Intelligent Transportation Systems (ITS) in National Parks & DOI Public Lands – 2010 Update

David Jackson
Michael Clark

August 3, 2010

John A. Volpe National Transportation Systems Center
Research and Innovative Technology Administration
U.S. Department of Transportation
Outline

1. ITS in National Parks & DOI Public Lands - Summary
2. Core Technologies
3. ITS in National Parks & DOI Public Lands – Next Steps
ITS in National Parks & DOI Public Lands – 2010 Update Purpose

• Update 2005 Inventory of ITS deployments on Public Lands

• Identify benefits & costs to Public Land units

• Provide deployment guidance to units desiring to deploy advanced technologies
<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Travel Information Kiosks</td>
<td>37%</td>
</tr>
<tr>
<td>Route Guidance</td>
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</tr>
<tr>
<td>Trip Planning tools</td>
<td>24%</td>
</tr>
<tr>
<td>Variable/Changeable Message Signs</td>
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</tr>
<tr>
<td>Interpretive Signage</td>
<td>Concept</td>
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<tr>
<td>Highway Advisory Radio</td>
<td>Planning</td>
</tr>
<tr>
<td>511 System Integration</td>
<td>Implementation</td>
</tr>
<tr>
<td>Parking Management/Availability</td>
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<td>Traffic Monitoring System</td>
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<tr>
<td>Incident Management System</td>
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<tr>
<td>Construction management/information</td>
<td>Planning</td>
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<tr>
<td>Automated Entry System</td>
<td>Concept</td>
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<td>Fleet Management</td>
<td>Concept</td>
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<td>Transit Management</td>
<td>Planning</td>
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<td>Vehicle Tracking System</td>
<td>Planning</td>
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<td>Transit Management</td>
<td>Planning</td>
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<td>In-Vehicle Electronic Information</td>
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<tr>
<td>Reservation Systems</td>
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<tr>
<td>ITS Needs Assessment</td>
<td>Concept</td>
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<tr>
<td>Integrate ITS with local DOTs</td>
<td>Planning</td>
</tr>
</tbody>
</table>

2005 Baseline Inventory and Program Assessment
National Parks involve transportation technologies (ITS) to:
National Parks involve transportation technologies (ITS) to:

- Help visitors make travel plans
National Parks involve transportation technologies (ITS) to:

- Help visitors make travel plans
- Facilitate visitor use of alternative transportation systems
National Parks involve transportation technologies (ITS) to:

- Help visitors make travel plans
- Facilitate visitor use of alternative transportation systems
- Alleviate entrance station and parking congestion
- Alert visitors to traffic situations and incidents
National Parks involve transportation technologies (ITS) to:

- Help visitors make travel plans
- Facilitate visitor use of alternative transportation systems
- Alleviate entrance station and parking congestion
- Alert visitors to traffic situations and incidents
- Monitor and manage park traffic and transit operations

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ITS in National Parks & DOI Public Lands – 2010 Update Procedure

• Diverse documents reviewed to identify ITS applications
  – 92 statewide and regional ITS architectures
  – ATPPL and TRIP grants
  – PMIS, TIP, STIP
  – Deployment evaluations

• Coordinating efforts with related analysis and research from Eastern Federal Lands HD, Western Transportation Institute, ITS JPO
ITS in National Parks & DOI Public Lands – 2010 Update Initial Findings

• 70 Public Lands units analyzed
  – ITS had been linked to park in some manner
  – Varying levels of ITS activities
    • Widespread involvement to no involvement

• Only 19 of 92 (21%) ITS Architectures reviewed cited any public lands agency involvement
  – Primarily NPS as a stakeholder
  – Specific deployments not identified
  – 35 Public Lands units with some ITS encompassed in architectures
ITS Architectures Reviewed - Number Reviewed By State (2010)

Statewide ITS Architecture Reviewed

# = Total ITS Architectures Reviewed for State

92 Architectures:
- 30 Statewide
- 62 Regional
Only 19 of 92 ITS architectures cited Public Lands

USFS Units Cited
1. Humboldt National Forest (Las Vegas regional)
2. Toiyabe National Forest (Las Vegas regional)

Regional Units Cited with Broad Parent Agency Involvement
1. Jackson, MS (NPS)
2. Knoxville, TN (NPS)
3. Trenton, NJ (NPS)
4. Washington, DC (NPS)

Statewide Units Cited with Broad Parent Agency Involvement
1. California (National Parks & Forests)
2. Idaho (USFS/BLM)
3. Illinois (National/State Park & Recreation Areas)
4. Maryland (undefined)
5. New Jersey (NPS)
6. West Virginia (USFS)

NPS Units Cited
1. Acadia National Park (Maine statewide)
2. Baltimore-Washington Parkway (Washington, DC regional)
3. Cape Cod National Seashore (Barnstable, MA regional)
4. Glacier National Park (Montana statewide)
5. Golden Gate National Recreation Area (San Francisco regional)
6. Harper’s Ferry National Historical Park (West Virginia statewide)
7. Kings Canyon National Park (Fresno regional)
8. Natchez Trace Parkway (Jackson, MS regional)
9. New River Gorge National Park (West VA statewide)
10. Sequoia National Park (Fresno regional)
11. Yellowstone National Park (Montana statewide)
12. Yosemite National Park (Fresno regional)
13. Zion National Park (St. George, UT regional)
ITS in National Parks & DOI Public Lands – 2010 Update Initial Findings

<table>
<thead>
<tr>
<th>ITS in National Park System Inventory</th>
<th>Travel &amp; Traffic Management</th>
<th>Public Transportation Management</th>
<th>Maintenance &amp; Construction Management</th>
<th>General</th>
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<tr>
<td></td>
<td>Automated Entry System</td>
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<td>51 System Integration</td>
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<td>Highway Advisory Radio</td>
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<td>Trip Planning tools</td>
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<td>Variable Message Signs</td>
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<td>Vehicular Weather Road Condition Information</td>
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<td>Fleet Management</td>
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<td>Construction Management</td>
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<td>Work Zone Management</td>
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<td>Integrate ITS with Local DOTs</td>
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<td>ITS Needs Assessment</td>
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</table>

Legend:
- **●** Essentially Complete or Complete
- **▼** Implementation Planning
- **〇** Identified Need or System Plan

Status of public lands involvement in ITS activities and coordination on a regional or statewide level remains much the same as it did five years ago.
ITS in National Parks & DOI Public Lands – 2010 Update Initial Findings

Deployments:

• 5-1-1 traveler information
  – Most common advanced system
  – Low cost initiative

• Automated reservation system & trip planners
  – Multi-functional applications
  – Links parks to transit & multi-modal regional transportation

• Dynamic Message Signs
  – Available, but use not maximized

• Advanced communications

• Maintenance tracking technologies
  – Work zones
  – Construction management
ITS in National Parks & DOI Public Lands – 2010 Update Initial Findings

511 SF Bay Area:
http://transit.511.org/destinations/index.aspx?#m1=P&did=22

5-1-1 Traveler Information Systems / Regional Trip Planners

Federal Highway Administration:
http://www fhwa dot gov/trafficinfo/511.htm

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Road / Weather Conditions

Great Smoky Mountains National Park – Winter 02-03

- Road Closures
  - Construction Work Zones
  - Traffic Incidents
  - Severe Weather
  - Fire / Landslides

Glacier NP – Going to the Sun Road
Parking Management Systems

Gateway – Sandy Hook

- Called for by MPO plan to prevent traffic backups when parking areas fill up
Parking Management Systems

Gateway– Sandy Hook

- Called for by MPO plan to prevent traffic backups when parking areas fill up
- 17,000 vehicles on peak days; only 4,100 parking spaces
Parking Management Systems

Gateway – Sandy Hook

- Called for by MPO plan to prevent traffic backups when parking areas fill up
- 17,000 vehicles on peak days; only 4,100 parking spaces
- Provides “30-minute” advance warning when beach parking areas will be “full”
ITS in National Parks & DOI Public Lands – 2010 Update Initial Findings

Desired Systems:
• Parking Management & Information Systems
• Social Media Applications
  – Expand Wayfinding / Traveler Information capabilities
• Weather Monitoring & Alert Systems
  – Environmental Sensor Stations
• Transit Management Systems
• Connection to Incident Management Systems
ITS in National Parks & DOI Public Lands
– 2010 Update Initial Findings

Implementation Challenges and Considerations:
ITS in National Parks & DOI Public Lands – 2010 Update Initial Findings

Implementation Challenges and Considerations:
- Context sensitive designs
ITS in National Parks & DOI Public Lands – 2010 Update Initial Findings

Implementation Challenges and Considerations:

- Context sensitive designs
- Few returning visitors in major destination parks
ITS in National Parks & DOI Public Lands – 2010 Update Initial Findings

Implementation Challenges and Considerations:

- Context sensitive designs
- Few returning visitors in major destination parks
- Sparse electrical power
ITS in National Parks & DOI Public Lands – 2010 Update Initial Findings

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ITS in National Parks & DOI Public Lands – 2010 Update Initial Findings

Implementation Challenges and Considerations:

- Context sensitive designs
- Few returning visitors in major destination parks
- Sparse electrical power
- Sparse communications service
- Limited NPS ITS expertise
- Seasonal staff for traffic operations
Implementation Challenges and Considerations:

- Context sensitive designs
- Few returning visitors in major destination parks
- Sparse electrical power
- Sparse communications service
- Limited NPS ITS expertise
- Seasonal staff for traffic operations
- Lack of dedicated funding
ITS in National Parks & DOI Public Lands – 2010 Update Initial Findings

Implementation Challenges and Considerations:

- Context sensitive designs
- Few returning visitors in major destination parks
- Sparse electrical power
- Sparse communications service
- Limited NPS ITS expertise
- Seasonal staff for traffic operations
- Lack of dedicated funding
Outline

1. ITS in National Parks & DOI Public Lands - Summary

2. Core Technologies

3. ITS in National Parks & DOI Public Lands – Next Steps
PROBLEM:
The large number of transportation technologies and their transit applications makes it difficult for transit managers to fully understand what is needed.

REQUEST:
General Managers and other public transit administrators asked the FTA to provide direction as to which of the many transportation technologies to invest.
TRANSIT CORE SUITE OF TECHNOLOGIES

TRANSIT MODES COVERED

- Rural Transit
- Fixed Route Bus
- Demand Response Service
- Rail Transit
- Ferry Boat
- Human Services Transit

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What is a TRANSIT CORE SUITE OF TECHNOLOGY?

A list of basic & key technologies for each type of transit agency

Fixed Route Bus

Rail Transit

Ferry Boat

Rural Transit

Demand Response Service

Human Services Transit

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RURAL TRANSIT Core Technologies

Computer-Aided Dispatch & Scheduling (CADS) +
Mobile Data Terminal +
Geographic Information System (GIS) +
AVL & Data Communications *
Security (Cameras or Silent Alarms) *

Voice Communications
Data Management Software
Pre-Trip Traveler Info Website

* = Core Technology for Large Rural Transit Agencies ONLY
+ = Core Tech NOT for Small Rural Transit

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DEMAND RESPONSE Core Technologies

Computer-Aided Dispatch & Scheduling (CADS) +
Geographic Information System (GIS) +
Maintenance Support Systems +
Data / Text Communications +
Automatic Vehicle Location +
Automated Billing *

Voice Communications

Pre-Trip Traveler Info Website

* = Core Technology for Large Demand Response Transit Agencies ONLY
+ = Core Tech NOT for Small Demand Response Transit Agencies

Radio Dispatcher at TMC

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HUMAN SERVICE TRANSIT Core Technologies

Voice Communications

Data Management Software

Pre-Trip Traveler Info Website

Maintenance Systems / Asset Management *

Geographic Information System (GIS) *

Computer-Aided Dispatch & Scheduling (CADS) *

Text / Data Communications *

Automatic Vehicle Location (AVL) – Mobile Data Terminal (MDT)

* = Core Technology for Large Human Service Transit Agencies or Brokerage Services ONLY

Mobility Manager / Transit Broker

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FERRY BOAT Core Technologies


Automated Transit Information

Weather Information Systems

Advanced (Wireless) Communications

(Large Ferry Agencies Only)

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<table>
<thead>
<tr>
<th>CORE TECHNOLOGY</th>
<th>Fixed Route Bus</th>
<th>Demand Response</th>
<th>Rural Transit</th>
<th>Human Service</th>
<th>Rail Transit</th>
<th>Ferry Boat</th>
<th>TOTAL MODES</th>
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<tbody>
<tr>
<td>1. Automatic Vehicle Location</td>
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<td>✔</td>
<td>✔</td>
<td>6</td>
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<tr>
<td>3. Traveler Information</td>
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<td>4. Data Management - GIS</td>
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<td>5. Electronic Fare Payment</td>
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<td>7. Security Cameras / System</td>
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<td>8. Maintenance Tracking</td>
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<td>9. Advanced Passenger Counters</td>
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<td>10. Traffic Signal Priority</td>
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<td>11. Weather Information System</td>
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<td>✔</td>
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X = Secondary Technology for the Mode

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## Non-Core (Secondary) Technology to Consider

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<tr>
<th>Technology to Consider</th>
<th>TRANSIT MODE</th>
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<tbody>
<tr>
<td></td>
<td>Fixed Route Bus</td>
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<tr>
<td>1. Incident Management</td>
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<tr>
<td>2. Vehicle Safety Enhancements</td>
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<tr>
<td>3. Automated Service Requests</td>
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<td>4. Transfer Protection</td>
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<tr>
<td>5. Transportation Management / Operations Center</td>
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<tr>
<td>6. Grade Crossing Monitoring / Protection System</td>
<td></td>
</tr>
<tr>
<td>7. Parking Management</td>
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</tbody>
</table>

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Outline

1. ITS in National Parks & DOI Public Lands - Summary

2. Core Technologies

3. ITS in National Parks & DOI Public Lands – Next Steps
ITS in National Parks & DOI Public Lands – 2010 Update Initial Recommendations

• Integrate ITS deployments on public lands with regional and statewide ITS architectures.
• Coordinate with State DOTs and local partners to maximize existing regional technologies.
• Pursue investments in regional or statewide 511 systems.
• Partner with agencies which provide transit or multi-modal trip planners.
• Establish a method to track ITS deployments on public lands, including system technical requirements, benefits and costs.
ITS in National Parks & DOI Public Lands – 2010 Update Next Steps

• Conduct interviews with Public Land representatives
  – benefits, costs, impacts and issues encountered
  – Lessons Learned

• Develop full list of ITS in Public Lands

• Identify what technologies are available by other public entities in the region
ITS in National Parks & DOI Public Lands
– 2010 Update Next Steps

• Technology Deployment Guidance for Public Lands Units
  – Best technologies for the type of unit
  – Categories:
    • Visitation levels
    • Congestion levels / number of vehicles (VMT)
    • Transportation options available (ATS, Public Transit, Ferries)
    • Location – urban, suburban, rural, remote

Over 5,000 Public Lands Sites / Units

<table>
<thead>
<tr>
<th>Agency</th>
<th>Sites</th>
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<tbody>
<tr>
<td>NPS Sites</td>
<td>391</td>
</tr>
<tr>
<td>FWS Sites</td>
<td>872</td>
</tr>
<tr>
<td>BLM Sites</td>
<td>886</td>
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<td>ACE Sites</td>
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<td>USFS Sites</td>
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<td>Bureau of Reclamation Sites</td>
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<td>NOAA Sites</td>
<td>38</td>
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<tr>
<td>TVA Sites</td>
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</table>
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