Florida Advance Public Transportation Systems (APTS) Concepts

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Florida Advance Public Transportation Systems (APTS) Concepts

By

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ACKNOWLEDGEMENT

Advanced Public Transportation Systems (APTS) technology offers enormous potential to transit systems in improving mobility and quality of life for residents in urban and rural areas, and contributing to a regional effort to reduce traffic congestion. This technology can also make public transit more attractive as an alternative to the single-occupant vehicle. Several APTS operational tests are being conducted by transit systems in the U.S. to show how APTS can be an integral part of a successful transportation system.

As part of the Center for Urban Transportation Research's (CUTR) commitment to provide solutions to current and future transportation needs, CUTR has completed research on the opportunities for APTS operational tests at Florida transit systems. This memorandum presents existing APTS technologies in operation at Florida transit systems, the application of APTS products, and opportunities for operational test funding through federal and state programs.

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**TABLE OF CONTENTS**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Tables</td>
<td>iii</td>
</tr>
<tr>
<td>List of Figures</td>
<td>iii</td>
</tr>
<tr>
<td>Executive Summary</td>
<td>1</td>
</tr>
<tr>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>Overview</td>
<td>2</td>
</tr>
<tr>
<td>Transit Opportunity in ITS</td>
<td>3</td>
</tr>
<tr>
<td>Current APTS Activity in Florida</td>
<td>5</td>
</tr>
<tr>
<td>Survey of Florida Transit Systems</td>
<td>9</td>
</tr>
<tr>
<td>Recommendations on APTS Products</td>
<td>17</td>
</tr>
<tr>
<td>Funding Options</td>
<td>33</td>
</tr>
<tr>
<td>Summary</td>
<td>40</td>
</tr>
<tr>
<td>Bibliography</td>
<td>41</td>
</tr>
<tr>
<td>Appendix A</td>
<td>43</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 1. Summary of Recommendations ........................................ 31
Table 2. FY 92 APTS Program Plan .............................................. 34
Table 3. FY 93 APTS Program Plan .............................................. 35
Table 4. FY 94 APTS Program Plan .............................................. 35
Table 5. FY 95 APTS Program Plan .............................................. 36
Table 6. FY 95 Proposed Projects Submitted to JPO ........................ 36
Table 7. List of Contacts .......................................................... 39

LIST OF FIGURES

Figure 1. Selection Frequency .................................................. 11
Figure 2. Percent Ranking of Improvements .............................. 13
Figure 3. Approach to Identifying APTS Products for Operational Tests ............................ 13
EXECUTIVE SUMMARY

Few urban areas can afford to expand existing roadways or build new ones, so more are turning to intelligent transportation systems (ITS) to manage road capacity more efficiently. It also may encourage travelers to diversify transportation modes. Transit systems in these areas are also considering the transit component of ITS, Advanced Public Transportation Systems (APTS), to increase the effectiveness and efficiency of transit.

Several APTS operational tests are being conducted by transit systems in the U.S. to show how APTS can be an integral part of a successful transportation system. The APTS program is developing an information base on the national applications of advanced technologies in public transportation and is testing these technologies in operating models. The operational tests serve as the transition between research and development and full-scale deployment of ITS technologies. The Tests are conducted in "a real world" operational environment under "live" transportation conditions. A typical APTS operational test integrates existing technology, research and development products, institutional arrangements, public acceptance, and market readiness in a real world test bed.

This report presents a summary of the technologies included within the framework of APTS. A review of APTS initiatives at Florida transit systems is provided. Two transit systems in the state are currently conducting operational tests of APTS technologies. Metro-Dade Transit Agency, in Miami, is testing the potential of information kiosks at strategic bus/rail transfer locations to increase ridership on transit. Lynx, in Orlando, is developing a transit component for their Passenger Travel Planning System. More detail on these projects is provided in the report. A survey of Florida transit systems was conducted to identify existing and planned efforts to incorporate APTS technologies into their systems. This is supplemented by a review of Transit Development Plans for transit systems in Florida. These plans reveal valuable information about problems faced by transit providers, as well as the operations and technological resources already in place. This information provides the basis for recommendations on the most appropriate APTS products for Florida transit systems. A description of the federal operational test programs, state funding programs, and private assistance is also provided.

With this information in hand, and with CUTR's assistance, it is hoped that Florida transit systems will seek operational test funding for appropriate APTS products.
INTRODUCTION

This report culminates the research by the Center for Urban Transportation Research (CUTR) to reveal the potential of APTS technologies in Florida. The report describes opportunities for Florida transit systems to apply for funding to serve as test beds for operational tests of APTS products. Funding for operational tests is available through the Federal Transit Administration's (FTA) APTS Program, Federal Highway Administration's Operational Test Program, and state programs. The federal programs were created as part of the U.S. DOT's initiative in the ITS. Most ITS systems are designed for the automobile driver and not the transit rider. The FTA APTS program addresses this imbalance by developing ITS that will improve the public transit option.

OVERVIEW

"You're sitting in freeway gridlock, inching your way toward a seemingly unattainable destination, gripping the steering wheel, head throbbing to the relentless rhythm of stops and starts. Maybe you're waiting at a bus stop, scanning the early-morning horizon for a bus that should have arrived minutes ago, or pacing the platform of a subway station, peering into a dark tunnel for the beckoning beacon of a long-awaited train. Each day, urban travelers across the country brave unpredictable traffic and transit conditions with bated breath, but little information.""}

Few urban areas can afford to expand existing roadways or build new ones, so more are turning to intelligent transportation systems (ITS) to manage road capacity more efficiently. It also may encourage travelers to diversify transportation modes. Transit systems in these areas are also considering the transit component of ITS, Advanced Public Transportation Systems (APTS), to increase the effectiveness and efficiency of transit.

The term ITS is used to describe projects which apply advanced technologies to improve the efficient and capacity of transportation systems. APTS are advanced navigation and communication technologies applied to all aspects of public transportation systems operations. APTS provide the technology for transportation agencies to make timely transit information available to the passenger and to improve the convenience, reliability, and safety of public transportation service. For example, smart cards, telecommunications, and

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other electronic technologies that have the potential to improve the efficiency and appeal of public transportation are being tested at various locations throughout the U.S.

Advanced Public Transportation Systems (APTS) technology offers enormous potential to transit systems in improving mobility and quality of life for residents in urban and rural areas, and contributing to a regional effort to reduce traffic congestion. This technology can also make public transit more attractive as an alternative to the single-occupant vehicle.

TRANSIT OPPORTUNITY IN ITS

Transit's ITS date to the 1968 Chicago Transit Authority's (CTA) bus monitoring and communications system. The system was, at that time, an advanced communication system that used signposts technology for locating buses. The system provided emergency alarm capability for the CTA's buses. When the bus operator activated the covert alarm, the dispatcher was alerted, the bus' location was determined, and the police were alerted.

Various technologies are being examined in the APTS program, and many projects involve the integration of several different systems. The APTS program has identified three technology areas: Smart Traveler, Smart Vehicle, and Smart Intermodal Systems.²

Smart Traveler technology focuses on providing basic travel information to transit users before they make personal decisions on how to travel and during the trip itself. The concept includes providing real-time information to the public through advanced computer and communication technology. Examples of Smart Traveler technology include smart cards and passenger information displays.

Smart Vehicle technology integrates vehicle-based APTS technologies into a single system that is designed to improve vehicle and fleet planning, scheduling and operations. The smart vehicle implements many advanced communication and vehicle location applications that are adapted from military, aerospace, industrial, and highway use to transit use. Some

of the technologies that are being used by transit systems are automatic vehicle location (AVL), automatic passenger counters, and computer aided dispatch.

**Smart Intermodal Systems** involve the integration of APTS technologies into transit management and other non-transit applications of ITS. Smart intermodal systems focus on building a multimodal transportation network that ensures the adaptation of technologies that optimize the transportation system as a whole. Examples of this technology include integrated adaptive signal timing and traffic management systems, vehicle guidance systems, and dynamic multimodal dispatching software.

APTS provide benefits in a variety of ways. Potential qualitative impacts are presented below.

- The use of an integrated fare card that supports a seamless transit system is desirable of riders moving from one jurisdiction into another.

- The improved quality of transit service that is possible from the increased capabilities of APTS can lead to increased ridership and passenger revenue. There are also secondary benefits, such as enhancing the image of the agency through its use of advanced technology. For example, Advanced Vehicle Monitoring and Communication (AVM/C) not only provides a method to monitor bus operation but also to perform a "town watch" service to communities served by the transit system. Clearly, more surveillance of criminal activities is beneficial to passengers and communities where service is provided.

- If APTS enables a transit system to operate more efficiently, passengers are less likely to complain about service, thus, providing improvements in the work environment.

- With the use of AVL, the exact location of an emergency may be found for the dispatching of assistance. It is difficult, if possible, to assign cost savings to the reduction in emergency response times provided by AVL.

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CURRENT APTS ACTIVITY IN FLORIDA

Few APTS projects are already underway in Florida. In some cases, the APTS product is a component of a larger operational test of an ITS technology. The following is a summary of APTS functions and technologies currently operating or under development in Florida.

Pinellas Suncoast Transit Authority (PSTA)

PSTA has replaced its bus coupons and punch tickets with magnetic fare cards. The magnetic cards, referred to as GO Cards, can be issued by drivers. The GO Cards will allow PSTA to keep track of fares and record data on when and where riders are going. The electronic fare program, which includes an electronic fare box systems, cost $500,000. Eighty percent of the project cost was funded through a federal grant.

Dade County Automatic Vehicle Locator/ Automatic Vehicle Monitor (AVL/AVM) System

Dade County has installed communication devices on all of the county owned vehicles. The system uses an 800 Mhz radio frequency for communications. Dade County has selected General Electric/Harris Corporation as the vendor of the system. As part of this project, MDTA acquired an AVL/AVM system that is integrated with the County's bus, rail, and mover system to provide a detailed tracking system of vehicles in service. The project, which has primarily been funded by federal formula block grants, is scheduled to be implemented during 1996. MDTA's Management information Systems Master Plan predicts that the AVL/AVM system will provide numerous benefits: route control capability; improved schedule adherence; automatic reporting of running and layover times, delays, and service interruptions; dynamic scheduling capabilities to better regulate vehicle spacing; and real-time vehicle location data to a wide variety of users.

In addition, MDTA is proposing to develop an Informational Kiosk Prototype at one or more major rail and bus transfer points, which would provide customers with an automated trip planning capability, including on-line route and schedule information. The prototype will also provide a continuous display of updated information including service messages such as emergency information, passes on sale, service changes, and special services. The total cost of the project is $400,000, which will be provided entirely by the Federal Department of Transportation.
Hillsborough Area Regional Transit (HARTline)

HARTline has installed an AVL (Motorola's sign-post and odometer system) for monitoring their fleet of 172 buses. The system became operational in October 1993 and cost approximately $1.56 million. A key component of the system is the wayside information system along the Marion Street Transit Parkway. The system uses video displays to provide schedule updates on vehicles expected at each bus stop. HARTline has made several changes in its service since the system was fully deployed. As a result, the agency reported that it has been difficult to assess any impacts to its operations. In addition to serving planning and operations function, the system allows the buses to serve as probes for the area's arterial network.

In addition to the AVL system, HARTline and the local office of Metro Traffic Network, which provides traffic information to 34 local radio and television stations, have set up a data link. The system provides HARTline with updated traffic reports every 15 minutes, and bus drivers call in with the latest road conditions that are passed on to the service. To accomplish this partnership, Metro gave HARTline a spare computer terminal, which is set up in the authority's dispatch room. As the information appears on the screen, it is relayed via radio communications to drivers whose routes may be affected. If bus drivers observe an accident or traffic backup, they in turn radio dispatchers who pass it on to Metro.

Southeast Florida Intelligent Corridor System (ICS)

The ICS operational test will examine the potential for ITS to improve transportation in portions of Broward, Palm Beach, and Dade counties. The project serves as a prototype for many different facets of ITS, applying technologies to a variety of transportation areas: traffic management, traveler information, commercial vehicle operations, vehicle control systems, and public transit. The principal goal of the project is to collect, process and disseminate real-time traffic and travel data, such that the transportation system operates more efficiently and travelers make more informed mode choices. Traffic engineers, transit operators, truck and taxi fleets, radio and TV stations, and individual travelers will have access to this information through a variety of communications media.

ICS is a federally-funded $7 million project and appear as a direct line item on the FY 1991 and FY 1992 federal transportation appropriations. Project administration will be provided
by the Florida Department of Transportation District Six Office. The prime consultant is JHK & Associates. JHK has subcontracted with Kimley-Horn & Associates to oversee the transit component of ICS.

While the project scope initially included an APTS component, the consultant, Kimley-Horn & Associates, reported that the ICS will not have any transit technology as part of the operational test.

**Key West Transit Authority**

Key West Transit Authority, Key West, Florida, operates a loop system (known as the Councnch Loop) consisting of two routes traveling the loop in opposite directions. The loop is approximately 14.5 miles in length.

The Transit Authority installed an AVL system to monitor bus operations. Unfortunately, the Authority has been limited in its ability to operate the AVL system, which uses global positioning technology. This technology uses radio signals transmitted from a network of 24 satellites in orbit, and receivers placed on the roof of each vehicle. The vehicles read the signals from a few satellites and transmit the location to dispatch. The signals transmitted by the system causes interference to the radar system at Key West Naval Air Station, which affects air traffic control. Thus, the Authority has been prohibited from using the AVL system.

**Arc Transit**

Arc Transit, Palatka, Florida, is a Community Transportation Coordinator (CTC) for Putnum County and provides coordinated transportation services to non-sponsored clients and to clients sponsored by other agencies.

Since 1993 Arc Transit has been testing an AVL system. The system, which is GPS based, was developed for the agency by Management Analysts. Total cost of the operational test ($80,000) included a Service Development Grant from FDOT for $40,000 and a match of $40,000 from the agency. All of the agency's 14 vehicles are equipped with the technology. In addition to being able to track vehicles within 100 - 200 feet of their location anywhere in Putnum County, the system uses an integrated fare card reader that records trip origin and destination for sponsored clients and keeps a log of drivers' hours.
The agency reports that this feature has been especially useful to improving Medicaid billing. Other benefits of the system include increased service in the county, especially for Medicaid trips, reduction in operating cost and overtime for drivers, and reduced spare ratio.

Jacksonville Transportation Authority (JTA)

JTA is using AVL technology as part of its Automatic Passenger Counters (APC) system, which collects data on passenger boardings and alightings by time and location. The APC system uses signpost technology to determine the vehicle location and data. The agency is testing a Global Positioning System (GPS) to enhance the capabilities of the APC technology already in place.

Besides the APTS initiatives presented in above, MDTA in Miami and Lynx in Orlando have been recently awarded federal grants to test APTS technology.

MDTA has been awarded a $400,000 technical assistance grant from the Federal Transit Administration to install interactive transit information kiosk prototypes at strategic bus/rail transfer locations. The prototype will consist of an interactive touch screen display with a real-time interface to the existing trip planning system, Transit Operating System (TOS), and the AVL/AVM system currently under development. A similar grant award for $240,000 was received by Lynx to develop a transit component for their Passenger Travel Planning System. This project includes the installation of electronic bus stop displays and a vehicle location system integrated with an existing signal preemption system.
SURVEY OF FLORIDA TRANSIT SYSTEMS

A survey of Florida transit systems was conducted to identify existing and planned efforts to incorporate APTS technologies into their systems. This section summarizes the results of the survey. The section begins with a presentation of the agencies surveyed. Information from key transit officials about their familiarity with the benefits of APTS is presented. Transit Development Plans for the systems in the survey reveal information about some of the problems these agencies face. This information is evaluated in this section with the survey data in a subsequent section to identify the most appropriate APTS product(s) for Florida transit systems. These recommendations may be useful for developing a grant application to test an APTS product. A copy of the survey and detailed information for each community that is included in the survey is presented in Appendix A.

Florida APTS Concepts Survey

A survey with a cover letter describing the Florida APTS Concepts Project was mailed to the Executive Directors of all transit systems in the State of Florida, using the Florida Transit Association (FTA) Corporate Membership. The survey included only transit systems with fixed-route service that receive Federal Section 9 capital and operation assistance. To improve the chances of getting a good response rate and expedite the process, respondents were asked to return the questionnaire by fax. In addition, the agencies were asked to provide a copy of their most current TDP, or an updated version of their TDP.

Surveys were completed and returned by 13 of the 18 transit systems included in the FTA membership. These systems are presented below.

- Broward County Transit (BCT)
- East Volusia Transit Authority (VOTRAN)
- Escambia County Area Transit (ECAT)
- Hillsborough Area Regional Transit (HARTline)
The transit systems presented above represent approximately 811 vehicles, or 52.9 percent of the total transit vehicles that are operated by public transit agencies in Florida, that operate in fixed-route service. Surveys were not received from Manatee County Transit and Suwannee Valley Transit Authority; both agencies are Community Transportation Coordinators. Several attempts were made to solicit information from the Key West Transit Authority, but a completed survey was not received. Thus, these agencies are omitted from the list. Additionally, MOTA and Lynx have been left out since both agencies are currently conducting operational tests of APTS products.

Of the transit representatives that responded to the survey, 85.7 percent reported that they are familiar with the benefits of using APTS technologies. Respondents were asked their opinion of APTS technologies. Selected responses to this question are presented below.

- Can be costly especially without a dedicated funding source.
- If they are the appropriate size and complexity for the system they can improve both quality and efficiency.
• A necessity for medium to large transit systems; can help to improve management and provide better service.

• These technologies can assist the transit provider with communicating customer service information with real time information and improve operational efficiency on the bus routes.

• Technology should improve efficiency of system and quality of service for the customer.

• Good approach for organizing operational data and improve performance strategies.

• Good, however difficult to implement taking the cuts in federal assistance.

It was surprising to find that more than half (57%) of the agencies that responded to the survey said they have existing or planned APTS technologies. Most of these agencies are interested in AVL technology. This seems appropriate since AVL provides the most benefit to transit operators and forms a building block to incorporate other technologies.

The survey included a list of possible improvements from implementing APTS technologies. Respondents were asked to rank the improvements they thought would be helpful to their transit operations. Figure 1 presents the improvements that respondents were able to choose and the selection frequency for each improvement, independent of its ranking.

![Figure 1](image)

**Figure 1**
Selection Frequency

- increase efficiency/reduce costs
- improve data collection
- improve quality of service
- increase ridership/revenues
- enhance image of transit system
- increase security/safety
- increase accuracy of passenger counting function
- reduce labor requirements
- improve route planning and scheduling
- improve fare payment media
- more efficient customer service
- increase flexibility
- enhance compliance with ADA requirements

11
It is not surprising that increase efficiency/reduce costs and improve quality of service were among the highest frequency selection. What is surprising, however, is that enhance compliance with ADA requirements has the lowest frequency selection.

The Americans with Disabilities Act of 1990 mandates accessibility requirements for transportation providers. ADA requires public fixed-route providers to prepare and implement a complementary paratransit plan and provide paratransit service to persons with disabilities who cannot use the fixed-route system. Public transportation providers operating fixed-route systems had to submit a complementary paratransit plan by January 26, 1992. The transit agency must be in full compliance with the Act by January 1997. Many transit systems are reporting problems with meeting the requirements of the ADA. The cost for retrofitting existing equipment, the purchasing new capital, and operating paratransit service have caused an undue financial burden for some agencies.

APTS products may be useful in meeting these criteria for ADA, and may be cost effective for the transportation provider. Automation for paratransit has made tremendous advancements over the last five years. Advanced technologies have been applied to paratransit operations and management mostly in the area of scheduling/dispatching. As a result of the ADA, many paratransit operations, and fixed-route operators, are considering the benefits of APTS technologies in order to comply with several of the complementary paratransit service criteria. Among the criteria used to measure the comparability of paratransit service to fixed-route service is response time and availability of information. Automated scheduling and dispatching accommodate advanced trip reservations, standing orders, and immediate requests. Information can be integrated into management information, billing and accounting functions of the paratransit operator. This technology is being tested in Detroit, MI, Santa Clara County, CA, and Ontario, CA. Additionally, in-vehicle information systems are being tested that provide en route support to the passenger and vehicle operator. Passengers are aided by on-board displays that list routes, schedules, fares, and connecting services. Several transit authorities are in the process of developing automatic in-vehicle voice announcement systems, a.k.a. "talking bus."

Figure 2 shows the percent ranking of improvements that were selected to be most helpful (ranked number 1 out of possible 13) to Florida transit systems. The information reveals that most respondents (32%) ranked increase ridership and revenues as the improvement they believe would be most helpful to their system. An equal percentage (25%) ranked
improve quality of service, increase efficiency, and reduce costs as desirable improvement. Eighteen percent ranked improve fare payment media as a significant improvement, and approximately 10 percent ranked enhance the image of transit system as an improvement they believe would be helpful.

![Figure 2](image)

**Percent Ranking of Improvements**

- increase efficiency/reduce costs: 25%
- improve data collection: 0%
- improve quality of service: 25%
- increase ridership/revenues: 10%
- enhance image of transit system: 32%
- increase security/safety: 0%
- increase accuracy of passenger counting function: 0%
- reduce labor requirements: 0%
- improve route planning and scheduling: 0%
- improve fare payment media: 18%
- more efficient customer service: 0%
- increase flexibility: 0%
- enhance compliance with ADA requirements: 0%

**Agency Assessments and Recommendations**

In addition to providing information about APTS activities at transit systems in Florida, the survey reveals objectives, strengths, and accomplishments for these transit agencies. The survey includes information about the improvements that agencies consider as helpful to their service. This information is combined with the issues and objectives from TDPs to develop recommendations for APTS operational tests. The recommendations will consider those issues and objectives that lend themselves to APTS technology. Figure 3 provides a visual interpretation of this approach to identifying APTS products for operational testing.
In addition to the recommendations presented in this section, it is strongly suggested that each transit agency should consider implementing an AVL system. As already stated, AVLs provides the most benefit to transit operators and forms a building block to incorporate other technologies. An AVL system offers transit agencies the opportunity to achieve significant productivity gains, which would allow them to amortize their investment in less than three years for most operations. For example, the savings from implementing an AVL at the Kansas City Area Transportation Authority (KCATA) resulted in a payback of the system's costs in about two years. As a result of implementing the AVL, the KCATA was able to reduce operating costs and the costs of replacing seven buses, which saved the agency approximately $1.5 million. KCATA invested $2.3 million in its AVL system.

AVLs provide transit customers with crucial real-time data, which can be accessed through telephone information centers, information kiosks placed at strategic locations and cable TV trip planning and signage at various transit locations. Additionally, real time vehicle location through AVL can provide the potential for improving on-time performance by generating trend data to better plan schedules and routes.

The following technologies are considered in the recommendations for APTS operational tests at Florida transit systems.

- **In-Terminal and Wayside Information Systems**

  These systems provide schedule updates and transfer information for passengers already en route. This information includes arrival and departure times, information on transfers and connections, information on other regional transportation services, and information on related services, such as park-and-ride lot availability. This information can be provided via electronic signs, kiosks or television monitors at terminals and active transit stops. This technology is being tested in Denver, CO, Milwaukee, WS, and Chicago, IL.

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• **Computerized Dispatching/Scheduling**

This is an extension of Computerized Telephone Information Systems and AVL, enabling a passenger to call (voice or touch tone) for transportation to a desired destination. The computer selects the bus that best serves the transit patron. Buses may deviate from established fixed-routes or may be summoned directly on demand. Reservations also can be made by users of the system. The concept was successful in the United States in the 1970s (with small fleets) when dispatching was manual, and now is working extremely well in Germany, where the systems is referred to as FOCCS (pronounced “fox”).  

• **Mobility Manager**

The Mobility Manager concept combines various functions of vehicle-based and traveler-based APTS functions. A Mobility Manager system coordinates transportation services offered by multiple providers, involving a variety of transit modes and multiple sources of funding. This integration is accomplished through electronic technologies, allowing the programmatic integrity of all participants to be preserved, while at the same time automating most of the transactions - financial and otherwise - which occur in the system. Similar to trains and airline reservation systems, a Mobility Manager acts as a clearinghouse of information on travel choices and processes the associated financial transactions. Target populations for this service are often transportation disadvantaged, such as elderly, disabled and low-income persons. Mobility Manager systems are being tested in Beaver County, PA, Northern Virginia, and Winston-Salem, NC.

• **Static Pre-Trip Passenger Information**

Static pre-trip traveler information systems provide information on transit routes, schedules, transfers, and fares though television, cable TV, telephone, and personal computers and pagers. These systems are designed for use by potential new riders, those who do not know routes and the locations of bus stops. All the

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traveler needs to supply are the cross streets of origin and destination. Applications of this technology are in Columbus, OH, San Diego, CA, and Riverside, CA.

- **Electronic Ticketing and Automated Trip Payment**

Electronic ticketing allows transit agencies to collect detailed information on revenue, passengers, origins and destinations, and automates a process which can be labor-intensive. Media currently being considered by U.S. transit agencies are magnetically-encoded fare cards, credit cards, debit cards, and "smart cards." Smart cards contain a tiny micro-chip in a processor the size of a credit card, which can store values in memory and perform advanced processing functions, such as charging different fare amounts for different trips and times of day. Several U.S. cities are testing smart cards for transit fare payment, including Chicago IL, Washington, D.C., and Ann Arbor, MI.

- **In-Vehicle Information Systems**

In-vehicle information systems consist of technical innovations that provide en route support to the passenger and vehicle operator. Travelers are aided by on-board displays, which list routes, schedules, fares, and connecting services. Several transit authorities are in the process of developing automatic in-vehicle voice announcement systems, a.k.a. "talking bus." A variation on the voice announcer is being tested in Dallas, TX, Long Beach, CA, and Wilmington, DE.

- **Pre-Trip Information**

Pre-trip Information can include transit routes, schedules, fares, and other pertinent information (e.g., location of park-and-ride lots). Often this information can support itinerary planning, which can provide information on a whole trip from one point to another, even if it involves multiple modes. Automated data retrieval systems to augment existing human-operator interfaces can provide information to the caller in a timely manner. Transit agencies with variations of this technology include Winston-Salem, NC, Seattle, WA, and Baltimore, MD.
RECOMMENDATIONS ON APTS PRODUCTS

Recommendations on APTS products for operational tests at Florida transit systems are presented in the following format below.

- Agency Name
- Existing or planned APTS technologies
- Agency objectives, strengths, and accomplishments reported in the survey
- Agency issues, needs, goals, policies, and objectives reported in TDP
- Improvement the agency ranked as most helpful on the survey
- Recommended technology for consideration

The recommendations for APTS products for operational tests at Florida transit systems are summarized in a table at the end of this section.
Agency Name: Broward County Transit (BCT)
Fort Lauderdale, FL.

BCT is planning to implement AVL and computer assisted trip planning for fixed-route and paratransit service. The agency reported that system growth and a dedicated funding source are objectives for the agency in the next 5 to 10 years. BCT ranks in the top 15 percent nationwide for cost-effectiveness, according to a recent study by the University of North Carolina-Charlotte; there has been a steady increase in ridership from 1988 to 1994, in spite of decreasing operating funds from the federal government.

The Broward County Transit Development Program: 1991 - 1995 Update, includes the following operational improvements: new service to existing or proposed residential areas and traffic generators not presently served; headways that conform with adopted performance standards; extend hours to conform with an adopted span of service; and premium service improvements on park-and-ride, express, and feeder routes. Significant capital improvements include: making transfer terminals more efficient and accommodating for vehicles and passengers; and making existing facilities conform to ADA requirements.

BCT selected increase efficiency/reduce costs as the improvement that would be most helpful to the agency.

Technology is not yet available that will provide a dedicated funding source for transit. However, some APTS products can be helpful to increasing ridership and managing system growth. According to the survey, BCT is planning to implement AVL technology for fixed-route and paratransit trips. As already stated, AVL can generate significant efficiencies for transit systems and help agencies manage costs more effectively. This technology alone will help BCT to meet the objectives described in the agency's TDP.

There remain two improvements from the TDP that may benefit from APTS products. They are: premium service improvements and accommodating passengers at transfer terminals. In view of BCT's efforts to meet these improvements, one area is recommended for consideration as an operational test.

- In-Terminal and Wayside Information Systems
Agency Name: East Volusia Transit Authority (VOTRAN)
Daytona, FL

Stabilize funding, increase ridership, and fully integrate fixed route and paratransit services are objectives that VOTRAN would like to achieve in the next 5 to 10 years. The agency has recently expanded operations county-wide and is working on integrating regular bus service with paratransit service.

Among others, the Needs Assessment section of the Volusia County Transit Development Plan: 1996 - 2001 revealed mobility needs in three areas that are appropriate for APTS products: service area, mobility manager, and marketing. Objectives from the agency's TDP include: an expansion of the service to existing unserved and under-served areas of the county; establishing a mobility manager for operation and/or coordination of carpools, vanpools, and other TDM strategies; and improved marketing of transit information throughout the service area. The TDP also reports that no major changes are necessary to improve the current system of operation. However, VOTRAN selected increase efficiency/reduce costs as the improvement that would be most helpful to the agency. In view of this, it is recommended that VOTRAN may consider an AVL operational test. The benefits and capabilities of AVLs have already been described, since they serve as the backbone for an APTS program. It was also recommended that agencies consider implementing an AVL prior to establishing other APTS products.

In addition to the recommendation for an AVL, the objectives from the TDP are precursors to some recommendations, which are appropriate for the APTS products presented below.

- Computerized Dispatching/Scheduling
- Mobility Manager
- In-Terminal and Wayside Information Systems
The major objective for ECAT in the 5 to 10 years is to increase ridership. Additionally, the agency reported growth in ridership and replacement of 90 percent of vehicle fleet are the major strengths and accomplishments of the agency.

ECAT selected increase ridership/revenues as the improvement that would be most helpful to the agency. As the part of the agency's strategy to achieve this objective, Chapter 8 of the 1995 Transit Improvement Strategy for ECAT recommends moderate improvements in the marketing program as a strategy to attract more riders. Key local officials who were interviewed as part of this study emphasized the need for additional marketing activities to increase awareness and attractiveness of ECAT and encourage discretionary riders to try the system. In addition, the Transit Improvement Strategy suggests that a wide variety of improvements and the provision of amenities have an indirect effect on ridership, i.e., encourages ridership by improving the image of the system. The study recommends two such amenities: a satellite transit center with a kiosk on transit schedule and route information; and electronic fare media such as "smart cards."

APTS products that may be considered by ECAT are presented below.

- Static Pre-Trip Passenger Information
- Electronic Ticketing and Automated Trip Payment
- In-Terminal and Wayside Information Systems
The major objective for JTA in the next 5 to 10 years is to improve quality of service, reliability, and increase ridership. Its major accomplishment is the addition of automatic passenger counting (APC) technology. This APTS product provides JTA with more accurate data at a lower cost for collecting data in the long run. The agency is also testing a Global Positioning System (GPS), which will replace the sign post technology that is used for the APC.

JTA responded in the survey that increase ridership/revenues as the most helpful improvement to the agency. Among the general goals in the 1995 JTA Transit Development Plan Update (TDP) is: improving transit's image with the public. Aside from this goal, the TDP does not present any need or objective that specifically relates to APTS products. However, in addition to cost savings and increased ridership, APTS offers the benefit of enhancing the image of the agency through its use of advanced technology. Thus, the APTS products that JTA should consider for operational tests are:

- In-Terminal and Wayside Information Systems
- Electronic Ticketing and Automated Trip Payment
- In-Vehicle Information Systems
The objective for LAMTD in the next 5 to 10 is to make the system as self-sufficient as possible by implementing AVL and increasing mode share and community support. Citrus Connection's response to the survey of Florida Transit Systems reveals that the system is: basically an efficient operation, has increased ridership, a good level of community support, and is customer oriented.

Citrus Connection selected increase efficiency/reduce costs as the most helpful improvement to the agency. This is consistent with an objective in the 1993 LAMTD Transit Development Plan (TDP). Objective 1.4-C states: "The LAMTD shall seek to achieve the most efficient delivery of its transportation services." A major benefit of APTS products is they enable a transit system to operate more efficiently.

Appropriate APTS products that meet the objectives of LAMTD are presented below.

- Electronic Ticketing and Automated Trip Payment
- Pre-Trip Information
During the next 5 to 10 years, LeeTran will attempt to increase service and ridership, as well as, modernize equipment and data collection. LeeTran's major accomplishments include good ridership and an excellent advertising program.

The 1994 LeeTran Transit Development Plan (TDP) recommended establishing a formal monitoring program to track the performance of individual routes. LeeTran's TDP Update reports a data tracking system in place to measure route performance. As part of this study, it is recommended the agency considers also the benefits of an AVL to evaluate route performance. The Update also includes a recommendation to explore innovative service concepts, such as deviated fixed-route service. LeeTran selected more efficient customer service as the most helpful improvement to the agency. This agrees with another recommendation in the 1995 TDP: provide information kiosks at major transfer centers. Additionally, this selection is consistent with a policy in the 1994 LeeTran TDP. Policy 23.3.3 reads: "Continue to widely disseminate mass transit scheduling and service information thought the transit service area . . . Investigate innovative methods to make mass transit a more attractive transportation alternative."

The following APTS products may be considered for operational testing by LeeTran.

- Electronic Ticketing and Automated Trip Payment
- Pre-Trip Information
- In-Vehicle Information Systems
- In-Terminal and Wayside Information Systems
As presented earlier in this document, PSTA has replaced its bus coupons and punch tickets with magnetic fare cards. The magnetic cards will allow PSTA to keep track of fares, record data on when and where riders are going, and include an electronic fare box system. Prior to implementing this technology, PSTA submitted a Joint Highway - Transit Intermodal Computerized Signalization Project to the Pinellas County MPO. This project provided an opportunity to demonstrate the application of interfacing transit operations and computerized traffic signal control systems to improve transit operations. Since it was not funded, it should be considered by PSTA as a potential technology for an operational test.

PSTA hopes to increase mobility by opening new markets with various types of service and to increase ridership. The agency would like to at least maintain present service levels in the next 5 to 10 years, or implement a modest expansion. Major strengths and accomplishments at PSTA include increased number of riders and revenue miles with fewer operating dollars. At the same time, the agency has held the ad valorem millage rate at .6697 mills since 1992.

Among other issues that are presented in the Pinellas County Transit Development Plan: 1992 - 1997, is the presence of several major employers in the PSTA service area, which provide opportunities for an increased level of transit service for commuters. PSTA Customer Service Representatives (CSRs) reported an average of one call per day for bus service along the Ulmerton Road corridor, a location of some of the area's large employers. In addition, the agency's Paratransit Plan specifies provisions for attaining a fully accessible fixed route system within the next five years, including the expansion of complementary paratransit service, i.e., demand-responsive, door-to-door service.

In view of the issues presented above, the following APTS products may also be considered for operational tests by PSTA.

- Static Pre-Trip Passenger Information
- Computerized Dispatching/Scheduling
RTS says that enhancing image of the transit system and improving customer service is an objective the agency would like to achieve in the next 5 to 10 years. Major strengths of the agency include the service area (high density) and the total number of vehicles in its fleet.

RTS selected enhance the image of transit system as the most helpful improvement to the agency. This is consistent with RTS 1995 - 2000 Transit Development Plan. A focus group was conducted as part of this plan, which pointed out the need to increase the number of satellite information centers to provide convenient access to route and schedule information. RTS has placed an emphasis on installing automated machines to sell passes and tokens, and to provide specific route information to passengers. Other transit operations identified in the plan include computerized scheduling and service alternatives (flexible routing).

Potential APTS applications that may be considered for operational testing by RTS include:

- Computerized Dispatching/Scheduling
- Mobility Manager
- In-Terminal and Wayside Information Systems
In July 1996, Space Coast Area Transit began a joint AVL demonstration project with Harris Corporation. The agency is using Section 9 planning funds to support the project, which will cost $30,000. The equipment has been installed on three of the fixed-route vehicles and will be installed on 14 of the fixed-route vehicles when the technology is fully deployed. Harris Corporation is currently refining the system to meet the agency's specifications.

Space Coast Area Transit's objectives in the next 5 to 10 years are to continue the growth in ridership, reduce cost per trip, and become an accepted choice in the transportation modes of Brevard County. The agency's major accomplishments are its paratransit service and vanpool program. Improve quality of service was selected as the most helpful improvement to the agency. The 1995 Update to The Brevard County 1995 - 1999 Transit Development Plan (TDP) includes recommendations and actions to be initiated immediately to meet this improvement. Continued research and implementation of computer-based applications that enhance system operation, is identified as an immediate action to be considered in the TDP Update. With the demonstration of the AVL system, Space Coast Area Transit has begun to use technology to improve system efficiency and effectiveness. The agency is planning to examine smart fare collection systems in the future. Another recommendation to be considered in the near-term is establishing superstops/transfer centers at major location where bus routes intersect. The update recognizes area malls and shopping centers and the Government Center complex as prime locations for information displays on routes and transit information.

APTS products that may be considered for Space Coast Area Transit include:

- Electronic Ticketing and Automated Trip Payment
- In-Terminal and Wayside Information Systems
SCAT is planning to use Section 9 funds for the purchase of an AVL system, pending any reductions in Section 9 funding for the agency. The complementary service provider for SCAT, Senior Friendship Centers, has purchased computerized trip scheduling package.

During the next 5 to 10 years, SCAT would like to increase service frequency on major arterials, add some form of night and Sunday service, and double fixed-route ridership. Regarding major accomplishments for the agency, since 1985 SCAT has almost doubled its service and increased ridership 250 percent. Additionally, a new administrative and maintenance facility is being constructed. SCAT selected improve quality of service as the most helpful improvement from APTS. In view of the plans to implement an AVL, a general assessment of appropriate APTS strategies is offered. These include:

- Electronic Ticketing and Automated Trip Payment
- In-Terminal and Wayside Information Systems
TALTRAN currently operates a computerized information system on schedules and routes at a transfer plaza. The system was developed and installed by International Display Systems (IDS). The agency is planning to replace this system by integrating transit operations with the City's new traffic signal system. This will provide TALTRAN with the capability of signal prioritization, AVL, stop announcements, and real time information kiosks. Specifications for the new system will be completed within the year and cost an estimated $250,000.

During the next 5 to 10 years, TALTRAN would like to become technologically advanced in equipment and personnel to improve transit services. The agency's major strengths are: a modern fleet of transit vehicles; the support of the City of Tallahassee to provide the latest technology, and a strong and increasing ridership. TALTRAN selected improve quality of service as the improvement that would be helpful to the agency. Improving passenger information on bus routes and schedules is a suggestion from the Community Attitude Survey in the TALTRAN Short Range Transit Development Plan Update. Other recommended quality improvements in the Update include upgrade/replace of radio system and implement traffic signal systems and GIS programs.

Notwithstanding the planned efforts to integrate the City's traffic signal system with transit operations, the following APTS products may be considered for operational testing by TALTRAN.

- In-Terminal and Wayside Information Systems
- In-Vehicle Information Systems
### Table 1
Summary of Recommendations

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>BCT</td>
<td>196</td>
<td>Increase efficiency/reduce costs</td>
<td>Planning to implement AVL system.</td>
<td>In-Terminal and Wayside Information Systems.</td>
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<tr>
<td>VOTRAN</td>
<td>37</td>
<td>Increase efficiency/reduce costs</td>
<td>None</td>
<td>AVL, Computerized Dispatching/Scheduling, Mobility Manager, In-Terminal and Wayside Information Systems.</td>
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<tr>
<td>ECAT</td>
<td>29</td>
<td>Increase ridership/revenues</td>
<td>None</td>
<td>Static Pre-Trip Passenger Information, Electronic Ticketing and Automated Trip Payment, In-Terminal and Wayside Information Systems.</td>
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<td>HARTline</td>
<td>167</td>
<td>More efficient customer service</td>
<td>AVL</td>
<td>In-Terminal and Wayside Information Systems, Electronic Ticketing and Automated Trip Payment, In-Vehicle Information Systems, Pre-Trip Information.</td>
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<tr>
<td>JTA</td>
<td>162</td>
<td>Increase ridership/revenues</td>
<td>APC and testing GPS</td>
<td>In-Terminal and Wayside Information Systems, Electronic Ticketing and Automated Trip Payment, In-Vehicle Information Systems.</td>
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<tr>
<td>LAMTD</td>
<td>21</td>
<td>Increase efficiency/reduce costs</td>
<td>None</td>
<td>Electronic Ticketing and Automated Trip payment, Pre-Trip Information.</td>
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<tr>
<td>LeeTran</td>
<td>37</td>
<td>More efficient customer service</td>
<td>None</td>
<td>Electronic Ticketing and Automated Trip Payment, pre-Trip Information, In-Vehicle Information Systems, In-Terminal and Wayside Information Systems.</td>
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<tr>
<td>CoTran</td>
<td>71</td>
<td>Increase ridership/revenues</td>
<td>None</td>
<td>Computerized Dispatching/Scheduling, Electronic ticketing and Automated Trip Payment, In-Terminal and Wayside Information Systems.</td>
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</table>
Table 1 (cont.)
Summary of Recommendations

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>PSTA</td>
<td>183</td>
<td>Increase mobility by opening new markets with various types of service and to increase ridership</td>
<td>Magnetic cards, proposal for Transit Intermodal Computerized Signalization Project.</td>
<td>Static Pre-Trip Passenger Information, Computerized Dispatching/Scheduling.</td>
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<tr>
<td>RTS</td>
<td>43</td>
<td>Enhance the image of transit system.</td>
<td>None</td>
<td>Computerized Dispatching/Scheduling, Mobility Manager, In-Terminal and Wayside Information Systems.</td>
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<tr>
<td>Space Coast</td>
<td>45</td>
<td>Improve quality of service.</td>
<td>AVL demonstration</td>
<td>Electronic Ticketing and Automated Trip Payment, In-Terminal and Wayside Information Systems.</td>
</tr>
<tr>
<td>SCAT</td>
<td>42</td>
<td>Improve quality of service.</td>
<td>Planning to purchase AVL</td>
<td>Electronic Ticketing and Automated Trip Payment, In-Terminal and Wayside Information Systems.</td>
</tr>
</tbody>
</table>

1 Represents directly operated motorbus available for maximum service.

FUNDING OPTIONS

Federal Sources

The federal government, through the Intermodal Surface Transportation Efficiency Act (ISTEA) and continuing appropriations, has clearly maintained its commitment to making existing transportation systems more efficient with the application of technologies. Congress mandated a $600 million ITS program as part of the ISTEA, approximately $60 million was made available in FY 1992 to APTS.

The Federal Department of Transportation supports two programs that provide financial assistance to transit agencies to conduct field operational test of ITS technologies. Transit projects are typically funded through the Federal Transit Administration (FTA) Advanced Public Transit Systems (APTS) program; highway projects are assisted by the Federal Highway Administration (FHWA) Operational Test Program. Funding for the APTS program is mainly from FTA Act Sections 3 and 26, and from FHWA through the ITS Operational Test program.

Section 3 of the FTA Act provides discretionary capital assistance funds that can support the development and introduction of new technologies and innovative products. Some APTS projects receive funds through Section 3. However, a recent trend in Congress to earmark Section 3 funds prevents the APTS program from being able to look to these funds as a reliable source for APTS projects. For projects funded through Section 3, the FTA will pay 80 percent of total project costs. State and local governments are required to fund 20 percent of project costs.

Besides Section 3 funding, the FTA Section 26-Planning and Research Program provides the majority of funding resources for the study, testing, and demonstration of APTS technologies. This program authorizes the Secretary of Department of Transportation:

"to under-take research, development, and demonstration projects in all phases of urban mass transportation (including the development, testing and demonstration of new facilities, equipment, techniques, and methods) which he determines will assist in the reduction of urban transportation needs, the improvement of mass transportation service, or the contribution of such services toward meeting total urban transportation needs at minimum cost. He may undertake such projects
independently or by grant or contract (including working agreements with other Federal departments and agencies)."\(^7\)

Tables 2 through 5 list the operation tests that were funded through FTA's Section 26 program for 1992 through 1995, respectively. The APTS program in FY 95 was partially funded by the U.S. DOT's Joint Program Office (JPO) which gets money through the ITS legislation. Table 6 shows 1996 proposed projects that have submitted to the JPO. In FY 96 and beyond, nearly all of the APTS program will be funded through the JPO.

Table 2
FY 92 APTS Program Plan

<table>
<thead>
<tr>
<th>APTS Project Title</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transit Network Route Algorithm Research</td>
<td>$50,000</td>
</tr>
<tr>
<td>ITS Technology Research</td>
<td>$750,000</td>
</tr>
<tr>
<td>Smart Card Research</td>
<td>$50,000</td>
</tr>
<tr>
<td>Project Development &amp; Evaluation</td>
<td>$450,000</td>
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<tr>
<td>Technical Requirements &amp; Performance Specifications</td>
<td>$950,000</td>
</tr>
<tr>
<td>Technical Assistance to Transit Authorities</td>
<td>$100,000</td>
</tr>
<tr>
<td>Houston Smart Commuter Operational Test</td>
<td>$500,000</td>
</tr>
<tr>
<td>California Smart Traveler</td>
<td>$300,000</td>
</tr>
<tr>
<td>Bellevue (WA) Smart Traveler</td>
<td>$100,000</td>
</tr>
<tr>
<td>Delaware County (PA) Smart Traveler</td>
<td>$200,000</td>
</tr>
<tr>
<td>Ann Arbor (MI) Smart Bus</td>
<td>$350,000</td>
</tr>
<tr>
<td>Chicago Smart Bus</td>
<td>$400,000</td>
</tr>
<tr>
<td>TOTAL SECTION 26</td>
<td>$4,400,000</td>
</tr>
</tbody>
</table>

Source: U.S. DOT APTS Program

### Table 3
**FY 93 APTS Program Plan**

<table>
<thead>
<tr>
<th>APTS Project Title</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID &amp; Catalog Technology Research</td>
<td>$80,000</td>
</tr>
<tr>
<td>Human Factors Research</td>
<td>$90,000</td>
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<tr>
<td>Spectrum Allocation Needs Research</td>
<td>$100,000</td>
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<tr>
<td>Testing of AVL Technologies</td>
<td>$50,000</td>
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<tr>
<td>Coordinated Parallel System Architecture</td>
<td>$250,000</td>
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<tr>
<td>Chattanooga Operational Demo</td>
<td>$75,000</td>
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<tr>
<td>User Requirements &amp; Equipment Standards</td>
<td>$100,000</td>
</tr>
<tr>
<td>Guidelines to Integrate Transit with Transp Mgmt Centers</td>
<td>$75,000</td>
</tr>
<tr>
<td>Technical Assistance</td>
<td>$75,000</td>
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<tr>
<td>APTS Technical Support</td>
<td>$50,000</td>
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<tr>
<td>California Smart Traveler Operational Test</td>
<td>$750,000</td>
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<tr>
<td>Rogue Valley Mobility Mgmt Oper. Test</td>
<td>$80,000</td>
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<tr>
<td>Winston-Salem Mobility Mgmt Oper. Test</td>
<td>$220,000</td>
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<tr>
<td>Denver Smart Bus Evaluation</td>
<td>$120,000</td>
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<tr>
<td>Milwaukee Smart Bus Evaluation</td>
<td>$50,000</td>
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<td>Twin Cities &quot;TravLink&quot; Oper. Test</td>
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<td><strong>TOTAL SECTION 26</strong></td>
<td><strong>$3,065,000</strong></td>
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</table>

Source: U.S. DOT APTS Program

### Table 4
**FY 94 APTS Program Plan**

<table>
<thead>
<tr>
<th>APTS Project Title</th>
<th>Budget</th>
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</thead>
<tbody>
<tr>
<td>APTS/IVHS Systems Architecture Research</td>
<td>$800,000</td>
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<tr>
<td>Suburban/Rural Fixed Route Deviation Research</td>
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<tr>
<td>Technical Support User Requirements</td>
<td>$300,000</td>
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<tr>
<td>Transit Operator Technical Support</td>
<td>$100,000</td>
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<tr>
<td>Technical Assessment</td>
<td>$50,000</td>
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<tr>
<td>California Smart Traveler Oper. Test</td>
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<td>Oper. Test Evaluations</td>
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<td><strong>TOTAL SECTION 26</strong></td>
<td><strong>$2,805,000</strong></td>
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Source: U.S. DOT APTS Program
### Table 5
FY 95 APTS Program Plan

<table>
<thead>
<tr>
<th>APTS Project Title</th>
<th>Budget</th>
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<tbody>
<tr>
<td>Beaver County Transit GIS Bus Route Data</td>
<td>$299,900</td>
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<tr>
<td>VNTSC Customer Information, Ridesharing, Advanced Fare Systems Evaluations</td>
<td>$160,000</td>
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<tr>
<td>VNTSC Atlanta Olympic Showcase Technical Assistance</td>
<td>$300,000</td>
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<tr>
<td>VNTSC ITS Implementation and Technical Assistance</td>
<td>$425,000</td>
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<tr>
<td>VNTSC GIS Applications and Technical Support</td>
<td>$350,000</td>
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<tr>
<td>MARTA Fleet Mgmt. &amp; Traveler Info. System</td>
<td>$4,200,000</td>
</tr>
<tr>
<td>Orlando Passenger Information System</td>
<td>$240,000</td>
</tr>
<tr>
<td>Miami Automated Passenger Info. System</td>
<td>$400,000</td>
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<td><strong>TOTAL SECTION 26</strong></td>
<td><strong>$6,374,900</strong></td>
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VNTSC - Volpe National Transportation Systems Center
Source: U.S. DOT APTS Program

### Table 6
FY 96 Proposed Projects Submitted to JPO

<table>
<thead>
<tr>
<th>APTS Project Title</th>
<th>Budget</th>
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<tbody>
<tr>
<td>Parking/Signage System</td>
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<tr>
<td>Rural Traveler Information System</td>
<td>$240,000</td>
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<tr>
<td>Intermodal Terminal Traveler Information</td>
<td>$300,000</td>
</tr>
<tr>
<td>Tourist Transit Information System</td>
<td>$350,000</td>
</tr>
<tr>
<td>Home/Workplace Transit Information</td>
<td>$350,000</td>
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<tr>
<td><strong>TOTAL Request for Operational Test from JPO</strong></td>
<td><strong>$1,590,000</strong></td>
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</table>

Source: U.S. DOT APTS Program
In addition to the FTA Section 3 and 26 funding, solicitations of Operational Tests are issued periodically through the Federal Highway Administration (FHWA). The FHWA operational test program is designed to evaluate ITS technologies that may improve mobility, transportation productivity, enhance safety, and reduce congestion on the Nation's highways. Operational tests of APTS products have been funded through this program in the past.

A review process was established to evaluate the proposals in the operational test program. Among other requirements, preference was given to project proposals that:

- had unique technological, institutional, or market characteristics and do not replicate past or current tests unless such replication provides a significant contribution to advancing the ITS program;
- included participation from the public and private sector to form cooperative ventures and/or multimodal partnerships;
- clearly defined the roles and responsibilities of the principal partners and demonstrated they have the ability to perform their assigned responsibilities; and
- minimized the federal share of the project budget to 80 percent; the remaining 20 percent must have been from non-federally funded sources and must have consisted of either cash, equipment contributions, or in-kind services.

The most recent solicitation for this program was issued November 1994 and awarded in September 1995. Four projects were funded in the area of Commercial Vehicle Operations (CVO), which apply various ITS technologies to improve the safety and efficiency of commercial vehicle and fleet operations. Total funding for this solicitation was $14.5 million. During the FY 1996 funding cycle, FHWA issued a solicitation, called Operation TimeSaver, to reduce the travel time of Americans by at least 15 percent through deployment of ITS in large metropolitan areas. These model deployments will demonstrate the benefits of integrated transportation management systems that feature a strong regional, multimodal traveler information services component.

A variety of criteria are used to evaluate APTS project proposals to the FTA APTS program and FHWA operational test program. Among other requirements, preference is given to proposals which:
• have unique technological, institutional or market characteristics;
• have participation from state, local, and private sectors, whose roles are clearly defined;
• are appropriately scaled as to have a measurable impact on the test region; and
• are budgeted so that the federal share of project funding cannot exceed 80 percent of the total cost.

Another possible source of funding is the Congestion Mitigation and Air Quality Improvement (CMAQ) program. Types of projects eligible for use of these funds are cited in Section 108(f)(1)(A) of the Clean Air Act. Financial assistance from the CMAQ program will be dependent on the amount of funds committed to other projects and if the transit system in a non-attainment or attainment area.

Transit Cooperative Research Program (TCRP)

TCRP is a program of research projects, selected by the transit industry, which meet the immediate needs of transit operators. The program encourages innovation in various aspects of transit operations: technologies, methods, management processes, materials, and system operations. The program announcement states that TCRP projects should "increase the effectiveness of transit service operations by applying advanced communications and delivery systems to improve ridership and service management." The Transportation Research Board administers this program for the FTA. The maximum award is $100,000. Projects are to be completed within one year.

State Funding

Florida Department of Transportation (FDOT) Service Development Program was enacted by the Florida Legislature to provide initial funding for a new or innovative technique or measure to improve or expand public transit. Local projects may be funded up to 50 percent of net project costs. These include technology for transit equipment, fare collection techniques, electronic data processing applications, bus locators, and improving system safety. Program funds are subject to specified times or duration, but no more than two years. Funds from this program were used by Arc Transit, Palatka, Florida, to test an AVL system.
Private Funding

Private companies may work jointly with public agencies or provide direct funding for APTS projects. A cooperative partnership of this nature is encouraged by the FTA. Many operational tests include a private company that provides in-kind services, such as hardware and software equipment and installation, instead of financial assistance.

Table 7 provides a list of helpful contacts for APTS operational test and research.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Contact</th>
<th>Phone</th>
</tr>
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<tbody>
<tr>
<td>Federal Transit Administration</td>
<td>Denis Symes</td>
<td>202.366.0232</td>
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<tr>
<td>Federal Transit Administration</td>
<td>Ron Boenau</td>
<td>202.366.0195</td>
</tr>
<tr>
<td>Federal Transit Administration</td>
<td>Sean Ricketson</td>
<td>202.366.6678</td>
</tr>
<tr>
<td>U.S. DOT, ITS Joint Program Office</td>
<td>Christine M. Johnson</td>
<td>202.366.9536</td>
</tr>
<tr>
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<td>Harry Lister</td>
<td>202.366.2128</td>
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<tr>
<td>U.S. DOT Website</td>
<td>Website</td>
<td><a href="http://www.its.dot.gov">http://www.its.dot.gov</a></td>
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<td>National Transit Institute</td>
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<td>FDOT</td>
<td>Shirley Conroy</td>
<td>904.381.8607</td>
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</tbody>
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Table 7
List of Contacts for APTS Operational Tests and Research
SUMMARY

Advanced Public Transportation Systems (APTS) technology offers enormous potential to transit systems in improving mobility and quality of life for residents in urban and rural areas, and contributing to a regional effort to reduce traffic congestion. This technology can also make public transit more attractive as an alternative to the single-occupant vehicle.

This report presents a summary of the technologies included within the framework of APTS. A review of APTS initiatives at Florida transit systems is provided. Two transit systems in the state are currently conducting operational tests of APTS technologies. Metro-Dade Transit Agency, in Miami, is testing the potential of information kiosks at strategic bus/rail transfer locations to increase ridership on transit. Lynx, in Orlando, is developing a transit component for their Passenger Travel Planning System. More detail on these projects is provided in the report. A survey of Florida transit systems was conducted to identify existing and planned efforts to incorporate APTS technologies into their systems. This is supplemented by a review Transit Development Plans for transit systems in Florida. These plans reveal valuable information about problems faced by transit providers, as well as the operations and technological resources already in place. This information provides the basis for recommendations on the most appropriate APTS products for Florida transit systems. A description of the federal operational test programs, state funding programs, and private assistance is also provided.
BIBLIOGRAPHY


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APPENDIX A
Florida APTS Concepts Survey
Florida APTS Concepts Survey

The Center for Urban Transportation Research (CUTR) is completing a study of Advanced Public Transportation Systems, and their application to transit systems in the State of Florida. To assess local transit needs and objectives, we would like for you to respond to the following survey.

Name: ____________________________________________________________

Position: __________________________________________________________

Transit Agency: ___________________________________________________

Location: __________________________________________________________

1. Are you familiar with the benefits of using APTS technologies? 1_ Yes 2_ No

2. What is your opinion of APTS technologies? __________________________

3. Does your system have existing or planned APTS technologies? 1_ Yes 2_ No

   If yes, please describe. ______________________________________________

4. The following is a list of possible improvements that APTS technologies may provide to your transit system. Please rank all the improvements that you think would be helpful (1 most helpful).

   _ increase efficiency/reduce costs
   _ improve data collection
   _ increase ridership/revenues
   _ enhance image of transit system
   _ increase security/safety
   _ increase accuracy of passenger counting function
   _ improve route planning and scheduling
   _ improve fare payment media
   _ more efficient customer service
   _ increase flexibility
   _ enhance compliance with ADA requirements
   _ OTHER (please specify) ____________________________

5. In your opinion what objectives would you like for your transit system to achieve in the next 5 to 10 years

   __________________________________________________________________

6. What are the major strengths and accomplishments of your transit system?

   __________________________________________________________________

7. If APTS technologies were identified that would help you to improve transit service, achieve your objectives in the next 5 to 10 years, and enhance the strengths of your system, would you be interested in applying for an operational test funding?

   1_ Yes 2_ No

THANKS FOR YOUR HELP!

Please return by fax: (813) 974-5168