511 Case Studies
Arizona
February 2001

Introduction

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

The U.S. Department of Transportation's Intelligent Transportation Systems (ITS) Joint Program Office is sponsoring an effort to document the progress of early implementers of 511 services for the benefit of the entire transportation community. It is anticipated that five such case studies will be documented.

This case study focuses on the State of Arizona and its implementation of statewide 511 services. As is evident in reading this document, the implementation is a work in progress. The intention is to concisely provide a current "snapshot" of the progress being made in Arizona. It is anticipated as events warrant and interest of the community demand, this case study will be updated.

The principal point of contact for the Arizona deployment is Tim Wolfe of the Arizona Department of Transportation (twolfe@dot.state.az.us or 602/712-6622). The principal author of this case study is Rick Schuman of PBS&J (rickschuman@pbsj.com or 407/647-7275).

Multiple documents and web sites have been referenced in this case study. To the extent possible, links are provided to these documents and sites. This and other 511 case studies are located at "www.its.dot.gov/511."

This document contains five sections:

➢ History/Perspective – Pre-511
➢ Institutional Background in Arizona
➢ Plans/Vision
➢ Ongoing Activities
➢ Lessons Learned

History/Perspective – Pre-511

Table 1 provides a listing of the principal transportation-related telephone services currently being provided in the State of Arizona.

Phone #	Managed By	Service / Information Available	Area Covered
888-411-ROAD	Arizona DOT	Road Construction & Closures	Statewide
602-253-5000	Valley Metro	Dial-A-Ride Services, Bus Route & Schedule Information	Metro Phoenix
602-262-7433	Valley Metro	Ride Share & Ride Matching	Metro Phoenix
602-372-9832	Maricopa County	AZTech Project Information & ITS Services	Metro Phoenix
520-792-9222	SunTran	Schedules; Routes; Location of Stops, Bike Lockers and Park & Ride Lots	Tucson and parts of Pima County

Table 1 – Current Transportation Phone Services in Arizona

The 888 phone system operated by Arizona DOT is the most relevant in terms of near-term 511 services. The system is called the Voice Remote Access System (VRAS).

Voice Remote Access System (VRAS)

Providing information to travelers is a key element of Arizona's ITS programs. Further, institutional coordination in the state through programs such as AzTech (www.aztech.org) and organizations such as the Maricopa Association of Governments (http://www.mag.maricopa.gov/), Pima Association of Governments (http://www.pagnet.org/) and ITS Arizona (http://www.azfms.com/About/Its/main.html) have created the environment for providing information to travelers across jurisdictional boundaries through a single source. One means of obtaining this information in the state is via the VRAS toll-free telephone service.

As shown in figure 1, there are three primary components to providing a telephone-based service.

➢ Call routing – Arizona DOT funds toll-free access statewide through 888-411-ROAD. All calls are routed from the 888 number to a local Phoenix number that terminates at the VRAS in Arizona DOT's Traffic Operations Center (ADOT TOC),
➢ Telephone System – An interactive voice response (IVR) telephone system is operated by ADOT at the TOC. It is this computer system that is technically known as the VRAS. The system will be described below.
➢ Information System – The Roadway Closures and Restrictions System provides real-time information to the VRAS by uploading a Microsoft Access file to VRAS every five minutes. RCRS is described below also.
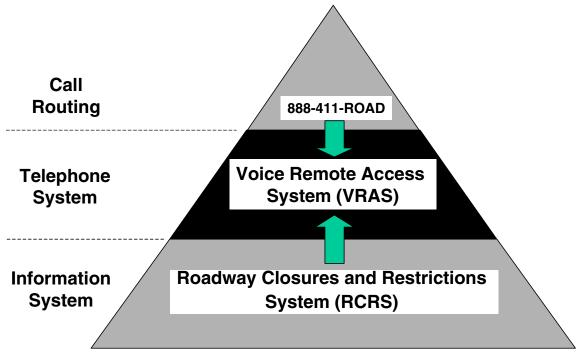
Figure 1 – Arizona Voice Remote Access System Elements

Three main types of information are presently available to callers through VRAS:

➢ Roadway conditions on major state roads – Callers select the desired road by typing the route number on the telephone keypad.
➢ City specific information in urban areas – Callers select the desired city by typing the first three letters of the city name on the telephone keypad.
➢ Weather information from the National Weather Service -- Callers select by typing "NWS" on the telephone keypad.

(Note: these commands are not presently voice activated)

As described below, the Roadway Closures and Restrictions System (RCRS) provides this information to the VRAS.

Roadway Closures and Restrictions System (RCRS)

The Roadway Closures and Restrictions System (RCRS) is designed to collect statewide information from various authorized agencies for both local arterial streets and urban/rural highways. This information may include data from neighboring states that are with similar systems or connected to the in-state system.

The Roadway Closures and Restrictions System (RCRS) collects road information and provides a statewide central repository of real-time traveler information for the dissemination to the public. The RCRS gathers information about construction locations, traffic-related maintenance

activities, weather-related road closures, and traffic accident information from various authorized agencies. The RCRS information includes:

➢ Current restrictions such as closed lanes and speed reductions
➢ Current and planned road closures and alternate routes
➢ Incident or accident location status
➢ Current roadway conditions, including weather information

THE RCRS computer located at each agency sharing and viewing information is known as the RCR Client. As of the end of 2000, 89 Clients are in use. Authorized agencies allowed to enter RCRS information include:

➢ Arizona Department of Transportation (ADOT) District offices
➢ ADOT Construction organizations
➢ ADOT Maintenance organizations
➢ City of Bullhead City 911 operator center
➢ Cities of Chandler, Glendale, Mesa, Scottsdale, Phoenix, Tempe, Gilbert
➢ City of Winslow Chamber of Commerce
➢ Department of Public Safety (Arizona Highway Patrol)
➢ Grand Canyon National Park
➢ Navajo Nation
➢ National Forest and Weather Services
➢ Neighboring DOTs including: California, Nevada, New Mexico, and Utah

The information from each authorized client is forwarded to the central repository computer where it is archived and shared with each client. In addition, the RCRS information is forwarded to the monitoring public within five minutes via:

➢ The World Wide Web (http://www.azfms.com/HCRS/hcrs.html)
➢ An 1-888-411-ROAD toll-free telephone hotline (VRAS)
➢ Personal computer dial-up
➢ Information Kiosks located at public venues

Entries into RCRS in are inserted via an event report screen on the client. There are six sections of the screen that describe the RCRS roadway information event:

➢ **ITIS** represents the International Traveler Information Interchange Standard event categories and descriptions (there are 21 categories and over 1900 event descriptions in the ITIS standard used in RCRS).
➢ **Location** indicates where the incident, accident, or road closure occurs, referenced by milepost.
➢ **Duration** allows the operator to specify when the event occurs—and, importantly, when it will conclude.
➢ **Public Notes** keeps additional free-form text information that will be seen by the monitoring public.
➢ **Internal Notes** is information that will only be seen by the authorized RCRS clients.

➢ **Entered By** is information automatically entered by the workstation and indicates what organization made the changes to the event.

Figure 2 provides a sample screen from the RCRS web site. Figure 3 and Table 2 contain information on the number of entries that are inserted into RCRS monthly and the growth in the number of RCRS clients over time.

(Note: The RCRS software is available to other public agencies through a free license from Arizona DOT. If interested, please contact Tim Wolfe for more information.)
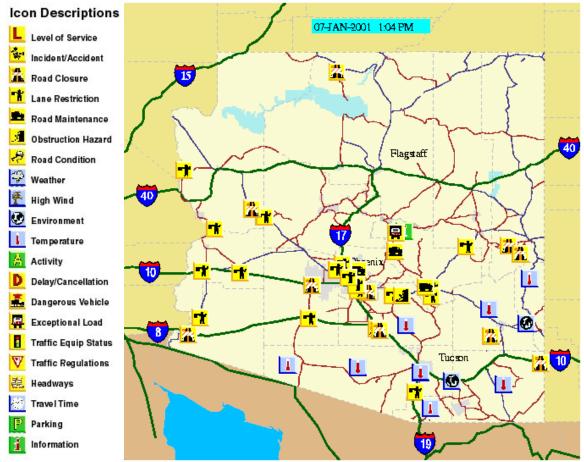

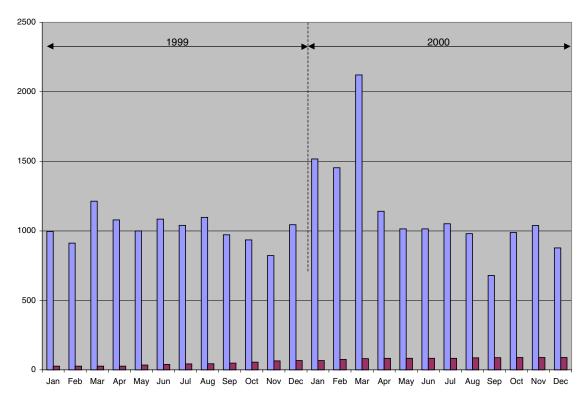Figure 2 – Sample Screen from RCRS Web Site

Figure 3 – RCRS Data Input

Month	Number of Entries	Number of Sites Reporting
January 1999	995	27
February 1999	912	27
March 1999	1213	27
April 1999	1079	27
May 1999	1000	35
June 1999	1085	39
July 1999	1039	42
August 1999	1097	44
September 1999	972	48
October 1999	935	55
November 1999	822	65
December 1999	1044	67
January 2000	1517	67
February 2000	1454	75
March 2000	2121	80
April 2000	1141	83
May 2000	1014	83
June 2000	1014	83
July 2000	1051	83
August 2000	979	86
September 2000	679	87
October 2000	988	88
November 2000	1038	88
December 2000	877	89

Table 2 – RCRS Statistics

02/27/01

VRAS Equipment

Arizona DOT has operated some form of telephone-based traveler information since 1992. In 1999, ADOT called upon Vodavi-CT to replace their previous Interactive Voice Response (IVR) dial-up system with PathFinderIVR. ADOT had been experiencing difficulties with their prior system, such as limited capacity, intermittent unexplainable shut downs, and inferior speech quality. Vodavi-CT's PathFinderIVR was an affordable solution to solve ADOT's problems. The new technology of the PathFinderIVR system incorporates a state-of-the-art Lernout & Hauspie Real Speak text-to-speech generator that enables system operation without requiring operators to record messages. At present 24 incoming phones lines are connected to the IVR, enabling 24 simultaneously calls to be processed.

Hardware platform consists of a Pentium PIII 450 MHz processor and Dialogic DSP voice boards. The operating system is Microsoft Windows for NT with the PathFinder NT Voice Processing Engine and software channel licenses for Lernout and Hauspie Real Speak text-to-speech. The telephone interfaces are analog telephone ports. The PathFinderIVR co-locates the highway and road information locally in an Access database and is populated and refreshed every five minutes across a TCP/IP LAN connection to the RCRS.

Installation of the existing IVR cost ADOT roughly $75,000. A maintenance contract is in place costing less than $10,000 per year. An important feature of the maintenance contract is that it provides for updates to the most current version of the Real Speak text-to-speech software, enabling continuous improvement of the sound quality.

VRAS Statistics

Figure 4 summarizes monthly VRAS phone calls since January 1999. Through July 2000, VRAS had over a 100% increase in calls per month compared to 1999.

The average call lasts roughly 2 minutes. Roughly 50% of the calls come from the Phoenix metropolitan area with the remaining 50% coming from other parts of the state (often referred to as "out-state"). There are 24 incoming phone lines, with an average of 720 calls capable of being handled in an hour

In periods of inclement weather or holiday weekends, the VRAS often becomes overloaded, with callers being unable to get through to one of the lines. There could be as many as 400 calls could be dropped in an hour in these peak periods.

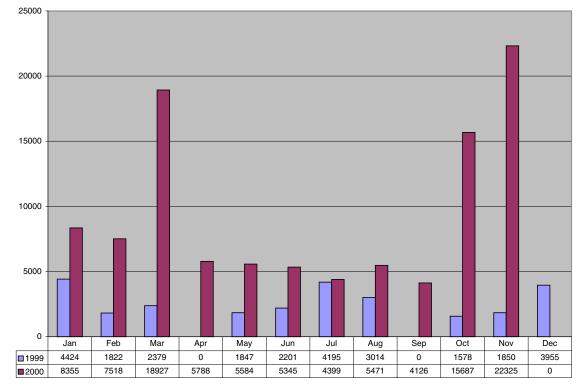Telecommunications charges cost ADOT roughly $30,000 in a one-year period from July 1999 to June 2000.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
■ 1999	4424	1822	2379	0	1847	2201	4195	3014	0	1578	1850	3955
■ 2000	8355	7518	18927	5788	5584	5345	4399	5471	4126	15687	22325	0

Figure 4 – VRAS Call Volume in 1999 and 2000
(Note: Data is not available for April, September 1999, December 2000)

VRAS Advertising

To date, a limited amount of advertising has occurred to inform the public of the availability of the VRAS, but no specific advertising budget has been established. The principal means of advertising has been via:

➢ Word of mouth
➢ Arizona Republic (the state's largest newspaper) frequently puts the number in its traffic section
➢ ADOT web sites
➢ Stories and coverage on local television news
➢ Arizona Department of Public Safety gives out the number to callers

Customer Feedback

According to ADOT, customer feedback has indicated that, while generally satisfied with the system, there are often too many "entries" for a given route. With the routes often spanning hundreds of miles, callers must listen to information for portions of a road they will not be traveling on. This and the busy signals in peak use times are the two most important areas being focused on for improvement in addition to 511 access.

02/27/01

Institutional Background in Arizona

This section describes the transportation and telecommunications institutional structures in Arizona.

<u>Transportation</u>

Presently, the state of Arizona has over 6600 centerline and 17,000 lane miles of roadway.

The Arizona Department of Transportation (ADOT) is the principal statewide transportation agency. ADOT is divided into eight districts and has responsibility for the construction, operation and maintenance of 6172 miles of state roads. Cities and counties, Indian reservations and the National Park Service own the remainder of roads.

In the Phoenix area, transit services are provided under the umbrella of Valley Metro. In the Tucson area, SunTran provides transit services.

The state has four metropolitan planning organizations that coordinate transportation investments in their region:

➢ Maricopa Association of Governments in the Phoenix metropolitan area
➢ Pima Association of Governments in the Tucson metropolitan area
➢ Northern Arizona Organization of Governments in the Flagstaff area
➢ Yuma Metropolitan Planning Organization

<u>Telecommunications</u>

Three different telecommunications infrastructures need to be considered when contemplating 511 services.

Landline

There are nearly 20 Incumbent Local Exchange Carriers (ILECs) that operate in Arizona (see Appendix A). While Competitive Local Exchange Carriers (CLECs) operate in the state, they carry a very small portion of traffic at present, and most of the CLECs resell ILEC capacity. Thus the ILECs are the principal organizations involved in landline 511 services. All landline calls are routed through Central Offices (COs). Collectively, the CLECs operate over 200 COs in Arizona. Quest (formerly US West) is the principal ILEC, serving over 2.5 million phone lines, representing greater than 90% of phone lines in the state.

Wireless

Throughout the State, there are seven licenses to operate wireless phone services. In urban markets such as Phoenix and Tucson, it is likely that all seven licenses are operating. In nonurban areas, it is possible that not all seven licenses are yet in operation. No centralized source exists that readily compares wireless carriers coverage in the State (often, carriers show

their advertised coverage on their corporate web site). However, several of the nation's major carriers offer wireless service in at least portions of Arizona, including AT&T, Verizon Wireless, Qwest Wireless, Voicestream Wireless, Nextel and Sprint PCS. As the following example of Sprint PCS coverage illustrates in figure 5, wireless coverage is not ubiquitous. The coverage pattern is typical.
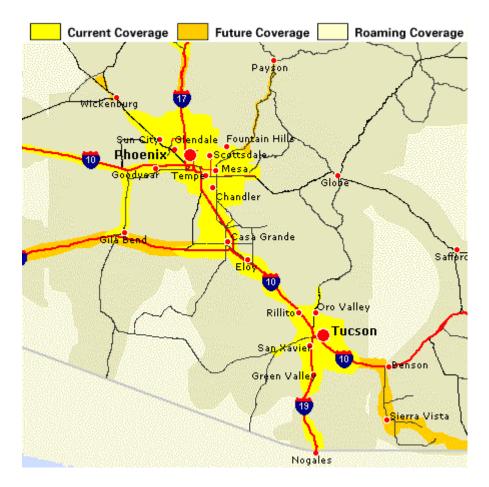

Figure 5 – Sprint PCS Wireless Coverage in Southern Arizona

Wireless calls are routed through the nearest wireless tower, often called a base station, then through a wireline network operated by the wireless carrier that interconnects with the telephone system. Charges apply for the amount of airtime used during a call, regardless of whether the caller originated or received the call. Roaming agreements are usually in place so a customer of a wireless carrier outside the region can make or receive calls while in the region. Often, additional charges apply when "roaming."

Payphones

There are many coin-operated phone vendors in Arizona. Routing of 511 calls made via payphones must be addressed by these coin operators, who in many cases are not the ILECs.

Arizona Corporation Commission (ACC)

The Arizona Corporation Commission was created by the Arizona Constitution. Only 7 states have constitutionally formed Commissions. Arizona is one of only 13 states with elected Commissioners. In the 37 other states, either the governor or the legislature appoints Commissioners. In most states, the Commission is known as the Public Service Commission or the Public Utility Commission. However, in Arizona the Commission has regulatory responsibility for incorporating organizations, securities, railroad and pipeline safety, as well as utilities. By virtue of the Arizona Constitution, the Commissioners function in an Executive capacity, they adopt rules and regulations thereby functioning in a Legislative capacity, and they also act in a Judicial capacity sitting as a tribunal and making decisions in contested matters.

The Corporation Commission is composed of three Commissioners elected by the people of Arizona for a six-year term, with one Commissioner standing for election every two years. In the case of a vacancy, the Governor appoints a Commissioner to serve until the next general election. Ultimate responsibility for final decisions on granting or denying rate adjustments, enforcing safety and public service requirements, and approving securities matters rests with the Commissioners. The Chief Executive Officer of the Commission is the Executive Secretary who serves at the pleasure of the Commissioners. He is responsible to the Commissioners for the day to day operations of the Commission and all its divisions.

The Commission staff is organized into six Divisions. A Division Director who reports to the Executive Secretary heads all Divisions:

➢ The **Administration Division** plans, coordinates and directs the administrative and fiscal activities necessary to support the Commissioners and all Divisions of the Commission. The Division also provides information to the general public and media on all Commission activities.
➢ The **Hearings Division** exercises the Commission's authority to hold public hearings on matters involving the regulation of public service corporations, the sale of securities and the registration of non-municipal corporations.
➢ The **Utilities Division** makes specific recommendations to the Commissioners to assist them in reaching decisions regarding public utility rates, utility finance and quality of service. The Division is responsible for researching and developing utility issues, providing information and evidence in Commission proceedings dealing with utility applications, monitoring the quality of utility service, and the rates approved by the Commissioners. Additionally, Division staff inspects gas pipelines for safety, operates a railroad safety program and maintains the official documents of proceedings before the Commission.
➢ The **Securities Division** strives to ensure the integrity of the securities marketplace through investigative actions as well as the registration and/or oversight of securities, securities dealers and brokers, investment advisers and their representatives; to enhance legitimate capital formation; and to minimize the burden and expense of regulatory compliance by legitimate business.
➢ The **Corporations Division** approves for filing all articles of incorporation for Arizona businesses; all articles of organization for limited liability companies; grants authority to foreign corporations to transact business in this state; propounds interrogatories when

necessary to determine a company's lawful purpose; and revokes the corporate charters of those corporations which choose to not comply with Arizona law.

➤ The **Legal Division** provides legal assistance, advice and representation to the Commissioners and each Division of the Corporation Commission except the Securities Division. Matters handled by the Legal Division fall into five general categories: Commission dockets, Federal regulatory dockets, litigation, other administrative matters and special projects.

It is the Utilities Division that has taken the lead in supporting ADOT in 511 implementation. Unlike in Kentucky, where the Kentucky Public Service Commission assigned 511 to the Kentucky Transportation Cabinet, the ACC has not determined that an official assignment of 511 is necessary. At present, the Utilities Division is offering technical expertise and has indicated that it will assist if it appears that the local exchange carriers are not being responsive to ADOT, or if negotiations between ADOT and the carriers do not lead to agreeable rates, terms and conditions.

Plans/Vision

At least in the near-to-mid-term, Arizona DOT will continue to operate the VRAS as the gateway to traveler information in the state. The service will continue to be free to callers.

Key elements of the Vision of the Arizona 511 approach are:

➤ *Reprogram existing switches to point 511 calls to the VRAS.* "Out-state" calls would be routed to the 888-411-ROAD number, incurring per minute charges as at present. Calls within the Phoenix metropolitan area would be routed through a local phone number, thus not incurring per minute charges. The hope is that by routing local calls through local lines, communications charges for the service would remain in the $30,000 range even if usage doubled.

➤ *Expand system capacity to meet anticipated demand.* The VRAS is being upgraded and expanded to support heavier call volumes. One T1 was recently added to increase the number of incoming lines from 8 to 24 to support existing call volume. With the introduction of 511, a second T1 will be added to provide 48 incoming lines to support the expected increase in calls due to 511. The practice of periodic upgrades of the text to speech software will continue as will the practice of no live voice to receive calls.

➤ *Include a call forwarding option to reach the appropriate transit agency and where available, dial-a-ride services*. Call dropping would be invoked so when a call is transferred, the VRAS port would be freed for another incoming call. This approach also minimizes toll charges.

➤ *Deploy roadside signage to "advertise" 511.* Static roadside signs would be installed throughout the state to inform the public of the service.
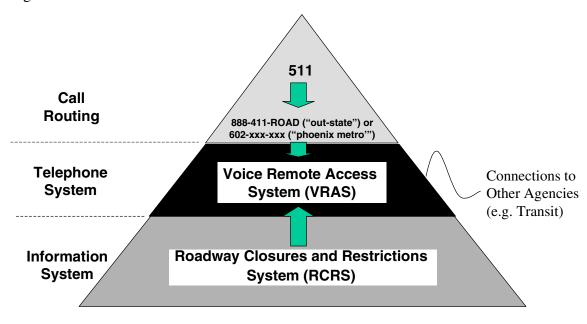
Figure 6 illustrates the vision for 511 service in Arizona.

Figure 6 – The Arizona 511 Vision

Ongoing Activities

An Arizona 511 Task Force has been established to coordinate the conversion of existing phone systems to 511 and facilitate their functional expansion. Participants include ADOT, the Maricopa and Pima Association of Governments, Maricopa County DOT (AzTech), the City of Phoenix, Phoenix and Tucson transit agencies, the Federal Highway Administration, the Arizona Corporation Commission, and two local exchange carriers, Qwest and Cox.

The Task Force had its initial meeting August 15, 2000. The initial meeting determined much of the near-term actions that are being pursued. Importantly, the Task Force has affirmed ADOT's role as the principal planning, implementing and operating agency for the 511 and agreed to continue expanding the VRAS as the focal point of statewide 511 services.

The Task Force identified several key issues as it continues its efforts:

➢ The "menu tree" – how to keep a simple tree structure as more information becomes accessible
➢ Content – what information should be available; what connections should be made to other information sources
➢ Call routing – what is the most cost-effective call routing approach
➢ Funding– how will services be supported
➢ Capacity – what will it take to meet user demand. Size for average usage or peak usage
➢ Coordination with the telecommunications carriers – how best to coordinate with the ACC, wireline and wireless carriers in Arizona

Next steps resulting from the Task Force meeting were identified and are being addressed. These include:

➢ Conduct kick-off meeting with Qwest (completed)
➢ Inventory existing equipment and identify costs (completed)
➢ Contact other N11 service providers in Arizona (completed for 211 and 311, not for 711)
➢ Reach out to Peers in other states/regions (ongoing)
➢ Brief the appropriate committees of the Maricopa and Pima Association's of Government on the direction of activities, secure support for ADOT continuing in lead role (completed)
➢ Identify local seed money to secure FHWA grants for conversion assistance (ongoing)
➢ Secure consultant to develop detailed action plan, federal grant submission, operations, maintenance and marketing plans (not started)
➢ Prepare VRAS for increased usage (ongoing)
➢ Test call forwarding/dropping to other organizations (ongoing)

The Task Force hoped to quickly roll out wireline 511 services. However, Qwest has not been as responsive as hoped to requests from ADOT to work out the necessary technical and financial agreements to enable call routing.

Lessons Learned

The following are some of the key "lessons learned' by the implementers of 511 in Arizona. They are not intended to be exhaustive, but rather cover some key items they have learned through their process that might be helpful to others.

Task Forces for multi-agency coordination work. The Arizona ITS program has a history of facilitating advancements through multi-agency cooperation. To develop a statewide 511 system demands similar agency coordination. Forming a task force to develop an overall vision and collectively address issues such as who will plan, implement and operate 511 services is a very effective method to reach the necessary consensus quickly.
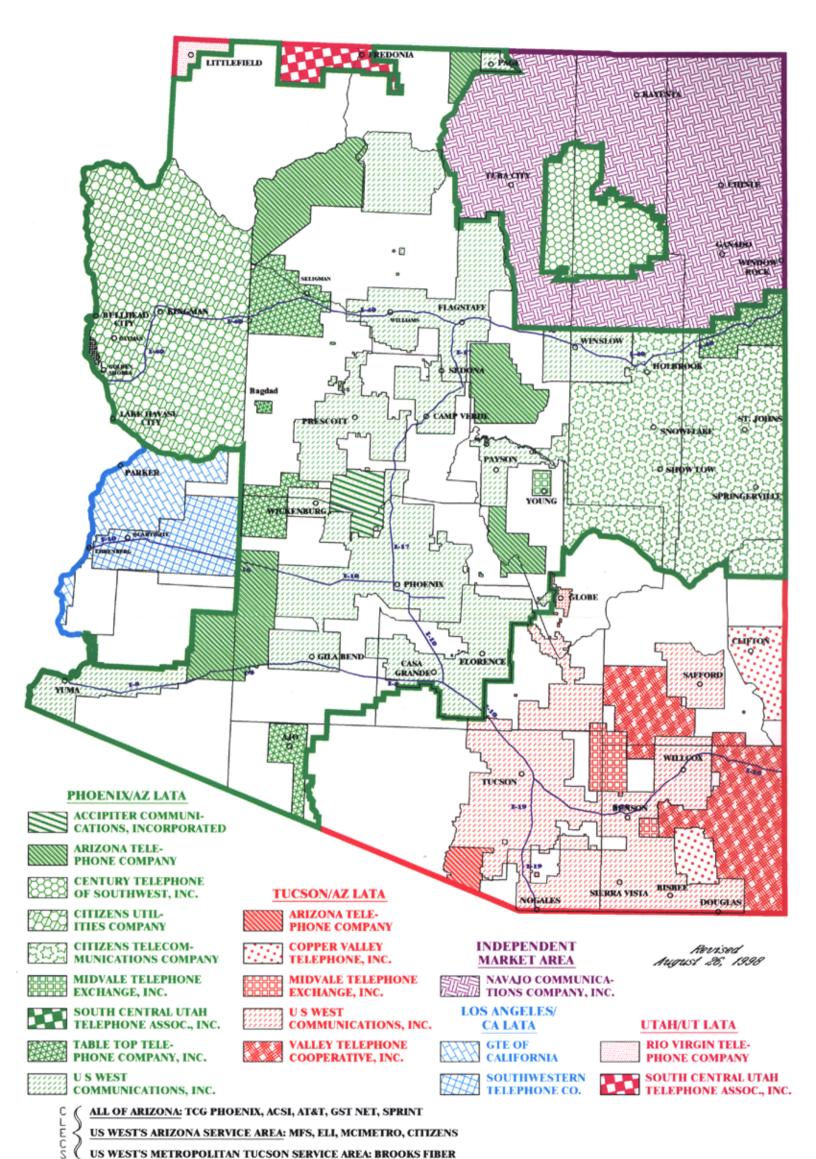
If procuring IVR system, direct communications with vendor's technical resources strongly encouraged. While installing the existing VRAS, ADOT personnel did not have as much direct contact with technical resources form the vendor. With the vendor's marketing/sales staff acting as the interpreter between ADOT and the technical resources, understanding the true system capabilities and limitations was often difficult.

Carefully understand system pricing. Be mindful of software license costs when expanding. While very happy with the text to speech software in the VRAS, expanding the number of incoming lines ("ports") into the VRAS results in significant license upgrade costs. The software vendor prices the text to speech software based on the number of ports. As a result, much of the expected $50,000 upgrade costs will be a direct result of the necessary license expansion.

Standards or guidelines for menu tree design would be helpful. To comply with the FCC's desire for service uniformity, ADOT would be very willing to adopt standard conventions for information access such as a common menu tree structure. However, no such standard or guideline exists.

Standards or guidelines for roadside signage would be helpful. In researching how it would design roadside signage to inform travelers about 511, ADOT discovered that the Manual of Uniform Traffic Control Devices (MUTCD) does not currently address sign design for telephone numbers, specifically 3 digit numbers. ADOT hopes that such guidance would be forthcoming prior to investing in signage that might otherwise be non-conforming.

Don't be afraid to ask for technical assistance from the regulatory commission. A key contact at the Arizona Corporation Commission is a former engineer at Qwest. As such, he has been a valuable resource for the transportation agencies as they work through technical and pricing issues with Qwest.

STATE OF ARIZONA TELEPHONE WITH LATA

Map labels (cities/places):

LITTLEFIELD · FREDONIA · PAGE · KAYENTA · CHINLE · GANADO · WINDOW ROCK · TUBA CITY · BULLHEAD CITY · KINGMAN · OATMAN · GOLDEN SHORES · LAKE HAVASU CITY · SELIGMAN · WILLIAMS · FLAGSTAFF · WINSLOW · HOLBROOK · Bagdad · SEDONA · CAMP VERDE · PRESCOTT · SNOWFLAKE · ST. JOHNS · PARKER · PAYSON · SHOW LOW · SPRINGERVILLE · QUARTZSITE · EHRENBERG · WICKENBURG · YOUNG · PHOENIX · GLOBE · CLIFTON · GILA BEND · CASA GRANDE · FLORENCE · SAFFORD · YUMA · AJO · WILLCOX · TUCSON · BENSON · NOGALES · SIERRA VISTA · BISBEE · DOUGLAS

Legend:

PHOENIX/AZ LATA

- ACCIPITER COMMUNICATIONS, INCORPORATED
- ARIZONA TELEPHONE COMPANY
- CENTURY TELEPHONE OF SOUTHWEST, INC.
- CITIZENS UTILITIES COMPANY
- CITIZENS TELECOMMUNICATIONS COMPANY
- MIDVALE TELEPHONE EXCHANGE, INC.
- SOUTH CENTRAL UTAH TELEPHONE ASSOC., INC.
- TABLE TOP TELEPHONE COMPANY, INC.
- U S WEST COMMUNICATIONS, INC.

TUCSON/AZ LATA

- ARIZONA TELEPHONE COMPANY
- COPPER VALLEY TELEPHONE, INC.
- MIDVALE TELEPHONE EXCHANGE, INC.
- U S WEST COMMUNICATIONS, INC.
- VALLEY TELEPHONE COOPERATIVE, INC.

INDEPENDENT MARKET AREA

- NAVAJO COMMUNICATIONS COMPANY, INC.

LOS ANGELES/CA LATA

- GTE OF CALIFORNIA
- SOUTHWESTERN TELEPHONE CO.

UTAH/UT LATA

- RIO VIRGIN TELEPHONE COMPANY
- SOUTH CENTRAL UTAH TELEPHONE ASSOC., INC.

CLECS:
- ALL OF ARIZONA: TCG PHOENIX, ACSI, AT&T, GST NET, SPRINT
- US WEST'S ARIZONA SERVICE AREA: MFS, ELI, MCIMETRO, CITIZENS
- US WEST'S METROPOLITAN TUCSON SERVICE AREA: BROOKS FIBER

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