

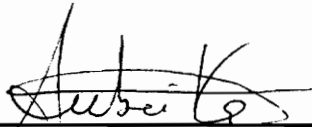
Using Intelligent Transportation System (ITS) Technologies to Promote Tourism in Southwest Virginia

by

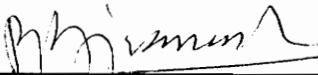
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Approved:



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1.0 INTRODUCTION

1.1 TOURISM AND ECONOMIC DEVELOPMENT

Tourism is the number one industry in the world. In 1991, travel expenditures totaled \$344.6 billion in the United States. This figure is projected to rise above one trillion dollars by the year 2005. With these staggering figures, an obvious relationship can be drawn between tourism and the economic well-being of a tourist community.

To better understand the magnitude of these numbers, tourism and economic development must be defined. Tourism or more specifically “travel” is generally defined as “activities associated with all overnight trips away from home in paid accommodations, and day trips to places 100 miles or more away from the traveler’s origin. Economic impact represents spending, employment, payroll, business receipts, and tax revenues generated by this travel. Employment and payroll are the jobs created by tourism and wages which support these jobs” (US Travel Data Center, 1991). Economic development can be defined as the economic growth of a town, locality, or region due to the economic impact of an outside force such as tourism.

The U.S. Travel Data Center recently completed a survey which concluded that over 1.3 billion person trips of 100 miles or more were taken in 1991. Further investigation of this data showed that 76% of these trips were made for pleasure purposes. This fact shows that most people become tourists each year by taking a vacation or

visiting friends and family. It is these people which comprise the tourism industry, an economic boon which many communities rely upon each year.

1.2 INTELLIGENT TRANSPORTATION SYSTEMS AND TOURISM

With the passing of the Clean Air Act of 1990 and the Intermodal Surface Transportation and Efficiency Act of 1991, the entire United States is realizing that we cannot continue to build and expand roads to meet ever increasing traffic demands. Intelligent Transportation Systems, ITS (formerly IVHS), is a new industry born from such recent legislation and allocation of federal funds. The primary objective of ITS is to develop new methods of moving more vehicles safer with less impact on the environment. With an emphasis on such highway related issues, can a relationship be drawn between ITS, tourism, and economic development?

The Strategic Plan for ITS lists a number of goals for the industry including improved economic productivity (IVHS America, 1992). Can ITS be linked to the tourism industry through the goal of economic productivity? The National Program Plan for ITS describes 28 user services to comprise the ITS effort. This number has recently been increased to 29 user services which are divided into seven groups or bundles (Phase 1 Summary Report, 1994). Two such bundles are Travel and Transportation Management and Travel Demand Management. Table 1 lists the user services associated with these two bundles and indication is given if the user service can be linked to tourism.

Table 1: Applications of User Services to Tourism

| <i>General Area or Bundle</i> | <i>ITS User Services</i> | <i>Application to Tourism</i> |
|--------------------------------------|----------------------------------|-------------------------------|
| Travel Demand Management | Pre-trip Travel Information | ✓ |
| | Ride Matching and Reservation | |
| | Demand Management and Operations | |
| Travel and Transportation Management | En-route Driver Information | ✓ |
| | Route Guidance | ✓ |
| | Traveler Services Information | ✓ |
| | Traffic Control | |
| | Incident Management | |
| | Emissions Testing and Mitigation | |

In general, any user service which relates to travel management can be applied to the tourism industry. Pre-trip travel information, en-route driver information, route guidance, and traveler services information are all new or enhanced methods of disseminating more information to drivers. Of course, the main goal of these user services is to “improve the safety, efficiency, and environmental soundness of the surface transportation system” (National Program Plan for IVHS, 1994). But these services will also improve the productivity and mobility of travelers which is where the tourism industry will benefit. Tourists will be better informed about the available attractions, possible fees, directions, hours of operation, as well as roadway conditions to expect along the way.

A host of technologies will either be improved or created to achieve the transportation goals of these user services. Some of these technologies include in-vehicle displays, advanced communications, automated kiosks, and more. These technologies

could be used to also inform travelers about tourist attractions they may want to visit along a trip. For example, an automated kiosk located at a rest stop may be initially placed to inform travelers of road construction delays in the area. Nearby tourist attraction information could also be displayed showing directions, hours of operation, and possible fees.

Currently, such information reaches travelers through highway signs, maps, travel agents, or word of mouth. New methods must be developed to relay this information to travelers either during the pre-trip phase or en-route as they are approaching the area. Some of the user services which could be utilized to attract these travelers include pre-trip travel information, en-route information, and traveler services information.

Although ITS technologies are not being developed primarily for tourism, tourists could reap information benefits from the advances in communications. With more information about a rural tourism community, a traveler will be more likely to plan a vacation there. Then the rural town should experience economic development from the tourist expenditures. Therefore, ITS technologies could be used to increase tourism and help achieve the overall goal of improved economic productivity.

1.3 USING ITS TECHNOLOGIES TO PROMOTE TOURISM IN SOUTHWEST VIRGINIA

Examining possible uses for ITS technologies to better promote the tourist attractions in southwest Virginia is the thrust of this project. The portion of Virginia to be studied is shown in Figure 1. Twenty counties and five cities comprise southwest Virginia

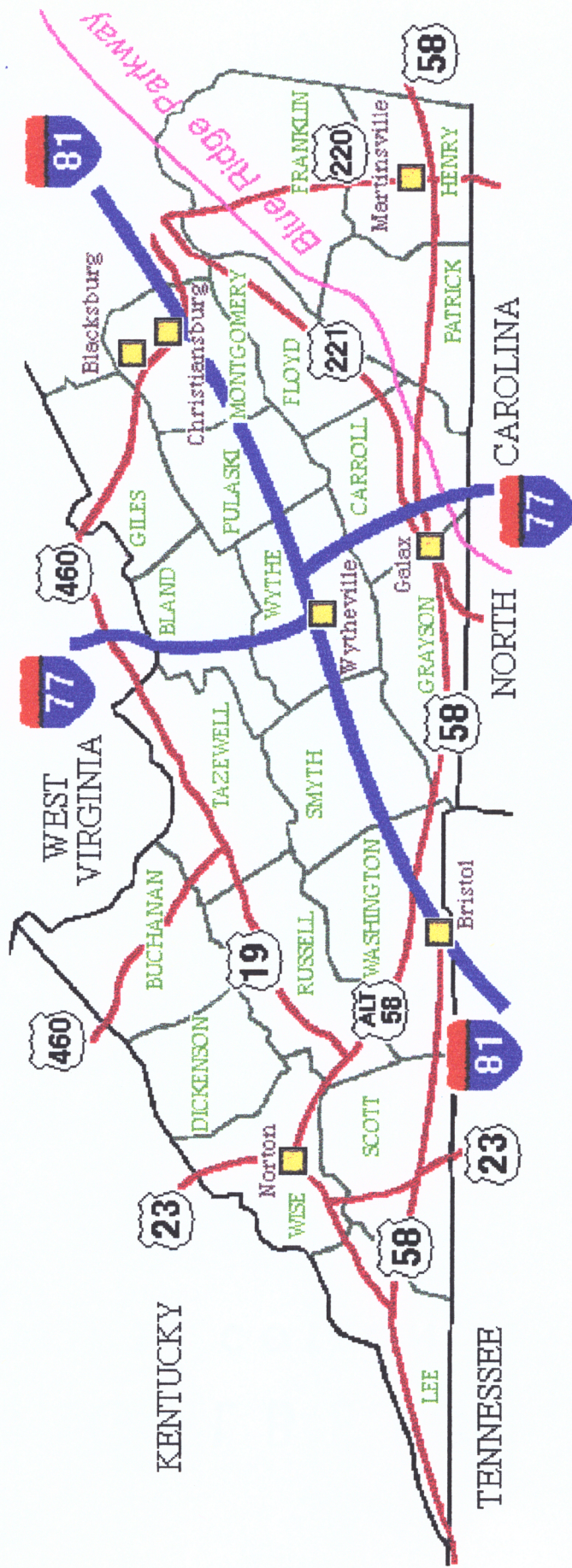


FIGURE 1 Southwest Virginia

(typically Patrick, Franklin, and Henry Counties are not considered part of southwest Virginia, but for the purposes of this project they are included because of the similar rural tourism issues of the Blue Ridge Parkway). Approximately 690,000 people lived in southwest Virginia in 1988 which was only 11.4% of the state population (Martin, 1989). Population projections for the year 2000 have about 790,000 people living in southwest Virginia which is 11.7% of the projected state population (Lillywhite, 1986).

Southwest Virginia is a typical rural region of America. Population densities are very low, and family incomes are significantly lower than the state average. From a transportation standpoint, rural settings such as southwest Virginia have low traffic volumes, few alternate routes, rugged terrain, and routes which are unfamiliar to many travelers (JHK & Associates, April 1994). Therefore, a separate branch of ITS, Rural ITS, has been developed primarily to study new transportation alternatives in such regions of America. Applications of ITS to rural transportation systems will “improve their safety, increase the efficiency of maintaining and operating them, and provide recreational travelers with improved navigational aids.” (IVHS America).

Although this part of the state is considered rural, southwest Virginia possesses a number of advantages which contribute to a successful tourism industry. As shown in Figure 1, this region is bordered by four adjacent states as well as the remainder of Virginia. Two interstate highways cross the area bringing through travelers who can be attracted by the natural beauty of the area. The mountains, valleys, forests, and lakes of the area attract many visitors who are interested in outdoor activities.

The transportation network and the economic well-being of any area are closely related. Transportation improvements lead to better mobility which in turn leads to economic development. In many southwest Virginia tourist towns, a larger transportation network is not needed. Instead of more roads, the localities need to improve their marketability, exposure, and 'user friendliness' to potential tourists. Capitalizing on ITS developments in traveler information systems appears to be an ideal way to get more tourist information to motorists. Personal communication devices, highway advisory radio, computer kiosks, and variable message signs are all ITS technologies which can provide tourist information.

This project concentrates on determining tourist information needs in southwest Virginia, and recommending ways to provide this information. This information could range from a printout of directions to a bed and breakfast to a radio broadcast explaining the tourist attractions within the area. Better promotion of the tourism industry will lead to more visitors and economic development. All of the proposed technologies have been used for tourism and other applications in different parts of the state and country. Will their implementation also work in southwest Virginia's rural setting?

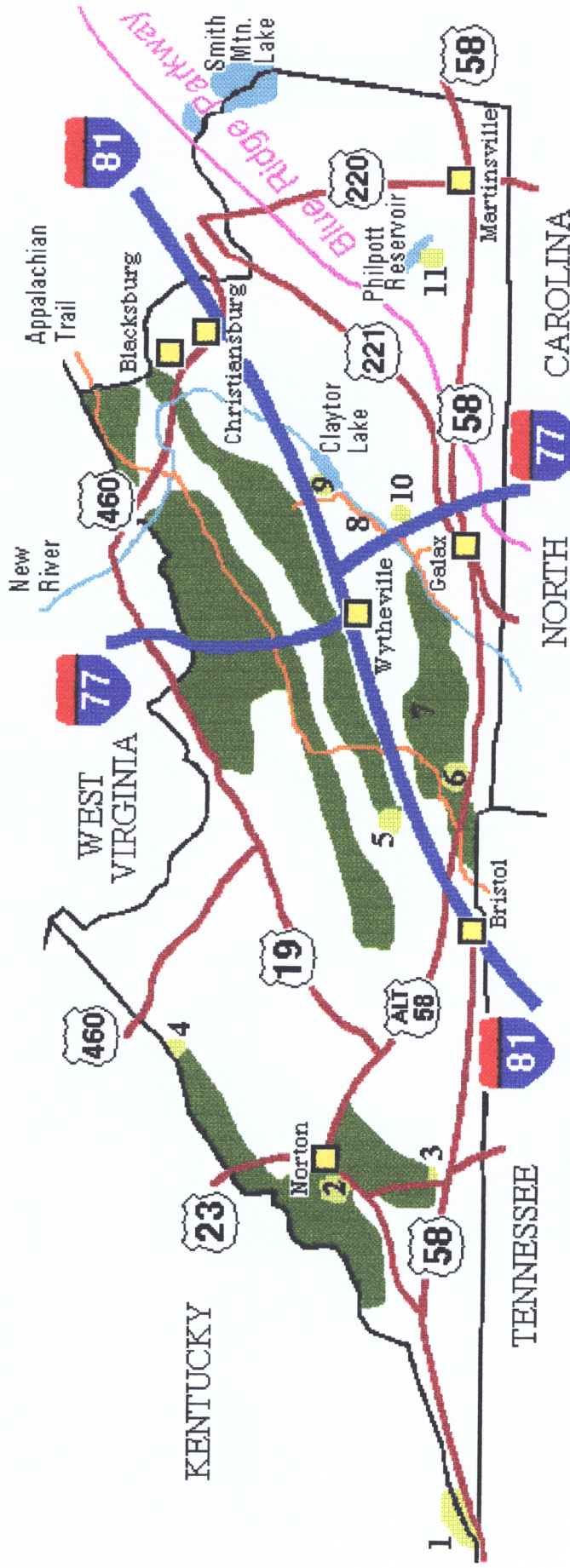
2.0 SOUTHWEST VIRGINIA AND THE TOURISM INDUSTRY

2.1 SOUTHWEST VIRGINIA'S TOURISM CHARACTERISTICS

Virginia is consistently ranked one of the top ten travel and tourism states in the nation. Virginia's large tourism industry stems from its diverse natural resources which include mountains as well as ocean beaches. Combined with the many national and state parks, civil war battlefields, and early English settlements, Virginia has a great deal to offer tourists.

In 1986, travelers spent \$6.1 billion in Virginia, and by 1991 this figure rose to \$8.2 billion. This money is spent on such items as transportation, lodging, foodservices, entertainment and recreation, retail trade, and travel planning. Table 2 shows the total travel expenditures in southwest Virginia from 1988-1990.

Tourism is a powerful industry which is being looked upon by many communities to bring more economic development to their area. Southwest Virginia boasts some of the most beautiful mountain settings in the nation including the Jefferson National Forest, the Appalachian Trail, the Blue Ridge Parkway, and the New River. Figure 2 shows the location of some of these scenic natural resources. These attractions and many more are the places which need to be promoted to bring more tourists to the area.



- Jefferson National Forest
- 1 Cumberland Gap National Park
- 2 Southwest Virginia Museum State Park
- 3 Natural Tunnel State Park
- 4 Breaks Interstate Park
- 5 Hungry Mother State Park
- 6 Grayson Highlands State Park
- 7 Mount Rogers National Recreation Area
- 8 New River Trail State Park
- 9 Claytor Lake State Park
- 10 Shot Tower State Park
- 11 Fairy Stone State Park

FIGURE 2 Southwest Virginia's Scenic Attractions

Table 2: Total Travel Expenditures in Southwest Virginia Counties and Cities

| <u>LOCALITY</u> | 1988 \$ (millions) | 1989 \$ (millions) | 1990 \$ (millions) |
|-------------------|-----------------------|-----------------------|-----------------------|
| Bland County | 4.54 | 4.03 | 4.82 |
| Bristol City | 16.4 | 13.21 | 12.14 |
| Buchanan County | 6.2 | 6.66 | 8.52 |
| Carroll County | 20.83 | 20.23 | 20.84 |
| Dickenson County | 5.39 | 3.37 | 3.86 |
| Floyd County | 5.15 | 5.22 | 5.58 |
| Galax City | 6.68 | 5.28 | 5.45 |
| Giles County | 13.45 | 14.46 | 13.27 |
| Grayson County | 5.89 | 6.52 | 6.72 |
| Lee County | 4.65 | 3.58 | 3.73 |
| Montgomery County | 44.41 | 49.56 | 45.84 |
| Norton City | 9.22 | 6.09 | 6.27 |
| Patrick County | 10.57 | 11.43 | 13.89 |
| Pulaski County | 19.33 | 18.18 | 17.08 |
| Radford City | 3.68 | 2.34 | 3.34 |
| Russell County | 6.11 | 4.07 | 3.75 |
| Scott County | 8.05 | 6.73 | 6.02 |
| Smyth County | 13.00 | 11.29 | 10.68 |
| Tazewell County | 18.66 | 18.64 | 16.64 |
| Washington County | 27.58 | 27.90 | 30.64 |
| Wise County | 11.06 | 9.02 | 10.65 |
| Wythe County | 32.59 | 38.99 | 40.29 |
| TOTAL | 293.44 | 286.80 | 290.02 |

Source: Virginia Division of Tourism

2.2 CURRENT METHODS OF OBTAINING TRAVEL INFORMATION

Before taking a trip, the traveler makes a number of decisions. Where am I going?

How will I get there? Where will I stop for rest or to eat? Where will I stay when I get

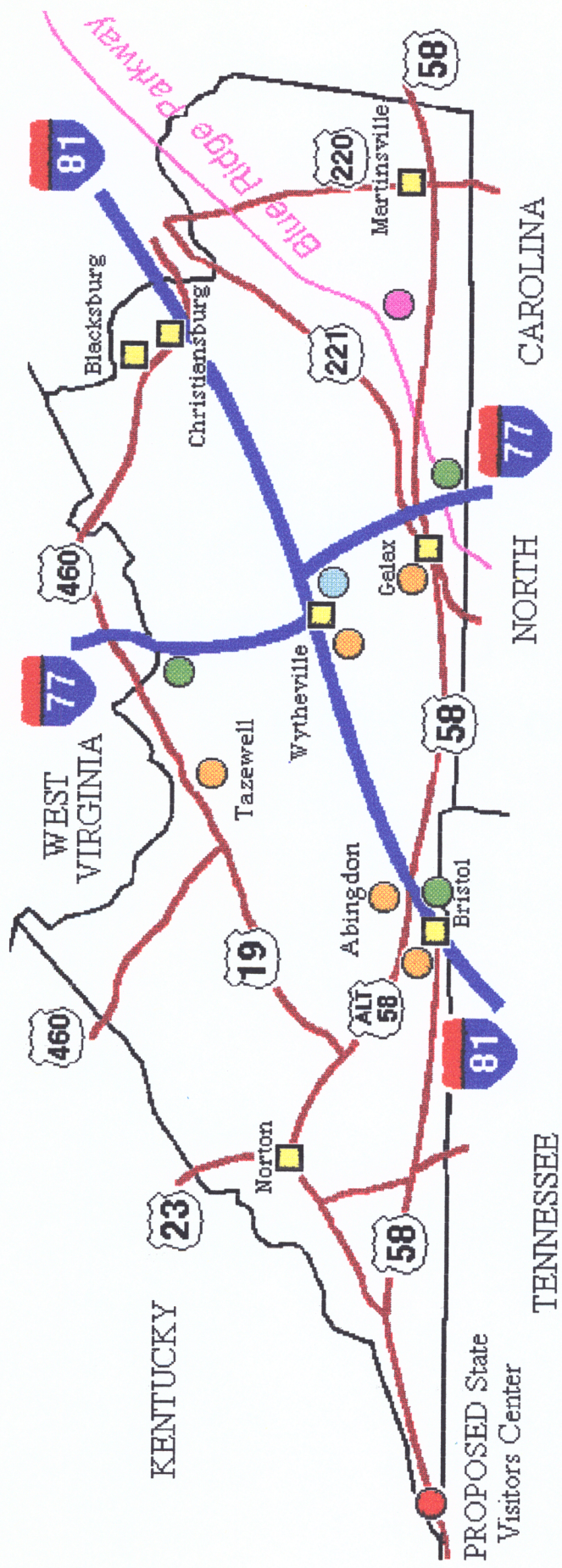
there, and what will I do? All of these questions require specific information, and travelers can choose a number of different methods to obtain this information.

Most people will obtain the information pre-trip or before they leave home. Perhaps they have taken the trip before, and they know exactly what the trip will entail. In other situations, the traveler will telephone ahead to make reservations, request brochures, or ask for directions. In Virginia, the Division of Tourism has a toll-free telephone number which tourists can call to order the Virginia Travel Guide. Some travelers call ahead to order the state map, so they can plan their route. A new map published by the Virginia Department of Transportation is called the “Map of Scenic Roads in Virginia”. This map highlights the scenic roads, parks, battlefields, and other tourist attractions throughout the state.

Other travelers may choose a destination and not collect any other pre-trip information. They will rely on information obtained en-route. People who do not know their destination will also rely on en-route information to guide them. This information may come from billboards, signs, travel information centers, etc.

2.3 TRAVEL INFORMATION CENTERS

Travel information center is a broad term which applies to any facility that welcomes visitors and provides them information about the country, state, region, park, attraction, or locality being represented. Such centers are normally staffed and provide information displays, brochures, or electronic information systems. Figure 3 shows where



- Virginia Welcome Center
- Gateway Highlands Visitors Center
- Tourism Bureau with Visitors Center
- Va. Parkway Hosts, Inc. Visitor Center

FIGURE 3 Travel Information in Southwest Virginia

travel information centers are located in southwest Virginia. The term travel information center is too general, so more specific names are given to information centers typically used by tourists, and they are further described below.

2.3.1 State Welcome Centers

Welcome centers are located at state boundaries, normally adjacent to an interstate highway. They provide restrooms, vending machines, and tourism information either in the form of brochures, touch screen computers, or counseling from center staff (Welcome Center Report, 1989). Welcome centers are normally constructed and operated by state governments. In Virginia, the welcome centers were built with federal funding during the construction of the interstate highway system. Since they were built with federal funds, the welcome centers must comply with the Shepherd Act which does not allow them to be operated by private concessionaires. Today, the welcome centers are maintained by the Department of Transportation and operated by the Division of Tourism which is part of the Department of Economic Development. In southwest Virginia, there are three welcome centers which are shown in Figure 3. On southbound Interstate 77, a state welcome center is located at the West Virginia border near Rocky Gap. On northbound Interstate 77, one is located at the North Carolina border near Lambsburg. The final welcome center is located on northbound Interstate 81 near the Tennessee border in Bristol.

2.3.2 Tourism or Visitor Information Centers

Tourism information center and visitor information center are synonymous terms which refer to service facilities located in communities. The main function of the center is to catch the attention of the tourist and convince them to stay in the community longer than previously planned. These centers are established, maintained, and operated by local governments, chambers of commerce, tourism associations, or a combination of public and private partners (Welcome Center Report, 1989). A number of visitor information centers are located in southwest Virginia and are shown in Figure 3. The Gateway Highlands Visitor Center is located at the intersection of I-81 and I-77 in Wytheville. The center is financed by federal funds and provides information about the Jefferson National Forest and southwest Virginia. A visitor center run by the Virginia Parkway Hosts, Inc. is located on the Blue Ridge Parkway near Fancy Gap. This center provides information on real-estate, tourism, and other community services in the area. Other visitor centers are located within tourism bureaus in the towns of Abingdon, Tazewell, and Wytheville.

2.3.3 Stand-Alone Travel Information Systems

The stand-alone travel information system provides the same benefits as the previously described information centers, but they need not be staffed 24 hours a day. Information is disseminated through exhibits, brochure racks, or electronic computer systems. The electronic systems are becoming quite advanced with the capability to make hotel and restaurant reservations, dispense tickets to sports events, and collect user fees

for parks (Welcome Center Report, 1989). Currently, no stand-alone travel information systems exist in southwest Virginia, but this project will further investigate their potential.

3.0 TOURISM SURVEYS

Obviously, a state interested in increasing its tourism industry wants to provide as much information as possible to potential visitors. But problems exist with many of the current methods of information dissemination. Billboards are targeted by environmental groups, particularly in rural settings, because they take away from the natural beauty of the landscape. Also, highway officials may not like these billboards because they distract drivers, momentarily taking their mind away from the driving task. Similarly, roadway signs distract drivers, so such policies as presented in the Manual on Uniform Traffic Control Devices restrict the number of tourist related signs which can be placed on the interstate highways.

Therefore, new methods of distributing this tourist information must be explored if a state wishes to expand its tourism market. Since ATIS is being developed to provide travelers more information about the driving task, it seems these developments can be utilized to also distribute tourist information.

Before any comparisons can be made or conclusions drawn, research must be conducted to determine exactly what travelers' information needs are, how travelers collect their information, and what changes in information collection they will accept.

3.1 METHODOLOGY FOR THE SURVEYS

To perform this research, it was decided to conduct surveys and interviews with a number of different people. First, interviews would be conducted with tourism officials at

the state and local levels to determine what are the information needs from a management perspective. Then tourist information centers would be visited to conduct interviews with the center staff to document their views on tourist information needs. Finally, a survey was developed to be administered at tourist information centers and actual tourist sites to determine the tourists' views on the subject.

Sample questionnaires for the tourists are shown in Appendix A. The surveys were designed to last approximately five minutes, and the questions begin by determining if the person is on a pleasure trip. Most of the locations chosen for surveys would provide only tourists, but a separate business traveler survey was developed to account for such travelers surveyed at the information centers. The business survey is very similar to the tourist survey, but the business traveler is asked general questions about pleasure trips they have taken in the past.

The survey then proceeds to find out the traveler's origin and destination. Then they are asked about the pre-trip information they collected prior to departure followed by their pre-trip information needs. Next, four en-route technologies are identified as potential information providers, and the tourist is asked to rate them according to a five step comfort scale. Finally, to target information provided at welcome centers or visitor centers, the traveler is asked about their stopping habits at these centers. With these questions, one can expect to draw general conclusions about current information gathering practices, information needs, and potential acceptance of the proposed ITS technologies.

The questions developed for the tourist information center staff are shown in Appendix B. These questions are similar to the tourist questions except they are redirected to a provider point of view. Questions one through five are directed at determining tourist information needs. The next group of questions relate technologies to information dissemination. First, the staff is questioned about technologies used in the past or currently being used. Then, they are asked about plans for future technology implementation. The survey concludes by asking staff members what will most benefit the tourists' need for information.

3.2 LOCATIONS OF THE INTERVIEWS AND SURVEYS

Interviews were conducted with tourism officials at the state and regional levels, and the transcripts of these interviews are shown in Appendix C. Laverne Deusebio and Mark Brown from the Division of Tourism, which is part of the Virginia Department of Economic Development, were interviewed. Also, John Strutner was interviewed who is a Division of Tourism field representative for the region west of the Blue Ridge. Mr. Strutner is also the executive director of the Virginia's Southwest Blue Ridge Highlands, Inc. which is a Destination Marketing Organization for the region. Another interview was conducted with Charlotte Reed who works in the Public Services Department at Virginia Tech as a liaison helping to promote tourism in the community. Finally, a list of questions was sent to Jerry Petsche who is an information systems manager for the National Park Service at the Harper's Ferry Center in West Virginia.

Interviews with travel information center staff were conducted at a number of locations throughout Virginia. One welcome center was visited on I-95 in North Carolina because they have a touch screen computer system in operation. The Virginia welcome center located near the Virginia-North Carolina border on I-95 was also visited to conduct interviews with the staff. An interview was conducted with Martha Doss who is the director of the Lexington Visitor Center. Other staff interviews were conducted in southwest Virginia with the park ranger at Claytor Lake State Park and Carol Lofin at the visitor center on the Blue Ridge Parkway run by Virginia Parkway Hosts, Inc.

The tourist surveys were conducted at five locations throughout southwest Virginia. The survey locations were spread around the region to get a representative sample of tourists throughout southwest Virginia. All surveys were conducted during the fall which is not the peak of the tourism season, but adequate visitors were in the region to view the fall foliage. Surveys were conducted at Claytor Lake State Park which is located in Pulaski County and at the Natural Tunnel State Park in Scott County. Their locations are shown in Figure 2. Some surveys were conducted at the Virginia welcome center in Bristol and at the Virginia Parkway Hosts, Inc. visitor center located on the Blue Ridge Parkway in Carroll County. These locations can be seen in Figure 3. The final tourist surveys were conducted at Virginia Tech during parent's weekend. These surveys were conducted in Blacksburg which is located in Montgomery County

3.3 ANALYSIS OF THE DATA

Due to the scope of this project, only a small sample size of tourists were interviewed. A total of thirty tourist interviews were conducted throughout the region which is too few from which to draw conclusive statistical results. Nevertheless, the data should remain useful and valid because only tourists were targeted at typical tourist locations. Therefore, legitimate generalizations can be drawn from the surveys. Appendix D shows a summary of the raw data from the tourist surveys.

The majority of the questions in the survey were quantitative in nature. The tourists were not given a list of possible answers. Instead, they were asked to respond to an open ended question. This method of questioning makes it very difficult to analyze the data by comparing the responses to each other because there is no “correct” answer, but trends in the data can be identified. For example, half of the people surveyed were from Virginia, and sixty percent of the tourists identified southwest Virginia as their destination. This high number of in-state tourists could be attributed to the time of year. Many of the people were on a weekend trip to the mountains to see the fall foliage. Interviews with the center staff showed that the peak season for tourists is the summer when families spend vacations in the area.

3.4 TOURIST INFORMATION NEEDS

Questions three and four dealt with information the tourists gathered pre-trip, and what additional information they felt they needed. Just below half of the people said they got directions to their destination before leaving. Other responses included information on:

- lodging
- campgrounds
- restaurants
- other places to visit along the way.

An interesting result of this question was that about one-fourth of the tourists collected no pre-trip information. Again, this result may be due to the large number of in-state and local tourists who were traveling to view fall foliage, and they were familiar with the area.

Question five asked the tourists to give examples of additional information which would have been useful. This broad question resulted in a wide variety of answers. The most common answers were information about places to stop and visit (tourist spots) and better directions including more information about local roads. Other information needs included:

- historical locations
- weather
- parks
- rest stops
- road construction
- reservations.

Tourists were also asked to explain how they obtained their pre-trip information, and how they would like to receive any additional information. Half of the people used

maps to obtain pre-trip information which correlates with the large number of people who had directions already planned. Other common methods of obtaining pre-trip information included:

- telephone
- relatives and friends
- brochures.

Methods which were less commonly used to obtain pre-trip information included:

- motor clubs
- visitor or welcome centers
- tourism guides.

A significant number of people wanted to receive additional information by calling ahead. Many of the tourists liked this option because it was simple, and they could get the information from home. Receiving information via computer was another answer which drew many of the same comments as receiving information by telephone. Those people liked getting the information at their leisure. This source could become very significant in the future as more and more people buy computers and become connected to the information superhighway.

Another common response was to receive additional information at visitor or welcome centers. People liked this option because regardless of receiving travel information, they were going to stop to use the restrooms. This fact is shown in the final question where 90% of the tourists said that the restrooms were one reason they stopped at such centers. Other methods to receive more information included better maps, more signs, and mail.

3.5 QUALITATIVE RESULTS AND COMPARISONS

A number of important results can be seen from these qualitative questions. First, many tourists gather some information pre-trip. This pre-trip planning period is a very good time to influence tourists on where to go, what to do, and where to stay. Also, a significant number of people do not make plans before they leave. They simply know generally where they want to go, and they collect information along the trip. Providing these people en-route information is very important if tourism officials want to persuade them to stay in the area.

People like to receive information which is convenient to their schedule. They want to make a phone call, look at a map, or search for the information using a computer. Virginia has a toll-free phone number which people can call to receive the Virginia Tourism Guide or state maps. At the 1994 Rural IVHS National Conference held at Virginia Tech, the director of the Virginia Division of Tourism commented that he sees the Virginia Tourism Guide being phased out in the near future. Current plans are to digitize the information and have it available by disk or on-line for computer users.

Another conclusion which can be drawn from these questions is that people are going to stop along their trip. Whether they are going to use the restroom, take a walk, or use the vending machines, travelers will stop. Since they are going to stop anyway, travelers see this as an opportune time to gather information on the surrounding area. For this reason, the state welcome centers were initially constructed along interstate highways.

Some states have seen this opportunity by updating the facilities to attract more travelers and expanding the facilities to accommodate everyone willing to stop.

One final result from this analysis is tourists' willingness to take less traveled roads rather than the interstate. The cliché "getting there is half the fun" does still apply. A number of tourists said they wanted to travel more local roads which were scenic and less boring than the interstate highways. Although traveling by interstate is quicker, these people were less concerned about reaching a destination faster. They wanted to take their time and see the landscape and small towns which make southwest Virginia so special.

The main concern these tourists had with taking the lesser traveled routes was the risk of getting lost or having car trouble. They felt more secure on the interstate because of the large signs and other travelers which would help if there was a problem. Therefore, more information should be provided to those people wishing not to travel on the interstate. People wanted better local maps and more information on tourist and historical spots to visit. Virginia has begun this process by publishing the "Map of Scenic Roads in Virginia". This map highlights the scenic byways and tourist attractions instead of the interstates and large cities which stand out on the official state map. Tourists want additional and more specific information, and Rural ITS provides this capability. More funding combined with better communications, new or improved technologies, and some creative thinking could be used to satisfy the additional information needs tourists have.

4.0 ITS TECHNOLOGIES TO PROMOTE TOURISM

4.1 TECHNOLOGY BACKGROUND

Since a need exists to provide travelers with more tourist information, new technologies must be developed or improved to dispatch this information. The four IVHS technologies identified by this project to promote tourism are as follows.

4.1.1 Better Signing Including Variable Message Signs (VMS)

Improving the signs leading to tourist attractions is not considered a goal of ITS. But these two issues do overlap. For example if variable message or changeable message signs are used to replace a current static sign or provide additional information, new ITS ideas and research can be tapped. Providing real-time information to motorists is a primary goal of Advanced Traveler Information Systems (ATIS).

Highway variable message signs (VMS) are traffic control devices widely used for traffic warning, regulation, routing, and management as well as devices to provide real-time highway related information (FHWA, 1991). Perhaps these types of signs could also be used to promote tourist attractions when other travel information is not being displayed. One disadvantage of variable message signs is the amount of time travelers have to view the message. Generally, at highway speeds a driver will only have about ten seconds to view the message, therefore the sign should only display two or three alternating five word messages. Another concern for these signs is their benefit to cost

ratio when compared to static signs. An advantage of variable messages signs is their ability to provide much more information to travelers than conventional stationary signs. Also, if the signs are linked within a communications network, they can be remotely updated to display accurate, real-time information.

Variable message signs can be divided into two categories, permanent installations and portable VMSs. Permanent installations are generally overhead signs which can be controlled remotely or on-site. Other control options include manual control, fixed-time, or automatic control of messages with computer algorithms which utilize tolerance criteria and traffic detectors (FHWA, 1991).

Variable message signs can display the message in a number of different ways. These three categories include light-reflecting, light-emitting, and hybrid. The first group uses the light from an external source such as the sun or headlights to reflect the message back to the motorist. These signs are comprised of small reflective disks or rotating static signs with reflective sheeting. Light-emitting signs generate their own light on or behind the viewing surface. Fiber optics, incandescent lights, or light-emitting diodes are methods of producing light for variable message signs. The hybrid signs are simply VMSs which reflect and emit light to convey the message (FHWA, 1991).

4.1.2 Traveler Information Stations (TIS)

Traveler information stations and highway advisory radio are two synonymous terms which refer to a 10 watt AM radio station which is licensed by the Federal

Communications Commission (FCC) to a governmental entity and used primarily to provide traveler information. These local area broadcasting systems are located at roadside stations and can provide information to travelers within a three to ten mile radius using any open frequency within the AM band. The roadside station consists of four basic components including a transmitter, a digital recorder/player, memory or storage of the message, and an antenna. A number of different options and limitations exist for each of these components, therefore several equipment configurations exist for a station (Digital Recorders Inc., 1992).

The system can be stationary and powered by a 115 volt AC circuit which leads to the station being inoperable during power outages. A battery backup can be added to provide service for three or four days without power. Also, the station can be solar powered with battery backup which can last up to two weeks. This configuration reduces operational costs since there is no monthly power bill. The final configuration is a mobile unit which is generator or solar powered.

The range of the station will depend on a number of factors. First, the transmitter has only ten watts of output which primarily inhibits the range of the signal. Terrain is another factor which must be considered. In rural areas with rolling terrain, a three to five mile radius can be expected. In flat regions, the range can increase to eight miles, and in mountainous regions, the range can drop to one mile. Also, the system must be properly grounded with a strategically placed antenna. For all areas, locating the antenna on a

dedicated pole away from trees and tall buildings will increase the broadcast range (Digital Recorders Inc., 1992).

Different options also exist concerning system operation and control. The message can be simply input into the memory and repeated until changed by the user on-site. Such operations as loading new messages, deleting messages, turning the system on or off, or scheduling messages can also be controlled remotely. Telephone lines and cellular communications are two methods of remotely controlling a TIS. Recent advances have allowed the stations to be controlled by computer with digital downloading of messages.

The FCC also permits the use of a tenth watt or 100 milliwatt transmitter. These systems require no license and may be operated by anyone. The major disadvantage of these systems is the broadcast range which is limited to one-half mile or less. This system can be very useful in certain situations such as radio guided tours which have TISs at the designated stops and at large parking facilities which need better parking management (Digital Recorders Inc., 1992).

An important advantage of all radio technology is its accessibility to nearly all travelers. The signal is broadcast over the standard AM radio band, so any vehicle with a radio can receive the signal. Again, highway signs would be placed to initially interest the traveler into tuning in the radio station. Although the stations have a limited broadcast range, they are reasonably inexpensive and if strategically placed, can cover a wide area economically.

Currently, these radio stations are being used across the U.S. for a variety of tourism applications. These systems transmit real-time information to promote parks, recreation facilities, historic and cultural events, local attractions, natural resources, and more. In Virginia, a low band station is being used in Prince William County to market their civil war battlefields. More than 25 national parks such as Yellowstone and Yosemite broadcast park related information. Wisconsin and Colorado operate TISs at welcome centers to greet visitors and promote events and travel services. Chambers of commerce and visitor bureaus in such cities as Lincoln, Nebraska and Dayton, Ohio use the stations to promote community events and attractions to through travelers on nearby interstate highways (Information Station Specialists, 1991).

4.1.3 Automated Computer Kiosks

An automated computer kiosk is a stand alone unit which is about the same size as an automated bank teller machine. Information is provided through full-motion video, graphics, text, stereo sound, and printouts. The kiosk commonly consists of a computer, user interface, communications module, and a printer. The computer is generally a personal computer with a modem and telephone line communication link. The user interface is most often a touch screen, but joystick, trackball, or keyboard interfaces are also available. Dot-matrix printers have been used in the past, but laser printers are being used more often for higher quality hard copies (JHK & Associates, 1994).

Computer kiosks should be placed where they are highly accessible and where travelers normally stop. Four potential locations for installing automated computer kiosks include:

- Visitor or Welcome Centers
- Highway Rest Areas
- Major Tourist Attractions (parks, historical sites, resorts, malls, etc.)
- Major Transportation Facilities (airports, bus terminals, train stations)

Travelers can access large amounts of data from such a system. Information on trip routing, en-route facilities, road conditions, weather conditions, traveler services, and alternate routes are all possible using computer kiosks. The previous examples are all traveler related types of information. Tourist information could also be displayed using computer kiosks. Information about lodging, tourist attractions, historical sites, hours of operation, possible fees, and reservations could also be provided.

The keys to any computer kiosk's success is the system database and how accessible this information is to the user. The computer's hard drive will commonly contain a map database with attribute data about the surrounding area and possibly the entire state. The data will be updated periodically by various entities such as the Department of Transportation, Tourism Bureaus, law enforcement agencies, service providers, or visitor center staff. Most of this updating could be done on-line to reduce delays and keep the data as current as possible. Since the kiosk is connected to telephone

lines via modem, external databases could be accessed and an endless amount of information would be available (JHK & Associates, 1994).

4.1.4 Personal Communication Devices (PCD)

Personal communication devices are information devices which are designed to be accessible at all times. Cellular telephones, portable computers, and other hand-held information devices are good examples of PCDs. The PCD of particular interest for this project is a read-only portable unit which provides tourist information. These devices are very small with most systems being approximately six inches long and weighing less than four pounds. The user interface is usually a keypad or pen based system which uses a special pen to 'write' on the screen. Some devices incorporate handwriting recognition for taking notes and software commands. Future improvements include voice recognition which will free users from touch screen and keypad commands (Barr and Neubarth, 1993).

Information will be collected by a tourism bureau, chamber of commerce, etc. and stored in the small hand-held device which is sometimes called a personal digital assistant (PDA) which can be borrowed or rented. Each device would contain the same information. As the tourist travels throughout the region, they could access information regarding maps, travelers services, tourist attractions, motorist services, and route guidance. Also, specific information systems could be developed for major tourist attractions such as parks or historic towns.

Another use of this technology is a trip specific system which would contain information about that traveler's particular trip. Similar to trip planners developed by motor clubs, the traveler would specify the origin and destination, and an information package would be developed specifically for them. This information is input into the PCD with the traveler renting the device before departure. The same types of information would be available such as lodging, motorist services, attractions, etc. (JHK & Associates, 1994).

Further advancements of PCDs could lead to route guidance capabilities where GPS is used to locate the vehicle at all times. Also, cellular capabilities could be included in the device so additional information could be accessed which is not programmed in memory. For example, if the vehicle breaks down, the traveler could locate a mechanic to complete repairs. Also, a tow truck could be contacted with the use of cellular communication. This feature is similar to the mayday concept which is being developed as a rural ATIS initiative.

4.2 SURVEY RESULTS

A recent national study conducted by the Center for Survey Research at Virginia Tech contacted 275 people who live in rural areas and have taken at least a 150 mile trip through a rural area within the past year. Of those interviewed, 77.5% felt touch screen information systems at rest areas would be useful for collecting travel information. Also, 76.0% felt electronic road signs would be a useful tool for travel information. Only 50%

saw in-vehicle video displays as useful, yet this figure rose to 68% for in-vehicle voice messages (VTCSR, 1993). A different study conducted by the Department of Hospitality and Tourism Management at Virginia Tech examined the potential for low band radio tourist information stations along Interstate 81 in the Roanoke/Salem area. A total of 100 travelers were interviewed at rest areas north and south of the of the Roanoke/Salem area. Of those interviewed, 77.8% felt likely or very likely they would tune into such a radio station to receive regional tourist information (Weaver, 1994).

Each of these surveys has provided positive results for the use of ITS technologies to promote tourism in rural areas, but none of the surveys concentrated on tourism in southwest Virginia. Another goal of this project was to determine how the four identified technologies would be accepted by typical travelers in southwest Virginia. As shown in Appendix A, question seven asked the tourists to rank the technologies according to how comfortable they would feel using them. A scale from one to five was used with one being the lowest. The results are shown in Table 3.

TABLE 3: Survey Question Seven Results

| TECHNOLOGY | MEAN SCORE |
|--------------------------------|------------|
| Better Signs (including VMS) | 3.8 |
| Automated Computer Kiosks | 3.8 |
| Traveler Information Stations | 3.5 |
| Personal Communication Devices | 2.7 |

As previously mentioned, a small sample of 30 tourists were interviewed, so results should not be investigated statistically to draw specific conclusions. Nevertheless, a general conclusion can be drawn from the data that the technologies will be well accepted. Also, it appears people do not feel as comfortable using personal communication devices as the other three technologies. Finally, these results correlate well with the previous rural studies with the first three technologies receiving approximately a 75% approval rating. As in the national study, in-vehicle information devices received lower ratings.

Some general trends in comments associated with these questions did occur. Many tourists agreed with the need for better signage to tourist attractions. Some said they were traveling on the interstate highway when they saw the sign and decided to stop at that particular attraction. Although most felt better signage was needed, they questioned the use of variable message signing because of the high cost. Also, a number of the tourists said they felt uncomfortable using any computer because they had never done so before. Such comments were generally made by older people. This issue coincides with statements by visitor center staff and tourism officials. They stressed the fact that any new computer technology will not be accepted by a certain group of people who are unfamiliar with computers in general. Therefore, any new technology with a user interface must be extremely user friendly.

5.0 POSSIBLE APPLICATIONS IN SOUTHWEST VIRGINIA

The tourist surveys have shown what tourist information needs exist in southwest Virginia as well as what technologies would likely be accepted by tourists to receive information. Now a plan must be developed to meet the information needs. The ITS technologies proposed for this project must be examined, and plans developed for their implementation. The guiding force for this portion of the project will be the interviews with the tourists, visitor center staff, and tourism officials. They provided good insight into possible applications of the proposed ITS technologies. The following recommendations will be divided into pre-trip information and en-route information dissemination.

5.1 PRE-TRIP INFORMATION DISSEMINATION

The majority of this project has focused on methods of providing information to travelers after they have reached southwest Virginia. Following the interviews, a definite need for more pre-trip information was established. Providing more information to travelers before they embark on their trip will reduce problems along the trip thus tying it to other ITS efforts. The traveler will experience increased efficiency and reduced travel times with better route guidance. Better directions would lead to more traveler comfort when driving on scenic local roads. Finally, traveler safety would be increased with advanced warning of poor road or weather conditions (JHK & Associates, 1994). The

following strategies may be further investigated as methods to provide more pre-trip information.

5.1.1 Personal Computer Capabilities

As personal computers become increasingly powerful and less expensive, more people, especially younger families, are purchasing computers for use in their homes. More and more people are becoming connected to the “information superhighway” which means they have access to ever increasing amounts of information. This avenue appears an ideal strategy upon which to provide travelers more pre-trip information.

In the past five years, the Virginia Travel Guide has grown from 35 pages to approximately 120 pages. Currently, the Public Services Programs at Virginia Tech is working with the Virginia Division of Tourism to digitize the guide. This will provide an excellent way for potential tourists to learn about Virginia. When travelers call the Division of Tourism for a copy of the guide, they may choose to receive a computer disk which contains the information. This will make the trip planning process more interactive. Also efforts are being made to have this information available on-line through the Internet or other national server.

More information could be provided about southwest Virginia using the same capability. The Hospitality and Tourism Department and the office of Public Services Programs at Virginia Tech have plans to compile tourism information about southwest Virginia and make it available on a limited basis through the Blacksburg Electronic

Village. Perhaps this information could be placed on the Internet or America On-line which would make it available to a much larger audience. If the user does not have on-line access, a computer disk could be mailed to them with the same information.

Since the tourism thrust in southwest Virginia is the promotion of outdoor activities such as hiking and rafting, tourists need to see beautiful pictures of the area's landscape. With computer power and speed increasing along with display resolution, tourists can get these pictures via computer. Floppy disks may not be an efficient way to send these pictures because of their large size, but large pictures can be downloaded on-line which entice a potential tourist to visit beautiful southwest Virginia.

5.1.2 Telephone Hot Lines

An important conclusion of the tourist interviews was that people want more information, but they want information which is easily accessed especially from their homes. Since many older travelers feel uncomfortable using computers, the telephone could provide a better means of providing them information. With touch-tone® phones, the traveler could call a general toll free number and choose to hear more information about different parts of the state. A specific directory for southwest Virginia could be developed to provide them more information about parks, scenic roads, lodging, etc. If additional or more specific information is needed, the tourist could request it by mail. This would reduce the amount of documentation to be sent, and the tourist would receive only that information which they need.

5.2 EN-ROUTE INFORMATION DISSEMINATION

Many of the innovative technologies developed through the ITS efforts will help the traveler receive information after the trip has begun. Although pre-trip information is very important, this project has focused primarily on providing information to tourists after they have reached southwest Virginia. Many people do not know what the area has to offer tourists. Therefore, an important key to promoting the region is to attract through travelers who had not planned to visit the area. The two interstate highways, I-81 and I-77, provide a great opportunity to attract tourists and convince them to get more information and possibly plan a future vacation in southwest Virginia. The following strategies may be further investigated as methods to provide more en-route information.

5.2.1 Better Signing Including the Use of Variable Message Signs

Many of the tourists interviewed expressed a need for better signing in the area especially the signs leading to tourist attractions. Funding is seen as a major obstacle for such a request. Who would pay for these signs? Also, Department of Transportation policies restrict the number of tourist information signs which can be placed on highways. Although some signs surely need replacement or updating in the area, other methods of providing such information must be investigated.

Variable message signs are one possible solution to the problem. These signs would be installed at strategic locations along the interstate highway to give travelers more information such as road and weather conditions. At times when road conditions

and weather are not a problem, other types of information would be displayed such as tourist information. Tourist attractions, parks, or visitor centers could be advertised while important roadway information was not being displayed. Since travelers have a limited time to read the signs, careful consideration must be given to the messages. For instance, the variable signs should be used to attract the travelers attention then promote a tourist information radio station or welcome center where more detailed information is provided.

A major problem for such a system, besides cost, is determining who will change and monitor the signs. One scenario is to develop a constant loop of messages which would contain the tourist information. This group of messages would be the default, so they would be shown at all times unless there is a problem. If there is an accident, bad weather, road maintenance, etc., appropriate officials would be able to change the message to relay the necessary travel information. This process could be done remotely with computers or telephone.

Another possible application of variable message signs was recommended in one of the welcome center staff interviews. She recommended placing scrolling variable messages above the doors in welcome and visitor centers. Again, these messages would give tourist information normally, and when necessary, important travel information would be given. This application seems to be quite useful especially since the welcome centers are not open 24 hours. If the signs are placed outside, travel information could be displayed at all times.

5.2.2 Traveler Information Radio Stations

Providing tourist information via car radio seems to be an excellent way to promote southwest Virginia. Stations would be placed along the interstate corridors promoting tourist attractions in the area. When necessary, the messages could be changed remotely by transportation or law enforcement officials to relay emergency travel information. Now the station can be considered a highway advisory radio thus it serves a dual role. Under normal conditions local tourism is promoted, but when necessary, travelers are advised of an incident, road work, adverse weather, etc.

Initially, travelers would see either static or variable message signs informing them of the radio station and its frequency. Since a low strength radio station would have only about a 3-6 mile radius in the mountains of southwest Virginia, the broadcast must be carefully created to convey an effective message within a couple of minutes. Again, they would have to get the travelers attention by promoting a certain aspect of the area or a local attraction. Then the traveler would be advised of a welcome/visitor center, computer kiosk, or telephone number where further information could be gathered.

Similar to variable message signs, cost, updating, and maintenance will be the problems facing such radio stations. With regards to updating, a tourism default loop could be established to be played continuously until emergency officials changed the message remotely. Since most of the stations can run on solar power, operating costs are very low. The largest problem is initial cost. To achieve adequate coverage a series of stations should be located along the interstate in mountainous areas such as southwest

Virginia. If coverage of a large area is too expensive, fewer stations should be used to catch the travelers attention, and then tell them where more information can be found.

The Roanoke/Salem area, which is immediately north of this study area, has proposed tourist radio stations to be installed along I-81. Surveys have shown the likelihood that travelers would use the stations to receive tourist information. The proposed solar unit would cost \$23,000 - \$25,000 and have no annual maintenance costs. Other initial costs include highway signs and mounting the antenna on a pole. Operational costs would be the telephone line to the station, and mowing or upkeep of the surrounding site. Although the station has the support of both localities, the effort has stalled due to a lack of funding.

5.2.3 Automated Computer Kiosks

One of the best ITS technologies to promote tourism in southwest Virginia would be the installation of automated computer kiosks at a number of locations in the area. Kiosks can provide large amounts of information to travelers through video, audio, and printouts. Past attempts to utilize kiosk technology in Virginia welcome centers failed for a number of reasons. The hardware was often broken, and because of the remote locations, contracting someone to maintain them was difficult. The information was often outdated or incorrect, so travelers lost confidence in the systems.

Welcome centers in North Carolina and Tennessee currently have computer kiosks which provide travel information. An example of a computer kiosk is shown in Figure 4. This system is quite simple with a touch screen and a dot-matrix printer.



FIGURE 4 An Automated Computer Kiosk on I-95 in North Carolina

The welcome center staff was very supportive of this particular system. She said the kiosk has been in use for 4 - 5 years with relatively no problems. Everyone uses the system regardless of their age, and the information is updated monthly by contract. The only drawback she saw were lines to use the kiosk. More terminals are needed to accommodate everyone. Obviously, kiosk technology has improved over the past ten

years, and people are accepting them more and more. For these reasons, kiosks should benefit tourism as well as travel throughout southwest Virginia.

The best locations for these kiosks would be at places along the interstate where the most travelers stop. A 1989 rest area study showed that over 95% of all drivers have stopped at rest areas. The overall average of mainline traffic entering a particular rest area is approximately 10%, and indications show this number is increasing (King, 1989). Therefore, installing kiosks in rest areas and welcome centers appears to be the best chance for maximum exposure to travelers. Other good locations for computer kiosks would be local visitor centers which attract many tourists and travelers.

The advantages of installing computer kiosks are numerous. They quickly provide significant amounts of information accompanied by a printout. Most people are familiar with them and feel comfortable using them. Current networking capabilities allow easy updating of information. New systems allow travelers to make reservations and toll free phone calls from the kiosk. But what are the disadvantages, and how can they be overcome?

As with any new technology to promote tourism, cost is an important concern. The 1994 Virginia General Assembly passed a resolution to study ways of increasing tourism in southwest Virginia. Obviously, legislators see tourism as an important industry, so the challenge is to prove that computer kiosks will help promote tourism. Raising awareness and support for such technologies could lead to funding for their implementation.

Besides cost, other logistical problems exist with computer kiosks. Locating the systems inside safe welcome centers will not allow 24 hour access. Therefore, they need to be located in fully accessible areas which may lead to vandalism. The threat of vandalism cannot be eliminated, but it can be reduced. Figure 5 shows a new rest area in Virginia located on I-95 south of Petersburg. Notice that the layout has changed to one large building with an enclosed common area. This enclosed area would provide shelter from the weather. The kiosk could be configured similar to an automatic bank teller machine (ATM) in that only the screen and user interface are exposed which should help reduce vandalism.



FIGURE 5 A New Virginia Rest Area Located on I-95 South of Petersburg

The timing for implementing computer kiosks in state rest areas and welcome centers is quite good. Nearly all of the current facilities are outdated, and many in southwest Virginia are scheduled for renovation within the next five years. Now is the perfect time to develop kiosk systems and incorporate them in the rest area renovation plans.

Another key problem associated with computer kiosks is the issue of maintaining the systems and updating the data. Other states have overcome these problems by contracting these duties to private firms. Virginia could establish standards for rest area kiosks and hiring a private contractor to monitor and maintain the systems.

Placing the kiosks in local visitor centers would raise different problems. Again, who would finance their installation and maintenance, and who would be responsible for updating? Networking all of the kiosks together would provide the necessary updated information. Also, if that visitor center wished, they could enter locality specific information into their kiosk. To finance the systems, partnerships would have to be established where state and private funds would be used.

5.2.4 Personal Communication Devices

Personal communication devices (PCDs) do not appear to be an effective way to promote tourism in southwest Virginia at the present time. About half of the tourists indicated they would be interested in such a system, but others had no idea what personal communication devices were. The devices have worked well in local situations such as

national parks where the PCD is rented as the tourist enters the park. The device contains information about the area which the visitor can access as they travel throughout the park. Their current effectiveness over a large area such as southwest Virginia is questioned because of the problem of renting the unit. Would a private company be developed with locations throughout the area where the devices could be distributed and returned? The logistics of renting the device and returning it seems to be a primary obstacle for this technology.

As more in-vehicle technology is developed, they could become a very effective tool in promoting tourism. Motor clubs may begin to provide their customers with trip planning on personal digital assistants or on CD-ROM which could be used in-vehicle. As this technology grew, state departments of transportation and tourism may want to provide travel and tourist information through in-vehicle displays. Results from the national survey for rural traveler information needs shows that people would be more interested if in-vehicle technologies gave voice messages. So, this technology does hold promise as it becomes more user friendly.

6.0 CONCLUSIONS

The objective of this project was threefold. Initially, interviews with tourists, visitor center staff, and tourism officials were conducted to determine if the proposed ITS technologies could be successfully used to promote tourism in southwest Virginia. From these interviews, a list of user needs was developed. Finally, possible applications of the ITS technologies were recommended.

6.1 RESULTS

Interviews were conducted with thirty tourists throughout southwest Virginia. A structured list of questions was asked to each tourist with responses being noted on each question sheet. A list of questions was also developed for interviews with staff at welcome and visitor centers. Five such interviews were conducted with center staff members. Interviews were also conducted with tourism officials throughout the state with a specific list of questions being developed for each interview. Officials were interviewed from the Virginia Department of Economic Development's Division of Tourism, the Virginia Department of Transportation, Virginia Tech Public Service Programs, Virginia's Southwest Blue Ridge Highlands, Inc., and the National Park Service.

All tourism officials and welcome/visitor center staff members were in favor of ITS technologies being used to help promote tourism in southwest Virginia with only a few concerns being raised. First, who would pay for the implementation of these technologies? Also, a few people who had past experience with computer kiosks

questioned their reliability. Finally, nearly everyone felt that these technologies could never replace the effectiveness of communicating with a human to get tourism information. The machinery should only be used to supplement the people.

Due to time restrictions, only a small sample of thirty tourists could be interviewed in southwest Virginia. Therefore, a statistical result should not be drawn from the data. Instead, general conclusions were drawn and compared to other similar studies to determine validity. Common information needs for tourists are:

- Directions
- Tourist attractions
- Lodging
- Restaurants
- Campground information
- Other travel information such as road and weather conditions

These findings are consistent with a national survey of rural traveler information needs conducted by the Center for Survey Research at Virginia Tech. Similar results were also found by a FHWA study to determine rural traveler information needs conducted by JHK & Associates and the Center for Transportation Research at Virginia Tech.

Also, from the tourist interviews, general conclusions were made concerning which of the four proposed technologies tourists would feel most comfortable using. Comparing the mean response for each technology showed that better signing including the use of variable message signs, automated computer kiosks, and traveler information radio

stations were all very close in ranking. Since the sample was small, further distinctions among these three could not be made. But, personal communication devices was ranked significantly lower than the other three due primarily to the fact that people did not understand or were uncomfortable with this new in-vehicle technology.

With all of the interviews complete, a literature search of the four technologies was done, and recommendations for possible applications of the technologies was made. The primary advantage for all of the proposed technologies is their dual purpose. They can provide essential travel information such as road and weather conditions when necessary, but they can also relay information to help promote tourism when travel conditions are normal. This concept is very important when searching for funding to implement the technologies. Transportation and economic development, which historically have very close ties, benefit from the same expenditure.

Automated computer kiosks are recommended to be installed in welcome centers, visitor centers, and other major transportation facilities throughout the region. Kiosks can safely provide the most information to travelers in the shortest amount of time. Potential tourists are given information about the region while they are resting and their mind is not on the task of driving. For this reason, more information can be delivered and absorbed. Past failures of computer kiosks can be overcome with proper funding, new technological advances, database management, and good maintenance of the systems.

Variable message signs and traveler information radio stations are also recommended for implementation to help promote tourism in southwest Virginia. These

devices should serve a supporting role to computer kiosks and other tourism efforts. Information from both of these technologies is received by travelers while the vehicle is moving. Exposure time is limited, and less information can be delivered and absorbed. Therefore, they should be used to initially interest the traveler in southwest Virginia then direct them to another source for more information such as a rest area kiosk or a telephone number. Further research and development of in-vehicle technology is suggested before personal communication devices are recommended for use as tourism tools in southwest Virginia.

6.2 APPLICABILITY TO OTHER RURAL LOCALITIES

Southwest Virginia has many similarities to other rural areas throughout the United States. The area is relatively sparsely populated, and the median family income is lower than the more developed regions of the state. Local officials are searching for ways to promote economic development hopefully helping to improve the lifestyle of everyone in the region. Tourism is one avenue being used to increase economic development. Convincing people to spend vacations in a rural community would definitely bring more money to that region.

Southwest Virginia has a number of unique characteristics which differentiate it from other rural America localities. First, the landscape is rugged with mountains and valleys. Small rivers and mountain streams line wind their way through the hills. This setting lends itself to an outdoor adventure vacation which may include hiking, rafting, or

camping. Also, two interstate highways traverse the region. I-81 is a major north-south connector for the entire east coast. Interstate 77 is another major east coast thoroughfare. Therefore, many out of state vehicles travel through southwest Virginia, and the potential for attracting tourists from neighboring states is quite good. These qualities help to make rural southwest Virginia a good location to use new ITS technologies to promote tourism.

These efforts should also work in other rural America regions which are searching for ways to increase tourism. The key ingredients for southwest Virginia are the landscape, transportation network, and the number of through travelers who are potential tourists. Other localities should examine their particular situation and determine if these ingredients or others exist which would make ITS technologies effective. The most important factor is that the community must have tourism appeal and is looking to increase visitation. Then there must be a targeted group of potential tourists. By using ITS technologies, the targeted group can be people traveling through the area either by highway, air, or rail.

6.3 FUTURE INVESTIGATIONS

The objective of this project was to determine if ITS technologies could be used to effectively help promote tourism in rural southwest Virginia. Without a doubt this question was proven true through the research and interviews. The interviews also showed which of the four proposed technologies tourists would feel comfortable using. Since three of the technologies received approximately the same ranking, further research

should be conducted to determine which to implement. All three may be implemented in stages, or different combinations could be used in different areas.

One suggestion to consider when continuing with the research is to find another way to rank the technologies. Even the small sample of tourists interviewed for this project was adequate to show which information providers people are willing to use. Possibly research could be conducted comparing the benefits and costs of the technologies. This may be accomplished by determining the amount other localities have invested to implement these technologies, and compare that figure to tourism trends.

After one technology or a combination of technologies is chosen, the findings should be shared with transportation, tourism, and other officials throughout southwest Virginia. With their help, plans can be created to implement a system by means of an operational test. A possible location for the initial testing would be determined by examining current tourist travel patterns who are entering the region. “Hot spots” could be identified where the technology would experience maximum exposure to motorists. If the operational test is successful, more full scale implementation could be planned for the entire region. The key to the success of such efforts is finding funding to implement the technologies. National, state, and local officials as well as the public must be shown the dual benefits of these efforts. Transportation and economic development can both benefit from the same expenditure.

Also, more research could be conducted into the specifics of how the technologies would operate. A software package with routing algorithms and tourism data from

southwest Virginia could be developed to run the computer kiosks. Research could be conducted to see which messages would be most effective to promote tourism with variable message signs. Possible travel radio station broadcasts could be developed. Finally, research could be conducted to see exactly how emergency officials would use the technologies to display information, and which messages would be the most effective.

The key to any research in this field will be good communication among the people involved. Transportation is not the only element which will contribute to the success of these efforts. Tourism officials must be consulted along with other state and local officials. The most important ingredient, which must be included with any such research and development, is public input. The public will be the eventual beneficiaries of these efforts, so systems must be developed which they will be willing and able to use.

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8.0 APPENDICES

Appendix A Questions for Tourists at Visitor/Welcome Centers

Appendix B Questions for Staff at Visitor/Welcome Centers

Appendix C Transcripts from the Following Tourism Official Interviews:

Laverne Deusebio and Mark Brown Virginia Division of Tourism, Richmond

Charlotte Reed Public Services Programs, Virginia Tech

John Strutner Virginia Division of Tourism, Blue Ridge Region

Jerry Petsche National Park Service, Harper's Ferry West Virginia

Appendix D Tourist Survey Summaries

**Center for Transportation Research
Virginia Tech**

Questions for Tourists at Centers

Hello! My name is Robb Alexander, and I am a graduate student at Virginia Tech. I am conducting a survey regarding tourism and technology in Southwest Virginia. Could you take about 5 minutes to share your thoughts on the subject with me by answering a few questions? Thank You!

1. Is this a pleasure trip or a business trip? (Go to business questionnaire if applicable)
2. Where are you from? Where are you going?
3. What types of information did you collect for this trip prior to departure?
4. How did you collect this information? (maps, phone calls, etc.)
5. What additional information do you feel you needed but could not get?
6. How would you like to receive the additional information? (i.e. telephone, visitor centers, computer, mail, signs etc.)
7. On a scale of 1-5 (1 being the lowest), how comfortable would you feel using the following four technologies to receive travel information? (explain the technologies if necessary)
 1. Better signs
 2. Traveler information via radio stations
 3. Automated computer kiosks
 4. Personal communication devices
8. How often, when traveling do you stop at the Welcome centers/Visitor centers?
9. What attracts you to the Welcome centers/Visitor centers? (signs, maps, personal information, rest rooms, etc.)

**Center for Transportation Research
Virginia Tech**

Questions for Business Travelers at Centers

1. When traveling on business, do you ever stop at tourist centers or tourist spots along the way?
2. How often do you travel for pleasure to tourist spots?
3. What types of information do you usually collect prior to departure?
4. How did you collect this information? (maps, phone calls, etc.)
5. What additional information do you feel you needed but could not get?
6. How would you like to receive the additional information? (i.e. telephone, visitor centers, computer, mail, signs, etc.)
7. On a scale of 1-5 (1 being the lowest), how comfortable would you feel using the following four technologies to receive travel information? (explain the technologies if necessary)
 1. Better signs
 2. Traveler information via radio stations
 3. Automated computer kiosks
 4. Personal communication devices
8. How often, when traveling for business or pleasure, do you stop at the Welcome centers/Visitor centers?
9. What attracts you to the Welcome centers/Visitor centers? (signs, maps, personal information, rest rooms, etc.)

**Center for Transportation Research
Virginia Tech**

Questions for Staff at Welcome or Visitor Centers

1. What are your hours of operation?
2. What types of information are most commonly requested by travelers?
3. How is information received by the center? How often do you update it?
4. What information are you able to provide the visitor?
5. What types of information are you currently unable to provide which you feel would benefit visitors?
6. Has advanced technology been used in the past to distribute information? If so, how were they received by the public?
- 6a. If technology is currently being used,
 - What are people's reaction/usage of it?
 - What are the drawbacks/deficiencies of the system?
7. Does the center have any plans to install advanced technologies for information?
8. How do you feel about the use of technology to provide information to the visitor? Do you feel it would make your job easier or more difficult?
9. What other improvements could be made to your center to make it more effective?
10. If money wasn't a concern, what could be done to improve the center's exposure and usage?

Interview with **Laverne Deusebio and Mark Brown**
Virginia Department of Economic Development Division of Tourism
8/16/94 9:00 am Richmond VA
Interviewer: Robb Alexander

1. What are your views on Advanced Traveler Information applications to promote tourism and economic development?

24 hr applications would be helpful but information would be limited. Such technologies would be a good supplement to people. Touch & Go kiosks were tried in the 80's. They were a maintenance problem especially since they were mainly located in rural areas which meant long service calls.

2. What special information needs do tourists have?

1. directions 2. attractions Map of Va. is important. At rest areas, most people stop and look at the map.

3. Does VDOT information come from the District level? Who distributes this information - public relations managers or traffic engineers?

VDOT calls 800 number to give welcome centers information. No computers in the welcome centers information is also faxed.

4. The Welcome Center Study says < 50% of the visitors would be willing to use interactive video. Does this figure correlate with the use of the Touch and Go system in the 80's?

People liked the system, but they were down too much. Mostly younger people used them. Currently reviewing a mapping program MAPSYS (handout) similar to the one used in Orlando

5. Did the Touch and Go system provide any printouts? If not do you think they would help travelers or be a maintenance and trash problem at the welcome centers?

They did provide printouts. They included information and directions to attractions. Advertisers paid for space on the system. Advertisers provided discounts to travelers who used the system by offering special coupons.

6. Can such systems be successful in locations where staff may not be available to clarify any questions? I was thinking of rest areas, airports, offices, or tourist attractions.

7. Do you know of any plans VDOT has to place kiosks in redesigned rest areas? Who could I contact about that?

On the Eastern Shore - no money to upgrade the center, but that welcome center is being reviewed for privatization.

8. Would state laws allow advertising on kiosks? Some states can and some cannot including the national park service.

No

9. Are the welcome centers advertised with anything other than highway signs? Could there be a place for such technologies to encourage more people to stop at the welcome center? (VMS or TIS)

Most people stop for the rest area services. The welcome center is second priority. Machines will not replace personal contact.

10. Are there any reservation systems at the welcome centers? Trip phone?

No reservation system. Had one years ago. An electronic reservation system would be good.

11. What are your department's plans for a practical deployment of ATIS technologies?

Currently, they are investigating mapping programs we are working on it at Tourism Division.

12. Would you advocate the use of any other ATIS technologies to promote tourism?

13. What barriers do you think will hinder the implementation of ATIS technologies?

Need to reconstruct centers to enclose devices. Vandalism would be a major problem. Security is a problem at the centers. Currently, staff can signal custodians for help. She changed the counters to be more secure. They are open 7 days a week 8:15 - 5:00 no extended hours.

Can I get information on summer visitor profiles and traveler information needs? Are there any statistics on the number of vehicles that stop each day at the welcome centers?

handouts

Other general comments:

- *Welcome centers have become information providers, not tools used to sell Virginia like they were originally envisioned.*
- *Sales of the brochure racks pays the staff's salaries*
- *During the Wilder administration, staff went from 4 to 2 and training for staff was discontinued*
- *People don't take long vacations any more. Instead more long weekends and they plan better before they leave. Therefore welcome centers don't provide the service they used to. Business travelers want information about future vacation trips to the state.*
- *Need to explore the importance of welcome centers. How do they actually help the economy and how many people use the information from welcome centers? Can use discount coupons to track number of people using such information.*
- *General Assembly has asked VDOT to do SW VA welcome center study.*
- *Hospitality dept. at Tech did 92 welcome center study, but had limited money.*
- *Federal law (Shepherd Act) prohibits sales at interstate rest areas and welcome centers only vending machines.*

Interview with **Charlotte Reed**
Economic Development Specialist, Tourism - Public Services Programs Virginia Tech
8/31/94 10:30 am Blacksburg VA
Interviewers: Robb Alexander and Melinda Heagy

1. Could you briefly describe your job here at Virginia Tech?

She works in the Public Services Department. Her job is to be a liaison with the community to help them promote tourism. They are part of the University Outreach Program which is a non-academic department within Virginia Tech.

2. What are your views on Advanced Traveler Information applications to promote tourism and economic development in Southwest Virginia?

“Without a doubt” potential exists to use the advanced traveler information technologies to promote tourism and economic development. One of her biggest concerns is educating people about the usefulness of the technologies, and convincing people that there is a strong connection between transportation and tourism -- both entities would benefit from this research.

3. What special information needs do tourists have?

Tourists need to know what's there to be seen or to do. Also getting there is half the trip, so people want to take the back roads and see rural America. These technologies would help if they could give people all of the travel or road options and letting them decide which route to take. Information must be reliable for people to believe it. She liked the idea of in-car capabilities where her location would be continuously updated and she could see her movements on a map. Also, advanced warning systems would be helpful telling visitors to Breaks Interstate Park when the area was covered with fog before they took the long drive there.

4. We pulled this map from a Virginia tourist information guide. Do you feel these counties sufficiently portray Southwest Virginia for the purposes of our project?

This area looks correct, but Henry, Franklin, and Patrick counties usually don't consider themselves SW Va. It would be fine to include them in the study because of the Blue Ridge Parkway. Roanoke has not decided in which part of the state they should be included.

5. Could you describe the Fort Chiswell project? Who is sponsoring the project, and what are the dates of implementation?

The Fort Chiswell project began when Congressman Rick Boucher obtained \$200,000 Federal money to upgrade the center. It is a visitors center for the Jefferson National Forest as well as Southwest Virginia. The center will have a touch screen interactive computer kiosk which will have networking capabilities. Currently it will be stand alone, but more computers are planned for the future, so networking is a must. The kiosk will be CD-ROM driven. There will be no reservation services yet, but phones will be installed for visitors to make their own reservations. There will be a 6 minute video about the area. The architecture department here at Tech developed the system and has more information.

6. Do you have any other plans or ideas using such technologies to promote tourism?
7. We are planning a trip down I-81 to Wytheville and Abingdon. Do you have any suggestions on people we should talk with?

She recommends we visit John Strutner in Abingdon, the Fort Chiswell Visitors Center, and maybe Wytheville if we have time. We should make it clear that our study is different than other research done with the Fort Chiswell project.

8. Do you know of any other related research here at Virginia Tech? Someone mentioned such work in either Human Resources or Hospitality and Tourism Management.

The Hospitality and Tourism Department here at Tech had his undergraduate class compile tourism information on SW Va. and place this information on the gopher which is accessible on Blacksburg Electronic Village through PROFS.

9. Could we get copies of the following information?
 - 1992 Virginia Tech Welcome Center Study
 - Manual on Economic Development
 - Dr. Pamela Weaver's study "An Examination of the Awareness and Effectiveness of Low Band Radio Tourist Information Radio Stations"
 - Any information on the Discover America computer kiosk project
10. Is there any other information which you think would help us?

Other General Comments

- *A travel and Tech information list has been placed on the Internet.*
- *The Smart Highway is being seen as a tourist product or attraction. People will want to come to Blacksburg to see the new highway technologies in action.*
- *She is working with the Division of Tourism to digitize the Virginia Travel Guide.*
- *Older travelers want a better sense of safe travel.*
- *With new technology and information services, there is a fear of wrong or missing data. There should be more studies to determine if people will use the computers.*
- *One group in the area is the Virginia's Southwest Blue Ridge Highlands, Inc. which is composed of a group of volunteers. John Strutner in Abingdon is the executive director of the group as appointed by the General Assembly.*
- *Another group is the Virginia Coalfield Regional Authority which has a tourism element.*
- *Tourism is seen as a way to "diversify the economy" within a particular region.*
- *In Albuquerque, New Mexico they have developed a Traveler Information Station for rural economic development.*
- *Roanoke was planning to spend \$90,000 on an information radio station, but there is no real study documenting if travelers will use the system - return on investment. Dr. Pamela Weaver conducted this study (copy) in the spring, and we see there are very favorable results. A more comprehensive study needs to be conducted.*
- *Also, someone should study the Blue Ridge Parkway to see if there is a market for these new information technologies. Great concerns exist to keep the Parkway looking rural with its many scenic views.*
- *We need better signs and signage technologies to help tourists who are totally unfamiliar with the area.*
- *Virginia had the first state supported Division of Tourism. We have taken our attraction to visitors for granted in recent years and Virginia has slipped from a top tourist state to about 10th. We need better more aggressive marketing strategies like*

other states are implementing. Such new information technologies would be a great place to start.

- *To get travelers used to the computers and information systems, we need to feed it to them slowly to gain their confidence in the technologies. Many of these travelers are older and they don't feel comfortable with any computer technology.*
- *Older people are a large targeted group for more tourist information. Younger people take shorter more planned out trips, so we could benefit them more by providing better pre-trip information (Internet, phone lines, computer directories, etc.). Older people generally have more time and less travel plans, so en-route tourist information about the area they are passing through could be very beneficial.*
- *We had a conference in July with the Discover America people and a number of other state agencies looking to utilize computer kiosks to do business. Such agencies as DMV and Game and Inland Fisheries are thinking of developing these kiosks to have people renew driver's licenses or purchase a hunting license. We got together to make sure everyone was on the same page and some consistency could be built in to the systems. That way patrons would see the same formats or procedures among different kiosks and not be intimidated by having to learn many new things.*

Interview with **John Strutner**
Community Services Manager - Virginia Division of Tourism
9/21/94 10:00 am Blacksburg VA
Interviewers: Robb Alexander and Melinda Heagy

1. Could you briefly describe the function of your office and your position within the Division of Tourism?

Mr. Strutner is a field representative for the region west of the Blue Ridge. His office is a satellite office of the Virginia Department of Economic Development, Division of Tourism. He works with communities who wish to expand their tourism efforts. This year, he is the executive director on loan to the Virginia's Southwest Blue Ridge Highlands, Inc. which is a Destination Marketing Organization for the region.

2. Could you briefly explain the current status of tourism in Southwest Va.?

Currently Southwest Va. is promoting the outdoor recreational activities focusing on adventure traveling. These activities will include tour groups which take tourists hiking, rafting, camping, etc.

Last year, Virginia had 2.85% of the national tourist market which placed us 9th in the country. That created \$9.1 billion in revenues and 160,000 jobs. We were around 10th in advertising dollars spent.

3. Is there any untapped potential in the region? If so, what would be your suggestions for tapping into this potential?

There is enormous amounts of untapped potential for tourism in Southwest Virginia. The key is good planning. Localities must learn that money needs to be invested to build their tourism industry. Today, tourism is similar to industrial development about 10 years ago. Then, everyone wanted industrial parks, and they had to invest money in the infrastructure to get the industries.

One of the largest growing markets for tourism in the region are the international travelers. In particular, we see more Asians, Eastern Europeans, and South and Central Americans. Many of these people cannot speak English well, so communicating tourist information to them can be difficult. In the future, we may have to provide this information in a number of different languages. For example, the same tourist information would be broadcast on a number of different low-band radio stations in different languages.

4. What are your views on Advanced Traveler Information applications to promote tourism and economic development in Southwest Virginia?

Advanced traveler information systems definitely have great potential to promote tourism.

5. Could you tell me a little more about the low-band traveler radio stations you mentioned last week?

The traveler information stations for the region are in a very preliminary planning phase. We were tossing around the idea of placing these radio stations on each of the major roads entering the region. For example, 460, 81, 77, 58, and 23. Roanoke is further along in developing these stations.

6. Are there any other advanced technologies being looked at to promote tourism in Southwest Va.?

Discover America kiosks are being developed to be placed in the welcome centers. Contact the Division of Tourism Richmond Office to see which centers will be getting the kiosks.

7. What barriers do you think will hinder the implementation of these ATIS technologies?
8. What special information needs do tourists have when traveling in Southwest Va.?

(questions 7 and 8 combined) We have cellular communications along the interstate corridors, and that is expanding every year. The mountains may pose some problems to the radio stations. Overall, the largest problem may be making the systems user friendly enough for the international travelers.

Dulles International Airport is a major supplier of tourists to this region. We are located in a good place between Washington, Charlotte, and Atlanta.

9. We want to interview a small number of tourists around the region. Could you suggest locations to conduct such interviews?

*The Fort Chiswell Center will be open in about three weeks. Talk to people at the welcome centers. Also at the state parks, Breaks and Claytor Lake
If you go Doe Run Lodge on the Parkway, contact their office to get permission.
Other people doing surveys on Parkway have gotten some trouble from Parkway officials. Be sure and ask tourists if their destination is in Virginia or just passing through.*

10. Is the Wise County Tourist Center still open?

The center at Big Stone Gap is closed.

11. Do you have any statistics on visitors to this region?

Statistics from the 1992 NFO Virginia Pleasure and Business Visitors Study. Also have figures on travel, lodging and meals expenditures as well as tax figures by county and city.

12. Is there any other information about the tourism industry in this region which you think would help our project?

Only other information is the number of different players entering the tourism market in the region. A lot of different people are seeing tourism as a good form of economic development including politicians and businessmen. It is Charlotte Reed's and my job to promote the tourism industry and it seems to be working.

Interview with **Jerry Petsche**

Information Systems Manager, National Park Service - Harper's Ferry Center
12/2/94 After a phone conversation, questions were sent, and he responded by fax.
Interviewer: Robb Alexander

1. In general, what are your feelings about using automated computer kiosks for tourism applications?

"I feel that automated computer kiosks for tourism have great potential. It is very important that they be located in the right places. It may be better to place them in areas where people plan vacations or trips rather than at the location of the vacation itself. Many tourists have little flexibility in their travels once they have bought tickets, arranged for tours, accommodations, etc."

2. What are some of the successful applications you have had with automated computer kiosks?

"Good systems have been designed for Alaska locations, including the Interagency Centers in Anchorage, Fairbanks, and Tok. A good one near you is in the visitor center at New River Gorge National Park."

3. What operating system do your kiosks use? Software? Do all of the kiosks use the same system? If not which setup has worked the best?

"A variety of platforms have been used. We are still searching for an optimum system, and are now most interested in CD-I or CD-XA based systems for those kiosks where information changes very little. Systems where fiber optics can be used as conduits to change information rapidly may well turn out to be the best."

4. What are some of the implementation issues which you have encountered with these kiosks, and how did you solve those problems?

"Making certain that each and every one of the systems has a contract written for it to provide maintenance."

5. How could kiosks be used more successfully to promote tourism?

"Get them in places where people plan trips. See 1 above."

6. Do businesses such as restaurants and accommodations pay to be included on the kiosks? If not, do you have a policy which determines who is eligible?

"We do not advertise business; it is not our policy to include such information in systems we develop for the Parks."

7. Have you had recent success in networking kiosks together? How important do you think kiosk networking is to the updating process?

"Not yet. We have a project in Washington DC that may get to that point."

8. Would you tell me a little about the personal communication devices used in Yellowstone? Are they successful? Any problems?

"I don't know what you mean by 'personal communications devices.' Perhaps some of the rangers are using more than radios, etc.; possibly 'personal information managers,' (PIMs) but you will have to contact the Chief of Interpretation at Yellowstone to find out."

9. Have you used these devices anywhere else?

"See 8 above."

10. Have you had success with shortband radio? Any places where they were not as effective?

"Yes. You need to contact the park service expert to answer your questions about these systems. They are quite successful and are used in many park service entrance areas. Contact the Denver Service Center for more information."

11. How much does a typical shortband radio setup cost? How about automated kiosk?

"See 10 above."

12. My project has concentrated on four advanced technologies: variable message signs, computer kiosks, shortband radio, and personal communication devices. Have you investigated or used any other advanced technologies to promote the national parks?

"There are all manner of electronic media we use, depending on the requirements. For example, we recently started using solid state sound for self-guided tours; also CD sound; multi projection Hasselblad slide shows; high quality projection of digital video in place of film, etc."

13. Any other suggestions which you think would help my project?

TOURIST SURVEY SUMMARY
(business and tourist totals have been combined)

| <u>Locations for the Surveys</u> | <u>Tourists Surveyed</u> |
|----------------------------------|--------------------------|
| Claytor Lake State Park | 11 |
| Virginia Tech (Parent's Weekend) | 6 |
| Welcome Center in Bristol, VA | 5 |
| Natural Tunnel State Park | 5 |
| Virginia Parkway Hosts, Inc. | 3 |

Total number of tourists surveyed = 30

Question 2: Origin and Destination

| <u>FROM</u> | | <u>TO</u> | |
|--------------|----|--------------|----|
| VIRGINIA | 15 | SW VIRGINIA | 18 |
| FLORIDA | 4 | VIRGINIA | 4 |
| NO. CAROLINA | 4 | NO. CAROLINA | 2 |
| TENNESSEE | 2 | MARYLAND | 2 |
| MARYLAND | 2 | NEW MEXICO | 1 |
| NEW JERSEY | 1 | OHIO | 1 |
| SO. CAROLINA | 1 | MAINE | 1 |
| ENGLAND | 1 | EASTERN U.S. | 1 |

Question 3: Information gathered pre-trip

| | |
|--------------------------------|----|
| Directions | 13 |
| None | 7 |
| Hotels/Lodging | 5 |
| Campgrounds | 5 |
| Places to visit, tourist spots | 3 |
| Restaurants | 2 |

Question 4: How they obtained pre-trip information

| | |
|-------------------------|----|
| Maps | 15 |
| Phone calls | 8 |
| Relatives/friends | 6 |
| Brochures | 5 |
| Motor Club | 3 |
| Visitor/Welcome Centers | 3 |
| Tourism guide | 2 |

Question 5: Additional information needed

| | |
|--------------------------------|---|
| Places to stop (tourist spots) | 8 |
| Local roads, better directions | 8 |
| Historical locations | 4 |
| Reservations | 4 |
| Weather | 3 |
| Parks and park hours | 3 |
| None | 3 |
| Road construction | 2 |
| Rest stops | 2 |
| Picnic area | 1 |
| Road signs | 1 |
| Hotels/lodging | 1 |
| Accidents | 1 |

Question 6: How they would like to receive this additional information

| | |
|-------------------------|----|
| Telephone | 11 |
| Visitor/Welcome Centers | 10 |
| Better maps | 6 |
| Computer | 6 |
| Signs | 5 |
| Mail (tourism guide) | 4 |
| Research | 1 |

Question 7: On a scale of 1 - 5, how comfortable they would feel using our proposed technologies

| TECHNOLOGY | SCALE | | | | |
|--------------------------------|-------|---|---|---|----|
| | 1 | 2 | 3 | 4 | 5 |
| Better Signs | 4 | 2 | 4 | 7 | 13 |
| Radio Stations | 5 | 4 | 5 | 4 | 12 |
| Computer Kiosks | 4 | 2 | 5 | 3 | 16 |
| Personal Communication Devices | 9 | 4 | 9 | 3 | 5 |

Question 8: How often they stop at Visitor/Welcome Centers

| | |
|--------------|----|
| Always | 8 |
| Often | 11 |
| Half | 4 |
| Occasionally | 5 |
| Never | 2 |

Question 9: What attracts them to the centers

| | |
|-----------------------|----|
| Restrooms | 27 |
| Information/brochures | 18 |
| Maps | 10 |
| Rest/walk | 4 |
| Snacks/coffee | 3 |
| Signs or appearance | 3 |