

# TECHBRIEF



The national Intelligent Transportation Systems (ITS) program includes the development and application of advanced systems upon all parts of the transportation network, including rural areas. The U.S. DOT has developed the Advanced Rural Transportation Systems (ARTS) program to meet the needs of travelers in and through rural areas, as well as the agencies responsible for the operation and maintenance of the rural transportation system. The ARTS program complements the ITS efforts in metropolitan areas and commercial vehicle operations (CVO) by studying ways to best implement technologies that address transportation problems in rural areas.



U.S. Department of Transportation  
**Federal Highway Administration**

Research and Development  
Turner-Fairbank Highway  
Research Center  
6300 Georgetown Pike  
McLean, VA 22101-2296

## Rural Public Transportation Technologies: User Needs and Applications

Publication No. FHWA-RD-98-146

Contacts: Paul Pisano, FHWA, (703) 285-2498 and  
William Wiggins, FTA, (202) 366-0255

Rural Intelligent Transportation Systems (ITS) have the ability to meet the needs of travelers in and through rural areas as well as the needs of agencies responsible for the operation and maintenance of rural transportation systems. To assist in these endeavors, the U.S. Department of Transportation (DOT) developed the Rural ITS program. This program complements the ITS efforts in metropolitan areas and commercial vehicle operations (CVO) by studying ways to best implement technologies that address transportation problems in rural areas.

As part of the Rural ITS Program, the U.S. DOT sponsored a study entitled *Rural Public Transportation Technologies: User Needs and Applications*. The study was initiated to identify the opportunities and challenges of planning and deploying advanced public transportation system (APTS) technologies in rural and small urban areas. This TechBrief provides a summary of the major findings of this study.

### Study Objectives

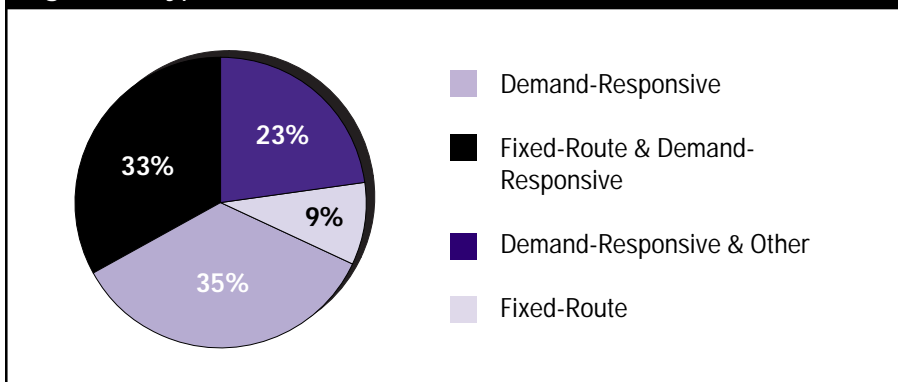
The objectives of this study were to gain a better understanding of the state-of-the-practice of rural APTS and to determine where the U.S. DOT could best direct its resources to close the gap between the state-of-the-practice and the state-of-the-art.

### Summary of Findings

To better understand the state-of-the-practice, it is first necessary to understand the types of transit services available in rural areas (see Figure 1 on the following page). Considering these services and based on a multifaceted approach that included a user and operator needs assessment, several site visits, and a technology assessment, the study yielded many important findings. A summary of these findings is provided below:

- Few rural transit systems have implemented advanced technologies as of 1997.

Figure 1. Type of Transit Services Available in Rural Areas



- Few rural transit operators know which ITS technologies are appropriate for rural transit needs, the benefits of these technologies, and how they should be implemented.
- Smaller transit systems need guidance to justify cost-effective technology applications.
- Rural transit systems need information on partnering opportunities and barriers.
- System size and service types are the best indicators of APTS needs or potentials.
- With respect to traveler information systems for rural transit, the most important needs are in the area of narrowing the pick-up window and making vehicle location information user-friendly.
- Future research is needed to determine how advanced technologies can help meet the demand

for rural public transportation created by welfare reform.

- Interest in advanced technologies is rising, but currently there is relatively little interest in automated fare collection among rural transit systems.

The study team visited 10 rural/small urban transit systems that had deployed or plan to deploy APTS technology. The purpose of the site visits was to gain a better understanding of the operational and administrative problems and issues facing rural transit agencies. Table 1 lists the rural transit systems visited and the APTS technologies in place or planned at each site.

### Recommended Actions

The study team developed a range

Table 1. Rural APTS Applications and Future Deployment at Visited Sites

Transit System	Location	APTS Deployed	Future APTS Deployments
Linn County Lifts	Linn County, IA	Computer Aided Dispatch (CAD)	Automatic Vehicle Location (AVL)
Arrowhead Transit, VA Dial-A-Ride	Virginia, MN	Transportation Center (TMC) & CAD	Mobile Data Terminals (MDTs), Geographic Information System (GIS)
Sweetwater County Transit Authority	Sweetwater County, WY	CAD	GIS, MDTs & AVL
Front Royal, VA	Front Royal, VA	None	GIS
Pee Dee Transit	Florence, SC	None	CAD & AVL
Dakota Area Resources & Transportation for Seniors	Dakota County, MN	CAD	AVL & MDTs
Park City Transit	Park City, UT	None	AVL, Advance Traveler Information Systems (ATIS)
Blacksburg Transit	Blacksburg, VA	Internet, cable television, AVL, CAD, kiosks & real-time passenger information at bus stops	Electronic fare payment
Flagler County Transport	Flagler County, FL	AVL	Electronic fare system, real-time passenger information at bus stops
Cape Cod Regional Transit Authority	Cape Cod, MA	None	Automatic Vehicle Location (AVL), TMC, cable television, Internet, variable message signs, highway advisory radio, information kiosks, MDTs & CAD, real-time passenger information at bus stops

of rural ITS actions that could address the identified transit needs and issues. The actions could pertain to any part of U.S. DOT's Rural ITS Program, including research and development, deployment, and delivery/outreach.

The study's expert panel recommended that high priority be given to the delivery/outreach aspect of the Rural ITS Program. The recommended actions are described in detail in the study's final report and are summarized in the study's executive summary. The action items could be considered for inclusion in future updates of U.S. DOT's Rural ITS Program Plan. In conjunction with the Rural ITS Program Plan, nine action items were developed under three focused areas— development, deployment, and delivery. The action items are as follows:

#### *Development*

Shared Technology Infrastructure Operational Test. This action involves a number of agencies sharing the cost and use of advanced technologies, e.g., a joint dispatching system within their region, and conducting a field-operational test.

Automated Trip Status Information Operational Test. This operational test is oriented toward evaluating various affordable systems for notifying riders of the status of their eventual pick-up time.

Trip Verification and Billing Operational Test. This operational test seeks to evaluate the application/integration of various automated accounting systems to verify trip eligibility and improve current billing operations.

Fleet Management Operational Test. This operational test is oriented toward optimizing the available vehicles and personnel for rural transit services through the application of various automated vehicle location (AVL) systems.

Broader Market Research Study. This research study will help provide better information on non-riders, public agencies, and welfare reform regarding rural APTS needs and opportunities.

#### *Deployment*

Demonstration of Low-Cost Technologies (Simple Solutions). This action involves identifying a number of low-cost technologies that could be used in providing simple solutions to specific rural transit problems (e.g., bus arrival notification system), followed by field-testing and evaluation of these technologies.

#### *Delivery*

Rural Transit Operator Information Kit. This information kit is intended to be a collection of materials that can provide information to rural operators regarding the nature of APTS and methods for determining whether these systems are applicable to their situation.

Training Materials for Rural APTS Application. This action concerns the development of a "Rural Transit Short Course" or "Rural Transit Module" for inclusion within selected existing training programs, particularly the ITS Professional Capacity Building (PCB) program.

Rural APTS Success Story Booklet. This booklet will provide a series of case studies from rural systems (and possibly other small to mid-sized systems) that demonstrate how APTS technologies have been successfully implemented and may be applicable to other rural transit services.

Figure 2 shows an example application of technologies to rural transit. Table 2 (on the following page) summarizes the recommended actions in order of relative priority. The prioritization is based on the study team's evaluation using a set of criteria that included needs, benefits, costs, feasibility, and potential to attract new riders. The table also shows:

- The duration or how long the process of completing the action might take.

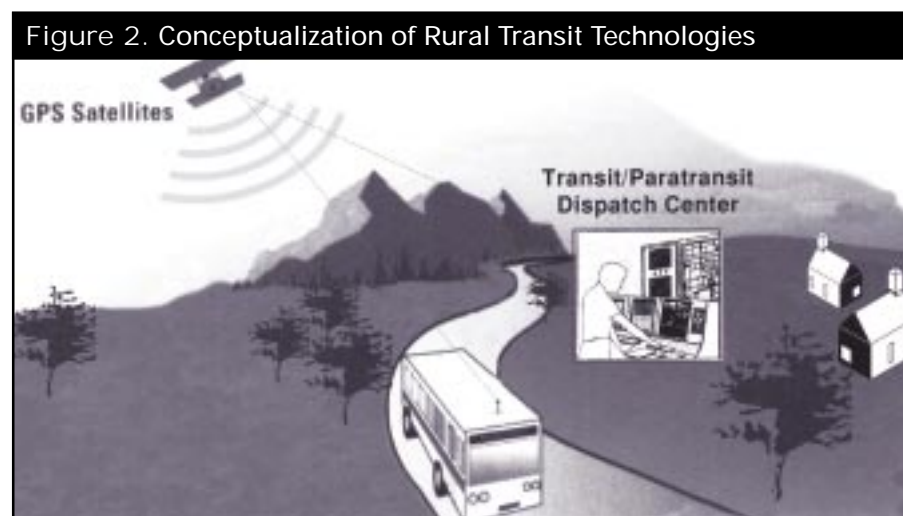


Table 2. Recommendations and Prioritization

Ranking	Action Item	Duration	Time Frame <sup>1</sup>	Criteria Score <sup>2</sup>
1	Rural Transit Operator Information Kit	6 Months	Near Term	29
2	Rural APTS Success Story Booklet	7 Months (then on-going)	Near Term	35
3	Demonstration of Low-Cost Technologies, e.g., Bus Arrival Notification System	24 Months	Med. Term	38
4	Training Materials for Rural APTS Applications	8 Months	Near Term	48
5	Fleet Management Operational Test	46 Months	Med. Term	59
6	Broader Market Research Study	12 Months	Med. Term	62
7	Shared Technology Infrastructure Operational Test	40 Months	Med. Term	64
8	Trip Verification and Billing Operational Test	36 Months	Long Term	79
9	Automated Trip Status Operational Test	36 Months	Med. Term	82

<sup>1</sup>Time Frame: Near Term = 1-2 years    Med. Term = 3-5 years    Long Term = 6-10 years  
<sup>2</sup>Criteria Score: The lower the score, the higher the priority ranking.

- The time frame or when the action should be addressed (near term, mid term, and long term).

**Study Reports**

The study reports and working papers on the following page are available on U.S. DOT's Web Page at <http://www.its.dot.gov>:

FHWA-RD-98-125, *Rural Public Transportation Technologies: User Needs and Applications*, Final Report, July 1998.

FHWA-RD-98-126, *Rural Public Transportation Technologies: User Needs and Applications*, Executive Summary, July 1998.

*Rural Transit User Needs Assessment*, Draft, July 1997.

*Advanced Public Transportation Systems (APTS) Traveler Information Services: The State-of-the-Art*, Draft, August 1997.

**External Review**

An expert panel was convened sev-

eral times during the project to conduct an external review of the major project findings. This expert panel consisted of volunteers from a variety of agencies, and included: Mary Martha Churchman, Federal Transit Administration; Steve Anderle, Transportation Research Board; Bruce Ahern, Beaver County Transit Authority; Larry Harman, Moakley Center, Bridgewater State College; and Charles Rutkowski, Community Transportation Association of America.

**Researcher:** This study was performed by SAIC/TransCore, 1900 North Beauregard Street, Suite 300, Alexandria, VA 22311-1716. Telephone number: (703) 820-5455. Contract No. DTFH61-93-C-00048. Other team members were Virginia Polytechnic Institute & State University, Multisystems, Inc., and Ecosymetrics, Inc.

**Distribution:** This TechBrief is being distributed according to a standard distribution. Direct distribution is being made to the Regions and Divisions.

**Availability:** The publication will be available in September 1998. Copies are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

**Key Words:** Advanced Rural Transportation Systems, Rural Intelligent Transportation Systems, Advanced Public Transit Systems.

**Notice:** This TechBrief is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The TechBrief does not establish policies or regulations, nor does it imply FHWA endorsement of the conclusions or recommendations. The U.S. Government assumes no liability for the contents or their use.