

# Virginia

## Transit Intelligent Transportation Systems Strategic Plan

Presented at ITSVA Information Exchange Forum  
At UVA  
October 30, 2009

# Agenda

## □ Meeting

- ITSVA Welcome
- DRPT ITS Strategic Plan Overview
- DRPT Department Update
- Transit Agency Snapshots
- Discussion and Wrap-up

## □ Presentation

- Background
- Technology Trend Research
- Survey
- Program

# Project Need

## Current - Ad-hoc ITS deployment

- Independent systems
- Varying technology standards
- Difficulties in data sharing
- Limited guidance on project selection
- Barriers to deployment

## Future – Results from Transit ITS Strategic Plan

- Improved program coordination
- Greater return from ongoing and new deployments
- Cost savings
- Phased technology roll-outs that allow for optimization of investments and returns
- Greater consistency in the levels and types of service provided across operators

**DRPT Mission: *Improve the mobility of people and goods while expanding transportation choices in the Commonwealth***

# Project Overview

- ❑ **Many of the 37 Transit operators across Virginia are deploying technology to improve transit service**
- ❑ **Opportunity for coordinated ITS planning and deployment**
- ❑ **DRPT with DMJM / IBI Group team led effort to develop Transit ITS Strategic Plan:**
  - **Statewide Transit System Assessment**
  - **Transit ITS Technology Status**
  - **Statewide ITS Architecture Coordination**
  - **Evaluation and Deployment Strategy**
  - **Plan compilation and review**

# Technology Assessment

## Inventory Transit ITS – Market Trends

### Central Systems

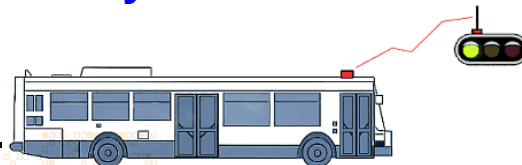
- Communications Systems
- Computer Aided Dispatching (CAD) / Automatic Vehicle Location (AVL)
- Scheduling & Workforce Management Software
- Maintenance Management Systems (MMS)



### In-Vehicle Systems

- Mobile Data Terminals
- Automatic Stop Announcements (ASA)
- Automatic Passenger Counters

### Transit Signal Priority



### Automated Fare Collection

### Security Systems

- On-Board Cameras
- In-Station/Stop Cameras
- In-Station/Stop Emergency Alarms
- Vehicle Alarms



### Advanced Traveler Information

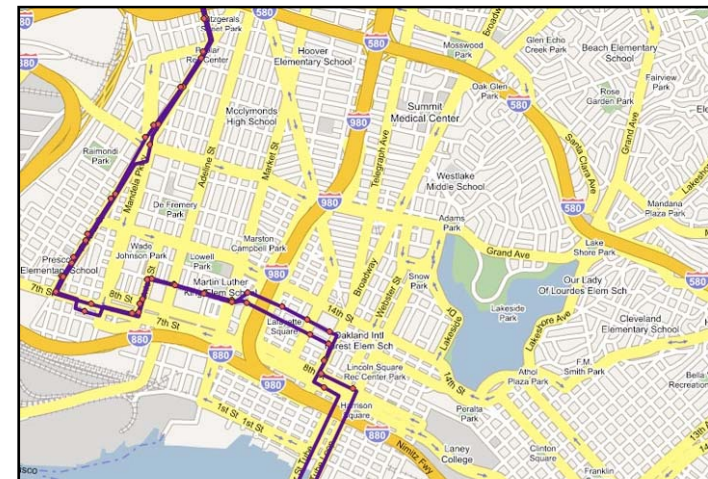
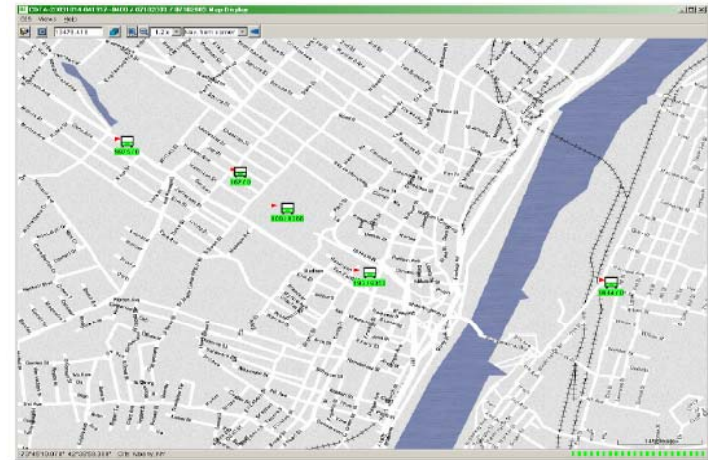
- Next Bus Arrival Displays/Annunciation at Stations
- Real-time Information Provided Online
- Real-time Information Available through Personal Communications Devices
- Interactive Voice Response (IVR) System
- Transit Trip Planner



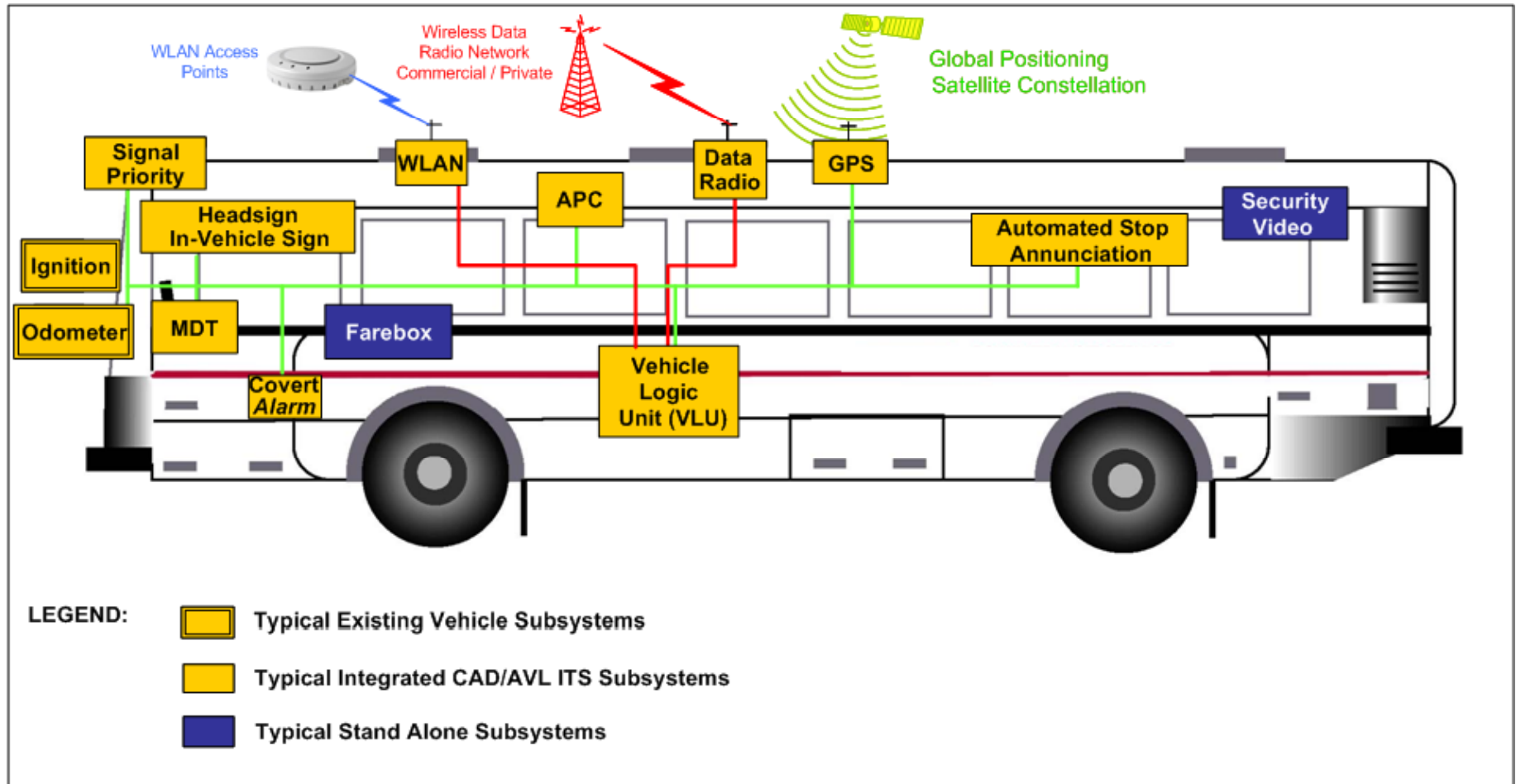
# Central Systems

## Computer-Aided Dispatch /Automated Vehicle Location

- Purchased as a system
  - Central processing
  - Vehicle components
  - Communications
- Modular format
  - Can select functionality required
  - Add functions at a later date
- Scalable

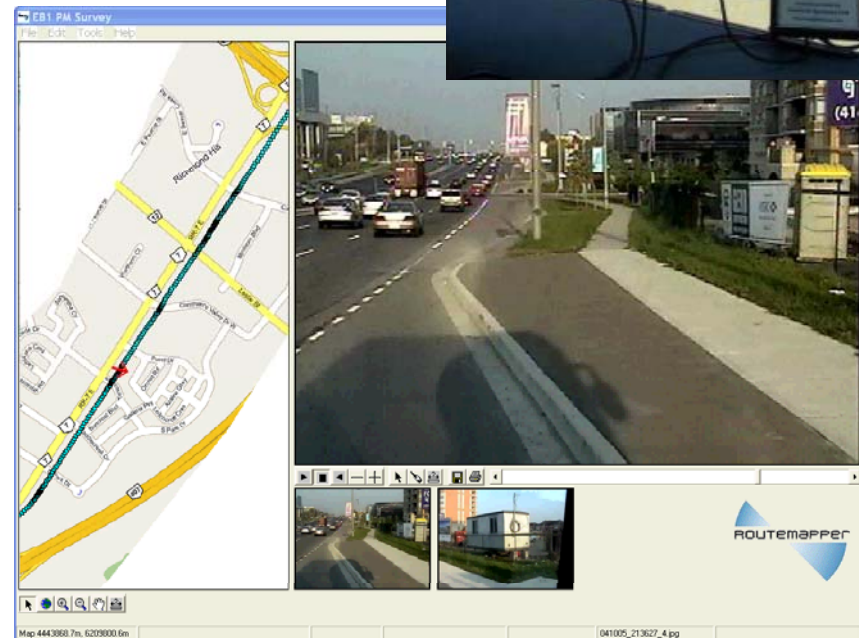
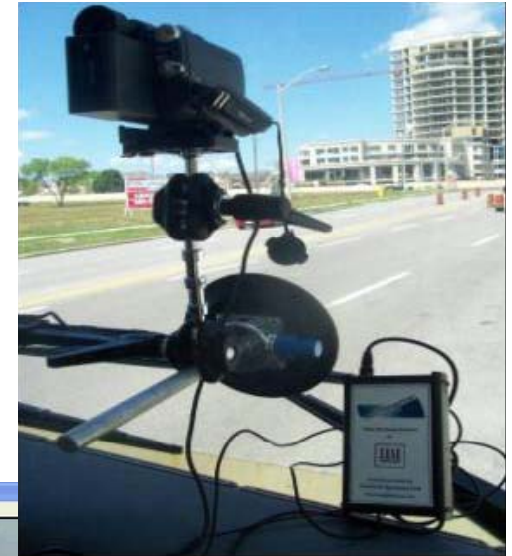


# In-Vehicle Systems



# Transit Signal Priority

Transit signal priority  
recovery logic is the  
most important element  
Extending the green  
generally has less  
impact than shortening  
the red  
Coming to agreement with  
local traffic agencies can  
be challenging  
Important to plan for  
system integration and  
fine tuning of parameters



# Automated Fare Collection

## Smartcards

- Offer benefit of reduced cash handling and reduced equipment maintenance
- Business case for regional multi-agency initiatives
- Institutionally complex
- Centralized and De-centralized business models



# Security Systems

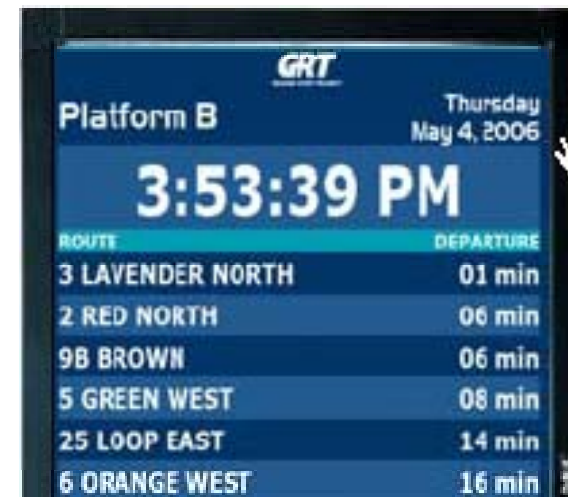


## ❑ Security Video

- Mostly used for post-event analysis, with video recorded onboard to a suitably sized Digital Video Recorder
- Requires policy directive regarding storage of video
- Real-time streaming images cannot be transmitted over the typical private mobile radio system due to bandwidth restraints, but wireless broadband and commercial carrier options could enable this
- Can be six or more cameras
  - Interior passenger areas
  - Boarding area
  - Driver
  - Front or rear external views

# Advanced Traveler Information Systems

- ❑ Static and Real-time traveler information via interactive voice, text messaging, e-mail and web access
  - Display arrival or departure times
  - Service messages
  - Field, solar/wireless options



# Technology Bundles

## ❑ National Trend of typical scenarios for technology deployments by service type and size

		On-Board Equipment					Central System Equipment							Wayside Equipment				
		CAD/AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Fixed-Route	300+ Vehicles	●	●	●	●	●	●	●	●	●	●	●	●	●	◐	●	●	◐
	100-300 Vehicles	●	●	●	◐	●	●	◐	◐	◐	◐	●	●	●	◐	●	●	◐
	<100 Vehicles	●	◐	●	○	◐	◐	◐	◐	◐	○	●	◐	◐	◐	◐	○	○
Demand-Response	Large (50+ Vehicles)	●	-	-	-	◐	●	◐	◐	-	◐	●	●	○	○	-	-	-
	Small (<50 Vehicles)	●	-	-	-	◐	◐	○	○	-	○	●	●	○	○	-	-	-
	Commuter Bus	●	○	◐	◐	●	●	●	●	◐	●	◐	◐	◐	○	●	●	○
	Passenger Rail	●	◐	●	○	◐	●	●	●	●	◐	●	◐	◐	○	●	●	◐

● Widespread  
 ◐ Less Common  
 ○ Optional  
 - Not Applicable

# Survey & Outreach Initiatives

- ❑ **Web-based survey of operators state-wide**
- ❑ **Additional outreach initiative to capture additional operators**
- ❑ **Each operator contacted directly via e-mail with an ITS program profile form:**
  - **Those that did not respond to the survey provided new information by filling out form**
  - **Those that did respond to initial survey validated information on form**
- ❑ **Of the total 37 operators statewide, 75% of operators identified specific transit ITS needs**
- ❑ **Uncovered broad base of ITS deployment and extensive ITS plans**

# Survey Results

23 agencies responded, categorized by service type:

FIXED-ROUTE	
300+ Vehicles	WMATA
	Hampton Roads Transit
100-300 Vehicles	Fairfax County DOT (Fairfax Connector)
<100 Vehicles	AASC/Four County Transit
	Alexandria Transit Company
	Arlington Transit
	Blacksburg Transit
	Charlottesville Transit Service
	Greater Roanoke Transit Company
	Harrisonburg
	King Street Trolley
	Loudoun County Office of Transportation Services
	Potomac & Rappahannock Transportation Commission
	RADAR-UHSTS, Inc.
	Virginia Regional Transit
	Passenger Rail

DEMAND-RESPONSE	
50+ Vehicles (Large Fleet)	Arlington Transit
	Hampton Roads Transit
	JAUNT, Inc.
<50 Vehicles (Small Fleet)	WMATA
	AASC/Four County Transit
	Bay Transit
	Blacksburg Transit
	Charlottesville Transit Service
	Greater Roanoke Transit Company
	Greene County Transit, Inc.
	Harrisonburg
	Lake Area Bus
	RADAR-UHSTS, Inc.
	Rockbridge Area Transportation System
	Virginia Regional Transit
	Williamsburg Area Transit Authority
Commuter Bus	Loudoun County Office of Transportation Services
	Potomac & Rappahannock Transportation Commission

# Survey Results - General

- For those ITS technologies identified as to be deployed in the future, the top ten prioritized deployments are:

Current state of preparedness of agencies to procure, deploy, and manage new ITS technologies:

Qualified staff able to support deployment activities and ready to begin now	30%
Some staff able to support deployment activities but additional expertise required	55%
Do not have staff or expertise and unable to support deployment activities now	15%

1	Automatic Vehicle Location and/or Computer Aided Dispatch Capabilities
2	Scheduling and Run Cutting Software
3	Radio Voice Transmissions
4	Maintenance Management Systems
5	Smart Card Fare Payment
6	Radio Data Transmissions
7	Automatic Passenger Counters
8	Driver Assignment and Workforce Management Systems
9	Real Time Information Available On-Line
10	Registering Farebox

# Survey Results - General

**Agency opinion regarding benefits / costs of ITS technologies deployed to date:**

Benefits outweigh costs	50%
Benefits and costs are even	25%
Costs outweigh benefits	25%

**Customer feedback regarding deployed ITS technologies:**

Positive feedback	71%
Neutral feedback	29%
Negative feedback	0%

# Operator Deployment Plans

- Program form to capture operator-specific ITS info
  - Existing technology deployments
  - Plan for future technology deployments
- Forms compiled for 37 transit operators statewide

**Agency Name:**

**Program Description**

Existing Deployment

On-Board Equipment					Central System Equipment							Wayside Equipment				
CAD/AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Typical Industry Deployment Path


On-Board Equipment					Central System Equipment							Wayside Equipment				
CAD/AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	K1 Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Action Plan**

Project	Budget <small>(for near term projects - if known)</small>	Date		
		1-2 yrs	2-6 yrs	6+ yrs

**Participants / Resource Sharing**


**Barriers**



Virginia Department of Rail and Public Transportation

VIRGINIA DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION

INTELLIGENT TRANSPORTATION SYSTEMS PLAN



Virginia Department of Rail and Public Transportation

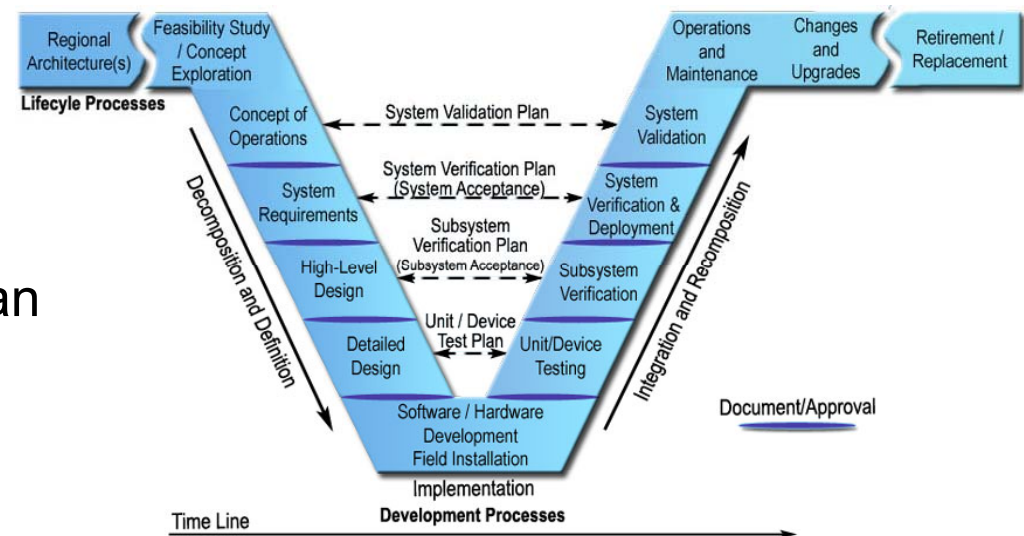
# ITS Program Summary

AGENCY NAME	ITS DEPLOYMENT PLANS (Within Next 6 Years)																
	On-Board Equipment				Central Systems Equipment				Wayside								
	CAD/ AVL	APC	AVA	TSP	AFC	On-Board Cam	IVR	RT Web	Trip Plan	Info Mobile Device	Sched & Run Cut	Maint Mgmt	Driver Mgmt	Yard Mgmt	Info Displ	Sec Cam	Sec Alarm Button
Alexandria Transit Company	■	■				■											
Arlington Transit	■	■	▲			▲	▲	■	■	▲							
Bay Transit	■	■	▲			▲		■	■	■	■	■	■	■			
Blacksburg Transit	■	■					■	■							■	▲	▲
Blackstone Area Bus															■		
Bristol Transit																	
Charlottesville Transit Service								■			▲			▲			
Danville Transit																	
District Three Public Transit	■								■								
Fairfax County DOT (Connector)	▲	▲	▲			▲		▲	▲	▲	■			▲	▲	▲	▲
Fairfax CUE		▲															
Farmville Area Bus						■											
Four County Transit						▲											
Fredericksburg Regional Transit	■																
Greater Lynchburg Transit Co	■								▲	■	■	■		▲			
Greater Richmond Transit Co	■			▲						■	■			▲		▲	
Greater Roanoke Transit Co	▲	▲								▲							
Greene County Transit, Inc.	▲				▲		▲	▲	▲			▲	▲				
Hampton Roads				■				■	■	■				■	■	■	
Harrisonburg Dept of Public Tran.	▲	■	■					▲	■	▲	▲				▲	▲	■
JAUNT Inc.					■	■		▲	▲	▲	■				▲	▲	▲
King Street Trolley																	
Lake County Area Agency on Aging																	
Loudoun County Office of Tran. Services			▲					▲	■	■							
Mountain Empire Older Citizens Inc.																	
Petersburg Area Transit																	
PRTC OmniRide	▲					■											
PRTC OmniLink	▲																
Pulaski Area Transit																	
RADAR			■		▲	■					■						
STAR Transit																	
Town of Bluefield - Graham Transit																	
Town of Chincoteague									■								
Virginia Railway Express																▲	▲
Virginia Regional Transit	▲	▲	▲			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Williamsburg Area Transport	■	▲					▲	■	▲	▲	▲	▲	▲	▲	■	▲	▲
Winchester Transit	▲	▲	▲							■							
WMATA															■		

LEGEND	
Existing Deployment	■
Near-Term Deployment (1-2 years)	■
Mid-Term Deployment (2-6 years)	▲

# Commonalities in ITS Plans Identified Across Operators

- ❑ Regional coordination
- ❑ Potential procurement coordination opportunities identified
  - Joint procurement
  - Common specifications
- ❑ Opportunity based on technology and potential for common needs
- ❑ Collaboration on development of concept of operations and specific agency requirements
- ❑ Utilize systems engineering process
- ❑ Level of shared procurement can then be identified



# Cross-Cutting and Research Efforts

- ❑ **Cross-cutting and regional projects that would provide benefit to multiple operators or entire regions:**
  - Statewide 511 participation
  - Multimodal real-time traveler information for I-95 & I-395 corridors
  - Activity center traveler information displays
  - Low cost bus location and real-time traveler information
  - Open data access
  - Communications assessment for transit
  - Fare integration
  - Standards working group
  - Stakeholder outreach working group

# Activity Center Traveler Info Displays

- ❑ Advanced video displays deployed at Tysons Corner Center Mall – static and real-time travel info and maps
- ❑ Focus is directing commuters and integrating traffic and transit info
- ❑ TDM function, access to TDM funding
- ❑ This project will leverage current work by identifying and expanding network of devices across the state
  - Develop criteria for site selection, identify other locations, deploy devices in chosen locations
  - Ongoing to expand the network of devices
- ❑ VDOT & private sector as key partners
- ❑ **Term:** Near-Term



# Open Data Access

- ❑ Primary efforts now:
  - Statewide clearinghouse by VDOT
  - Regional clearinghouse called RITIS in metropolitan Washington
  - May provide means to deliver multi-service and operator information
- ❑ Project to explore data sharing efforts
  - Work with technology providers to develop concept of operations
  - Develop info sharing agreements and data sharing standards
  - Ongoing support to encourage participation and ensure new systems are integrated
  - Explore private sector role (e.g. Google Transit)
- ❑ DRPT, VDOT, MWCOG/RITIS & transit op
- ❑ **Term:** Near-term & Mid-term



# Communications Assessment for Transit

- ❑ Wireless communications is the backbone of ITS – central to operation of CAD/AVL system and real-time information
- ❑ Wide variety of commercial and privately operated systems are available such as EVDO, GPRS, WiFi, private radio
- ❑ New technologies such as WiMax and mesh networks provide additional options
- ❑ Project will research:
  - latest suite of communication options to provide guide operators
  - identify opportunities for resource sharing and joint pro
- ❑ **Term:** Near-term



# Standards Working Group

- ❑ Address need for workable and enforceable ITS standards
- ❑ Support deployment of standards-based ITS projects
- ❑ Group will:
  - identify best approach to encouraging standards usage
  - identify best practices,
  - Develop contract language, and
  - Providing guidance to operators on procuring and validating compliant systems and components
- ❑ DRPT, transit operators, consultant support as key partners
- ❑ **Term:** Near-Term

# Stakeholder Coordination Working Group

- ❑ Need to develop guidelines and strategies for engaging external stakeholders in ITS deployment
- ❑ Continued dialog and support for transit ITS
- ❑ Group will consist of representatives from different stakeholder groups
- ❑ DRPT, WMATA, VDOT, operators, local jurisdictions, consultant support as key partners
- ❑ **Term:** Near-Term

# Future

- ❑ Plan is the beginning to an ongoing process of coordinating ITS deployment across the state
- ❑ Opportunities identified to coordinate for cost sharing, product enhancement and advancing the level of ITS deployment
- ❑ Annual update to plan using operator forms developed as part of this project
- ❑ Incorporate ITS planning into TDP process
- ❑ Expand opportunities for collaboration and interaction between transit operators and partners on ITS deployment – pursue ITS Virginia workshops

# Funding

- ❑ FTA runs several programs that could potentially support ITS planning and operation. These programs are targeted toward general planning and operation, so only a portion of the funds may be used for ITS.

These programs include:

- FTA Section 5303 - Metropolitan Planning
- FTA Section 5304 – Statewide Planning
- FTA Section 5307 – Small Urban Areas Program – Operating expenses
- FTA Section 5311 – Rural Areas – Operating and capital expenses with operating expenses having priority.
- FTA Section 5317 – New Freedom – Intended for programs that improve mobility for people with disabilities

# Funding

- DRPT administers grant funds to support planning, capital and operating expenses from federal and state sources.
  - **Demonstration Program** – with focus areas on ITS and Safety and Security. Assists communities in preserving and revitalizing public or private-public transportation service by implementing innovative projects. Covers up to 95% of eligible expenses  
Applications will be sought for Economic Stimulus Act funds in September of 2009. ITS projects are eligible for 100% funding of capital expenses.
  - **Capital Program** supports costs borne by eligible recipients for public transportation capital projects. Covers up to 95% of eligible expenses.
  - **Operating Assistance Program** supports costs borne by eligible recipients for operating related public transportation expenses. Can cover up to 95% of eligible expenses.
  - **Technical Assistance Program** supports planning or technical assistance to help improve or initiate public transportation related services. State funds can cover up to 50% of eligible expenses. Federal funds may be provided to support 80% of project costs.
  - **Transportation Efficiency Improvement Funds (TEIF) Projects**, supports Transportation Demand Management projects and programs that encourage the reduction of single occupant vehicle travel. Can cover up to 80% of eligible expenses.
  - **TDM/Commuter Assistance Program** supports administration of existing or new local and regional Transportation Demand Management/Commuter Assistance programs. Covers up to 80% of eligible expenses

# The Plan

Can be found by going to:

[www.drpt.virginia.gov](http://www.drpt.virginia.gov)

Studies and Reports

Public Transportation

Studies and Reports

Intelligent Transportation Systems Strategic Plan