

EDAPTS Smart Transit System

65A0061; Fall 2003

Intelligent Transportation Systems solutions for the small transit provider.

Why We Pursued This Research

Transit users in small urban and rural communities often face significant problems when trying to use transit as a viable mode of transportation. The uncertainty of simply catching a bus that may come by only once every two or three hours is one of them. It's the old "Have I missed the bus?" question with a uniquely rural twist — a really long wait. At the same time, the small transit system operator typically has problems just maintaining schedules when buses are on long headway sections of a route and is faced with heightened safety concerns for drivers and passengers in remote areas. To help build reliable service and increase ridership these problems must be dealt with efficiently and effectively.

Intelligent Transportation Systems (ITS) may offer solutions to some of these problems. However, when small urban and rural transit agency managers are asked the question, "Why don't you make more use of ITS technology to resolve operational and customer service problems?" the answer usually contains concerns over the high cost and complexity of the systems needed to implement the solution. The stigma of cost and complexity is keeping the ITS market from developing in these smaller markets. To investigate ways of overcoming these concerns for the small operator, the California Department of Transportation teamed with California Polytechnic State University at San Luis Obispo and the City of San Luis Obispo Transit (SLO Transit) on the Efficient Deployment of Advanced Public Transportation Systems (EDAPTS) Research Project

What We Did

In assessing this unique small transit environment, the team identified operational and customer service problem areas where ITS might help, developed unique conceptual solutions, and tested their effectiveness in a real world environment.

The team started with two basic ground rules:

1. ITS solutions must be (a) low cost, (b) easily configurable to local needs, and (c) non-proprietary.
2. System performance trade-offs that significantly reduce costs can be made if they do not adversely impact the usefulness of the deployed system.



The EDAPTS Smart Transit Sign at City Hall in downtown San Luis Obispo, California

In discussions with transit agency managers and stakeholders the team found that:

- **Low cost** means not just low purchase price, but low life cycle cost – especially low cost of operation, and maintenance.
- **Easily adapted** means expandable or contractible configurations that include only those capabilities most in need at the time of purchase. Standard, plug-in modules and sub-assemblies expand system performance when funding becomes available or new needs arise .
- **Non-proprietary** means that the solution is free from restrictive intellectual property rights clauses that (a) prohibit efficient interfacing with other systems, (b) restrict system modifications that accommodate changing agency needs, or (c) otherwise limit the use, operation, and maintenance of the systems .

EDAPTS ITS solutions use the FHWA National ITS Architecture Guidelines and the Transit Coordinated Interface Protocol (TCIP) as integral elements of the design. These conceptual designs incorporated novel, cost saving approaches such as transmission of digital data by time-sharing the current analog RF voice radio link, using a single text paging service to simultaneously update bus arrival data at all bus stops, and using solar power for the dynamic messaging signs at bus stop signs to allow their installation anywhere.

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EDAPTS
Project Fact Sheet

Project Goals

- Safety:** *Achieve the best safety record in the nation*
Flexibility: *Make transit a more practical travel option.*
Productivity: *Improve the efficiency of the transportation system*

Research Test System

The research test system design incorporated the following ITS capabilities:

- Automatic Vehicle Location (AVL) using the Global Positioning Satellite (GPS) system.
- Dynamic Messaging Signs (DMS) to display real time bus arrival information at bus stops.
- Solar power option for the DMS to allow installation at remote, unpowered bus stops.
- Central dispatch software and web page showing current bus locations and schedule adherence data.
- Silent emergency alarm for problems requiring emergency services.
- RF modem for transmission of digital data over the voice radio link.
- Mobile Data Terminal (MDT) to monitor bus data sources, display information to drivers, and interface with the RF modem.
- Card reader for magnetic or electronic fare media.
- Keypad for bus driver inputs.
- Accurate time using GPS time base.

to determine how effective the systems were in improving service and solving operational problems. Changes in safety, operational efficiency, employee satisfaction, and customer service level were selected as performance measures. The results were overwhelmingly positive.

Following completion of the research project, all field test assets were turned over to the local partners who continue to use it in the daily operation of the transit system. The local partners have independently enhanced the system with new functions that provide real-time bus pass verification.

What We Concluded

Focused performance vs. cost trade-offs can significantly lower the life-cycle cost of ITS ownership in the small transit environment without impacting performance. The EDAPTS project, has shown that designs taking advantage of unused operational capacity can help bring the advantages of ITS to this currently underserved market area. It has also shown that smaller agencies are interested in using technology to help them solve day-to-day operational problems and better serve their customers - when it is affordable.

"EDAPTS...helps all the riders."

Mayor Dave Romero; City of San Luis Obispo

A field test of the EDAPTS design was done using equipment assembled from commercial off the shelf parts, material, and sub-systems. The hardware was coupled with non-proprietary transit management software developed by Cal Poly. Test systems were installed on the SLO Transit bus fleet and critical performance parameters were measured. Transit riders and agency personnel were surveyed

Recommendations

Initial discussions with private industry representatives indicate that the EDAPTS designs have significant commercial product appeal. Technology transfer funding should be used to commercialize EDAPTS concept designs.

Implementation Strategies

Use pooled fund studies, partnerships with private industry, and associations with public/private cooperatives to bring the EDAPTS designs into the marketplace.

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