

## **Coordination Concepts**

Some ITS concepts should be deployed in the Dulles Corridor by an agency or organization other than the Corridor's designated transit operator. These ITS concepts are often intermodal in nature, and require coordination with the designated transit operator. In general, the coordination ITS concepts did not rate as high a priority as those recommended for implementation by this project. However, the concepts are applicable to the Corridor and provide many benefits.

The importance of the coordination concepts is that many of them are currently employed in the Washington, DC region, and thus the foundation of an ITS infrastructure has already been laid in the Dulles Corridor. In other words, it is not necessary to start from scratch in developing an ITS system in the Corridor. The existing ITS elements in the region provide a platform upon which to build and expand ITS in the Corridor. This provides a cost efficient approach in creating an ITS system in the Corridor. It is important to note that unreasonable delay must be avoided in achieving coordination for the deployment of technologies which are critical path items for the overall Dulles Corridor project.

In addition to the operational ITS concepts, other concepts beneficial to the Corridor were identified and are recommended for deployment. These concepts, along with the operational concepts, comprise the coordination concepts, implementation concepts, and monitor concepts which are presented in the remainder of the document.

### **PRIMARY COORDINATION CONCEPTS**

The ITS concepts that have the greatest potential for coordination in the Dulles Corridor are discussed below. These concepts are currently employed in the region, and are shown in bold in the middle ring of Exhibit 1.

#### **Broadcast Traveler Information**

This concept provides non-interactive traveler information over the telephone, television, and radio. Information includes travel advisories and reports, general transit information, video footage, and public service announcements. The information is broadcast or transmitted to customers; customers are not provided a list of options from which to respond.

Bus and rail service status in the Corridor could be provided to an information service provider (ISP), like SmarTraveler, which in turn could broadcast the information along with other transportation information to travelers. Currently, SmarTraveler provides information in this fashion in the Washington, DC area. VDOT and WMATA also broadcast information about their respective systems to travelers in the region.

## **Interactive Traveler information – Personal Information Access**

This concept provides tailored information, such as travel advisories, traffic conditions, transit services, traveler services, ride share/match, parking information, and fare/pricing information, in response to a traveler's request. Information is obtained via personal devices such as touch tone telephones, pagers, and personal computers connected to the Internet. The concept includes interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on the traveler's submitted profile.

Parking and transit information in the Dulles Corridor can be provided to an information service provider, such as SmarTraveler, which in turn provides the information to travelers. SmarTraveler currently provides a variety of transportation information interactively via its telephone service and Internet web site. Other interactive traveler information systems or programs in the area include VRE's Train Information Provider (TRIP) and the City of Fairfax's Travel Demand Management (TDM) Information.

## **Transit Trip Itinerary Planning**

This concept consists of software that generates a transit trip itinerary (route, schedule, and fare information) based on user-specified trip parameters such as trip origin/destination and travel time, and criteria such as fastest route, lowest fare, least number of transfers, and least walking distance. Integration of multiple transit systems is an option. Delivery mechanisms include the Internet and telephone.

WMATA currently has itinerary planning software that its customer service agents use to develop itineraries for customers requesting information over the telephone. WMATA also provides this service on its Internet web site. It would be logical for WMATA to expand its itinerary planning system to include transit service in the Dulles Corridor. It is beneficial to travelers to be able to access one source for regional itinerary information, rather than having to contact multiple transit operators for trips that require transfers between different transit systems.

## **Traffic Information Dissemination**

Traffic information dissemination is the provision of transportation information (congestion, incidents, etc.) to motorists using roadway equipment such as dynamic message signs (DMS) (a.k.a. variable message signs (VMS)) and highway advisory radio (HAR).

VDOT, the District of Columbia, and Maryland State Highway Administration (MdSHA) currently provide travelers information in this fashion. VDOT could implement DMS signs and HAR in the Dulles Corridor to alert drivers of major incidents. The designated transit operator could coordinate with VDOT and provide VDOT information for transit-related announcements over the HAR system and DMS signs. For example, VDOT DMS signs could suggest that drivers board a bus or train at the next park-and-ride lot to avoid an approaching traffic jam.

## **Interactive Kiosks**

Interactive kiosks provide tailored transportation information in response to a traveler's request. The type of information includes travel advisories, traffic conditions, transit services, traveler services, ride share/match, parking information, and fares/pricing. Kiosks may link to an Internet web site or centrally controlled traveler information database.

Fairfax County, Arlington County, WMATA, and the Metropolitan Washington Council of Governments (MWCOC) currently have or are planning to implement kiosk systems. As stated previously, it is more beneficial and convenient for travelers to be able to access one source for regional transportation information. Therefore, it is recommended that the Dulles Corridor designated transit operator coordinate with WMATA and MWCOC to deploy kiosks in the Dulles Corridor and to provide transit information to these kiosk systems.

## **Electronic Toll Collection**

This technology collects tolls electronically using in-vehicle transponders and readers mounted at tollbooths. It also detects and processes violators automatically using high-speed cameras.

VDOT currently collects tolls electronically on the Dulles Toll Road, and WMATA collects fares electronically on its transit system and in its parking facilities. In addition, MWCOC is conducting a regional electronic payment study and the Federal Transit Administration (FTA) has issued a request for proposals (RFP) for an integrated electronic payment study. It is recommended that the designated transit operator, VDOT, WMATA, and any other agency in the region considering to implement electronic payment, coordinate with one another to develop a universal electronic payment system. This coordination can extend to the I-95 Corridor Coalition's program to implement a universal electronic payment system for tolls along the eastern seaboard. Such a system would increase convenience to travelers by providing one account for all electronic payment transactions in the Corridor. It also saves travelers time by processing transactions quicker and reduces agency costs.

## **Transit Fixed-Route Software**

Transit fixed-route software assists transit properties in planning and operating transit fixed-route services. It performs automatic driver assignment, vehicle monitoring, and routing and scheduling functions. Examples include run-cutting software and computer programs that assist transit planners in developing transit routes and schedules.

WMATA, Fairfax County, and Loudoun County currently use transit fixed-route software for transit planning. It is recommended that one or more of these existing systems be expanded to include transit service in the Dulles Corridor.

## **Probe Data Collection**

Probe data collection uses vehicles as a means of collecting traffic data (e.g., vehicle speeds). This approach is an alternative to the “traffic network data collection” concept. Most probe data collection systems use electronic toll collection technology to collect traffic data. Another method uses wide-area wireless communications between vehicles and an ISP.

Through the Road Reporter program, drivers in the Washington, DC area can register with SmarTraveler and become “probes” by reporting traffic incidents and congestion. The Corridor’s designated transit operator could participate in this program and have bus drivers report incidents. As an alternative, the designated operator could coordinate with VDOT and equip its buses with a Smart Tag transponder. Transponder readers could be deployed along certain roadways in the Corridor to measure vehicle speeds in the Corridor. VDOT is not currently practicing probe data collection, and implementation of probe data collection in the Corridor would require a VDOT policy decision.

## **Lane Control**

This concept controls use of surface street and freeway lanes via electronic signage. Examples include dynamic lane closure and HOV signs.

VDOT currently uses lane control signs on I-66 outside the Beltway for peak period HOV and shoulder usage. VDOT could deploy lane control signage in the Dulles Corridor to reserve lane usage for buses during peak periods (the system could operate on a fixed-time basis). Lane designation and control strategies should be coordinated with the Metropolitan Washington Airports Authority and VDOT.

## **Regional Traffic Control**

Regional traffic control provides coordinated, interjurisdictional control of traffic signals (e.g., coordinated traffic signal control on arterial roadways that cross jurisdictional boundaries).

Agencies involved in traffic control and management would provide this function. In the Dulles Corridor, this includes VDOT and local jurisdictions. Transit service in the Corridor can benefit from the regional traffic control strategy through decreased route run times. Coordinated signals increase throughput and decrease the number of unnecessary stops at red lights. The designated transit operator should coordinate closely with VDOT and the local jurisdictions to help identify arterials for regional control of traffic signals.

## **OTHER COORDINATION CONCEPTS**

The following ITS concepts also require coordination for their implementation and should be implemented by an agency or organization other than the designated transit operator. These concepts

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have less opportunity for coordination (than those discussed previously) and are less applicable to transit service in the Dulles Corridor. They are the remaining (non-bold) concepts shown in the middle ring of Exhibit 1. A brief description and an example of each of these concepts is provided below.

- **Incident Management System** — Detects, verifies, and implements response to incidents. Provides electronic communication among transit agencies, traffic agencies, and emergency management service providers for coordinated response and management of incidents. Example: Using the VDOT traffic management center to manage incidents (incident detection, verification, response, and recovery) in the Dulles Corridor.
- **Intersection Collision Avoidance** — Determines probability of collision and provides warnings to vehicles. Example: A system that prevents perpendicular collisions at intersections.
- **Intersection Safety Warning** — Provides the vehicle operator with a warning of potential hazards at an intersection. Example: A system that warns drivers of potential perpendicular collisions at intersections.
- **Emergency Response** — Provides automatic location of emergency vehicles and computerized dispatching to assist dispatchers in deploying appropriate resources to an emergency quickly and efficiently. Example: The VDOT ALERT initiative.
- **Traffic Prediction and Demand Management** — The collection, storage, and processing of transportation data for historical evaluation, real-time assessment, and forecast of the roadway network performance. Example: Use of travel demand models to monitor and predict travel patterns in a region or corridor. Information produced by the models would be used to manage traffic flow (via traffic control devices such as traffic signals, ramp meters, and lane control signs) and to implement demand management policies.
- **Demand Response Transit Software** — Computer software that assists dispatchers in allocating transit fleet resources to demand response service requests (e.g., taxi, airport shuttle, and paratransit dial-a-ride service). Performs driver assignment, vehicle monitoring, and routing and scheduling of transit vehicles. Provides data processing and information display to assist dispatchers in making optimal use of the transit fleet. Example: Computer programs that assist the transit dispatcher in scheduling and routing transit vehicles for personalized, demand response service. Customer requests are typically made over the telephone.
- **Road Weather Information System** — Collects and analyzes road and weather conditions on or near the roadway. Collected road weather information is monitored to detect and forecast weather-related hazards such as icy road/bridge conditions, dense fog, and approaching severe weather fronts. Information is used to deploy road maintenance resources, and issue location specific warnings and general travel advisories. Example: Monitoring weather conditions on/near the Dulles Airport Access Road from a central traffic management center using weather sensors in/near the roadway.
- **Freeway Ramp and Interchange Metering with Queue Jumping** — Controls the number and timing of vehicles entering a freeway. Helps to reduce or eliminate a surge of vehicles entering the freeway system. High-occupancy vehicles (including transit vehicles) are typically allowed to bypass the metered queue of vehicles. Example: Ramp metering on I-66 and I-395.
- **Emissions Monitoring and Management** — Monitors individual vehicle emissions and general air quality within a corridor or area. Information is used to manage emissions and to implement

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environmentally sensitive TDM programs, policies, and regulations. Example: Sensors that monitor exhaust levels of vehicles traveling on the Dulles Toll Road. TDM policies are put into action when emissions levels in the Corridor exceed a certain level. Warnings or citations are given to drivers for vehicles that violate exhaust standards.

## **IMPLEMENTATION PHASING**

The phase of the Dulles Corridor Rapid Transit Project in which each of the coordination concepts is recommended for coordinated implementation or expansion is presented in the following table. The concepts may be implemented over a period consisting of more than one phase. The information in the table, therefore, represents the phase in which the initial implementation or expansion takes place. The implementation phasing is provided as a general guide and is based on potential opportunities for coordination with other agencies, implementation coordination with other ITS concepts (e.g., the implementation concepts), and technology maturity. The primary coordination concepts are in bold.

Phase III has two time period end points (2006 and 2010) because BRT will run between West Falls Church and Loudoun County until 2006, and between Tysons Corner and Loudoun County until 2010. Rail will replace BRT between East Falls Church and Tysons Corner starting in 2006, and between Tysons Corner and Loudoun County starting in 2010. Although rail construction is proposed in two parts (in Phase IV), it is the intention of the Task Force to complete rail all the way to the vicinity of Route 772 in Loudoun County without delay. Exhibit 2 provides a summary of the coordinated concepts with respect to the implementation phasing.

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Exhibit 2. Implementation Phasing for Coordination Concepts

COORDINATION CONCEPT	PHASE I EXPRESS BUS (1999-2001)	PHASE II ENHANCED EXPRESS BUS (2001-2003)	PHASE III BRT (2003-2006, 2010)	PHASE IV RAIL (2006- )
Broadcast Traveler Information	✓			
Interactive Traveler Information – Personal Information Access	✓			
Transit Trip Itinerary Planning	✓			
Traffic Information Dissemination		✓		
Interactive Kiosks		✓		
Electronic Toll Collection			✓	
Transit Fixed-Route Software	✓			
Probe Data Collection		✓		
Lane Control		✓		
Regional Traffic Control			✓	
Incident Management System	✓			
Intersection Collision Avoidance				✓
Intersection Safety Warning			✓	
Emergency Response			✓	
Traffic Prediction & Demand Management				✓
Demand Response Transit Software			✓	
Road Weather Information System			✓	
Freeway Ramp & Interchange Metering with Queue Jumping		✓		
Emissions Monitoring & Management			✓	