

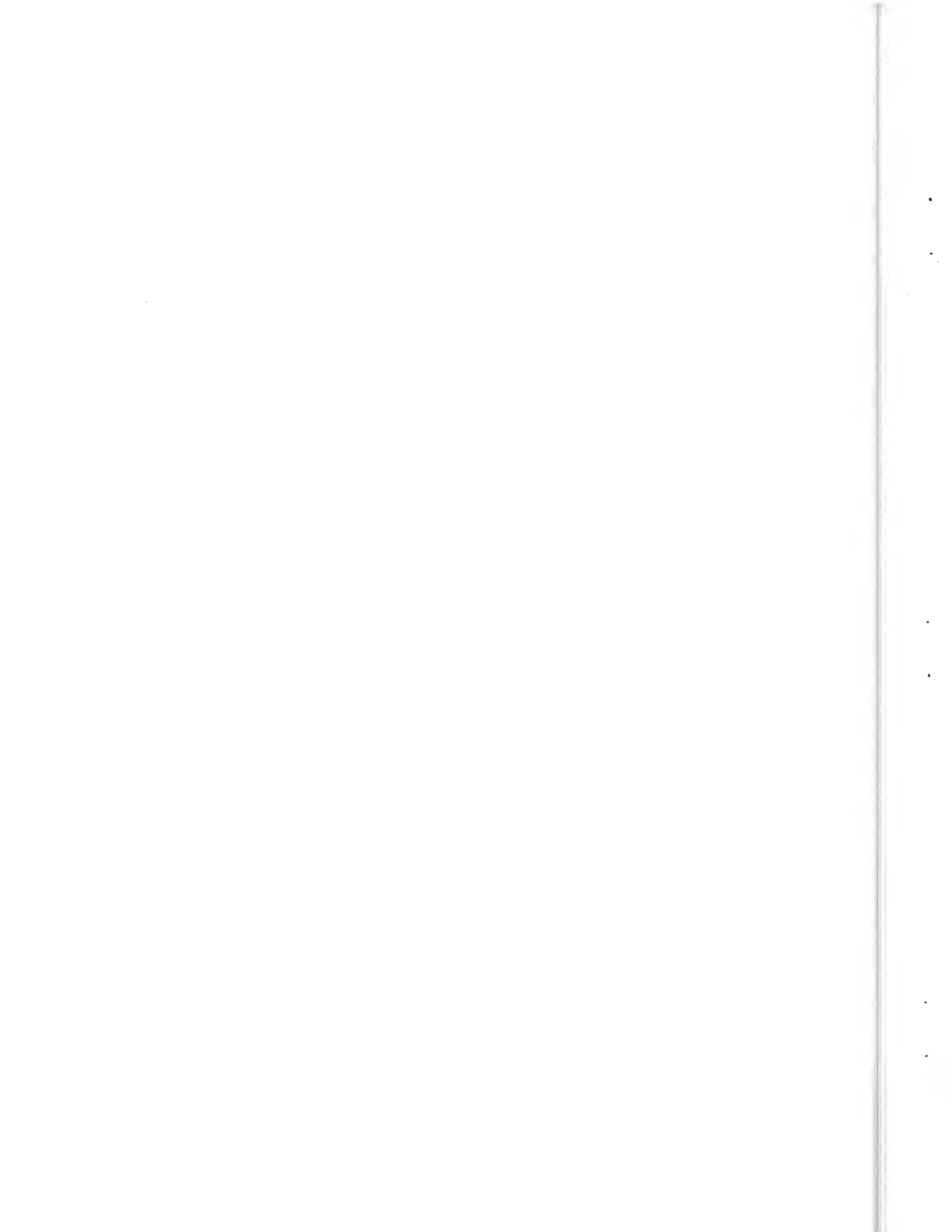
Advanced Public Transportation Systems Project Summaries

January, 1996



FEDERAL TRANSIT ADMINISTRATION

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ADVANCED PUBLIC TRANSPORTATION SYSTEMS (APTS) PROGRAM

MISSION

The mission of the Advanced Public Transportation Systems (APTS) program is to enhance the ability of public transportation systems to satisfy customer needs and contribute to community goals by providing information on innovative applications of available Intelligent Transportation Systems (ITS) technologies from a coordinated operational test and evaluation program.

OBJECTIVES

The APTS program has four major objectives. The first objective, "Enhance Quality of On-Street Service to Customers", focuses on service to the customer. The second, "Improve System Productivity and Job Satisfaction", focuses on the system and its workers. The third, "Enhance the Contribution of Public Transportation Systems to Overall Community Goals", focuses on the community. The fourth objective, "Expand the Knowledge Base of Professionals Concerned with APTS Innovations", focuses on dissemination of information developed in the APTS program.

BACKGROUND

The Federal Transit Administration (FTA) has created the Advanced Public Transportation Systems (APTS) program as part of the U.S. DOT initiative in ITS.

ITS involves the integration of electronics, communications, computer and control systems into both vehicles and highways. It is a tool to enhance transportation mobility, energy efficiency, and environmental protection. Most ITS systems benefit the automobile driver and not the transit rider, however, APTS' goal is to address this imbalance by identifying and developing ITS systems suited to improving the public transit and ridesharing option.

The importance of ITS as a possible solution to transportation problems has grown in recent years, in part from the efforts of ITS America, a non-profit technical organization with members from business, industry, academia and government. To assist in promoting APTS, ITS America has formed a special APTS technical committee to advise the FTA on candidate technologies for operational tests, and to provide an additional link between interested State and local agencies and the FTA.

Various technologies are being examined in the APTS program, and many projects involve the integration of several different systems. The APTS program encourages innovation and is committed to examining worthwhile approaches that use advanced technology to improve public transportation.

Participation in APTS projects by public and private interests occurs in many ways. Multimodal efforts that include the Federal Highway Administration are encouraged, as are private sector and university participation. Cost sharing by all participants is expected. The use of cooperative

agreements, negotiated procurements, and possibly procedures under the Federal Technology Transfer Act of 1986 will guide joint efforts. The FTA is open to considering whatever approach a local sponsor proposes for a cooperative venture.

THE TRANSIT OPPORTUNITY IN ITS

Transit's ITS activities 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 signpost 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 would be called.

Presently, more than 30 transit authority's have installed (or are installing) ITS technologies to improve operating efficiency, collect data, or present travel information to passengers. These technologies are used for fleet management and control to keep buses on schedule, for report generation to automate labor intensive activities, to provide real-time information to passengers to increase customer satisfaction, and to improve security and passenger safety.

There is a significant trend toward use of the Global Positioning System (GPS) for location information. GPS offers the transit operator a reliable, affordable technology for determining location without the requirement to maintain an independent location technology. GPS is now being used for fleet management and control, data collection, emergency alarms, passenger information, and other related activities in several transit systems.

One area that is generating increasing interest is passenger information to assist travelers in making rational decisions regarding their modal choice. Information on travel modes, times and fares can be presented to passengers in their homes and offices via computer, cable TV or Personal Digital Assistants, and at interactive kiosks located at major boarding points.

As computers, peripheral devices, and mobile hand-held personal communication systems become smaller, more convenient and less costly, these technologies will become even more prevalent in society. They will give the consumer unparalleled access to public transportation information on which he can make more informed decisions.

TECHNOLOGY GROUPINGS

The APTS program has identified three technology areas to address: Smart Traveler; Smart Vehicle; and Smart Intermodal Systems.

Smart Traveler Technology focuses on providing both pre-trip and en route travel information to transit users before they make personal decisions on how to travel. The concept of the Smart Traveler is to provide real-time transportation information to the public through advanced computer and communication technology. This information could be provided to travelers at home, in the workplace, or through roadside or transit center monitors using ITS communication technologies. Examples of Smart Traveler technologies include interactive displays on personal

computers or cable TVs that provide graphic views of public transportation services. The traveler indicates the origin and destination of the trip using a touchscreen that maps out the best route on a graphic display and shows bus numbers, bus stop locations, arrival and travel times. Real-time information can also be provided to travelers on board a bus or other vehicle, thereby giving the traveler the opportunity to complete an efficient journey. Such information can be communicated visually (via videotex) or by voice (via audiotex) to aid passengers with disabilities.

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 are automatic vehicle location, automatic passenger counters, on board passenger information (both voice and visual), vehicle diagnostics, smart card readers, adaptive signal timing, automated demand-responsive dispatching systems (on board equipment), transponders for automatic toll collection and HOV verification, and on board automatic guidance equipment. The common element linking all of these technologies is communications. To be effective, data must be transferred between the vehicle and the dispatch center, with computational processing either on the vehicle, at the user location, or at a central computer.

Smart Intermodal Systems involve the integration of Advanced Public Transportation Systems (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. Recognizing that transit systems operate in intermodal transportation environments, smart intermodal systems provide the link between APTS and non-transit ITS. A variety of technologies are involved in the design of smart intermodal systems. A simple version can involve the exchange of information on traffic flow between transit dispatch centers and traffic control centers. A more complex version can involve a coordinated adaptive traffic signal timing system that closely monitors traffic flow while favoring buses that are behind schedule. This requires the integration and coordination of information between the transit dispatch and control center and the traffic management center.

Smart Traveler Technologies, Smart Vehicle Technologies, and Smart Intermodal Systems represent the transfer of technology innovations into the U.S. transportation systems of the 21st century.

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SEATTLE SMART TRAVELER

WA-06-0039 and WA-26-0001

RECIPIENT: Municipality of Metropolitan Seattle, Seattle, WA

OTHER PARTICIPATING AGENCIES: Federal Transit Administration; TransManage; University of Washington; City of Bellevue, Washington State DOT

LOCAL CONTACT: Mark Haselkorn (206)543-2577 (Univ. of Washington)

FTA CONTACT: Ron Boenau (202) 366-0195

Project Description:

This project examines ways in which mobile communications, such as cellular phones, and information kiosks can be used to make ridesharing (carpooling and vanpooling), more attractive. A set of information-based services for ridematching was developed in Phase I in cooperation with the mobile telecommunications industry in an effort to increase the use of HOV facilities. The initial focus advised private auto drivers of rideshare possibilities using mobile communications. A second phase operationally tested a prototype computer-based, interactive commuter information center in an office building in downtown Bellevue. The center provided computerized transit information, rideshare matching, and a method to schedule occasional carpool or vanpool trips. In addition to cellular telephone, the technological applications included voice mail, computer-based ridematching, traffic monitoring computers, and electronic maps. A third phase will use a FM subcarrier wide-area communications system plus a pager to deliver public transit, ridesharing and traffic information and will be funded through the DOT ITS Operational Tests Program. Phase III will operationally test phone and paging technologies in providing dynamic ride-matching and real-time traffic information to encourage public transportation use.

Status as of: October 1995

Phase I determined that there is a potential for the use of cellular telecommunications and voice mail in ridesharing, although there was no incentive found for existing carpools/vanpools. It was found that 42 percent of "drive-alone" commuters would consider "instant sharing." A final report of Phase I is available from FTA.

Phase II, recently completed, developed and operationally tested a prototype traveler information center at a major downtown Bellevue office complex and tested the use of pagers to assist single trip ride matching. A draft final report was prepared with publication pending.

Phase III was selected as part of the National ITS Operational Test Program. The project has defined roles and relationships of the various partners and will use the University of Washington service area as the prime operational test site.

A final report is being published.

Future Developments:

An expanded operational test to include travelers using additional kiosk employer involvement and an expanded geographic coverage is a probability prior to deployment.

CALIFORNIA SMART TRAVELER

CA-06-0242 and CA-26-0007K

RECIPIENT: Division of New Technology and Research of the California Department of Transportation

OTHER PARTICIPATING AGENCIES: Los Angeles Metropolitan Transportation Authority (LAMTA), California Health and Welfare Agency Data Center (HWDC), Aegis Transportation Information Systems, Inc., Merced County Council of Government, the University of California, Volpe National Transportation Systems Center (VNTSC), and the Federal Transit Administration (FTA).

LOCAL CONTACT: Cliff Loveland (916) 654-9970

FTA CONTACT: Ron Boenau (202) 366-0195

Project Description:

This project is comprised of two primary components: (a) Los Angeles Smart Card, and (b) Orange County Smart Intermodal System. The Los Angeles Smart Card will test the use of smart cards for express transit service as well as for parking and other services at employment sites. Two different card technologies will be tested: a contact card and a radio frequency (RF) proximity card. The Orange County Smart Intermodal System will operationally test (1) an integrated transit and traffic management system and (2) a real-time information system that will include special event information.

Status as of: October 1995

The first phase of the project has been completed which identified and evaluated several test sites and appropriate technologies for operational testing. A report describing the concept and a providing cost estimates for implementation of smart traveler projects has been published and is available from FTA. The Los Angeles Smart Card project has distributed over 700 RF smart cards for use on three different transit systems. Card readers, computers and GPS antennas have been installed on 24 buses. Operational testing is proceeding.

Future Developments:

Additional operational tests are being considered along with the integration of four state Transportation Management Centers, installation of system detectors, integration of intermodal subsystems and dissemination of information through regional clearinghouses. The smart project, when combined with automatic vehicle location (AVL) technology could be include every aspect of bus operation rather than just a fare payment system.

HOUSTON SMART COMMUTER

TX-26-0072 and TX-26-0001

RECIPIENT: Houston Metropolitan (METRO) Transit Authority, Harris County, TX

OTHER PARTICIPATING AGENCIES: Federal Transit Administration, Texas State Department of Highways and Public Transportation, and Texas Transportation Institute.

LOCAL CONTACT: Ms. Sholeh Karimi, P.E. (713) 613-0315

FTA CONTACT: W. Raymond Keng (202) 366-6667

Project Description:

This project seeks to develop and evaluate a real-time traffic and transit information system. Four tasks are underway: First, assess the market potential to increase bus, vanpool, and carpool use by providing traffic information, bus choices, and carpool options to travelers at home and work; second, evaluate available technologies and identify those most feasible and cost-effective; third, examine various ways of gathering and distributing transit and traffic information, to include the identification of roles and costs for the agencies involved; and fourth, identify the project's administrative requirements and projected costs.

Status as of: November 1995

In the I-10 West Corridor, Houston METRO will try to entice people from single occupant vehicles (SOV) into car and vanpools with a rideshare system. In October 1995, Houston METRO received the rideshare system from GDE, a software consulting firm, and a GIS map from Land Data, a software consulting firm. Houston METRO is currently trying to integrate the rideshare system with the GIS map. System integration will be complete by January 1996. Recruitment of 2,500 drivers and ride seekers will commence in March 1996.

In the I-45 North Corridor, Houston METRO will try to entice people from SOV into buses by using in-home transit information devices. TRW has been selected as the prime consultant and an agreement will be executed in December 1995. TRW will develop the software and hardware for the in-home transit information devices and will deliver the devices to Houston METRO in April 1996. In January 1996, Houston METRO will commence recruiting of 700 test participants and 700 control participants. The operational test will commence in May 1996 and will last 1 year. An evaluation will be conducted every six months.

Future Developments:

A comprehensive evaluation report will be conducted by the Volpe National Transit Systems Center. The report will assist other agencies who are considering the approach to make informed decisions.

LOS ANGELES SMART TRAVELER

CA-06-0242 and CA-26-0007

RECIPIENT: Division of New Technology and Research of the California Department of Transportation

OTHER PARTICIPATING AGENCIES: Los Angeles County Metropolitan Transportation Authority (MTA), Commuter Transportation Services, Inc. (CTS), California Health and Welfare Agency Data Center (HWDC), IBM, North Communications, Pacific Bell, Pacific Bell Information Services, Volpe National Transportation Systems Center (VNTSC), Federal Highway Administration and Federal Transit Administration (FTA).

LOCAL CONTACT: Cliff Loveland (916) 654-9970

FTA CONTACT: Ron Boenau (202) 366-0195

Project Description:

This project demonstrates access to real-time and other reliable sources of transportation information that can be used to examine high-occupancy vehicle travel options. Kiosks using audiotex and videotex are being used to provide the information which will include transit, paratransit and rideshare options. The availability of additional travel options is expected to decrease single-occupant vehicle travel by providing alternative modes of travel which are more reasonable, safe, convenient, and economical. An (800)-COMMUTE telephone number was developed which allows the public to obtain transit, rail, carpooling, highway conditions and telecommute information via touch-tone telephones.

Status as of: October 1995

Audio/video text, map database, and transmission line linkages were developed and installed in over 75 interactive, multimedia, touch screen information kiosks. Site locations included shopping malls and public buildings (hospitals, college/universities) throughout the Los Angeles area. Information provided includes public transit itineraries to allow a traveler to know how to get to the intended destination, on-line ridesharing opportunities, and real-time freeway traffic conditions in greater Los Angeles. Project logo including design, color and usage was developed. A final report is being written. The (800)-COMMUTE phone system handles 32,000 calls per month and the kiosk system averages more than 60,000 users per month.

Future Developments:

Additional operational tests of information kiosks to improve their performance and which could provide real-time rideshare matching are being considered. Integration of four state Transportation Management Centers, installation of system detectors, integration of intermodal subsystems and dissemination of information through regional clearinghouses is also under consideration.

NORTHERN VIRGINIA SMART ROUTE SYSTEM

RECIPIENT: Potomac-Rappahannock Transportation Commission (PRTC)

OTHER PARTICIPATING AGENCIES: Northern Virginia Planning District Commission (NVPDC); Virginia Department of Rail and Public Transportation (VDRPT); Gandalf Mobile Systems, Inc. (GMSI); Trapeze Software, Inc; SG Associates (SG), and Tidewater Consultants.

LOCAL CONTACT: Eric Marx, (703) 490-4811 [PRTC]

FTA CONTACT: Ron Boenau (202) 366-0195

Project Description:

This 30-month operational test, referred to as Smart Flexroute Realtime Enhancement System (SaFIRES), will evaluate an integrated smart vehicle service that includes fixed route, route-deviation, and demand response service types. The test site is a suburban-to-rural environment in the Prince William County area of Virginia, twenty-five miles south of Washington, D.C. The test will use ITS technologies including GPS-based automated vehicle location (AVL), real-time scheduling software, GIS mapping, and digital communication through mobile data terminals (MDT). It will integrate route deviation, commuter bus and rail, feeder bus, and human service transportation in a low density environment. Small, multi-purpose vehicles will switch between service types on an as-needed basis. This will allow the best vehicle to respond to each request in real time using the integrated computerized dispatching software developed for the operational test. ITS technologies will also greatly simplify Section 15 reporting and tracking human service ridership and agency charges. It is hypothesized that this system will provide greater effectiveness and efficiency in serving the public transportation needs of the community than would be the case in a non-ITS enhanced environment. Route deviation (up to 3/4 mile) will enable the service to reach a far larger market and negate the need for complementary paratransit services required of fixed route systems. The test is expected to involve up to 50 ITS enhanced vehicles and will include a dispatching center.

Status as of: October 1995

The overall system design has been completed. Landmarks and transit destinations have been prepared for the base map. An in-house GIS has been acquired. The functional design for the FlexRoute computer support has been completed and detailed specifications and hardware requirements are also complete. Semi-automated flexroute service began in April 1995. An analysis for the radio communications system has been completed. Mobile data terminals (MDT) including Global Positioning System (GPS) have been installed in the vehicles and include three external trunking modems for the base. Radio coverage is being investigated to assure adequate data and voice communication is achieved. An evaluation strategy is being developed for the project.

Future Developments:

After this initial operational test, full scale deployment will be considered for specified elements of this project system.

SACRAMENTO RIDESHARE

CA-06-0242 and CA-26-0007

RECIPIENT: Division of New Technology and Research of the California Department of Transportation

OTHER PARTICIPATING AGENCIES: Sacramento Rideshare, Transportation Management Associations, Sacramento Council of Governments, Volpe National Transportation Systems Center (VNTSC), Federal Transit Administration (FTA)

LOCAL CONTACT: Cliff Loveland (916) 654-9970

FTA CONTACT: Ron Boenau (202) 366-0195

Project Description:

The Sacramento Real-Time Ridesharing component will use a geographic information system (GIS) to provide single-trip or multiple-trip real-time ridesharing information. A driver seeking a rider will enter the request into the system through one of the TMAs. A prospective rider will enter a destination and ride request. Driver incentives will also be identified in the implementation of the system.

Status as of: October 1995

Software is being developed in conjunction with various rideshare agencies to provide real-time rideshare opportunities. Pacific Bell has completed the programming development work to bring the Sacramento Rideshare System under the Smart Traveler 1-800 Commute umbrella. This allows registration as well as trip requests to be accomplished automatically. Geographic information system (GIS) software is being evaluated for its ability to perform ridematching algorithms including an Internet interface.

Future Developments:

Future activities may include the expansion of the ridesharing information to a greater number of employers and the establishment of a specialized ridesharing organization for participants.

WINSTON-SALEM MOBILITY MANAGEMENT

NC-26-7000

RECIPIENT: Winston-Salem Transit Authority, City of Winston-Salem, NC

OTHER PARTICIPATING AGENCIES: Winston-Salem Transit Authority (WSTA); North Carolina DOT; North Carolina State University's Institute for Transportation Research and Education.

LOCAL CONTACT: Nedra Woodyatt (910) 727-8131 [WSTA]
John Stone (919) 515-7732 [NC State]

FTA CONTACT: Ron Boenau (202) 366-0195

Project Description:

This project will define and identify system needs and operationally test and evaluate a mobility management system for the City of Winston-Salem. It will include automated scheduling and demand responsive, shared-ride transit for the young, elderly, and disabled who are unable to use fixed-route transit (Phase I). The project will extend the transportation service to fixed-route transit, ridesharing and taxis used by the general public (Phase II). Integration with the Winston-Salem traffic management program will be accomplished. Technologies being investigated also include smart cards, GPS, and automatic vehicle location.

Status as of: October 1995

The project has been divided into a human service operational test (demand-responsive phase) and a total system operational test (fixed-route phase). System needs including hardware and software requirements have been identified, stated in an RFP with On-Line Data Product being selected as the vendor. Installation of the software (PASS) and hardware equipment and initial testing was completed. An initial assessment of the agency's operations is being completed. A telephone survey of riders and drivers was initiated with data being accumulated for analysis. Daily ridership and schedule information is being collected by computer. Products planned for testing include mobile data terminals, automatic vehicle location devices and electronic fare card media. A draft evaluation plan was developed.

Future Developments:

A test bed could be provided for use as a laboratory for testing and evaluating technology such as digital communications, smart card fare media, AVL, and new algorithms and management policies for service delivery. Service could be expanded to include fixed-route service, relocation into a central multimodal transfer facility, an informational kiosk, and an electronic variable message sign to provide real-time passenger information.

BALTIMORE SMART VEHICLE

- MD-26-0000

RECIPIENT: Baltimore Mass Transit Administration, Baltimore, Maryland

OTHER PARTICIPATING AGENCIES: Federal Transit Administration

LOCAL CONTACT: Ray Carroll (410) 767-3327

FTA CONTACT: Denis Symes (202) 366-0232

Project Description:

MTA is implementing an Automatic Vehicle Location (AVL) System that will provide bus status information to the public while simultaneously improving bus schedule adherence and labor productivity. A prototype system involving 50 buses was previously tested with LORAN-C receivers and 800 MHz radios. The new system will use the Global Positioning System for location. The buses' location is determined by the receiver and the information is processed on-board; only those buses off-schedule will transmit the central dispatch center. Corrective action will be taken to restore schedule adherence. Ultimately all 900 Baltimore transit buses will be equipped. A new trunked communication system is being installed.

Status as of: November 1995

The scheduling and routing software has been installed and is operational. The microwave and communication system installation is underway. Vehicle installation will begin in January 1996. The system will be expanded to all transit vehicles using GPS for location, new dispatcher displays and new software. Transportation Management Systems, a subsidiary of E-Systems, is the contractor. Initial installation will be on 285 vehicles (215 buses and 70 light rail vehicles) and includes a new communications system. The system involves route/independent tracking. Driver feedback on schedule can be used to control routes.

Future Developments:

Bus passenger information will be made available through Interactive Customer Information Kiosks (SMART TRAVELER CONCEPT) in homes and offices. Computer Aided Dispatch for the bus fleet and light rail system may be tested. Using location and schedule adherence information, late buses may be automatically granted single preemption to aid them maintain schedules. Each of these potential improvements will be evaluated in the APTS program with close cooperation with the MTA. Ultimately, the system will be expanded to include all MTA transit vehicles.

DALLAS SMART VEHICLE EVALUATION

TX-26-0000

RECIPIENT: Dallas Area Rapid Transit, Dallas, Texas

OTHER PARTICIPATING AGENCIES: Federal Transit Administration and Volpe National Transportation Systems Center

LOCAL CONTACT: John Hengs (214) 749-2961

FTA CONTACT: W. Raymond Keng (202) 366-6667

Project Description:

Dallas Area Rapid Transit (DART) has installed an Integrated Radio System that includes automatic vehicle location on 823 transit buses, 200 mobility impaired vans, and 142 supervisory and support vehicles. The Global Positioning System (GPS), a satellite navigation system developed by the Department of Defense, is generating vehicle location information. Under the U.S. DOT ITS Operational Test Program, this system will test a Flexibly Routed Transit Operations, which involves buses deviating from fixed routes to pick up passengers outside the route's service area.

Status as of: November 1995

The prime consultant to DART is undergoing final system debugging and fine tuning of the Integrated Radio System to meet specification requirements. Final acceptance of the system will occur in February 1996.

Future Developments

Once comprehensive operational experience of the Integrated Radio System is gained, DART will commence testing of flexible transit routing.

DENVER SMART VEHICLE

CO-26-0000

RECIPIENT: Regional Transportation District, Denver, Colorado

OTHER PARTICIPATING AGENCIES: Federal Transit Administration

LOCAL CONTACT: Lou Ha (303) 299-6265

FTA CONTACT: Denis Symes (202) 366-0232

Project Description:

The RTD is installing an Automatic Vehicle Location (AVL) system, as part of an upgraded communications system, to provide bus location information to transit dispatchers to increase efficiency, ridership, and passenger safety. Location information is supplied by the Global Positioning System (GPS), which uses a series of navigation satellites. The location of each bus is determined by a GPS receiver on the buses and is transmitted to a central dispatch center. Off-schedule buses are identified so corrective action can be taken to reroute buses when needed.

Status as of: November 1995

An advanced AVL communications system has been installed on 788 buses and 28 supervisor vehicles and is operational. Map displays showing each vehicle's location will permit the dispatcher to control the buses and their schedules. In the event of an on-bus emergency, the driver can summon help through a silent alarm, that identifies the bus and its location so that police can be directed to the bus. Schedule adherence software has been installed and tested by the contractor. Software testing and acceptance has been completed. An evaluation of the system is being initiated by the FTA in close cooperation with the RTD. System acceptance will be completed in December 1995.

Future Developments:

A future expansion that includes passenger information and interactive displays has been funded under the ITS Corridor Program for Implementation in the next year.

MILWAUKEE SMART VEHICLE

WI-26-7000

RECIPIENT: Milwaukee County, Wisconsin

OTHER PARTICIPATING AGENCIES: Federal Transit Administration and Volpe National Transportation Systems Center

LOCAL CONTACT: Ron Rutkowski (414) 278-4888

FTA CONTACT: Sean Ricketson (202) 366-6678

Project Description:

This project will support the efforts of Milwaukee County to conduct data collection and evaluation of its Automatic Vehicle Location (AVL) and bus fleet management system. The project will enable Milwaukee County to participate in the Volpe National Transportation Systems Center (VNTSC) Operational Test Evaluation effort. Milwaukee County will conduct data collection and evaluation in coordination with the VNTSC National Evaluation Plan. The AVL system is designed to track buses and ensure accurate schedule performance, increase overall operating efficiency, and assist in fleet management activities. As new technologies are operationally tested around the country, it is critical that standard evaluations are conducted to ensure consistency and compatibility of evaluation data.

Status as of: November 1995

Installation of hardware and software (schedule adherence) on all 602 buses is complete. Systems acceptance testing is underway and will be complete by December 1995. During this phase, all system functions will be exercised. The system will be tested under normal operating conditions for a period of 30 days.

Future Developments:

Future developments beyond the initial scope of the project are not yet anticipated.

SANTA CLARA COUNTY SMART VEHICLE

CA-06-0242 and CA-26-0007

RECIPIENT: Division of New Technology and Research of the California Department of Transportation

OTHER PARTICIPATING AGENCIES: Santa Clara County Transportation Authority, Outreach Paratransit Broker, Trimble Navigation, UMA Engineering, Navigation Technologies, Volpe National Transportation Systems Center (VNTSC), and Federal Transit Administration (FTA)

LOCAL CONTACT: Cliff Loveland (916) 654-9970

FTA CONTACT: Ron Boenau (202) 366-0195

Project Description:

This project will use global positioning system (GPS) technology for automatic vehicle location (AVL) operation of a paratransit system in conjunction with bus, light-rail, and train operation. The service provided will allow disabled travelers to request specific transportation service. A vehicle will be routed and, where appropriate, the traveler would be transferred to a fixed-route mode. Use is made of AVL technology, demand-responsive dispatching software, and a navigable map database which allow the closest available vehicle nearest a requester to be dispatched.

Status as of: October 1995

GPS hardware is being installed on a portion of the fleet with a "Next Stop" display being planned for operational testing. Routing software has been installed and is being tested with initial operation planned for late 1995.

Future Developments:

Expansion of the AVL equipment to the entire fleet will allow full utilization of the transportation services provided.

ORANGE COUNTY SMART VEHICLE

RECIPIENT: California Department of Transportation

OTHER PARTICIPATING AGENCIES: Federal Transit Administration; Orange County Transit District, FHWA, Caltrans

LOCAL CONTACT: Dean Delgado (714) 560-5744

FTA CONTACT: Ron Boenau (202) 366-0195

Project Description:

This 1-1/2 year project further develops a concept plan by designing and implementing a real-time information service to be provided to the transit system, to traffic operations personnel, and to travelers in a variety of ways including at bus stops, transfer centers, and on transit vehicles. The information sources to be used will include the City of Anaheim, the Orange County Transit District and the California Department of Transportation. A central Traveler Information System will be used. A limited number of transit vehicles will be equipped with AVL devices and used as probes. The resulting information will be combined with traffic data and disseminated to the transit agency, the highway agency and the traveling public. The City of Anaheim has one of California's most advanced traffic management systems and has been selected by Caltrans as a testbed. This project is part of the California Advanced Public Transportation System (CAPTS) series of projects.

Status as of: October 1995

The concept planning work has been completed. An RFP was prepared for release to select a systems manager. Design work is underway with implementation expected to be complete in 12 months. An independent evaluation is planned by Caltrans.

Future Developments:

Future activities include the possibility of equipping the entire fleet with AVL devices and providing continuous, systemwide real-time information to travelers, the transit system, and traffic operations.

ANN ARBOR SMART INTERMODAL

MI-26-0003

RECIPIENT: Ann Arbor Transportation Authority (AATA), Ann Arbor, Michigan

OTHER PARTICIPATING AGENCIES: Federal Transit Administration; City of Ann Arbor; University of Michigan

LOCAL CONTACT: Bill Hiller (313) 973-6500

FTA CONTACT: Sean Ricketson (202) 366-6678

Project Description:

This project will report the Ann Arbor Transportation Authority's (AATA) conduct of an operational test of the Smart Bus concept. Included are an on-board bus communication and navigation system, a central control system, and a "Smart Card" fare collection the on-board system monitors actual performance in regard to route, location, speed, and status of mechanical systems. It will allow control of on-board electronics, such as the fare collection system, designation sign and enunciator. The on-board system will also enable buses to interact with traffic signal preemption devices and to communicate with the central control system. The central control system will then integrate the data from the bus fleet for coordinated supervision, and will also provide real-time transit information to the public. The "Smart Card" fare system will provide a dual farecard/parking pass to encourage auto drivers to ride transit by providing them an easy cost-saving method for fare payment.

Status as of: November 1995

A Request for Proposals has been released, contractor selection is expected to be complete by early 1996.

Future Developments:

The operational test will be evaluated through the Volpe National Transportation Systems Center to provide a critical analysis of systems and technologies. The evaluation will identify problems in the implementation and use of smart cards, and will make recommendations for future research and testing.

CHATTANOOGA SMART CARD

TN-26-0003

RECIPIENT: Chattanooga Area Regional Transportation Authority

OTHER PARTICIPATING AGENCIES: Federal Transit Administration

LOCAL CONTACT: Art Barnes (615) 629-1411

FTA CONTACT: Sean Ricketson (202) 366-6678

Project Description:

This project will assist the Chattanooga Area Regional Transportation Authority (CARTA) in its ongoing "Downtown Parking and Circulator" effort. This project will support the planning and development of a smart card fare and parking system to be used to increase the appeal of transit and park-and-ride lots in the downtown area. The project will examine using smart cards for both the payment of parking fees and for transit fares on the downtown circulator. Presently, CARTA provides a downtown shuttle system that runs from the north end of downtown to the south end. CARTA is constructing "auto intercepts," or park and ride-lots located at key entry points into the downtown area. These intercepts will relieve congestion and act as boarding areas for public transportation. The Chattanooga Smart Card project will tie into this developing effort.

Status as of: November 1995

Analysis of card systems is complete; system development is underway.

Future Developments:

Based on the results of the initial analysis, the feasibility of deploying an advanced fare media for other CARTA transit services may be examined.

CHICAGO SMART INTERMODAL

IL-26-0001

RECIPIENT: Chicago Transit Authority

OTHER PARTICIPATING AGENCIES: Federal Transit Administration and City of Chicago Department of Public Works and Department of Streets and Sanitation

LOCAL CONTACT: Ron Baker (312) 664-7200 x-4105

FTA CONTACT: Sean Ricketson (202) 366-6678

Project Description:

This cooperative agreement supports data collection and evaluation of an operational test of a Bus Service Management System (BSMS) by the Chicago Transit Authority (CTA). The CTA is in the process of creating a BSMS which includes procuring an Automatic Vehicle Location (AVL) system, a computer-assisted dispatch and control system, real-time passenger information signs, and a traffic signal preemption system. The installation will include up to 162 buses, 5 intersections, and two bus stops. The initial demonstration phase is being funded locally by the Regional Transportation Authority (RTA). In addition to supporting data collection and evaluation, this cooperative agreement is to document the implementation of the BSMS, and to analyze the BSMS human factors element to assess the effects of introducing video terminals and information systems into the transit dispatching environment.

Status as of: November 1995

The CTA is evaluating RFP results. Announcement is expected to be made by January 1996.

Future Developments:

After system selection and procurement, the operational test and subsequent evaluations will take place. The results of the evaluations will be made available through conferences, seminars, and written reports.

DELAWARE COUNTY RIDETRACKING

PA-26-2900

RECIPIENT: Delaware County Community Transit, Delaware County, Pennsylvania

OTHER PARTICIPATING AGENCIES: Federal Transit Administration; EG&G Dynatrend

LOCAL CONTACT: Judy McGrane (610) 532-2900

FTA CONTACT: Sean Ricketson (202) 366-6678

Project Description:

This project will develop and evaluate an automated identification and billing system (AIBS) for paratransit service. The AIBS will automate existing processes using advanced technology for the identification of passengers, the accounting and billing data collected on each passenger trip, the reporting required for coordination with various transportation suppliers and internal performance monitoring. Elimination of manual processes, including eligibility verification and reconciliation of trip information for billing purposes, will result in system efficiency and cost saving.

Status as of: November 1995

A contractor has been selected and system installation is underway. Estimated completion is Summer, 1996.

Future Developments:

Based on the results of the AIBS system, applications of similar systems for other paratransit services will be examined.

DELAWARE SMART DART

RECIPIENT: Delaware Department of Transportation

OTHER PARTICIPATING AGENCIES: Delaware Transportation Authority, Delaware Area Regional Transit, Electronic Payment Services, Federal Highway Administration, Federal Transit Administration, GFI Genfare, Wilmington Trust Bank

LOCAL CONTACT: Wayne Spaulding (302) 739-4593

FTA CONTACT: Sean Ricketson (202) 366-6678

Project Description: This project will operationally test smart card technology in a transit application in Wilmington, Delaware. A smart card fare collection system will be developed for the Wilmington bus fleet. An Employee Commute Option (ECO) program will be created that allows employers to provide transit benefits through the smart card system which facilitates the administration of transit benefits. The ECO program was developed as a response to the Clean Air Act of 1992, and the program will allow participating employers to qualify for tax credits based on the level of employee participation in the program.

Status as of: November, 1995

The draft evaluation strategy is complete. System design is 90% complete. Negotiations to finalize contracts among private sector participants are continuing.

Future Developments: The operational test is a full-scale implementation on DART's 135-bus fleet. Future possibilities include integrating the smart card system into multimodal applications such as electronic toll collection and parking.

TWIN CITIES' TRAVLINK AND GENESIS EVALUATION

MN-26-7000

RECIPIENT: Regional Transit Board, St. Paul, Minnesota

OTHER PARTICIPATING AGENCIES: Federal Transit Administration; Federal Highway Administration, Minnesota Department of Transportation; Metropolitan Transit Commission; University of Minnesota

LOCAL CONTACT: Marilyn Remer (612) 282-2469

FTA CONTACT: Sean Ricketson (202) 366-6678

Project Description:

This project will support data collection and evaluation for the ITS Operational Test "Travlink" and "Genesis". Travlink is an automatic vehicle location and information system providing real-time transit and traffic data to travelers at home, work, and at transit terminals. Travlink will test the integration of various advanced technologies into a comprehensive system for increasing transit ridership by providing better information to the traveler. Genesis will test the effectiveness of a personalized real-time, route-specific information system for highways and public transportation. The data collection and evaluation effort supported by this cooperative agreement will be in conjunction with the Volpe National Transportation Systems Center's National Evaluation Plan, ensuring consistency with other operational test evaluations. This effort will also disseminate evaluation data to other transportation agencies considering similar systems.

Status as of: November 1995

Evaluation strategy is complete. The operational test is underway and will continue for a period of one year.

Future Developments:

The operational tests are in their initial stages, and future developments will be based on test results.

WASHINGTON DC ADVANCED FARE MEDIA

RECIPIENT: Washington Metropolitan Area Transportation Authority

OTHER PARTICIPATING AGENCIES: Federal Transit Administration

LOCAL CONTACT: Ramon Abromovich (202) 962-5274

FTA CONTACT: Irv Chambers (202) 366-0238

Project Description:

In 1992, Congress mandated \$1,000,000 to the Washington Metropolitan Area Transit Authority (WMATA) to develop and demonstrate an advanced Integrated Fare Collection Systems that would employ advanced technologies, improve security, and allow the sale and use of long term transit pass while assuring reliability and security against fraudulent abuse. WMATA selected Cubic's new Go-Card System, a proximity reader/encoder that activate the fare gates when the passenger holds the pass within inches of the reader. The fare media will also debit the card on exiting the system and have the capability to integrate the fare collection system throughout the Authority by allowing passengers to use the same fare media to pay for Metrorail, Metrobus, and parking. The new system will be installed in both directions of at least two aisles on as many as possible of the 93 mezzanines at the 70 stations. The system will work in conjunction with or in addition to the equipment currently being used, and will not reduce the capabilities of the existing equipment.

Status as of: November 1995

Fare collection equipment has been installed at 29 Metro stations, on 21 buses and at 5 parking lots. The system was installed and put into operation February 6, 1995 for a one year demonstration period.

Future Developments:

The fare collection system is be considered for wider adoption by WMATA. The system may also encourage cooperation among area transit providers seeking an integrated fare collection system that allows a common fare medium to be used among multiple operators.

ATLANTA ITS PROJECT

GA-03-0053

RECIPIENT: Metropolitan Atlanta Rapid Transit Authority, Atlanta Georgia

OTHER PARTICIPATING AGENCIES: Federal Highway Administration and Volpe National Transportation Center

LOCAL CONTRACT: Gerald Pachucki (404) 848-5320

FTA CONTACT: Denis Symes (202) 366-0232

Project Description:

This project involves an intermodal Intelligent Transportation System (ITS) project consisting of several inter-related systems. The Metropolitan Atlanta Rapid Transit Authority (MARTA) is installing a transit fleet management system on a portion of its 680 buses. This system will include automatic vehicle location (AVL) on 250 buses, in-vehicle signs and annunciators on 100 buses, 15 wayside passenger information signs at major boarding points, and automatic passenger counters (APC) on 10 buses. The communication system will also be upgraded to transmit data from these components. MARTA is also developing a Trip Itinerary Planning System that will permit travelers to plan origin to destination trip itineraries using Smart Kiosks (200), personal computers, and telephones. The purpose of this project is to improve on-time schedule adherence and improve passenger information.

The FHWA is cooperating with the Georgia Department of Transportation in the development of an Advanced Traffic Management and Incident Detection System. Data from these systems will be shared as part of a Core Infra-structure and presented to travelers. Data on traffic flows, transit operations, incidents will be shared between systems so information can be developed to improve travel within the Atlanta metropolitan area.

Status as of: November 1995:

System design is complete. The new communication system links are installed at radio sites; modifications of bus radios has begun. Factory system integration tests have been successfully completed. Vehicle equipment installation will start in December 1995.

Future Developments:

The system will be expanded to the entire MARTA bus fleet of 680 buses.

OPERATIONAL TEST EVALUATION

RECIPIENT: Volpe National Transportation Systems Center

OTHER PARTICIPATING AGENCIES: Cambridge Systematics, Inc.; Castle Rock Consultants; Multisystems, Inc.; Texas Transportation Institute.

LOCAL CONTACT: Robert Casey (617) 494-2213

FTA CONTACT: Ron Boenau (202) 366-0195

Project Description:

This project evaluates selected APTS operational tests. Project evaluation is the link between operational tests and technology transfer in the APTS Program. It serves as the bridge between the conduct of a particular operational test and understanding the actual performance at the site, as well as potential effectiveness at other locales. Specific objectives for each test are identified along with measures of effectiveness to communicate results to all interested professionals. National objectives are compared with the local objectives for the test. Key issues are being evaluated for each test site ranging from the reliability of particular new technologies in transit applications to the effectiveness of new service and management methods made possible by the technologies. Crosscutting studies will be initiated to develop a national set of insights across different site conditions.

Status as of: October 1995

Evaluation guidelines for selected APTS projects have been developed and site specific evaluations are being performed at 13 sites. Final evaluation plans have been developed for the Bellevue (WA) Smart Traveler, the Denver (CO) Smart Vehicle, and the Houston (TX) Smart Commuter projects. A draft evaluation plan has been produced for the Santa Clara County (CA) Smart Paratransit project and the King County (WA) Smart Vehicle project. Evaluation strategies have been prepared for the Sacramento (CA) Dynamic Ridesharing, the Winston-Salem (NC) Mobility Management, the Rogue Valley (OR) Mobility Management, the Dallas Smart Vehicle, the Milwaukee (WI) Smart Vehicle, and the Ann Arbor (MI) Smart Intermodal projects.

Future Developments:

A comprehensive national data base for APTS operational test results is in the early stage of development. Additional projects for the development of an evaluation strategy and evaluation plan include the Delaware Smart Card, the Denver (CO) Passenger Information, the Northern Virginia Rideshare/Flexible Service, the Ontario (CA) Smart Vehicle, the Oakland County (MI) Smart Vehicle, the Delaware County (PA) Ridetracking, and the Montgomery County (MD) Smart Intermodal projects.

TECHNOLOGY RESEARCH

RECIPIENT: Volpe National Transportation Systems Center

OTHER PARTICIPATING AGENCIES:

LOCAL CONTACT: Robert S. Ow, (617) 494-2411

FTA CONTACT: Denis Symes, (202) 366-0232

Project Description:

Under this project, various new technologies will be evaluated for their potential benefit to transit and studies will be performed to support and facilitate the application of the technologies to public transportation. Studies to be performed will address APTS benefits, inventory of deployed or planned APTS type systems, transit system architecture requirements, frequency spectrum requirements and allocations, multi-modal fare/toll payment smart cards, and map and spatial database requirements. As part of this effort, the Volpe Center will administer Working Advisory Group 8 (Public Transport and Emergency Services) of the ISO Technical Committee 204 and support FTA APTS outreach activities and the ITS America APTS Committee.

Status as of: December 1995

Participation in and support to the national ITS system architecture development program has continued. In addition to representing FTA and transit interests in Phase II of the architecture program, contributions were made in the areas of vehicle-to-roadside communications, architecture modeling, standards, and outreach. A paper on transit-related architecture issues together with recommendations has been prepared. Work on smart cards have focused on completion of six case studies of smart card applications and oversight of operational tests in Ventura and Santa Barbara Counties. Efforts have begun to assemble experts and other delegates for ISO WAG-8. In the frequency spectrum area, support to a Transit Cooperative Research Program project to study the impact of radio frequency refarming on transit communications is near completion. Work is also near completion on updating the state-of-the-art report on APTS technologies. Anecdotal APTS benefits are being collected and compiled on an ongoing basis. Information is being assimilated to develop an APTS inventory.

Future Developments:

Work on the transit system architecture will continue to foster in a proactive manner the consideration of transit needs and considerations as the national architecture evolves. An international workshop will be organized and held on smart cards. Operational tests of smart cards in Ventura and Santa Barbara Counties will continue. Emphasis on identifying APTS benefits and conducting outreach activities will continue including an assessment on APTS benefits and development of an APTS inventory. The updated state-of-the-art report as well as a number of technical briefs will be published. Work on ISO WAG-8 will continue.