sensors planned
4 - East Alabama	No activity
5 - Tuscaloosa	Operational TMC, CCTV, and Video Detectors; DMS are planned
6 - Montgomery	Constructing ITS architecture
7 - Southeast Alabama	No activity
8 - Soutwest Alabama	No activity
9 - Mobile	Operational Fog Warning System, TMC, CCTV; Traffic sensors planned

Note: DMS = Dynamic Message Sign, CCTV = Closed-circuit television (video camera system), TCC = Traffic Control Center, ATMS = Advanced Traffic Management System

Identification of Stakeholders

The operation of a 511 system in Alabama will require the participation of a number of stakeholders. The following entities are perceived to have major initial roles in deployment and operation of the Alabama 511 system.

- Alabama Department of Transportation (ALDOT)
 - Design Bureau
 - Maintenance Bureau
 - Geographic Information Systems/Computer Technology
 - Alabama Department of Public Safety and local law enforcement
- Alabama Public Service Commission
- Telecommunications companies (landline and wireless)
- Motoring public

ALDOT

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ALDOT will play a lead role in the planning, deployment, and operation of an Alabama 511 system. Table 5-3 provides a Nebraska Department of Roads (NDOR) estimate of time expenditures of NDOR personnel with regard to their roles in the 511 system. ALDOT personnel requirements may be similar but smaller due to less severe climate conditions.

Position	Number of employees	% Time devoted to 511 Data Entry
Maint. Supts. & Supvr.	120	8%
Staff Assistants	30	8%
Construction personnel	16	1%
511 Manager	1	65%
IS/IT Div. employees	3	1%
Web employee	1	3%
	Total # = 171	

Table 5-3: NDOR personnel time expenditure estimates

Note: Number of employees figure reflects employees that have role in 511 system in Nebraska

Maintenance/Construction Personnel

Personnel in the ALDOT Maintenance and Construction Bureaus will likely be requested to provide data for entry into the Alabama 511 system. Existing resources such as the Emergency Road Closure and Highway Construction Bulletin (both currently available via the ALDOT website) will be integrated into the Alabama 511 system. Additionally, real-time reports from field personnel will be required as work zone conditions change (e.g., a right-lane closure is switched to a left-lane closure, etc.). These actions will require only a small percentage of employees' time but will require a big adjustment in priorities to ensure that accurate, current information is always delivered to the public via 511.

Geographic Information Systems (GIS)/Information Technology Personnel

Existing state GIS data will be integrated into the system of the selected 511 service provider. ALDOT GIS personnel will assist the service provider with the integration of this data which should take approximately four to six weeks. After the 511 system becomes operational, ALDOT information technology personnel will be perform the following tasks, which should consume a very small portion of their daily work time:

- Establish and maintain links between the ALDOT website and the 511 system website
- Maintain the server that serves as a repository for 511 data prior to being fetched by the 511 system service provider

New Personnel Requirements

Existing personnel will be used for the majority of tasks related to 511 (e.g., conditions reporting, GIS data integration, etc.). However, several states (notably Nebraska and Kentucky) have hired a full-time 511 system administrator. This individual is tasked with training personnel to enter data into the 511 system via the RCRS, reviewing and responding to 511 caller feedback, and being on-call to enter data into the 511 system during hours when other personnel are unavailable (e.g., late-night, weekends, holidays, etc.). It is recommended that the 511 system administrator hold "Civil Engineer"rank, at a pay grade 78 (salary range from \$40,055 to \$60,960 per year).

Department of Public Safety

It is envisioned that the Alabama Department of Public Safety (DPS) will play a role in reporting traffic incident data for entry into the Alabama 511 system. However, based upon discussions with DPS personnel, the research team has concluded that the DPS does not currently have either the personnel or technological resources to provide complete data to an Alabama 511 system. This conclusion is based upon the following observations:

• There are a limited number of DPS troopers deployed statewide, especially at night; therefore, coverage of traffic incidents would be limited and may not be sufficient to provide timely reporting of incidents to the 511 system.

• Most DPS dispatch centers are not equipped with the computer technology necessary to access and enter data into a 511 RCRS. The capital cost to upgrade the stations is modest, approximately \$2,500 for each dispatch center without the necessary computer facilities. However, the issue of dedicating DPS staff time to 511 would remain a potential stumbling block.

The SAFETEA (Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2003) legislation may require each state to establish a statewide incident reporting system within two years of the legislation's passage. This legislation is undergoing congressional review but may improve the DPS' capability to report incidents.

Local Law Enforcement

If a determination is made that the DPS is not adequately equipped or prepared to provide traffic incident data for entry into the Alabama 511 system, ALDOT may consider involving city and county law enforcement officials. As of the end of 2002, there were 377 law enforcement agencies (67 county sheriff's offices, 290 city police departments, and 17 university or campus security agencies) within Alabama (ACJIC, 2003).

In the event that 511 data reporting devolved from the DPS to local law enforcement officials, the task of training and equipping these officials for data reporting is daunting. Where possible, the DPS should be provide 511 traffic incident data reporting capability, while select local enforcement agencies (e.g, major city police or county sheriff's departments) may also be requested to report data. In any event, in the early stages of 511 deployment in Alabama, timely reporting of traffic incident information may be difficult to achieve.

Public Service Commission

The PSC will be asked to provide assistance in negotiations with telecommunications companies doing business in Alabama. The PSC is comprised of three elected commissioners and a staff which regulates public utilities and some aspects of transportation within Alabama.

With regard to landline telecommunications providers, BellSouth, the largest ILEC doing business in Alabama, has already filed tariffs of the costs that would be charged to the state to allow 511 calls to be placed from BellSouth landline phones. The Alabama PSC will likely be asked to approach BellSouth and other landline telephone providers doing business in the state and negotiate reasonable charges for switch reprogramming to allow 511 calls to be placed. In several states, smaller telephone companies have been willing to provide switch reprogramming at no charge to the state.

Given the PSC's limited jurisdiction over wireless telecommunications companies, it is recommended that the PSC serve in an advisory role to ALDOT in negotiations with wireless companies doing business in Alabama. The PSC should not attempt to gain rate control over wireless companies (this jurisdiction currently lies with the FCC), as such an attempt may be viewed as adversarial by wireless providers.

Alabama 511 System Content

It is recommended that Alabama adhere to the system content principles that have been established by the 511 Deployment Coalition. At a minimum, the initial 511 system deployment should provide traveler information for the state's 3,655 miles of National Highway System (NHS) roadways. Ideally, the approximately 11,050 miles of roadway in Alabama (including the NHS roadways) that are under the jurisdiction of ALDOT should be included in the system.

Information for these roadways should be provided by route number or name, and additional detail should be provided in urban areas such as Birmingham, Montgomery, etc. Furthermore, it is anticipated that all traveler information components of the Alabama 511 system (excluding potential call transfers to tourism or other third party information providers) will be automated, and that the caller will not engage in direct contact with a human operator.

Weather information on an Alabama 511 traveler information system is recommended to be provided on a roadway segment-by-segment basis. These segments should be defined at logical lengths to provide accurate weather conditions and to reflect the potential for variation of weather conditions. Weather information must be updated frequently.

Figure 5-2 illustrates a potential configuration of the Alabama 511 system.



Figure 5-2: Potential Alabama 511 system configuration

Future Developments

As the ITS infrastructure in Alabama becomes more mature and is deployed on a widescale basis, it is anticipated that traffic congestion/travel time information may be available for several urban areas via 511.

Traffic congestion/travel time information may be integrated into the Alabama 511 system at minimal cost (excluding the cost of the construction of the necessary ITS infrastructure to provide the traffic information). The estimated integration cost for traffic information ranges from \$10,000 to \$50,000 per urban area.

Section 6 Summary of Findings and Recommendations

511 Overview

On July 21, 2000, the FCC granted a petition offered by the USDOT requesting that the FCC designate a national three-digit telephone number for traveler information. With the granting of this petition, 5-1-1 was established as the national traveler information telephone number for the United States.

511 systems are currently deployed in 18 locations (13 statewide systems and five regional or metropolitan systems). A total of 44 states (including Alabama) have indicated an interest in the deployment of a 511 system and have received \$100,000 in funding from the FHWA to assist with the development of a 511 Deployment Plan.

Potential Configuration of an Alabama 511 System

This section summarizes the proposed configuration of an Alabama 511 system. This system will include an automated response system for callers dialing 511 within Alabama as well as an internet site accessible from personal computers.

Initial Deployment

ALDOT will use its \$125,000 Deployment Plan Assistance grant from the FHWA to write a detailed Deployment Plan for Alabama.

Based upon existing infrastructure and state resources (ALDOT, DPS, etc.), it is envisioned that an initial deployment of an Alabama 511 system will provide the following types of data:

- Road Construction/Work Zone information/Emergency road closures
- Weather Conditions/Forecasts and Weather-related road condition information
- Major traffic incidents

Road Construction/Work Zone Information/Emergency Road Closures

This information will be provided by personnel in the Maintenance and Construction Bureaus of ALDOT. ALDOT currently provides emergency road closure and construction information via its website. The information contained within these resources will be provided via 511 and will be supplemented, as needed, by reports from field personnel as conditions change (e.g., a right-lane closure is switched to a left-lane closure, a road is blocked by floodwaters, etc.). ALDOT personnel tasked with reporting road construction/work zone information must be vigilant and committed to the timely reporting of accurate data to 511.

Weather Conditions/Forecasts and Weather-related Road Conditions

In the early years of an Alabama 511 system, weather and weather-related road condition information may be the most valuable information to callers. For this reason, it is highly recommended that Alabama obtain weather conditions, forecasts, and weather-related road condition information from a third-party, value-added meteorology source (such as a 511 system provider). Current National Weather Service-provided information has been deemed by the 511 Deployment Coalition to be inadequate, as the coverage area and time horizon for the data are often too large to be applied to specific roadway segments. The best weather data is specifically geared towards travel (i.e., weather as it relates to the condition of the roadway, visibility, etc.) and can be applied to individual roadway segments.

Major Traffic Incidents

Given the limited personnel and technological resources of the Alabama Department of Public Safety, it is recommended that the reporting of traffic incidents via 511 be limited to only accidents deemed as "major." The threshold for determining whether an accident is major should be determined prior to the deployment of the Alabama 511 system and should be based upon the estimated amount of time that traffic flow will be restricted by the incident in question. For example, Kentucky uses a threshold of 15 minutes (i.e., if an incident will result in restricted flow for more than 15 minutes, then it is reported via 511). Reporting of minor incidents (below the established major incident threshold) may occur, but the timeliness and accuracy of this reporting may be unreliable. In the event that DPS is unable to report incidents to the 511 system, local law enforcement may be called upon.

Potential Future System Enhancements

This report assumes that traffic congestion/travel time data for large Alabama cities will be added to an existing Alabama 511 system as the infrastructure to allow these enhancements become operational. The inclusion of congestion/travel time data is highly desirable and should be integrated into 511 as soon as is feasible. The integration of traffic data into an Alabama 511 system is anticipated to be a low cost to the state (potentially less than \$50,000 per major urban area). However, this cost does not include the millions of dollars spent to construct, operate, and maintain the actual ITS infrastructure components which would feed information to the 511 system.

Potential Cost of an Alabama 511 System

Cost estimates for an Alabama 511 system were provided by both CARS and Meridian. These estimates are presented in Table 6-1.

	CARS	Meridian
Deployment Costs		
System Configuration and Integration	\$250,000	\$115,000
Purchase Ports	\$144,648	
Sum	\$394,648	\$115,000
Annual Costs		
Hosting, Operations, and Management	\$83,172	\$175,924
Telephony Charges *	\$60,000	\$125,000
Sum	\$143,172	\$300,924

Table 6-1: Summary of 511 service provider cost estimates

* Telephony Charges = 2.5 million minutes used on the 511 system multiplied by the CARS and Meridian per minute usage rates (\$0.024 and \$0.05, respectively)

Assuming these costs remain constant, Figure 6-1 illustrates the five-year projected costs associated with both CARS and Meridian 511 systems in Alabama and suggests that (assuming constant costs) the CARS-provided 511 solution for Alabama will be initially more costly, but will be less costly over the long-term. However, CARS-511 gains much of its long-term advantage over Meridian due to a lower 800-number per minute usage charge. If Meridian can lower its 800-number rate to match the CARS rate, the two systems are almost equal in price.

The costs given in Table 6-1 do not include the following additional costs:

- One-time fees paid to telecommunications companies to reprogram switches to allow 511 calls to be placed This cost is currently difficult to project, as only BellSouth has published tariffs for charges to the state to reprogram its switches for 511. Given the experience of other states that have deployed 511 systems, this cost will likely be less than \$75,000 (though this estimate is subject to revision). The state should refine this cost estimate through discussions with the telecommunications companies operating in Alabama during the development of its 511 Deployment Plan.
- The hiring of a 511 Manager for the state's 511 system deployment and operation It is recommended that the state hire or reassign an employee to serve as manager of the state's 511 system. This individual would devote his/her time to training personnel to enter data into the 511 system, reviewing and responding to 511 caller feedback, providing general system administration, and being on-call to enter data into the 511 system other personnel are unavailable (e.g., late-night, holidays, etc.). The estimated salary for this individual is \$40,055 to \$60,960 per year plus benefits.
- Travel costs incurred by representatives from the selected 511 service provider Representatives from the selected 511 service provider will likely travel to Alabama for contract negotiations, personnel training, and assistance with the integration of state GIS data with the 511 system. This travel would be billed to the state at approved travel rates and is estimated to be below \$10,000.
- ALDOT may advertise the 511 system to the driving public. From experiences in other states (South Dakota and Kentucky), advertising may cost the state between \$40,000 and \$125,000. This cost could include the purchase of roadside signage, brochures, and television/radio advertising time.



Figure 6-1: Five-year cost comparison of CARS and Meridian 511 systems for Alabama

Potential 511 Deployment Timetable for Alabama

The following is a workable timetable for the deployment of a 511 traveler information system in Alabama. This timetable is not absolute, and the actual time to deploy may vary as the deployment takes place.

Stage One: Deployment Planning (2004)

- Complete a FHWA 511 Deployment Plan as per the requirements of the FHWA 511 Deployment Plan Assistance grant.
- Initiate negotiations with landline, wireless, and payphone telecommunications companies regarding switch reprogramming for calls to 511.
- Secure potential internet domain names for an Alabama 511 internet presence (e.g., <u>www.511al.org</u>, <u>www.511al.com</u>, etc.).
- Initiate contract proceedings with 511 service provider (e.g, Meridian or CARS). Note: Once a contract has been signed with a provider, six to twelve months will likely pass before an operational 511 system is deployed.

Stage Two: Initial Deployment (January 2005)

• Deploy a statewide 511 system in Alabama that provides the following information types:

- Weather conditions and forecasts
- Construction/work zone/road closure information
- Road condition information (Based upon state personnel reported conditions and weather condition information)
- Major incident information (Utilize a pre-set threshold to determine if an incident is severe enough to warrant reporting via 511)
- Deploy an Alabama 511 internet portal using domain name secured in Stage One.

Stage Three: Continued Operation, Evaluation, and Improvement (Ongoing)

- Operate a 511 system on a statewide basis, providing information as delineated above.
- Review operation of the 511 system and evaluate system performance.
- Monitor federal, state, and local governmental entities for potential sources of operating funds (e.g., Department of Homeland Security grants, etc.).

<u>Stage Four: Traffic Information Integration (as metropolitan traffic systems come "on-line")</u>

• Bring advanced traffic management systems "on-line" in Birmingham and other areas of the state (e.g., Mobile, the Shoals area, Tuscaloosa, etc.), and integrate the information gathered by these systems (e.g., congestion information and project travel times) into the 511 system.

Further Recommendations

It is strongly recommended that, if 511 is implemented in Alabama, a 511 system provider be engaged. The provider will supply the RCRS software, telephonic elements, and weather information that would be more expensive if Alabama attempted to construct a system by itself. Alabama will likely be able to use existing computer hardware (i.e., a single, internet-ready computer) to store 511 information before it is fetched by the 511 system at a regular interval (e.g., every five minutes).

Based upon the University of Alabama's research, both Meridian and CARS clearly provide viable and comprehensive 511 traveler information system solutions. Either company's solution would be acceptable and serve the citizens of Alabama well. However, at this point the University of Alabama researchers recommend Meridian Environmental Consulting as the state's 511 system service provider. The primary reasons for this conclusion follow:

- Both Meridian and CARS provide weather information as part of their services described in Table 6-1. Meridian provides a weather forecasting/modeling solution superior to the National Weather Service products currently used by CARS.
- Meridian has low initial costs for system development and deployment.

However, technology changes can occur quickly. Thus, it is important to continue to evaluate these and other providers during the development of Alabama's 511 Deployment Plan.

Several other recommendations follow:

- ALDOT should continue to work through the Alabama PSC to negotiate with the state's telecommunications companies.
- One key to a successful 511 system is accurate and up-to-date roadway information. ALDOT must instill this principle in employees who will provide content to the 511 system.
- Like many states, a 511 system in Alabama will initially lack a well-developed system for crash/incident reporting. The future development of such a system should be a high priority.

Section 7 References

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Appendix One

Sample Questionnaire for Existing 511 Systems

- 1. From hiring the system host to implementation, how long did it take to implement your state's 511 system?
- 2. How many people were on your 511 planning committee? What organizations did they represent?
- 3. Please break down the costs of 511 system deployment and operation.
- 4. What were the sources of funds to set up the system and to provide operating expenses? Did those sources include federal funding or legislative earmarks? Please describe, in as much detail as possible, the sources of system funding.
- 5. Do you expect to tap other funding sources in the future?
- 6. What types of roads are covered in your 511 system? What centerline mileage(s) are involved?
- 7. How is weather/road condition/road construction information/forecasts generated and how is this information integrated into the 511 system?
- 8. Did your system host provide assistance with integrating your state's GIS data into the 511 system? Did the host do all of the integration? How long did this integration take?
- 9. Regarding relations with telephone companies, did all companies in the state switch?
 - How long did it take?
 - How much did your state spend to help telephone companies switch?
 - Did you deal with the companies individually or as a "state telephone group"?
 - Was the Public Service Commission involved in negotiations? Did you get other outside help during the negotiations?
- 10. Can you provide us with call statistics (e.g., calls/hour, peak call volumes, etc.)?
- 11. Before your system was deployed, what methods did you use to project call statistics?
- 12. What upgrades do you plan for your system?
- 13. Are you currently providing real-time traffic information? If so, by what method/equipment is this information gathered and integrated in to the 511 system? If not, is traffic information a planned, future component of your 511 system? Who provides the voice recognition software and components?
- 14. What other problems have you encountered implementing the 511 system that this questionnaire hasn't already asked about?

Appendix Two

Sample Neighboring State Questionnaire

- 1. Are you investigating 511?
- 2. Which system vendor/host(s) are you considering?
- 3. Have you finalized selection of a vendor/host for the system?
- 4. When will you start service?
- 5. What are your costs or projected costs for deployment/operation?
- 6. What services will the 511 system in your state provide?
- 7. What are your funding sources?
- 8. What data fusion software/engine are you planning to use? (CARS? A system your state already had in place? Etc?)
- 9. How are you handling negotiations with phone companies? Will your state have to pay the phone companies to program their switches to allow 511 calls?
- 10. How many ports (lines) are you planning to use? (Or, what maximum calls/hr or calls/day are your planning for?)