Transit Service Integration Practices: An Assessment of U.S. Experiences

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ABSTRACT

This report presents the results of its assessment of transit service integration practices in the United States. Initially, a review of the literature was performed that identified the various types of service integration policies that have been and are being implemented including infrastructure, schedule, information, fare payment and special events/emergency service integration. The review also revealed how the introduction of service integration practices is part of overall changes in transit properties’ way of conducting business. The research then made use of a two-stage survey of transit agencies which have implemented specific practices. The initial survey cast a wide net to identify service integration practices across the country by approximately 100 agencies. The subsequent survey targeted specific examples of each type of practice and examined the objectives of the practices, the agency responsible for promoting integration, the effectiveness of the practices, the measures of effectiveness, the barriers overcome and the lessons learned. Transit agencies that have implemented integration practices have been able to overcome barriers to coordination and integration and have made a number of trailblazing efforts. While there has been little formal evaluation of these practices by transit agencies, the predominant view is that transit integration supports the overall goals of the transit agency and provides substantial benefits to the customers. Data to support impact evaluation is limited; however several case studies were also conducted quantitatively and qualitatively as part of this project. Lessons learned and guiding principles are also provided.

Key Words: service integration practices, coordination, public transportation, transit agencies
EXECUTIVE SUMMARY

This report constitutes the final deliverable for PATH Project Task Order 4152 under contract 65A0071 — “Assessment of Service Integration Practices for Public Transportation”.

Historically, intra-regional transit agencies in the U.S. have operated fairly independently of one another with public operators being given exclusive rights to provide public transportation services within a given jurisdiction, whereby fare and service attribute policies are established, executed, and monitored by a managing or governing board overseeing the activities of the transit agency. The incentive is for each transit agency to naturally focus on its particular service area and its own ridership. This tradition is changing into a more holistic business model involving coordination and service integration practices. Numerous examples exist from many locations around the world, but such examples of implemented policies are usually presented in descriptive terms of the policy and how it works with no discussion of its impacts, and rarely, if ever, in quantitative terms. Since service integration may require significant efforts to achieve, there is a need to understand the benefits and costs associated with various types of integration practices. This report describes the effectiveness of various types of transit integration practices based on an assessment of U.S. experiences. Both high level results and findings from case studies are presented.

A review of the literature was initially performed to obtain a picture of the current state of the practice of transit service integration, which may directly or indirectly impact transit passengers. Practices having a direct impact on passengers have an immediate effect on passengers’ transit travel routines through route or schedule changes, new options in how to pay for transit services, and new choices in what and how they learn about transit-related information. These may be categorized into the following five types: fare payment, infrastructure, schedule, information, special event/emergency conditions. Practices having an indirect impact on passengers have a primary impact on the business relationships between and among those transit agencies implementing such practices, which could, over time, influence the services that these agencies provide to their customers. Such practices by transit agencies, especially in adjacent jurisdictions, include data sharing, joint procurement of equipment, joint funding proposals, coordinated public information dissemination activities, coordinated improvement at intermodal transfer facilities, and planning and research.
Service integration activities are affected by a variety of region-specific institutional constraints and barriers. It has been argued that a necessary condition for effective service integration is to have a regional transportation authority serve as champion for service integration. Such a setting may offer transit properties added incentives to pursue service integration beyond their physical and operational domain. However, the regional or metropolitan authority must be empowered with a “stick”, e.g., withholding of state funding from transit operators unwilling to cooperate in regional service integration efforts, as well as a “carrot”, e.g. helping to pay the costs of implementing coordination activities.

The Overview Survey of Transit Integration Practices
The second step of the project was to gather information about current and past transit agency service integration practices. This was achieved by surveying transit properties through a two-stage process. An initial overview survey was administered to a selected group of transit agencies and which was designed to disclose key facts about each of its integration practices such as implementation date, brief description, and agency points of contact. Survey responses were used by the research team to screen potential candidates for the second stage survey.

In selecting the transit agencies, the study team cast a wide net to obtain information that was reasonably representative of current U.S. service integration practices and to be able to eventually draw conclusions of a general nature that will be applicable to a wide variety of transit agencies. Hence a cross-section of agencies, varying widely in size and geographic region, was sought. The common criterion used for inclusion was known or perceived service integration practices. Thus, this was not a random sample of transit properties, but instead a targeted and focused one. Ninety-six U.S. transit agencies were selected and sent the overview survey.

Sixty of the ninety-six transit properties responded to the surveys. Fifty-six of the respondents indicated that they have implemented or were implementing service integration in at least one of the five stated categories. Nearly three-quarters of the respondents indicated that they were/are involved with either four or all five different types of service integration practices, which may indicate agency activity in the area of implementing transit service integration practices.
General Findings from Second Stage Survey

Criteria were developed to reduce the list of transit properties and associated integration practice(s) from which to administer the second stage survey as not every transit agency’s reported integration practice(s) would be able to be examined via the second-stage survey and such criteria were integration practice-based and not agency-based. Since one of our goals was to ascertain available quantitative data for evaluation purposes, only already implemented integration practices were considered. Furthermore, only interagency projects were considered for further analysis. Third, the integration practices had to have been implemented within the last 10 years, since older projects would be unlikely to provide useful data and may not have knowledgeable staff members to answer further questions. Finally, the integration practices had to appear to be interesting and somewhat innovative from a national perspective.

Infrastructure Integration Practices

Nine transit agencies associated with the eight infrastructure integration practices responded to the second stage survey on these types of integration practices. Most practices were fairly widely applied. The least common was single agency intermodal facilities mainly because few of the agencies are multimodal. Several agencies had future plans to expand infrastructure integration. Some of these were being implemented as parts of continuing regional initiatives. Generally, the responding agency perhaps along with another regional or state agency introduced the integration practice. When asked about the effectiveness of the infrastructure integration practices, there were varying responses but generally they were viewed as effective with positive and few negative impacts cited. Although most agencies cited convenience and ridership benefits, it was generally hard to quantify specific impacts, even if agencies monitor ridership and transfer activity. None of the respondents identified a previously prepared evaluation of costs and benefits associated with the practice. The primary objectives of many of the projects have been to improve customer convenience and to provide seamless service and connections. Other objectives include improve service, increase ridership, reduce costs, achieve operating or administrative efficiencies and assist other agencies to fulfill service needs. Several agencies noted that considerable efforts were required to overcome funding constraints and institutional barriers, such as union and jurisdictional issues and differing policies. Some have developed formal interagency agreements. Generally, agencies appear to consider the efforts worthwhile despite the additional efforts required.
Schedule Integration Practices

Nine transit agencies associated with nine schedule integration practices responded to the second stage survey on schedule integration practices. All practices were widely applied and approximately half the agencies also had future plans to expand and/or continue schedule integration practices. Generally the responding agency alone or with another transit agency was identified as having introduced the integration practice. When asked about the effectiveness of the schedule integration practices, there were varying responses ranging from a little effective to completely effective. Some positive impacts were cited with only few negative impacts cited. Positive impacts included 1) increase in transfer activity, 2) user satisfaction (decrease in customer complaints), 3) decrease in transfer time, 4) increase in ridership and transit modal split with some alleviation of parking issues, 5) increase in sales of multi-ride and multi-agency fare media, and 6) enhanced image of agency. Negative impacts included some crowding at transfer facilities. However, no agency cited the availability of data with which to quantitatively evaluate the impacts of these practices. The primary objective for most of the projects was to enhance customer service and operational efficiency by reducing passenger transfer/wait time, especially during the off-peak when headways are longer. In terms of the barriers to implementation of schedule coordination practices faced by agencies, there was wide variation ranging from no barriers at all to one case in which there were funding, institutional, and technological constraints. A commonly-stated barrier was the limited opportunities for schedule coordination either because of potential financial consequences associated with such coordination or some incompatibility in headway policies between and/or among connecting agencies.

Information Integration Practices

Six transit agencies associated with the eight information integration practices responded to the second stage survey on transit infrastructure integration practices. The least common practice was intra-agency intermodal transit trip itinerary planning because few of the agencies are multimodal. Most practices were fairly widely applied and most agencies also had future plans to expand information integration. Some of these were being implemented as parts of continuing projects. It was very common that a regional planning agency was identified as the agency that introduced the integration practice. It is also not uncommon to see the responding agency itself also listed as the initiating organization for a particular information integration practice. When asked about the effectiveness of the information integration practices, there were varying responses ranging from not effective at all to effective. Only a few positive or negative impacts were cited. In terms of benefits, there was positive feedback and fewer complaints from
customers and a ridership increase. However, there was also a dependency on the system for information so that if/when the system went down, alternative information sources needed to be found. No agency cited the availability of any data with which to quantitatively evaluate the impacts of these practices. Respondents’ primary objectives for implementing most of the projects were to enhance customer convenience and level of service and promote regional connectivity by making it easier for people to take transit across communities. In terms of the barriers to implementation of these practices faced by agencies, there was wide variation ranging from no barriers at all, to cases in which there are funding, technological, and institutional constraints. Frequently mentioned were institutional barriers in the area of inter-agency cooperation and administrative reluctance to try something new.

**Fare Payment Integration Practices**

Twelve agencies associated with the eight infrastructure integration practices responded to the second stage survey on fare payment integration practices. Interagency passes were the most common, with all of the agencies either currently using or developing such passes. Interagency free/reduced price transfers were currently in use at nine of the agencies, while interagency stored value was in use by six agencies. With regard to intra-agency fare media, free/reduced price transfers are used by most respondents. Intra-agency intermodal passes are in use by all agencies which operate more than one mode of service. Intra-agency stored value is the least common, used by some though not all of the agencies that are part of an interagency stored-value agreement. Generally, fare integration was initiated by the responding agency, frequently in coordination with either other transit agencies or a regional planning agency. When multiple transit agencies are involved, one of them generally plays a regional role. In none of these cases was the fare integration initiated by a state agency. Most respondents viewed these practices as either effective or completely effective. The most common reason for implementing fare coordination practices was to improve the quality of service to customers who travel through areas served by more than one agency. The principal concerns expressed by agencies were ensuring that the program be revenue neutral to the participating agencies and the operating and capital costs of implementing fare coordination. Agencies generally stated that they were unable to provide specific quantitative data regarding the effectiveness of any of these practices. In some cases, data exists to show that ridership increased or complaints dropped after the fare integration practices were adopted, but no in-depth studies have been conducted regarding the extent to which these resulted from the fare integration. Barriers to implementation have included a range of technological, institutional, and financial issues. However, the general
conclusion has been that the customer can benefit greatly from fare integration if all agencies work together.

Special Events / Emergency Conditions Integration Practices
Five transit agencies associated with four special event/emergency condition(s) integration practices responded to the second stage survey on such practices. Most practices were fairly widely applied and most agencies also had future plans to expand special event/emergency condition integration. Some of these were being implemented as parts of continuing projects and consistent with regional plans. Generally, the responding agency perhaps along with a regional or state agency introduced the integration practice. It is also not uncommon to see an emergency management or services office, either at the local or state level, also be listed as the initiating organization for the particular special event/emergency condition integration practice. When asked about the effectiveness of the special event/emergency condition integration practices, there were varying responses ranging from partially effective to completely effective with positive impacts and only few negative impacts cited. Positive impacts included 1) public support, 2) improved coordination, communication, and cooperation among participating organizations, and 3) minimal, if any, change in ridership on special event days. Negative impacts included unrealistic expectations of service response times. No agency cited the availability of any data with which to quantitatively evaluate the impacts of these practices. The primary objective for most of the projects was to be prepared in case of an actual emergency — a direct response to the events of September 11, 2001 — and this meant to be able to maintain service with minimal disruptions to get passengers safely to their destinations and improve cooperation, coordination, and communication among participating organizations. In terms of the barriers to implementation of these practices faced by agencies, there is wide variation ranging from no barriers at all, to one case in which there are funding, regulatory, jurisdictional, and technological constraints. Notwithstanding all these barriers, this agency indicated that the special event/emergency condition integration practices were at least partially effective with support from the public. Other agencies indicated simply a single barrier such as funding constraints dampening the extent of implementing such practices and communication across participating organizations.
Case Studies’ Findings from Second Stage Survey

Based on the responses from the second stage survey, several service integration practices were selected for more in-depth examination in the context of site-specific case studies. Case study sites were chosen for a variety of reasons, including 1) innovative institutional and funding arrangements between local and regional agencies, 2) availability of data to measure the impacts, 3) a complex environment where recent regional coordination efforts have focused on reversing trends that have led to fragmentation of the region’s transit system, 4) region includes many cooperative service integration projects, 5) region offers unique example of joint operation of transit service, 6) region has unique characteristics that help promote service integration activities, and 7) local agencies pre-date the rise of a new regional entity that is attempting to engineer service integration.

In this section highlights from these case studies are presented.

Infrastructure Integration: Southwest Connecticut Joint Operation of the Coastal Link

Southwest Connecticut offers a rather unique example of joint operation of transit service, with available cost, ridership and survey data to describe the project and its impacts. Recognizing the need for more seamless travel between communities on the southwest Connecticut coast, three adjacent bus systems developed a cooperative arrangement to jointly operate a single, inter-town regional bus route, the Coastal Link. The Coastal Link provides intercommunity service among six municipalities (Norwalk, Westport, Fairfield, Bridgeport, Stratford and Milford) spanning a distance of over 20 miles along U.S. Route 1, the primary job and commercial corridor for this part of Connecticut. Although represented on a single schedule, the individual trips are operated by each of the three transit systems using their own buses. Each system collects fares valid on any of the systems. The service is subsidized using an FTA Jobs Access Reverse Commute grant and other state funding sources.

The result has been the creation of a very successful and productive route, which is believed likely to outlast the Jobs Access funding sources that were instrumental in its creation. Passengers have much more convenient transit options and the number of transfers between routes has dramatically decreased as ridership has increased. The transit agencies have been able to curtail service on other routes.
It is difficult to make direct ridership comparisons before and after implementation, and no comprehensive evaluation of the service has been performed. It is roughly estimated that Coastal Link inter-town ridership is perhaps 2,800-3,000 per day. The total corridor ridership (inter-town and local) is over 110,000 per month compared to about 53,000 riders per month on the old GBTA Route 2 before the Coastal Link was introduced. The 2002 Job Access Regional Plan identified the Coastal Link’s farebox recovery as over 46%, a relatively high figure.

On board surveys of 249 riders (36% of the ridership) were conducted in March 2000 by the People to Jobs program. The vast majority (74%) said the route provides them with a direct route to the destination. Overwhelmingly the bus was reported to be convenient (94%). About 14% reported they would not be able to make the trip without the Coastal Link, while about 27% would need to take a taxi. About 29% said they would have driven their car. The riders were largely working age people, distributed throughout the 22-54 age range. About 60% said the Coastal Link enabled them to get a job.

*Infrastructure Integration: Puget Sound Interagency Passenger Transit Centers*

The Puget Sound metropolitan region has a number of transit operators who have coordinated their service over the years. Major improvements in regional service were recently introduced with the creation of a new regional transit agency, Sound Transit (aka Central Puget Sound Regional Transit Authority), authorized by state legislation in 1993 and provided with its own dedicated funding. The agency developed a 10-year regional transit plan, *Sound Move*, and proceeded to implement regional rail service and a commuter express bus program as well as other commuter improvements such as park-and-ride lots and transit centers. Puget Sound was chosen as a case study because of unique arrangements between local and regional agencies, because the local agencies pre-date the rise of a new regional entity that is attempting to engineer service integration, because there are many cooperative infrastructure projects and because data were available to describe the costs and ridership impacts of recent projects. As an example of the infrastructure coordination in the Puget Sound region, we selected the Lynnwood Transit Center and Ash Way Park-and-Ride facilities. These facilities both serve Snohomish County and involve integration activities on the part of Sound Transit and Community Transit. The Lynnwood Transit Center project involved enhancements to an existing transit center while the Ash Way Park-and-Ride involved the construction of a new facility.
The Lynnwood Transit Center project was funded by Sound Transit and its partners. Sound Transit Express buses and Community Transit buses provide service to the Lynnwood Transit Center. While Sound Transit retains a part ownership of the facility, Community Transit is operating and maintaining the new Lynnwood facility but only incurring ongoing expenses based on those prior to the reconstruction project; Sound Transit is contributing the funding for the additional operating costs. Sound Transit has negotiated specific interagency agreements to share costs that set a fixed percentage and amount of the O&M costs that Sound Transit will fund (63.8%) for this facility based on work scope that distinguished between the costs of operating and maintaining the pre-existing facility elements (Community Transit’s responsibility) and the new elements (Sound Transit’s responsibility). This type of agreement is being used throughout the region although there is some variation in arrangements by project. Developing the interagency agreement was a challenge and the approach is still evolving as Sound Transit continues implementation of projects around the region.

The Ash Way facility was jointly funded by Sound Transit and Community Transit and is currently owned by Washington DOT and maintained by Community Transit. This facility is used by both Community Transit and Sound Transit Express buses to Lynnwood and Seattle; there are three new Sound Transit Express routes and 9 Community Transit bus routes that have been realigned to serve the site. Sound Transit has not retained any ownership of this facility and does not contribute to ongoing maintenance costs.

It is difficult to quantify the ridership benefits associated with this excellent example of infrastructure integration. One complicating factor is that cuts in service made after a 1999 citizen budget cut initiative had a severe impact on ridership during the time Sound Transit was planning its initiatives (to expand service and replace local agency commuter services with regional express service). Community Transit staff believe that overall ridership has rebounded to 1999 levels partly as a result of the improvements (while population has continued to grow). Another factor is that Sound Transit has increased overall service levels including extended span and increased frequency, which have had impacts on ridership as well. As a result, the impacts cannot be easily discerned in a before/after comparison. However, corridor ridership appears to have increased while overall Community Transit system ridership has decreased.
Infrastructure Integration: Arlington County, Virginia PikeRide Service to Pentagon City Metrorail Station

The rapid development of suburban areas in Northern Virginia led to both expansion and decentralization of services. In response, over the past seven years, Washington Metro (WMATA) and the various jurisdictions have engaged in ongoing regionwide coordination studies and many integration efforts. The region offers many examples of shared infrastructure and was selected for a case study because it is a complex environment where local jurisdictions fund both regional and local systems and because there were examples of applications where ridership impacts had been measured.

One example that includes infrastructure and schedule integration is the new PikeRide bus service along Columbia Pike to Pentagon City in Arlington County introduced in September 2003. The PikeRide name applies to the Metrobus 16 Line service and ART-Arlington Transit routes serving the Columbia Pike corridor and through the surrounding Arlington neighborhoods. (ART - Arlington Transit is a local bus service that operates within Arlington County, Virginia, supplementing Metrobus with smaller, neighborhood-friendly vehicles and providing access to Metrorail and Virginia Railway Express (VRE).) PikeRide reflects Regional Bus Study recommendations for a priority bus service, ultimately bus rapid transit, in the Columbia Pike corridor. (Bus Rapid Transit in the corridor is being studied in an alternatives analysis.) The interagency effort involved Arlington County (and its local ART operation), WMATA (the regional operator of Metrobus and Metrorail) and Fairfax County (the source of 25-30% of the corridor’s riders and just over half of the route miles in the corridor). PikeRide was an early test case of WMATA’s new more collaborative way of doing business as a result of the Regional Bus Study. Arlington County considers the project to have advanced the level of coordination beyond formal channels into operations. Arlington County and Metro had to coordinate efforts to establish the bus transfer terminal at Pentagon City. This involved Arlington County paying for and constructing shelters on Metro-owned land and getting specific upper management approvals for shelters that do not meet standard Metro guidelines. Coordination extended into implementation activities that included Arlington County staff assisting with promotional activities, acting as customer ambassadors working with Metro supervisors and working very closely with Metro operations staff.

As a result of the changes, the number of weekday bus trips on Columbia Pike was increased by 45%, Saturday service by 64%, and Sunday service nearly doubled. Service is better timed and
more customer information is provided at every bus stop. The service restructuring introduced limited stop service. Another improvement was that bus service at Pentagon City Metrorail (unlike at Pentagon Station) is now timed to meet the Metrorail schedule.

Arlington County considers *PikeRide* to be an unqualified success, particularly working in collaboration to offer passengers a better service. The new service on Columbia Pike has led to an increase in corridor bus ridership on the order of 14%. Arlington County has conducted ridership surveys to assess customer response to the PikeRide service. The results have shown high customer satisfaction.

*Schedule Integration: San Francisco Bay Area Peninsula Rail Service Coordination between Caltrain and BART*

Caltrain is a tri-county partnership that is owned and operated by the Peninsula Joint Powers Board (JPB) consisting of three members from each of the JPB partners: San Francisco, San Mateo, and Santa Clara counties. It provides commuter rail service along the peninsula in the San Francisco Bay Area.

Caltrain has implemented schedule integration practices primarily through interagency schedule coordination since 2003. It has coordinated times with both limited and local trains as well as with BART at the Millbrae Intermodal station, and transfer connection protection but only for the last train of the day. Caltrain initiated the implementation of such schedule integration practices to maximize ridership and create an express service for passengers traveling greater distances. Caltrain works with BART, SamTrans, and the Santa Clara Valley Transportation Authority in its interagency schedule integration practices.

Both BART’s and Caltrain’s schedules needed to be integrated to show that the intermodal transfer concept could truly be viable, otherwise, the extension itself would not be successful. Both BART and Caltrain initiated these scheduling coordination measures. BART’s objective in implementing these schedule coordination measures was to provide the best connection between BART and Caltrain taking into account performance variability.

Caltrain expanded upon these ongoing schedule integration practices in June 2004 by adding to its Peninsula train service a new express service during peak periods, called Baby Bullet, in which travel time between San Francisco and San Jose was decreased from 96 minutes on the
local train to 57 minutes on the Baby Bullet. Travel times are decreased primarily because the Baby Bullet stops at only seven of Caltrain’s 34 stations, the seven most heavily patronized stations and bypasses slower local trains made possible by the construction of additional tracks. However, the Baby Bullet travels at approximately 80 mph, whereas some local trains’ maximum speed is about 60 mph, thus the higher speed also contributes to improved travel times. Moreover, low floors and additional doors help expedite passenger boarding and alighting and so also contribute to further reducing travel time.

Caltrain has revamped its entire schedule to provide a hopefully more efficient and timely mix of local, limited-stop and express train services. Caltrain continues to work closely with BART to enhance the already existing interagency schedule coordination between these two rail service providers especially at the new Millbrae intermodal station — an example of an infrastructure integration practice — where improved connections between BART and Caltrain’s Baby Bullet have been possible since the latter’s debut.

Caltrain has experienced four consecutive months of ridership increases. Since Caltrain’s new timetable took effect in June in conjunction with the start of Baby Bullet train service, Caltrain’s ridership has increased approximately 17 percent, totaling more than 31,000 average weekday riders for the month of September. It is, however, difficult to determine what contribution to this ridership increase is specifically due to Caltrain’s implementation of its schedule integration practices since other contemporaneous events may have also contributed to this increase. For example, ridership fell below the 30,000 mark in late 2001, a result of the Bay Area’s economic slump and post-9/11 job losses and so, arguably, it was inevitable that ridership would rebound at least partially from this low independent of Caltrain’s schedule integration practices. Also, Caltrain has initiated its “Go Pass” pilot program, a customer service program to improve access to service and increase ridership. The program allows companies to purchase an annual pass for their full-time employees at a fixed rate intended to encourage employees to try transit. Nonetheless, Caltrain views its schedule integration practices a success and a major contributor to the ridership increases. Moreover, Caltrain’s revenues for September 2004 showed an increase of more than $200,000 over September 2003.

BART has also experienced an increase in ridership as measured by the growth in the number of total trips and the growth in the number of transfers at the Millbrae Intermodal station before and after Baby Bullet service. There is a noted increase in the percentage of transfers since June 2004.
when Baby Bullet service and its resultant enhanced schedule coordination with BART, began. There has also been growth in the number of transfers at the Millbrae station, as well as growth in the percentage of transfers out of all trips at Millbrae, that is, the number of transfers is growing at a faster rate than the overall number of trips involving the Millbrae Intermodal station. Therefore, the Baby Bullet service has brought additional riders to the BART system.

**Fare Payment Integration: Puget Sound Area, Washington State**

In 1999, Sound Transit began service in the Puget Sound region, including both new regional service and taking over regional service previously provided by other agencies. In preparation, the boards of Sound Transit, King County Metro Transit, Pierce Transit, Community Transit, and Everett Transit held joint meetings regarding fares and adopted a joint set of policies for fares. In 1999, they implemented a set of joint passes. In 2000, they agreed to accept other’s transfers as payment of a base fare.

The principal concern of the agencies was that fare integration would result in reduced revenue. However, as the boards of the agencies had agreed to implement fare integration, the focus was on addressing the concern rather than it being a reason for not implementing fare integration. The resolution was for Sound Transit to use some of its new tax revenue to compensate for some of this loss.

As a result of the fare integration and the addition of service by Sound Transit, riders have increasingly used multiple agencies for their travel. Pierce Transit’s survey showed that use of another transit system in the last 30 days had risen from 19% in 1998 to 27% in 2004. Other surveys showed that the awareness that Puget Pass could be used on multiple agencies increased from 65% in 2001 to 67% in 2004, and the percent using it on other systems had increased from 41% in 2001 to 60% in 2004. Metro’s survey showed that from 1999 to 2000 the awareness Puget Pass could be used on multiple systems increased from 61% to 69%, while the use of it on other systems increased from 12% to 27%.

Despite the fact that many riders now need to use multiple transit agencies, as well as the loss of substantial tax revenue and resulting service cuts, customer satisfaction has remained strong. Metro’s “very satisfied” riders was at 44% in 1998, increased to 50% in 2000 with inter-agency transfers, fell in 2001 with the service cuts, and then increased to 52%.
This case study shows the importance of high-level commitment to achieving fare integration, the value of new resources in addressing possible fare revenue loss, and how fare integration can increase the use of multiple agencies and customer satisfaction.

Fare Payment Integration: Washington D.C. Metropolitan Area/National Capital Region
In the Washington, D.C. metropolitan area, fare integration began in 1997 with joint passes between WMATA and two commuter rail providers. In 1999, this was expanded to include free/discounted transfers and joint one-day buss passes between WMATA and eight local bus agencies. While it is impossible to prove a causal link, ridership on both WMATA and connecting services rose significantly, especially between 1999 and 2000.

The next step in regional fare integration is SmarTrip, a smart card program that is currently just used by WMATA for bus and rail fares, and for parking at rail station. Adoption of the card has been slow and steady since its implementation in 1999. As of June 2004, it was used by 35% of rail customers (45% of peak trips), 60% of park & ride trips, and 71% of parking payments. At the end of June 2004, WMATA offered the SmarTrip card for sale at all Metrorail stations which provided parking, and required its use to pay for parking. In the following two months, purchases of SmarTrip increased from 8,000 per month to 75,000 per month, with the majority of cards purchased at the stations. Demand was so high that WMATA briefly suspended sales over the internet to avoid running out of cards. In a survey, SmarTrip was considered easy to use for paying for both parking and fares by over 97% of those who had used it, and its usefulness was rated at 4.85 on a scale of 1 (low) to 5 (high).

This case study illustrates a correlation between fare integration and ridership, as well as the importance of convenient distribution in implementing a smart card system.

Information Integration: San Francisco Bay Area
In the San Francisco Bay Area, the Metropolitan Transportation Commission (MTC), the region’s transportation planning organization, has directed for the last twelve years the integration of traveler information. Initially there were three separate efforts to provide information via phone and the world-wide-web.
TravInfo began in 1996 as 2-year field operational test (FOT) that collected, organized, and disseminated information to the traveling public on traffic and road conditions, transit routes and schedules, carpooling, and P&R facilities. Public access was via the phone and a single 7-digit number usable throughout the region. After the FOT, TravInfo remained in an “as is” mode for two years as MTC collected more information on public information needs. A new systems manager came on board in 2000 and in 2003 the original phone number converted to “5-1-1” as an early part of a nationwide implementation of the 511 traveler information number. Next, a transit information website began in 1994 as a university project that grew in popularity with transit agencies and the public as Web use started to grow. In 1998, it permanently located its server site at MTC. Lastly, the transit itinerary planner was originally part of another project that MTC implemented for use and benefit of telephone information operators at transit agency call centers. In 2001, MTC developed a Web interface for it.

These three separate integration activities matured and merged until by 2003 the single integrated information source via phone (511) or web (www.511.org) from all the region’s transit agencies was complete with information on transit, traffic, rideshare, bicycling and transit trip itineraries. MTC has evaluated the usage of and level of customer satisfaction for 511 services via surveys and focus groups. There has not yet been an assessment of behavioral/ridership changes. Customer satisfaction is very high for both the phone and the web service especially relative to the accuracy of public transportation information received by phone, the easy-to-remember web address, the simple and straightforward process of navigating the web for experienced users, and a very useful trip planner. Improvements, however, are needed including more links, fewer clicks, and fewer graphics.

Special Events / Emergency Conditions: Washington, D.C. Metropolitan Area/National Capital Region Use of the Regional Incident Communication and Coordination System (RICCS)

Immediately following the events of September 11, 2001, a Task Force on Homeland Security and Emergency Preparedness for the National Capital Region was formed under the direction of the Metropolitan Washington Council of Governments (MWCOG). The National Capital Region was selected as a case study because of its unique position as the nation’s capital and seat of the U.S. government, one of the primary targets of the 2001 terrorist attacks and a likely target for future attacks.
While the National Capital Region’s jurisdictions have had emergency coordination policies, practices, and procedures in place long before September 2001, these events and the subsequent anthrax attacks made it clear that a regional interagency plan to improve coordination and communication in anticipation of potential future regional emergencies was needed.

The product of this Task Force was RICCS: Regional Incident Communication and Coordination System. When an incident occurs in a member jurisdiction, its local Emergency Communication Center decides whether to request regional notification through RICCS: a 24-hour, seven day-of-week communications capability that became operational in 2002. The RICCS will reach key system participants by various means. RICCS’s primary mission is to

- Facilitate real-time communication among governmental decision-makers during regional emergencies
- Coordinate decision-making regarding regional emergencies including closings, early release of employees, evacuation, re-openings, transportation decisions, and health response.
- Coordinate information dissemination to other levels of government, the media, the public, and private and non-profit organizations.

Use of RICCS assists local governments and facilitates their working together for a more coordinated and integrated response to regional emergencies. RICCS provides a mechanism for member jurisdictions to collaborate in planning, communicating, sharing information, and coordinating activities before, during, and after a regional incident or emergency.

The system has been used on several occasions since becoming operational. In addition to speeding up communications with critical agencies, RICCS provides benefits by identifying whom to contact and how through its Website. This also reduces the chance of not sending information to the appropriate individuals and/or organizations. Moreover, it helps train agencies to think regionally rather than just about local or individual agency needs.

**Lessons Learned and Guiding Principles**

Survey participants were asked to describe the key lessons their agency drew from its experience to date with service integration practices. These lessons, culled from survey responses, are described in original form in Appendix H: Summary of Specific Survey Results. These lessons learned have been synthesized and formulated as guiding principles for use by transit agencies and regional transportation organizations who may consider implementing service integration practices in the future. These principles also serve as important reminders to prospective
implementers of transit service integration practices of common pitfalls that all too often occur. However, using these principles as an integral part of an agency’s approach can help overcome certain barriers it is likely to encounter and help foster successful integration practices.

Guiding Principles

*The following are general principles that apply to various types of integration:*

1. All organizations and individuals need to be committed to and invested in coordination, communication, and cooperation to achieve successful implementation of service integration practice(s); nevertheless, institutional barriers and turf protection can be anticipated to pose challenges and there will still be circumstances when regional objectives take a backseat to greater intra-agency priorities.
2. Having an institutional champion as a lead stakeholder to provide necessary direction will assist the service integration implementation process.
3. Developing contingency plans to address unexpected exogenous events is essential in the service integration implementation process.
4. As the number of participating organizations grows, including public transit agencies and regional planning organizations, the potential exists for greater customer benefits; however, these additional benefits must be traded-off against the growth in complexity of institutional issues.
5. Incremental and small, though successful, steps toward integration appear to be favored over the do-everything-at-once approach.
6. Other public transit agencies who have implemented candidate service integration practices in similar environments should be consulted to determine how effective their practices have been and to identify likely challenges.

*The following are lessons and principles that apply to specific types of integration practices:*

**Infrastructure**

7. Formal written agreements should be negotiated to guide integration of services and facilities. These agreements also need to address management of day-to-day operations, including processes for making immediate decisions regarding matters that are not explicitly covered in the agreement (possibly with informal consultations).
8. Sharing of a facility, such as an intermodal passenger transfer center is easier to implement when the facility owner and/or operator has some leverage over participating transit operators, e.g., the owner/operator is the parent agency of participants.

Schedule
9. Informed decision-making requires a true picture of the costs associated with schedule coordination. A system analysis should therefore be conducted to identify the tradeoffs between providing coordinated schedules (or timed-transfers) and vehicle/crew productivity.

Information
10. The resources needed to provide accurate and timely customer information must be estimated carefully and realistically; under-budgeting resources could lead to delivery of inaccurate information, which will in turn result in customer dissatisfaction (the opposite of the intended effect).

Fare Payment
11. Adequate training is very important when a new technology such as smartcards is introduced as part of fare integration.
12. When considering a new fare technology, explore alternatives to using a proprietary technology controlled by a single vendor.
13. In an integrated environment, it is more difficult for any single agency to regulate fare media discount policies. That is, agencies are unable to establish their own criteria for passengers to qualify for discounted fare media, and therefore are less able to have their fare structure match their political needs. Fare integration will require compromise among agencies’ varying fare policy objectives.
14. Revenue neutrality and costs are key concerns for many transit agencies introducing integrated fare payment. Lower revenue and new costs can be offset by decreases in other costs, e.g., cash handling, and mitigated through increased ridership.
15. Agencies can be induced to participate in regional fare integration using “carrots”, i.e., incentives; even in cases where there is a regional or metropolitan authority, fare integration does not require the regional entity to be empowered with a “stick”, i.e., punitive action, e.g., withholding of state funding from transit operators unwilling to cooperate in regional service integration efforts. In neither the Puget Sound area of Washington State nor the Washington D.C. metropolitan area, did any regional agency need to wield a “stick” in order to achieve regional fare integration.

Special Events/Emergency Conditions
16. Putting emergency condition integration mechanisms into place is not sufficient without appropriate testing. Dry-runs are recommended to hone skills needed in a true emergency.

Conclusions

There is certainly variation around the country in the extent of involvement in transit service integration practices. Among the most active regions are the Puget Sound area of Washington State, metropolitan Washington D.C., the San Francisco Bay Area, and the Tri-State area of New York-New Jersey-Connecticut. Having a regional transit agency champion of integration has certainly been beneficial; however it is not a prerequisite to successful implementation.

Overall, customers appear satisfied with transit service integration practices and there is a strong sense among transit managers that customer level of service has improved and ridership has increased as a result of these practices. It has, however, due to exogenous factors, been difficult to attribute specific benefits to particular integration practices. To be able to objectively and quantitatively evaluate the effectiveness of a particular service integration practice will require better data. This is an area where transit agencies must take a pro-active role. The measures of performance and data requirements will vary by service integration type.
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1.0 PROJECT OVERVIEW

This report constitutes the final deliverable for PATH Project Task Order 4152 — “Assessment of Service Integration Practices for Public Transportation”. The project has examined service integration policies and practices that transit agencies have implemented. The examination has been performed by means of 1. a review of the literature to learn what previous investigations have been done, 2. an overview survey to capture the current snapshot of service integration practices in the U.S., 3. a more detailed follow-up survey of strategically chosen regions and associated practices in the U.S. based on specific selection criteria, and 4. in-depth case studies of several U.S. practices covering different types of service integration practices selected from respondents of the detailed follow-up survey. The remainder of this section discusses the motivation for, objectives of, and a summary of the contents for the remainder of this report.

1.1 Motivation

Transit properties have customarily operated from a rather narrow perspective in that their almost exclusive focus has been on serving their passengers effectively by concentrating only on the section of their trips within that operator’s service boundaries instead of seeing the larger picture and coordinating with other regional operators to successfully integrate service for the passengers’ entire trip. This situation is changing with a more holistic approach through coordination, institutional alliances and service integration policies and practices between and among properties. There is a need to understand these policies and practices and the changes they have brought and benefits resulting from them.

1.2 Objectives

The overall objective of this project is to understand service integration policies and practices that transit agencies have employed and the changes such practices have brought, quantitatively, in terms of the benefits and costs from them. Studies have shown that ongoing coordination of transit services can improve public transportation system connectivity and reliability, and help make transit a more attractive travel mode alternative to the car, especially single occupancy cars. Thus the implementation of service integration policies and practices are not an end in and of themselves. It has been argued that successful implementation of such policies can result in demonstrable benefits to transit properties, transit passengers, and society as a whole. This project’s deliverables will include development of estimates of the benefits of service integration policies and practices that have been implemented by transit properties to the extent that
quantitative data is available and a set of guiding principles to understand what policies and practices have worked best under what conditions (and have not worked so well). The results of this project will provide transit properties with a model to follow to improve service integration and with it improve transportation services to the public. In this project we will also investigate the relationship between service integration policies and intelligent transportation systems/advanced technologies. This relationship may indeed be two-way, that is, intelligent transportation system (ITS) technologies can play an important role in service integration policies and practices as such systems provide an incentive to and a methodological tool for transit agencies to implement such policies, e.g., with the use of automated vehicle location and electronic fare payment systems, and so studying the benefits from these policies is linked to understanding ITS benefits. Then again, transit agencies could become more interested in coordination and service integration because they want to implement advanced technologies and perhaps one agency is taking the lead role.

1.3 Contents of the Report
This is the first of six sections. Section 2 provides general background material and key findings from the review of the literature. The methodological approach used primarily the survey instruments, their design and administration, are presented in Section 3, followed by the analysis of findings from the initial or overview survey in Section 4. General findings from the follow-up survey are presented in Section 5, followed by a presentation of case study examinations in Section 6. Section 7 includes discussion of lessons learned and guiding principles, followed by conclusions in Section 8.
2.0 BACKGROUND MATERIAL: KEY FINDINGS FROM REVIEW OF THE LITERATURE

This section provides a brief discussion of the current state of the practice for the implementation of transit service integration policies in the United States, which is based on a review of the literature that was performed early in the project. Complete documentation of this review of the literature may be found in (1). The literature review has helped provide a strong foundation on which the survey-related research — its design, administration, and analysis, is based.

Service integration policies and practices may be grouped into two categories as to whether they have a direct or indirect impact on transit passengers. Five major elements that have a direct impact on passengers have been identified:

Direct Impact

- Infrastructure
- Fare payment
- Schedule coordination
- Information
- Special event/emergency conditions

2.1 Practices with a Direct Impact on Passengers

By having a direct impact on passengers, we mean practices that have an immediate effect on passengers’ transit travel routines through route or schedule changes, new options in how to pay for transit services, and new choices in what and how they learn about transit-related information.

By infrastructure integration, we mean physical changes such as 1. Integration of routes, that is, changes to the route structure of at least two transit properties so as to be more in alignment with the travel pattern needs of their customers and 2. Establishment of interchange or transfer centers to facilitate the movement of people between different transit modes as well as within different routes of the same mode.

Schedule integration involves the coordination and synchronization of arrival and departure times to facilitate the movement of transit customers from their trip origins to their trip destinations involving any of the following four different combinations of transit service providers and transit modes:
1. Multiple transit service providers for different modes
2. Multiple transit service providers for the same mode
3. Different modes for a single transit service provider
4. Multiple lines of a single mode for a single transit service

Information integration includes a single (“one-stop shopping”) way of delivering multi-agency information to existing and potential transit customers. The types of information include

1. Transit trip itinerary planning about how to take transit from their trip origin to their trip destination
2. Real-time information about transit delays and incidents, such as, current location and/or speed of “their” bus to be used for planning a “just in time” arrival at their usual transit station or stop and traffic conditions affecting the public transit route they usually take.

While such information could be delivered to transit customers over the phone, a faster and more efficient way of providing this is through the Internet to an at-home or at-work computer, cellular phone, or personal digital assistant. Providing such information services, including its design, development, operation, and maintenance tasks are usually overseen by a regional transportation/planning authority.

Integration of fare payment systems consists of the establishment of a single medium (e.g., a universal transit fare card -- conventional paper card or computer-chip embedded smart card -- or pass) for transit customers to pay and, pay only once, for transit services regardless of the transit service provider (within the boundaries of the regional jurisdiction overseeing the implementation of such a regional card).

By special event or emergency condition integration, we mean coordinated multi-organizational policies consisting of an action plan to implement during and/or in response to particular events in order to minimize the negative impact that the occurrence of such events has on the regional transportation system. Such events may include planned for, or at least expected, events as well as unplanned for events that occur without warning. Examples include 1. Major sporting events like the Olympics and political conventions (planned and human in origin), 2. Terrorist attacks (unexpected and human in origin), 3. Hurricanes (expected and of natural origin), and 4. Earthquakes (unexpected/unplanned and of natural origin).
2.2 Practices with an Indirect Impact on Passengers

By having an *indirect* impact on passengers, we mean practices whose primary impact is on the business relationships between and among those transit agencies implementing such practices, which could, over time, influence the services that these agencies provide to their customers.

Transit agencies, especially in adjacent jurisdictions, may find it advantageous to work together on the following:

- Data sharing
- Joint procurement of equipment
- Joint funding proposals
- Coordinated public information dissemination activities
- Coordinated improvement at intermodal transfer facilities
- Planning and research

2.3 Role of the Regional Institutional Setting

Service integration activities are affected by a variety of region-specific institutional constraints and barriers. A precursor to any type of successful and effective service integration is inter-operator coordination and a commitment to or interest in system integration by all parties. It is argued in (2, 3) that a necessary condition for effective service integration is to have a regional transportation authority serve as champion for service integration and promote various means of integration as part of its overall regional mobility plan. This offers individual transit properties added incentives to pursue service integration beyond their physical and operational domain.

The regulatory environment can play a major role in determining the success of service integration practices. In a completely deregulated or privatized environment, regional transportation planning is often not regularly performed; in such cases, individual transit service providers must shoulder the burden of costs associated with coordination (3). The U.S. regulatory environment for the delivery of urban transit services is neither fully regulated nor fully privatized, but rather contains elements of both and thus have been referred to as “regulated spatial monopolies” (4, 5).

The existence of a regional entity, though it has been argued is a necessary condition for service integration, is not sufficient to bring about transit service integration. The authors in References
2 and 3 also argue that the regional or metropolitan authority must be empowered with a “stick”, e.g., withholding of state funding from transit operators unwilling to cooperate in regional service integration efforts, as well as a “carrot”, e.g. helping to pay the costs of implementing coordination activities. In the San Francisco Bay Area, for example, the metropolitan planning organization — the Metropolitan Transportation Commission (MTC) — was empowered by the State of California through Senate Bill (SB) 1474 in 1996 that supports service integration to promote customer satisfaction and achieve a network of cost-effective regional services. There are, indeed, teeth in this piece of legislation. MTC has been directed to consolidate functions that will improve productivity and enhance service integration in “corridors of regional significance”. Moreover, MTC has the authority to withhold funds from those transit operators unwilling to cooperate with MTC in these efforts.
3.0 SURVEY METHODOLOGY

3.1 Survey Instruments
The second major task in the project after the review of the literature was to gather information about current and past transit agency service integration and coordination practices by surveying transit properties. A two-step surveying process was employed to accomplish this end. An initial overview survey was sent to a selected group of transit agencies. This survey was designed to disclose which specific practices agencies have been implementing and who the best contacts were to learn more about these practices and their outcomes. The survey responses enabled us to screen potential candidates for follow-up research. The smaller pool of transit agencies that had implemented the most innovative practices, based upon the information discovered in this survey, was administered more detailed follow-up surveys about their specific integration practices and their outcomes.

3.2 Overview Survey
Initially, a candidate list of transit properties was developed by the study team. The objective was to cast as wide a net as possible to obtain information that was reasonably representative of current service integration practices throughout the U.S. and to be able to eventually draw conclusions of a general nature that will be applicable to a wide variety of transit agencies. Hence a cross-section of agencies, varying widely in size and geographic region, was sought. The common criterion used for inclusion was known or perceived service integration practices. Thus, this was not a random sample of transit properties, but instead a targeted and focused one. The study team relied on its personal knowledge of the transit industry and the knowledge of colleagues to identify specific implementations of service integration policies around the country. Other sources of information for this task included the National Transit Database, which is accessible via the Federal Transit Administration’s Web site, and other appropriate and relevant Web sites, such as transit agency websites. Ninety-six transit agencies were selected as candidate properties and sent the overview survey. These surveys covered the following regions of the United States; the specific transit agencies that were sent the overview survey are listed by region in Appendix A:

- Atlanta
- Chicagoland
- Southwestern Connecticut
The overview survey consisted of a brief questionnaire (Appendix B), which was designed to solicit information from a transit agency about its service integration practices. Each agency was asked to check an accompanying box if they had implemented inter-agency or intermodal service integration practices in each of the five major service integration categories (infrastructure, fare payment, schedule, information, and special events/emergency conditions). For each category that was answered “yes”, respondents were asked to provide a brief description of each integration practice, when it was implemented, and a contact person at their agency for follow-up discussions.

3.3 Transit Integration Practices Survey

The overwhelming participation in integration practices among agency respondents necessitated the study team to develop additional criteria to reduce the list of transit properties and associated integration practice(s) from which to administer the second and more detailed survey as not every transit agency’s reported integration practice(s) would be able to be studied in this follow-up survey. Several criteria, both objective and subjective, were used to determine which
agencies’ integration practices would be further investigated and so these criteria were practice-based and not agency-based. Since the ultimate goal was the discovery of quantitative data for evaluation, only transit agencies that had already implemented service integration practices were deemed to be eligible. Furthermore, only inter-agency projects were considered for further analysis. Third, the integration practices had to have been implemented within the last 10 years, since older projects would be unlikely to provide useful data and may not have knowledgeable staff members to answer further questions. Finally, the integration practices had to appear to be interesting and somewhat innovative from a national perspective. In Table 3-1 we list the transit integration practices and associated agencies that were selected based on the above criteria and administered the more probing and detailed second survey. The transit integration practices survey were custom designed for each of the five different types of integration practices. Appendices C through G contain the template for each of these five integration types, that is, infrastructure, fare payment, schedule, information, and special event / emergency conditions, respectively.
### TABLE 3-1 Selected Transit Integration Practices for Second Stage Survey

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<td>1. Trinity Railway Express Joint Operation (Dallas/Fort Worth)</td>
<td>Trinity Railway Express, DART, The T</td>
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<td>2. Coastal Link Joint Operation (SW Connecticut)</td>
<td>Greater Bridgeport Transit Authority, Milford Transit District, Norwalk Transit, Greater New Haven Transit, Connecticut Transit-Stamford Division</td>
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<td>3. Sound Transit Regional Express Service and Transit Centers (Puget Sound)</td>
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<td>5. Millbrae Intermodal Station (SF Bay Area)</td>
<td>Caltrain, SanTrans, BART</td>
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<td>6. Transit Centers in Northern Virginia (Washington DC Area)</td>
<td>WMATA, Fairfax County Connector, Arlington County Transit, Virginia Railway Express</td>
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<td>7. Shared Trolley/Bus Station (San Diego)</td>
<td>San Diego Trolley, San Diego County Transit, North Coast Transit District</td>
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<td>8. Shared Transfer Facility (Portland, Oregon)</td>
<td>Tri-Met, Clark County Public Transportation Benefit Area</td>
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<td><strong>Fare Payment</strong></td>
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<td>2. TransLink Smartcard &amp; Interagency Use of Passes (SF Bay Area)</td>
<td>MUNI, BART, Golden Gate Bridge, Highway, Transportation District, Sam Trans, AC Transit, Caltrain, SC VTA</td>
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<tr>
<td>3. EZPass Monthly Pass (LA County)</td>
<td>LA MTA, Culver City Transit, Foothill Transit, Santa Monica Big Blue Bus, Montebello Bus</td>
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<tr>
<td>5. MetroCard (New York City Area)</td>
<td>MTA/NYC TA and LI Bus, JFK Airtrain, PATH</td>
</tr>
<tr>
<td>6. GoVentura Regional Smartcard (Ventura County, southern California)</td>
<td>Ventura Intercity Service Transit Authority, Camarillo Area Transit, Thousand Oaks Transit, Moorpark Transit</td>
</tr>
<tr>
<td>7. Shared Fare Media (Fargo, North Dakota)</td>
<td>Fargo Area Transit, Moorhead Area Transit</td>
</tr>
<tr>
<td>8. Joint Fare Media/Passes &amp; Future Smartcard (Seattle/Puget Sound)</td>
<td>King County Metro Transit, Pierce Transit, Sound Transit, Everett Transit, City of Seattle Monorail Transit, Snohomish County Transportation Benefit Area</td>
</tr>
<tr>
<td><strong>Schedule</strong></td>
<td></td>
</tr>
<tr>
<td>1. CTA Purple Line Express (Chicago area)</td>
<td>CTA, Metra</td>
</tr>
<tr>
<td>2. Fairfax Connector 105/106/107 with Metrobus 9A Route Coordination (Wash. DC Area)</td>
<td>Fairfax County Connector, WMATA</td>
</tr>
<tr>
<td>3. Bullet Service Connection (SF Bay Area)</td>
<td>BART, Caltrain</td>
</tr>
<tr>
<td>4. Intermodal Schedule Coordination (Puget Sound)</td>
<td>Pierce Transit, King County Metro, Sound Transit</td>
</tr>
<tr>
<td>5. Synchronized Schedules (Sacramento, California)</td>
<td>South County Transit Link, Sacramento Transit District, Lodi GrapeLine</td>
</tr>
<tr>
<td>6. Norwalk-Stamford Coordination of Transfers @ Norwalk CBD Pulse Pt. (SW Conn.)</td>
<td>CT Transit, Norwalk Transit District</td>
</tr>
<tr>
<td>Information</td>
<td>1. Ride Guide Website &amp; Automated Telephone Customer Information Center / Itinerary Planning (Wash. DC Area)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>• WMATA, Md. MTA, MARC, Mont. Co. RideOn, Arlington Co. ART, Alexandria DASH, Fairfax County Connector, PG Co. The Bus, Fairfax City CUE, Virginia Railway Express, Loudoun County Transit Commuter Bus</td>
</tr>
<tr>
<td></td>
<td>2. RTA Regional Transit Travel Information Center (Chicagoland)</td>
</tr>
<tr>
<td></td>
<td>• CTA, Metra, Pace</td>
</tr>
<tr>
<td></td>
<td>3. MTC Regional Transit Customer Information Center (SF Bay Area)</td>
</tr>
<tr>
<td></td>
<td>• BART, MUNI, AC Transit, Golden Gate BHTD, MTC</td>
</tr>
<tr>
<td></td>
<td>4. Sound Transit Regional Trip Planner (Puget Sound)</td>
</tr>
<tr>
<td></td>
<td>• Sound Transit, King County Metro Transit, Pierce Transit, Snohomish Transportation Benefit Area</td>
</tr>
<tr>
<td></td>
<td>5. Go Ventura Central Information Center (Ventura County, southern California)</td>
</tr>
<tr>
<td></td>
<td>• Ventura Intercity Service Transit Authority, Camarillo Area Transit, Thousand Oaks Transit, Moorpark Transit, South Coast Area Transit, Ventura County Transportation Commission</td>
</tr>
<tr>
<td></td>
<td>6. Metro Trip Planner (L.A. County)</td>
</tr>
<tr>
<td></td>
<td>• L.A. MTA, Foothill Transit, Culver City Transit</td>
</tr>
<tr>
<td></td>
<td>7. Capital Area Regional Transit Information Website and Itinerary Planner (Research Triangle North Carolina)</td>
</tr>
<tr>
<td></td>
<td>• Capital Area Transit, Triangle Transit Authority, Durham Area Transit Authority, Chapel Hill Transit</td>
</tr>
<tr>
<td></td>
<td>8. Regional Transit Information Center (Twin Cities, MN)</td>
</tr>
<tr>
<td></td>
<td>Metro Transit, Minnesota Valley Transit Authority, Plymouth Transit, Anoka County Transit, Maple Grove Transit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Special Events / Emergency Conditions</th>
<th>1. MNCR Emergency Coordination (New York City Area)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• MTA/Metro North RR, Westchester DOT / “B” Line, CT Transit</td>
</tr>
<tr>
<td></td>
<td>2. NJ Coordination (NJ/NY City area)</td>
</tr>
<tr>
<td></td>
<td>• NJ Transit, MTA, PATH</td>
</tr>
<tr>
<td></td>
<td>3. RICCS (Washington DC Area)</td>
</tr>
<tr>
<td></td>
<td>• Metro. Washington COG, WMATA, VRE, MARC, Mont. Co. Ride On, PG Co. The Bus, Maryland MTA, Fairfax City CUE, Alexandria DASH, Fairfax County Connector, Arlington Co. ART, Loudoun County Transit Commuter Bus</td>
</tr>
<tr>
<td></td>
<td>4. BART Emergency Coordination (SF Bay Area)</td>
</tr>
<tr>
<td></td>
<td>• BART, AC Transit, SC VTA, MUNI, Golden Gate BHTD</td>
</tr>
</tbody>
</table>
Sixty or 62.5% of the ninety-six transit properties that were sent overview surveys responded to them. Fifty-six of the sixty respondents indicated that indeed they have implemented or were implementing service integration in at least one of the five stated categories. The only properties that indicated that they had not done so were the Greater Waterbury Transit District, City of Alexandria – DASH Bus, Potomac and Rappahannock Transportation Corporation (PRTC), and the Utah Transit Authority. From a California/non-California perspective, forty-two of the 66 (63.6%) non-California properties responded while 18 out of the 30 (60%) California agencies responded with each responding California agency stating their participation in service integration practices. Nearly three-quarters of the respondents indicated that they were/are involved with either four (18%) or all five (55%) different types of service integration practices; this survey statistic may be viewed as an indicator of agency activity in the area of implementing transit service integration practices. Table 4-1 shows the overall percentage breakdown of responses by integration practice type.

**TABLE 4-1 Types of Transit Service Integration Practices**

<table>
<thead>
<tr>
<th>Type of Transit Service Integration Practice</th>
<th>Number of Responses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>51 (85.0%)</td>
</tr>
<tr>
<td>Fare Payment</td>
<td>54 (90.0%)</td>
</tr>
<tr>
<td>Schedule</td>
<td>40 (66.7%)</td>
</tr>
<tr>
<td>Information</td>
<td>45 (75.0%)</td>
</tr>
<tr>
<td>Special Events / Emergency Conditions</td>
<td>43 (71.7%)*</td>
</tr>
</tbody>
</table>

*The vast majority of these coordinated arrangements are not with other transit or transportation agencies. Instead, they are with local agencies and municipalities.

Although the overview survey was targeted at properties that potentially had service integration, the study team had not anticipated positive responses from so many of them. It appeared that nearly every agency surveyed wished to claim that it had undertaken some service integration practice. This overwhelming positive response by the agencies to the overview survey drove the study team to develop additional criteria for reducing the list of transit properties. Not every transit agency’s reported “integration practices” would be able to be studied in the more detailed second survey; a usable list of agencies had to be created for the second survey. Thus, several factors were set to determine which agencies’ integration practices would be further investigated. Since the ultimate goal was the discovery of quantitative data for evaluation, only transit agencies who had already implemented service integration practices would be eligible. Ongoing
or future planned projects were not judged to be as helpful to the research. Second, only inter-
agency projects would be considered for further analysis. The overview survey had asked transit
properties about inter-agency and intermodal practices. Many agencies responded and discussed
intermodal integration practices taking place solely within their agency. Third, the integration
practices had to have been implemented within the last 10 years, since older projects would be
unlikely to provide useful data and may not have knowledgeable staff members to answer further
questions. Finally, the integration practices had to appear to be interesting and somewhat
innovative from a national perspective.

4.1 Infrastructure Integration Practices

4.1.1 California Respondents
Seventeen of the 30 (56.7%) California properties who responded to the overview survey
reported infrastructure service integration. All but one of the 17 indicated that they have already
implemented such practices, most of which in the non-recent past. The Los Angeles County
Metropolitan Transportation Authority (LACMTA) was the only agency that reported having
plans for future infrastructure integration. Three California infrastructure integration projects
were selected for further study. Two of these were located in the San Francisco Bay Area – the
Dunbarton Bridge Express bus and the Millbrae Intermodal Station – while the other was in the
San Diego areas – the El Cajon and Chula Vista intermodal stations. Table 4-2 shows the
infrastructure integration practices for California respondents.
TABLE 4-2 Infrastructure Integration Practices for California Respondents

<table>
<thead>
<tr>
<th>Agency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bay Area Rapid Transit (BART)</td>
<td>Joint BART/MUNI stations; new joint BART/Caltrain station at Millbrae</td>
</tr>
<tr>
<td>AC Transit (Alameda-Contra Costa Transit District)</td>
<td>Operates Dumbarton Bridge Express with VTA, SamTrans, Union City, &amp; BART; bus bays built at BART stations</td>
</tr>
<tr>
<td>MUNI (SF Municipal Railway)</td>
<td>Shared ferry &amp; bus terminals; Shared subway stations with BART</td>
</tr>
<tr>
<td>Caltrain</td>
<td>Millbrae Intramodal station serves BART, SamTrans, and Caltrain</td>
</tr>
<tr>
<td>VTA (Santa Clara Valley Transit Authority)</td>
<td>Integration of passenger facilities with Caltrain, Amtrak, ACE, &amp; BART</td>
</tr>
<tr>
<td>Golden Gate Bridge, Highway, and Transit District</td>
<td>Coordination of regional bus routes &amp; facilities with Marin County routes &amp; facilities</td>
</tr>
<tr>
<td>SamTrans (San Mateo County Transit District)</td>
<td>Millbrae Intramodal station serves BART, SamTrans, and Caltrain</td>
</tr>
<tr>
<td>Roseville Transit</td>
<td>2 main transfer stations used by multiple agencies</td>
</tr>
<tr>
<td>South County Transit/Link</td>
<td>Shared stops with Sacramento Regional Transit &amp; Lodi Grapeline</td>
</tr>
<tr>
<td>San Diego Trolley</td>
<td>LRT stations have bus &amp; P&amp;R facilities; El Cajon, Old Town Depot, &amp; Chula Vista all have bus, rail, &amp; LRT modes</td>
</tr>
<tr>
<td>L.A. County Metropolitan Transportation Authority</td>
<td>Planned transit transfer centers</td>
</tr>
<tr>
<td>Culver CityBus</td>
<td>Shared passenger facilities w/MTA, Big Blue Bus, &amp; Torrance Transit</td>
</tr>
<tr>
<td>Foothill Transit</td>
<td>Shared operation of El Monte station with MTA</td>
</tr>
<tr>
<td>Camarillo Area Transit</td>
<td>Coordination with VISTA &amp; SCAT Dial-a-Ride</td>
</tr>
<tr>
<td>Moorpark City Transit</td>
<td>Coordinated with VISTA</td>
</tr>
<tr>
<td>Thousand Oaks Transit</td>
<td>Multi-modal transit center built</td>
</tr>
<tr>
<td>Ventura Intercity Service Transit Authority (VISTA)</td>
<td>Coordinated stops &amp; services with other providers</td>
</tr>
</tbody>
</table>

Key:

- Past Implementation
- In the process of Implementation
- Future Plans

4.1.2 Non-California Respondents

Thirty-four of the 66 (51.5%) non-California transit properties who responded to the overview survey reported infrastructure service integration practices. Of these 34 agencies, 32 (94%) reported having already implemented these practices. Upon further examination, it was discovered that the majority of these implemented infrastructure integration practices had been in place for many years. Five recent infrastructure integration projects were chosen to be studied: the Trinity Railway Express (Dallas/Fort Worth), the Coastal Link bus (southwestern Connecticut), Sound Regional Express Buses (Puget Sound region), the new transit center at Herndon and the Pentagon (Washington, DC area), and new shared multimodal transfer facilities (Portland, OR area). Table 4-3 shows the infrastructure integration practices for non-California respondents.
### TABLE 4-3 Infrastructure Integration Practices for Non-California Respondents

<table>
<thead>
<tr>
<th>Agency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broward County Mass Transit Division</td>
<td>Shared passenger facilities with PalmTran, Tri-Rail, &amp; MDT</td>
</tr>
<tr>
<td>Palm Tran, Inc.</td>
<td>Bus service to Tri-Rail, shared stops with Broward County Transit</td>
</tr>
<tr>
<td>MetroLINK - Rock Island County Metropolitan Mass Transit District</td>
<td>Joint on-street transfer site with Davenport system</td>
</tr>
<tr>
<td>Capital Area Transit</td>
<td>Coordination with TTA</td>
</tr>
<tr>
<td>Triangle Transit Authority</td>
<td>Regional transfer center accommodates Durham Transit buses</td>
</tr>
<tr>
<td>Clark County Public Transportation Benefit Area Authority</td>
<td>Shared funding (Tri-Met/C-Tran) for LRT/Bus stations</td>
</tr>
<tr>
<td>Gwinnett County Transit</td>
<td>Shared use of bus facility with MARTA</td>
</tr>
<tr>
<td>Dallas Area Rapid Transit Authority</td>
<td>Joint development &amp; operation of TRE with The T</td>
</tr>
<tr>
<td>Chicago Transit Authority</td>
<td>Metra &amp; Pace transfer locations at CTA facilities; shared CTA/Pace bus turnarounds</td>
</tr>
<tr>
<td>Minnesota Valley Transit Authority</td>
<td>Metro Transit coordinated system</td>
</tr>
<tr>
<td>Anoka County Transit</td>
<td>Coordinated with other local systems</td>
</tr>
<tr>
<td>Metro Transit</td>
<td>Shared passenger facilities with other providers</td>
</tr>
<tr>
<td>Moorhead Area Transit</td>
<td>Joint transfer facility; shared dispatchers</td>
</tr>
<tr>
<td>Sound Transit</td>
<td>Provides funding for local agencies to run regional bus routes</td>
</tr>
<tr>
<td>Pierce Transit</td>
<td>Operates Sound Transit routes; some shared facilities with other providers</td>
</tr>
<tr>
<td>King County Metro Transit</td>
<td>Service connections with other agencies</td>
</tr>
<tr>
<td>City of Seattle - Monorail Transit</td>
<td>Planned interfaces</td>
</tr>
<tr>
<td>Snohomish County Transportation Benefit Area Corporation</td>
<td>Regional express bus operated under contract for Sound Transit</td>
</tr>
<tr>
<td>Greater Bridgeport Transit Authority</td>
<td>Coastal Link service operated jointly with Milford &amp; Norwalk Transit Districts</td>
</tr>
<tr>
<td>Milford Transit District</td>
<td>Coastal Link service operated jointly with GBTA &amp; Norwalk Transit Districts</td>
</tr>
<tr>
<td>Connecticut Transit-Stamford Division</td>
<td>Bus route to White Plains; Stamford Intermodal Center shared by MetroNorth, Amtrak, &amp; CT Transit</td>
</tr>
<tr>
<td>Dutchess County Division of Mass Transportation</td>
<td>Shuttle buses for MetroNorth trains</td>
</tr>
<tr>
<td>Westchester County Department of Transportation</td>
<td>White Plains facility used by other providers</td>
</tr>
<tr>
<td>MTA MetroNorth Railroad</td>
<td>Hudson Rail Link feeder buses &amp; feeder ferry buses</td>
</tr>
<tr>
<td>Nassau County Regional Transit</td>
<td>Operates inter-regional service with Norwalk Transit</td>
</tr>
<tr>
<td>Port Authority Trans-Hudson Corporation</td>
<td>Planned connection to NYCTA at new WTC station</td>
</tr>
<tr>
<td>New Jersey Transit</td>
<td>Multimodal terminals at Hoboken and Newark, operation agreements with MetroNorth</td>
</tr>
<tr>
<td>Southeastern Pennsylvania Transportation Authority</td>
<td>Connections w/NJ Transit, Amtrak, PATCO, DART</td>
</tr>
<tr>
<td>Washington Metropolitan Area Transit Authority</td>
<td>Connections with other providers</td>
</tr>
<tr>
<td>Ride-On Montgomery County Dept. of Public Works</td>
<td>Metrorail facilities built to accommodate Ride-On buses</td>
</tr>
<tr>
<td>Fairfax Connector Bus System</td>
<td>Serves Metrorail; shared bus stops with WMATA</td>
</tr>
<tr>
<td>Virginia Railway Express</td>
<td>Connection to Metrorail &amp; local bus systems</td>
</tr>
<tr>
<td>Mass Transit Administration</td>
<td>Silver Spring Transit Center shared with WMATA &amp; Ride-On</td>
</tr>
<tr>
<td>Loudoun County Department of Transportation - Commuter Bus</td>
<td>Serves Metrorail</td>
</tr>
</tbody>
</table>

**Key:**
- Past Implementation
- In the process of Implementation
- Future Plans

### 4.2 Fare Payment Integration Practices

#### 4.2.1 California Respondents

Eighteen of the 30 (60%) California properties who responded to the overview survey reported fare payment integration. All of these agencies indicated that they have recently implemented such practices. All of the San Francisco Bay Area respondents indicated that they had implemented some sort of fare integration but were currently in the process of implementing another type of fare integration (TransLink). Two systems — San Diego Trolley and Roseville Transit - were systems that implemented fare integration in the past but plan on future improved
fare integration practices. Three California infrastructure integration projects were selected for further study: TransLink (San Francisco Bay Area), EZ Pass (Los Angeles County), and the GoVentura Card (Ventura County). Table 4-4 shows the fare payment integration practices for California respondents.

<table>
<thead>
<tr>
<th>Agency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bay Area Rapid Transit (BART)</td>
<td>Past Implementation: TransLink, some existing arrangements with other agencies</td>
</tr>
<tr>
<td>AC Transit (Alameda-Contra Costa Transit District)</td>
<td>Past Implementation: TransLink, some existing arrangements with other agencies</td>
</tr>
<tr>
<td>MUNI (SF Municipal Railway)</td>
<td>Future Plans: MUNI pass good on BART &amp; Caltrain within SF</td>
</tr>
<tr>
<td>Caltrain</td>
<td>In the process of Implementation: TransLink in progress; current fare arrangements with VTA &amp; SamTrans</td>
</tr>
<tr>
<td>VTA (Santa Clara Valley Transit Authority)</td>
<td>In the process of Implementation: Integration of fares with Caltrain, Amtrak, ACE, &amp; BART</td>
</tr>
<tr>
<td>Golden Gate Bridge, Highway, and Transit District</td>
<td>Past Implementation: Fare coordination with local operators</td>
</tr>
<tr>
<td>SamTrans (San Mateo County Transit District)</td>
<td>Past Implementation: Fare arrangements with VTA &amp; Caltrain; Bart-Plus tickets</td>
</tr>
<tr>
<td>Yuba-Sutter Transit</td>
<td>Past Implementation: Discount combination monthly pass with Sacramento Regional Transit</td>
</tr>
<tr>
<td>Roseville Transit</td>
<td>In the process of Implementation: Transfer agreements with Sacramento Regional Transit &amp; Placer Co. Transit, plans for regional fare system</td>
</tr>
<tr>
<td>South County Transit/Link</td>
<td>Future Plans: Transfer agreements with Sacramento Regional Transit &amp; Lodi Grapeline</td>
</tr>
<tr>
<td>San Diego Trolley</td>
<td>In the process of Implementation: Shared transfers &amp; passes with SD Transit, National City Transit, &amp; Chula Vista Transit, plans for NCTD &amp; Amtrak</td>
</tr>
<tr>
<td>L.A. County Metropolitan Transportation Authority</td>
<td>Past Implementation: EZ Pass</td>
</tr>
<tr>
<td>Culver City Bus</td>
<td>Past Implementation: EZ Pass, Metrocard with Montebello &amp; Big Blue Bus</td>
</tr>
<tr>
<td>Foothill Transit</td>
<td>Past Implementation: EZ Pass</td>
</tr>
<tr>
<td>Camarillo Area Transit</td>
<td>Past Implementation: GoVentura smartcard system</td>
</tr>
<tr>
<td>Moorpark City Transit</td>
<td>Past Implementation: GoVentura smartcard system</td>
</tr>
<tr>
<td>Thousand Oaks Transit</td>
<td>Past Implementation: GoVentura smartcard system</td>
</tr>
<tr>
<td>Ventura Intercity Service Transit Authority (VISTA)</td>
<td>Past Implementation: countywide regional smartcard, passes, &amp; e-purse</td>
</tr>
</tbody>
</table>

Key:

- Past Implementation
- In the process of Implementation
- Future Plans

4.2.2 Non-California Respondents

Thirty-six of the 66 (54.5%) non-California transit properties who responded to the overview survey reported fare payment integration practices. The majority of these agencies (63.9%) claimed that they had already implemented fare payment integration while 13.8% of the agencies stated that they had implemented some sort of fare integration but were currently in the process of implementing another type of fare integration. Three agencies (Anoka County Transit, Sound Transit, and Maryland MTA) indicated that they were only in the process of implementation while three other agencies (VRE, Seattle Monorail, and BCT) said they were planning on implementing some sort of fare payment integration in the future. Fairfax Connector provided an interesting case of a system that implemented fare integration in the past but plans on being part of new regional fare integration. Although fare payment integration practices are typically associated with large metropolitan areas, the overview survey disclosed some interesting recent practices in smaller metropolitan areas. Two of the five fare payment integration projects chosen
for further study were in small metropolitan areas – Fargo-Moorhead’s shared fare media and Quad Cities universal fare card. The remaining three projects selected for future study were the SmarTrip Smartcard (Washington, DC), Metrocard (NYC area), and Puget Sound Joint Fare Media (Puget Sound area). Table 4-5 shows the fare payment integration practices for non-California respondents.

**TABLE 4-5 Fare Payment Integration Practices for Non-California Respondents**

<table>
<thead>
<tr>
<th>Agency</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broward County Mass Transit Division</td>
<td>Plans for compatible regional farebox system</td>
</tr>
<tr>
<td>Palm Tran, Inc.</td>
<td>Free transfers to BCT &amp; Tri-Rail</td>
</tr>
<tr>
<td>Davenport Citibus</td>
<td>Regional flash passes and fare cards</td>
</tr>
<tr>
<td>MetroLINK - Rock Island County Metropolitan Mass Transit District</td>
<td>Universal fare card for use in Rock Island, Davenport, and Bettendorf systems</td>
</tr>
<tr>
<td>Capital Area Transit</td>
<td>Regional fare card with Durham Transit, Orange County, &amp; TTA</td>
</tr>
<tr>
<td>Triangle Transit Authority</td>
<td>Multiagency regional monthly flash pass</td>
</tr>
<tr>
<td>Gwinnett County Transit</td>
<td>Unofficial reciprocal fare agreement w/MARTA</td>
</tr>
<tr>
<td>Dallas Area Rapid Transit Authority</td>
<td>Ft Worth media accepted on DART LRT system; coordination of fare pricing &amp; fare structure with the T</td>
</tr>
<tr>
<td>Chicago Transit Authority</td>
<td>CTAPace transfers &amp; passes, CTAPace LinkUp Pass, CTAPace combined fare cards</td>
</tr>
<tr>
<td>Minnesota Valley Transit Authority</td>
<td>Regional fare card with Tri-Met</td>
</tr>
<tr>
<td>Anoka County Transit</td>
<td>Coordinated regional system arranged by Metro Transit</td>
</tr>
<tr>
<td>Metro Transit</td>
<td>Fully integrated regional smart card in near future</td>
</tr>
<tr>
<td>Moorhead Area Transit</td>
<td>Shared passes &amp; fare cards</td>
</tr>
<tr>
<td>Clark County Public Transportation Benefit Area Authority</td>
<td>Implementation of smart card in progress</td>
</tr>
<tr>
<td>Sound Transit</td>
<td>Puget sound joint fare media implemented</td>
</tr>
<tr>
<td>Pierce Transit</td>
<td>Puget sound joint fare media implemented</td>
</tr>
<tr>
<td>King County Metro Transit</td>
<td>Participant in regional smartcard effort for future</td>
</tr>
<tr>
<td>City of Seattle - Monorail Transit</td>
<td>Regional pass program; regional smartcard project</td>
</tr>
<tr>
<td>Snohomish County Transportation Benefit Area Corporation</td>
<td>Regional smartcard effort for future</td>
</tr>
<tr>
<td>Greater Bridgeport Transit Authority</td>
<td>Multiple fare media accepted on Coastal Link Route; free transfers to CT Transit</td>
</tr>
<tr>
<td>Milford Transit District</td>
<td>Uniticket</td>
</tr>
<tr>
<td>Connecticut Transit-Stamford Division</td>
<td>Metrocard used on LiBus &amp; at some PATH stations, expansion to all PATH stations is underway</td>
</tr>
<tr>
<td>Westchester County Department of Transportation</td>
<td>Transfer agreements with Putnam County Transit, Rockland County Transit, and others</td>
</tr>
<tr>
<td>MTA MetroNorth Railroad</td>
<td>Uni-tickets, Metrocard combination passes</td>
</tr>
<tr>
<td>Housatonic Area Regional Transit</td>
<td>Interagency transfer agreements with some other providers, MTA Unicket participant</td>
</tr>
<tr>
<td>Port Authority Trans-Hudson Corporation</td>
<td>MetroCard accepted at 2 stations, plans for regional smart cards agreement with Amtrak for monthly passes; multimodal passes, tickets available on NJ Transit</td>
</tr>
<tr>
<td>New Jersey Transit</td>
<td>Regional bus transfer agreement, SmarTrip in progress</td>
</tr>
<tr>
<td>Washington Metropolitan Area Transit Authority</td>
<td>Accept transfers from other local carriers</td>
</tr>
<tr>
<td>Ride-On Montgomery County Dept. of Public Works</td>
<td>Accept transfers from other No. Va systems</td>
</tr>
<tr>
<td>City of Fairfax CUE Bus System</td>
<td>Metrobuses fare media good on Fairfax Connector, plans for regional smartcard</td>
</tr>
<tr>
<td>Virginia Railway Express</td>
<td>Regional smartcard planned</td>
</tr>
<tr>
<td>Mass Transit Administration</td>
<td>Smartcard in progress</td>
</tr>
<tr>
<td>Loudoun County Department of Transportation - Commuter Bus</td>
<td>Participant in regional smartcard effort for future</td>
</tr>
<tr>
<td>DART 1st State - Delaware Transit Corporation</td>
<td>Free transfers with Ocean City, MD systems for RTE 208 riders</td>
</tr>
</tbody>
</table>

**Key:**

- Past Implementation
- In the process of Implementation
- Future Plans
4.3 Schedule Integration Practices

4.3.1 California Respondents

Only 36.7% of the California properties who responded to the overview survey reported schedule integration. One of these, Golden Gate Bridge, Highway, and Transportation District (GGBHTD) mentioned multimodal integration that was implemented between their buses and ferries. Four other Bay Area agencies reported that they were currently in the process of interagency schedule integration. Alameda-Contra Costa Transit District (AC Transit) indicated that its interagency schedule coordination had already been implemented. Several Sacramento area and southern California transit properties indicated that they had also implemented interagency schedule integration. One such agency, Foothill Transit in southern California, mentioned the constant challenge of schedule integration and was currently in the process of “re-vamping” their schedules for integration. Two California schedule integration projects were selected for further study: Baby Bullet Service Connection in the San Francisco Bay Area and schedule synchronization in the Sacramento area. Table 4-6 shows the schedule integration practices for California respondents.

<table>
<thead>
<tr>
<th>Agency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bay Area Rapid Transit (BART)</td>
<td>Coordination with Caltrain</td>
</tr>
<tr>
<td>AC Transit (Alameda-Contra Costa Transit District)</td>
<td>Coordination with BART</td>
</tr>
<tr>
<td>Caltrain</td>
<td>Coordinate with BART &amp; VTA LRT</td>
</tr>
<tr>
<td>VTA (Santa Clara Valley Transit Authority)</td>
<td>Integration with Caltrain, Amtrak, ACE, &amp; BART</td>
</tr>
<tr>
<td>Golden Gate Bridge, Highway, and Transit District</td>
<td>Buses coordinated to meet GGT ferries</td>
</tr>
<tr>
<td>SamTrans (San Mateo County Transit District)</td>
<td>Coordination with BART &amp; Caltrain</td>
</tr>
<tr>
<td>Roseville Transit</td>
<td>Coordinate with other agencies</td>
</tr>
<tr>
<td>South County TransitLink</td>
<td>Coordination with Sacramento Regional Transit &amp; Lodi Grapeline</td>
</tr>
<tr>
<td>L.A. County Metropolitan Transportation Authority</td>
<td>Coordination with commuter rail and with other local providers</td>
</tr>
<tr>
<td>Foothill Transit</td>
<td>Attempts to coordinate with other systems</td>
</tr>
<tr>
<td>Camarillo Area Transit</td>
<td>Coordination with VISTA</td>
</tr>
</tbody>
</table>

Key:

- | Past Implementation
- | In the process of Implementation
- | Future Plans

4.3.2 Non-California Respondents

Slightly less than half (43.9%) of the non-California transit properties who responded to the overview survey reported service integration practices involving scheduling. All but three of these agencies stated that they have already implemented these practices. Fairfax Connector provided an interesting case of a system that implemented schedule integration in the past, which apparently was not successful, and that is continuing to try to resolve it. Upon further
examination, it was discovered that the majority of these implemented scheduling integration projects had been in place for many years. Hence, only a few were chosen to be studied: the Chicago Transit Authority (CTA) Purple Line Express Connection (Chicago), Fairfax Connector and WMATA (Washington Metropolitan Area Transportation Authority), intermodal coordination among buses, trains, and ferries (Puget Sound region), Norwalk-Stamford coordination (southwestern Connecticut), MetroNorth train coordination with local buses (New York City area), Hoboken and Newark train coordination (New Jersey). Table 4-7 shows the schedule integration practices for non-California respondents.

**TABLE 4-7 Schedule Integration Practices for Non-California Respondents**

<table>
<thead>
<tr>
<th>Agency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broward County Mass Transit Division</td>
<td>Adjustment of schedules to meet Tri-Rail</td>
</tr>
<tr>
<td>Palm Tran, Inc.</td>
<td>Timed connections with Tri-Rail</td>
</tr>
<tr>
<td>Dallas Area Rapid Transit Authority</td>
<td>Timed connections between bus and TRE systems</td>
</tr>
<tr>
<td>Davenport Citibus</td>
<td>Timed connections between MetroLink, Bettendorf, &amp; Davenport systems</td>
</tr>
<tr>
<td>MetroLINK - Rock Island County Metropolitan Mass Transit District</td>
<td>Timed connections between MetroLink, Bettendorf, &amp; Davenport systems</td>
</tr>
<tr>
<td>Clark County Public Transportation Benefit Area Authority</td>
<td>Integration of schedules with Tri-Met</td>
</tr>
<tr>
<td>Chicago Transit Authority</td>
<td>Purple line trains timed to meet reverse commute Metra trains at Davis station</td>
</tr>
<tr>
<td>Anoka County Transit</td>
<td>Coordination with other providers</td>
</tr>
<tr>
<td>Metro Transit</td>
<td>Coordination with local providers</td>
</tr>
<tr>
<td>Minnesota Valley Transit Authority</td>
<td>Routes coordinated with other systems</td>
</tr>
<tr>
<td>Moorhead Area Transit</td>
<td>Coordination with Fargo Transit</td>
</tr>
<tr>
<td>City of Seattle - Monorail Transit</td>
<td>Future Plans</td>
</tr>
<tr>
<td>Sound Transit</td>
<td>Regional transit integration group meets to coordinate schedules</td>
</tr>
<tr>
<td>Pierce Transit</td>
<td>Coordination with other providers</td>
</tr>
<tr>
<td>King County Metro Transit</td>
<td>Coordination with WA ferry system</td>
</tr>
<tr>
<td>Snohomish County Transportation Benefit Area Corporation</td>
<td>Coordination with other agencies</td>
</tr>
<tr>
<td>Connecticut Transit-Stamford Division</td>
<td>Coordination of CT Transit &amp; Norwalk Transit at Norwalk pulse point</td>
</tr>
<tr>
<td>Dutchess County Division of Mass Transportation</td>
<td>Buses timed to meet MetroNorth trains</td>
</tr>
<tr>
<td>Westchester County Department of Transportation</td>
<td>Buses timed to meet MetroNorth trains</td>
</tr>
<tr>
<td>MTA MetroNorth Railroad</td>
<td>Coordination with bus providers</td>
</tr>
<tr>
<td>Housatonic Area Regional Transit</td>
<td>Shuttle buses and ferries coordinated to meet MetroNorth Trains</td>
</tr>
<tr>
<td>New York City Transit Authority</td>
<td>Coordination of buses w/Staten Island Ferry, late night buses held to meet trains at Jamaica Center</td>
</tr>
<tr>
<td>New Jersey Transit</td>
<td>Refinement of schedules for coordination</td>
</tr>
<tr>
<td>Port Authority Trans-Hudson Corporation</td>
<td>NJ Transit holds trains at Newark &amp; Hoboken when there are PATH delays</td>
</tr>
<tr>
<td>Ride-On Montgomery County Dept. of Public Works</td>
<td>Inter-time shared route segments w/WMATA</td>
</tr>
<tr>
<td>City of Fairfax CUE Bus</td>
<td>Future Plans</td>
</tr>
<tr>
<td>Fairfax Connector Bus System</td>
<td>Tried to coordinate Metrobus route 9A &amp; FFX 105, 106, 107; in the process of converting to 2 routes: express bus (9A) and local (107)</td>
</tr>
<tr>
<td>Mass Transit Administration</td>
<td>Refinement of schedules for coordination</td>
</tr>
<tr>
<td>Washington Metropolitan Area Transit Authority</td>
<td>Future Plans</td>
</tr>
</tbody>
</table>

**Key:**

- Past Implementation
- In the process of Implementation
- Future Plans
4.4 Information Integration Practices

4.4.1 California Respondents

Half of the California transit properties who responded to the overview survey reported information integration practices. Nearly three-quarters of these agencies stated that they have already implemented these practices in the form of a centralized regional information dissemination system. Two additional agencies indicated that they include information about other providers with their information, but do not participate in a regional information center. One Sacramento area property mentioned participating in Sacramento Area Council of Government’s (SACOG’s) current development of a regional information system while another mentioned that the extent of their information integration practices was having some of their information appear in the annual regional transit guide. Three information integration projects were selected for further study: MTC Regional Transit Travel Information Center (San Francisco Bay Area), Transtar (Los Angeles Area), GoVentura Central Information Center (Ventura County). Table 4-8 depicts the information integration practices for California respondents.

### TABLE 4-8 Information Integration Practices for California Respondents

<table>
<thead>
<tr>
<th>Agency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bay Area Rapid Transit (BART)</td>
<td>MTC website</td>
</tr>
<tr>
<td>AC Transit (Alameda-Contra Costa Transit District)</td>
<td>MTC website</td>
</tr>
<tr>
<td>MUNI (SF Municipal Railway)</td>
<td>MTC website</td>
</tr>
<tr>
<td>VTA (Santa Clara Valley Transit Authority)</td>
<td>Integration with Caltrain, Amtrak, ACE, &amp; BART</td>
</tr>
<tr>
<td>Golden Gate Bridge, Highway, and Transit District</td>
<td>MTC website</td>
</tr>
<tr>
<td>Roseville Transit</td>
<td>SACOG working to create regional trip planning guide</td>
</tr>
<tr>
<td>South County Transit/Link</td>
<td>Info included in annual regional guide</td>
</tr>
<tr>
<td>San Diego Trolley</td>
<td>Regional website &amp; phone system</td>
</tr>
<tr>
<td>L.A. County Metropolitan Transportation Authority</td>
<td>Single source for regional transit info</td>
</tr>
<tr>
<td>Culver CityBus</td>
<td>Information on other agencies available at kiosks</td>
</tr>
<tr>
<td>Foothill Transit</td>
<td>Info on other agencies available at transit stores</td>
</tr>
<tr>
<td>Camarillo Area Transit</td>
<td>Countywide central information for transit, including on-line routing, run by Ventura County Transportation Commission (VCTC)</td>
</tr>
<tr>
<td>Moorpark City Transit</td>
<td>Countywide central information for transit, including on-line routing, run by VCTC</td>
</tr>
<tr>
<td>Thousand Oaks Transit</td>
<td>Countywide central information for transit, including on-line routing, run by VCTC</td>
</tr>
<tr>
<td>Ventura Intercity Service Transit Authority (VISTA)</td>
<td>Countywide central information for transit, including on-line routing, run by VCTC</td>
</tr>
</tbody>
</table>

**Key:**

- Past Implementation
- In the process of Implementation
- Future Plans
4.4.2 Non-California Respondents

Nearly half (45.5%) of the non-California transit properties who responded to the overview survey reported information integration practices. Almost two-thirds of these agencies stated that they have already implemented these practices in the form of a centralized regional information dissemination system. Three additional agencies indicated that they include information about other providers with their information, but do not participate in a regional information center. Rock Island’s MetroLINK reported that the extent of their information integration practices was having their information printed in the annual regional transit guide.

Several New York City area providers mentioned that they are involved in the development of a regional information system while the Seattle Monorail plans on participating in future in Seattle’s current system. Four information integration projects were chosen for further study: RideGuide and Automated Telephone Customer Information System and Itinerary Planning (Washington, DC), Sound Transit Regional Trip Planner (Puget Sound Area), Capital Area Regional Transit Information Website and Itinerary Planner (Raleigh-Durham), and Metropolitan Transit Information Center (Twin Cities). Table 4-9 shows the information integration practices for non-California respondents.

**TABLE 4-9 Information Integration Practices for Non-California Respondents**

<table>
<thead>
<tr>
<th>Agency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broward County Mass Transit Division</td>
<td>Planning for regional customer information network</td>
</tr>
<tr>
<td>Palm Tran, Inc.</td>
<td>Inclusion of Tri-Rail schedules with Palm Tran info</td>
</tr>
<tr>
<td>Capital Area Transit</td>
<td>Regional transit information website</td>
</tr>
<tr>
<td>Triangle Transit Authority</td>
<td>Regional transit information website</td>
</tr>
<tr>
<td>Dallas Area Rapid Transit Authority</td>
<td>Single source for multi-provider customer information</td>
</tr>
<tr>
<td>Chicago Transit Authority</td>
<td>RTA travel information center</td>
</tr>
<tr>
<td>Anoka County Transit</td>
<td>Regional transit info center operated by Metro Transit</td>
</tr>
<tr>
<td>Metro Transit</td>
<td>Runs single regional call center and trip planning website</td>
</tr>
<tr>
<td>Minnesota Valley Transit Authority</td>
<td>Regional transit info center operated by Metro Transit</td>
</tr>
<tr>
<td>Moorhead Area Transit</td>
<td>Links to other providers on website</td>
</tr>
<tr>
<td>MetroLINK - Rock Island County Metropolitan Mass Transit District</td>
<td>Annual regional ride guide printed</td>
</tr>
<tr>
<td>Clark County Public Transportation Benefit Area Authority</td>
<td>Links to regional customer info website</td>
</tr>
<tr>
<td>City of Seattle - Monorail Transit</td>
<td>Future Plans</td>
</tr>
<tr>
<td>Sound Transit</td>
<td>Regional transit web page and customer information center</td>
</tr>
<tr>
<td>Pierce Transit</td>
<td>Online regional trip planning</td>
</tr>
<tr>
<td>Snohomish County Transportation Benefit Area Corporation</td>
<td>Regional trip itinerary system</td>
</tr>
<tr>
<td>Greater Bridgeport Transit Authority</td>
<td>Links to other providers on GBTA website</td>
</tr>
<tr>
<td>Connecticut Transit-Stamford Division</td>
<td>Trips123 being developed</td>
</tr>
<tr>
<td>Westchester County Department of Transportation</td>
<td>Trips123 being developed</td>
</tr>
<tr>
<td>New York City Transit Authority</td>
<td>MTA website has info for NYCTA, LI Bus, &amp; MetroNorth</td>
</tr>
<tr>
<td>Port Authority Trans-Hudson Corporation</td>
<td>Trips123 being developed</td>
</tr>
<tr>
<td>New Jersey Transit</td>
<td>NJ Transit's website covers all of its modes</td>
</tr>
<tr>
<td>Ride-On Montgomery County Dept. of Public Works</td>
<td>METRO RideGuide</td>
</tr>
<tr>
<td>City of Fairfax CUE Bus</td>
<td>METRO RideGuide</td>
</tr>
<tr>
<td>Fairfax Connector Bus System</td>
<td>METRO RideGuide</td>
</tr>
<tr>
<td>Virginia Railway Express</td>
<td>Links on website to other providers</td>
</tr>
<tr>
<td>Loudoun County Department of Transportation - Commuter Bus</td>
<td>METRO RideGuide</td>
</tr>
<tr>
<td>Washington Metropolitan Area Transit Authority</td>
<td>Operates METRO RideGuide</td>
</tr>
</tbody>
</table>

**Key:**

- Past Implementation
- In the process of Implementation
- Future Plans
4.5 Special Events / Emergency Conditions Integration Practices

4.5.1 California Respondents

Although many transit properties answered that they have implemented special events/emergency conditions coordination, the vast majority of these arrangements are not with other transit or transportation agencies. Instead, they are with local agencies and municipalities. This phenomenon was observed in both California and non-California properties. Some of the agencies have dedicated emergency conditions and special event personnel, who do not do much with integration with other transit agencies. Only a few cases were deemed interesting enough for further study. California’s examples included emergency coordination and relief for the Bay Area Rapid Transit District (BART) and special events planning in San Diego. Tables 4-10 show the special events / emergency conditions integration practices for California respondents.

**TABLE 4-10 Special Events / Emergency Conditions Integration Practices for California Respondents**

<table>
<thead>
<tr>
<th>Agency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bay Area Rapid Transit (BART)</td>
<td>Participation in regional &amp; MTC emergency services efforts</td>
</tr>
<tr>
<td>AC Transit (Alameda-Contra Costa Transit District)</td>
<td>Provides shuttles for BART if BART shuts down</td>
</tr>
<tr>
<td>MUNI (SF Municipal Railway)</td>
<td>Provides shuttles for BART in SF if BART shuts down</td>
</tr>
<tr>
<td>Golden Gate Bridge, Highway, and Transit District</td>
<td>Participation in regional &amp; MTC emergency services efforts</td>
</tr>
<tr>
<td>VTA (Santa Clara Valley Transit Authority)</td>
<td>Integration with Caltrain, Amtrak, ACE, &amp; BART</td>
</tr>
<tr>
<td>Roseville Transit</td>
<td>Internal emergency plan</td>
</tr>
<tr>
<td>South County Transit/Link</td>
<td>Coordination with local agencies</td>
</tr>
<tr>
<td>San Diego Trolley</td>
<td>Plan for events with event sponsors &amp; other transit agencies</td>
</tr>
<tr>
<td>L.A. County Metropolitan Transportation Authority</td>
<td>Special events/emergencies command structure</td>
</tr>
<tr>
<td>Culver CityBus</td>
<td>Coordination with local agencies</td>
</tr>
<tr>
<td>Foothill Transit</td>
<td>Provide service to Hollywood Bowl along with other agencies</td>
</tr>
<tr>
<td>Camarillo Area Transit</td>
<td>Coordination with local agencies</td>
</tr>
</tbody>
</table>

Key:

- Past Implementation
- In the process of Implementation
- Future Plans

4.5.2 Non-California Respondents

Non-California examples were the new Regional Incident Communication and Coordination System (RICCCS) system in the Washington, DC area, emergency coordination and relief for Metro-North, and emergency coordination in New Jersey. Tables 4-11 show the special events / emergency conditions integration practices for non-California respondents.
### TABLE 4-11 Special Events / Emergency Conditions Integration for Non-California Respondents

<table>
<thead>
<tr>
<th>Agency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broward County Mass Transit Division</td>
<td>Buses used by county for hurricane evacuations</td>
</tr>
<tr>
<td>Palm Tran, Inc.</td>
<td>Future plans</td>
</tr>
<tr>
<td>Capital Area Transit</td>
<td>Coordination with local agencies</td>
</tr>
<tr>
<td>Dallas Area Rapid Transit Authority</td>
<td>All agency emergency preparedness plan</td>
</tr>
<tr>
<td>Davenport Citibus</td>
<td>Coordinates with other transit agencies and organizations for special events</td>
</tr>
<tr>
<td>Moorhead Area Transit</td>
<td>Future plans</td>
</tr>
<tr>
<td>Metro Transit</td>
<td>Coordinated agency response for emergencies</td>
</tr>
<tr>
<td>Anoka County Transit</td>
<td>Operated by Metro Transit</td>
</tr>
<tr>
<td>Minnesota Valley Transit Authority</td>
<td>Regional transit agencies agreed on emergency plans</td>
</tr>
<tr>
<td>Chicago Transit Authority</td>
<td>Dedicated staff to deal with special events</td>
</tr>
<tr>
<td>Clark County Public Transportation Benefit Area Authority</td>
<td>Coordination of I-5 Bridge Closure with Tri-Met &amp; ODOT</td>
</tr>
<tr>
<td>City of Seattle - Monorail Transit</td>
<td>Future plans</td>
</tr>
<tr>
<td>Sound Transit</td>
<td>Coordinated by service delivery task force</td>
</tr>
<tr>
<td>Pierce Transit</td>
<td>Dedicated staff</td>
</tr>
<tr>
<td>King County Metro Transit</td>
<td>Coordinates with other transit agencies and organizations</td>
</tr>
<tr>
<td>Snohomish County Transportation Benefit Area Corporation</td>
<td>Regional plan for emergencies</td>
</tr>
<tr>
<td>Greater Bridgeport Transit Authority</td>
<td>Emergency services provided for local communities</td>
</tr>
<tr>
<td>Connecticut Transit-Stamford Division</td>
<td>Buses used as a back up for MetroNorth &amp; Shore Line East</td>
</tr>
<tr>
<td>New York City Transit Authority</td>
<td>Internal emergency team, special events teams</td>
</tr>
<tr>
<td>MTA MetroNorth Railroad</td>
<td>Coordination with regional agencies and providers for emergencies</td>
</tr>
<tr>
<td>Westchester County Department of Transportation</td>
<td>Buses used as a back up for MetroNorth</td>
</tr>
<tr>
<td>Housatonic Area Regional Transit</td>
<td>Emergency services provided for local communities</td>
</tr>
<tr>
<td>Port Authority Trans-Hudson Corporation</td>
<td>Emergency drills held with NCYTA &amp; NJ Transit</td>
</tr>
<tr>
<td>New Jersey Transit</td>
<td>Emergency drills held with NCYTA &amp; PATH for NYC evacuation</td>
</tr>
<tr>
<td>Ride-On Montgomery County Dept. of Public Works</td>
<td>RICCS regional confab to share info</td>
</tr>
<tr>
<td>City of Fairfax CUE Bus</td>
<td>RICCS regional confab to share info</td>
</tr>
<tr>
<td>Fairfax Connector Bus System</td>
<td>RICCS regional confab to share info</td>
</tr>
<tr>
<td>Virginia Railway Express</td>
<td>RICCS regional confab to share info</td>
</tr>
<tr>
<td>Loudoun County Department of Transportation - Commuter Bus</td>
<td>RICCS regional confab to share info</td>
</tr>
<tr>
<td>Mass Transit Administration</td>
<td>RICCS regional confab to share info</td>
</tr>
<tr>
<td>Washington Metropolitan Area Transit Authority</td>
<td>Runs RICCS regional confab to share info</td>
</tr>
</tbody>
</table>

**Key:**
- ← Past Implementation
- ↑ In the process of Implementation
- → Future Plans

### 5.0 TRANSIT INTEGRATION PRACTICES SURVEY: GENERAL FINDINGS

#### 5.1 Infrastructure Integration Practices

Nine transit agencies associated with the eight infrastructure integration practices (Table 3-1) responded to the detailed second stage follow-up survey on transit infrastructure integration practices. Table 5-1 shows the types of practices that have already been implemented by these agencies. Most practices were fairly widely applied. The least common was single agency intermodal facilities; this is because few of the agencies are multimodal. Several agencies had future plans to expand infrastructure integration. Some of these were being implemented as parts of continuing regional initiatives such as in the Washington, DC region and the Puget Sound region of Washington State. A complete description of general findings from survey responses for infrastructure integration practices are provided in Appendix H.
In terms of the agency that introduced the integration practice(s), there is wide variation though in general, it appears that the responding agency along with another agency, sometimes a regional or state agency, was identified as the agency originating the integration practice. Note that some agencies identified the originator as another transit agency but those agencies play a regional role such as WMATA, Sound Transit and MTC. As a result, there are a total of six cases (of the nine reporting), where a regional or state agency had at least some role in initiating integration.

When asked about the effectiveness of the infrastructure integration practices, there were varying responses but generally they were viewed as effective. Some positive impacts were cited and few negative impacts were cited. Although most agencies cited convenience and ridership benefits, it was generally hard to quantify the specific impact of the practices, even if agencies monitor ridership and transfer activity. Some also identified that savings in the costs of operation were part of the benefits. None of the respondents identified a previously prepared evaluation of costs and benefits associated with the practice.

The primary objectives of many of the projects have been to improve customer convenience and to provide seamless service and connections. Other objectives include improve service, increase ridership, reduce costs, achieve operating or administrative efficiencies and assist other agencies to fulfill service needs.

Several agencies noted that considerable efforts were required to overcome funding constraints and institutional barriers, such as union and jurisdictional issues and differing policies. Some have developed formal interagency agreements. Generally, agencies appear to consider the efforts worthwhile despite the additional efforts required. Few instances of negative impacts were identified.
TABLE 5-1 Survey Responses: Implemented Infrastructure Integration Practices

<table>
<thead>
<tr>
<th>Agency Responding to Survey</th>
<th>Region</th>
<th>Shared Interagency Passenger Facilities</th>
<th>Other Shared Interagency Facilities</th>
<th>Single Agency Intermodal Passenger Facilities</th>
<th>Interagency Coordinated Route Restructuring/ Service Planning</th>
<th>Joint Operation of Services</th>
<th>Joint Purchasing/ Procurement</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caltrain</td>
<td>Bay Area</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>WMATA</td>
<td>Wash. DC Area</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>RideOn</td>
<td>Wash. DC Area</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Community Transit</td>
<td>Puget Sound</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>King County Metro</td>
<td>Puget Sound</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>DART</td>
<td>Dallas/Ft. Worth</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>GBTA</td>
<td>SW CT</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Milford Transit District</td>
<td>SW CT</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>CT Transit</td>
<td>SW CT</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
5.2 Fare Payment Integration Practices

Twelve agencies associated with the eight fare payment integration practices (Table 3-1) responded to the detailed second stage follow-up survey on fare payment integration practices. Table 5-2 shows the types of practices that have already been implemented by these agencies. A complete description of general findings from survey responses for fare payment integration practices are provided in Appendix H.

Within these agencies, interagency passes are the most common, with all of the agencies either currently using or developing such passes. Interagency free/reduced price transfers are currently in use at nine of the agencies, while inter-agency stored value is in use by six agencies.

With regard to intra-agency fare media, free/reduced price transfers are used by all of these agencies which operate transit, except for the Los Angeles MTA and the Maryland MTA, both of which have replaced transfers with a day pass. Intra-agency intermodal passes are in use by all agencies which operate more than one mode of service (not counting paratransit). Intra-agency stored value is the least common, it is used only by some, but not all, of the agencies which are part of an interagency stored-value agreement.

In terms of the agency that introduced the integration practice(s), in most cases, the fare integration was initiated by the agency responding, frequently in coordination with either other transit agencies or a regional planning agency. When multiple transit agencies are involved, one of them generally plays a regional role, such as WMATA, Sound Transit and LACMTA. In one case, the fare integration was initiated based on a recommendation by a community group. In none of these cases was the fare integration initiated by a state agency.

When asked about the effectiveness of the fare payment integration practices, there were varying responses but more than two-thirds of the respondents viewed these practices as either effective or completely effective with ‘intra-agency intermodal passes’ viewed as completely effective and the highest ranked practice, while ‘intra-agency free/reduced transfers’ were considered less than effective and the lowest ranked practice.
### TABLE 5-2 Survey Responses: Implemented Fare Payment Integration Practices

<table>
<thead>
<tr>
<th>Agency Responding to Survey</th>
<th>Region</th>
<th>Interagency Free/Reduced Transfers</th>
<th>Interagency Stored Value</th>
<th>Interagency Passes</th>
<th>Intra-agency Free / Reduced Transfers</th>
<th>Intra-agency Stored Value</th>
<th>Intra-agency Intermodal Passes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventura County Transportation Commission</td>
<td>Ventura County</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000 Oaks Transit</td>
<td>Ventura County</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>GGBHTD</td>
<td>SF Bay Area</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Los Angeles County MTA</td>
<td>LA County</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Foothill Transit</td>
<td>LA County</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>San Diego Trolley</td>
<td>San Diego</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Davenport Citibus</td>
<td>Quad Cities (IA/IL)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WMATA</td>
<td>Wash. DC Area</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Maryland MTA</td>
<td>Wash. DC Area</td>
<td>Joining the WMATA system in Aug/Sept 2004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>City of Fairfax</td>
<td>Wash. DC Area</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Pierce Transit</td>
<td>Seattle / Puget Sound</td>
<td>X</td>
<td>developing</td>
<td>X</td>
<td>X</td>
<td></td>
<td>developing</td>
</tr>
<tr>
<td>Community Transit</td>
<td>Seattle / Puget Sound</td>
<td>X</td>
<td>developing</td>
<td>X</td>
<td>X</td>
<td></td>
<td>developing</td>
</tr>
</tbody>
</table>
The most common reason for implementing fare coordination practices was to improve the quality of service to the customers who travel through areas served by more than one agency. Other, less common reasons cited were to increase ridership, to increase the use of prepaid fare media, to generate better data on ridership, to simplify the fare structure and to reduce capital and operating costs. The principal concerns expressed by agencies were ensuring that the program be revenue neutral to the participating agencies and the operating and capital costs of implementing fare coordination.

Agencies generally stated that they were unable to provide specific quantitative data regarding the effectiveness of any of these practices. In some cases, data exists to show that ridership increased or complaints dropped after the fare integration practices were adopted, but no in-depth studies have been conducted regarding the extent to which these resulted from the fare integration.

Barriers to implementation have included a range of technological, institutional, and financial issues. However, the general conclusion has been that the customer can benefit greatly from fare integration if all agencies work together.

5.3 Schedule Integration Practices

Nine transit agencies associated with the nine schedule integration practices (Table 3-1) responded to the detailed second stage follow-up survey on transit schedule integration practices. Table 5-3 shows the types of practices that have already been implemented by these agencies. All practices were widely applied and approximately half the agencies also had future plans to expand and/or continue schedule integration practices. A complete description of general findings from survey responses for schedule integration practices are provided in Appendix H.

In terms of the agency that introduced the integration practice(s), there is little variation and only the responding agency, either alone or along with another transit agency, was identified as the agency originating the integration practice.
### TABLE 5-3 Survey Responses: Implemented Schedule Integration Practices

<table>
<thead>
<tr>
<th>Agency Responding to Survey</th>
<th>Region</th>
<th>Interagency Schedule Coordination (Single Mode or Intermodal)</th>
<th>Intermodal Schedule Coordination (Single Agency)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>King County Metro</td>
<td>Puget Sound</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>RideOn</td>
<td>Wash. DC Area</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fairfax Connector</td>
<td>Wash. DC Area</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>CT Transit</td>
<td>SW CT</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PATH</td>
<td>NJ/NY</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BART</td>
<td>SF Bay Area</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTA</td>
<td>Chicago Area</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>NJ Transit</td>
<td>New Jersey</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Caltrain</td>
<td>SF Bay Area</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
When asked about the effectiveness of the schedule integration practices, there were varying responses ranging from a little effective to completely effective. Some positive impacts were cited with only few negative impacts cited. Positive impacts included 1) increase in transfer activity, 2) user satisfaction (decrease in customer complaints), 3) decrease in transfer time, 4) increase in ridership and transit modal split with some alleviation of parking issues, 5) increase in sales of multi-ride and multi-agency fare media, and 6) enhanced image of agency. Negative impacts included some crowding at transfer facilities. However, no agency cited the availability of hard data with which to quantitatively evaluate the impacts of these practices.

The primary objective for most of the projects was to enhance customer service and operational efficiency by reducing passenger transfer/wait time, especially during the off-peak when headways are longer.

In terms of the barriers to implementation of schedule coordination practices faced by agencies, there is wide variation ranging from no barriers at all to one case in which there are funding, institutional, and technological constraints. A commonly-stated barrier was the limited opportunities for schedule coordination either because of potential financial consequences associated with such coordination or some incompatibility in headway policies between and/or among connecting agencies.

### 5.4 Information Integration Practices

Six transit agencies associated with the eight information integration practices (Table 3-1) responded to the detailed second stage follow-up survey on transit infrastructure integration practices. Table 5-4 shows the types of practices that have already been implemented by these agencies. A complete description of general findings from survey responses for information integration practices are provided in Appendix H.

The least common was intra-agency intermodal transit trip itinerary planning; this is because few of the agencies are multimodal. Most practices were fairly widely applied and most agencies also had future plans to expand information integration. Some of these were being implemented as parts of continuing projects.
### TABLE 5-4 Survey Responses: Implemented Information Integration Practices

<table>
<thead>
<tr>
<th>Agency Responding to Survey</th>
<th>Region</th>
<th>Intra-agency intermodal transit trip itinerary planning</th>
<th>Interagency transit trip itinerary planning</th>
<th>Intra-agency real-time information dissemination</th>
<th>Interagency real-time information dissemination</th>
<th>Interagency dissemination of other user information (maps, schedules)</th>
<th>Interagency marketing and advertising</th>
<th>Interagency sharing of operational and planning data</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>RideOn</td>
<td>DC/MD/VA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Loudoun County Transit</td>
<td>Wash. DC</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Camarillo Area Transit</td>
<td>Ventura Co. California</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Capital Area Transit</td>
<td>Raleigh, NC</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>CUE Bus</td>
<td>Wash. DC</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>GGBHTD</td>
<td>SF Bay Area</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
In terms of the agency that introduced the integration practice(s), there is some variation though it was very common that a regional planning agency was identified as the agency originating the integration practice. It is also not uncommon to see the responding agency itself also listed as the initiating organization for the particular information integration practice.

When asked about the effectiveness of the information integration practices, there were varying responses ranging from not effective at all to effective. Only a few positive or negative impacts were cited. On the positive side were positive feedback/fewer complaints from customers and an increase in ridership. On the negative side was a dependency on the system for information so that if/when the system goes down, alternative information sources must be found. No agency cited the availability of any hard data with which to quantitatively evaluate the impacts of these practices.

The primary objectives stated by respondents for most of the projects were to enhance customer convenience and level of service and promote regional connectivity by making it easier for people to take transit across communities.

In terms of the barriers to implementation of these practices faced by agencies, there is wide variation ranging from no barriers at all, to cases in which there are funding, technological, and institutional constraints. Frequently mentioned were institutional barriers in the area of inter-agency cooperation and administrative reluctance to try something new.

5.5 Special Events / Emergency Conditions Integration Practices

Five transit agencies associated with the four special events/emergency condition(s) integration practices (Table 3-1) responded to the detailed second stage follow-up survey on such practices. Table 5-5 shows the types of practices that have already been implemented by these agencies. A complete description of general findings from survey responses for special events / emergency conditions integration practices are provided in Appendix H.
<table>
<thead>
<tr>
<th>Agency Responding to Survey</th>
<th>Region</th>
<th>Interagency planning/coordination for expected special events</th>
<th>Interagency planning / coordination for expected emergency conditions</th>
<th>Interagency planning / coordination for unexpected special events</th>
<th>Interagency planning / coordination for unexpected emergency conditions</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loudoun County Transit</td>
<td>Wash. DC</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>GBTA</td>
<td>SW CT</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT Transit</td>
<td>SW CT</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WMATA</td>
<td>Wash. DC</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>GGBHTD</td>
<td>SF Bay Area</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Most practices were fairly widely applied and most agencies also had future plans to expand special event/emergency condition integration. Some of these were being implemented as parts of continuing projects and consistent with regional plans.

In terms of the agency that introduced the integration practice(s), it was fairly common that the responding agency, either alone or along with another agency(ies), sometimes a regional or state agency, or other transit agencies, was identified as the agency originating the integration practice. It is also not uncommon to see an emergency management or services office, either at the local or state level, also be listed as the initiating organization for the particular special event/emergency condition integration practice.

When asked about the effectiveness of the special event/emergency condition integration practices, there were varying responses ranging from partially effective to completely effective. Some positive impacts were cited with only few negative impacts cited. Positive impacts included 1) support from the public, 2) improved coordination, communication, and cooperation among participating organizations, and 3) minimal, if any, change in ridership on special event days. Negative impacts included unrealistic expectations of service response times. No agency cited the availability of any hard data with which to quantitatively evaluate the impacts of these practices.

The primary objective for most of the projects was to be prepared in case of an actual emergency — a direct response to the events of September 11, 2001 — and this meant to be able to maintain service with minimal disruptions to get passengers safely to their destinations and improve cooperation, coordination, and communication among participating organizations.

In terms of the barriers to implementation of these practices faced by agencies, there is wide variation ranging from no barriers at all, to one case in which there are funding, regulatory, jurisdictional, and technological constraints. Notwithstanding all these barriers, this agency indicated that the special event/emergency condition integration practices were at least partially effective with support from the public. Other agencies indicated simply a single barrier such as
funding constraints dampening the extent of implementing such practices and communication across participating organizations.

6.0 TRANSIT INTEGRATION PRACTICES SURVEY: CASE STUDIES

In this section case studies are presented for several site-specific service integration practices based on responses from the second survey.

6.1 Infrastructure Integration

This section describes three cases of infrastructure integration. Each case emphasizes a somewhat different type of integration and each occurred in a different environment. An overview of each is provided below:

Puget Sound Area / Washington State

Puget Sound has been the scene of new regional and interagency transit initiatives in recent years. Transit in the Puget Sound region has been operated for many years by local governments. Five agencies provided service in specific service areas; some of these operated across municipal boundaries and offered commuter service. In the mid-nineties, a new organization, Sound Transit, came into existence to specifically address regional transit issues and its regional transit plan was approved by voters along with its own dedicated funding source. The new entity’s focus has included commuter rail, light rail, commuter express buses and regional intermodal transfer facilities and HOV lanes. Sound Transit contracts with existing local bus operators to provide its regional commuter express routes. Sound Transit and local operators are cooperating to provide an integrated regional system including coordinated routes and shared facilities. These efforts on building upon the service integration efforts made by the local providers in the region occurred prior to the advent of Sound Transit.

Puget Sound was chosen as a case study because of the unique arrangements between local and regional agencies, because the local agencies pre-date the rise of a new regional entity that is currently attempting to engineer service integration, because there are many cooperative infrastructure projects and because data were available to describe the costs and ridership impacts of recent projects.
Several interesting integration efforts related to infrastructure have recently occurred in Northern Virginia. Because of the number of transit operators and the rapid development of suburban areas in Northern Virginia, it is particularly active in transit integration. Suburban transit operators such as Fairfax Connector in Fairfax County and Arlington Transit (ART) in Arlington County have grown rapidly over the past two decades while the regional bus and rail authority, the Washington Metropolitan Area Transit Authority (WMATA or Metro), concentrated on completing the Metrorail system and identifying new rail service corridors. More recently, WMATA undertook planning studies focusing on the regional bus network in cooperation with the various jurisdictions to address service integration issues. Since WMATA depends on the local jurisdictions for its funding, local jurisdictions have substantial clout. Both WMATA and local jurisdictions have recently placed a new emphasis on coordination of the local and regional services.

One example of infrastructure integration in the region is at West Falls Church. As a precursor to planned Metrorail expansion to the Dulles Corridor (including Dulles International Airport, Reston and Tyson’s Corner), WMATA and the suburban jurisdictions implemented improvements in transfer facilities and feeder bus service to the West Falls Church Metrorail Station and Bus Transfer Facility. Another example is the Columbia Pike PikeRide service to Pentagon City. This service reflects integration primarily between WMATA (Metrorail and Metrobus) and Arlington County ART bus service. These services use the Pentagon City Metrorail Station and an adjacent on-street bus transfer terminal.

Northern Virginia was chosen as a case study because it is a complex environment where recent regional coordination efforts have focused on reversing trends that have led to fragmentation of the region’s transit system, because it is a region where local jurisdictions fund both regional and local systems and because there were examples of applications where ridership impacts had been measured.
Southwestern Connecticut

Connecticut has a number of small bus systems operating in individual communities besides the State’s contracted bus system that operates in its largest cities (Hartford, New Haven and Stamford). Recognizing the need for more seamless travel between communities on the southwest Connecticut coast, three adjacent bus systems developed a cooperative arrangement to jointly operate a single, inter-town regional bus route, known as the Coastal Link. The Coastal Link provides intercommunity service through Norwalk, Westport, Fairfield, Bridgeport, Stratford and Milford spanning a distance of over 20 miles. Although represented on a single schedule, the individual trips are operated by each of the three operators using their own buses. Each operator collects fares valid on any of the systems. The service is subsidized using an FTA Jobs Access Reverse Commute grant and other state funding sources.

Southwest Connecticut was chosen as a case study because the region offers a rather unique example of joint operation of transit service and because cost, ridership and survey data were available to describe the project and its impacts.

Each of these examples of infrastructure integration is described in more detail below:

6.1.1 Puget Sound Area / Washington State

There are a number of operators of transit service in the Puget Sound metropolitan region. Historically there have been five major operators: King County Metro serving Seattle and King County, Pierce Transit serving Tacoma and Pierce County, Everett Transit serving the City of Everett, Community Transit serving Snohomish County particularly outside of the City of Everett and Kitsap Transit serving Kitsap County including the city of Bremerton. Since King County contains Seattle, the center city of the region, and Bellevue, a city with major employment centers, providers from the outer counties operated commuter bus service to King County in addition to local services. Besides bus service, ferry service has been a key component of the region’s public transportation network. Until recently there was no commuter rail or rail transit service other than the monorail within Seattle and Amtrak intercity rail service.
Major improvements in regional service were introduced in recent years with the creation of a new regional transit agency, Sound Transit (also known as Central Puget Sound Regional Transit Authority) with its own dedicated funding. The new agency was authorized by legislation in 1993. The agency developed a 10-year regional transit plan, *Sound Move*, which was approved by voters in November 1996 along with local sales and vehicle license taxes that now provide half of the agency’s revenues. The organization then moved to implement regional rail service (Sounder Commuter Rail and Link Light Rail) and a commuter express bus program (ST Express or Regional Express) as well as other commuter improvements such as park-and-ride lots and transit centers.

Sounder commuter rail service began in September 2000 between Tacoma and Seattle and was expanded in December 2003 to include service between Everett and Seattle. Expansion of service from Tacoma to Lakewood is scheduled for 2007. The Tacoma Link light rail service began operation in 2003; construction for the initial segment of the 14-mile Central Line from Seattle to Sea-Tac Airport began in November 2003.

The Regional Express program has also seen substantial progress towards full implementation. This program was initiated in September 1999. Besides running 19 ST Express bus routes promised to the voters in 1996, Regional Express is building 39 capital improvement projects throughout the region, including direct access ramps, transit centers, freeway stations and park-and-ride lots. Regional Express has already added more than 3,000 new park-and-ride lot spaces to the region.¹

While Sound Transit has funded and built transit centers and park-and-ride lots, the ongoing operation and maintenance of these facilities are handled by local operators, with costs shared with Sound Transit in some cases. Also, while Sound Transit has initiated new Regional Express commuter bus service, these services are operated by the pre-existing local operating agencies under contract to Sound Transit. Some of the express services are new services while others were previously operated by the local operators; in the latter case, there have been service enhancements as part of the Regional Express program including increased frequency and

¹ Sound Transit Webpage (www.soundtransit.org)
expanded service hours, such as introduction of all day service to routes that operated only during peak periods, and introduction of weekend service. As a result of the Sound Transit services and dedicated funding, local operators have been able to expand other bus services using the available budget. In some cases, this allowed agencies to restore service that had been previously curtailed due to budget reductions.

As an example of infrastructure coordination in the Puget Sound region, we have selected the Lynnwood Transit Center and Ash Way Park-and-Ride facilities. These facilities both serve Snohomish County and involve integration activities on the part of Sound Transit and Community Transit.

Community Transit, in operation since 1976, has 276 coaches that provide service to most of Snohomish County, the University of Washington, Seattle and the Eastside. Its service area is over 1,300 square miles with a population over 400,000, and contains some of the region’s fastest growing cities. The agency now operates 19 local and 33 commuter routes. In 2003, 6.8 million people rode Community Transit local and commuter fixed bus routes. Community Transit, itself, is a force working towards regional integration and cooperates with its regional partners. It has the contract to provide Sound Transit service for Snohomish County, operating 33 buses on six routes (Routes 510, 511, 513, 530, 532 and 535). Community Transit also helped develop the Puget Pass, which allows riders to use one pass on transit systems in Snohomish, King and Pierce counties.²

The Lynnwood Transit Center project involved enhancements to an existing transit center while the Ash Way Park-and-Ride involved the construction of a new facility. Each is described below.

The original Lynnwood Park-and-Ride lot, in place since 1981, has been the hub of Community Transit’s service in the southern part of Snohomish County. Although Community Transit and King County Metro routes met at this location prior to the development of the new Transit Center, the project reflects an enhanced integration of services and infrastructure. The original Park-and-Ride lot had 17 bays for commuter routes and an island for local routes. Passengers

² Conversation with David Hyslop, Community Transit and Community Transit Webpage (www.communitytransit.org)
transferring between local and commuter routes had to walk a substantial distance. There were 965 parking spaces. The original facility had bus shelters, larger than those found at typical bus stops.

The Lynnwood Transit Center project involved a complete reconstruction and is now a facility with 12 bus bays and expansive curb space loading areas (about 20 bays could be accommodated), separate bus layover areas, designated areas for paratransit vehicles, large improved passenger waiting areas with enhanced lighting and weather protection, a customer service center, a food concession, and rest rooms. The new facility also provided an expansion of about 300 parking spaces to increase capacity to over 1,200 (many of these parking spaces have been unavailable in much of 2004 due to continuing construction activities related to the direct access project described below). The facility’s attractiveness is also enhanced by public art, a component of the overall Sound Transit program. The new Transit Center opened in 2003 and is being complemented by intersection upgrades and traffic signal improvements (completed in fall 2004) and a project to construct new direct access ramps to the I-5 HOV lanes both northbound and southbound (also substantially completed in fall 2004). The direct access ramps were expected to cut up to 20 minutes off the round trip travel time. The Lynnwood Transit Center project was funded by Sound Transit and its partners including the City of Lynnwood, the Washington Department of Transportation, Community Transit, Federal Highway Administration and Federal Transit Administration. Sound Transit retains a part ownership of the facility. Sound Transit Express buses and Community Transit buses provide service to the Lynnwood Transit Center.  

Community Transit is operating and maintaining the new Lynnwood facility but incurring only those ongoing expenses based on such expenses incurred prior to the reconstruction project; Sound Transit is contributing the funding for the additional operating costs. Sound Transit has negotiated specific interagency agreements to share costs that set a fixed percentage and amount of the operating and maintenance costs that Sound Transit will fund (63.8%) for this facility based on a work scope that distinguished between the costs of operating and maintaining the pre-existing facility elements (Community Transit’s responsibility) and the new elements (Sound

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3 Sound Transit Webpage
Transit’s responsibility). This type of agreement is being used throughout the region although there is some variation in arrangements by project. Developing the interagency agreement was a challenge and the approach is still evolving as Sound Transit continues implementation of projects around the region. (In another project, the Everett Intermodal Station, consultants were employed by the local agency to develop 30 year life cycle operating costs to be used as the basis for the interagency agreement on capital and operating costs.) Sound Transit has found that the process gets bogged down because many agencies are not used to developing budgets for contract arrangements (where they are the contractor) and because any disagreements among agencies can take on a political nature. Nevertheless, the agency has found that there are clear benefits to Sound Transit in arranging to fund operating and maintenance costs in this manner, so that it does not need to directly procure services with outside contractors; Sound Transit has no infrastructure to handle operating and maintenance on its own and has limited staff to conduct procurement of contractors. Sound Transit believes the result is improved efficiency in providing for operation and maintenance.

The Ash Way facility was opened in June 1999. Prior to this, the area was served by local routes on arterials; area residents seeking to park-and-ride would have had to travel either about 40-50 blocks north or south to the existing Lynnwood or Mariner Park-and-Ride lots to access similar commuter services. (There was and is another much closer facility, but smaller and less accessible to the interstate, Swamp Creek Park-and-Ride, that offered somewhat different service options, including some less frequent commuter service with shorter spans; utilization of that facility decreased after Ash Way opened.)

The Ash Way facility was jointly funded by Sound Transit and Community Transit and is currently owned by Washington DOT and maintained by Community Transit. Sound Transit has not retained any ownership of this facility and does not contribute to ongoing maintenance costs. The facility provides 1,019 parking spaces and a bus shelter. A related ongoing project is the Ash Way Direct Access project, which is building transit-only direct access ramps connecting the Ash Way Park-and-Ride to the HOV lanes on I-5 to from the south. It is anticipated that travel time will be reduced by 12.5 minutes for each round trip and that reliability will be enhanced by the direct access ramps. The Direct Access project should be completed in 2005 and
is being funded by Sound Transit and its partners, Community Transit, Washington DOT, Snohomish County and the City of Kenmore. This facility is used by both Community Transit and Sound Transit Express buses to Lynnwood and Seattle. There are three new Sound Transit Express routes and 9 Community Transit bus routes (6 local routes and 3 commuter routes that have been realigned to serve the site).  

The following bus routes provide service to each location:

**Lynnwood Transit Center:**

Community Transit Routes:
- Local Routes: 110, 112, 114, 115, 116, 118, 120, 121, 201, 202, 630
- Intercounty Routes: 401, 402, 441
- University of Washington Routes 810, 850, 855
- Sound Transit Routes: 511, 535

**Ash Way Park-and-Ride**

Community Transit Routes:
- Local Routes 114, 115, 116, 118, 201, 202
- Intercounty Routes: 413, 414
- University of Washington Routes 810
- Sound Transit Routes: 511, 530, 532

Sound Transit costs associated with the capital improvements at these two facilities were:
- Lynnwood Transit Center including intersection/signal improvements $31.6 million
- Lynnwood Direct Access Ramp $26.7 million
- Ash Way Park-and-Ride $1.1 million
- Ash Way Direct Access Ramp $18.4 million

Both park-and-ride lots appear to be 83% utilized based on May 2004 data.

---

4 Sound Transit Webpage  
5 Sound Transit Webpage and Conversation with Todd Jacobs of Community Transit and Hank Howard of Sound Transit  
6 Community Transit funded the Ride Store, their customer service center at the Transit Center.  
7 This was a joint project with Community Transit and other sponsors; Sound Transit’s contribution amounted to about 12% of the total cost of $8.67 million. Community Transit contributed the largest share -- $3.8 million for land and $0.16 million for construction; $3.2 million for construction was provided by grants from FHWA and other sources; Washington DOT provided $0.4 million for construction.
It is difficult to quantify the ridership benefits associated with this excellent example of infrastructure integration. Overall, it is believed that ridership has rebounded to 1999 levels partly as a result of the improvements, while population has continued to grow. (Sound Transit has increased overall service levels including extended span and increased frequency, which have had impacts on ridership as well.) The 20-30% cuts in service made after a 1999 citizen budget cut initiative had a severe impact on ridership during the time Sound Transit was planning its initiatives (to expand service and replace local agency commuter services with regional express service). The infrastructure integration and enhancements have improved service and ridership. However, the impacts cannot be easily discerned in a before/after comparison. The following ridership data is nevertheless cited to shed some light on the impact.

As shown in Tables 6-1 and 6-2, and Figure 6-1, corridor ridership has increased while overall system ridership has decreased.

---

8 Conversation with Davis Hyslop, Community Transit
TABLE 6-1 Sound Transit Express Route Ridership
(Based on data from Sep. 29, 2003 to Feb. 13, 2004)

<table>
<thead>
<tr>
<th>Route</th>
<th>Direction</th>
<th>Daily Trips</th>
<th>Boardings/Day</th>
<th>Boardings/Trip</th>
<th>Serves Lynnwood</th>
<th>Serves Ash Way</th>
</tr>
</thead>
<tbody>
<tr>
<td>510</td>
<td>NB</td>
<td>27</td>
<td>566.6</td>
<td>21.0</td>
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</tr>
<tr>
<td>510</td>
<td>SB</td>
<td>24</td>
<td>503.6</td>
<td>21.0</td>
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<tr>
<td>511</td>
<td>NB</td>
<td>33</td>
<td>807.1</td>
<td>24.5</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>511</td>
<td>SB</td>
<td>32</td>
<td>704.9</td>
<td>22.0</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>513</td>
<td>NB</td>
<td>4</td>
<td>181.1</td>
<td>45.3</td>
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<td></td>
</tr>
<tr>
<td>513</td>
<td>SB</td>
<td>4</td>
<td>189.7</td>
<td>47.4</td>
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<td>530</td>
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<td>14</td>
<td>172.4</td>
<td>12.3</td>
<td>x</td>
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<tr>
<td>530</td>
<td>SB</td>
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<td>153.5</td>
<td>11.0</td>
<td>x</td>
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<tr>
<td>532</td>
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<td>6</td>
<td>212.4</td>
<td>35.4</td>
<td>x</td>
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<td>532</td>
<td>SB</td>
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<tr>
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<td>23</td>
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Note: Sound Transit Express Routes began operation in September 1999.

---

9 Source: Davis Hyslop, Community Transit
TABLE 6-2 Community Transit Route Ridership
(May 1999\textsuperscript{11}, 2002\textsuperscript{12}, 2004\textsuperscript{13})

Community Transit Route Ridership Summary

<table>
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<th>Route</th>
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<th>Ash Way</th>
<th>Comment</th>
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<th>May-04</th>
<th>May-04</th>
<th>May-02</th>
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</table>

Note: Excludes Sound Transit Routes

\textsuperscript{10} Source: Community Transit Monthly System Performance Reports
\textsuperscript{11} Prior to Sound Transit Express Routes and Ash Way Park-and-Ride
\textsuperscript{12} After introduction of Sound Transit Express Routes and Ash Way Park-and-Ride but prior to new Lynnwood Transit Center
\textsuperscript{13} After Lynnwood Transit Center opening but during a period when many new park-and-ride spaces were unavailable due to construction activities
6.1.2 Washington D.C. Metropolitan Area / National Capital Region

The Washington metropolitan area has seen a large expansion of transit service in suburban areas and increasing efforts to coordinate and integrate the services of a wide variety of service providers. The region as a whole and the rapidly growing Northern Virginia area in particular make an interesting case study of infrastructure integration.

Washington Metropolitan Area Transit Authority (WMATA also known as Metro) is the regional provider. The agency was formed in 1966 as a regional compact in order to implement the Washington Metrorail system which began service in the mid-1970s. (The compact members include the District of Columbia; State of Maryland; Commonwealth of Virginia; Arlington County and Fairfax County, Virginia; Montgomery County and Prince George’s County, Maryland; and the Cities of Alexandria, Fairfax and Falls Church, Virginia.) WMATA also took over the operation of buses in the District of Columbia and became the regional bus provider.

In 2000, the original 103-mile Metrorail system plan was completed and Metro embarked on construction of the first expansion beyond the originally conceived system to Largo in Prince George’s County, Maryland. At the same time, expansions of the Orange Line in Northern Virginia to Centerville and Dulles International Airport were under study.
Each Metrorail station serves as an intermodal terminal where Metrobuses and local suburban transit system buses provide feeder and distributor service. Some of these facilities are major transit centers for the region.

Beside Metrorail, there are two commuter rail operators, Virginia Railway Express (VRE) and MARC (Maryland). Both operate into Washington, DC’s Union Station, which is also a Metrorail station. Several stations are both Metrorail and commuter rail stations.

The local suburban bus systems have grown rapidly over the past 25 years while Metro (WMATA) has devoted much of its energy on developing the regional rail system. In the Washington region, there are local bus systems in many of the surrounding cities and counties, as follows:

- Maryland Mass Transit Administration (commuter service)
- Montgomery County, Maryland Ride On
- Prince George’s County, Maryland The Bus
- City of Laurel, Maryland Connect-a-Ride bus
- University of Maryland Bus System
- City of Alexandria, Virginia DASH
- City of Fairfax, Virginia CUE
- City of Fall Church, Virginia GEORGE bus system
- Arlington County, Virginia ART
- Fairfax County, Virginia Connector
- Loudoun County, Virginia Loudoun Commuter Bus
- Stafford County, Virginia Potomac and Rappahannock Transportation Commission (PRTC) OmniRide and OmniLink
- Washington Flyer Airport Bus Service to Dulles International and Reagan National Airports (Metropolitan Washington Airports Authority)

While services have expanded, the entire transit system had become somewhat decentralized. In response, the WMATA Board formed a Regional Mobility Panel in 1998 to develop a policy to
define the roles of the regional authority relative to bus services initiated by the local jurisdictions. The Panel defined regional versus non-regional bus service and gave the regional authority the rights to provide regional bus service and the local jurisdictions the right to provide non-regional service. It also suggested the formulation of a cost structure that enables the regional authority to compete with others for contracts for local bus service. Finally the Panel called for a comprehensive Regional Bus Study in 2002 to examine the facilities, services, and finances needed and to develop a plan for the next 25 years. That study strengthened the collaborative process among the jurisdictions, which fund both local bus service and Metro (bus and rail).

Following the Regional Bus Study (2002-2003), WMATA established the Regional Mobility Initiative. The Regional Mobility Initiative encompasses a number of WMATA programs designed to improve regional mobility and accessibility by enhancing the quality of transit service. The Regional Mobility Initiative recognizes that there is no single solution to solving the region’s mobility crisis. Instead, a coordinated mobility program that pairs complementary policies, services, and facilities from a “Toolbox” of transportation management strategies is needed (Table 6.3). Demonstration programs will be used to collect information about the effectiveness of strategies as they are implemented. The authority’s goals in undertaking this initiative are to improve service to the customer, increase ridership and reduce costs.

The WMATA Board of Directors has already approved two major elements of the Initiative. The Regional Activity Center Demonstration Program and the Bus Enhancement Program are efforts to develop integrated packages of capital and operational transit improvements and supportive policies in activity centers and major corridors. Many of these improvements were recommended in the WMATA-sponsored Regional Bus Study, a comprehensive evaluation of bus services in the region and a plan to create a more integrated transit network of Metrobus, Metrorail and local bus systems. Short-term capital improvements recommended in the Regional Bus Study have been included in the WMATA 10-Year Capital Improvement Plan.
TABLE 6-3 Toolbox of Strategies\textsuperscript{14}

- System Management Strategies such as coordinated bus operations, bus stop locations, neighborhood and activity center circulators.
- Customer facilities such as bus shelters, park and ride lots.
- Running Way Improvements such as signal priority, intersection improvements, bus pull-outs
- Service Information including transit maps, signs and wayfinding, real-time information, trip planning
- Travel Demand Management strategies such as Transportation Management Associations, employer-based programs, transit fare subsidies, regional fare integration
- Land Use strategies including supportive street design, sidewalks, bicycle and pedestrian paths, and transit-oriented development

The Washington/Northern Virginia region offers many examples of shared infrastructure. Some examples of shared interagency passenger facilities include:

- Union Station in Washington, DC: Metrorail and Metrobus, Amtrak, MARC, VRE, Tour Buses
- King Street in Alexandria, VA: Metrorail and Metrobus, Amtrak, VRE, DASH
- New Carrollton (Metro, Amtrak, MARC)
- Pentagon in Arlington, VA: Metrorail and Metrobus, Fairfax Connector and PRTC OmniRide
- Franconia-Springfield in Fairfax County, VA: Metrorail and Metrobus, VRE, Transportation Association of Greater Springfield (TAGS) bus
- Silver Spring in Maryland: Metrorail and Metrobus, MARC, MTA Bus, Ride On
- West Falls Church in Falls Church, VA: Metrorail and Metrobus, PRTC OmniRide, Loudoun (County) Commuter Bus and Fairfax Connector buses, Washington Flyer buses to Dulles International Airport

\textsuperscript{14} Source: Tom Harrington, Office of Business Planning, WMATA
• Herndon Monroe Park-and-Ride in Fairfax County, VA: Metrobuses and Fairfax Connector buses
• Tysons West Park in Fairfax County, VA: Metrobuses and Fairfax Connector buses\(^{15}\)

Planning is underway for a major inter-modal transit facility in Silver Spring, Maryland.

**Joint Operation: Fairfax Connector and Metro**

Besides passenger facilities, there are instances of joint operation of bus routes. Typically this involves operation of peak period service by Metrobus and off-peak service by suburban transit providers or weekday service by Metrobus and weekend service by suburban transit providers. For example, Metrobus operates its Route 17A in Fairfax County, between George Mason University and the Pentagon, during peak periods while Fairfax Connector operates its Route 306 during off peak periods. This route was originally operated solely by Metrobus at all times. Fairfax County, which funds Metrobus service in its jurisdiction was seeking to reduce costs and shifted off peak service to its growing contractor-operated bus system, which typically has lower operating costs. While the result is lower cost operation, there are more pull-ins and pull-outs than would otherwise be needed and increased driver training requirements\(^{16}\).

Another type of joint operation in a corridor began in September 2004 in the Richmond Highway (U.S. 1) corridor. As a precursor to Bus Rapid Transit service in this corridor, a plan for limited stop bus service (known as REX) was developed to reduce travel times. Metrobus operates the limited stop service while Fairfax Connector operates all the local services.

There are other corridors where Fairfax Connector and Metrobus operate collinear segments. Because there are fare policies in place that allow each provider to accept each other’s fare media (passes, etc.), riders can take advantage of the next arriving bus to make many trips, thereby reducing wait time.

\(^{15}\) Ibid.
\(^{16}\) Conversation with Tom Black, Fairfax Connector
Facility Coordination between Fairfax County, Metro and Other Providers

Fairfax Connector operates at all Metrorail stations in Fairfax County with Metro permission. This has worked well to benefit passengers who transfer between routes, although it has not always been easy to develop configurations that maximize convenience for transferring passengers. There are also common bus stops at other locations such as hospitals and shopping malls.

While Metro owns its Metrorail stations and associated bus transfer areas, Fairfax County owns many other transit centers and park-and-ride facilities in the county. Yet other park-and-rides are owned by the Virginia Department of Transportation. Fairfax County owns the parking facilities at all of the Virginia Railway Express commuter rail stations in the county.

There are also shared running way facilities used by several transit providers. For example, the shoulder lane of the Dulles Connector Road between the Dulles Toll Road and I-66 is used by Washington Flyer airport buses, Metrobus and Loudoun County buses as well as by Fairfax Connector. There are also automated gated slip ramps connecting the Dulles Toll Road with the Dulles Access Road (an uncongested road reserved for airport travel and used by transit buses as an HOV facility); this is used by Metrobus, Loudoun County and Fairfax Connector buses.

Fairfax County Connector and Metrobus are also working on a joint use operating base bus garage.

A specific facility, West Falls Church Station, is explored in more detail below:

Fairfax County/ Dulles Corridor and West Falls Church Station

West Falls Church is an important Metrorail station and bus facility shared by several providers. Bus service at West Falls Church includes:

- Metrobus: 26A, 26W, 28A,B, 28T, 3B, 3T
- Fairfax Connector Bus: 425, 427, 505, 551, 552, 553, 554, 557, 585, 950, 951, 952, 980

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17 Ibid.
18 Conversation with Fred Simms, Virginia Service Planner, WMATA
Recently, the bus facility (North Side) at the West Falls Church Metrorail Station was expanded. This side of the station is almost exclusively served by other providers including Fairfax Connector, Loudoun Commuter Bus and Washington Flyer. Fairfax County funded the expansion of the bus facility from six to eight bus berths using CMAQ (Congestion Management/Air Quality) funding; Metro implemented the construction project on its property.

This improvement accommodated increased bus service from the Dulles Corridor which is the corridor slated for a Metrorail extension in the future. As a result of service improvements, a doubling of ridership was experienced. Ridership increases at this location relate more to service improvements than to facility improvements. The facility improvements were more in response to demand created by service improvements, rather than an instance where facility improvements generated additional ridership. Nevertheless, the improvements to the facility were critical to serving the demand and maintaining efficient operation.

Service in the Dulles Corridor was greatly increased starting in 1999 in accordance with the Dulles Corridor plan. Ridership in the corridor on Fairfax Connector buses has grown from 6,200 on an average weekday in 1999 to 14,681 on an average weekday in 2004 (through June). Frequency of service has been greatly improved. Currently, bus service to the Herndon-Monroe Transit Center in the corridor (which opened in 1999) is up to 12 buses per hour.

The new facility not only expanded berth capacity; it also provided other operational benefits, expanding the layover capacity, providing accommodation for larger articulated buses, expanding turning radii, enabling buses to pass others and allowing reduced layover times at the facility.

**Arlington County, VA: PikeRide**

In September 2003, a new bus service called *PikeRide* was introduced along Columbia Pike in Arlington, Virginia. *PikeRide* is an interagency initiative that reflects recommendations in the

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19 Source: ART website ([www.commuterpage.com](http://www.commuterpage.com)) and Conversation with Lisa Rivers, ART
Regional Bus Study for priority bus service, including bus rapid transit, in the Columbia Pike corridor. *PikeRide* is a precursor to a future Bus Rapid Transit system that is being studied as part of an ongoing alternatives analysis.

The *PikeRide* name applies to the Metrobus 16 Line service and ART-Arlington Transit routes serving the Columbia Pike corridor and the surrounding Arlington neighborhoods. ART - Arlington Transit is a local bus service that operates within Arlington County, Virginia, supplementing Metrobus with smaller, neighborhood-friendly vehicles and providing access to Metrorail and Virginia Railway Express (VRE).

The new *PikeRide* service includes routes to Pentagon City Metrorail station as well as to the Pentagon Metrorail station (the two stations are located a short distance apart). In the past, the Pentagon Metrorail station was the single intermodal transfer location for this corridor; the Pentagon City Metrorail station was not directly served by buses, although one bus line served the rear entrance of the Pentagon City Mall (located a distance away from the Metrorail station). One of the goals of the service was to shift about 1,200 riders per day from transferring at the Pentagon Metrorail station to transferring at the Pentagon City Metrorail station. After the September 11, 2001 terrorist attack on the Pentagon, buses were rerouted to serve the Pentagon City Metrorail station with a makeshift on-street terminal. Arlington County and Metro believed that some demand could be shifted to Pentagon City on an ongoing basis for several reasons. One reason was that it worked well during the period after September 11th, 2001. Another was that there was clearly demand to travel to workplaces and shopping at Pentagon City. Another was that Pentagon station experiences overcrowding and queuing of buses during peak times. Also, during times of high alert, bus operations at Pentagon could be curtailed. Furthermore, some transit customers expressed fears about traveling to the Pentagon on a daily basis just for the purpose of transferring to Metrorail. Thus, service to Pentagon City became part of the planning for enhanced corridor bus service on Columbia Pike that was undertaken following up on recommendations of the Regional Bus Study.

The Arlington County Board adopted the Columbia Pike Initiative – A Revitalization Plan for the Columbia Pike Corridor on March 12, 2002. The Revitalization Plan recognized that the
current Metrobus service is a vital transportation resource in the corridor, which is not served directly by the regional Metrorail system. The Columbia Pike Initiative acknowledged the future vision of a higher-capacity transit system and specified recommended interim steps to improve transit on the way toward that long-term transit vision. As a first step toward developing a high quality transit system for the corridor, WMATA and the Arlington County Department of Public Works have worked closely in developing a comprehensive Metrobus service restructuring plan to support near-term changes in the Columbia Pike area.

The interagency effort involved Arlington County and its local ART operation, Metro and Fairfax County; Fairfax County is the source of 25-30% of the corridor’s riders and constitutes just over half of the route miles in the corridor.

From an institutional point of view, the PikeRide experience may be somewhat unique. Arlington County was in a very good position to facilitate the service and infrastructure integration in this case. WMATA (Metro) does not have dedicated funding but is funded by the jurisdictions. Thus, Arlington County has the right to determine and approve what Metrobus service is operated in its boundaries. Arlington County has always taken an active role in Metrobus service development. As a result of the Regional Bus Study, Metro was embarking on a new way of doing business and the stage had been set for more coordination. Arlington County was an early test case of this new collaboration. Arlington County considers the project to have advanced the level of coordination beyond formal channels into operations. 

PikeRide service includes the following routes:

- **Metrobus 16A,B,D,F,J** Columbia Pike Line:
- **Metrobus 16L** Annandale-Skyline City - Pentagon Line:
- **Metrobus 16G,H,K,W** Columbia Heights West - Pentagon City Line:
- **Metrobus16Y** Columbia Pike - Farragut Square:
- **ART 41** - Columbia Pike - Ballston- Court House:
- **ART 73** - Arlington Heights - Penrose - Pentagon City:
- **ART 74** - Douglas Park - Arlington Village - Pentagon City:
- **ART 75** - Wakefield H.S. - Carlin Springs Rd. - Ballston:
Specific Service Changes

The changes can be described as follows:

- While keeping Metrobus service to the Pentagon essentially the same on the 16A, B, D, J, F routes, brand new service to Pentagon City was added via Metrobus 16G, H, K, W. These buses had previously served Pentagon Metrorail station. These routes were also increased to all-day service. This re-routing served a number of purposes including relieving bus congestion at Pentagon and supporting Pentagon City as a more important shopping destination for local bus riders. Arlington County had wanted to increase service on Columbia Pike but Pentagon did not have capacity for more bus service. The 16G, H, K, and W offer Blue Line riders a chance to avoid the crowds at the busy Pentagon Metrorail station. Furthermore, the Pentagon City service is timed to arrive within five or six minutes of a train.

- Simultaneously, new ART-Arlington Transit routes 73, 74, 75 were added to serve the neighborhoods along the Columbia Pike corridor. ART was clearly positioned as the neighborhood small bus service; this allowed large buses to be removed from residential streets and new small bus routes to enter residential areas. The existing ART 41 Columbia Pike-Ballston-Court House route was restructured to include the Barcroft neighborhood. Metrobus route 16W continues to operate with the terminus now at Pentagon City and the number of trips adjusted.

- Pentagon City service (to/from Columbia Heights West)—Metrobus 16G provides service every 12 minutes all day long. It is supplemented with Metrobus 16H service during peak hours. So, during those peak hours, PikeRide service is every 6 minutes.

- Pentagon service (to/from Annandale/Culmore)—Metrobus 16A, and D provide service throughout the day every 30 minutes to and from Annandale. Metrobus 16B, and J travel to and from Culmore, also at 30-minute intervals. During peak periods, the 16F Limited also makes the Culmore circuit. When combined during peak hours, these PikeRide routes travel Columbia Pike every 5 minutes.

- Additional trips have been added during peak hours to the existing Metrobus 16Y route serving Farragut Square in downtown Washington, DC (to/from Annandale/Culmore).
Impacts

As a result of the changes, the number of bus trips on Columbia Pike on weekdays was increased by 45%, on Saturdays by 64%, and on Sundays nearly doubled. Service is better timed and more customer information is provided at every bus stop.

The service restructuring introduced limited stop service. Metrobus 16F from Fairfax County stops only at the 8 most popular stops in Arlington (skipping 10-12 stops) to speed riders on their way. All PikeRide buses operating within Arlington stop at all Metrobus or ART-Arlington Transit bus stops.

Riders connecting to Metrorail can take any PikeRide bus, because they all go to a Metrorail station. All PikeRide bus stops are clearly marked and have route information. Pentagon City service (16G and H Arlington buses) is easily identified by the distinctive PikeRide logo and advertising on the sides of the buses.

Another improvement was that service at Pentagon City Metrorail is timed to meet the Metrorail schedule. Thus, the service is better integrated with Metrorail. The schedule of bus service at Pentagon does not offer timed transfers and reflects the higher demand in the peak and lower demand in the off peak.

Arlington County and Metro had to coordinate efforts to establish the bus transfer terminal at Pentagon City. This involved Arlington County paying for and constructing shelters on Metro-owned land and getting specific upper management approvals for shelters that do not meet standard Metro guidelines. Coordination extended into implementation activities that included Arlington County staff assisting with promotional activities, acting as customer ambassadors working with Metro supervisors and working very closely with Metro operations staff.

The new service on Columbia Pike has led to an increase in corridor bus ridership on the order of 14%. Approximately 9,360 used the Metrobus Line 16 service on an average day in June 2003 (prior to implementation of PikeRide). At the same time ART served about 573 riders in the corridor, bringing the total to 9,933. As of June 2004, Metrobus Line 16 averaged 10,134 riders per day and the new ART services in the PikeRide corridor averaged about 1,202. Thus the total ridership in the corridor was just over 11,336. Although a small number of riders transfer
between ART and Metrobus Line 16, making unlinked trip statistics an overstatement of the impact, it is believed that this effect is minor since only some ART routes serve purely as feeders. In fact, transfers between ART and Metrobus Line 16 are smaller than expected.

Arlington County has conducted ridership surveys to assess customer response to the PikeRide service. The results have shown high customer satisfaction. Initially some riders perceived that service was imbalanced, offering more service to Pentagon City than to Pentagon, while in reality, the majority of service continues to serve the Pentagon. Improved user information and marketing has promoted use of the service to Pentagon City so that riders who are using the service to access Metrorail are now more likely to take the first bus rather than wait for a Pentagon bus.

**Conclusion**

Arlington County considers PikeRide to be an unqualified success. It believes that the real success was working together to offer passengers a better service. Arlington County identifies the keys to success as communication and commitment to communication with agencies, employees, customers, politicians and community groups. Another key factor was focusing on a specific target market and clearly defining the role each service will play. Arlington expects to extend the lessons learned to other corridors in the county.

**Future Plans**

Improvements will continue to be made in the corridor. In the next few years, PikeRide will have:

- traffic light signal priority, which will speed buses down the Pike (coming in 2004);
- buses that run on clean-burning compressed natural gas (coming in 2005);
- real-time arrival and departure information; and
- new bus stops designed with community input (design process starts fall, 2004).

In the long-term, Arlington envisions a bustling corridor that includes a transitway that will carry express bus service, tram or light rail. A 12-month study effort completed in January 2005 called The Pike Transit Initiative was being sponsored by WMATA. The study analyzed alternatives
for a new high-capacity and environmentally friendly transit service along Columbia Pike from
the Pentagon/Pentagon City area to Bailey’s Crossroads (at the County Line). Working closely
with local jurisdictions, neighborhoods, and community groups, the study team developed a
preferred transit investment (e.g. light rail, streetcar, or bus rapid transit) for the corridor that will
support the county redevelopment initiatives.

6.1.3 Southwestern Connecticut / Coastal Link

The Coastal Link is an inter-town (and inter-district) bus service that is jointly operated by three
different transit agencies in southwestern Connecticut, Norwalk Transit District (NTD or
WHEELS), Milford Transit District (MTD) and the Greater Bridgeport Transit Authority
(GBTA). It provides a model of integration among three transit agencies, as well as coordination
among two jobs access regions using FTA Jobs Access Reverse Commute (JARC) program
funding administered by the State of Connecticut.

Coastal Link serves a 25 mile corridor through Milford, Bridgeport, Norwalk, Stratford, Fairfield
and Westport along U.S. Route 1, the primary job and commercial corridor for this part of
Connecticut (Figure 6-2).
Coastal Link (6) extends from the Norwalk WHEELS Hub (the pulse point for the Norwalk bus system) to the Connecticut Post Mall in Milford. At its midpoint, it passes through downtown Bridgeport serving the Bridgeport Bus Terminal and Railroad Station (MetroNorth) complex. (See Figure 6-3 showing the route structure.)
FIGURE 6-3 Coastal Link Route Map

Points of Interest
1. CT POST MALL
2. MILFORD R. R. STATION
3. MILFORD HOSPITAL
4. DOCK SHOPPING CENTER
5. STRATFORD R. R. STATION
6. BRIDGEPORT BUS TERMINAL & R. R. STATION
7. CAROLTON HOSPITAL
8. FAIRFIELD CENTER & R. R. STATION
9. NORWALK PULSE POINT

Location of Departure Points shown on time table.

Schedules in accessible format available on request.

Source: GBTA Webpage (www.gbtabus.com)
Prior to implementation of the *Coastal Link*, each agency operated service along one or more segments of US 1 (Post Road) and passengers making inter-town trips had to make (one or more) transfers between these routes. GBTA operated Route 2 in Bridgeport, Fairfield and Stratford, NTD operated Route 6 in Norwalk and Routes 1 and 4 in Westport, and MTD operated Route 1. There were substantial numbers of transfers between these routes even though some transfer trips were rather inconvenient. While the agencies had already had a common free transfer policy so that additional fares were not required, the routes did not operate a common headway so that transfer times were not always convenient.

Planning for the *Coastal Link* project was initiated in 1998 and service was implemented in November 1999. The primary goal of the program was to improve customer convenience and the primary market was the access to jobs market. FTA JARC funding created an opportunity to design and implement the service, and is a major source of the operating funds for the service. Thus, the *Coastal Link* is a project of 1) the FTA JARC Program, 2) the People to Jobs Program (projects administered by The WorkPlace, Inc., Southwestern Connecticut’s Regional Workforce Development Board, and the Regional Growth Connection, South Central Connecticut’s Regional Workforce Development Board), 3) MetroPool (a regional ride share program) and 4) the three local transit agencies. The local match for FTA JARC funds is provided by the Connecticut Department of Social Services.

Each agency operates certain trips of the *Coastal Link* service using their own buses. GBTA, the largest of the three agencies, operates about half the vehicles and in many ways is a lead agency for the program.

*Coastal Link* signs are attached to the front of the bus and *Coastal Link* appears on the front destination sign. A rider may board a *Coastal Link* bus operated by any of the three agencies, pay the current $1.25 fare ($0.60 for elderly and disabled persons with identification, free for children under 5), and ride between the towns without transferring vehicles or paying an additional fare. Passengers who wish to ride another route can request a transfer. The *Coastal Link* also interfaces with other services to other regions such as the Connecticut Transit bus routes that serve the New Haven and South Western (Stamford/Greenwich) region.
The Coastal Link operates weekdays, Saturdays and Sundays. On weekdays service begins at 5:30 AM and ends at 11:00 PM. Service between the endpoints of the Coastal Link operates every 20 minutes during the peak and every hour during the off peak. Along much of the route, there is supplementary service by another GBTA route, which operates from Fairfield to Stratford through Bridgeport and is collinear with the Coastal Link on this large segment during off peak hours. Thus, weekday off peak service on this segment is every half hour. On Saturdays service operates from end to end every hour; with the supplementary local service along the core segment, the frequency is about every half hour. Service on Saturday operates during approximately the same span as on weekdays. On Sundays and Holidays hourly service from end to end is operated for an 11 hour day.

The Coastal Link was promoted aggressively through radio and TV advertisements. The service grew in popularity and needed to be expanded. When the Coastal Link was initiated, service in the peak was only at 40 minute intervals. However, ridership soon exceeded capacity and additional service had to be provided. Additional funds were obtained from the State of Connecticut Transportation Strategy Board in February 2002 to offer peak period service at 20 minute intervals. The riders are largely transit-dependent, entry level workers who were the focus of the program.

The total FTA JARC funding from inception in November 1999 through June 2004 has been $1.98 million; the annual amount for state fiscal year 2004 was $612,000. During state fiscal year 2004, state funds from the Transportation Strategy Board amounted to an additional $286,000 to provide enhanced service during peak hours to meet the demand. Thus the total subsidy for state fiscal year 2004 was just under $900,000. The cost of service is estimated separately by each agency. For Norwalk and Milford it is simply the cost of the Coastal Link trips. For GBTA, it is based on the cost of additional service hours including the extension of its Route 2 service to other towns and additional local service (Route 16) that had to be added on U.S. 1 within the GBTA service area as part of the plan to create Coastal Link service. The
subsidy is based on the cost minus the revenue obtained on the Coastal Link. The distribution of funding of the service operating cost for 2002 is shown in Figure 6-4:  

**FIGURE 6-4 Funding of Coastal Link 2002**

No formal interagency agreements were established nor were they required. Since these small transit agencies had long established relationships, the necessary coordination was made easier. While there was a history of trust, the Coastal Link experience nurtured the relationships.  

There is no transfer of funds for costs or revenues among the agencies. The agencies accept any fare media including tokens that they would not be able to redeem for revenue. The funding agreement with the State using JARC funds to cover the total deficit after revenue made the revenue issue insignificant and facilitated the development of such simple reciprocity policies. Some issues that had to be addressed were union issues, supervisory issues and communications. Joint meetings were established to address some of these issues. Nextel cell phone service provided interagency communications. Drivers were introduced to the supervisors of neighboring agencies that would have oversight of operations. Only Norwalk had a different union, but this did not turn out to be a significant problem; issues were resolved more easily than expected.

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21 Source: Lisa Rivers, Connecticut Department of Transportation Office of Transit and Ridesharing  
22 Conversation with Henry Jadach, Milford Transit District
The result of the Coastal Link implementation has been the creation of a very successful and productive route, which is believed likely to outlast the Jobs Access funding sources that were instrumental in its creation. The number of transfers between routes has dramatically decreased while ridership has increased. The transit agencies have been able to curtail service on predecessor routes. Passengers have much more convenient transit options.

The agencies have surveyed riders and have some ridership and transfer information that confirms these findings as described below.

Ridership and revenue on the Coastal Link is recorded by each transit agency and reported to the state as shown in Figure 6-5. While Norwalk and Milford report total ridership and revenue on the new Coastal Link routes, GBTA reports an estimate of riders and revenue attributed to the additional service introduced in the U.S. 1 corridor; this consists of actual ridership and revenue from GFI fareboxes on the additional trips funded by state funds and 19% of ridership on Coastal Link service funded by FTA JARC funds, based on the 19% increase in service hours.23

Coastal Link ridership was 684,000 in state fiscal year 2004. Total ridership in the Coastal Link corridor including about 535,000 annual riders who used GBTA service on U.S. 1 prior to the Coastal Link therefore exceeds 1.2 million. This means that ridership has doubled.

The estimated subsidy per Coastal Link passenger was $1.32 (excluding the former riders). Since the cash fare is $1.25, the farebox recovery is nearly 50%. However, the average fare is somewhat less than the cash fare due to discount ridership and transfers. The 2002 Job Access Regional Plan identified the farebox recovery of the Coastal Link as over 46%. Thus, the route is considered to have a relatively high farebox recovery.

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23 Conversation with Tom Gorman, GBTA
Norwalk Transit District reported that transfers between GBTA Route 2 and Westport Route 4 prior to the Coastal Link implementation numbered about 1,200 in an average month. By June 2000, about 6-7 months after Coastal Link was implemented, transfers were down to about 40. Currently about 75 transfers are made from Coastal Link buses to Westport buses in downtown Westport. Clearly, the riders who previously made transfers are now riding on the Coastal Link directly to their destinations. Thus, the service has been successful in enhancing passenger convenience. (Staff observations of passenger activity have supported this conclusion.)

It should also be noted that the service has been very helpful in addressing non-traditional work hours by extending service into evening and weekend hours. Although GBTA service always operated seven days a week, since Norwalk Route 6 did not operate on Sundays and the Westport routes did not operate on weekends, passengers coming from Bridgeport inner city areas to jobs in Westport or Norwalk could not even make transfers prior to the Coastal Link. Service in Milford also had limited service spans. The Coastal Link now provides seven day a week service and operates frequently (20 minutes in the peak and at least hourly during off peak period and on weekends).

24 Conversation with Nancy Carol, Norwalk Transit District
It is more difficult to make direct ridership comparisons before and after implementation, and no comprehensive evaluation of the service has been performed. However, Norwalk Transit District provided average weekday ridership on Norwalk Route 6 and Westport Route 1 and Route 4 prior to the *Coastal Link* to compare with ridership on the *Coastal Link*. Table 6-4 shows the available information.

Norwalk Route 6 originally operated about every half hour from the WHEELHUB in Downtown Norwalk east along U.S. 1 to a transfer point on the Westport town line. Service on Route 6 continued to operate but at a reduced frequency (hourly) after the *Coastal Link* was introduced. Over time, as the *Coastal Link* assumed the role of providing service on U.S. 1 to Westport and points east, Route 6 was shortened and combined with Route 5 to create a loop which has a much shorter segment on U.S. 1 and operated only five trips per day.

Westport Route 1 originally operated about every half hour from the Norwalk-Westport town line on U.S. 1 to the Westport hub at Jesup Green and then down to the Saugatuck station on the Metro-North New Haven rail line. After *Coastal Link* was introduced, the service continued to operate. However, over time, as the *Coastal Link* assumed the role of providing inter-town service on U.S. 1, the route was shortened to primarily serve the link between the hub and the rail station with a shortened segment on U.S. 1.

Westport Route 4 originally operated about every half hour from the Westport hub to the Fairfield town line via U.S. 1 and continued to serve a neighborhood north of U.S. 1. At the easternmost point on U.S. 1, transfers could be made to GBTA Route 2. After the *Coastal Link* was implemented, the route continued to operate but at hourly headways. Route 4 no longer operates and the neighborhood it had served is now served by other routes.
TABLE 6-4 Norwalk Transit District Daily Ridership

<table>
<thead>
<tr>
<th>Route</th>
<th>Pre-Coastal Link</th>
<th>June 2000</th>
<th>December 2002</th>
<th>Current Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norwalk Route 6</td>
<td>350-400</td>
<td>NA</td>
<td>75</td>
<td>Route no longer operates on US 1 to the Westport line</td>
</tr>
<tr>
<td>Westport Route 4</td>
<td>180-225</td>
<td>60</td>
<td>25</td>
<td>Eliminated</td>
</tr>
<tr>
<td>Westport Route 1</td>
<td>140-150</td>
<td>100</td>
<td>50</td>
<td>Continues to operate but not on US 1; ridership averages 60-70</td>
</tr>
</tbody>
</table>

While ridership declined on the above routes, ridership on the Coastal Link soared. It is difficult to make a comparison with ridership on the Coastal Link since each provider operates only a portion of the trips and records the ridership only on those trips. For example, Norwalk Transit District serves about 700 passengers per day on the service it operates. It is estimated that Milford carries about the same. GBTA carries at least twice that number on the trips they count as the Coastal Link which operate beyond the GBTA boundaries. Thus it is roughly estimated that Coastal Link inter-town ridership is perhaps 2,800-3,000 per day.

GBTA Route 2 had about 53,000 riders per month before the Coastal Link was introduced. Total reported Coastal Link ridership (operated by all three agencies) is reported to be about 58,000-61,000 per month (June 2004 ridership was 61,200). Since this total nets outs the old GBTA Route 2 ridership, the total corridor ridership is over 110,000 per month and over 1.2 million annually. Thus the corridor ridership doubled.

On board surveys were conducted in March 2000 by the People to Jobs program. Of the 698 riders at the time, 249 responded to the survey (36%). The survey revealed that a large share of riders resides in Bridgeport (77% of those responding) and that Bridgeport represented about half

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25 Source: Nancy Carol, Norwalk Transit District  
26 Conversation with Douglas Holcomb and Tom Gorman, GBTA  
27 People to Jobs Regional Transportation Task Force Report on Coastal Link On-Board Passenger Survey
of the boarding or alighting locations (53%). Most ride the bus daily (59%), that is, on weekdays; about 30% ride on Saturdays and 12% on Sundays. The vast majority (74%) said the route provides them with a direct route to the destination. Just over 20% reported transferring to get to the bus and the same percentage reported transferring to get to their destination (on their one-way trip). Overwhelmingly the bus was reported to be convenient (94%). About 14% reported they would not be able to make the trip without the Coastal Link, while about 27% would need to take a taxi. About 29% said they would have driven their car. The riders were largely working age people, distributed throughout the 22-54 age range. About 60% said the Coastal Link enabled them to get a job.

**Lessons Learned**

- Infrastructure integration efforts are being undertaken by many agencies and have been enable to increase customer convenience and positively impact ridership.

- In particular, infrastructure integration can facilitate inter-jurisdictional travel and offer reverse commuter job opportunities.

- Infrastructure integration can be designed to allow each provider to do what it does best.

- A history of trust and cooperation is a good foundation for the more ambitious integration efforts.

- Communication and commitment to communication is cited as key to interagency integration efforts.

- Interagency agreements can protect each agency’s interest and help to manage risks associated with infrastructure integration.

- State, regional or federal funding to cover revenue shortfalls can serve as an insurance policy for local agencies considering infrastructure coordination and concerned about risks.

**6.2 Fare Payment Integration**

This section describes two cases of fare integration. Each case emphasizes a somewhat different type of integration and each occurred in a different environment. The cases are described below.
6.2.1 Puget Sound Area / Washington State

The central Puget Sound region consists of three counties on the eastern shore of Puget Sound, Snohomish, King and Pierce, and one county on the western shore of Puget Sound, Kitsap. For the past twenty to thirty years, transit has been primarily offered on a county level, with Metro Transit providing service in King County, Pierce Transit providing service in Pierce County, Kitsap Transit providing service in Kitsap County, and Community Transit providing service in most of Snohomish County. The Boards governing these agencies are made up of elected officials within the area they serve. In addition, the City of Everett (in Snohomish County) operates a separate municipal transit service. Service across Puget Sound is provided by ferries operated by the State of Washington Department of Transportation (WSDOT).

Historically, the principal employment center in the region has been the city of Seattle, in King County. The five transit agencies have a long history of cooperation, with Metro Transit agreeing to share bus stops in downtown Seattle with Community Transit as early as 1986 and with Pierce Transit in 1991.28 However, the most important early step in establishing coordination occurred in 1990, when the state legislature authorized Metro Transit, Community Transit and Pierce Transit to jointly form a Joint Regional Policy Committee (JRPC) with responsibility for supervising regional planning.29 The JRPC was formed within a few months. In 1993, the JRPC completed its development of a regional transportation plan and recommended the establishment of a Regional Transit Authority (RTA). In 1993, the RTA was established by Pierce, King and Snohomish Counties.

In 1996, the RTA adopted Sound Move, a 10-year regional transportation system plan. This plan included the construction of new HOV lanes and facilities, light rail, commuter rail, and the funding of new regional bus service. The plan also included multiple efforts to improve the coordination of all transit in the region, including developing a method to allow riders to use a single fare media on all local and regional transit providers. The financial elements of the Sound Move plan identified funding sources including new taxes, federal contributions, bonding, and farebox revenues, providing a total of $3.9 billion. While the majority of this was for the

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28 King County Metro website, *Transit Milestones*
29 This and following timeline details from the Sound Transit website, *Regional Transit History and Chronology*
construction of new facilities, $45 million (1995 $) was allocated to funding fare integration efforts.

It is important to note that the RTA is governed by a board made up of representatives of Pierce, King and Snohomish Counties, and the cities contained in those counties. Many of the members of the RTA Board also sit on the boards of, or otherwise oversee, Pierce Transit, Metro Transit, Community Transit and Everett Transit. This overlap in the individuals governing the RTA and the transit agencies has resulted in considerable political emphasis on all of the agencies cooperating. This cooperative effort resulted in Sound Transit, WSDOT, and the other five transit agencies holding Board-level discussions of fares, including joint policy forums beginning in 1997. These forums also discussed Sound Transit’s fare policies and levels, providing the other regional transit agencies an opportunity to influence these policies at an early stage. In 1998, these agencies adopted the following set of objectives for fares to:

- encourage transit ridership;
- simplify transfers;
- encourage pre-paid fares; and
- maintain transit financial health of the transit agencies.

There are three major regional fare integration efforts. The first fare integration effort was the Puget Pass, implemented September 1, 1999. The Puget Passes were originally valid on Sound Transit, Pierce Transit, Metro Transit, Community Transit, and Everett Transit. Each pass has a “face value” varying from $0.50 to $4.00, in $0.25 increments. A pass is valid as full payment of all fares less than or equal to its “face value”. A pass is also valid as a credit equal to its “face value” against higher fares (including commuter rail fares), with the rider paying the difference in cash. Monthly passes cost 36 times the “face value” of the pass. Three month and annual passes are available for some “face values”, with multiples of 108 (3 times the monthly multiple of 36) and 396 (11 times the monthly multiple of 36). During the first month after the Puget Pass was introduced, Puget Ship-to-Shore passes were implemented combining a Puget Pass with a

30 Sound Transit Motion M98-54 and attached documentation
31 Sound Transit News Release, July 30, 1999

The timing of the Puget Pass was crucial, because on September 19, 1999, Sound Transit launched its first nine Regional Express bus routes. These routes are operated by the regional agencies, but using Sound Transit buses and Sound Transit fares. Without the Puget Pass or some interagency agreement to honor other agencies’ passes, Sound Transit would have needed to implement its own fare media by September 19. Furthermore, these routes replaced high density routes that had been operated by the member agencies, with considerable numbers of transferring riders. Absent some type of fare integration, these riders could have seen their fares double as they paid to ride both the Sound Transit service and connecting routes on other agencies.

The next step in fare integration occurred in September 2000, when Sound Transit, King County Metro Transit, Pierce Transit, Community Transit and Everett Transit implemented an agreement to accept each other’s transfers. Transfers are accepted as a base fare, and riders are required to pay any additional zone fees. Transfers between bus services and Sounder (commuter rail operated by Sound Transit) were also established, with Sounder tickets accepted as local transfers by the other transit agencies, and the Sounder accepting the transfers as credit against the Sounder fare equal to a one zone fare on Sound Transit bus service. Kitsap Transit is not part of the agreement regarding transfers.

The third step in fare integration, a smart card based stored value system, has not yet been implemented. The Puget Sound Regional Council originated the smart card project in 1994 and quickly brought the local transit agencies and WSDOT on as partners. This effort is currently in development and is scheduled for a beta test in 2005 and full operation by the end of 2006. The same five agencies are participating in this effort, along with Kitsap Transit and the Washington State Ferry System. In addition, other transit agencies in the region have initiated discussions to

32 Sound Transit News Release, September 14, 1999
33 Sound Transit News Release, September 8, 1999
34 Sound Transit News Release, September 8, 2000
participate in the smart card project, including the Seattle Monorail and Intercity Transit (Thurston County / Olympia, WA).

The initial financial concern of the pre-existing agencies was that free transfers meant that they would receive less revenue from trips that involve an inter-agency transfer than they had previously. As Sound Transit took over more and more of the long distance regional service, there would be more transfers between Sound Transit and the other agencies, resulting in a continual drain on the revenue of the other agencies. The agreed resolution was that Sound Transit would use some of its Fare Integration Fund to subsidize the revenues that the other agencies received from inter-agency transfers.

Implementation of this solution raised its own problems. Most of the agencies did not possess fareboxes capable of recording the different types of passes and transfers that would be in existence, thus it would be impossible for the agencies to accurately report inter-agency trips and make claims on the Fare Integration Fund. The mechanism finally adopted by the agencies is as follows:

- Sound Transit would administer a regional reconciliation service, through which agencies would receive (or pay) the difference between the revenue that they actually recognize and the revenue which they earn. Sound Transit would also establish a fare integration budget using its revenues to insure that all agencies receive the full amount of their earned revenues, which will exceed the total amount of revenues recognized by the agencies.
- Revenues Recognized: This includes all farebox revenue and all revenue received from the sale of regional passes. Revenue from employer and institutional pass programs would be excluded.
- Revenues Earned:
  - Regional Pass Boardings

35 Discussions with agency staff, including Jay Peterson of Pierce Transit and Matt Sheldon of Community Transit.
36 Sound Transit Motion M99-07 and attached documentation
37 Sound Transit Motions M2001-114 and attached documentation; Discussions with agency staff, including Jay Peterson of Pierce Transit, Matt Sheldon of Community Transit, and Christy Parker of Sound Transit.
Boardings from trips conducted entirely on a single agency – that agency would receive the full amount of its average revenue per pass boarding by customer and service category

Boardings from trips involving a transfer between Sound Transit and another agency – each agency would receive two-thirds of its average revenue per pass boarding by customer and service category

Boardings from trips involving a transfer between two agencies and not involving Sound Transit – each agency would receive the full amount of its average revenue per pass boarding by customer and service category

Cash Boardings

Boardings from trips conducted entirely on a single agency – agencies would receive the cash deposited

Boardings from trips involving a transfer between Sound Transit and another agency – each agency would receive two-thirds of its cash fare by customer and service category

Boardings from trips involving a transfer between two agencies and not involving Sound Transit – agencies would allocate revenue pursuant to any existing interagency agreements

Research Program: The agencies agreed to engage in an annual program to estimate the number of transfers occurring between Sound Transit and each other agency each year and to estimate the number of boardings likely to occur in the following year. The agencies coordinated a major survey effort in 2001 to collect data on transfers, and have just conducted a second major survey during 2004.

**Revenue Impacts**

The greatest concerns voiced by the transit agencies with regard to this mechanism for allocating revenue are whether the data accurately portrays the transfer behavior of the riders and whether the mechanism is resulting in their revenues being higher or lower than they would be in the absence of integration. The mechanisms are currently based on a survey conducted in 2001, two

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38 This rule was implemented as collecting data on the number of boardings involving transfers between each agency was determined to be too difficult and expensive.
years after Puget Pass was first implemented and one year after free transfers were implemented. The 2004 rider survey was designed to address these issues, and the data is expected to be available late this year.

The other ongoing effort to address the difficulties associated with this mechanism is the smart card project. After the smart cards are implemented (currently scheduled for 2006), data will be collected by the regional clearinghouse regarding the use of each type of fare media and the number of transfers between vehicles of each agency. This data will then be used to calculate the revenues earned by each transit agency.

It is important to note that the fare integration was implemented despite the agencies’ concerns regarding the potential impact on their revenue. This appears to be related to two factors. First, Sound Transit’s willingness to use its Fare Integration Fund to mitigate the impact of fare integration on the other agencies reduced the potential for lost revenue. Second, the agreement between policy makers at the agencies that fare integration was an important goal forced the agencies to accept that integration was going to happen. They therefore recognized that they needed to look at how fare integration could be accomplished with the minimum pain and loss to all of the agencies, not just at the potential impact to their own agency. The ability of the policy makers to reach an agreement probably was influenced by the fact that Sound Transit’s board had a considerable overlap with the policy makers at the other agencies, while the effectiveness of the agencies’ staffs in implementing fare integration was undoubtedly related to their long history of cooperation.

**Ridership Impacts**

While considerable information is available on the ridership and revenue of the agencies participating in the fare integration effort, it is impossible to use this data to assess the impact of fare integration. This is because the creation of Sound Transit and the implementation of Regional Express and the Sounder commuter rail service have significantly changed the shape of public transportation in the region. Many regional routes are now operated by Sound Transit that were previously operated by other agencies. Furthermore, service in the region has varied significantly, increasing starting in 1997 as Sound Transit supported regional transit provided by
the other agencies, increasing further during most of 1999 with the commencement of Sound Transit’s Regional Express service and Sounder commuter rail service, then dropping in 2000 after Washington state voters approved the elimination of the motor vehicle excise tax, eliminating up to a third of the revenue of some transit agencies. Subsequently, transit service has once more expanded with the implementation of additional Sound Transit service and the passage of several local option tax packages to support the individual transit agencies.

Survey data does indicate that the changes in the regional transit system have increased the use of multiple transit agencies by riders. Community Transit’s 1997 On-Board Survey showed that 13.0% of riders interviewed transferred to King County Metro at least once a week, and 7.3% of riders transferred to Everett Transit at least once a week.39 The Community Transit / Everett Transit 2001 On-Board Survey asked a somewhat different question, reporting that 27% of all trips on Community Transit involved a transfer to a different transit agency (7).

Pierce Transit’s customer satisfaction surveys (8, 9) also showed an increase in riders using multiple agencies:

- In 1998, 19% of the surveyed riders had used another transit system in the region in the previous 30 days
- In 2001, 25% of the surveyed riders had used another transit system in the region in the previous 30 days
- In 2004, 27% of the surveyed riders had used another transit system in the region in the previous 30 days

The increase in transferring has probably been caused by a combination of factors, including fare integration, Sound Transit’s takeover of many regional commuter routes, and efforts to improve service integration in the region. However, it is important to note that without fare integration, riders transferring between systems would have needed to pay two fares (or purchase two passes), which would be expected to cause a reduction in transferring between systems. Therefore, by eliminating this potential increase in costs for riders, fare integration facilitated riders taking

39 Per Davis Hyslop, Community Transit Supervisor of Research and Statistics
advantage of the increase in service offered by Sound Transit on the regional routes it took over and of the other service integration efforts in which the agencies engaged.

Surveys at both King County Metro (10, 11) and Pierce Transit (8, 9) also showed that most riders were aware that the Puget Pass could be used on multiple systems, and increasing numbers of riders took advantage of that:

- In 1999, immediately after the introduction of the Puget Pass, 61% of King County Metro’s surveyed riders were aware of the fact that Puget Pass could be used on other transit systems and 12% had done so at some time.
- In 2000, 69% of King County Metro’s surveyed riders were aware of the fact that Puget Pass could be used on other transit systems and 27% had done so at some time.
- In 2001, 65% of Pierce Transit’s surveyed riders were aware of the fact that Puget Pass and transfers could be used on other transit systems and 41% had done so at some time.
- In 2004, 67% of Pierce Transit’s surveyed riders were aware of the fact that Puget Pass and transfers could be used on other transit systems and 60% had done so at some time.

The most important issue regarding fare integration is that, despite the addition of a new transit system – Sound Transit, the transferring of routes from the original transit systems to Sound Transit, and the increased use of multiple transit agencies, customer satisfaction has remained constant or increased.

At Metro Transit, the percentage of riders who are “very satisfied” was at 44% for the two years prior to the implementation of Sound Transit Regional Express and of fare integration (1997 & 1998), stayed at 44% for the implementation of Regional Express and the Puget Pass, then rose to 50% in 2000 implementation of inter-agency transfers and additional Regional Express Routes. The percentage of riders who were “very satisfied” dropped in 2001 back to 44%, most likely the result of service cuts associated with the elimination of the Motor Vehicle Excise Tax, and then increasing to 52% in 2002 and 2003 as service was restored. The percentage of riders who were dissatisfied varied in a similar pattern, 7% in 1997 through 1999 and 2001, and 6% in 2000, 2002 and 2003 (10, 11, 12, 13, and 14).
Pierce Transit did not consistently ask riders about their overall satisfaction, but did ask a series of questions about their satisfaction with transfers, including the number of transfers, waiting time, reliability, and time limit. On a scale of 1 (very dissatisfied) to 5 (very satisfied) riders satisfaction with transfers were at 4.21 in 1998, then fell slightly to 4.02 in 2001, and increased to 4.08 in 2004 (8, 9). This pattern is the same as shown for most other customer satisfaction issues, with the drop in 2001 probably relating to the service cuts and the resulting difficulty in transferring.

The Central Puget Sound case study illustrates the role that fare integration can play when new regional services, and a new regional transit agency, are added to existing services. Under these circumstances, riders become more likely to need to, or desire to, use services provided by multiple transit operators and may need to transfer between operators as part of a single trip. Fare integration greatly reduces the importance to riders of the number of agencies, and the identity of the agency operating any specific route, and simplifies the use of transit for riders. In this case, by simplifying fare payment and eliminating the possibility of having to pay multiple agencies, fare integration facilitated Sound Transit in increasing the total amount of service provided to transit users in the region while maintaining or increasing rider’s satisfaction with transit.

This study also indicated two ways to address the financial concerns associated with fare integration, especially concerns over possible reduced revenue and

6.2.2 Washington D.C. Metropolitan Area / National Capital Region

The Washington metropolitan area has seen a large expansion of transit service in suburban areas and increasing efforts to improve the ability of riders to travel throughout the area, including efforts to integrate fares.

Washington Metropolitan Area Transit Authority (WMATA also known as Metro) is the regional transit provider. The agency was formed in 1966 as a regional compact in order to implement the Washington Metro Metrorail system. (The compact members include the District
of Columbia; State of Maryland; Commonwealth of Virginia; Arlington County and Fairfax County, Virginia; Montgomery County and Prince George’s County, Maryland; and the Cities of Alexandria, Fairfax and Falls Church, Virginia.) In 1969, WMATA adopted a plan for a 98-mile rail system and broke ground on construction. Operation of the Phase I system began in 1976, with operation of an expanded 103-mile system beginning in 2001. In 1973, WMATA acquired four privately owned bus companies and created the Metrobus system – providing service in and around the District of Columbia.

Regionally, there are two commuter rail operators, Virginia Railway Express (VRE) and MARC (Maryland). Both operate into Washington, DC’s Union Station, which is also a Metrorail station. Several outer stations are served by both Metrorail and one of the commuter rail operators.

There are also numerous local bus services in the region. These include:

- Maryland Mass Transit Administration (commuter service)
- Montgomery County, Maryland Ride On
- Prince George’s County, Maryland The Bus
- City of Laurel, Maryland Connect-a-Ride bus
- University of Maryland Bus System
- City of Alexandria, Virginia DASH
- City of Fairfax, Virginia CUE
- City of Fall Church, Virginia GEORGE bus system
- Arlington County, Virginia ART
- Fairfax County, Virginia Connector
- Loudoun County, Virginia Loudoun Commuter Bus
- Stafford County, Virginia Potomac and Rappahannock Transportation Commission (PRTC) OmniRide and OmniLink
- Washington Flyer Airport Bus Service to Dulles International and Reagan National Airports (Metropolitan Washington Airports Authority)
While services have expanded, the entire transit system had become somewhat decentralized. In response, the WMATA Board formed a Regional Mobility Panel in 1998 to develop a policy to define the roles of the regional authority relative to bus services initiated by the local jurisdictions. The Panel defined regional versus non-regional bus service and gave the regional authority the rights to provide regional bus service and the local jurisdictions the right to provide non-regional service. It also suggested the formulation of a cost structure that enables the regional authority to compete with others for contracts for local bus service. Finally the Panel called for a comprehensive Regional Bus Study in 2002 to examine the facilities, services, and finances needed and to develop a plan for the next 25 years. That study strengthened the collaborative process among the jurisdictions, which fund both local bus service and Metro.

**Joint Media and Reciprocity**

Significant fare integration efforts began earlier, starting in 1993 when WMATA launched MetroChek, voucher system that allowed participants to redeem them for service on 29 Washington-area transit systems. (As of 2004, MetroChek can now be redeemed to pay for service on over 100 bus and vanpool commuter services in the region, VRE, MARC, MetroBus and Metrorail.) In 1997, WMATA joined with VRE and MARC to implement a one-year demonstration program offering monthly passes providing unlimited MARC-Metrorail or VRE-Metrorail travel. This program was so successful that it was continued after the demonstration program (renamed the Transit Link Card) and, ultimately, expanded to also cover the base fare on any Metrobus (riders still need to pay a differential for express buses).

In 1999, a regional bus transfer agreement was implemented between WMATA and several adjacent bus operators. This agreement allows riders to transfer between Metrobus and:

- Montgomery County RideOn – free
- Laurel MD Connect-a-Ride – free
- Prince George’s County The Bus – free from Metrobus, $0.45 upgrade to Metrobus
- Alexandria DASH – free
- Local Fairfax County Connector Routes – free from Metrobus, $0.45 to Metrobus
- Arlington County ART – free
- City of Fairfax CUE – free
- Falls Church GEORGE buses – free from Metrobus, $0.95 to Metrobus

Also in 1999, WMATA and eight other bus operators (RideOn, DASH, Fairfax Connector, CUE, ART, The Bus, Connect-a-Ride, and PRTC OmniRide) agreed to offer a joint one-day pass that can be used on Metrobus and the eight other operators. There is reciprocity on some passes, with ART, RideOn, Fairfax Connector, and DASH all honoring some or all of WMATA’s Metrobus passes.

It is difficult to estimate the impacts of these agreements, as several new Metrorail stations opened in 1997, 1998 and 1999, and Metrobus implemented new service in 1998, 1999, and 2000. Metrobus and Metrorail ridership have steadily increased, with a significantly higher increase from 1999 to 2000, as shown in Table 6-5.

### Table 6-5 Changes in Metrobus and Metrorail Ridership

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Much of the increase in Metrorail service is the result of service expansion, as the number of unlinked passenger trips per vehicle revenue mile on Metrorail fell from approximately 5.1 to approximately 4.6 from 1997 to 2001. However, the growth in ridership on Metrobus has outpaced service expansion, rising from about 3.7 to about 3.9 unlinked passenger trips per vehicle revenue mile.40

Ridership also increased on services connecting to Metrorail and Metrobus. Arlington County ART steadily lost riders from 1995 to 1998, falling from an annual ridership of 109,196 to 87,857. Ridership began to turn around in 1999, rising to 5.6% to 92,779. Ridership in 2000

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40 Data drawn from the National Transit Database.
almost doubled to 177,151, and ridership since then has continued to be over 50% greater than in 1999.\(^{41}\)

City of Fairfax CUE bus was fluctuating from 1995 to 1998, with alternating increases and decreases. Ridership jumped 7.4% in 1999 and an additional 4.4% in 2000, before falling slightly in 2001.\(^{42}\)

Alexandria DASH ridership was fairly flat from 1995 to 1998, with the largest increase being 2.3% from 1997 to 1998. Ridership in 1999 jumped by 4.9%, while ridership in 2000 increased by another 4.8%.

As similar large jump occurred in ridership on Loudoun County Transit in 1999, while smaller increases occurred on PRTC Omni Link and Omni Ride and the Fairfax Connector.\(^{43}\)

It is unlikely that all of these increases are due to the fare integration, but the consistent timing of significant increases at several agencies indicate that fare integration likely was an important factor in supporting ridership at all of the agencies.

**SmarTrip**

In 1995, WMATA launched smart cards with a demonstration of its GO CARD at 19 Metrorail stations, five parking lots and three Metrobus lines. This demonstration program led into the 1999 launch of **SmarTrip**, a permanent, rechargeable plastic smart card which could be used to pay for Metrorail trips and Metro parking. The smart card was contactless, providing faster passage for riders as it only needed to be touched to a target to open faregates or pay for parking, rather than entered into a reader. An additional benefit offered by SmarTrip was that riders could avoid the risk of losing the card by registering it, as WMATA would replace lost cards for only a $5 administrative fee. After a 90 day test of SmarTrip on a small portion of Metrobus in 2002 and 2003, WMATA began outfitting all of the Metrobuses to accept SmarTrip in April 2004, with installation completed in August 2004.

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\(^{41}\) Northern Virginia Transportation Commission website  
\(^{42}\) Ibid  
\(^{43}\) Ibid
In 2001, WMATA formed a consortium with the Maryland Transit Administration (Baltimore) and 15 other transit operators serving Maryland, the District of Columbia and Northern Virginia to develop the Regional SmarTrip System. This is the same smart card based stored value system as has been tested and implemented by WMATA, with additional administration and accounting functions to allow it to be used by multiple agencies. The Maryland Transit Administration (MTA) has been testing the fareboxes and plans to install them at the completion of testing. Other bus operators are also expected to install the fareboxes once the MTA finishes its testing, with full regional operability expected by mid-2005.

The SmarTrip card is also supported by WMATA’s SmartBenefits, which enables employers and employees to have commute benefits distributed to the SmarTrip card merely by tapping it at a SmarTrip vending machine.

WMATA considers the SmarTrip card to be very successful, and its strategic plan includes the possibility of replacing all paper and magnetic fare media with smart cards. Adoption of the SmarTrip card by the public was fairly slow and steady. In the first two months after implementation (May and June 1999) WMATA issued 14,000 cards. In fiscal 2000 (July 1, 1999 through June 30, 2000) WMATA issued an additional 70,000 cards. The rate of distributing cards increased in subsequent years, reaching 93,000 cards in fiscal 2004. As of June 2004, a total of about 440,000 cards had been issued and approximately 355,000 were in active use. Market penetration was 35% of rail customers (45% of peak trips), 60% of park & ride trips, and 71% of parking payments.44

WMATA has tracked rider opinions regarding the SmarTrip card as part of its market research program. In a Fare Initiatives Research Study conducted in 2000, 35% of respondents stated they were aware of SmarTrip and 4% had used it. In its regular customer survey in 2001, these numbers had risen such that 48% of respondents were aware of SmarTrip and 12% had used it.45

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44 Telephone interview with Craig Maxey of WMATA
45 Telephone interview with Craig Maxey of WMATA
Currently SmarTrip has not resulted in any cost savings, as it is layered on top of WMATA’s pre-existing fare structure and fare media. WMATA’s five-year plan for SmarTrip does anticipate that there will be operational and capital savings as the need to produce, distribute and account for paper farecards, passes and transfers decrease, and there is a matching decrease in the agency’s need to handle cash.

On June 28, 2004, WMATA began requiring the use of the SmarTrip card for all payments for parking at Metrorail stations and expanded the hours during which payment for parking would be required. Previously, WMATA had accepted both the SmarTrip card and cash. To insure that patrons parking at the lots would have access to a SmarTrip card, WMATA also installed SmarTrip vending machines at all Metrorail stations with parking. Demand for the SmarTrip card immediately soared, from the previous rate of almost 8,000 per month to 75,000 per month during July and August of 2004. Most of these cards were purchased from the new SmarTrip vending machines that are located inside 30 of WMATA’s 87 Metrorail stations. The demand was so high that WMATA was concerned that it would run out of SmarTrip cards, suspending sales over the internet on July 21 because the cards were in short supply. WMATA also suspended the requirement that parking be paid for with SmarTrip cards, allowing the use of paper farecards until August 23, 2004 because of the possibility that the vending machines might run out of cards. Metrorail ridership during June and July of 2004 were also unprecedentedly high, with a weekday average near 700,000. While this is correlated with the high demand for SmarTrip cards, the impact of each demand on the other is unclear.46

Additional information on the impacts of SmarTrip comes from a survey of Northern Virginia transit riders conducted during April 2003 (15). Almost all (96.4%) of those surveyed are Metrorail riders and many (30.9%) are Metrobus riders. Many of the riders also ride other transit services in the region, including the Fairfax Connector, DASH, and VRE. The great majority of riders (76%) were aware of SmarTrip while less than half (45%) were aware that SmarTrip could be used to pay for parking at Metro parking lots and garages. Seventy-five percent (75%) of those aware of using SmarTrip to pay for Metrorail used it, while only 66% of those aware of using SmarTrip to pay for parking used it for parking. When asked about the usefulness of

46 Telephone interview with Craig Maxey of WMATA
SmarTrip, those using it to pay for parking and for Metrorail both rated it on average at about 4.85 on a scale of 1 (low) to 5 (high). SmarTrip was also considered easy to use for both purposes by over 97% of those who had used it.

6.3 Schedule Integration

This section describes one case of schedule coordination and integration.

6.3.1 San Francisco Bay Area

The focus of this case study is on rail service schedule coordination between Caltrain and BART. Caltrain is the commuter rail service provider on the peninsula of the San Francisco Bay Area and is a tri-county partnership of San Francisco Municipal Railway, San Mateo County Transit District and Santa Clara Valley Transportation Authority. It is owned and operated by the Peninsula Joint Powers Board (JPB), which consists of three members from each of the JPB partners: San Francisco, San Mateo, and Santa Clara counties. The San Mateo County Transit District (SamTrans) is the managing agency that includes oversight of Amtrak, the contract operator.

Caltrain has implemented the following four types of schedule integration practices since 2003:

- Interagency, single mode
- Single mode and single agency
- Intermodal interagency
- Intermodal, single agency

For interagency schedule coordination, Caltrain has coordinated times of both limited and local trains with BART at the Millbrae Intermodal station since 2003. Both agencies work together to get the best fit and timing of schedules given the system’s constraints. At the Millbrae facility, the only location where BART and Caltrain share facilities, there are connections that are so close in time as to be in effect a timed transfer between BART and Caltrain using their shared platform. There is also transfer connection protection by means of telephone communication and coordination between the control centers of BART and Caltrain to communicate train delays.
Moreover, BART provides the Caltrain control center with a train location, tracking, and performance display to show when and where BART trains may be delayed so that mitigation measures can be taken.

The Millbrae station is just south of San Francisco International Airport (SFO) and the terminal station for BART on the peninsula. The opening of BART’s extension to SFO and the new intermodal facility at Millbrae were motivating factors for such schedule integration practices by BART. Both BART’s and Caltrain’s schedules needed to be integrated to show that the intermodal transfer concept could truly be viable, otherwise, the extension itself would not be successful. Both BART and Caltrain initiated these scheduling coordination measures.

BART’s objective in implementing these schedule coordination measures was to provide the best connection between BART and Caltrain taking into account performance variability, such as late trains, missing trains, and transfer time, including walk time, ticket processing time, and other performance measures.

Caltrain initiated the implementation of such schedule integration practices in order to maximize ridership and create an express service for passengers traveling greater distances. In addition to BART, Caltrain works with SamTrans and the Santa Clara Valley Transportation Authority in its interagency schedule integration practices.

Caltrain expanded upon these ongoing schedule integration practices in June 2004 by adding to Caltrain’s Peninsula train service with the debut of the new Baby Bullet express service in which travel time between San Francisco and San Jose was decreased 40% from 96 minutes on the local train to just under one hour on the Baby Bullet. Travel times are decreased primarily because the Baby Bullet stops at only the seven most heavily patronized stations of Caltrain’s 34 stations and bypassing slower local trains made possible by the construction of additional tracks. Higher speed also contributes to the improved travel times as the Baby Bullet travels at approximately 80 mph, whereas some local trains currently reach a maximum of about 60 mph. Moreover, low floors and additional doors help expedite passenger boarding and alighting and so
also contribute to further reducing travel time. There are five Baby Bullet trains in the morning and in the afternoon/evening peak periods\textsuperscript{47}.

Caltrain has revamped its entire schedule to provide what it hopes is a more efficient and timely mix of local, limited-stop and express train services during the week. Caltrain continues to work closely with BART to enhance the already existing interagency schedule coordination between these two rail service providers especially at the new Millbrae intermodal station — an example of an infrastructure integration practice — where improved connections between BART and Caltrain’s Baby Bullet have been possible since the latter’s debut in June 2004. These schedule and infrastructure integration practices have worked together to improve customer level of service.

BART runs uniform headways and can shift the entire schedule a couple of minutes earlier or later, but cannot provide uneven headways. Caltrain has some uneven headways due to the timing (overtaking) of the Bullet trains, so the transfers cannot be entirely timed. Another problem is that both agencies cannot hold trains more than a minute or two due to timing and scheduling constraints farther down the line. In BART’s case the total scheduled dwell time at Millbrae is about two minutes (assuming the train is on time). While the dwell time (layover time) could be made longer, that would require an additional another train in the loop or cycle and at a capital cost of $3\text{M} per car, or $30\text{M} per train, this is not feasible. Thus there are technological and financial constraints that BART and Caltrain have had to deal with.

\textit{Impacts}

Caltrain has experienced four consecutive months of ridership increases. Since Caltrain’s new streamlined timetable took effect in June in conjunction with the start of Baby Bullet train service, Caltrain’s ridership has increased approximately 17 percent, totaling more than 31,000 average weekday riders for the month of September. It is, however, difficult to determine what contribution to this ridership increase is specifically due to Caltrain’s implementation of its schedule integration practices since other contemporaneous factors may have also contributed to Caltrain’s ridership increase. For example, ridership fell below the 30,000 mark in late 2001, a

\textsuperscript{47} Source: Caltrain website, \url{www.caltrain.com}
result of the Bay Area’s economic slump and post-9/11 job losses and so, it could be argued, it was inevitable that ridership would rebound at least somewhat independent of Caltrain’s schedule integration practice\textsuperscript{48}. Also, Caltrain has initiated its “Go Pass” pilot program, a customer service program to improve access to service and increase ridership. The program allows companies to purchase an annual pass for their full-time employees at a fixed rate intended to encourage employees to try transit. Nonetheless, Caltrain views its schedule integration practices as a success and as a major contributor to the ridership increases. Moreover, Caltrain’s revenues for September 2004 showed an increase of more than $200,000 over September 2003.

On the negative side as a result of schedule coordination, there has also been the creation of hubs offering the most desirable services and overcrowding has occurred at some of the parking facilities at these hubs.

BART has also experienced an increase in ridership, as measured by the growth in the number of total trips and the growth in the number of transfers at the Millbrae Intermodal station, before and after Baby Bullet service. There is a noted increase in the percentage of transfers since June 2004 when Baby Bullet service, and its enhanced schedule coordination with BART, began. In particular, comparing the four-month period from July to October 2003 with the same period in 2004, there has been a growth ranging from 14.3% to 25.6% in the total number of Millbrae trips; and a growth ranging from 30.2% to 60.7% in the number of transfers at the Millbrae station; Finally, there has also been growth in transfers as a percentage of all trips at Millbrae from approximately 13.6% to approximately 16.4%. Since the number of transfers is growing at a faster rate than the overall number of trips involving the Millbrae Intermodal station, one can conclude that the Baby Bullet service has brought additional riders to the BART system\textsuperscript{49}.

Despite the schedule coordination, customer complaints have actually increased because not all connections between the two modes have been smooth or reliable.

\textsuperscript{48} Source: Caltrain website (Ridership News); www.caltrain.com.
\textsuperscript{49} E-mail correspondence with Dean Leonard and Janice Lee of BART.
For the near term future beginning June 2004, BART plans closer coordination with Caltrain’s new Baby Bullet service at Millbrae to achieve optimum transfers. The agencies’ joint objective is to provide a seamless transfer between the two rail modes with minimal wait time for passengers.

6.4 Information Integration

This section describes one case of information integration.

6.4.1 San Francisco Bay Area

Introduction and Background

The San Francisco Bay Area consists of nine counties and 100 cities with 6.8 million people residing within its 7,000 square miles. There are over two dozen transit properties, seven of which are primary ones50 that together carry an average weekday ridership of about 1.5 million people. Its transportation network is diverse and multi-modal, traveled by single-occupancy vehicles, high-occupancy vehicles such as vanpools and buses, other motorized vehicles and bicycles, as well as light rail, rapid rail, commuter rail, cable cars, and ferries.

The Metropolitan Transportation Commission (MTC) is the transportation planning, coordinating and financing agency for the San Francisco Bay Area. Created by the State Legislature in 1970, MTC functions as both the regional transportation planning agency and as the region's metropolitan planning organization (MPO) for federal purposes. As such, it is responsible for the Regional Transportation Plan, a comprehensive blueprint for the development of mass transit, highway, airport, seaport, railroad, bicycle and pedestrian facilities. MTC also screens requests from local agencies for state and federal grants for transportation projects to determine their compatibility with the Plan.

Over the years, state and federal laws have given MTC an increasingly important role in financing Bay Area transportation improvements. Most significant at the federal level was the

50 BART, AC Transit, SamTrans, Santa Clara VTA, MUNI, Golden Gate Bridge, Highway, and Transportation District, and Caltrain.
1991 Intermodal Surface Transportation Efficiency Act (ISTEA), which increased the powers of MPOs like MTC to determine the mix of transportation projects best suited to meet their region’s needs. To foster consensus in the implementation of ISTEA and develop agreed-upon spending priorities, MTC created The Bay Area Partnership -- a consortium of local, state and federal agencies. With the cooperation of these partners, MTC administers federal funds -- such as those from the Surface Transportation Program and Congestion Mitigation and Air Quality Improvement program laid out in ISTEA -- to combat congestion and air pollution in the Bay Area.

MTC also administers state monies. Legislation passed in 1997 gives MTC and other regional transportation planning agencies increased decision-making authority over the selection of projects and allocation of funds for the State Transportation Improvement Program (STIP). Also in 1997, the State Legislature transferred to MTC the responsibility for administering the base $1 toll from the Bay Area's seven state-owned toll bridges. A new entity, the Bay Area Toll Authority (BATA) was created for this purpose.

With the authority over the Bay Area’s transportation purse strings has come the duty to oversee the efficiency and effectiveness of the region's transportation system. MTC monitors transit operators’ budgets, conducts performance audits and adopts a yearly productivity/transit coordination improvement program. MTC has also been empowered by the State of California, through Senate Bill (SB) 1474 in 1996 that supports service integration, to promote customer satisfaction and achieve a network of cost-effective regional services. There are, indeed, teeth in this piece of legislation. MTC has been directed to consolidate functions that will improve productivity and enhance service integration in “corridors of regional significance”. Moreover, MTC has the authority to withhold funds from those transit operators unwilling to cooperate with MTC in these efforts.

**History of the Bay Area’s Traveler Information System: Telephone and Internet**

Development of the Bay Area’s current integrated traveler information system began approximately twelve years ago as three separate proto-integrated efforts to provide various types of information to Bay Area transit users by means of the telephone and the then nascent
internet/World Wide Web. Progress has steadily moved toward a single integrated source of transit information the public can access by either telephone or the Internet by calling 511 or clicking on 511.org, respectively, which became operational in 2003.

Initial Integration Efforts
The first of these three efforts, TravInfo®, was developed under the authority of MTC as a comprehensive system to gather, organize and disseminate timely information on San Francisco Bay Area traffic and road conditions, public transit routes and schedules, carpooling, highway construction and road closures, van and taxi services for disabled travelers, park-and-ride facilities, and bikeways. Its purpose was to help motorists avoid congestion and to encourage the use of public transit and ridesharing services by giving Bay Area travelers easy access to information, enabling them to choose the most appropriate modes, times and routes to reach their destinations.

TravInfo® was selected for funding by the U.S. Department of Transportation as an Advanced Traveler Information System Field Operational Test (FOT) and its design and development began in 1992 and was completed in 1996. The FOT was conducted between September 1996 and September 1998; it was followed by another two-year period when TravInfo® remained in an “as-is” stasis mode as MTC solicited information from the public regarding their needs and desires. Finally, in September 2000 after a new TravInfo® systems manager was hired by MTC the transition to more permanent status began, followed by the shift of full operational responsibility to the new systems manager in November 2000 under a contract that runs through 2006.

Public access to TravInfo® was by means of the Traveler Advisory Telephone System (TATS) and has always been free of charge to users via a single phone number with any of the region’s five telephone area codes. Originally, the phone number was 817-1717, however, in 2003 the new 3-digit telephone number for traveler information — 511 — became operational in the Bay Area as an early part of a nationwide implementation of the 511 traveler information number in selected regions around the country. Originally, TravInfo® provided a direct link to over two
dozen Bay Area transit agencies in addition to providing other types of information such as traffic conditions, incident updates, construction and road closures, and ridesharing opportunities.

The second of these three efforts, a transit information website, — www.transitinfo.org — dates back to May 1994 when two UC Berkeley students began building a comprehensive Bay Area transit information resource and hosted this service on the World Wide Web. At that time, comprehensive, easily-accessible, region-wide transit information did not exist. Each transit agency published its own information for its own service area and none had a Web presence. At the time, this volunteer effort was called the Bay Area Transit Information Project. It was an independent endeavor without public funding at the time in which the first Web pages were hosted on a fellow student's donated Web server.

The students worked with individual transit agencies developing customized methods and tools for posting and updating schedule, route, fare and map data on the Internet. Transit agencies valued this new way of getting their service information out to the public and one by one signed on to the project. But as the site grew, the data collection and update process became too time-consuming for a volunteer effort. Transit agencies also began depending more and more on the Website as a valuable part of their customer information process. There were also raised expectations on the part of the public. These factors drove the Website's transition from a volunteer effort to a permanent feature of the Bay Area’s transit information system. In June 1996, MTC contracted with the students to continue their efforts and expand the information base to include all public transit services in the nine-county San Francisco Bay Area. As part of this next phase in the evolution of the Website, its URL changed in January 1997 to www.transitinfo.org to provide a more recognizable and permanent location. At approximately this time, the site was physically relocated to server space donated by the Bay Area Rapid Transit District. In February 1998, the site moved to a dedicated server located at MTC in Oakland. Since June 1998, the project has been funded by MTC.

The third of these three efforts, TakeTransit™, was originally part of a separate project, the Regional Transit Information System (RTIS), with the cooperation of the region’s transit

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agencies. MTC implemented this transit trip itinerary planning system that, given an origin and destination, would compute a transit itinerary connecting the two points. This system was originally developed primarily for the benefit of telephone information operators in the different transit agency call centers. In July 2001, MTC developed a Web interface to this regional transit trip planning system. This made it possible for anyone with Web access to generate transit trip itineraries on his or her own computer, much like telephone operators were able to do.

Integration Activities Mature and Merge
In November 2002, responsibility for maintaining and further developing www.transitinfo.org was handed over to MTC and its contractor, who also became responsible for designing, developing and implementing RTIS, under which the transit Website was subsumed.

In October 2003, the original Website became part of the 511 traveler information Web Portal. Through its RTIS project, MTC currently oversees all aspects of this Website. With the significant cooperation of Bay Area transit agencies, MTC also manages the process for entering and updating transit service information for the benefit of the transit riding public. In addition to the Web aspect of 511, 511 is also a toll-free telephone information number whose primary objective is to provide up-to-the-minute information on traffic conditions and incidents, details on public transportation routes and fares, instant carpool and vanpool referrals, and bicycling information. In December 2002, 511 replaced the former TravInfo seven-digit telephone number.

Thus the final merging of phone and Web service providing integrated information from all Bay Area’s transit agencies was complete with the consolidation of Bay Area transportation-related information into a one-stop source by either dialing 511 or clicking 511.org. This three-digit number provides up-to-the-minute information on traffic conditions and incidents, details on public transportation routes and fares, instant carpool and vanpool referrals, bicycling information and more.

By calling 511, a caller may obtain the following information:

- Public Transportation
o Agency Information: Routes, schedules, fares, service announcements, lost-and-found and customer service for more than 40 public transportation and paratransit providers.

o Commuter Incentives: Information about programs that provide financial incentives for commute alternatives, including the commuter tax benefit program and free services for commuters. Operator hours are Monday-Friday, 8am-5pm. A message service is available for after-hours questions.

o Airports: An operator provides information about public transportation, ground transportation, and shuttle services for SFO, Oakland, San Jose and Sacramento Airports.

o Paratransit: Information about services provided by 20 paratransit agencies for persons with disabilities or the elderly, including shuttle services, public transportation, and customer service.

- Traffic
  o Traffic Conditions: Current incidents and road closure information from the California Highway Patrol (CHP), Caltrans, and other transportation agencies.
  o Airports: Information about traffic conditions, ground transportation and parking options for SFO, Oakland, San Jose, and Sacramento Airports.
  o 511 Driving Times: Driving times for a specific route based on real-time traffic information.

- Carpooling and Vanpooling
  o Information on how to join a carpool or vanpool, information on rideshare incentives, tax benefits, commuter checks, park-and-ride lots, and rules about diamond/HOV lanes (express lanes on freeways). Operator hours are Monday-Friday, 8am-5pm, with a service available for after-hours questions.

- Bicycling
  o Operators can provide answers to bicycling questions, including how to get bike maps, tips for taking a bike on transit and across Bay Area bridges, and how to get in touch with local bicycling organizations. Operator hours are Monday-Friday, 8am-5pm, but a message service is available for after-hours questions.
By clicking on http://511.org/, a user may obtain the following information:

- **Transit**
  This on-line version of the transit information service at transit.511.org integrates route, schedule and fare information for all transit services in the Bay Area and features the 511 TakeTransit™ Trip Planner. This automated web-based tool assists in planning Bay Area transit trips. By typing in the starting and ending points, the Trip Planner will return the most efficient routes, including walking maps to and from transit. Other features include transit schedules and route maps, fare information, paratransit information for the elderly and disabled, and a customizable transit page defined by personal preference.

- **Traffic**
  The Traffic Page (traffic.511.org) includes features such as 511 Driving Times, which provides estimated driving times for specific routes based on real-time information. Additional features on the Traffic Page include Bay Area traffic maps and FasTrak™ information (Electronic Toll Collection on Bay Area’s bridges).

- **Rideshare**
  511’s new Rideshare Page (rideshare.511.org) makes it even easier to find information about alternatives to driving alone. The 511 Online Ridematching service can help in finding members for a carpool or vanpool. It also provides information on incentives for carpoolers and vanpoolers. The service is free, easy, and can provide instant information on starting a carpool and vanpool.

- **Bicycling**
  511’s Bicycling Page (bicycling.511.org) serves as a resource for bicycling commuters and recreational cyclists. The new site provides information, including safety tips, bike maps, tips for taking bikes on transit and across Bay Area bridges, information on local bicycling organizations, and announcements that affect the Bay Area’s bicycling community.

**Impacts**
The Metropolitan Transportation Commission has evaluated the impact of the telephone and online versions of the 511 traveler information service using as primary measures of
performance the number of people using the service and users’ level of satisfaction with the service. To date, there has been no assessment measuring the types of behavioral changes resulting from the use of the 511 service including no measurement of the impact 511 may have had on transit ridership. Such an assessment of behavioral changes resulting from using the 511 service must await follow-up investigations. Thus, the impacts that have thus far been measured focus on system development, appraisal, and refinement to assess user perceptions and obtain feedback including suggestions for system improvements.

MTC conducted a survey of users of the 511 telephone information service in 2004 to determine their level of satisfaction with the service and to compare with baseline 2003 survey results. Responses were collected from 1001 individuals during May and June of 2004. Callers to the 511 service were intercepted with an automated request to participate in the survey then transferred to a live operator who administered the survey interview. Key results are described below.

Overall Satisfaction with the 511 Telephone Service
The vast majority of respondents in 2004 reported that overall they were satisfied with the 511 service (70% ‘Very satisfied’, 22% ‘Somewhat satisfied’) as shown in Figure 6-6. In comparison to 2003 overall satisfaction with the 511 telephone service has improved. The proportion of users who are satisfied overall (‘Very satisfied’ or ‘Somewhat satisfied’) has remained fairly steady at 91 percent in 2003 and 92 percent in 2004. However, the proportion of respondents who indicated being ‘Very Satisfied’ with the 511 service has significantly increased from 62 percent in 2003 to 70 percent in 2004 (16, 17).
Of the 1001 in the sample, 388 requested information on public transportation. In this subsample, 65.1% and 21.0% were either “very satisfied” or “somewhat satisfied” with the service. For 2003, these same categories garnered 54.2% and 28.3%, respectively whereas the sample size was 354.

In terms of improvements to the 511 phone service, two-thirds of respondents could not identify anything that they thought was missing from the 511 service. Some specific things that a small proportion of respondents indicated were missing from the service include ‘More detailed information’ (5%), ‘More live operators/extended hours of service’ (4%), and ‘Expand coverage area’ (4%). Relative to the likelihood of calling 511 again, in 2004 the vast majority of respondents (93%) said that there are ‘Very likely’ to call 511 again (Figure 6-7). This is significantly higher than in 2003 when 87 percent of respondents said that they were ‘Very likely’ to call 511 again.
The feature that contributes most to a rating of satisfaction for public transportation mode callers is ‘Accuracy of public transportation information received’. To the extent that MTC wishes to enhance overall satisfaction among callers, the feature that ranked lowest and that needs improvement for public transportation mode callers is: ‘Hours of availability of transit service operators’.

In addition to user surveys with large sample sizes, focus groups have also been conducted, two each of current users and potential users of the 511 telephone service in two different parts of the Bay Area (San Francisco and the East Bay). All focus group participants were asked about their general perceptions of the 511 telephone service. Of particular interest and relevance to our project is the fact that participants in both the ‘Current Users’ groups expressed the view that they would like the service to be more integrated, i.e., participants would like to be able to direct all of their inquiries to one operator who can provide them with information for all the different transportation options in the Bay Area.
Current users and potential users were also asked whether they liked having a one-stop source for all traveler information, or if having all information in one place was confusing or overwhelming. Both types of focus group participants reported that they liked having access to all travel information through one source for all Bay Area traveler information. This one-stop shopping feature is another indicator of the value of information integration (18).

Focus groups have also been conducted examining the 511 Transit website, with an emphasis on its design, ease-of-use, navigation, and ability to meet the information needs of users especially the transit trip planner and information on schedules, fares, and routes. The findings from these focus groups suggest that the main benefit of the 511.org homepage is perceived to lie in its very easy-to-remember address. Moreover, for savvy and experienced users of the 511 Transit website, navigating the 511 Transit website proved fairly simple and straightforward, even though they see room for improvement; however, for somewhat older and less web savvy users with less experience using the 511 Transit website, the website was harder to use especially to execute more complex tasks. Given the broad base of users of transit information in the Bay Area, it is necessary to ensure that the site is relatively easy to use in order to cater to each of these two groups.

Participants generally like the fact that the Trip Planner is a predominant feature on the main page. The website is perceived to contain very useful information, including the trip planner, schedules, fares, and route maps; however the manner by which the information is organized and the format by which information is displayed on the 511 Transit homepage is confusing and leaves ample room for improvement. Reasons for this include the fact that there is duplicate information, links on both left and right sides of the screen, terms that are not always self-explanatory and too many images and graphics. The most important improvements to the 511 Transit website may be summarized simply by more readily available links, fewer clicks and fewer graphics (19).

6.5 Special Events / Emergency Conditions Integration

This section describes one case of special events / emergency conditions integration.
6.5.1 Washington, D.C. Metropolitan Area / National Capital Region

Regional Incident Communication and Coordination System (RICCS)

The focus of this case study into special event/emergency conditions integration practices is on the Regional Incident Communication and Coordination System (RICCS) in the domain of interagency planning and coordination for unexpected emergency conditions (15). Immediately following the events of September 11, 2001, a Task Force on Homeland Security and Emergency Preparedness for the National Capital Region — consisting of multiple jurisdictions in the District of Columbia, and in the States of Virginia and Maryland — was formed under the auspices of the Metropolitan Washington Council of Governments (MWCOG), the metropolitan planning organization in the Washington, D.C. area. MWCOG’s charge was to create a regional emergency response plan.

While the National Capital Region’s jurisdictions have had emergency coordination policies, practices, and procedures, such as mutual aid agreements, in place long before September 11, 2001, these events and the subsequent anthrax attacks in the metropolitan Washington, D.C. area made it clear that a regional coordination plan with new policies, protocols, and procedures to improve coordination and communication in anticipation of potential future regional emergencies was needed. The National Capital Region was selected as a case study because of its unique position as the nation’s capital and seat of the U.S. government, one of the primary targets of the terrorist attacks of September 11, 2001 and a likely target for similar attacks in the future.

Under direction from MWCOG, the Regional Emergency Coordination Plan (RECP) was developed together with federal, state, and private sector partners. RECP is an all-hazards emergency response plan that facilitates coordination and communications for major emergencies and disasters affecting the National Capital Region. The RECP is based on the Federal Response Plan used by the Federal Emergency Management Agency and identifies 15 regional emergency support functional areas that may be needed during a regional emergency. These 15 areas allow for organizing information during a regional emergency into definable areas using common terminology.
When an incident occurs in a member jurisdiction, the local Emergency Communication Center assesses the event to decide whether to request regional notification through RICCS, which is a 24-hour, seven day-of-week communications capability that became operational in the spring of 2002. On September 11, 2001 it took ten hours to arrange a teleconference among regional leaders. The goal with RICCS is to reduce this time to 30 minutes. The RICCS will reach key decision makers and representatives of the corresponding emergency support functions by means of landline phone, cell phone, two-way radios, pagers, e-mail, PDAs, conferencing calling, secure Web sites, wireless communication, or other means as necessary and available. RICCS’s primary mission is to

- Facilitate communication among governmental decision-makers on a real-time basis during regional emergencies
- Coordinating decision-making regarding regional emergencies including closings, early release of employees, evacuation, re-openings, transportation decisions, and health response.
- Coordinating information messages to other levels of government, the media, the public, and private and non-profit organizations.

Enabled by RECP, use of RICCS assists local governments and facilitates their working together for a more coordinated and integrated response to regional emergencies. The first responders to any emergency are always expected to be local police, firefighters, or other emergency service personnel. RICCS provides a mechanism for member jurisdictions to collaborate in planning, communicating, sharing information, and coordinating activities before, during, and after a regional incident or emergency.

Regional events warranting use of RICCS include deliberate acts, accidents, threats, as well as forecasted events such as snowstorms and droughts. Initiation of communication by means of RICCS is based on the following criteria:

- Weapon of mass destruction employed
- Terrorism event
- Hazardous materials event
- Severe weather incident
- Mutual aid required
- Multiple jurisdictions affected
- Significant impact on transportation system
- Significant impact on major employment center
- Major impact on infrastructure

The system has been used on several occasions to notify local officials of such events as a demonstration in downtown Washington, D.C. and the October 2002 sniper incidents. For example, RICCS allowed regional school systems to coordinate with one another regarding closure policies during the sniper events.

The RICCS system is hosted on an interim basis by the D.C. Emergency Management Agency's Emergency Communications Center, at least for notification and conferencing calls. At some point, two more RICCS sites will be established, one each in Maryland and Virginia.

**Impacts**

The system has been used several times since it became operational. Incidents must be regionally broad to be handled through RICCS. In addition to speeding up communications with critical agencies, RICCS provides benefits by identifying whom to contact and how through its Website. This also reduces the chance of not sending the information to the appropriate individuals and/or organizations. Moreover, it helps train agencies to think in terms of regional needs rather than just local or individual agency needs.

**7.0 LESSONS DRAWN AND GUIDING PRINCIPLES**

Survey participants were asked to describe the key lessons their agency drew from its experience to date with service integration practices. These lessons, culled from survey responses, are described in original form in Appendix H: Summary of Specific Survey Results. These lessons learned have been synthesized and formulated as guiding principles for use by transit agencies
and regional transportation organizations who may consider implementing service integration practices in the future. These principles also serve as important reminders to prospective implementers of transit service integration practices of common pitfalls that all too often occur. However, using these principles as an integral part of an agency’s approach can help overcome certain barriers it is likely to encounter and help foster successful integration practices.

Guiding Principles

The following are general principles that apply to various types of integration:

1. All organizations and individuals need to be committed to and invested in coordination, communication, and cooperation to achieve successful implementation of service integration practice(s); nevertheless, institutional barriers and turf protection can be anticipated to pose challenges and there will still be circumstances when regional objectives take a backseat to greater intra-agency priorities.

2. Having an institutional champion as a lead stakeholder to provide necessary direction will assist the service integration implementation process.

3. Developing contingency plans to address unexpected exogenous events is essential in the service integration implementation process.

4. As the number of participating organizations grows, including public transit agencies and regional planning organizations, the potential exists for greater customer benefits; however, these additional benefits must be traded-off against the growth in complexity of institutional issues.

5. Incremental and small, though successful, steps toward integration appear to be favored over the do-everything-at-once approach.

6. Other public transit agencies who have implemented candidate service integration practices in similar environments should be consulted to determine how effective their practices have been and to identify likely challenges.

The following are lessons and principles that apply to specific types of integration practices:

Infrastructure

7. Formal written agreements should be negotiated to guide integration of services and facilities. These agreements also need to address management of day-to-day operations,
including processes for making immediate decisions regarding matters that are not explicitly covered in the agreement (possibly with informal consultations).

8. Sharing of a facility, such as an intermodal passenger transfer center is easier to implement when the facility owner and/or operator has some leverage over participating transit operators, e.g., the owner/operator is the parent agency of participants.

Schedule
9. Informed decision-making requires a true picture of the costs associated with schedule coordination. A system analysis should therefore be conducted to identify the tradeoffs between providing coordinated schedules (or timed-transfers) and vehicle/crew productivity.

Information
10. The resources needed to provide accurate and timely customer information must be estimated carefully and realistically; under-budgeting resources could lead to delivery of inaccurate information, which will in turn result in customer dissatisfaction (the opposite of the intended effect).

Fare Payment
11. Adequate training is very important when a new technology such as smartcards is introduced as part of fare integration.

12. When considering a new fare technology, explore alternatives to using a proprietary technology controlled by a single vendor.

13. In an integrated environment, it is more difficult for any single agency to regulate fare media discount policies. That is, agencies are unable to establish their own criteria for passengers to qualify for discounted fare media, and therefore are less able to have their fare structure match their political needs. Fare integration will require compromise among agencies’ varying fare policy objectives.

14. Revenue neutrality and costs are key concerns for many transit agencies introducing integrated fare payment. Lower revenue and new costs can be offset by decreases in other costs, e.g., cash handling, and mitigated through increased ridership.

15. Agencies can be induced to participate in regional fare integration using “carrots”, i.e., incentives; even in cases where there is a regional or metropolitan authority, fare integration does not require the regional entity to be empowered with a “stick”, i.e.,
punitive action, e.g., withholding of state funding from transit operators unwilling to cooperate in regional service integration efforts. In neither the Puget Sound area of Washington State nor the Washington D.C. metropolitan area, did any regional agency need to wield a “stick” in order to achieve regional fare integration.

Special Events/Emergency Conditions

16. Putting emergency condition integration mechanisms into place is not sufficient without appropriate testing. Dry-runs are recommended to hone skills needed in a true emergency.

8.0 CONCLUSIONS

There is certainly variation around the country in the extent of involvement in transit service integration practices. Among the most active regions are the Puget Sound area of Washington State, metropolitan Washington D.C., the San Francisco Bay Area, and the Tri-State area of New York-New Jersey-Connecticut. Having a regional transit agency champion of integration has certainly been beneficial; however it is not a prerequisite to successful implementation.

Overall, customers appear satisfied with transit service integration practices and there is a strong sense among transit managers that customer level of service has improved and ridership has increased as a result of these practices. It has, however, due to exogenous factors, been difficult to attribute specific benefits to particular integration practices. To be able to objectively and quantitatively evaluate the effectiveness of a particular service integration practice will require better data. This is an area where transit agencies must take a pro-active role. The measures of performance and data requirements will vary by service integration type.
REFERENCES


APPENDIX A: TRANSIT AGENCIES SELECTED AS INITIAL CANDIDATES TO RECEIVE OVERVIEW SURVEY

ATLANTA
- Metropolitan Atlanta Rapid Transit Authority (MARTA)
- Gwinnett County Transit

CHICAGOLAND
- Chicago Transit Authority (CTA)
- Pace Bus
- Metra

SOUTHWESTERN CONNECTICUT
- Greater Bridgeport Transit Authority (GBTA)
- Norwalk Transit District
- Milford Transit District
- Greater New Haven Transit District
- Connecticut Transit – Stamford Division
- Housatonic Area Regional Transit (HART)
- Northeast Transport
- Greater Waterbury Transit District

DALLAS-FORT WORTH
- Dallas Area Rapid Transit Authority (DART)
- Fort Worth Transportation Authority (The T)

FARGO-MOORHEAD
- Fargo Area Transit
- Moorhead Area Transit

LOS ANGELES (METRO AREA)
- Los Angeles County Metropolitan Transportation Authority (LACMTA)
- Los Angeles DOT DASH
- Santa Monica Big Blue Bus
- Culver City Bus
- Norwalk Transit
- Foothill Transit

NEW YORK CITY METRO AREA/NORTHERN NEW JERSEY/CONNECTICUT
- Greater Bridgeport Transit Authority
- Norwalk Transit District
- Milford Transit District
- Greater New Haven Transit District
• Connecticut Transit – Stamford Division
• Housatonic Area Regional Transit (HART)
• Northeast Transport
• Greater Waterbury Transit District
• Transport of Rockland
• Putnam County Transit
• Westchester County Department of Transportation
• Dutchess County Division of Mass Transportation
• MTA Long Island Bus
• Long Island Railroad (LIRR)
• MTA MetroNorth Railroad
• New York City Transit Authority (NYCTA)
• Port Authority Trans-Hudson Corporation (PATH)
• New Jersey Transit

PHILADELPHIA – SOUTHERN NEW JERSEY
• Southeastern Pennsylvania Transportation Authority (SEPTA)
• Port Authority Transportation Corporation (PATCO)
• New Jersey Transit
• Delaware Transit Corporation (DART-First State)

PORTLAND (OREGON)
• County Metropolitan Transportation District of Oregon (Tri-Met)
• Clark County Public Transportation Benefit Area Authority (C-TRAN)

QUAD CITIES (IOWA/ILLINOIS)
• Davenport Citibus
• Bettendorf Transit System
• MetroLINK – Rock Island Metropolitan Mass Transit District

RALEIGH-DURHAM (RESEARCH TRIANGLE)
• Durham Area Transit Authority
• Capital Area Transit
• Chapel Hill Transit
• Triangle Transit Authority (TTA)

SACRAMENTO
• Sacramento Regional Transit District
• Yolo County Transportation District
• Yuba-Sutter Transit
• Roseville Transit
• El Dorado Transit
• South County Transit/Link
• Placer County Transit
SALT LAKE CITY
- Utah Transit Authority

SAN DIEGO
- San Diego County Transit
- San Diego Trolley
- National City Transit
- Chula Vista Transit

SAN FRANCISCO BAY AREA
- Bay Area Rapid Transit (BART)
- Alameda-Contra Costa Transit District (AC Transit)
- San Francisco Municipal Railway (MUNI)
- Caltrain
- San Mateo County Transit District (SamTrans)
- Santa Clara Valley Transit Authority (VTA)
- Altamont Commuter Express (ACE)
- Golden Gate Bridge, Highway and Transportation District (GGBH&TD)

SEATTLE/PUGET SOUND
- Sound Transit
- Pierce Transit
- King County Metro Transit
- City of Seattle – Monorail Transit
- Everett Transit
- Snohomish County Transportation Benefit Corporation (Community Transit)

SOUTH FLORIDA
- Miami-Dade Transit Agency
- Tri-County Commuter Rail Authority (Tri-Rail)
- Broward County Mass Transit Division
- Palm Tran, Inc.

TWIN CITIES
- Minnesota Valley Transit Authority (MVTA)
- Bloomington Bus Service (BE Line)
- Plymouth Transit
- Anoka County Transit
- Maple Grove Transit
- Metro Transit

VENTURA COUNTY/SOUTHERN CALIFORNIA
- Ventura Intercity Service Transit Authority (VISTA)
- South Coast Area Transit (SCAT)
- Camarillo Area Transit
- Moorpark City Transit
- Thousand Oaks Transit

WASHINGTON, DC (METRO AREA)
- Washington Metropolitan Area Transit Authority (WMATA)
- Montgomery County Department of Public Works (Ride-On)
- Prince Georges County Department of Public Works (The Bus)
- City of Fairfax CUE Bus
- Fairfax Connector Bus System
- City of Alexandria – DASH Bus
- Virginia Railway Express (VRE)
- Maryland Mass Transit Administration (MTA & MARC)
- Loudon County Department of Transportation
- Potomac and Rappahannock Transportation Corporation (PRTC)
APPENDIX B: SURVEY ON TRANSIT SERVICE INTEGRATION PRACTICES

Dear Colleague:

This survey is being conducted as part of a research project led by the California PATH Program at UC-Berkeley and sponsored by the California Department of Transportation. The purpose is to better understand inter-agency and inter-modal service integration practices and to quantify the resulting benefits.

Please take a few moments to check each of the following transit service integration practices that your agency has implemented. For each item checked, please provide the name of someone in your agency whom we can contact for more information.

Name of Transit Agency: ________________________________________________

Contact information for person completing this form:
Name: ___________________________ Title: _______________________________
Phone number: __________________ Email address: _________________________

**Infrastructure integration** – Coordination or joint operation of routes or establishment of passenger facilities for transfers between transit providers or transit modes, etc.

When implemented: ____________ Brief description: ___________________________

_______________________________________________________________

Contact name: ___________________________ Title: _________________________
Phone number: __________________ Email address: _________________________

**Fare payment integration** – Regional interagency fare card, passes or transfer agreements, etc.

When implemented: ____________ Brief description: ___________________________

_______________________________________________________________

Contact name: ___________________________ Title: _________________________
Phone number: __________________ Email address: _________________________
**Schedule integration** – Coordination and synchronization of arrival and departure times of different modes or providers, etc.

<table>
<thead>
<tr>
<th>When implemented:</th>
<th>Brief description:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Contact name: ___________________________  Title: ___________________________

Phone number: __________________________ Email address: _______________________

**Information integration** – A single source for multi-provider customer information about schedules, routes, trip itineraries, fares and actual arrival times, etc.

<table>
<thead>
<tr>
<th>When implemented:</th>
<th>Brief description:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Contact name: ___________________________  Title: ___________________________

Phone number: __________________________ Email address: _______________________

**Special event/emergency conditions integration** – Coordinated interagency policies and planning in response to planned special events or emergencies, etc.

<table>
<thead>
<tr>
<th>When implemented:</th>
<th>Brief description:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Contact name: ___________________________  Title: ___________________________

Phone number: __________________________ Email address: _______________________

Thank you very much for your assistance.

Please return your completed survey in the enclosed self-addressed stamped envelope.
APPENDIX C: SURVEY ON TRANSIT INFRASTRUCTURE INTEGRATION PRACTICES

This survey is being conducted as part of a research project led by the California PATH Program at UC- Berkeley and sponsored by the California Department of Transportation. The purpose is to better understand interagency and intermodal infrastructure integration policies and practices and to quantify the benefits that have been obtained from their deployment. Your agency has designated you as a person we could contact for detailed information regarding infrastructure integration policies.

Name of Transit Agency:
Person completing this form:
Contact phone number/email:

Section I: Current Practices

1. Please check off which of the following infrastructure integration practices your agency has already implemented and provide a brief description of the practice or project. Please also list the YEAR each of these projects was implemented. If your agency is currently in the process of implementing infrastructure integration, please skip to Part II of the survey.

Practice
☐ A. Shared interagency passenger facilities (e.g. stations, stops)
☐ B. Other shared interagency facilities (e.g. maintenance, communications, control center)
☐ C. Intermodal passenger facilities, single agency
☐ D. Interagency intermodal passenger facilities
☐ E. Interagency coordinated route restructuring or service planning
☐ F. Interagency (joint) operation of routes/services
☐ G. Interagency (joint) capital purchases/procurement of equipment
☐ H. Other

For this section’s subsequent questions, please provide the requested information where applicable.
2. Why did your agency begin implementing infrastructure integration?

3. If your agency is engaged in interagency infrastructure integration practices, who introduced them?
   - A. Your agency
   - B. Another transit agency (please list)
   - C. A regional planning agency (please list)
   - D. A state agency (please list)
   - E. Another agency (please list)

4. If your agency is engaged in interagency infrastructure integration practices, which other agencies are participating in them?

5. What were your agency’s objectives for implementation of infrastructure integration?

6. How effective have your organization’s infrastructure integration practices been in meeting their objectives? (Check only one number with “1” representing “not effective at all” and “5” representing “completely effective”.)

<table>
<thead>
<tr>
<th>Practice</th>
<th>Degree of Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Shared interagency passenger facilities (e.g. stations, stops)</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>B. Other shared interagency facilities (e.g. maintenance, communications, control center)</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>C. Intermodal passenger facilities, single agency</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>D. Interagency intermodal passenger facilities</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>E. Interagency coordinated route restructuring or service planning</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>F. Interagency (joint) operation of routes/services</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>G. Interagency (joint) capital purchases/equipment procurement</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>H. Other</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

7. What positive impacts (e.g., increased ridership, decreased customer complaints, increased revenue, lower costs, increased number of transfers, etc.) has infrastructure integration had on the delivery of public transportation services? Also please indicate whether or not your agency has data available that quantitatively measures these specific impacts.
8. What negative impacts (e.g., decreased ridership, increased customer complaints, reduced revenue, higher costs, etc.) has infrastructure integration had on the delivery of public transportation services? Also please indicate whether or not your agency has data available that quantitatively measures these specific impacts.

9. What were the major barriers (e.g., financial, institutional, regulatory, jurisdictional, technological) to implementation that arose?

10. What are the key lessons your agency has learned from its experience to date with infrastructure integration?

Section II

To what extent are you familiar with the implementation of infrastructure integration practices by other transit agencies in your region? If so, which ones?

Have you declined to participate in interagency infrastructure integration programs in your region? If so, why is your agency not participating in these programs?

Are there agencies in your region that have declined to participate in your agency’s interagency infrastructure integration programs? If so, please name them. If you are aware of specific reasons why these agencies chose not to participate, please list them.
Section III  Future Plans

Is your agency currently involved in a project to implement infrastructure integration in the near future? Please provide a brief summary of these types of infrastructure integration:

a. Types of infrastructure integration practices and planned timeframe for implementation

b. What are your agency’s objectives in implementing such practices?

c. Will these practices involve the use of intelligent transportation systems technologies (in addition to any described in Section 1)? If so, which technologies?

Thank you very much for your assistance.

Please email your completed survey to:
Mark Miller          mamiller@path.berkeley.edu
APPENDIX D: SURVEY ON TRANSIT FARE PAYMENT INTEGRATION PRACTICES

This survey is being conducted as part of a research project led by the California PATH Program at UC- Berkeley and sponsored by the California Department of Transportation. The purpose is to better understand interagency and intermodal fare payment integration policies and practices and to quantify the benefits that have been obtained from their deployment. Your agency has designated you as a person we could contact for detailed information regarding fare integration policies.

Name of Transit Agency:
Person completing this form:
Contact phone number/email:

Section I: Current Practices

1. Please check off which of the following fare integration practices your agency has already implemented and provide a brief description of the practice or project. Please also list the YEAR each of these projects was implemented. If your agency is currently in the process of implementing fare payment integration, please skip to Part II of the survey.

Practice
☐ A. Interagency free or reduced price transfers
☐ B. Interagency (or regional) stored value farecards or smartcards
☐ C. Interagency (or regional) passes
☐ D. Intra-agency free or reduced price intermodal transfers
☐ E. Intra-agency stored value intermodal farecards or smartcards
☐ F. Intra-agency intermodal passes
☐ G. Other

For this section’s subsequent questions, please provide the requested information where applicable.
2. Why did your agency begin implementing fare payment integration?

3. If your agency is engaged in regional fare payment integration practices, who introduced them?
   - A. Your agency
   - B. Another transit agency (please list)
   - C. A regional planning agency (please list)
   - D. A state agency (please list)
   - E. Another agency (please list)

4. If your agency is engaged in regional fare payment integration practices, which other agencies are participating in them?

5. What were your agency’s objectives for implementation of fare payment integration?

6. How effective have your organization’s fare payment integration practices been in meeting their objectives? (Check only one number with “1” representing “least effective” or “not at all” and “5” representing “completely effective”.)

<table>
<thead>
<tr>
<th>Practice</th>
<th>Degree of Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Interagency free/reduced price transfers</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>B. Interagency (or regional) stored value farecards or smartcards</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>C. Interagency (or regional) passes</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>D. Intra-agency free or reduced price intermodal transfers</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>E. Intra-agency intermodal stored value farecards or smartcards</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>F. Intra-agency intermodal passes</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>G. Other</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

7. What positive impacts (e.g., increased ridership, decreased customer complaints, increased revenue, lower costs, wide public acceptance of new fare media, etc.) has fare integration had on the delivery of public transportation services? Also please indicate whether or not your agency has data available that quantitatively measures these specific impacts.

8. What negative impacts (e.g., decreased ridership, increased customer complaints, decreased revenue, higher costs, limited public acceptance of new fare media, etc.) has fare integration had on the delivery of public transportation services? Also please
indicate whether or not your agency has data available that quantitatively measures these specific impacts.

9. What were the major barriers (e.g. regulatory, financial, institutional, jurisdictional, technological) to implementation that arose?

10. What are the key lessons your agency has learned from its experience to date with fare integration?

Section II

Are there other agencies in your region implementing regional fare payment integration programs in which your agency is not participating? If so, why is your agency not participating in these programs?

Are there agencies in your region that have opted not to participate in the regional fare integration program? If so, please name them. If you are aware of specific reasons why these agencies are not participating, please list them.

Section III  Future Plans

Is your agency currently involved in a project to implement fare payment integration in the near future? Please provide a brief summary of these types of fare payment integration:

a. Types of fare payment integration practices and planned timeframe for implementation

b. What are your agency’s objectives in implementing such practices?
c. Will these practices involve the use of intelligent transportation systems technologies (in addition to any described in Section 1)? If so, which technologies?

*Thank you very much for your assistance.*

Please email your completed survey to:
Mark Miller  mamiller@path.berkeley.edu
APPENDIX E: SURVEY ON TRANSIT SCHEDULE INTEGRATION PRACTICES

This survey is being conducted as part of a research project led by the California PATH Program at UC- Berkeley and sponsored by the California Department of Transportation. The purpose is to better understand interagency and intermodal schedule integration policies and practices and to quantify the benefits that have been obtained from their deployment. Your agency has designated you as a person we could contact for detailed information regarding schedule integration policies.

Name of Transit Agency:
Person completing this form:
Contact phone number/email:

Section I: Current Practices

1. Please check off which of the following schedule integration practices your agency has already implemented and provide a brief description of the practice or project. Please also list the YEAR each of these projects was implemented. If your agency is currently in the process of implementing schedule integration, please skip to Part II of the survey.

Practice
☐ A. Interagency schedule coordination (single mode or intermodal)
   ☐ 1. Schedule coordination
   ☐ 2. Timed transfers / pulse systems
   ☐ 3. Transfer connection protection

☐ B. Intermodal schedule coordination, single agency
   ☐ 1. Schedule coordination
   ☐ 2. Timed transfers / pulse systems
   ☐ 3. Transfer connection protection

☐ C. Other

For this section’s subsequent questions, please provide the requested information where applicable.
2. Why did your agency begin implementing schedule integration?

3. If your agency is engaged in interagency schedule integration practices, who introduced them?

☐ A. Your agency
☐ B. Another transit agency (please list)
☐ C. A regional planning agency (please list)
☐ D. A state agency (please list)
☐ E. Another agency (please list)

4. If your agency is engaged in interagency schedule integration practices, which other agencies are participating in them?

5. What were your agency’s objectives for implementation of schedule integration?

6. How effective have your organization’s schedule integration practices been in meeting their objectives? (Check only one number with “1” representing “least effective” or “not at all” and “5” representing “completely effective”.)

<table>
<thead>
<tr>
<th>Practice</th>
<th>Degree of Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Interagency schedule coordination, single mode</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>B. Schedule coordination among single mode, single agency</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>C. Intermodal interagency schedule coordination</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>D. Intermodal schedule coordination, single agency</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>E. Other</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

7. What positive impacts (e.g., increased ridership, decreased customer complaints, increased revenue, lower costs, reduction in transfer wait time, etc.) has schedule integration had on the delivery of public transportation services? Also please indicate whether or not your agency has data available that quantitatively measures these specific impacts.
8. What negative impacts (e.g., decreased ridership, increased customer complaints, reduced revenue, higher costs, etc.) has schedule integration had on the delivery of public transportation services? Also please indicate whether or not your agency has data available that quantitatively measures these specific impacts.

9. What were the major barriers (e.g. technological, financial, jurisdictional, institutional, regulatory) to implementation that arose?

10. What are the key lessons your agency has learned from its experience to date with schedule integration?

Section II

To what extent are you familiar with the implementation of schedule integration practices by other transit agencies in your region? If so, which ones?

Has your agency declined to participate in interagency schedule integration programs in your region? If so, why?

Are there agencies in your region that have declined to participate in your agency’s interagency schedule integration practices? If so, please name them. If you are aware of specific reasons why these agencies chose not to participate, please list them.

Section III Future Plans

Is your agency currently involved in a project to implement schedule integration in the near future? Please provide a brief summary of these types of schedule payment integration:

a. Types of schedule integration practices and planned timeframe for implementation

b. What are your agency’s objectives in implementing such practices?
c. Will these practices involve the use of intelligent transportation systems technologies (in addition to any described in Section 1)? If so, which technologies?

Thank you very much for your assistance.

Please email your completed survey to:
Mark Miller mamiller@path.berkeley.edu
APPENDIX F: SURVEY ON TRANSIT INFORMATION INTEGRATION PRACTICES

This survey is being conducted as part of a research project led by the California PATH Program at UC- Berkeley and sponsored by the California Department of Transportation. The purpose is to better understand interagency and intermodal information integration policies and practices and to quantify the benefits that have been obtained from their deployment. Your agency has designated you as a person we could contact for detailed information regarding information integration policies.

Name of Transit Agency:
Person completing this form:
Contact phone number/email:

Section I: Current Practices

1. Please check off which of the following information integration practices your agency has already implemented and provide a brief description of the practice or project. Please also list the YEAR each of these projects was implemented. If your agency is currently in the process of implementing information integration, please skip to Part II of the survey.

Practice
☐ A. Intra-agency intermodal transit trip itinerary planning
☐ B. Interagency transit trip itinerary planning
☐ C. Intra-agency real-time information dissemination
☐ D. Interagency real-time information dissemination
☐ E. Interagency (joint) dissemination of other user information (e.g. maps, schedules)
☐ F. Interagency (joint) marketing and advertising
☐ G. Interagency sharing of operational and planning data
☐ H. Other

For this section’s subsequent questions, please provide the requested information where applicable.
2. Why did your agency begin implementing information integration?

3. If your agency is engaged in interagency information integration practices, who introduced them?
   - A. Your agency
   - B. Another transit agency (please list)
   - C. A regional planning agency (please list)
   - D. A state agency (please list)
   - E. Another agency (please list)

4. If your agency is engaged in interagency information integration practices, which other agencies are participating in them?

5. What were your agency’s objectives for implementation of information integration?

6. How effective have your organization’s implemented information integration practices been in meeting their objectives? (Check only one number with “1” representing “not effective at all” and “5” representing “completely effective”.)

<table>
<thead>
<tr>
<th>Practice</th>
<th>Degree of Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Intra-agency intermodal transit trip itinerary planning</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>B. Interagency transit trip itinerary planning</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>C. Intra-agency real-time information dissemination</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>D. Interagency real-time information dissemination</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>E. Interagency (joint) dissemination of other user information (e.g., maps, schedules)</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>F. Interagency (joint) marketing and advertising</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>G. Interagency sharing of operational and planning data</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>H. Other</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

7. What positive impacts (e.g., increased ridership, decreased customer complaints, increased revenue, lower costs, more inquiries served, etc.) has information integration had on the delivery of public transportation services? Also please indicate whether or not your agency has data available that quantitatively measures these specific impacts.
8. What negative impacts (e.g., decreased ridership, increased customer complaints, reduced revenue, higher costs, less inquiries served, etc.) has information integration had on the delivery of public transportation services? Also please indicate whether or not your agency has data available that quantitatively measures these specific impacts.

9. What were the major barriers (e.g. regulatory, institutional, financial, technological, jurisdictional) to implementation that arose?

10. What are the key lessons your agency has learned from its experience to date with information integration?

Section II

To what extent are you familiar with the implementation of information integration practices by other transit agencies in your region? If so, which ones?

Has your agency declined to participate in interagency information integration programs in your region? If so, why is your agency not participating in these programs?

Are there agencies in your region that have declined to participate in your interagency information integration programs? If so, please name them. If you are aware of specific reasons why these agencies chose not to participate, please list them.
Section III  Future Plans

Is your agency currently involved in a project to implement information integration in the near future?  Please provide a brief summary of these types of information integration:

   a. Types of information integration practices and planned timeframe for implementation

   b. What are your agency’s objectives in implementing such practices?

   c. Will these practices involve the use of intelligent transportation systems technologies (in addition to any described in Section 1)? If so, which technologies?

Thank you very much for your assistance.

Please email your completed survey to:
   Mark Miller  mamiller@path.berkeley.edu
APPENDIX G: SURVEY ON TRANSIT SPECIAL EVENTS / EMERGENCY CONDITIONS INTEGRATION PRACTICES

This survey is being conducted as part of a research project led by the California PATH Program at UC- Berkeley and sponsored by the California Department of Transportation. The purpose is to better understand interagency special events/emergency conditions integration policies and practices and to quantify the benefits that have been obtained from their deployment. Your agency has designated you as a person we could contact for detailed information regarding special events/emergency conditions integration policies.

Name of Transit Agency:
Person completing this form:
Contact phone number/email:

Section I: Current Practices

1. Please check off which of the following special events / emergency conditions integration practices your agency has already implemented and provide a brief description of the practice or project. Please also list the YEAR each of these projects was implemented. If your agency is currently in the process of implementing special events/emergency conditions integration, please skip to Part II of the survey.

Practice
☐ A. Interagency (or regional) planning/coordination for expected special events
☐ B. Interagency (or regional) planning/coordination for expected emergency conditions
☐ C. Interagency (or regional) planning/coordination for unexpected special events
☐ D. Interagency (or regional) planning/coordination for unexpected emergency conditions
☐ E. Other

For this section’s subsequent questions, please provide the requested information where applicable.
2. Why did your agency begin implementing special events/emergency conditions integration?

3. If your agency is engaged in interagency special events/emergency conditions integration practices, who introduced them?
   - A. Your agency
   - B. Another transit agency (please list)
   - C. A regional planning agency (please list)
   - D. A state agency (please list)
   - E. Another agency (please list)

4. If your agency is engaged in interagency special events/emergency conditions integration practices, which other agencies are participating in them?

5. What were your agency’s objectives for implementation of special events/emergency conditions integration?

6. How effective have your organization’s special events/emergency conditions integration practices been in meeting their objectives? (Check only one number with “1” representing “least effective” or “not at all” and “5” representing “completely effective”.)

<table>
<thead>
<tr>
<th>Practice</th>
<th>Degree of Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Interagency (or regional) planning/coordination for expected special</td>
<td>1 □ 2 □ 3 □ 4 □ 5 □</td>
</tr>
<tr>
<td>events planning</td>
<td></td>
</tr>
<tr>
<td>B. Interagency (or regional) planning/coordination for expected emergency</td>
<td>1 □ 2 □ 3 □ 4 □ 5 □</td>
</tr>
<tr>
<td>conditions</td>
<td></td>
</tr>
<tr>
<td>C. Interagency (or regional) planning/coordination for unexpected special</td>
<td>1 □ 2 □ 3 □ 4 □ 5 □</td>
</tr>
<tr>
<td>events planning</td>
<td></td>
</tr>
<tr>
<td>D. Interagency (or regional) planning/coordination for unexpected emergency</td>
<td>1 □ 2 □ 3 □ 4 □ 5 □</td>
</tr>
<tr>
<td>conditions</td>
<td></td>
</tr>
<tr>
<td>E. Other</td>
<td>1 □ 2 □ 3 □ 4 □ 5 □</td>
</tr>
</tbody>
</table>

7. What positive impacts (e.g., increased ridership, decreased customer complaints, increased revenue, lower costs, enhanced public image, etc.) has special events/emergency conditions integration had on the delivery of public transportation
services? Also please indicate whether or not your agency has data available that quantitatively measures these specific impacts.

8. What negative impacts (e.g., decreased ridership, increased customer complaints, reduced revenue, higher costs, poorly executed plan, etc.) has special events/emergency conditions integration had on the delivery of public transportation services? Also please indicate whether or not your agency has data available that quantitatively measures these specific impacts.

9. What were the major barriers (e.g. regulatory, jurisdictional, institutional, financial, technological) to implementation that arose?

10. What are the key lessons your agency has learned from its experience to date with special events/emergency conditions integration?

Section II

To what extent are you familiar with the implementation of special events / emergency conditions integration practices by other transit agencies in your region? If so, which ones?

Has your agency declined to participate in interagency special events / emergency conditions integration programs in your region? If so, why is your agency not participating in these programs?

Are there agencies in your region that have declined to participate in your interagency special events / emergency conditions integration programs? If so, please name them. If you are aware of specific reasons why these agencies chose not to participate, please list them.
Section III Future Plans

Is your agency currently involved in a project to implement special events / emergency conditions integration in the near future? Please provide a brief summary of these types of special events / emergency conditions integration:

a. Types of special events/emergency conditions integration practices and planned timeframe for implementation

b. What are your agency’s objectives in implementing such practices?

c. Will these practices involve the use of intelligent transportation systems technologies (in addition to any described in Section 1)? If so, which technologies?

Thank you very much for your assistance.

Please email your completed survey to:
Mark Miller mamiller@path.berkeley.edu
APPENDIX H: SUMMARY OF INDIVIDUAL SURVEY RESULTS

Infrastructure Integration Practices

*Caltrain*
Caltrain, the commuter rail service operator on the peninsula region of the San Francisco Bay Area, identified a number of interagency passenger facilities (rail stations) all of which are intermodal in nature, as shown below:

<table>
<thead>
<tr>
<th>Facility</th>
<th>Shared with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millbrae</td>
<td>BART (rapid transit), San Francisco Airport</td>
</tr>
<tr>
<td>Mountain View</td>
<td>Valley Transit Authority (VTA) bus</td>
</tr>
<tr>
<td>Santa Clara</td>
<td>San Jose Airport</td>
</tr>
<tr>
<td>Redwood City</td>
<td>VTA bus, Stanford (University bus)</td>
</tr>
<tr>
<td>Palo Alto</td>
<td>VTA bus, Stanford (University bus)</td>
</tr>
<tr>
<td>San Jose Diridon</td>
<td>ACE (rail), Amtrak (rail)</td>
</tr>
</tbody>
</table>

Beside the above passenger facilities, CalTrain identified the joint procurement of ticket vending machines with VTA and the TransLink smartcard system for the entire Bay Area transit network.

Caltrain’s objectives were coordination and efficient movement of passengers. Caltrain generally rated the practices as effective. At Millbrae, Caltrain reported that some 1900 passengers transfer each day between Caltrain, BART and the San Francisco Airport. Caltrain also noted that another measure of the effect of integration was the need to increase the amount of parking at stations.

The only negative impact was the increased cost to agencies and to passengers associated with the facilities.

Implementation involved overcoming barriers in the funding of the projects, institutional rule and regulations including union and jurisdictional issues. The agency learned that intense coordination was required including the coordination of schedules.
No future plans for further integration were identified.

Washington Metropolitan Area Transit Authority (WMATA)

WMATA identified a large number of interagency passenger facilities which are intermodal in nature. In fact, besides those major facilities listed below, it was noted that most Metrorail rapid transit stations have bus bays for multiple operators including Metrobus operated by WMATA and other local bus services.

<table>
<thead>
<tr>
<th>Facility</th>
<th>Shared with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union Station</td>
<td>Amtrak (intercity rail), MARC (commuter rail), Virginia Railway Express (VRE) (commuter rail), tour buses, Metrobus and Metrorail</td>
</tr>
<tr>
<td>King Street</td>
<td>Amtrak (intercity rail), VRE (commuter rail), DASH (bus), Metrobus and Metrorail</td>
</tr>
<tr>
<td>New Carrollton</td>
<td>Amtrak (intercity rail), MARC (commuter rail), Metrobus and Metrorail</td>
</tr>
<tr>
<td>Pentagon</td>
<td>Metrobus, Metrorail, other bus operators</td>
</tr>
<tr>
<td>Franconia-Springfield</td>
<td>Metrobus, Metrorail, VRE (commuter rail)</td>
</tr>
<tr>
<td>Silver Spring</td>
<td>Metrobus, Metrorail, MARC (commuter rail), MTA Bus (commuter bus), Ride On (bus)</td>
</tr>
<tr>
<td>West Falls Church</td>
<td>Metrorail, Metrobus, Washington Flyer (airport bus), Fairfax Connector (bus), GEORGE (bus)</td>
</tr>
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</table>

WMATA also noted that it provide bicycle paths and lockers and pedestrian facilities at Metrorail stations.

Besides the passenger facilities, WMATA noted that some bus routes are operated jointly with other agencies. These typically involve Metrobus during weekdays and local bus operators on weekends; an example is the L7 route in Montgomery County, operated ion weekends by RideOn.
WMATA goals have been to improve service, increase ridership and reduce costs. It rated its passenger facilities as quite effective. Positive impacts have including increased ridership. No negative impacts were cited.

To implement infrastructure integration, WMTA noted that the barriers were mostly institutional and financially, specifically, finding funds to maintain a facility that supports interagency operations.

WMATA indicated that it has learned that integration improves the quality of service for the customer and can lead to less duplication of facilities and therefore more efficient operation.

WMATA is undertaking a Regional Mobility Initiative to demonstrate the effectiveness of an integrated package of strategies to achieve increased transit ridership, improved quality of service for the customers, and reduced traffic congestion. The program includes a variety of intelligent transportation technologies to support the program of improved facilities, information, travel demand management and land use strategies.

*RideOn*
RideOn identified that it has implemented interagency passenger facilities, some of which are intermodal, coordinated route restructuring/service planning, joint operation of routes and joint purchasing/procurement. Many of these practices date to the late 1970s and 1980s; joint operation is more recent dating from about 1990.

The agency’ primary objective has been customer convenience and the agency rated most practices as highly or quite effective. Coordinated route restructuring/service planning was rated mid-range in effectiveness.

The primary measure of effectiveness of interagency passenger facilities has been passenger transfer activity. Measures of coordinated service planning is reduction in vehicle miles and measures of joint purchasing, reduced prices. The agency reported that data is available.

The agency has concluded that infrastructure integration does work.
Joint operation of routes was reported to have resulted because the regional operator, WMATA, wished to curtail weekend operation of routes and RideOn filled the void on three such routes.

RideOn is continuing to participate in infrastructure integration with WMATA to jointly develop real time bus arrival information signs (an application of transit ITS).

**Community Transit**
Community Transit provides bus service in Snohomish County outside the city of Everett. It is also part of the Puget Sound region served by Sound Transit and a series of other providers.

Community Transit identified a number of infrastructure integration practices largely with Sound Transit. Community Transit has been involved or is currently involved in every practice type identified in the survey except single agency intermodal facilities since it is a provider of bus services only (not rail).

Community Transit identified a large number of interagency passenger facilities in place, some of which are intermodal. Some have been implemented in recent years while others have been in place for over twenty years. They are listed below:
<table>
<thead>
<tr>
<th>Facility</th>
<th>Shared with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lynnwood Transit Center</td>
<td>Sound Transit</td>
</tr>
<tr>
<td>Mountlake Terrace Park-and-Ride</td>
<td>KC Metro</td>
</tr>
<tr>
<td>Aurora Village Transit Center</td>
<td>KC Metro</td>
</tr>
<tr>
<td>Ash Way Park-and-Ride</td>
<td>Sound Transit</td>
</tr>
<tr>
<td>Everett Station</td>
<td>Everett Transit, Sound Transit (ST Sounder Trains)</td>
</tr>
<tr>
<td>Bothell U of W/Cascadia Community College Campus</td>
<td>Sound Transit, KC Metro</td>
</tr>
<tr>
<td>Canyon Park Park-and-Ride</td>
<td>Sound Transit</td>
</tr>
<tr>
<td>NE 145&lt;sup&gt;th&lt;/sup&gt; Street/I-5 Station</td>
<td>KC Metro</td>
</tr>
<tr>
<td>Kingsgate, Evergreen Point, Montlake Freeway Stations</td>
<td>KC Metro</td>
</tr>
<tr>
<td>Overlake Park-and-Ride</td>
<td>KC Metro</td>
</tr>
<tr>
<td>Edmonds Station (intermodal)</td>
<td>Sound Transit (ST Sounder Trains)</td>
</tr>
<tr>
<td>Edmonds Ferry, Mukilteo Ferry Terminal (intermodal)</td>
<td>Washington State Ferries</td>
</tr>
</tbody>
</table>

Besides passenger facilities, Community Transit shares bus stops and layover areas with KC Metro in downtown Seattle and the University District.

Community Transit operates Sound Transit Regional Express bus routes under a contract with Sound Transit and it participates in planning and scheduling for these services. It operates one route (Route 414) in place of Sound Transit for service to Mountlake Terrace and NE 145<sup>th</sup> Street.

Finally, there are joint procurement activities; Sound Transit will be piggybacking on Community Transit’s coach person.

Community Transit’s implemented infrastructure integration to provide more seamless transportation between counties and transit agencies. Another reason for implementing many of the infrastructure integration has been the introduction of Regional Express bus services by Sound Transit. Specific objectives have included improving public transportation, reducing costs,
achieve operating efficiencies and assist other agencies to fulfill service needs. Community Transit’s key partners have been Sound Transit, King County Metro and Everett Transit.

Community Transit rated its infrastructure integration practices as highly or quite effective. Positive impacts cited include making the system easier for riders to use, providing more attractive alternatives to driving through coordination of transfers, increased ridership by acting as a feeder service to regional service and redeployment of hours to meet additional needs once regional services were put in place or taken over by Sound Transit.

Negative impacts have included the pressure to provide effective transfer connections when in reality lower frequencies on some services or undependable travel times make this very difficult.

Major barriers that had to be overcome were space requirements at facilities and financial limitations.

The agency believes that advance planning as well as open communications involving all stakeholders throughout the process is a key to success.

**King County Metro**
King County Metro (KC Metro) serves Seattle and King County. It is also part of the Puget Sound region served by Sound Transit and a series of other providers.

KC Metro identified a variety of infrastructure integration activities that began in 1997 and 1999. These include shared interagency passenger facilities and other facilities, joint operation of routes, joint purchasing/procurement, and coordinated interagency service planning and route restructuring. In 2002, intermodal passenger facilities were introduced as a result of Sound Transit’s implementation of commuter rail(???).

Interagency infrastructure integration is occurring with Sound Transit, the new regional transit District serving King, Pierce and Snohomish Counties, as well as with the Seattle Monorail Authority.
KC Metro identified the following objectives for its infrastructure integration activities:

1. Provide convenient connections between regional and local services
2. Improve infrastructure at major transit hubs
3. Increase park-and-ride capacity
4. Coordinate maintenance at completed facilities
5. Coordinate different fare structures
6. Coordinate customer information activities
7. Recover costs for providing regional services under contract in King County

KC Metro rated its infrastructure integration practices as quite effective; shared interagency passenger facilities was rated as mid-range in effectiveness.

Numerous positive impacts of infrastructure integration between KC Metro and Sound Transit were cited.

- Improved transfer facilities have been implemented in downtown Bellevue, Overlake, Auburn and Kent.
- Transit ridership has improved in the Woodinville –Seattle (S.R. 522) corridor where Metro service was restructured around a new ST Express bus route as well as in corridors where Sound Transit has provided new or improved express bus or commuter rail connections between urban centers (Federal Way/Auburn/Bellevue express buses, commuter rail service between Tacoma, South King County and Seattle).
- As a result of Sound Transit services, KC Metro has been able to reallocate freed up service hours (70,000 annual platform hours in 2001) to other services in East King County.
- Sound Transit has been able to piggy back on KC Metro bus procurements and has been able to have KC Metro provide it telephone information access, customer lost and found and pass sales services through its own centers in downtown Seattle.

Some negative impacts were also noted.

- Customers have complained about new complexities in the fare structure, particularly differences between the two agencies’ special needs and off peak fares.
- Separate agency identities and customer information have created more complexity and new coordination challenges.

Barriers that arose included the differing policies such as fare structure due to the different governing bodies, conflicts over route design and coordination, and agency financial constraints.
KC Metro offered some lessons it has learned as a result of its experience to date with interagency infrastructure coordination:

Negotiate written agreements to guide integration of services and facilities.
Involve all affected parties and jurisdictions at the appropriate stages of each project.
Recognize that a large number of agencies (as is the case in the Puget Sound) will increase the complexity of planning and operating services and facilities.

Additional projects are ongoing, including additional bus transit centers and park-and-ride facilities, bus access improvements, fleet procurement, opening of the initial Sound Transit LINK Light Rail segment and Seattle Monorail stations with associated KC Metro service restructuring, opening of a joint communications center for bus service and for LINK light rail operations.

**DART / Fort Worth T (Trinity Railway Express)**
Dallas Area Rapid Transit (DART) and Fort Worth Transportation Authority have established a commuter rail service known as the Trinity Railway Express (TRE). A respondent from DART reported on this project and others from DART’s perspective. This service which is operated by a contractor is a joint funded by both authorities. Beside this joint operation, the two agencies have joint ownership of the rail corridor, rolling stock, maintenance yards and control center and have jointly procured rolling stock and track improvements. Besides this interagency integration surrounding TRE, DART has its own intermodal facilities serving its light rail line and bus service.

The commuter rail project was always contemplated to be jointly funded, owned and operated; thus, no particular agency was identified as the source of the integration concept. The objective was to develop a commuter rail system while avoiding creation of a separate new agency, thereby realizing certain administrative/support cost efficiencies. The agency rated its practices as generally quite effective; the interagency facilities were rated as mid-range in effectiveness. Since the TRE service was always operated jointly, there is no data for (before/after) comparative purposes.
DART reported that joint ownership/operation require significant coordination efforts. The two agencies executed an Interlocal Agreement which serves as the primary directive, however, day-to-day operations typically call for immediate decision which are not always explicitly covered in the Agreement.

**Greater Bridgeport Transit Authority (GBTA)**

Greater Bridgeport Transit Authority reported several types of infrastructure integration. The agency shares a bus terminal with intercity bus operators in downtown Bridgeport, which is located adjacent to the Bridgeport rail station (served by Metro North Railroad’s commuter rail service sponsored by Connecticut DOT’s rail division).

Besides shared passenger facilities, GBTA has jointly operated a bus route, known as the Coastal Link, for several years with its neighbor transit agencies – Norwalk Transit District and Milford Transit District. This also involved interagency service planning. *This is the subject of a more detailed case study later in this document.*

GBTA participated in a joint procurement of buses with CT Transit and the Connecticut Department of Transportation.

Although there is no current interagency sharing of maintenance facilities and control centers, there is a consolidation study underway examining the feasibility of consolidating GBTA, Milford Transit District and Valley Transit.

The primary reason for implementing infrastructure integration is passenger convenience. GBTA rates each practice as highly effective except for the interagency bus terminal which was rated as mid-range in effectiveness.

Ridership is the primary performance measure for evaluating the effectiveness of the successful jointly operated and planned Coastal Link service. Ridership, revenue and user satisfaction were reported to have increased as a result of the service integration. No formal evaluation was completed of this or any other infrastructure integration practice.
No major barriers were encountered.

GBTA is working on two other projects involving infrastructure coordination. GBTA is working with the City to develop the Bridgeport Intermodal Transportation Facility which will include up to eight modes of transportation.

GBTA is working with the Connecticut Department of Transportation on implementation of an automatic vehicle location (AVL) system for both fixed route bus and paratransit vehicles.

**Milford Transit District**
Milford Transit District (MTD) is a small transit agency; Milford is located between two major urban centers in Connecticut – Bridgeport and New Haven. Milford Transit District reported that it shared operation and planning of the Coastal Link with Norwalk Transit District and GBTA (described above and in a specific detailed case study). It also shares the Nextel phone system for the Coastal link and to a small extent some joint purchasing.

MTD’s objective (for the Coastal Link) was to provide a seamless transit service along a common corridor. MTD reported that the Coastal Link has been quite effective. Other infrastructure integration practices were reported as mid-range or less effective. No negative impacts of any of its practices were cited.

MTD reported that all barriers were overcome through interdistrict agreements. Decisions were made at the top level of each organization that implementation was a priority. The key lesson was that infrastructure coordination can be achieved with commitment from the top and that many perceived barriers either did not exist or could be easily overcome. It was very important to have every level of employee in the organization buy into the project and eliminate any friction between organizations.

MTD noted that a coordination and consolidation study is underway with GBTA and Valley Transit that is looking at a wide range of options from joint purchasing to complete consolidation. Furthermore, MTD hopes to piggy back on GBTA’s implementation of ITS (AVL), which is
being done with Connecticut DOT; once they are successful, it is hoped they can be extended to other properties in the state.

**CT Transit**

CT Transit is the operator of bus service (under contract to Connecticut Department of Transportation) for several cities in the State of Connecticut (Hartford, New Haven and Stamford). The agency reported that it shares intermodal passenger facilities with the rail operators to these cities; these include Amtrak (intercity rail), and Connecticut DOT’s rail division (commuter rail service operated by New York’s MetroNorth Railroad).

The agency’s objective was to improve connections between downtown shuttle buses and commuter trains, provide a location for CT Transit’s downtown information and sales outlet and to provide a better transfer hub for the Stamford bus system. The agency rates these facilities as highly effective. While the agency feels all the objectives were accomplished, results are not quantifiable with available data. No negative impacts were identified.

The major barriers to implementation were coordination with construction and facility management.

The agency believes that it has been advantageous that its parent agency, Connecticut DOT also owns and operates the intermodal center.

No future projects in infrastructure integration were identified.
Fare Payment Integration Practices

Ventura County Transportation Commission (VCTC)
The State of California places responsibility for transportation on county Transportation Commissions. These commissions are responsible for transportation policy, as well as coordinating activities between the counties and the various transportation operators, agencies, and cities within each county. The commissions also control the allocation of federal, state and local funds for highway, transit, rail, aviation, bicycle and other transportation projects.

VCTC is therefore the regional planning organization for Ventura County. It allocates all state, federal and local transportation funds to the operators.

VCTC proposed that all of the transit agencies in Ventura County implement a regional transit pass and a stored value smartcard, with two objectives:
- Facilitating travel between the transit agencies operating in the county
- Generating better planning data

In 1995, the agencies adopted regional pass program. In 2001, the agencies adopted a new smartcard based system. Riders can purchase a monthly pass (the GoVentura Card) or a stored value card with value purchased in increments of $10 (the GoVentura E-Purse). Both the pass and the stored value card are accepted on all transit services in Ventura County. Data from the use of the card is collected electronically and available to both VCTC and the operating agencies.

VCTC’s evaluation of the effectiveness of the fare payment integration practices was as follows:
- Interagency free/reduced price transfers – 4 (VCTC has not implemented these)
- Interagency stored value smartcards – 4
- Interagency passes – 4

VCTC reports that ridership has increased in the County, but that it cannot identify what portion of this increase can be attributed to fare integration. Pass use has increased, as has the revenue from passes. Passes are also used by more riders who are taking less than the break-even number of trips, i.e., some riders are purchasing the pass for convenience, even though they would pay less by paying cash. On the negative side, VCTC reports that there are new operating costs for maintaining the system and the sales network, as well as sales reconciliation and revenue disbursements.
VCTC’s largest challenges were technical in nature as it was an early adopter of regional stored-value smartcards and regional passes. Once project delays occurred, institutional issues arose and it became difficult to keep all of the project partners participating. VCTC reports that the key lesson it learned from this project was the importance of keeping all the project partners engaged in the project at all times, and at all costs.

City of Thousand Oaks Transit (TOT)
TOT is one of the municipal transit operators in Ventura County. TOT participates in the regional pass and stored value card programs organized by VCTC. TOT also has reduced fare transfers and a multi-ride card which provides free transfers.

TOT implemented the fare integration practices to provide better service to the general public, including a seamless fare system. It also sought to increase its ridership.

TOT’s evaluation of the effectiveness of the fare payment integration practices was as follows:

- Interagency free/reduced price transfers – 1 (TOT has not implemented these)
- Interagency stored value smartcards – 5
- Interagency passes – 5
- Intra-agency intermodal transfers – 3 (TOT has transfers but only one mode)
- Intra-agency stored-value smartcards – 5
- Intra-agency intermodal passes – 4

TOT reports that ridership has increased, as has fare revenue. However, as there have been other changes to the system, it cannot identify what portion of this increase can be attributed to fare integration. Customer complaints regard fare issues have decreased and the staff has received a number of positive comments regarding the E-purse part of the system. The only negative comments from the public have been that there were operational difficulties when the cards were first implemented, including cards not being accepted by some buses.

There were three principal barriers to implementation:

- Institutional – how would the monthly revenue be divided between the participating agencies
- Implementation – can the contractor equip all of the vehicles within a fairly short time frame, minimizing the difficulties of changing fare equipment
• Technological – can the contractor provide a system with sufficient options for the agencies, including updating cards on buses

TOT reports that its key lessons were:
• If all agencies work together on a system the public benefits
• Training is very important with new technology such as the smartcard

Golden Gate Bridge, Highway, and Transportation District (GGBHTD)
GGBHTD is a multi-modal agency that operates the Golden Gate Bridge, Golden Gate Transit, and Golden Gate Ferries. Golden Gate Transit provides regional fixed route transit between San Francisco and Marin and Sonoma counties, as well as between San Rafael and the El Cerrito Del Norte BART station.

GGBHTD participates in numerous fare integration practices. On an interagency basis, it implemented free/reduced price transfer agreements with eight agencies, some of which are valid only at specific locations (e.g., transfers to or from Vallejo Transit at BART’s El Cerrito Del Norte station) or for service within a specific area (e.g., transfers to and from Sonoma County Transit for service within Sonoma County). GGBHTD also has 4 interagency pass programs, including programs with Muni, SamTrans, AC Transit, and Sonoma County agencies. The most recent interagency program is TransLink, the Bay Area smartcard, which GGBHTD joined in 2002. GGBHTD participated in TransLink’s Phase I demonstration, and is now scheduled to be one of the first two transit agencies that fully implements TransLink. TransLink smartcards can carry stored value (e-cash) which is valid on all participating transit agencies, transit passes valid on specific agencies, and stored rides valid on specific agencies.

On an intra-agency basis, GGBHTD offers reduced/free transfers between its buses and ferries, with the price of the ferry ride decreasing as the face value of the bus ticket being used increases (GGBHTD has a zone system with fares based on the distance traveled). GGBHTD is also accepting TransLink cards for intermodal trips within the agency, e.g., transfers between bus and ferry, however it does not offer any intermodal passes.

GGBHTD began implementing fare integration when it was first established in 1971. The principal agency responsible for introducing fare payment integration is the Metropolitan
Transportation Commission, the transportation planning, financing, and coordinating agency for the nine-county San Francisco Bay region.

GBBHTD’s objectives for fare payment integration were to promote seamless travel within its own transit system and to comply with regulations for interagency revenue sharing, all without losing fare revenue. The agency rates the effectiveness of all of the fare integration practices as a 4. Neither the positive nor the negative impacts of fare integration have been investigated. Some customers have asked for improved fare integration. Furthermore, some staff believe that fare integration has resulted in increased costs as well as revenue loss. However, with the significant drops in ridership and fare revenue that resulted from the recession, as well as the impact of GGBHTD’s fare increases, it is impossible to identify specific impacts.

The major barriers to implementation were financial, institutional, and technological, although the agency does not provide more specific details. The agency also states that the principal lesson it learned was that fare integration is a very complex subject.

Los Angeles County Metropolitan Transportation Authority (LACMTA)
The LACMTA is both an operator of transit, with about 200 Metro Bus lines and 4 Metro Rail lines, and the regional transportation planning organization. In addition, it funds 16 municipal bus operators and a wide array of transportation projects, including bikeways, pedestrian facilities, local road and highway improvements, goods movement, and freeway call boxes. It serves an area of 1,433 square miles and 9.6 million people.

LACMTA has implemented three fare integration practices:
- Interagency free or reduced price transfers – valid between municipal services and Metro Bus or Metro Rail
- Interagency passes – EZ Transit Pass, valid on Metro Bus, Metro Rail and 17 additional agencies
- Intra-agency intermodal passes – valid on both Metro Bus and Metro Rail

LACMTA does not have intra-agency intermodal transfers. On January 1, 2004, the agency eliminated transfers and replaced them with day passes, at the same time reducing cash fares slightly (from $1.35 to $1.25).
LACMTA’s objective was to increase customer convenience by improving fare integration and service coordination. Many areas are served by both municipal services and LACMTA routes, so in some cases riders may be able to choose between the services used on a specific trip. In other cases riders need to use more than one agency’s services to make a trip.

The agency rates the effectiveness of all three fare integration practices as 5 – completely effective. The rating of the inter-agency practices is based on the wide public acceptance of the regional pass and the increases in its use (and increases in the revenue from this pass) since it was first implemented. The agency has not investigated how current users of the regional pass previously made their trips, and whether the regional pass has actually resulted in increased use of transit and increased total transit revenue. The ratings of the intra-agency passes is based on their heavy use. The agency does not believe that there are any specific negative impacts that are associated with any of these practices.

The principal barriers to implementation of these practices were financial, institutional, and jurisdictional, although the agency does not describe these barriers.

The key lesson learned by the agency is that programs like this provide a great benefit to the customer.

**Foothill Transit**

Foothill Transit is the largest of the municipal operating agencies in Los Angeles County. It provides bus service to the San Gabriel and Pomona Valleys, located in the eastern portion of Los Angeles County.

Foothill Transit participates in the inter-agency fare integration practices that were initiated by LACMTA, including free interagency bus to bus transfers, stored value smartcards (on rail and some buses), and regional passes. It also offers reduced fare transfers from bus to Metro Rail.

Foothill Transit agrees with LACMTA that the latter originated regional fare integration in the region. The agency agreed to participate with expectations that this would increase passenger convenience and provide more seamless travel in the region. The agency’s objectives in
implementing the more recent move to smartcards are to continue to improve the seamlessness of travel for passengers, to reduce dwell time, to improve the accuracy of the ridership data, and to increase the agency’s revenue.

Foothill Transit’s ratings of the effectiveness of these practices is much different from LACMTA. It gives a rating of 1 (“not at all effective”) to interagency stored value smartcards and a rating of 2 to interagency passes. The LACMTA gave a rating of 5 to both of these practices. Foothill Transit and LACMTA both give a rating of 5 to interagency free/reduced price transfers.

Foothill Transit also rated intra-agency stored value smartcards at 3, significantly higher than the rating given to interagency stored value smartcards. Finally, the agency rated free / reduced price intermodal transfers at 4, although it is unclear exactly which services the agency was considering as they only operate bus (and paratransit) service.

Foothill’s low ratings for the interagency practices are a result of a perceived reduction in revenue resulting from these practices, including being reimbursed by other agencies for less than the agency had anticipated.

The major barrier to implementation arose from the different technologies used by agencies. Foothill Transit desired the use of magnetic media which, compared with flash passes and tickets, would have reduced the role played by bus operators in administering the fare system.

The key lesson that Foothill Transit reports from its experience is that it is difficult for any single agency to regulate discounted fare media in an integrated environment. The agency also mentioned that agencies are unable to establish their own criteria to qualify for discounted fare media, and therefore are less able to have their fare structure match their political needs.

**San Diego Trolley**
The San Diego Trolley is one of the operating entities that is a part of the San Diego Metropolitan Transit System (MTS). Along with the other members of the MTS, it has implemented interagency transfers free if transferring from a service with an equal or higher cost,
otherwise with an upgrade charge, as well as interagency passes. Three regional monthly passes exist, each valid for all services with a fare up to a specific maximum level.

The regional fare integration efforts were led by the Metropolitan Transit Development Board (MTDB) the parent organization of both the San Diego Trolley and San Diego Transit. In 2003, MTDB became MTS and began to be consolidated into the San Diego Association of Governments (SANDAG), the regional planning agency.

San Diego Trolley staff did not rate the effectiveness of the fare integration practices or provide any information on their positive or negative impacts.

**Davenport Citibus**

The Davenport Citibus is one of three transit operators serving the Quad Cities of Iowa and Illinois. These agencies have a long established policy of free or reduced price transfers between their services (depending on the specific transfer being made). In October 2003, the agencies adopted a regional pass, the Quad-City PassPORT.

The principal reasons for adopting the regional pass was to make travel more seamless for passengers, and therefore generate additional ridership and revenue for all three agencies. The agencies also view the regional pass as making it easier for local businesses to offer transit benefits, as they will only need to deal with a single pass regardless of which transit services their employees may use. The principal concern mentioned by Davenport Citibus was the potential for revenue loss.

The regional pass was originally conceived of by a local community group, Churches United, chaired by the mayor of Davenport. The three transit agencies developed the details of the plan, including arrangements to minimize the potential for revenue loss by any one agency.

Davenport CitiBus rates both interagency transfers and interagency passes as a 3 in effectiveness. They state that the interagency pass appears to have increased ridership, although they cannot determine whether other factors may also have contributed to the ridership increase. No specific
negative impacts have been identified. Interagency transfers have been in existence too long to identify their original impacts.

The major barrier to implementation was financial, concern over the potential revenue loss and, especially, the potential that one agency might benefit at the expense of other agencies. In order to address this concern, the agencies implemented the pass through a four-month pilot program which incorporated monthly reviews of its ridership and financial impact.

**Washington Metropolitan Area Transit Authority (WMATA)**

WMATA operates Metrobus and Metrorail, which serve the District of Columbia and adjacent portions of Virginia and Maryland. WMATA has a flat cash fare on Metrobus, with a surcharge for express buses, while the fares on Metrorail are based on the distance traveled. WMATA also offers a 7-day pass valid on all regular Metrobus service, a 7-day pass valid for short trips on Metrorail, and a 7-day pass valid for any trip on Metrorail.

WMATA identified multiple types of interagency and intra-agency fare integration practices. In 1999, a regional bus transfer agreement was implemented between WMATA and several adjacent bus operators. This agreement allows riders to transfer between Metrobus:

- Montgomery County RideOn – free
- Laurel MD Connect-a-Ride – free
- Price George’s County The Bus – free from Metrobus, $0.45 upgrade to Metrobus
- Alexandria DASH – free
- Local Fairfax County Connector Routes – free from Metrobus, $0.45 to Metrobus
- Arlington County ART – free
- City of Fairfax CUE – free
- Falls Church GEORGE buses – free from Metrobus, $0.95 to Metrobus

In 2001, WMATA formed a consortium with the Baltimore MTA and 15 other transit operators serving Maryland, the District of Columbia and Northern Virginia to develop the Regional SmarTrip System, a smartcard based stored value system. In 2002, field testing of the SmarTrip-accepting fareboxes began on WMATA, and fleetwide installation began in May 2004. The Maryland Transit Administration (MTA) is separately testing the fareboxes and plans to install them at the completion of testing. Other bus operators are expected to install the fareboxes once the MTA finishes its testing, with full regional operability expected by mid-2005.
WMATA and eight other bus lines (RideOn, DASH, Fairfax Connector, CUE, ART, The BUS, Connect-a-Ride, and PRTC OmniRide) offer a joint one-day pass that can be used on Metrobus and the eight other operators. There is also reciprocity on some passes, with ART, RideOn, Fairfax Connector, and DASH all honoring some or all of WMATA’s Metrobus passes. WMATA also has the Transit Link Card, which works like a monthly pass on MARC and VRE, gives unlimited Metrorail rides for a month, and covers up to $1.20 of the fare on any Metrobus service.

WMATA also utilizes a variety of intra-agency, intermodal fare integration practices. Reduced price transfers are offered from Metrorail to Metrobus, although no transfers are offered from Metrobus to Metrorail. Stored value smartcards, SmarTrip, were introduced in 1999 for use on Metrorail and parking at WMATA facilities. As mentioned above, in 2002 SmarTrip began being tested on Metrobus and it is expected to be in full operation by August 2004.

WMATA does not have any intra-agency, intermodal passes for the general public, but it does provide a monthly pass for elementary and secondary school students who live and go to school in Washington, D.C. This pass provides unlimited travel on Metrobus and Metrorail for school or school-related events.

WMATA’s goals in adopting fare payment integration measures were to improve customer convenience, enhance ridership and revenue growth, and to begin reducing the operating and capital costs associated with fare collection.

WMATA has been the lead agency in developing SmarTrip and has generally been the lead agency in developing and implementing most of the interagency fare integration practices.

WMATA did not rank the effectiveness of any of these fare integration practices. However, it did provide data on the wide acceptance of the SmarTrip card to date. As of June 2004, 450,000 cards have been issued and approximately 355,000 are in active use. Market penetration is 35% of rail customers (45% of peak trips), 60% of park & ride trips, and 71% of parking payments.
Usage is expected to continue to increase once SmarTrip is usable on all WMATA Metrobuses and as it becomes usable throughout the region. Furthermore, as of June 28, 2004, SmarTrip will be the only method of payment allowed at all Metro parking lots. No negative impacts were cited associated with any of the fare integration practices.

The major barrier to implementation of SmarTrip was the need to have 16 agencies coordinate their planning, funding and implementation of this project.

WMATA’s strategic plan is considering the possibility of replacing all paper and magnetic fare media with smartcards, as well as developing additional transportation and non-transportation uses for the cards. Multiple pilot programs are underway in 2004, including a co-branded First Union Bank ATM card / SmarTrip card and a District of Columbia employee ID / building access Card / SmarTrip card.

**Maryland Transit Administration**

The Maryland Transit Administration (MTA) is a part of the Maryland Department of Transportation, and provides local bus, subway, light rail, commuter bus, and commuter rail ( MARC). The majority of MTA’s service is centered on Baltimore, although MARC provides service into Washington, D.C. MTA and WMATA service overlaps in much of southern Maryland.

The MTA is part of the consortium implementing the SmarTrip smartcard, which is discussed above under WMATA. The MTA’s objectives for this project are to maximize smartcard used, reduce cash, reduce fraud related to fares, simplify the fare structure, and increase ridership. As implementation of the SmarTrip equipment on MTA’s buses and trains is scheduled to be completed in September 2004, the MTA had no comments on the effectiveness or impacts of fare integration practices.

The major barrier to implementation identified by the MTA was the level of internal coordination required. The key lesson learned by the MTA was the need to have a plan established that addresses all of the issues associated with implementation.
The MTA is also developing a “Next System” which will link all on-board vehicle systems and station systems, including GPS, smartcard, bus maintenance, AVL, and other systems.

**City of Fairfax CUE Bus**
The CUE Bus provides regularly schedule, low-cost service to many locations within the City of Fairfax, and also serves as a feeder network to the Vienna/Fairfax-GMU Metrorail station. The basic fare on CUE Bus is $0.50, with a reduced fare of $0.25 for students, senior citizens, and individuals with disabilities. CUE bus does not offer any passes itself.

CUE Bus is part of the regional fare integration initiatives discussed under WMATA, and led by WMATA. It issues transfers for $0.25 and accepts transfers from all regional bus systems. It also accepts transfers from Metrorail, with an additional charge of $0.25. It is part of the SmarTrip initiative and accepts all regional bus passes.

CUE Bus’s objective in implementing these practices was to conform to the practices of other transit agencies in the region and to add convenience for riders. The agency gives all of these practices a rating of “5”, completely effective. It cites positive impacts of increased ridership, decreased customer complaints, and wide public acceptance, although it does not have any specific data. The agency also identifies a negative impact of decreased revenue due to accepting too many free transfers; however, revenue is expected to increase with SmarTrip, as the smartcard will allow the agencies to share revenue between agencies issuing transfers and those providing the transfer.

The principal barrier to implementation identified by CUE Bus was that the vendor was not very efficient in correcting faults in the system. As a result, the agency identifies the key lesson it learned from this process is to not be tied to proprietary technology controlled by a single vendor.

**Pierce Transit**
Pierce Transit is the primary transit provider for Pierce County in Washington State. It operates bus service throughout the county and, until recently, express buses to Seattle. These express buses were taken over by Sound Transit, a regionally oriented transit agency, beginning in 1999.
Pierce Transit identified three interagency fare integration efforts. First, beginning in 2000, Pierce Transit, Sound Transit, King County Metro, Community Transit, and Everett Transit agreed that they would issue transfers free of charge and accept transfers from other agencies at the accepting agency’s base fare. Upgrade charges for express routes and other special services would be allowed, but treated the same as transfers within each agency.

The other fare integration effort that currently exists is PugetPass. These passes are valid on the same five transit systems and have a “face value” varying from $0.50 to $4.00, in $0.25 increments. Each pass is valid as full payment of all fares less than or equal to its “face value” and as a credit equal to its “face value” against higher fares. Monthly passes cost 36 times the “face value” of the pass. Three month and annual passes are available for some “face values”, with multiples of 108 (3 times the monthly multiple of 36) and 396 (11 times the monthly multiple of 36). Revenue from these passes is shared based on the base fare of each agency and their use at each agency. These passes are intermodal, in that they are valid both on bus service and on Sound Transit’s commuter rail service. Some of the Puget Passes also include Washington State Ferries (Washington State Department of Transportation).

The third fare integration effort is a smart card based stored value system, which will ultimately also incorporate the Puget Pass. This effort is currently in development and is scheduled for a beta test in 2006. The same five agencies are participating in this effort, along with Kitsap Transit and the Washington State Ferry System. In addition, other transit agencies in the region have initiated discussions to participate in the smartcard project, including the Seattle Monorail and Intercity Transit.

The fare integration efforts grew out or a regional recognition that the absence of a shared set of fare media and coordinated transfer policies hindered the use of public transportation at the regional level. The transit agencies assessed the impacts and issues associated with regional fare coordination, following which elected officials from the governing boards of the five agencies participated in a series of Fare Policy Forums. The goal of the forums was to develop a general fare integration policy. This policy was that regional passes should be introduced. Working
together, the agencies developed the regional pass, as well as an agreement and process for sharing the revenue from the pass.

Pierce Transit rated both the regional passes and the interagency transfers as “4” on the scale of 1 to 5. No specific positive or negative impacts were identified.

The principal barriers to implementation of these agreements were financial, especially the risk that some agencies could lose revenue (perhaps substantial amounts) by participating in the regional agreement. One of the solutions to this was to allow local agencies some flexibility in setting of their fares, for example each agency can set their basic cash fare in $0.25 increments. The regional passes have limited agencies’ flexibility with regard to the ratio between their cash fare and the regional passes. The agencies also have a separate agreement regarding the definition of which passengers are entitled to a discount as a senior or an individual with a disability, as well as a regional identification card for such riders. Some agencies also provide discounts for additional riders. Participating agencies do have the right to also issue their own passes, which are valid only on their own systems, however Pierce Transit has not done so.

The key lesson identified by Pierce Transit is to take small steps and not try and do everything at once. This regional agreement first implemented regional passes and then waited another year before implementing interagency transfers. After that, the agencies standardized the ages for the fare categories (e.g., youth and seniors). There is a lot of effort required to get multiple agencies to agree on a policy and to implement it, and the effort expands dramatically as the number of issues included expands.

**Community Transit**
Community Transit provides bus service in Snohomish County outside the city of Everett. It is also part of the Puget Sound region and, like Pierce Transit, has had some of its intercity service taken over by Sound Transit.

Community Transit is a member of the same regional fare integration initiates as Pierce Transit. Its objectives for participating were to improve the seamlessness of regional travel and to simplify transfer rules for passengers, while insuring revenue neutrality.
Community Transit has a slightly lower opinion of the effectiveness of these fare integration practices than does Pierce Transit, rating them at a “3” compared with Pierce Transit’s rating of “4”.

The agency does state that there have been fewer customer complaints regarding interagency travel. However, it is unclear what the other impacts of fare integration have been as the impacts of fare integration cannot be isolated from the impacts of other changes, including changes in employment and economic activity in the agency’s service area. The only negative impact cited is that agencies are not entirely satisfied with the current revenue reconciliation process and are unsure whether or not they are receiving their fare share of the revenue. The new smartcard project will improve the quality of the data available to be used for revenue reconciliation and should address this negative impact.

The principal barrier to implementation was the financial issue of protecting each operating agency’s fare revenues and the institutional / financial issue of allowing each agency to maintain autonomy over their fare structure while still creating a regional pass structure that is easily understood by riders.

The key lesson learned by the agency is that while it is the right thing to do for the customer, it is an enormously complex issue with significant revenue and governance issues for each participating agency.
Schedule Integration Practices

King County Metro

King County Metro (KC Metro) serves the city of Seattle and King County, Washington. It is also part of the Puget Sound region served by Sound Transit and a series of other transit service providers. KC Metro identified four types of schedule coordination practices:

- Single mode / Single agency
- Single mode / Interagency
- Intermodal / Single agency
- Intermodal / Interagency

In particular, its interagency/single mode schedule coordination was with Sound Transit, Pierce Transit, and Community Transit implemented in 1999 including timed transfers/pulse systems. KC Metro also identified intermodal schedule coordination within its own agency that was initially implemented in 1983. Such schedule integration practices were put into place to improve customer service. KC Metro and Sound Transit were the agencies that introduced such schedule coordination practices.

KC Metro’s objective in implementing such practices includes customer service, bus stop and layover coordination, and to help generate service efficiencies. Its single agency/single mode and single agency/intermodal practices were rated as the most effective in meeting their objectives. Its intermodal/interagency schedule coordination was rated as only a little effective in meeting KC Metro’s objective.

There has been an increase in transfer activity as KC Metro has moved to more of a Hub-and-Spoke type system.

The major barriers to successful implementation of schedule coordination practices have been technological vis-à-vis incompatible systems, institutional with respect to having to work within the context of different calendars for service change, and financial barriers relative to different fare structures.
The key lessons learned include the need for good communication, agreement on calendar and holiday schedules, and a regional fare structure.

KC Metro is familiar with the implementation of other schedule integration practices implemented by Washington State Ferries and Kitsap County Transit.

In the near future, KC Metro is considering working with Onboard Systems for enhanced schedule integration with trains. While the exact technologies have not been selected, KC Metro’s scheduling software would likely be involved. Currently, it uses HASTUS.

**Ride On**

Ride On has implemented interagency schedule coordination for both a single mode and intermodal conditions, which were initially implemented in the 1980s. Improving customer service is the primary factor that motivated the implementation of these schedule integration practices. Ride On was the agency that introduced such practices; for interagency practices, it is participating with WMATA.

Ride On’s objectives in implementing these practices were to reduce waiting times on shared streets and to reduce transfer waiting time for bus-Metrorail transfers.

In terms of meeting its objectives, single mode / interagency schedule coordination was only a little effective; intermodal / interagency schedule coordination was somewhat more effective in meeting Ride On’s objectives.

The primary measures of effectiveness of interagency schedule coordination for a single mode and intermodal interagency schedule coordination were, respectively, a comparison of public timetables and customer complaints of missed connections.

Ride On has no quantitative information available that measures the impact of its schedule integration practices.
In terms of the impacts that Ride On’s schedule integration practices have had on the delivery of public transportation services, there has been a decrease in the following measures:

- Crowding
- Customer complaints
- Operational costs

There has been an increase in the following measures:

- User satisfaction
- Sales of multi-ride fare media
- Sales of multi-agency fare media
- Intermodal and interagency transfers
- Image of the agency

The major barriers to the implementation of these schedule integration practices include the following:

- Staff time availability
- Staff cooperation
- Entire process is manual, which takes a lot of time that staff does not have

The key lessons Ride On learned from its experience with these schedule integration practices include how important it is to present to the public a better total/overall product and depending on others’ trips has the potential to reduce agency costs.

**Fairfax County, VA / Fairfax Connector**

Fairfax County Department of Transportation (DOT) has implemented the following types of schedule integration practices:

- Single mode / Single agency
- Single mode / Interagency
- Intermodal / Single agency

Ad-hoc coordination is performed with WMATA on CONNECTOR and Metrobus bus schedules. CONNECTOR schedules provide timed transfers between buses and rail. The primary reason for implementing such schedule integration practices was to space trips between services operating
in the same corridors and to provide timed transfers between bus and rail modes. Fairfax County DOT was the initiating agency for these practices, however, it is working with WMATA.

Fairfax County DOT’s objective in instituting these practices was to rationalize trip spacing and these practices have been fairly effective in helping Fairfax County DOT to meet its objective.

Although schedule integration has not been formally evaluated nor has quantitative data been collected, customers have complained about the lack of coordination where such integration practices have not been enacted.

There have been both jurisdictional and institutional barriers that needed to be resolved in order to implement such practices. The primary lessons that Fairfax County DOT learned from this experience with schedule integration has been that a formal process is definitely needed to maintain currency with service and schedule changes.

Fairfax County is familiar with other schedule integration practices on-going in the metropolitan Washington D.C./Northern Virginia region.

Fairfax County DOT is involved with the expansion of schedule coordination with WMATA on a new CONNECTOR and Metrobus routes serving the Richmond (Virginia) Corridor that is expected to be implemented in the Fall of 2004. Its objective in participating in these new schedule integration efforts again is to rationalize the spacing of trips. These practices will engage the use of intelligent transportation systems technologies including traffic signal prioritization on Richmond Highway and the use of advanced vehicle location systems and transfer protection measures.

**San Diego Trolley**

The San Diego Trolley has instituted schedule coordination measures by sharing and considering schedules among all area transit agencies. This is a policy that was put into practice from the start of service for the Trolley, so there is no baseline or “before” time-period nor associated data
to use for comparative purposes. No additional information was provided by the survey respondent.

**CT Transit**

CT Transit is the operator of bus service (under contract to Connecticut Department of Transportation) for several cities in the State of Connecticut (Hartford, New Haven and Stamford).

CT Transit has implemented interagency schedule coordination for a single mode. It began implementing this schedule integration practice because its coverage area includes Stamford and another agency, Norwalk Transit District, operates in Norwalk, a contiguous community and there is significant inter-regional ridership between these two operators. Improving service for this customer base of shared riders motivated CT Transit and Wheels Transit to embark upon coordinating their schedules. Moreover, it was CT Transit that initiated this effort at schedule coordination and its main objective was to facilitate transfers for such inter-agency riders between the two operators. CT Transit has stated that such schedule coordination measures have proven to be completely effective in helping it to meet its objective.

In terms of the benefits that schedule coordination has brought to the region, CT Transit does not have specific quantitative data systematically proving that there has been an increase in ridership resulting from coordination, however, the F-route between Stamford and Norwalk is one of CT Transit’s most heavily patronized lines in the Stamford system. Moreover, the agency is very confident that schedule coordination has increased ridership, at least somewhat, and provided greater convenience to customers traveling across the region. No negative impacts were cited by CT Transit nor were any barriers to implementation mentioned as both CT Transit and Norwalk Transit District mutually benefited from the coordination. CT Transit’s key lesson learned was to realize how important it is to promote the potential benefits derived from schedule coordination with all other transit systems with whom it shares transferring customers.
**PATH**

PATH, a subsidiary of the Port Authority of New York and New Jersey, stands for the Port Authority Trans-Hudson and is a rail operator connecting Manhattan with New Jersey across the Hudson River. PATH has initiated the implementation of interagency schedule coordination measures with other rail lines, namely, New Jersey Transit. The main objective that PATH wanted to achieve was to provide improved connections during off-peak time periods. PATH has deemed that schedule coordination has proven to be partly effective in meeting this objective.

While there is no data available to quantify the impacts of this schedule coordination, PATH has observed a decrease in the volume of customer complaints, which itself is a measure of effectiveness. No negative impacts resulting from the schedule coordination practices were cited.

PATH cited jurisdictional and institutional barriers to the implementation of schedule coordination, due to the fact that New Jersey Transit operates in the Northeast Corridor and Amtrak provides only limited windows for schedule changes. These situations can create difficulty in coordinating connections.

For lessons learned, PATH observed that even minor schedule changes affect the ability for passengers to make their connections and how important it is for agencies to exchange information prior to developing schedule changes.

**Bay Area Rapid Transit District (BART)**

BART is the San Francisco Bay Area’s regional rail service provider. It has implemented different types of interagency schedule coordination with Caltrain, which began in June 2003 with better coordination with Bullet Trains on the peninsula that started in June 2004. Both agencies work together to get the best fit and timing of schedules given the system’s constraints. At the Millbrae intermodal station there are connections that are so close in time as to be in effect a timed transfer using the shared platform at Millbrae. There is also transfer connection protection by means of telephone communication and coordination between the control centers of BART and Caltrain to communicate train delays. Moreover, BART provides the Caltrain
control center with a train location, tracking, and performance display to show when and where BART trains may be delayed so that mitigation measures can be taken. One motivating factor for such schedule integration practices has been the opening of the BART extension to San Francisco International Airport and the associated intermodal facility at Millbrae. Both BART’s and Caltrain’s schedules needed to be integrated to show that the intermodal transfer concept could truly be viable, otherwise, the extension itself would not be successful. Both BART and Caltrain initiated these scheduling coordination measures. BART is also engaged with other Bay Area agencies, namely, SamTrans.

BART’s objective in implementing these schedule coordination measures was to provide the best connection between BART and Caltrain taking into account performance variability, such as late trains, missing trains, and transfer time, including walk time, ticket processing time, and other performance measures.

BART has deemed that its intermodal interagency schedule coordination practices have been to date only partially effective in helping BART meet its objective; on the other hand, its intermodal schedule coordination for single agency has been effective in helping BART meets its objective.

It is likely to be too early to determine whether or not the schedule integration practices have had positive impacts. Nevertheless, intermodal transfers between BART and Caltrain between June 2003 and spring 2004 have been much less than expected. The new schedule with the new Baby Bullet train service starting June 2004 will be better coordinated. At that point it will be possible to measure the number of people actually making the transfer and to compare existing counts with those counts once data is collected on Baby Bullet service. Customer complaints have increased because not all connections between the two modes have been smooth or reliable.

BART runs even headways and can shift the entire schedule a couple of minutes earlier or later, but cannot provide uneven headways. Caltrain has some uneven headways due to the timing (overtaking) of the Bullet trains, so the schedules cannot be entirely timed. Another problem is that both agencies cannot hold trains more than a minute or two due to timing and scheduling
constraints further down the line. In BART’s case the total scheduled wait time at Millbrae is about two minutes (assuming the train is on time). While the wait time (layover time) can be made longer, that would take another train in the loop or cycle and at $3M per car, or $30M per train, this is not feasible. Thus there are technological and financial constraints that BART and Caltrain have had to deal with.

The primary lesson learned during this experience has been that there will still be times during which within-agency priorities trump coordination between and/or among agencies.

Generally, since BART has frequent, fixed headway service that operates from early in the morning to late at night, it is incumbent on the other agencies, especially bus operators, to adjust their schedules to match BART schedules. Schedule change information are distributed to the Bay Area’s bus operators as mandated by MTC at least 3 months in advance of a schedule change. What is not yet mandatory is whether or not these agencies make appropriate changes consistent with BART’s changes.

For the near term future, BART plans for continued closer coordination Caltrain’s new Baby Bullet service, beginning June 2004, at Millbrae for optimum transfers. Their joint objective is to provide a seamless transfer between the two rail modes with very little wait time for passengers.

Chicago Transit Authority
The Chicago Transit Authority (CTA) has implemented the following types of schedule integration practices:

- Interagency / Single mode
- Interagency / Intermodal

Ever since 1997, there have been corridor-level Joint Schedules between Pace Suburban Bus and CTA: In some cases, trips alternate between CTA and Pace. In other cases, CTA provides weekday service while PACE provides weekend service. In 2001 CTA instituted its Purple Line Reverse Commute Span of Service: In setting span of service for northbound Purple Line trains
leaving Downtown, CTA timed the first train to meet Metra's first northbound departure at Davis Street in Evanston, allowing approximately 10 minutes for the connection.

In 2003, there have been new CTA Evanston bus routes. When CTA re-designed its Evanston bus services, several routes were timed to connect with AM Metra express trips to Downtown. Specifically, the #93 was timed to meet early AM Metra downtown trips at Davis while the #201 southbound trips were timed to meet Metra downtown trips at Central. On the #96, trips were timed in both directions, both AM and PM, to meet Metra trains. Reliability of these timed connections has not been measured.

In 1997, the Downtown Owl Pulse at State/Washington was implemented involving bus-to-bus and bus-to-rail connections: Two rail lines and 7 bus routes pulse every 30 minutes Downtown at State and Washington from midnight until early morning. Buses hold for connecting passengers at :10 and :40 past the hour.

Downtown distributor shuttles that serve Metra Commuter Rail stations are tweaked periodically to improve connections. Based on the lack of detailed passenger transfer data between Metra and CTA, the CTA Planning Department relies heavily on customer feedback and field personnel observations in making these adjustments.

CTA has embarked on these schedule integration practices to improve the level of service offered to passengers especially in terms of reducing overall travel time. In other words, in instances where there are large enough headways, these schedule integration practices have been able to reduce passenger wait times, thereby reducing overall total travel time.

No information was provided concerning the effectiveness of these practices in meeting CTA’s overall objective of reducing wait times, nor information regarding any impacts, whether positive or negative, that these practices may have had.

The major barriers to the implementation of these schedule integration practices have been primarily operational. Matching even bus headways with erratic commuter rail headways has proven difficult. For buses, CTA's grid system proves difficult to coordinate connections.
because every route has dozens of connection opportunities that drive comparable volumes. In addition, headways frequently do not match well because they are determined, as a matter of policy, by passenger flow volumes at the peak loading point.

Generally, CTA's headways are frequent enough (less than 15 minutes) to not require timed transfers. There are longstanding issues regarding uniformity of operational practices. For example, the timing of when buses or trains should hold for arrivals and the means of communication and enforcement of this operational policy.

CTA learned a considerable amount about the tradeoffs inherent in implementing schedule integration practices. For example, timed connections often result in lower productivity for vehicle and crew schedules. One must consider the trade-offs between timed connections and running more frequent service for a given level of resources and expense. Another trade-off is evenly spaced headways versus somewhat erratic headways when trying to accommodate timed connections. Since there are tradeoffs between providing coordinated schedules or timed-transfers and productivity for vehicle and crew schedules, a systems approach should be used to reveal such tradeoffs so more fully-informed decisions may be made.

No additional schedule integration practices were identified to be implemented in the near future.

New Jersey Transit

New Jersey Transit has implemented intermodal / single agency schedule integration practices consisting of schedule coordination and transfer connection protection for every schedule change. These practices were implemented because New Jersey Transit is a statewide multimodal public transportation agency and such practices are part and parcel to its mission, which focuses on improving customer service as a central objective.

In New Jersey Transit’s view these schedule integration practices have been effective in helping the agency meets its objective.
Positive impacts resulting from these schedule integration practices include a decrease in transfer time and cost savings. The only negative impact has been the challenge associated with coordinating schedules.

The major barrier to the implementation of these practices for New Jersey Transit has been one of communication.

The key lesson learned has been the need to coordinate and communicate internally and to customers.

**CalTrain**

Caltrain is owned and operated by the Peninsula Joint Powers Board (JPB), which consists of three members from each of the JPB partners: San Francisco, San Mateo, and Santa Clara counties. The San Mateo County Transit District (SamTrans) is the managing agency that includes oversight of the contract operator, which has been awarded to Amtrak on a competitive basis.

Caltrain has implemented the schedule integration practices through the following measures:

- Interagency schedule coordination, single mode
- Schedule coordination among single mode and single agency
- Intermodal interagency schedule coordination
- Intermodal schedule coordination, single agency

For interagency schedule coordination, Caltrain has coordinated times with both limited and local trains as well as with BART at the Millbrae Intermodal station, and transfer connection protection but only for the last train of the day.

For intermodal schedule coordination with a single agency, Caltrain coordinates with SamTrans bus lines that connect with Caltrain at various transfer stations. There are timed transfers at major transfer stations such as Millbrae and Redwood City.
Caltrain initiated the implementation of such schedule integration practices in order to maximize ridership and create an express service for passengers traveling greater distances. Caltrain works with BART, SamTrans, and the Santa Clara Valley Transportation Authority in its interagency schedule integration practices.

Caltrain has stated that ridership has increased, that there has been an increase in the transit modal split, and a reduction in some parking-related issues. On the other hand, there has also been the creation of hubs with the most desirable services and overcrowding at some of the parking facilities.

The major barriers to implementation that arose include finding the technology to allow coordination of the trains to happen. Allocating the funds necessary for these schedule integration services has been a challenge. Finally, working with existing institutional structures and frameworks has brought additional challenges, including labor unions, company/management policy.

The primary lesson learned is that successful schedule coordination is crucial to serving the public and moving passengers safely and efficiently from origin to destination.

Caltrain plans to continue ongoing schedule integration practices with BART and SamTrans with the objective of assessing the needs of both the public and agencies and meeting those needs. Such practices at least consider the use of GPS to place on all trains to maximize coordination and communication.
Information Integration Practices

Ride On

Ride On has implemented the following information integration practices:

- Interagency transit trip itinerary planning initially implemented in the 1980s
- Interagency dissemination of user information such as maps and schedules, implemented in the 1980s
- Interagency marketing and advertising, implemented in 1999
- Interagency sharing of operational and planning data, implemented in the 1980s

Ride On implemented such practices to enhance customer convenience. Its main objective was to simplify the number of calls made by members of the public and an attempt to institute a form of “One-stop shopping”. Ride On is in Montgomery County, Maryland and it works with WMATA to implement these practices.

For interagency transit trip itinerary planning and interagency dissemination of user information, these practices have proved to be only partly effective in meeting Ride On’s objective; however, interagency marketing and advertising and interagency sharing of operational and planning data have been effective in meeting Ride On’s objective to enhance customer convenience.

There is no quantitative information available that measures the impact these information integration practices. Moreover, the impacts that such information integration practices have had on the delivery of public transportation services are unknown.

The major barriers to the successful implementation of these information integration practices were institutional and operational, including inter-agency cooperation and continuity of staff.

The main lesson learned is that participants need to be willing to work, that is, be invested as an actual stakeholder in a particular integration project.
In the near future, Ride On is considering the dissemination of real-time information as part of its suite of information integration practices, including the use of intelligent transportation systems.

**Loudoun County Transit**

Loudoun County Transit (LCT) has the following information integration practices:

- Intra-agency real-time information dissemination through a text messaging system that was implemented in 2003.
- Inter-agency real-time information dissemination through its RICCS system since 2003
- Interagency dissemination of user information such as maps and schedules through ongoing commuter connections

Loudoun County Transit worked to initiate these information integration practices with Metropolitan Washington Council of Governments (MWCOG) and the Northern Virginia Transportation Commission. However, LCT is participating with all metropolitan Washington D.C. transit operators.

LCT’s objective in introducing these practices was agency growth and interagency communication. These practices have been effective in helping Loudoun County Transit meet its objectives.

The only impact cited by Loudoun County Transit resulting from these information integration practices is an increase in ridership; no negative impacts are cited at all. However, no mention is made of any quantitative data to substantiate this.

No barriers to the implementation of these integration practices were mentioned; nor were any lessons learned cited from this experience either.

There was no mention of any further information integration to be implemented in the near future.
Camarillo Area Transit (CAT)

Camarillo Area Transit (CAT) is engaged in the following information integration practices:

- Interagency transit trip itinerary planning
  - Coordinating with the Ventura County Transportation Commission’s (VCTC) Bus Information and Scheduling Hotline (1-800-433-1112)
- Intra-agency real-time information dissemination
  - Is in the process of installing NEXTBUS signs at several city bus stops
- Interagency real-time information dissemination
  - NEXTBUS signs have been installed at several VISTA\(^{52}\) stops within the City of Camarillo.
- Interagency dissemination of other user information
  - VCTC distributes CAT schedules to requestors through its 1-800 telephone number.
- Interagency sharing of operational and planning data
  - Performed through the Transit Advisory Committee, which is a county-wide transit group.

Camarillo Area Transit has been working on information integration practices with the following Ventura County organizations:

- City of Thousand Oaks
- City of Simi Valley
- City of Moorpark
- South Coast Area Transit
- City of Ojai
- City of Fillmore
- Ventura County Transportation Commission

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\(^{52}\) VISTA = Ventura Intercity Service Transit Authority and operates seven regular bus routes and two general public dial-a-ride services.
CAT’s objective in implementing these practices has been to increase the level of service for its residents, especially in their intercity trips.

In terms of CAT’s information integration practices effectiveness in meeting its objectives, the following effectiveness ratings have been cited on a scale of 1 (not effective at all) to 5 (completely effective):

- Interagency transit trip itinerary planning: “3” rating
- Intra-agency real-time information dissemination: “2” rating
- Interagency real-time information dissemination: “2” rating
- Interagency dissemination of other user information: “4” rating
- Interagency sharing of operational and planning data: “1” rating

It has been difficult to measure the impact of these information integration practices and no mention was made of the existence of quantitative data to measure any impacts. For example, customer complaints are a constant in transit and it has been hard to determine whether or not any change in the volume of complaints may be attributable to any of these information integration practices.

Key lesson learned has been to work through a single agency with sufficient authority to make a difference.

City of Raleigh, Capital Area Transit

Capital Area Transit (CAT) has implemented the following information integration practices:

- Interagency transit trip itinerary planning
  - Online transit trip planner for CAT, TTA\(^5^3\), DATA\(^5^4\), and OPT\(^5^5\); implemented in 2003
- Interagency dissemination of user information such as maps and schedules

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\(^5^3\) TTA = Triangle Transit Authority  
\(^5^4\) DATA = Durham Area Transit Authority  
\(^5^5\) OPT = Orange County Public Transportation
o TTA schedules and maps are distributed at CAT’s Moore Square station information booth; unknown implementation date

- Interagency marketing and advertising
  o For special events; unknown implementation date
- Interagency sharing of operational and planning data
  o Limited sharing began in 2002.

These information integration practices were implemented by CAT, TTA, as well as the North Carolina State Department of Transportation.

CAT’s primary objective in implementing these integration practices was to enhance customer level of service and improve regional connectivity.

In terms of CAT’s information integration practices effectiveness in meeting its objectives, the following effectiveness ratings have been cited on a scale of 1 (not effective at all) to 5 (completely effective):

- Interagency transit trip itinerary planning: “3” rating
- Interagency dissemination of user information such as maps and schedules: “4” rating
- Interagency marketing and advertising: “4” rating
- Interagency sharing of operational and planning data: “4” rating

There is no quantifiable data with which to measure any impacts, however, CAT has received positive feedback from its riders on the trip planner.

The major barriers to the successful implementation of these information integration practices were administrative in nature, specifically related to overcoming staff reluctance to initiate these integration measures.

The primary lesson learned from this experience is to realize how important it is to realistically estimate the resource needs to provide accurate and timely information. Incomplete resources
can/does lead to inaccurate delivery of information and associated customer complaints. It is necessary to estimate more realistically the resources that the project would require to successfully deliver the intended product. Moreover, it is crucial that to make sure that the system is ready to go live when it goes live.

In the near future, CAT is planning to implement an IVR system within the next six to nine months. Once again, its primary objective is to enhance customer service.

*City of Fairfax CUE Bus*

The City of Fairfax CUE Bus has implemented the following information integration practices:

- Interagency transit trip itinerary planning
  - Has been implemented in concert with WMATA
- Interagency real-time information dissemination
  - GPS/AVL for real time bus arrival information, August 2001
- Interagency dissemination of user information such as maps and schedules
  - Has been implemented with WMATA and Northern Virginia Transportation Commission (NVTC)
- Interagency marketing and advertising
  - Has been done through NVTC
- Interagency sharing of operational and planning data

These information integration practices were implemented because regionally, that is, in concert with the NVTC, WMCOG, and WMATA, it was desired to have a unified source of information to make it easier and more convenient for users of public transportation.

The city of Fairfax works with all other transit agencies in the greater metropolitan Washington area in implementing information integration practices.

The primary objective in implementing these integration practices was to enhance cooperation among public transportation agencies in the region by means of a unified way of disseminating information to enhance level of service for public transportation users.
In terms of the City of Fairfax’s information integration practices effectiveness in meeting its objectives, the following effectiveness ratings have been cited on a scale of 1 (not effective at all) to 5 (completely effective):

- Interagency transit trip itinerary planning: “3” rating
- Interagency real-time information dissemination: “1” rating
- Interagency dissemination of user information such as maps and schedules: “2” rating
- Interagency marketing and advertising: “3” rating
- Interagency sharing of operational and planning data: “3” rating

There is no quantifiable data with which to measure any impacts, however, Fairfax has observed a decrease in customer complaints and fewer inquiries. However, people’s dependence on real time bus arrival information grows and when the system is down, there naturally is a sizable increase in inquiries.

The major barriers to the successful implementation of these information integration practices were:

- Technological: Each system wanted its own version
- Financial: Not every system had sufficient funds
- Institutional: The decision-making process naturally varies from agency to agency and this can slow down the implementing the practices on a regional basis.

The primary lesson learned from this experience is that since not everyone is on the same timetable, it will take time to do the integration and be successful at it. Also, the most important element for the political decision-makers is to be convinced about the benefits of integration.

The implementation of information integration practices will continue in the near future, again in the context of coordinated regional deployment with NVTC and WMATA and again for the objective of enhancing customer service in a unified and cooperative fashion.
Golden Gate Bridge Highway and Transportation District

Golden Gate Bridge Highway and Transportation District (GGBHTD) has implemented the following information integration practices:

- Intra-agency intermodal transit trip itinerary planning
  - 511 Trip Planner, 2004
- Interagency transit trip itinerary planning
  - 511 Trip Planner, 2004
- Interagency dissemination of user information such as maps and schedules
  - 511 Trip Planner, 2004
- Interagency marketing and advertising
  - Various regional efforts over the past 20 years

These information integration practices were introduced by the regional transportation planning organization in the San Francisco Bay Area, the Metropolitan Transportation Commission (MTC). The following factors motivated GGBHTD to implement these information integration practices:

- Customer requests
- Internal efficiency
- External requirements from MTC.

GGBHTD’s primary objective in implementing these integration practices was to enhance customer level of service and improve their own cost effectiveness.

In terms of GGBHTD’s information integration practices effectiveness in meeting its objectives, the following effectiveness ratings have been cited on a scale of 1 (not effective at all) to 5 (completely effective):

- Intra-agency intermodal transit trip itinerary planning: “4” rating
- Interagency transit trip itinerary planning: “3” rating
- Interagency dissemination of user information such as maps and schedules: “3” rating
- Interagency marketing and advertising: “3” rating
There is no quantifiable data with which to measure any impacts, whether positive or negative.

The major barriers observed thus far to the successful implementation of these information integration practices have been institutional, financial, and technological.

The primary lesson learned from this experience forewarns about the complexity of the endeavor and the need to prepare in advance for challenges and barriers.

In the near future, GGBHTD is working on additional internal — intra-agency — information integration practices. Its primary objective is to improve cost-efficiency. These new practices will likely involve the use of intelligent transportation systems, namely, integrated business systems.
Special Events / Emergency Conditions Integration Practices

**Loudoun County Transit**
Loudoun County Transit (LCT) has implemented the following special events / emergency conditions integration practices:

- Interagency planning/coordination for expected special events
  - Multiple special events that occur in District of Columbia such as protests, inaugural events, funerals
- Interagency planning/coordination for expected emergency conditions
  - Emergency situations in the District
- Interagency planning/coordination for unexpected
  - Special events
  - Emergency conditions: Coordination with other regional transit operations in the event of emergency evacuation of the District or closure of Metro Rail

The primary motivation for these integration practices were the events of September 11, 2001. The Metropolitan Washington Council of Governments introduced these special events/emergency conditions integration practices. Loudoun County Transit works with all other District transit operators on these practices. Loudoun County Transit’s main objective in implementing these integration practices is to help insure that all transit riders reach their homes safely and in a timely manner.

In terms of the Loudoun County Transit’s special events / emergency conditions integration practices effectiveness in meeting its objectives, the following effectiveness ratings have been cited on a scale of 1 (not effective at all) to 5 (completely effective):

- Interagency planning/coordination for expected special events: “5” rating
- Interagency planning/coordination for expected emergency conditions: “3” rating
- Interagency planning/coordination for unexpected special events: “3” rating
- Interagency planning/coordination for unexpected emergency conditions: “3” rating
Loudoun County Transit reports that only a minimal decrease of ridership has occurred on special event days; otherwise, there is no mention of any other impacts that such special events or emergency conditions have had on the metropolitan Washington D.C. transportation system. Moreover, there is no mention of any data available to quantify any impacts of these integration practices.

The only barrier to the implementation of these integration practices was inter-agency communication; nor were any lessons learned cited from this experience either.

There was no mention of any further information integration to be implemented in the near future.

Greater Bridgeport Transit Authority
The Greater Bridgeport Transit Authority (GBTA) has implemented the following special events / emergency conditions integration practice:

- Interagency planning/coordination for expected emergency conditions
  - The Authority regularly participates in emergency planning with the Bridgeport Office of Emergency Planning since 2001.

The City of Bridgeport Office of Emergency Management initiated this emergency conditions integration practice after the events of September 11, 2001. GBTA works with all emergency service providers in the region including fire, EMS, police, and utilities. GBTA’s primary objective in implementing this emergency conditions integration practice was to improve response time, communications, and coordination of service among agencies in the event of an emergency.

In terms of GBTA’s emergency conditions integration practice’s effectiveness in meeting its objectives, GBTA rated its interagency planning/coordination for expected emergency conditions as completely effective, giving it a “5”, the highest rating.
GBTA did not cite any performance measures with which it ascertains the effectiveness of its emergency conditions integration practice. Moreover, there is no quantitative information available that measures the impact, positive or negative, of the emergency conditions integration practice.

No barriers were cited to the implementation of this integration practice; nor were any lessons learned cited from this experience either.

There was no mention of any further special events / emergency conditions integration to be implemented in the near future.

**CT Transit**

CT Transit has implemented the following special events / emergency conditions integration practice:

- Interagency planning/coordination for expected emergency conditions

CT Transit introduced and began implementing this integration practice because it was directed by the Connecticut Department of Transportation (CDOT) to be a resource for providing emergency bus service in the event of disruption to rail service on the Metro-North branch lines and the Shore Line East. CT Transit works with CDOT Rails Division and the Metro-North Railroad in implementing this integration practice. CT Transit’s objective for implementing this practice was to make its vehicles and operators available to maintain service for rail passengers in the event rail operations were disrupted.

In terms of CT Transit’s emergency conditions integration practice’s effectiveness in meeting its objectives, GBTA rated its interagency planning/coordination for expected emergency conditions as completely effective, giving it a “5”, the highest rating.

CT Transit indicated that providing emergency fill-in service for the Metro-North branch lines and the Shore Line East happens on an as necessary basis, which has occurred at least once a
month. The positive impact is to insure that transportation for rail passengers continues; however, response times to provide this backup service for rail suffers from unrealistic expectations and this has contributed to the only barrier to successful implementation of this practice.

The key lessons learned cited from this experience deal with the need for cooperation and partnership at all levels of the organization including senior management involvement in developing the basic agreements to provide emergency service as well as supervisory-level staff to implement the service when called upon. In the near future, emergency preparedness plans with other local agencies will continue to be developed and updated in order to be as effective a resource as possible to support other agencies as directed by CDOT. Currently, there will likely not be involvement of intelligent transportation systems technologies in these future practices.

*Washington Metropolitan Area Transit Authority (WMATA)*

WMATA has implemented the following special events / emergency conditions integration practice:

- Interagency planning/coordination for unexpected emergency conditions

WMATA introduced and began implementing this integration practice because of the events of September 11, 2001. WMATA works with all regional bus transit agencies, two commuter rail roads, Amtrak, the Metropolitan Washington Council of Governments, and the state Departments of Transportation of Maryland and Virginia and the Washington D.C. Department of Transportation. WMATA’s objective for implementing this practice was to establish improved interagency communications following the events of September 11, 2001. Moreover, WMATA has worked closely on scenerios to better to prepare all players in the event of a number of different types of events that could disrupt service and especially those that require closer communication and cooperation.

In terms of WMATA’s emergency conditions integration practice’s effectiveness in meeting its objectives, WMATA rated its interagency planning/coordination for unexpected emergency
conditions as partly effective, giving it a “3”, out of a total of 5, where “1” means least effective and “5” means “completely effective”.

Transit and highway agencies are frequently communicating each other when events occur that could disrupt part or all of the regional transportation network. The results have been quicker responses to events, better cooperation and support with alternative options for customers and generally a better response to emergency situations and vastly improved customer communication regarding events, delays that can be expected and alternatives, if any. The only negative impact is that more work needs to be performed and that there are no immediate alternatives during an event. However, there is no data to quantify this information.

In terms of barriers to the implementation that have arisen, money seems to be scarce and thus efforts have been limited to easily and cost effective means. These efforts have been primarily in conference call, telephone, internet technologies. One factor that has made matters more complex is dealing with the large number of different institutions and organizations that are now part of overall emergency response endeavor.

The key lessons learned cited from this experience deal with the need to know the institutional players and be able to communicate with appropriate points of contact on a 24/7 basis. Moreover, it is important to meet, discuss, and practice/rehearse different emergency condition scenarios. The scenarios are critical and help define what is actually likely to happen whether planned or not. Critiques are very useful to further develop techniques to improve during emergencies. Use of these tools during major traffic incidents, weather related delays, and major demonstrations will help prepare for other more serious unexpected emergency events.

In the near future, regional plans call for future technology improvements, additional scenario practices and continued coordination between agencies.

City of Fairfax CUE Bus

The City of Fairfax CUE Bus is currently in the process of implementing special events / emergency conditions integration practices. It is familiar with the implementation of these
integration practices and has participated in the preparation of a Regional Emergency Evacuation Transportation Coordination Plan.

In the near future, the City of Fairfax CUE Bus will continue to be involved in preparation for special events such as the Fourth of July celebrations and exercises involving emergency conditions and integrating coordination efforts for these activities, which will be done through the auspices of the Metropolitan Washington Council of Governments, the regional Metropolitan Planning Organization. Its objectives in implementing such practices are to make sure that each participating agency is familiar with the coordination process that has been established. These practices will involve the use of intelligent transportation systems technologies including surveillance cameras, variable message signs, cellular phones, traffic signal coordination, and GPS/AVL systems on buses.

**Golden Gate Bridge Highway and Transportation District**
The Golden Gate Bridge Highway and Transportation District (GGBHTD) has implemented the following special events / emergency conditions integration practices:

- Interagency planning/coordination for expected special events
  - Latest examples are San Francisco Giants baseball home games
- Interagency planning/coordination for expected emergency conditions
  - Ongoing since the 1970s
- Interagency planning/coordination for unexpected special events
  - Ongoing since the 1970s
- Interagency planning/coordination for unexpected emergency conditions
  - Ongoing since the 1980s

GGBHTD began implementing special events / emergency conditions integration practices as soon as transit service was established because GGBHTD is a public transportation resource. In addition to GGBHTD, the California Office of Emergency Services and the San Francisco Bay Area’s Metropolitan Transportation Commission along with local police and fire departments
introduced these integration practices. GGBHTD’s main objective for implementing these integration practices is to provide an effective response with minimal negative financial impact.

In terms of GGBHTD’s special events / emergency conditions integration practices effectiveness in meeting its objectives, the following effectiveness ratings have been cited on a scale of 1 (not effective at all) to 5 (completely effective):

- Interagency planning/coordination for expected special events: “3” rating
- Interagency planning/coordination for expected emergency conditions: “3” rating
- Interagency planning/coordination for unexpected special events: “3” rating
- Interagency planning/coordination for unexpected emergency conditions: “3” rating

The impacts, positive and negative, of these special events / emergency conditions integration practices are generally unknown. Certainly, no data is available with which to quantitatively evaluate the effectiveness of these practices. However, special event services are well received and appear to foster support for public transit. Regulatory, jurisdictional, institutional, financial, and technical barriers were cited as being present and that needed to be overcome.

The only lesson learned cited from this experience deal with the complexity of the endeavor.

In the near future, GGBHTD will continue to participate in refinements to the Regional Transportation Response Plan and in special events planning as the need arises. The objective will again be to provide an effective response with minimal negative financial impact. There will likely not be the use intelligent transportation systems technologies in these practices.