Perspectives on Intelligent Transportation and Telematics

Workshop on Intelligent Transportation and Telematic Systems
University of California, San Diego

Ronald E. Boenau, P.E.
Federal Transit Administration
U.S. Department of Transportation

October 19, 2001
Presentation Overview

• Vision
• Current Status
• ITS Benefits
• U.S. DOT Programs to Accelerate Implementation
• National ITS Architecture
• ITS Standards
• Transportation Safety & Security
• Partnerships
• Strategic Goals
• Use of Technologies
  – Fleet Management Example (ADART)
  – Traveler Information Example (511)
• Integration
Vision: Strategic Goals

- Safety
- Mobility
- Economic Growth
- Human and Natural Environment
- National Security
- Organizational Excellence
Vision: Use of Technologies

• Fleet Management Systems [buses, commercial vehicles, maintenance fleets, etc.]
  – Automatic vehicle location (AVL) systems
  – Operations software
  – Communications systems
  – Geographic information systems (GIS)
  – Automatic passenger counters (APC)
  – Traffic signal priority (TSP)
Vision: Use of Technologies

• Traveler information Systems
  – Pre-trip & multi-modal
  – In-terminal/ wayside
  – In-vehicle
• Electronic Payment Systems [fares, tolls, retail sales, etc.]
• Intelligent Vehicle Initiative (IVI)
• Traffic Management Systems [freeway, arterial, emergency services, etc.]
Vision: Autonomous Dial-A-Ride Transit (ADART)

- Modern version of dial-a-ride transportation
- Employs fully automated entry-order and dispatching systems that reside on-board the transit vehicle
- Efficiently serves travel demand in a large geographic area without the need of formal dispatch
- Project phasing:
  - Phases I & II: research
  - Phase III: systems engineering, and deployment & testing
  - Phase IV: revenue operations
Vision: Autonomous Dial-A-Ride Transit (ADART) [con’t]

Benefits:

– Provides better service than conventional dial-a-ride service at a lower operating cost
– Increases driver productivity and reduces total manpower needs
– Provides potential for transportation service in low-density areas
– Increases the level of service provided to the elderly, disabled, and financially disadvantaged
Vision: 511

• A National Traveler Information Number.
• FCC assigned 511 with responsibility to government transportation agencies in July 2000 with a review of the implementation status in five years.
• Current grant program for statewide implementation with an anticipated model deployment grant program to be initiated.
• National launch set for early Spring 2002
• Current activities:
  – Early Adopters Evaluation
  – Development of Guidance
  – Testing of XML Conversion of ATIS Message Sets
  – ATIS Data Fusion Guidelines
Vision: Integration

• ITS as an example:
  – Migration from single mode to multimode
  – Migration from urban focus to urban and rural focus
  – Migration from technology focus to service focus
  – Migration from the transportation community to include the non-traditional transportation community
  – Migration from an infrastructure focus to include a vehicle focus
  – Migration from a hardware [infrastructure] focus to include an infostructure focus
• Achieve integration by combining components to leverage impact and conserve costs.
• Standards provide the mechanism to integrate systems from different manufacturers and to integrate systems within a vehicle.
• Dedicated Short Range Communication (DSRC) is one example of a service that needs to be integrated through the use of standards [e.g. fare payment, transportation systems operations, signal priority].
Current Status

• U.S. DOT is tracking progress toward achieving the goal of deploying ITS infrastructure in the nation’s largest metropolitan areas

• Tracking:
  – 78 largest metropolitan areas
  – Level of ITS component deployment
  – Level of integration between agencies that operate the infrastructure
  – Level of integrated deployment
  – Uses high, medium, and low deployment indicators
  – 9 key infrastructure components
Current Status

National Component Summary Indicators

- Freeway Management
- Incident Management (Freeways)
- Arterial Management
- Electronic Toll Collection
- Transit Management
- Electronic Fare Payment
- Highway-Rail Intersections
- Emergency Management
- Regional Multi-Modal Traveler Information

Percent Deployed

1997
1999
2000
2005 Estimated
Current Status

National Progress in Integrated Metropolitan ITS Deployment

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Level of Deployment:
- Pink: Low
- Green: Medium
- Blue: High
ITS Benefits

• Transit Passengers:
  – Increased safety & security
  – Increased customer convenience
  – Seamless multi-agency/multi-modal service
  – Reduced travel time
  – Improved transit information

• Transit employees:
  – Increased safety
  – Reduced stress
ITS Benefits [con’t]

• Transit agencies:
  – Increased operational productivity & efficiency
  – Increased transit operating speeds
  – Decreased operational costs
  – Lower maintenance costs
  – Decreased revenue losses
  – Increased ridership
  – Decreased vandalism & other crimes
  – Improved transportation data

• Additional benefits are provided on the Transit ITS Impacts Matrix Web Site at www.mitretrek.org/its/aptsmatrix.html
ITS Benefits [con’t]

• Traffic management personnel provide information for:
  – Traffic operations
  – Emergency response personnel
  – Traveling public

• Technologies central to most ITS applications:
  – Sensing [vehicle position and velocity]
  – Communicating [transportation centers to infrastructure, infrastructure to vehicle, vehicle to vehicle]
  – Computing [processing large amounts of data]
  – Algorithms [computerized methods for dynamically operating transportation systems]
Acceleration of Implementation

• ITS Research and Development
• ITS Deployment Program
• Transit Technology Summit and Showcase
  – Will highlight innovative technology from U.S. based companies that have made or promises to make significant improvements in transit systems safety, passenger security, mobility and accessibility, economic growth and trade, energy conservation, and pollution abatement
  – 4 general sessions to discuss selected technology & technology deployment issues
  – In conjunction with APTA Annual September 23-25, 2002
National ITS Architecture

• Policy
• Guidance
National ITS Architecture Policy

- FTA National ITS Architecture Policy on Transit Projects, and companion FHWA Rule, became effective on April 8, 2001
- Requires development of regional ITS architectures
- Prior to adoption of a regional ITS architecture, requires development of a project level architecture for major ITS projects
National ITS Architecture Policy

- Requires a systems engineering analysis for ITS projects
- No specific documentation is required – must be able to demonstrate compliance
- Policy can be accessed from the FTA Web site at www.fta.dot.gov
National ITS Architecture Policy Guidance (under development)

Guidance focuses around 4 areas:

- Determining if the policy requirements are applicable
- Identifying the status of the regional ITS architecture development
- Determining if the ITS elements are reflected in federal funding requirements
- Determining if the policy’s project implementation requirements are being met
National ITS Architecture Policy Guidance (under development)

- Federal role: offer guidance and assistance on meeting the architecture conformity requirements through oversight integrated with the normal FTA oversight procedures.
- Transit agency role: work with regional partners to develop a regional ITS architecture and meet other project level requirements.
ITS Standards

• Overview
• Application Areas
• TCIP
ITS Standards: Overview

• Allows the exchange of ITS data and encourages the interoperability of ITS systems
• Development of about 90 non-proprietary, industry-based, consensus standards
• Status: 39 published, 12 approved, 15 ballot, 24 under development
• Standards program is maturing from standards development to deployment
• U.S. DOT providing deployment support
• More information: www.its-standards.net
# ITS Standards: Application Areas

<table>
<thead>
<tr>
<th>National ITS Architecture Interface Class</th>
<th>Standards Application Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center-to-Roadside</td>
<td>• Data Collection &amp; Monitoring&lt;br&gt;• Dynamic Message Signs&lt;br&gt;• Environmental Monitoring&lt;br&gt;• Ramp Metering&lt;br&gt;• Traffic Signals&lt;br&gt;• Vehicle Sensors&lt;br&gt;• Video Surveillance</td>
</tr>
<tr>
<td>Center-to-Center</td>
<td>• Data Archival&lt;br&gt;• Incident Management&lt;br&gt;• Rail Coordination&lt;br&gt;• Traffic Management&lt;br&gt;• Transit Management&lt;br&gt;• Traveler Information</td>
</tr>
<tr>
<td>Center-to-Vehicle/Traveler</td>
<td>• Mayday/Site Surveillance&lt;br&gt;• Traveler Information&lt;br&gt;• Transit Vehicle Communications</td>
</tr>
<tr>
<td>Roadside-to-Vehicle</td>
<td>• Toll/Fee Collection&lt;br&gt;• Signal Priority</td>
</tr>
<tr>
<td>Roadside-to-Roadside</td>
<td>• Highway Rail Intersection</td>
</tr>
</tbody>
</table>
ITS Standards: TCIP

• Transit Communications Interface Profiles (TCIP)
  – Suite of standards covering different business areas of transit
  – Allow users to communicate data between:
    – Different departments of a transit agency
    • Transit operating agencies
    • Transit agencies and other modal agencies

• TCIP published standards:
  – Common Public Transportation Objects
  – Incident Management Business Area Standard
  – Passenger Information Business Area Standard
  – Scheduling/Runcutting Business Area Standard
  – Spatial Representation Standard
ITS Standards: TCIP

• The remainder of the business area object set standards will be published in late fall 2001

• FTA will provide training in implementation of transit ITS standards beginning in late fall 2001
Safety & Security

• Expanded scope of safety and security
• FTA Safety & Security program focuses on:
  – Crime Prevention and Anti-terrorism
  – Information Systems Security
  – Intelligent Vehicle Initiative (IVI)
  – Railroad Safety Program
  – Railroad Grade Crossing Safety
  – Rail Vehicle Materials Safety
  – Train Control Centers Safety
• Each area involves the use of technologies to address a variety of problems facing transit agencies
• Program goal: to achieve the highest practical level of passenger safety & security
Partnerships

- ITS Integration Program
- FTA Joint Partnership Program (JPP)
- FTA Adopt-A-University
FTA Joint Partnership Program (JPP)

- Provides federal support for transit innovations through public/private partnerships
- Primary deployment mechanism for activities of the FTA National Research and Technology Program
- Consortium members provide 50% of costs
- Allows for retention of patents and intellectual rights
- Based on competitive selection process
FTA Adopt-A-University Partnership

- Provides access to FTA staff for higher educational institutions
- Complements the U.S. DOT’s education and Garrett A. Morgan initiatives
- Ensures that the transportation industry continues to attract young people eager for careers of promise and opportunity
- Enhances the programs of participating educational institutions and the FTA