"A Transit Pass in Everyone's Hand?" - Implementing Unlimited Access Pass Programs as a Strategy to Increase Transit Ridership

By

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B.S. Business Administration
University of Redlands, 1996

Submitted to the Department of Urban Studies and Planning on August 13, 2004 in partial fulfillment of the requirements for the degree of

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ABSTRACT

Unlimited Access Pass (UAP) Programs -- arrangements between transit agencies and universities that provide transit passes to group members at a heavily discounted rate through a group purchase program -- have become a successful tool to increase ridership and decrease vehicle miles traveled (VMT) and parking demand while yielding an equivalent fare value to transit agencies. Due to the prepaid and discounted nature of the pass these programs level the playing field between the automobile and transit by virtually eliminating the perceived out-of-pocket cost of taking transit. In addition, by capturing the cross-subsidies within a functional entity, such as a university or employer, this technique has the potential to internalize the otherwise external benefits of transit use, such as reduced pressure on limited amount of expensive parking supplies and access roads. It thereby achieves a "win-win" outcome for all of the primary affected groups, while maintaining equitable revenues, increasing ridership and improving off-peak utilization.

Despite the apparent success of such programs, particularly with university students, many agencies, especially the largest ones in the United States, have not offered this type of university program, let alone considered a larger scale program targeting different market segments, such as hospitals or other large employers.

Drawing on case studies of three agencies that offer successful university and employer UAP programs, this thesis shows that innovative program design allows the agencies to address the most common concerns. It examines why and how UAP programs work and provides a set of implementation guidelines including a recommended pricing model that allows for an equitable and effective way of capturing revenue increases related to ridership growth induced by UAP programs.

The lessons learned are then applied in form of a university pass program at the MBTA in Boston, suggesting program designs, pricing alternatives and estimating impacts on the transit agency, universities and unlimited access pass holders.

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Sponsorship
This thesis was partially supported by a research assistantship funded by MIT research projects with the Massachusetts Bay Transportation Authority and the Chicago Transit Authority.

Biography
Ursula Hester received her BS in Business Administration from the University of Redlands in 1996 with departmental honors. She spent five years working in the computer industry in Silicon Valley before deciding to pursue her interests in Urban Planning and Transportation at MIT.

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Prologue

The increase of car use in America – while providing much needed mobility in an increasingly mobile world – has had considerable negative impacts on our lives. Longer commutes, with respect to distance and time, have increased transportation costs and decreased leisure time. Time that used to be spent with family, friends, relaxing and being "socially productive" is now spent in an angry frenzy stuck in rush hour traffic. Contrary to the opinion of some economists, environmental externalities of driving have not been eliminated by the cleaner emissions technology of recent years. In fact, any gains have been offset by a sharp increase in vehicle miles traveled. Impacts range from poor air and water quality to loss of natural assets, such as wetlands, to noise impacts. From an urban planning standpoint, wide roads and highways divide neighborhoods, discourage walking and bicycling and are anything but aesthetically pleasing. For businesses, the cost of goods movement is increased as millions of dollars are wasted through a loss of productivity caused by traffic congestion. Yet, we keep on driving, because the alternatives are few and far in between, often expensive and inconvenient.

Public transit is a viable alternative to driving in urban areas that have the density required to support mass transit. Most major cities have some form of public transit, however, in North America, service is often not as frequent as necessary for it to be a reliable and convenient commuting choice and transit agencies have been struggling to increase ridership and maintain their mode share. But adding the frequent service required increases the need for public subsidy when government austerity makes this difficult. Securing funding to cover operating expenses and capital expansion projects is an ongoing challenge. Traditionally, the way agencies have dealt with the need to control their financial situation, has been to increase fares or decrease service, both of which result in ridership losses, which in turn might result in further decreases in service and so on. In order to avoid this downward spiral, turning to ridership increases as a starting point seems to be part of the solution agencies are seeking. The million dollar question is how this can be accomplished.

A few transit agencies have found a way to increase ridership by responding to the plea from universities to help them achieve their transportation goals. The U-Pass program was created – a group purchase program that allows universities to purchase passes for all their students for the same total amount the transit agency collected from student riders before the U-Pass was introduced. The concept is simple: by spreading the cost of transit across more people, the individual's cost drops significantly, a model similar to an insurance model. Students receive an unlimited access pass (or can use their student ID to ride transit), prepaid at the beginning of the year or semester. As transit now appears to be free, ridership in almost all cases has increased significantly. Many people argue that Americans love their cars and independence too much to give them up, but that argument is flawed. Among other things it ignores the fact that "free" parking provided to employees is in fact subsidized by employers and provides an incentive toward driving rather than taking transit. Given reasonable alternatives, a percentage of the population will choose alternative methods of transportation over driving alone. It is not a black and white issue either – replacing a few automobile trips with public transit trips makes a difference and does not require that everyone abandon his/her car or make a large lifestyle change.

When I reviewed unlimited access pass programs closer, two characteristic stood out: the initial ridership levels in almost all of the programs were relatively low and only one of the ten largest transit systems in the U.S. currently offers this type of program. Could it be that this program is

more suitable in areas where the initial ridership is low, which translates into a low per-person pass price that is acceptable to students and employees? Would an unlimited access pass program work in a large system where the initial ridership is much higher? These questions and their relevance to the MBTA in Boston became the starting point for the research described in this thesis.

Executive Summary

Introduction

Unlimited Access Pass (UAP) Programs -- arrangements between transit agencies and universities that provide transit passes to students at a heavily discounted rate through a group purchase -- have become a successful tool to increase ridership and decrease VMT and parking demand while yielding an equivalent fare value to transit agencies. Despite the apparent success of such programs, particularly with students, many agencies, especially the largest ones in the United States, have not offered this type of university program, let alone considered a larger scale program targeting different market segments, such as hospitals or other large employers. In general, unlimited access pass programs are viewed as fringe programs that provide special discounts to a subset of the population.

Conversations with transit agencies revealed several reasons, most notably a fear of revenue loss and abuse of the program, lack of knowledge about this type of program, limited resources to study and implement new programs and concerns about political and equity considerations.

The goal of this research is to generate a set of guidelines for implementing unlimited access pass programs, drawing on case studies of three successful programs. This includes defining an effective and equitable pricing model that assists transit agencies in fulfilling their goal of increasing ridership and revenue. This thesis aims to present unlimited access pass programs not merely as special niche programs for universities, but as an effective tool to increase ridership and revenue that can be successful in a variety of settings and has the potential for widespread application. The research tests the program's applicability in a setting where ridership is already high, leading to higher per person pricing than that of most existing programs, and where agencies have been hesitant to try new and innovative approaches. It concludes with an implementation plan for a pilot U-Pass (University UAP) program at the MBTA in Boston, which targets both students and university employees.

Context/Challenges

Finding innovative ways to increase ridership and agency revenues has become more important than ever. Federal funding sources for transit agencies' operating expenses have vanished, obtaining local financial support is often difficult and farebox revenues are not keeping up with

operating costs. Transit agencies find themselves in the position to have to cut service, increase fares or both, none of which is an alternative that encourages transit ridership and promotes long-term growth. Targeting existing and future choice riders with a UAP program that reduces their transportation costs and makes transit an attractive option presents a more positive, politically acceptable way of increasing ridership and revenue.

How UAP Programs Work

The UAP program manages to address a few fundamental problems the transit industry faces. First, it levels the playing field between driving and taking transit by reducing the out-of-pocket cost of transit to zero. By using payroll deduction or charging students as part of tuition or student life fees once or twice a year, transit expenses become as much a sunk cost as automobile expenses. Second, as any pre-paid period pass, the unlimited access pass takes the punishment out of transferring. Where transit agencies do not offer free transfers, customers often perceive the agency's attempt to charge for the amount of service provided as punishment: not only do they have to transfer to reach their destination, which adds inconvenience and time, but they also have to pay more. Third, a UAP program often succeeds in what is much more difficult to achieve in a larger context: taxation or cross-subsidies benefiting transit service that, due to its localized nature, is only available to a small portion of the population. In the case of the unlimited access pass, the cross subsidy occurs within a real or perceived community of interest, where all members feel that they can gain something, either from being able to have inexpensive access to transit or by experiencing the positive side effects of the program, such as less congestion and air pollution. Last, all participating parties experience positive impacts: agencies see an increase in ridership and revenue and positive public relations as a result; universities and employers value a decrease in parking demand and the positive effects of the UAP on recruiting and retaining employees and students; the city benefits from less congestion and air pollution and students and employees receive unlimited access to the transit system at a fraction of the regular price. Disadvantages are limited to the need for concerted efforts in marketing the program to ensure its success and to the user cost to those individuals who choose never to take transit.

Lessons Learned from Successful Programs

This thesis draws lessons from the U-Pass program at the Chicago Transit Authority, the College Pass and EcoPass programs at Denver Regional Transit District and from the U-Pass and FlexPass programs at Metro Transit in King County, WA. In examining these programs in details, best practices were produced with regards to pricing, technology and fraud prevention and political acceptance and findings summarized below:

Pricing Strategy

Pricing the pass according to actual ridership levels is the recommended alternative, as it allows for equitable treatment of customers (universities and/or employers) located in different areas that are characterized by different service levels, and guarantees the agency fair compensation for its services. This can be achieved initially by relying on automated fare collection (AFC) data or – more commonly – on surveys or existing pass sales to establish a basis for the amount to charge the institution. As ridership increases, pricing should be adjusted based on a per trip price (ideally based on the average fare collected per trip before the UAP introduction), which will proportionately contribute to future need for service increases. The agency can build administrative and marketing expenses into the pricing model in order to share them with the organization and the end users.

Technology and Fraud Prevention

The transit agencies studied found different ways of dealing with potential abuse, although none named it as a significant problem. Using the university or company ID as a transit pass minimizes abuse, as pass holders need their IDs for other purposes. Alternatively, the transit agency can issues passes with the pass holders photo. In both cases, occasional spot checks are necessary. Automated fare collection facilitates data collection, provides data for revenue adjustments as ridership increases and reduces the risk of abuse, but it is by no means a prerequisite for successful implementation of the program. Both Denver RTD and Metro Transit have fared well without AFC.

Political acceptance

In order for the program to be successful, both the organization as well as its members, the end-users, need to understand the benefits of the program. Most unlimited access pass programs

have been implemented in systems where initial ridership was low and pricing subsequently was low enough to be acceptable to end-users. In more successful urban systems with relatively high initial ridership numbers, this might not be the case. The solution to the problem lies in recognizing that "free" parking is not free, but subsidized by employers, and that providing an equivalent transit subsidy may create the potential for organizations to save money by not having to provide as many parking spaces. This gives them an incentive to subsidize a UAP program to the extent that it becomes acceptable to its members. In some areas, organizations struggle to comply with mandated Clean Air Act VMT reductions, and the UAP program provides a tool for them to reach their goals. Combining unlimited access pass programs with other transportation programs or tying in merchant benefits increases the likelihood that the program will be viewed as positive. And as long as it is made available to any organization that wants to participate and prices are adjusted to reflect actual use, equity issues can be minimized.

Pilot Program with MIT and Harvard at the MBTA

The program and pricing model designed as a pilot program at the MBTA with MIT and Harvard shows that all parties would gain significantly by participating. Program alternatives include two types of coverage: limited to subway and bus service or including commuter rail service.

Assuming that the university will maintain its current transit pass subsidy and that participation is mandatory for students and employees, MIT students and employees would pay between $10.33 and $12.33 a month (depending on coverage area, the higher price includes access to commuter rail). This is just over a quarter of their current price of a Combo+ pass at $39.50. At Harvard, the price would range from $9.73 to $12.16 compared to a current employee cost of $47 to a currently unsubsidized cost of $68 for students. Including an opt-out alternative at the university level would increase the price per student/employee, but would have little impact on ridership and thus the expected results at the university and transit agency level.

Assuming that ridership increases by 22.5% (calculated based on fare elasticity for the Boston area) and estimating that half of that represents a switch from SOV travel, MIT could save up to $1,187,854 in costs related to leasing of or debt services for parking spaces. Harvard's potential savings could amount to as much as $2,364,131, enough to increase its subsidy in

future years to cover the increase in cost associated with an increase in ridership. Based on the same assumptions, the MBTA would experience a revenue increase of $2,113,303 combined from both pilot programs after the first years of operation.

Given the potential for such a significant positive financial impact, gaining support for this type of program should not be a difficult undertaking. In addition to universities, employers and their members, the cities of Cambridge and Boston as well as environmental groups should have reason to support the MBTA in its efforts to increase ridership and revenue and decrease SOV travel through a program that celebrates its customers instead of burdening them with fare increases and service cuts. It makes sense to start this program with Harvard and MIT, which are both located in Cambridge, a municipality with unusually strong VMT reduction regulations that provide added incentives for the universities. After establishing a success with a pilot university program, it should be possible to expand the program to other universities, medical centers and large employers.

Challenges of Moving Forward

Ultimately the success of a UAP program hinges on the acceptance of those who pay the bill, whether that is the pass recipient or the participating organization. This points towards a need for the MBTA and other transit agencies to educate existing and new institutional and corporate customers on this type of program and assist them in marketing it to their members to gain support. Similarly, universities and employers will have to put resources into reaching out to students and employees to communicate the value of a UAP program. Packaging the U-Pass program with improvements in other transportation services or tying it to parking fees are two ways to overcome potential resistance to the concept. There might be good reason to subsidize employees more than students (who already pay a student life fee for services around campus) or students more than employees (on the basis that employees can use pre-tax dollars to pay for their passes and thus effectively pay less than students). Whether or not to include commuter rail service is a similarly important consideration: on one hand it gives much larger discounts to commuter rail riders than to all others, on the other hand, people driving in from the suburbs who could be using commuter rail are a very important group to target when trying to reduce SOV travel. While this thesis offers suggestions one how the program could be

structured, the final details are likely be different based on each organization's current situation and program goals.

Next Steps

Further research would explore a broader employer based program in detail, including a survey of organizations in order to judge their level of interest given the expected pay-offs. After using the pilot program with MIT and Harvard to test the concept, the MBTA has a great opportunity to expand the program to the numerous colleges and universities in the Boston area, including Boston University, Boston College, Northeastern and Suffolk University. Downtown businesses and medical institutions in the Longwood Medical Area provide another target market for future expansion. The work done for the MBTA also points towards lessons for the CTA. It suggests that a revised pricing strategy following the MBTA pilot program example could make the program more equitable, thereby increasing its appeal to colleges and universities less well-served by transit, and would allow the CTA to capture revenue increases as ridership goes up. It also points toward opportunities for an employer-based EcoPass program in areas where parking is scarce and expensive.

1) Research Objectives and Methodology

1.1 Research Objectives

Unlimited access pass (UAP) programs started as bulk purchase agreements between transit agencies and universities that provide transit passes to students at a heavily discounted rate. The steep discount is achieved by spreading the cost of riding transit across all members of the university community, effectively reducing the end-user cost significantly while maintaining equivalent fare value for the agency. The goal is an increase in ridership and a decrease in SOV travel along with the related congestion, pollution and parking needs. Participating universities have documented significant benefits ranging from reduced parking demand to increased university access for students and employers are citing the pass as an attractive employee benefit. Transit agencies have reported an increase in ridership and improved relations with their large customers and to date no program has been terminated. By all accounts, this type of arrangement seems to be a win-win situation for all parties involved. Nevertheless, almost all U-Pass (University UAP) programs have been implemented in small agencies, either outside of major urban areas or in new, growing systems with relatively low transit mode share. Among the ten largest transit authorities in the country, only the Chicago Transit Authority (CTA) has implemented a type of unlimited access pass program[1]. Given that even the most established transit agencies across the country are struggling to attract or maintain ridership, why are not more offering unlimited access pass programs or expanding their existing programs to new population groups?

In their U-Pass program overview Brown, Hess and Shoup only marginally address the question of why some universities have not implemented U-Pass programs despite availability through their local transit agency, citing unawareness and high start-up costs as main reasons. They argue, however, that more and more universities are in fact offering U-Pass programs, a trend, which has proven to continue throughout the early years of the 21st century in the United States and Canada. This holds true for transit agencies as well, with the most recent program introduction having taken place at the Orange County Transit Association in January of 2004.

[1] U-Pass programs are currently not available at the MTA (NYC), New Jersey Transit Corporation, Washington Metropolitan Area Transit Authority, Los Angeles County MTA, Massachusetts Bay Transportation Authority, Southeastern Pennsylvania Transportation Authority, San Francisco Bay Area Rapid Transit District, Metropolitan Atlanta Rapid Transit Authority and the Maryland Transit Administration (9 of the 10 largest transit agencies during FY 2002 ranked by passenger miles)

However, in general, unlimited access pass programs are viewed as fringe programs that provide special treatment to a subset of the population.

Conversations with transit agencies revealed several reasons why transit agencies have not implemented UAP programs, most notably a fear of revenue loss and abuse of the program, lack of knowledge about this type of program, limited resources to study and implement new programs and concerns about political and equity considerations.

The goal of this research is to generate a set of guidelines for a successful implementation of unlimited access pass programs, whether they target universities, employers or other population groups. This includes defining an effective and equitable pricing model that assists transit agencies in fulfilling their goal of increasing ridership and revenue. This thesis aims to present unlimited access pass programs not merely as special niche programs, but as an effective tool to increase ridership and revenue that can be successful in a variety of settings and has the potential for widespread application. The research tests the program's applicability in a setting where ridership is already high, leading to higher per person pricing than that of most existing programs, and where agencies have been hesitant to try new and innovative approaches. It concludes with an implementation plan for a pilot U-Pass (University UAP) program at the MBTA in Boston.

1.2 Research Approach

Case Study approach

The case study approach is a commonly employed research method for understanding complex issues or, in the case of this thesis, programs. I chose this method because it allowed for a contextual analysis of all different aspects of unlimited access pass programs and provides a basis for applying the program in a different setting. Each case draws from both primary and secondary data sources, mainly interviews with transit agencies and universities, reports and other published sources.

Case Selection

In order to determine which unlimited access pass programs to study in detail, I had to find cases that would prove most valuable in providing guidelines for application to the MBTA. The criteria for case selection are outlined below:

- The transit agencies serve large metropolitan areas
- They represent a range of different transit ridership levels and geographic locations
- They represent bus only, bus & light rail and bus & subway systems
- They represent agencies offering a spectrum of university, employer and neighborhood pass programs
- They offer the program to more than one organization

Additional interviews were conducted with other transit agencies to obtain general knowledge about their pass programs, specifically unlimited access pass programs or lack thereof.

Application to MBTA

In this section I designed program alternatives, developed pricing and implementation strategies and evaluate impacts for the application of a new U-Pass program at the MBTA. MIT and Harvard University are analyzed as potential pilot program participants because of their interest and their location in Cambridge, which has unusually strong SOV reduction regulation. This step includes the application of lessons learned from the case studies and basic financial modeling.

Generalized Conclusion

In addition to the specific application to the MBTA, general guidelines and conclusions applicable to any transit agency interested in implementing an unlimited access pass program are generated and presented.

2) Problem Definition and Background

2.1 Public Transit in the U.S.

Public Transit in the United States makes up 1.5% of all trips (NHTS, 2001), a small percentage compared to other parts of the world. Reasons for that are numerous, ranging from decades of auto oriented developments and continuing suburbanization to years of disinvestment in the public transit system. A 77% decline in federal operating assistance per passenger over the last 11 years (in fact, operating subsidies were cut entirely for most agencies) has left transit agencies relying increasingly on state and local funding to make up the difference between farebox revenue and operating expenses (FTA, 2001). This leads to a system dependent on local sales or property tax revenue that fluctuates heavily depending on the economic health of the region. During the most recent recession, many agencies have been faced with the difficult choice of increasing fares or cutting service, both of which have the self-defeating consequence of further decreasing ridership and increasing people's reliance on the automobile.

While the majority of transit agencies have seen a recent growth in absolute numbers of riders and trips, particularly during the economic boom in the second half of the 1990s, public transit's mode share has been decreasing slowly but steadily, as can be seen from 2000 U.S. Census commute to work figures. While the number of commuters taking transit to work remained stable at about 6 million, the transit share of commute modes fell from 6.2% in 1980 to 5.1% in 1990 and to 4.6% in 2000 (U.S. Census, 2000). Since census numbers only capture commute to work data, they only tell part of the story in terms of public transit's mode share of all trips. In fact, the 2001 National Household Travel survey reported a similar transit work trip mode share as the census data (4.9%); however, it also reveals that less than 30% of all trips were commute to work/school trips and that the overall mode share of all trips was 1.5%. The data suggest that transit mode share of non-work trips is significantly lower than that of journey-to-work trips.

Most transit systems in North America are far from reaching capacity, especially during off-peak perios, and agencies have an interest in building ridership not only to cover a larger portion of their operating expenses but also to build political support for public transit at the local level, which is necessary to secure funding. Additionally, the FTA has put more emphasis on attracting new riders and is challenging transit agencies to increase ridership by 2% nationwide.

A decline in ridership needs to be avoided, because it can catapult an agency into a vicious cycle of decreased funding, service cuts and fare increases, which ultimately lead to a further decline in ridership. In the spirit of self-preservation, transit agencies must look towards measures that will lead to an increase in ridership as a starting point in making gains toward a larger role of public transit in the overall transportation picture in the United States.

Factors affecting transit ridership include many exogenous ones, such as the health of the economy, income, demographics, job/housing balance, the cost of driving and the levels of traffic congestion in the respective cities. They also include internal factors, such as fare and service policies. While the state of the economy proves to be one of the most important factors affecting transit ridership, internal factors can play an important role. A survey of transit agencies that have shown above-average ridership increases during the 1990s points towards the importance of fare and service policies and marketing in attracting and retaining riders. Table I summarizes these factors (Taylor, 2002).

Factors Attributed to Ridership Growth in Survey		
Internal Factors	Fare Changes & Innovation	Fare decreases or freeze
		Universal fare coverage programs
		Introduction of new payment options
	Marketing & Information Programs	Advertising
		Niche marketing/market segmentation
		Survey research
		Customer satisfaction feedback mechanisms
	Service Improvements	Expansion of routes (geographic/temporal)
		Introduction of new/specialized service
		Route restructuring
	Amenities/Service Quality	Development of transit centers
		Development of park-and-ride facilities
		Increasing frequency/reliability of service
		Cleanliness of vehicles
		New equipment/rolling stock
		Bus stop improvements (signage, shelters, benches)
	Partnerships	Community outreach/education
		Planning & strategies
		Intra-agency collaboration
External Factors	Population Growth	More immigration
		Rising transit dependency (agency populations, etc.)
	Strong Economy & Employment Growth	Increased tourism
		More demand for travel
	Changing Metropolitan Form	Suburbanization
		Residential & employment relocation
	Changes to Transportation System	Increased congestion
		Parking shortage and increasing costs
		Rising gas prices
		Construction projects and time delays

Table 1: Factors Attributed to Ridership Growth
(Source: 2002 MTI Report 01-22)

2.2 Overview of Pass programs, including Unlimited Access Pass Programs

Pass programs

Over the years trends in fare policy have shifted noticeably. When transit systems gradually switched from private to public ownership, there was a shift from differentiated fares (such as zone-based or peak/off-peak differentials) to a flat base fare in an effort to simplify the process and enhance the rider experience. While most agencies continue to rely on a flat fare as their

base fare, a more recent trend shows an increase in pre-paid options, such as unlimited ride passes for a certain time period (for a day, a week, a month or some other period) and multi-ride tickets. These fare strategies not only make it easier for riders to use transit, but also act as marketing tools as they generally offer a discount over a single-ride cash fare. By 2003, 3/4 of all U.S. agencies offer either pass or multi-ride programs (Multisystems, 2003). In addition to providing more user-friendly service and a direct consumer incentive to ride the system, pass programs also decrease the agency's cost by reducing individual transactions.

The recent introduction of automated fare collection (AFC) systems (using magnetic strips or smart cards in place of tokens or cash) has opened numerous new possibilities for agencies to restructure their pass programs. Since transit agencies tend to be less proactive in changing their fare structures and mostly do so in response to an event or a crisis (Multisystems, 2003), a switch to AFC can be a much-needed catalyst in rethinking current fare policy and structure. However, due to the complexity involved in introducing a new automated fare collection system, it is important to consider new policies in the planning stages to ensure that the agency can take full advantage of the benefits the new system has to offer.

U-Pass Overview

U-Pass (University UAP) programs allow colleges and universities to purchase unlimited use of local transit services for all students and sometimes staff, at a significant discount per pass compared to regularly priced transit passes or cash fares. The discounted price is achieved by spreading the cost of transit across a larger population than the one already riding transit, thus reducing the unit cost of the pass significantly. Some universities pass the cost on to their students in form of student life fees; others subsidize the pass partially or fully. Where implemented, the U-Pass program has decreased the individual's cost of using public transit, increased transit ridership and at the same time reduced transaction costs and guaranteed a steady revenue stream for transit authorities due to the universities' bulk purchases. Most universities observed a significant mode switch from single occupancy vehicle (SOV) travel to transit among their students and employees which led to a reduced need for parking, reduced congestion and less environmental impact (Brown et al, 2000). Because many students have irregular schedules, they tend to fill excess capacity during off-peak hours. Higher transit ridership has only in some cases led to increased service needs, which increased the cost for

the transit agencies, but also provides incentives for other commuters, who will pay the regular fare to switch to public transit. In most cases, depending on the program design and contractual agreements, agencies periodically renegotiate the contract with the participating organizations allowing them to offset the increase in expenses caused by an increase in service or a significant increase in ridership.

With regards to the participation level of students and employees, three types of programs currently exist: mandatory, opt-in and opt-out participation. The opt-in program relies on members of the organization to sign up in order to receive the pass, while the opt-out program provides all members with a pass (and charges them) but gives them the opportunity to opt-out if they choose. The mandatory program has been most successful at achieving significant discount levels and ridership increases, followed by the opt-out option. Opt-in programs have been less effective and are not commonly used, since the discount that can be provided is not large enough to draw widespread participation and provide people with enough of an incentive to switch modes.

While a review of several U-Pass studies reveals remarkable consistency in the types of impacts the program has had in different cities, the actual ridership increases vary dramatically. A study conducted by the Institute of Transportation Studies at UCLA in 2000 looking at data from 1997/98 detailed the positive results experienced by 35 universities and transit agencies across the country. The programs, averaging a cost of $30 per student per year, saw an increase in ridership ranging from 71% - 200% among U-Pass recipients during the first year and between 2% and 10% during subsequent years (Brown et al, 2000). A University of Milwaukee study conducted in 1998 found that their program resulted in a reduction of vehicle trips by 221,000 trips per year resulting in a decrease in vehicle miles traveled of approximately 5 million per year (Meyer, 1996). The University of Illinois at Urbana-Champaign was able to eliminate 1000 parking spaces as a result of the program, while the University of Colorado at Boulder eliminated 750 spaces.

Brown, Hess and Shoup's study mentions a variety of benefits for all parties involved. These include reduced demand for parking and recruitment advantages for universities, increased

ridership, particularly during the off-peak, and revenue as well as improved public image for transit agencies and lower transportation costs and increased mobility for students.

Additionally the upfront payment of the pass and the fact that the actual cost is usually hidden in university fees or deducted from paychecks before reaching the employee's wallet, serve to level the playing field between the out-of-pocket costs of driving versus taking transit. Once they own and operate a car, drivers usually perceive additional trips as free, often not even taking into account gas and parking costs. By eliminating the out-of-pocket fare payment for transit, the user can now choose based on other factors than cost per ride.

Since the program mandates that all or the majority of members of an organization purchase the pass, the costs incurred are spread across a higher number of users and non-users. While this puts additional financial burdens on those who will not use the pass, it can be argued that they incur a number of indirect benefits, such as a decrease in road congestion, higher availability of parking and cleaner air. In those cases, in which universities or other participating organizations subsidize the cost, their increase in cost might be compensated for in the long run by a reduced need for building additional parking, an expensive undertaking, especially if land is scarce and structures or underground parking are the only options. Another approach involves increasing parking charges to cover the full marginal cost of providing added parking and use the revenue to subsidize the cost of the U-Pass or EcoPass.

EcoPass Program Overview

A few transit agencies across the country have embraced the unlimited access pass concept and adapted it to employers and, in some cases, neighborhood groups. The programs exist under several different names, such as EcoPass in Denver and Santa Clara, FlexPass in Seattle and GoPass in Ann Arbor. For simplification purposes, I will refer to these programs in general as EcoPass programs unless I am referring to a specific program.

Similar to U-Pass, EcoPass programs allow for heavily discounted unlimited travel within a transit system in return for mandatory participation of all members of the organization. Beyond the obvious difference in the groups they target, EcoPass programs differ from U-Pass programs in several areas:

- Whereas most U-Pass program participants share the cost of the pass between the university and the pass recipients, most EcoPass employers carry the majority or all of the program costs and provide passes free of charge to their employees. One reason for that is that employers view the pass as an additional employee benefit that will help them recruit and retain employees.
- EcoPass programs are often more comprehensive in order to cater to the employees' needs. Most include a guaranteed ride home program, which entitles pass holders to receive a free taxi ride home in case of an emergency, and some include access to car- and vanpool resources (matching etc.).
- Under section 132 (f) of the Internal Revenue Code, employers can offer up to $100 of non-taxable transit benefits per month to their employees. Depending on income, this benefit can reduce the actual employee portion of the cost of the pass significantly.

EcoPass programs have been particularly successful in states in which the legislature or Clean Air Act regulation mandates a reduction of SOV commute trips and holds employers responsible for achieving such reductions, in cities in which parking is scarce and expensive and where congestion and the resulting air pollution and loss of productivity are high. An analysis of the GoPass in Ann Arbor, Michigan, showed an increase in ridership at participating companies of 5.1% versus an increase of 0.5% at non-participating companies as well as a 3.5% decrease in daily SOV commuting trips reducing the need for parking by 300 spaces (White, 2002).

Employers commonly benefit from offering the EcoPass as it assists in recruiting and retaining employees, reduces parking supply costs and fosters the company's environmentally conscious image. Transit agencies benefit from increased ridership and improved relations with businesses, which often leads to stronger local political support, while employees benefit from additional and less expensive transportation options and easier access to affordable housing.

2.3 Transit Benefits Program

The commute benefits program refers to three types of tax-free benefits employees can receive under Internal Revenue Code section 132(f): subsidies for parking, public transit and vanpool expenses. Initially, this benefit was limited to a tax-free parking subsidy in lieu of compensation,

enacted under the Taxpayer Relief Act of 1997. Since the latest amendment to the Internal Revenue Code, Section 132(f) under TEA-21, the Transportation Equity Act for the 21st Century, employers may provide up to $100 per month of transit benefits or vanpool benefits as well as $195 of parking benefits (2004 limits). They have the option of paying for the employees' transit expenses, allow employees themselves to pay for transit using pre-tax income or partially subsidizing transit expenses. Since transit or vanpool benefits can be added to the parking benefit, the combined limit is $295.

Both employers and employees benefit financially from this program. Employers save FICA and unemployment tax for the amount provided as a transit benefit, while employees can save a significant amount in federal and state income tax as well as FICA. Table 2 shows the maximum savings to employers and employees possible under this program.

Table 2: Maximum Tax Advantages of Transit Benefit

EMPLOYEE COSTS	AMOUNT
Annual Transit Set-Aside	$1200.00
Federal Income Tax Saved	($336.00)[2]
Employee FICA 7.65% Saved	($91.80)
State Income Tax Saved[3]	($36.00)[2]
TOTAL COST FOR $1200 IN TRANSIT	$736.20
TOTAL SAVINGS TO EMPLOYEE	**$463.80**

EMPLOYER COSTS	AMOUNT
Initial Order Payment	($1200.00)
Employee's Pre-Tax Salary Deduction	$1200.00
Actual Cost to Employer	$0.00
Employer FICA 7.65% Saved	$91.80
Employer Unemployment Tax Saved	$8.05
NET SAVINGS TO EMPLOYER	**$99.85**

Source: www.transitchicago.com

[2] Assumes employee pays 28% in federal income tax, 3% in state income tax, and 7.65% FICA and sets aside the maximum ($1200 or $100/month) and assumes employer pays 7.65% FICA, 6% unemployment tax (for first $7,000 of salary/ year), 30% federal/state income tax.

[3] State income tax savings vary by state

The calculation shows that the federal and state subsidy of the $1,200 transit expense can amount to as high as $563.65 or 47%.

Most transit agencies actively work with employers to provide transit benefits to employees. These can be provided in form of a transit voucher, which can be redeemed for any type of fare media or in form of an actual transit pass. Often employers act as consignment customers taking employee orders and purchasing passes in bulk from the transit agency. The advent of smart cards has increased the number of ways employers can provide benefits to their employees. In the future, automatic downloads of employer benefits are a distinct possibility.

Despite their voluntary nature, transit benefits programs have managed to achieve considerable ridership increases. A study of the TransitChek program in the New York City and Philadelphia areas by the Volpe Transportation System Center reports ridership increases of more than 20% at a particular work site (23% in NYC) (Schwenk, 1995).

3) Why Unlimited Access Pass Programs Work

The UAP program addresses several fundamental problems transit agencies face regarding the perception of the cost of taking transit, the pricing of its services and the difficulty of gaining widespread political support for transit cross subsidies.

3.1 Leveling the playing field between driving and taking transit

Most car owners are unaware of the actual cost of driving. At most, drivers notice the rising cost of gasoline at the pump. Beyond that, they are not likely to calculate the cost of owning or leasing their car, let alone the costs of registration, insurance and maintenance, when deciding whether or not to drive. They view these as "sunk costs", making the perceived out-of-pocket cost of driving zero, or close to zero. Taking public transit, on the other hand, has a very visible out-of-pocket cost associated with it. Every time we purchase a token or swipe our fare card or pass to board a bus, subway or train, we are reminded of the cost of taking transit. By reducing the frequency of having to pay for transit to once or twice a year, reducing the cost by spreading it across the entire community, and hiding it in student fees or deducting it from payroll before it hits the employee's wallet, the UAP manages to level the playing field between the perceived cost of driving and that of taking transit. Once people hold a pass in their hands, any rides are "free", just as any car ride appears to be free of charge. Thus the UAP serves to dismantle the argument that "transit is too expensive".

3.2 Taking punishment out of transfers

Unlimited ride passes also address the mismatch between the producer's (transit agency's) and the consumer's (transit rider's) points of view with regards to the pricing of services. Many agencies do not offer free transfers from one mode to the other (or from bus-to-bus) because they are intent on charging based on the costs of the services provided (more modes, higher expenses). However, having to transfer already presents an inconvenience to the rider, even without paying a premium to do so. From the rider's perspective, a transfer thus means additional time commitment, inconvenience and expense, which makes public transit a less attractive transportation option. Pre-paid unlimited ride passes decrease the rider's transfer disadvantage by eliminating the out-of-pocket cost for the transfer.

3.3 Enabling transit cross subsidies

Public transit is a public good. It carries with it positive externalities, such as a lower environmental impact than SOV travel (better air quality, fewer paved surfaces, less habitat destruction), less congestion on roadways, more equitable access to jobs and other destinations, and increased overall mobility and quality of life. Although all transit systems in the United States – and in most of the rest of the world – are subsidized with taxpayer's money, gaining political support for additional transit cross subsidies is generally difficult due to the localized nature of transit service.

For example, a suburban dweller without access to public transit will very likely not support a tax increase earmarked for public transit improvements in the city, since she might never directly benefit from them. Confining the cross subsidy increase to a specific community in a defined geographic area leads to a more viable application. In the case of a U-Pass program at a university campus or an EcoPass program at an employer site, the cross subsidies occur within a perceived or real community of interest. The suburban commuter may still decide not to commute by transit, but she will benefit from greater availability of parking, less congestion around the campus and access to occasional transit use without having to pay for each ride.

3.4 Advantages Generally Outweigh the Disadvantages

Since many transit agencies offer other types of pass programs, it is valid to inquire about the expected advantages and disadvantages of implementing a U-Pass or EcoPass program instead or in addition. The following stakeholder analysis shows that the benefits generally outweigh the costs, creating win-win situations.

Transit Agency

Advantages

The most important reason for the transit agency to implement a UAP program is the financial impact of the expected increase in ridership and revenue. The model described in chapter 7 builds a modest ridership increase of 5%[4] into the first-year pricing calculations, which raises the

[4] While the actual ridership increase may be higher than 5% (as discussed in chapter 7), the model incorporates a modest increase in the first year pricing to allow transit agencies to immediately realize a revenue gain while keeping it manageable for the universities. After the first year, data will be available to increase the pricing based on actual ridership increases.

agency's revenue instantly. Tracking ridership on an annual basis and adjusting pricing accordingly allows the agency to capture the financial advantage of actual ridership increases in the first and future years. The agency will likely incur additional savings by not having to print and distribute monthly passes, either by allowing the university or employer ID to be used as a transit pass or issuing semester or yearly passes. The fact that the agreement offers a guaranteed revenue stream will facilitate the transit agency's financial planning. Several other advantages are harder to quantify, but might have noticeable impacts in the short or long term. Short-term, the UAP program provides an opportunity to take advantage of institutional support in marketing public transit. Since universities and employers also benefit from this arrangement, they have a valid interest in promoting the new UAP program. Unlike existing pass program, it will reach every student and employee, including those who would otherwise not consider public transit. Additionally this program offers an opportunity to foster relationships with colleges and universities or employers, all of which are or can be among the largest customers a transit agency has, leading to strengthened political support for transit. An increase in off-vehicle fare collection could also decrease dwell times, although that would depend on the type of technology used and whether or not the pass holder needs to show the ID to the driver or use an onboard card reader.

A university-based program carries with it the added benefit that students often ride during off-peak times and thus fill unused capacity. In addition, getting students accustomed to riding public transit should be viewed as a valuable long-term strategy. The "temporarily poor" students are generally desirable transit riders and most will turn into middle-class choice riders, an elusive market segment transit agencies are trying to attract, but have traditionally found hard to market to.

Disadvantages

The main disadvantage of introducing a UAP program is the necessity to change business processes. Measures have to be put into place to prevent illegal pass sharing. While this was declared at worst a minor issue by agencies that offer U-Pass and EcoPass programs, introducing new processes (such as having bus drivers check IDs at boarding or doing occasional spot checks at subway stations) require planning, administrative attention and employee training. Start-up costs to launch the program are another disadvantage, although

they can be recovered over time. Service increases might be necessary in the long-term, and although those are associated with an increase in cost, they also promise an increase in ridership, not limited to that induced by the UAP program.

Participating Organizations

Advantages

The UAP program would offer financial and administrative benefits to participating universities and employers. By providing very low cost public transportation, it opens up more housing options to students and employees who often cannot afford to pay the high rents close to campus or the employer site. Thus, it assists in recruiting and retaining students and employees. It also helps improve the organization's image as an environmentally friendly organization and a good neighbor.

Longer term, by providing a strong incentive to switch from driving to public transit, the UAP program will help organizations comply with city and state requirements to reduce SOV travel[5] and limit the amount of space needed for parking. The latter is becoming a more powerful advantage as parking costs increase. As most new parking spaces in urban areas need to be accommodated in parking structures or underground parking, the marginal cost of adding a parking space is much higher than it has been historically. In order to cover those costs, organizations have to either increase parking permit fees significantly or increase their subsidies. By comparison, the introduction of a UAP program might be an inexpensive alternative, even if the university or company decides to subsidize the pass significantly.

Disadvantages

The primary disadvantage of the UAP program to the organizations is the need to publicize and market it to its members in order to gain internal support for its implementation and subsequently to ensure its effectiveness. Adding a charge to all students and employees may be politically difficult, but providing an opt-out provision raises the price for those who stay in the program. Either way, an aggressive marketing effort is necessary for organizations to ensure that the program reaches its goals. This disadvantage vanishes if the organization decides to

[5] State regulations in several states, including Massachusetts and Washington require employers above a certain size to implement and report efforts to decrease SOV commuting and encourage the use of alternative commuting options. In addition, cities are sometimes imposing their own trip reduction requirements in an effort to curb additional VMT generated by new developments or expansion projects.

fully subsidize the cost of the pass, in which case the added cost to the employer or university presents a disadvantage of the program. Lastly, unless automated fare collection is in place, organizations might have to conduct surveys to measure the ridership effects of the program.

City

Advantages

Widespread implementation of a UAP program would have positive effects on the primary city the transit agency serves and to a lesser degree other cities in the surrounding area. A decrease in SOV travel would result in less congestion and air pollution leading to an overall improvement in quality of life for citizens. While legislative or regulatory mandates to reduce SOV travel and VMT are hard to achieve politically, the UAP program offers an attractive alternative a city can easily support, without entering highly controversial discussions, as it relies on voluntary participation of organizations. In those cases where legislative or regulatory mandates exist, the program serves to mitigate the backlash against the regulation.

Disadvantages

None.

Pass Recipients

Advantage

The main advantage of the program is a steeper discount on transit passes for those students and employees who will ride the system as well as the added convenience of having access to transit at any time with their ID card (or unlimited access pass issued by the transit agency). The low cost allows easier access to affordable housing and to off-campus internships or jobs for students living at a university campus. Students and employees will have less need for a car or a second family car, which greatly reduces the individual's cost of transportation. Longer term, an increase in ridership will lead to improved service. Even those who do not use the pass and continue to drive will benefit from greater availability of parking and a slower increase in parking costs in the future. Additionally they will benefit from less congestion and air pollution in the area.

Disadvantage

Those who will not ride public transit or only use it occasionally will cross-subsidize those who ride regularly. Particularly those who are already walking or biking might view the new UAP fee as unjust, since they will not benefit from greater parking availability. This disadvantage only applies if a portion or all of the cost is passed on to students or employees and if the organization mandates participation.

Given the generally positive impact of this program on all stakeholders, it should not be an insurmountable task to gain political support for an unlimited access pass program. But since any new program constitutes a change and involves the need to sell it to all primary parties, it is important to start with pilot cases that are the least complex and most likely to succeed. This approach allows the transit agency to proof the concept in the specific locality.

4) How UAP Programs Work - Lessons from Existing Programs

Conversations with transit agency that do not currently offer the program revealed concerns regarding its pricing and potential revenue loss, abuse and equity issues as well as a general skeptical attitude as to how the program would work and whether it would be successful in their particular situation. The case studies in this thesis illustrate how transit agencies developed their programs to reach their goals and effectively address these concerns.

4.1 CTA U-Pass case study

CTA Overview

The Chicago Transit Authority (CTA) is the second largest public transportation system in the United States providing an average of 1.5 million rides every weekday in the City of Chicago and surrounding suburbs. The system includes an extensive bus operation with approximately 2,000 buses on 148 routes covering 2,273 miles and providing two thirds of all trips (about 1 million per day). 1,190 rapid transit cars cover 7 routes on 222 miles of track serving 144 stations and 500,000 trips a day. The CTA employs more than 11,000 employees and had an operating budget of $925 million and a capital budget of $539 million in 2003 (www.transitchicago.com).

Transit enjoys a high mode share in Chicago. 2000 Census data reported a 11.5% (down from 13.4% in 1990) commute to work mode share in the Chicago metropolitan area and a 17.4% (down from 19.4% in 1990) share in Cook County, which encompasses most of the City of Chicago. This is significantly higher than the U.S. average, which is at 4.78% nationwide and 7.4% within the nation's 49 metropolitan areas.

After holding base fares stable at $1.50 per ride from 1991 to 2003, the CTA increased its bus and rail fare to $1.75 effective January 1, 2004 to maintain levels of service customers had become accustomed to. The agency offers a variety of multi-day passes, reduced fares for seniors and children, and since the introduction of automated fare collection in 1997, also discounts for the use of the Chicago Card or Transit cards (by giving a bonus of $1 for each $10 of credit purchased). In addition, the CTA has been successful in attracting and retaining college student riders through its U-Pass program.

CTA U-Pass Program

The U-Pass program was started in 1998 as an initiative aimed at targeting new markets in order to reverse the trend of decreasing ridership and serve more customers. The program gives unlimited ride passes to all full-time students of participating colleges and universities, which will pay for the passes - at a heavy discount compared to the regular price - with their student life/tuition fees on an academic term basis. The fee is mandatory, ensuring a predictable revenue stream and allowing the CTA to offer the steep discount per pass, since the cost is spread across all students at the respective college or university.

In the beginning/External Conditions

The CTA worked with the Center for Neighborhood Technology (CNT) on developing the U-Pass program, which was modeled after the Milwaukee County Transit System U-Pass program with the University of Wisconsin and Marquette University. The CTA names the following as primary goals for establishing the program:

- Increase ridership, particularly off-peak
- Create loyal ridership base
- Improved access to valuable data, such as student travel patterns and the effectiveness of the program in influencing modal choice

Secondary goals include greater visibility of CTA and improved relationships with universities and colleges. Unlike the program in Denver and Seattle, the CTA initiated the program as an effort to slow a decline in ridership and not in response to organizations asking for help in achieving regulatory or legislative caps on VMT or parking. Despite the fact that the Chicago Metropolitan area is in non-attainment under the Clean Air Act, neither the state of Illinois nor the City of Chicago has put any responsibility on large organizations to work towards changing their members' "drive alone" commuting behavior.

Pricing

The initial price was set as a fixed fee of $.50 per day per student during the academic term. Since then, the price has been increased on a yearly basis and now (in 2004) is set at $.60 per

day per student. The price is uniform across participating universities and colleges, regardless of size, ridership levels and transit service levels. This approach differs from some other U-Pass and EcoPass programs offered across the country which tailor their pricing to organizations based on actual pre-pass ridership levels (CollegePass, RTD Denver) or based on service levels to the organization (EcoPass, VTA Santa Clara). The CTA's approach has been successful and popular, despite the fact that neither the original price nor the annual increases reflect actual ridership numbers. This suggests that the price is low enough to appeal to a large number of universities within the CTA's service area.

More importantly, the fixed price favors universities and colleges that are well served by the CTA and disadvantages those that have less frequent service. At the extreme, this means that institutions on the fringe of the service area are not participating in the program. Even within the service area the differences can be significant and the organizations with less frequent service are paying the same price as those who have easy access to service and whose students ride more often. Well-served colleges and universities may be receiving a below cost benefit from the CTA causing an equity problem in relation to other riders, particularly if U-Pass price increases are not proportional to fare increases.

Program related costs

The program is administered by a team of 3 CTA employees. Initial funding for the program's operating costs was secured in form of CMAQ grants. So far, the CTA has not had to increase service in response to increased ridership; however, some additional costs were generated by the introduction of the fraud prevention techniques discussed in the following paragraph.

U-Pass technology and fraud prevention

The CTA introduced automated fare collection technologies in 1997, which facilitated the introduction of innovative pass and discount programs. The U-Pass is a magnetic strip pass equipped with a photo and the name of the student, the name of the participating university, the expiration date (end of academic term) and a unique serial number. On buses, the student presents the pass to the bus driver; at subway stations, the pass activates the turnstiles. In order to prevent illegal pass sharing, bus drivers check the pictures and expiration dates on the passes. Additionally, the CTA conducts undercover spot checks at university subway spots,

such as stations serving UIC, De Paul University and City Colleges of Chicago[6].

Program Impact

The program started in 1998 with 30,000 students from 12 participating universities, immediately making it the most extensive U-Pass program in the country. From the start, university interest exceeded the CTA's expectation (CTA, June 1998). College administrators welcomed the opportunity to reduce the students' cost of riding transit and thus encouraging transit use, reducing the need for parking and curbing traffic congestion.

Ridership increased significantly upon program introduction and has been fairly stable on a per student basis ever since. Increases reported during the first year that were attributed to the U-Pass range from a 2.6% increase in boardings in 1998 over 1997 at the Red Line Wilson station serving Harry S Truman College to an overall 4.1% increase at the Red Line Fullerton station near DePaul's Lincoln Park campus (CTA, October 1998). In subsequent years of operation, however, the average rides per student per day remained fairly stable, fluctuating little over the years from an average of 1.24 (1.71 for 2-year schools and 1.00 for 4-year schools) in 1998/99 to 1.22 in 2001/02 (1.70 for 2-year schools and 1.10 for 4-year schools). This pattern facilitates agency revenue and service planning, since significant ridership increases seem to be confined to the first year of running the program. Overall U-Pass ridership increased as more and more universities signed on to the program, proof of its popularity with students and universities. At the beginning of 2004, 29 colleges and universities had entered into U-Pass agreements with the CTA, amounting to 77,000 students who hold an unlimited access pass in their hands (CTA, 2002).

From a ridership perspective, the program has been a success. Not only is it attracting net new riders, but it is also attracting business during off-peak hours. In 1998, CTA figures showed that 59% of U-Pass holders ride off-peak, high compared to the system's normal off-peak percentage of 47.5%.

[6] Wilson, Jeff, Personal Communication, February 9, 2004

The impact of the U-Pass program on whether a student will continue to ride transit after graduation is unclear so far. The CTA is currently working on a 5-year study that will examine actual alumni ridership habits after graduation.

The CTA identifies increased ridership, particularly during off-peak hours, as the most important benefit derived from this program. Other benefits include reduced transaction costs and the pre-payment of a lump sum at the beginning of the academic term. The U-Pass program also allows for detailed data collection for a very specific transit market, facilitated by the CTA's automated fare collection system. Since all students are assigned a unique ID number, which identifies them as U-Pass holders at a particular institution, the CTA can segregate the data they collect every time the pass holder swipes the pass by college or university. This gives the CTA the opportunity to compare the ridership patterns of U-Pass holders to other transit riders, identify actual ridership levels at a participating college or university or compare the institutions to each other. Finally, an increase in ridership carries with it the additional advantage of being one of many criteria in the distribution of federal funds[7]. Although this currently affects only a very small portion of federal funds, the FTA has recently set a goal of increasing ridership by 2% nationwide, and it is possible that a more direct ridership incentive may be incorporated in apportionment formulas in the future.

In addition, the U-Pass program has contributed to improving the CTA's image. Surveys show that customers are crediting the CTA with becoming more customer-oriented (61% thought so in 2001 compared to 36% in 1995), and U-Pass was one of several initiatives the public cited for its customer satisfaction. Others include cameras on buses, automated announcements, graffiti removal and Bike and Ride (CTA, 2004).

[7] Under the §5307 urbanized area formula program, federal fund allocation to metropolitan areas over 200k is based on a formula that includes an incentive tier: 4.39% of the fixed guideway tier & 9.2% of the bus tier are appropriated based on the calculation of passenger miles x passenger miles/operating cost for that urbanized area. Thus, the higher ridership levels and the resulting passenger miles, the larger the appropriation for that particular metropolitan area.

Marketing Opportunities

With the U-Pass U-Save program, the CTA gives local merchants the opportunity to offer discounts to U-Pass holders upon presenting their pass. Discounts are advertised on the CTA web site and in printed marketing materials.

Best Practices/Guidelines

- Fixed pricing strategy limits the attractiveness of the program in areas not well-served by the transit agency
- Building flexibility into the contract allows for modest price increases to accommodate additional service needs
- Program is popular and has raised CTA's visibility and good will with institutions
- Increased ridership, particularly off-peak, increases ability to secure federal funding and creates support for local funding
- AFC facilitates program enforcement and tracking
- Involving local merchants produces positive public relations

4.2 Denver RTD CollegePass and EcoPass Case Study

Denver RTD Overview

Denver RTD provides public transit coverage for the seven-county area around Denver, CO, which include Boulder, Broomfield, Denver and Jefferson Counties, and parts of Adams, Arapahoe and Douglas Counties. It covers 2,410 square miles with an estimated 47 million annual service miles carrying approximately 2.4 million people. RTD's buses run on 174 fixed bus routes serving 10,348 bus stops with 1,127 buses. 49 light rail vehicles run on 15.8 miles of track serving 24 stations. In addition, Denver RTD operates 67 park-and-ride lots and a paratransit service comprised of 186 vans.

Transit mode share in the Denver metropolitan area is close to the national average, but has been on the rise (4% in 1990, 4.3% in 2000). The two counties best served by the RTD, Denver and Boulder County, show a significant increase from 1990 to 2000. Denver County's transit share rose from 8% in 1990 to 8.4% in 2000 and Boulder County's share increased from 3.5%

to 4.9% during that same period (U.S. Census, 2000). In 2002, average weekday ridership on buses, light rail and paratransit was 273,924 (Henry, 2003).

Cash fares vary from $1.25 for a local ride to $2.75 for an Express ride and $3.75 for a regional ride for both bus and light rail service. Discounted fares are available to students, seniors, disabled and Medicare recipients. A 10-ride ticket book provides users with an approximate 10% discount off cash fare. Monthly passes are available for regular users as well as those eligible for discounts. RTD offers free transfers between bus and light rail. In 2002, Denver RTD sold on average 41,656 passes per month, 4,600 annual passes and a total 226,327 ten-ride ticket books. Farebox revenue covered 20.9% of operating costs in 2001 ($47.1 million out of $226 million) (Henry, 2003).

Denver RTD CollegePass and EcoPass Programs

Denver RTD started offering CollegePass and EcoPass programs in 1990/91. The CollegePass program is an unlimited access pass program targeting college and university students while the EcoPass program serves employers and neighborhood groups in the RTD service area.

The program is open to all colleges in the service area. Currently the RTD has 4 different contracts with 6 universities, including Naropa University and UC Boulder, University of Denver (undergraduate and law students only) and universities at the Auraria Campus (University of Colorado-Denver, Metropolitan State College of Denver, Community College of Denver). Negotiations are in progress for additional colleges, such as Red Rocks Community College and the Art Institute of Colorado, which has 2400 students and 3 downtown locations. The program has been successful in attracting universities to join with the exception of those situated in remote areas with relatively poor transit service[8].

In the beginning/External Conditions

The catalytic force behind offering the program was UC Boulder's parking problem and a desire on the university's part of promoting alternatives to SOV travel for its students and employees. A student referendum showed overwhelming support for a U-Pass program. At the same time, the City of Boulder enthusiastically embraced the idea as a tool to reduce traffic congestion and

[8] Henry, Bob, Personal Communication, February 3, 2004

parking needs and decided to provide funds to Denver RTD to cover administrative costs while getting the program started.

The EcoPass program grew out of a Boulder City Agency called Go Boulder, which started with local service for 300 employees in downtown Boulder in 1989. By 1991, a pilot program included 6 employers and both local and regional transit service. The pilot was deemed successful when it fulfilled the goals of achieving revenue neutrality, increasing ridership, attracting new transit users and shifting people from SOV travel. This led to the creation of a region-wide EcoPass program.

Pricing and Contracts

CollegePass

Pricing is negotiated separately for each contract between Denver RTD and the respective university or college. Current usage is estimated based on pre-implementation counts/surveys in order to determine the agency's revenue at status quo. Since the CollegePass program is intended to be revenue-neutral, the total revenue is then divided by the number of enrolled eligible students at the participating university. Denver RTD offers a local or regional pass option at different prices, depending on the location of the university.

Generally colleges use student semester or quarterly fees to finance the passes, which often requires a student body vote that is usually repeated on a regular basis or once program costs rise above a specific percentage. Colleges may subsidize the students' cost to make the program more attractive and to give back savings incurred in not having to build additional parking facilities.

Yearly contracts are signed with the RTD to adjust for the increase in ridership and inflation and any fare increases.

EcoPass

Unlike the CollegePass program, the EcoPasses relies on a fixed price model. The price per employee is based on the number of employees at the company as well as the company location within the RTD's pricing zones (ranging from $31 to $279 per employee/year (2004 pricing, Denver RTD). In areas well served by the RTD, such as downtown, the price is higher

than in outlying areas with less frequent service. There is a minimum contract amount for companies with less than 21 employees, which makes it more expensive for small businesses; however, they have the option to join another type of group pass program instead. This limits the administrative costs and potential revenue loss related to handling a large number of businesses with one or two employees. The program includes a Guaranteed Ride Home[9] feature and companies have the option to include part-time employees (although part-time employees might not qualify for transit benefits under section 132 (f), which allows for the provision of a free or subsidized transit pass to employees as a tax-free benefit). Most employers shoulder the costs for their employees and see it as an employee recruitment and retention tool. Since it is tax deductible for employers and tax-free for employees, both benefit from the program. Additional employer benefits are a "green business" image, supporting public transit in the area and saving money by providing less employee parking and opening up parking for customers. (Whitson, 2002)

By differentiating pricing based on service area and company size, the RTD program is effective in attracting businesses areas with different levels of service. The disadvantage is that there is no tracking mechanism built into the program, such as annual ridership surveys or tracking via automated fare collection, which would provide a basis for adjusting the pricing based on actual ridership changes. It is thus harder to evaluate the financial ramifications of the program.

Program Impact

CollegePass CU Boulder example impact

CU Boulder saw an impressive increase in ridership tripling its numbers during the first year of the program and continuing to grow. Within 6 years, ridership grew from 300,000 to 1,500,000 trips. Initially, no service enhancements were needed as students filled excess capacity. Since then, the RTD has added 8 buses in a high-frequency community transportation network, which not only service CU Boulder, but also attracted new full fare paying riders in the city of Boulder (Gardner, 2002).

[9] A Guaranteed Ride Home program offers employees a predetermined number of free taxi rides home in the case of an emergency. This program provides assurance that individual mobility needs are met, even in unforeseen circumstances.

Company Impact

Surveys conducted by participating companies for the RTD showed that ridership at the respective companies increased by 50% to 200%. Vehicle miles traveled by single occupancy vehicle decreased correspondingly as documented by RTD Denver's Pre and Post Eco Pass VMT Summary (as of 12/30/03, based on 48 companies completing surveys) and shown in Chart 1 below.

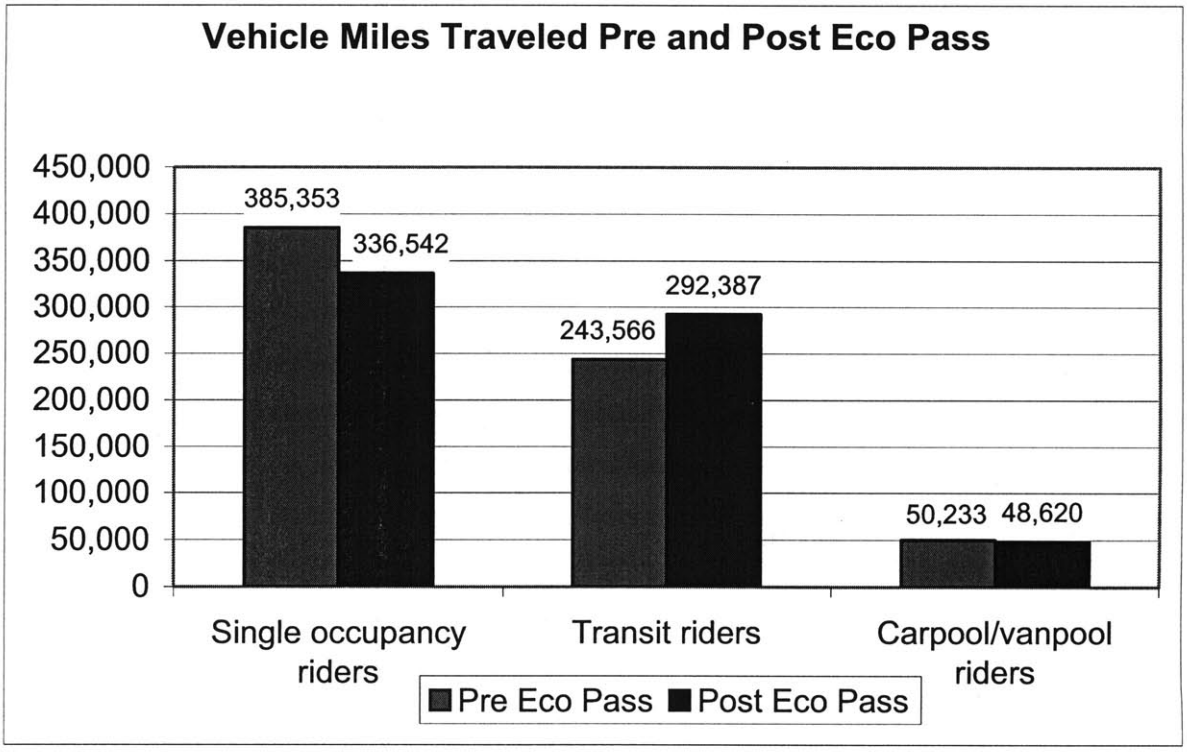

Chart 1: Vehicle Miles Traveled Pre and Post Eco Pass
(Source: RTD Denver Market Research Department)

City of Boulder impact

To provide a broader view of the impact the CollegePass and EcoPass program has had, one only needs to turn to the city of Boulder's statistics on travel mode choice. Boulder's Modal Shift Report from 2000 revealed that transit mode share based on the number of trips increased from 1.6% in 1990 to 4.2% in 2000. SOV travel dropped from 44.2% to 41.5%. The city attributes much of the shift to the pass programs. 1/3 of surveyed Boulder residents hold an Eco- or

CollegePass (11% through their employer, 4% through their neighborhood, 4% as CU Boulder employees and 20% as CU Boulder students). More than 20% of pass holders in the study made a transit trip on the survey day, compared to 4% of those who were not pass holders (Caldwell, 2001). The Downtown Boulder before-after survey revealed that 80% of new transit trips were shifted from SOV mode.

Program related costs to agency

One manager and two staff people manage both programs. In addition there is staff time and costs associated with data analysis and enforcement. In 2002, Denver RTD's marketing budget for the program was approximately $25,000. The yearly budget for administration, including salaries, was $150,000, and the fulfillment/materials budget was $18,500.

Technology and fraud prevention

The RTD provides students with decals to stick to their student ID or, in the case of UC Boulder, with a plastic ID sleeve carrying a decal along with the student's name and student ID. Students show their student ID card when boarding the bus and light rail in order to get their free ride (or discount, such as airport ride discount). Denver RTD does not consider fraud a significant problem related to the CollegePass or EcoPass programs.

Denver RTD is tracking ridership by having bus drivers in Boulder push a key at boarding. On light rail trains, counters manually count passengers 3 – 4 times a year. Denver RTD is currently evaluating automated fare collection technology, which would greatly facilitate enforcement, data collection and the adequate pricing of pass programs.

Marketing

Several other agencies participate in the employer sales effort to promote the Eco Pass program, including the Downtown Denver Partnership, Southeast Business Partnership, U.S. 36 TMO, Stapleton TMO, Transportation Solutions, Transit Alliance, the Denver Regional Council of Governments, and GO Boulder.

Best Practices/Guidelines

- Innovative tracking and enforcement despite lack of AFC
- Pre- and post ridership surveys important to establish pricing and measure program performance
- Initial surveys should be detailed and well-designed. If timed well, these can often be combined with commute survey requirements universities or employers might have to comply with on a regular basis.
- Pricing model that reflects actual ridership and service levels
- Cooperation with the city in promoting and funding the project start-up costs
- Cooperation with other agencies in marketing the program.
- Partnerships with universities to provide added service to the campus
- Automated Fare collection greatly facilitates an agency's ability to track ridership and establish a basis for pricing models such as the CollegePass model.

4.3 King County Metro Transit U-Pass and FlexPass Case Study

King County Metro Transit Overview (Seattle, King County, Washington)

Metro Transit provides transit service to more than 1.6 million area residents in King County covering 2,134 square miles. Operating a fleet of 1,300 vehicles, primarily buses, Metro Transit' serves an annual ridership of 100 million passengers. In addition to conventional public transit offerings, Metro Transit has been operating the largest publicly owned vanpool program in the country with 700 vans and a regional rideshare matching system.

Transit use in King County is roughly twice the national average and is on the rise. The number of people taking transit to work increased by about 25% from 1990 to 2000. Transit's mode split of all journey-to-work trips captured in the Census increased from 8.7% in 1990 to 9.6% in 2000 (U.S. Census, 2000).

Metro Transit is one of few transit agencies in the United States that differentiate fares between peak (defined as 6 – 9 am and 3 – 6pm) and off-peak (all other times). Peak cash fares are $1.50 within one zone and $2.00 for travel in two zones. Off-peak fare is $1.25 in all zones. The agency offers one-month, 3-month and annual passes, heavy discounts for youth ($.50 per trip)

and seniors and the disabled ($.25 per trip). Day- and visitor passes for the whole region are available as well.

U-Pass Program

The U-Pass program at Metro Transit describes a bulk purchase arrangement between the University of Washington and Metro Transit. Unlike the other programs reviewed in this paper, this one does not mandate participation of all students and employees. While students receive a U-Pass at the beginning of the semester and get billed for it, they may opt out and return the pass for a full refund. Employees have to opt in and request the pass. This model has been extraordinarily successful with a student participation of 86% and employee participation of 60%, much higher than initially anticipated (University of Washington, 2002).

FlexPass Program

Parallel to the U-Pass program with UW, Metro Transit offers the FlexPass to employers with more than 20 employees in the service area. The FlexPass program requires employers to purchase FlexPasses for all of its employees at any given worksite. Both the U-Pass and employer FlexPass programs offer more than fare free transit rides for the user. They are part of a larger transportation demand management program, which can entitle the pass holder to additional benefits, such as Metro vanpool subsidies, access to other transit agencies' services (e.g. Community Transit and Pierce Transit), guaranteed rides home, merchant discounts, and carpool/bike/walk benefits, depending on the individual employer's arrangement. In addition, both the U-Pass and FlexPass programs are run in conjunction with Sound Transit, which broadens the pass coverage beyond the area served by Metro Transit.

In the beginning/External conditions

As early as 1983, UW developed a transportation management plan in response to neighborhood concerns about traffic and the resulting city requirement to limit parking spaces to 12,300. A new General Physical Development plan for 1999-2001, which proposed a significant increase in building square footage and number of employees, also forecast a reduction of 1700 surface parking spaces. Additionally, the state of Washington introduced a Commute Trip Reduction (CTR) law in 1991 as part of the Washington State Clean Air Act, requiring large employers to provide transportation options to decrease VMT traveled, particularly during peak

hours. UW approached Metro Transit, which at the time had excess capacity on university routes and a vested interest in increasing ridership.

Following the success of the U-Pass program, the FlexPass program was added in 1993 to allow employers to offer subsidized transit passes to their employees. Also included in the FlexPass program are students and employees of three Seattle community college campuses. Despite initial concern about abuse of the program (such as employees giving their passes to others, if they were not going to use them), Metro Transit started a demonstration program with 20 employers in 1993, which quickly grew into a permanent program popular with employers trying to achieve their commute trip reduction goals.

Pricing

U-Pass pricing

The initial pricing was based on revenue from pass sales at UW at the time (UW was a consignment customer, thus the numbers were readily available) and an estimate of cash business. The total number amounted to a revenue stream of about $3.1 million, a price which Metro Transit and UW locked in for the first three program years.

Five years ago, Metro Transit changed its pricing strategy to a trip-based model. An estimate of the total number of trips generated by university students and employees based on surveys is multiplied by a set price per trip calculated by the transit agency. This pricing strategy ensures that Metro Transit can cover proportional cost increases resulting from increased ridership and service requirements.

An additional cost item for the university grew out of an agreement to add 50,000 additional service hours to university bus routes over the first three years of the program. UW and Metro Transit split the marginal cost 50/50. After seven years of cost-sharing, Metro assumed full cost of operating those additional services. Beginning in Fall 2004, the UW will purchase a limited number of additional trips on selected routes experiencing overloads. The UW is committing to financially support those trips for three years, at which time the service will be reviewed[10].

[10] Cooper, Carol, Personal Communication, March 18, 2004

UW passes on a portion of U-Pass cost (47%) to students and employees, charging quarterly rates of $33 for students to $46.50 for employees. In addition, those individuals purchasing a parking permit are given a complimentary U-Pass. Costs not covered by user fees are partially covered by revenue from parking permit sales (41%), parking fines (4%) and general UW funds (8%) (University of Washington, 2002).

FlexPass pricing

The FlexPass program includes two types of passes: the custom FlexPass, for which pricing is calculated and negotiated with each participating employer, and the area FlexPass, which simplifies the pricing calculation by setting one price for all employers within a designated area.

Custom FlexPass

The custom FlexPass is the only option for organizations with more than 500 employees. Employers with less than 500 employees are offered the Area FlexPass instead. The basis for custom FlexPass pricing is a survey that is conducted at the employer site to determine the current transit ridership at the site and consequently the current revenue Metro receives. The FlexPass price is then calculated by the number of annualized transit trips x average system fare. The average fare was calculated as a weighted average since Metro's fare varies by zones and times of the day. Metro reserved the right to increase the price to the employer on an annual basis reflecting the actual increase in ridership (measured by annual surveys). Surprisingly, the average increase during the first year amounted to 90%, a price increase Metro know the employers would not be able to accept. Instead, Metro devised a 4-year plan, which would distribute the price increase over 4 years. During the first year, the employer pays the agreed upon price based on pre-tax surveys (minus a 10% incentive financed by a federal grant). During the second year, the employer pays the base price plus 1/3 of the increase. During the third year, employer pays base price plus 2/3 of the increase and during the 4th year and all subsequent years the employer pays the full price. By the fourth year, employees had gotten used to the program and employers benefited from the annual survey data available in planning for parking and other transportation needs. Renewal rates have been at about 95%.

Area FlexPass – The Area FlexPass (AFP) was introduced in order to grow the program while keeping administrative costs manageable and providing a simpler, more user-friendly process.

Pricing is calculated separately for each of the areas in which the Area FlexPass is available. The calculations are based on the state CTR (Commute Trip Reduction) survey and vanpool ridership data (since the pass includes access to Metro Transit's vanpool program). The annual price for each group is based on a formula including the following cost items:

- Average baseline use per capita
- Average growth per capita
- Average use of vanpool
- Cost of commuter bonus plus subsidy per employee
- Unit cost of Guaranteed Ride Home per employee
- Unit cost of Card processing per employee
- Unit cost of administration fee per employee
-

The transit agency also built an incentive into the formula. As with all annual passes, one month is free. In addition, the growth in trips is spread over the first two years.

Metro Transit uses two different base lines to determine pricing for new members and established program participants, which was created to account for the difference in transit use between the two groups. During the first two years of participation, the base line for pricing is the "new customer" cohort. The difference lies in the calculation of the average growth per capita. In the renewing customer cohort, the growth estimate is based on the percentage change in the average baseline for the cohort between CTR survey periods. In the new customer cohort, the growth estimate is set as the percentage difference between the renewing customer cohort and the new customer cohort.

Program-related costs

The U-Pass program currently requires less than .5 full-time employee to cover administration and research tasks. UW shoulders all responsibility for marketing while Metro Transit manages the research component, such as the biennial surveys. During the initial start-up phase, more staff support was required, but ongoing administration costs are minimal.

Apart from operational costs, Metro Transit had built in a contract element that would provide UW with a discount if ridership grew faster than population growth. More successful than expected this incentive amounted to about 5% ($500,000 out of a $10 million contract) in 2003. In the future Metro will cap this discount at $300,000. In essence, Metro pays indirectly for UW's marketing efforts, as it mandates that the incentive money needs to be reinvested in the program.

The FlexPass program is managed by two full-time staff employees: one person administers 110 Area FlexPass contracts and a brokering arrangement, while the other handles approximately 50 contracts in the regular (custom) FlexPass program (2004 numbers).

U-Pass and FlexPass Technology and fraud prevention

In the U-Pass program the eligible pass holder receives a sticker, which is fixed onto the student or employee identification card. When boarding a bus, the driver makes sure that the sticker and ID are valid. In the future, Metro Transit is planning on converting to smart card technology, which will facilitate tracking ridership in the future.

According to Carol Cooper, while Metro Transit acknowledges that there is likely some abuse of the U-Pass card, the agency views the ridership gains and benefits as outweighing the potential abuse. Since students and university employees need their ID for purposes other than transit use (building access, library card, etc.), instances in which a pass holder shares his/her ID with an ineligible person are estimated to be minimal.

In the FlexPass program, the employees at participating organizations receive FlexPass swipe cards to use on the bus. Employers track the distribution of the FlexPass cards and employees sign a use agreement where they agree not to abuse the pass.

Program Impact

Metro Transit lists the following initial goals for the U-Pass and employer programs:

- Increase ridership
- Sell excess capacity
- Assist companies in complying with trip reduction programs and parking caps

The U-Pass and FlexPass programs are viewed as very successful within Metro Transit and among participating organizations. At this point, approximately 17% of all trips are taken using a U-Pass or FlexPass. Ridership at UW continues to increase at rates greater than population growth. The U-Pass program managed to slow down a trend of increasing SOV travel and reversed a trend of decreased transit use in the area.

At UW, the program has resulted in significant increases in transit use and decreases in SOV parking permit sales.

	Students		Faculty		Staff		Weighted Avg	
	1989	2000	1989	2000	1989	2000	1989	2000
Commute Modes								
Drive Alone	25%	16%	60%	54%	44%	39%	33%	25%
Transit	21%	35%	11%	18%	25%	25%	21%	31%
Carpool/Vanpool	9%	10%	11%	11%	15%	21%	10%	12%
Bicycle	10%	4%	9%	7%	6%	5%	8%	5%
Walking	31%	34%	7%	8%	6%	7%	23%	25%
Other	4%	1%	2%	2%	4%	3%	4%	1%

Table 3: University of Washington Modal Split Comparison
(Source: University of Washington, 2002)

Parking permit sales dropped significantly from pre-U-Pass days to 2001 from 7467 in 1990 to 5593 in 2001. During that same time period the number of parking spaces used dropped from 10079 to 9538. Since UW raised parking rates significantly with the introduction of the U-Pass program (from $72 a quarter to $177.70 now), it is difficult to determine to which degree the

actual cause of these positive developments can be attributed to the increased parking prices or the introduction of the U-Pass. However, it shows that a combination of the two measures is highly successful in decreasing SOV travel and parking demand as well as increasing transit use.

Both the Area FlexPass and Custom FlexPass have been successful in increasing ridership. Participation in the program has increased as well showing proof of its popularity and effectiveness. The Area FlexPass program grew from 58 clients in 2001 to over 100 and two broker arrangements for smaller employers in 2004. Renewal rates continue to be very high at 93% for AFP and 95% for regular FlexPass between 2002 and 2003.

Ridership is following a positive growth trend. Compared to the potential market in the 11 areas covered by AFP, the transit mode share of participating companies tends to be significantly higher in most cases (see table 4).

Table 4: Transit Mode Share Comparison – Metro Transit

	Transit Mode Share	
AFP Zone	Potential Market	AFP Market/ Participating Companies
West		
Seattle CBD	47.17%	53.92%
Lake Union - Queen Anne	10.99%	22.16%
Belltown	28.29%	46.10%
First Hill	33.18%	36.88%
SODO-Duwamish	14.53%	13.57%(1)
East		
Bellevue CBD	11.55%	39.56%
Greater Bellevue	5.62%	6.37%
Kirkland	3.00%	3.00%
Overlake (2)	4.54%	N/A
South		
SeaTac	6.74%	14.49%
Renton - Tukwila – Kent	3.83%(3)	3.08%

(1) Includes two employers.

(2) Overlake currently has no renewing customers.

(3) One employer in this group pulls the average up considerably. Without this employer the mode share equals 2%.

Source: Metro Transit 2004

Challenges and Opportunities

Metro Transit is currently in a new phase of contract renegotiations with UW. The biggest challenge at this point is to make sure that the program does not fall victim to its success, which means finding a delicate balance between accommodating ridership growth and ensuring that the individual user and the university's costs do not become too high. The future implementation of smart cards presents an operational challenge, but also a tremendous opportunity to increase the ability to track ridership trends. The FlexPass program provides the most opportunity for expansion.

Marketing Opportunities

Merchant discounts

Best Practices

- With enough motivation and incentives in place, U-Pass does not have to be mandatory to work (opt-out model)
- Trip-based pricing ensures agency revenue as ridership increases and warrants additional service
- University and transit agency teaming up to increase service
- Cooperative effort to decrease VMT and increase transit ridership pays off (shared responsibility for program, such as marketing at UW and market research at Metro Transit)
- A combination of initiatives by the university and the agency, such as combining the unlimited access pass with increased service and an increase in parking costs, can yield impressive results.
- Offering a combination of custom passes for large employers and area-based passes for smaller employers opens up the FlexPass program to a large number of organizations without administrative costs becoming unmanageable. Additionally, it allows transit agencies to start a program with employers that do not have current ridership data available (one strategy might be to start with an area-based pass and later convert large employers to a custom pass.
- Give free pass to parking permit holders (built into parking permit fees)

4.4 Guidelines for program design

The case studies revealed a variety of concerns an effective program needs to address. These range from political and legal considerations to market acceptance to concerns of fraud prevention, cost considerations and fair pricing. The section below summarizes lessons learned and best practices that emerged from the cases.

Pricing Strategy

- Pricing strategies might vary based on the transit agency's goals
- Pricing based on actual ridership levels results in most equitable treatment of customers and ensures that the agency experiences revenue increases as ridership grows. This would also capture revenue from off-peak rides, which is lost in most pass programs as their pricing is generally based on commute trips.

Option	Pricing	Example	Advantages	Disadvantages	Admin. Effort/Cost
1	**Fixed price per person - same for every participant**	CTA U-Pass	Easy to administer	Disadvantages those with lower service levels leading to lower participation rates of organizations outside of core service area - Does not necessarily reflect actual ridership levels	Lowest
2	**Fixed price per person - differentiated by service level**		Reflects differences in service levels making it more attractive to participants in all service areas	Does not reflect differences in ridership between organizations within designated service areas	Low to medium
3	**Fixed price per person - differentiated by service level and company size**	VTA EcoPass	Same as 2 and passes on administrative savings of large vs. small contracts to participants	Same as 2, but members of larger organizations happen to benefit more than those of smaller organizations	Low to medium
4	**Fixed price per person - differentiated by service level and new or established members**	Metro Transit Are FlexPass	Same as 3, but new members pay lower rates than renewing members, which more accurately reflects ridership		Medium
5	**Pricing based on each organization's travel data**	RTD CollegePass, Metro Transit FlexPass	Accurately reflects organization's current ridership levels	Requires frequent surveys or analysis of AFC data	Highest

Table 6: UAP Pricing Options

Adjusting Pricing when Ridership Increases / Dealing with Service Increases

- In the case of a U-Pass program, much of university use takes place during off-peak hours using excess capacity
- Increased service will increase revenue from general, full-fare paying public
- Pricing strategy based on increases in ridership will contribute to paying for increased service

Option	Price Increases	Example	Advantages	Disadvantages	Notes
1	**Based on increase in ridership (by using a per trip rate or by using a ridership growth rate based, both based on surveys)**		Reflects pay per ride	Does not reflect whether unused capacity is filled or new service needs to be added	Should balance out long-term
2	**Based on increase in service**		Reflects increased agency cost for providing new service	New service may attract paying riders, so organization should not have to pay for all of new service costs	This may be appropriate if the additional service serves the organization exclusively or predominantly

Table 7: Alternatives for Price Increases

Administrative Costs and Effort

Upfront investment

- Grants may be available for this type of program
- Additional staffing investment may be minimal if pass programs are currently offered
- Additional administrative costs can be built into the pricing

Marketing Costs

- Universities and employers often take on significant responsibility for marketing the program
- Transportation Management Associations, City departments and environmental organizations may have an interest in promoting the program
- Existing pass or transit benefits programs may provide a good base to work with

- Allowing local merchants to offer discounts to unlimited access pass holders increases the program's visibility and gives merchants a stake in the program.

Cost Saving Potential

- Lump-sum payments at the beginning of the semester or year reduce the transaction costs associated with individual cash payments or monthly pass payments and provide positive cash flow for the agency.

Fare Collection and Fraud Prevention

- Smart card allows for efficient and cost-effective tracking of pass ridership
- A UAP program can be administered without automated fare collection. Flash passes work well in many transit agencies, particularly bus based systems. Ridership is tracked manually (bus driver pressing a key) or via surveys. In systems where automated fare collection is on the horizon, the program can be initiated before the introduction of AFC and convert to the latest technology as it becomes available.
- The use of a university or employee ID card as a transit pass minimizes the risk that pass holders give or sell it to non-eligible people (flash pass or coordination with smart cards)
- Including a photo on the transit pass facilitates spot checks.
- Spot checks similar to POP (Proof of Payment) spot checks will need to be conducted, particularly if the program does not use the university or employer ID card as the transit pass.

Option	Pass Delivery Mechanism	Example	Advantages	Disadvantages	Notes
1	**University/ Employee ID - no AFC**	**RTD College Pass**	Can be implemented immediately, only minimal driver training, no passes need to be issued	Fraud less likely since members need their IDs, but drivers need to be diligent to prevent fraud, tracking is manual and may be time consuming	Good for bus systems and trams without turnstiles
2	**Transit pass w/ picture - no AFC**		Can be implemented quickly, only minimal driver training	Abuse more likely (individuals might give up pass before giving up ID), need for spot checks, tracking is manual and may be time consuming	
3	**Transit pass or Smart Card w/picture- AFC**	**CTA U-Pass**	Can be implemented quickly, allows for easy data tracking	Abuse more likely (individuals might give up pass before giving up ID), need for spot checks	No significant abuse found at the CTA
4	**University/ Employee ID - AFC**		Allows for easy data tracking, convenient for user, agency does not have to issue the pass. Fraud less likely since members need their IDs.	Need for integrated multi-purpose smart card system, organizations and agency need to switch, expensive. Need for occasional spot checks	

Table 5: UAP Technology Options

Political implications

- Improved relationships with employers, universities and transit riders lead to increased political support for public transit
- Program may help municipal authorities achieve air quality goals
- Negative impacts should be minimized as long as the program is available in non-discriminatory way to every organization that is interested in participating
- Allowing local merchants to offer discounts to UAP holders increases the program's visibility and gives merchants a stake in the program

Equity considerations

The unlimited access pass approaches used at Denver RTD and Metro Transit in Seattle are more equitable and generate more revenue than the fixed price approach used by the CTA in Chicago, since they take service levels into account when calculating pricing to the organizations. In the fixed-price approach the CTA takes, those organizations with lower levels

of service are disadvantaged as they pay the same price per member as those with high levels of service.

The cross subsidy approach of spreading the cost of transit among all members of the organization raises the question of whether it is fair to mandate participation. While this may be viewed as an equity issue, the congestion reduction benefits from the program apply to all members, not only those who decide to commute by transit. However, there should be exemption provisions for those who are unable to use transit (because of disabilities, for example).

Additionally, the fact that these programs work as cross subsidy programs within organizations may raise equity issues as well. Making unlimited access pass programs available to universities and employers leaves out a population of low-income people, many of whom may be unemployed or are working for small businesses that might not have the resources or knowledge to offer such a program to their employees. However, most transit agencies are offering significant discounts to seniors, youths, persons with disabilities and Medicare recipients. Additionally, since the transit agency collects the same amount as it did before the program (unless ridership increases), the program does not grant special treatment/pricing to individuals. It simply leaves it up to the organization how to distribute the cost of access to the transit system.

Legal restrictions

Not all transit agencies can implement a discount program targeted only at a particular target market. SEPTA in Philadelphia, for example, has enabling legislation which prohibits it from offering a discount to one population group only, effectively ruling out a U-Pass or EcoPass program which targets a certain market segment with discounts. While this issue may be subject to interpretation (on the group level, the organization pays the same as before, thus the agency is not directly granting a discount to that group), it might constrain some agency's ability to introduce this type of program.

User Acceptance/Interest

Organizational Level

- May not be there unless outside legislation or incentives are in place (commute trip reduction programs, city requirements to freeze parking etc.).
    - The State of Oregon has an Employee Commute Options (ECO) program, which requires employers with more than 50 employees in the Portland area to make a good faith effort to encourage employees to reduce automobile commute trips, with a target of a 10% reduction over three years. (Employers who fail to make such an effort may be fined).
    - The State of Washington passed a commute trip reduction (CTR) program in 1991, which requires all employers with more than 100 employees who start work between 6 and 9am in the 9 most populated counties to participate. The legislation requires employers to appoint a transportation coordinator, design a plan to reduce VMT and report on a regular basis on progress.
- Generally, lack of parking is one of the most important drivers of innovative transportation management programs. Building structured or underground parking is sufficiently expensive at $25k to $50k per spot to induce organizations to consider alternative programs to reduce the need for parking.
- EcoPasses for employees are often viewed as an important benefit in attracting and retaining qualified employees.
- Pricing of the passes should reflect the service level experienced by the organization and/or actual ridership at the organization.

Student & Employee (End-user) Level

- Students all over the country have voted for increasing student life fees in order to pay for fare free transit passes. Many undergraduates do not pay these fees themselves: they are either covered through scholarships or paid for by parents.
- Many universities already subsidize transit passes. If this subsidy is maintained, the cost per student is reduced further.

- A fare-free transit pass opens up more (and often more affordable) housing options without increasing transportation costs and may in fact eliminate the need to purchase a car.
- If combined with the federal transit benefit program, the actual cost of the EcoPass to the employee is reduced further through pre-tax payroll deduction. Additionally, some employers may choose to subsidize some or all of the cost.
- Acceptance may be higher if additional services are lumped into the program (guaranteed ride home, shuttle services, a limited number of free parking permits).

Options	Participation levels & Cost distribution	Example	Advantages	Disadvantages	Notes
1	**Mandatory**	CTA U-Pass, VTA EcoPass, RTD College & EcoPass	Lowest possible cost per member	Harder to get approved by members, especially if organizational subsidies are low and/or high initial ridership causes pricing to be relatively high	Perfect if organization pays for 100% of the cost or cost with or without subsidy is viewed as palatable by members
2	**Opt-out**	Metro Student U-Pass	Allows members with good reasons to opt out of the program	Hard to foresee participation rate and set pricing. Pricing per member will be higher than with option 1.	Risk can be taken on by organization or transit agency
3	**Opt-in**	Metro Employer U-Pass	Easy to get approved	Extremely hard to price, advantage of bulk purchase and spreading cost across many more members will be greatly reduced to minimal level	Not very practical for large scale program, people who opt in very likely will buy transit passes anyway

Table 8: UAP Participation Alternatives

Measuring Program Impacts

- Requires data collection
    - AFC facilitates data collection (such as ridership tracking) and program evaluation
    - Surveys can take the place, if AFC is not available. In some states, state regulation requires employers above a certain size to conduct regular surveys

detailing commuting behavior (this is certainly the case in CA, MA and WA). These surveys can be adapted and used as a basis for pricing and program evaluation.

    - May provide the opportunity to obtain additional data concerning the target market

- Important to maintain program and useful in establishing a basis for pricing
    - Determine ridership impact
    - Evaluate expansion opportunities
    - Measure overall program success
- Quantitative Measurements
    - Ridership numbers
    - Ridership patterns (temporal and spatial)
    - Service/capacity changes
- Qualitative Measurements
    - User satisfaction/program support
    - Image of agency
    - Relationship between agency and customers

5) A U-Pass Program for the MBTA

5.1 MBTA System Overview

The MBTA is the 4th largest mass transit system in the United States serving a population of 4,510,400 in 175 cities and towns with an area of approximately 3,244 square miles. The agency maintains a fleet of 1030 buses on 170 routes, 4 subway lines and 13 commuter rail routes. For fiscal year 2002, the average weekday unlinked trips amounted to 1,271,248 (National Transit Database, 2002). The agency employs 6500 people.

The transit mode share for work trips in the greater Boston Metropolitan area was 9% in 2000, but significantly higher in the urban areas directly served by the MBTA system. Transit mode share in Cambridge increased from 23.5% in 1990 to 25.1% in 2000 while mode share in the city of Boston increased from 31.5% to 32.3% during the same time period. However, the MBTA has experienced ridership losses during the last two years. During a speech at the Kennedy School of Government at Harvard in March of 2004, General Manager Mike Mulhern pointed towards customer service improvements and the pending automated fare collection introduction as strategies with which the agency is addressing two apparent needs: the need to make transit more competitive to regain ridership and the need to attract a higher mode share compared to the automobile (Mulhern, 2004).

Fare Structure and Collection

Being one of the oldest public transit systems in the United States, the MBTA continues to rely on archaic technology to collect fares. Vendors in subway stations sell tokens, which are collected at turnstiles. On buses and streetcars, the passengers drop exact change into an on-board farebox next to the driver.

Free bus-to-bus transfers are available, however, riders pay for all other transfers. On January 1, 2004, the MBTA raised its base fares to $.90 for bus rides and $1.25 for subway, leading to a loss of ridership as a result of the fare increase. In the recent past, there has not been much focus on fare collection and fare evasion appears to be a prevalent problem (open gates at subway entrances, overflowing bus fare boxes, etc.). The agency has traditionally had a lower farebox recovery than many other North American transit agencies, such as Toronto and

Montreal, which have to cover a greater share of their operating costs with farebox revenue for lack of other funding options.

The MBTA is offering weekly and monthly passes as well as visitor passes valid for 1, 3 or 7 days. Discounts are available for seniors, persons with disabilities and students (K-12). Additional pass programs include the semester pass program, offering college and university students an 11% discount, as well as a corporate pass program facilitating the provision of transit benefits by employers to their employees. In both programs, the organization effectively acts as a reseller for the MBTA.

Opportunities and Challenges

Since Boston has an unusually large student population amounting to approximately 200,000 during the academic year, introducing a U-Pass program would allow the MBTA to target an important segment of its customer base and take advantage of institutional support to market its services. Through its semester pass program the agency has established relationships with colleges and universities. While the program is moderately attractive, the requirement to purchase passes for the entire semester, the fixed pricing regardless of service levels, and the fact that the time frame does not necessarily match the university's semester schedule make it less than ideal for many students and universities.

There is considerable interest in an improved university transit pass program on the part of many universities in the area, including Harvard, MIT, Boston University and Boston College. One of the reasons for the high level of interest is external pressure related to scarce and expensive parking, municipal development requirements (particularly by the City of Cambridge) and state regulation aiming at reducing SOV travel and VMT and increasing alternative commute options. Because of these pressures, several universities already subsidize transit passes and are likely to continue to do so, which reduces the individual's cost and thereby increases user acceptance of the program. State rideshare reporting requirements also facilitate pricing calculations, as large employers are required to conduct transportation surveys, thus commuting data is available for many institutions.

An additional opportunity might be the upcoming automated fare collection implementation the MBTA is currently working on. Initial implementation is planned for 2005 with a general roll-out expected in 2006. While not a prerequisite for the U-Pass program, it opens up opportunities for the MBTA to rethink its fare policy, structure and programs to offer more choices to customers and respond to customer needs. It would also present a challenge, since the use of student ID cards as transit passes in the future system requires cooperation between universities and the MBTA in order to standardize technology and enable multi-purpose smart card applications. Given the complexities of the AFC implementation, it would be timely to introduce a U-Pass program beforehand, so that the system can be set up to accommodate it.

Other challenges include the need to change business practices at the MBTA. The MBTA has long established employer and student pass programs that are well accepted, so the potential benefits of introducing a U-Pass program must be clear. In addition, abuse potential needs to be minimized to avoid revenue loss and negative press.

5.2 Pilot U-Pass Program

Several Boston area universities have expressed interest in a U-Pass program and MIT and Harvard have expressed a desire to cooperate with the MBTA on an integrated smart card that works as a transit pass as well as a university ID. Because both MIT and Harvard are located in Cambridge and have experience in applying innovative methods to comply with the city's parking caps, including subsidizing transit passes, the two universities are prime targets for a pilot program. Naturally, the pilot program should serve as a trial for an expanded program that makes U-Pass available to all universities that choose to participate and ultimately to other types of organizations as well.

MIT Pilot Program

MIT Overview

Massachusetts Institute of Technology is located on 154 acres along the Cambridge side of the Charles River Basin. The university is a private institution offering undergraduate and graduate degrees in a variety of disciplines. Total enrollment during the academic year of 2003-04 amounted to 4112 undergraduate students and 6228 graduate students. The institute employs

9500 faculty and staff under one central administration, 2432 of whom work off-site at Lincoln Labs. The total university population amounts to 19840, 17,408 at the Cambridge location.

The campus is well served by public transit. The Kendall/MIT subway stop of the Red Line is located on the east side of the campus and this stop is also served by 4 bus lines (CT2, 64, 68 and 85). The west side and main entrance to the university is served by bus lines 1 and CT1 and CT2.

The university operates its own shuttles as well. The Safe Ride shuttle runs on 4 different routes in Cambridge and Boston between 6pm and 3am (4am on weekends) serving off-campus housing locations. The Tech Shuttle provides cross-campus transportation during weekdays from 7:15am to 7:15pm. Both shuttles are free to all members of the MIT community. The EZRide shuttle run by Charles River TMA and supported by MIT offers direct access to commuter rail at North Station free of charge to all MIT affiliates.

MIT offers several commuter options, including access to carsharing (Zipcar), Emergency Ride Home service and access to car/vanpool matching through Mass Rides. The university has 4400 parking spots (commuter and residential) for which it sold a total of 6552 permits during the academic year 2003/04 (including 1455 occasional/evening permits). New parking is expensive and the City of Cambridge caps the total number of parking spots allowed at 4814 (McDonald, 2004). MIT charges substantial annual fees for parking permits, however, the rates are well below market rate. During the 2003/04 academic year employees paid $518 per year for the standard commuter permit. Resident students paid $480 while student commuters paid $333. A variety of additional and special passes are available for occasional or special considerations (such as the $259 carpool parking permit).

Current pass program

The City of Cambridge has been a driving factor in MIT providing transit pass subsidies to its students. Subsidies started in October of 1997 when the city tied a $10 per pass subsidy requirement to a building permit for Simmons Hall, a new dormitory. During the permit process for the Media Lab expansion, the City increased the required subsidy to 50% and mandated that MIT financially support the EZRide shuttle service to North Station shuttle (operated by Charles River TMA and the City of Cambridge).

MIT is a consignment customer for MBTA passes. Passes are purchased at an 11% discount for students and at full pass price for faculty and staff. Providing the 50% subsidy required by the city to students and employees costs MIT approximately $1.1 million annually and the administrative costs of distributing the passes amount to an additional $80,000 a year.

Given MIT's urban setting and good transit connection, it is not surprising that the modal split favors public transit and walking. The 2002 MIT transportation survey reveals the following modal split during an average workweek:

- 26.4% Public transit
- 25.9% Walking
- 17.7% Single Occupancy Vehicle
- 12.2% Biking
- 5.7% Carpool or taxi
- 4.8% Day off, work at home etc.
- 4.4% No answer[11]

MIT Criteria for an acceptable U-Pass program

The MIT parking and transportation office is open to the idea of providing lower cost transit passes to its students and employees. Not only would it simplify the process for both students and administrators, it would also help the university grow while staying below the parking space cap imposed by the City of Cambridge and comply with city and state mandates related to VMT reduction.

According to John McDonald, a U-Pass program would have to fulfill the following criteria:

- It has to be more user-friendly for students and employees than the current program
- Ideally, the student ID would be used as a transit pass
- The price per individual needs to be low enough to be acceptable to students and employees

[11] Multiple answers possible. Data source: 2002 MIT Transportation Survey conducted for DEP Rideshare report

- Ideally, administrative costs and subsidies for MIT would decrease or remain stable
- Year-to-year price increases need to stay within reasonable limits
- There might have to be opt-out provisions for the disabled who are not able to ride transit[12]

The ideal MIT U-Pass scenario

Mike, a first-year MIT graduate student who lives a short T ride away from campus, picks up his student ID during orientation week. In addition to gaining access privileges to labs and studios, he can store Tech cash to pay for products and services on campus and – best of all – his ID card doubles as a MBTA transit pass. The pass allows him not only to ride back and forth from MIT free of charge, but ride the entire core subway and bus system at any time. To use his ID to ride, all he needs to do is swipe it through the turnstiles and fare collector machines on board buses. Mike's card works as a transit pass during the entire year. Transit privileges are automatically updated once enrollment information is transmitted and stop upon graduation or in the unlikely case that Mike abuses the system by lending out his card to friends and family. Of course, Mike's pass is not entirely free. A portion is paid for by student life fees, while MIT subsidizes the rest. Knowing that he would have fare free access to public transit, a subsidized Zipcar membership and access to local shuttles, including MIT's Safe Ride, Mike sold his car before moving to Cambridge. This saves him over $1000 yearly in insurance and registration fees alone, a big chunk of money for a graduate student.

Brenda works at MIT and commutes in from Framingham. She also automatically receives T pass privileges on her ID at the beginning of the year, good for the whole year, or until her employment ends. Since her pass only covers the core area of the system, she purchases a commuter rail upgrade through MIT. Brenda usually orders quarterly and her upgrade pass gets delivered with her paycheck every month. In the future, when the MBTA has finished installing AFC in commuter trains, the upgrade information will simply be loaded onto her card from a central MIT location. Brenda pays for her pass with a pre-tax payroll deduction, which gives her an additional savings off the already subsidized price.

[12] McDonald, John, "Personal Communication", February 17, 2004

Jim lives in Newton and usually drives to work at MIT because he feels it takes too long to take public transit. When the U-Pass program was approved, the price of a parking pass was increased to pay for the transit privileges that his ID card provide. Since he started receiving free transit rides, he has taken transit a few times to avoid particularly bad traffic jams or excessive parking fees when meeting up with his friends in Boston for dinner after work. He has also started riding the T occasionally on the weekends. And let's face it, his monthly charge equals two Café Latte at Starbucks.

Kevin is a sophomore and lives on campus at MIT. He walks to class or takes the Tech shuttle when the weather is bad. He is not so happy about the additional student life fee that is being assessed in order to pay for the U-Pass program. On the other hand, he does take the #1 bus into Boston occasionally at night or on the weekends and loves the convenience of not having to provide exact change but instead just swipe his card. He also heard that along with the U-Pass program, improvements were made to the Tech shuttle service, which he uses more frequently.

Program Design

- Provide all students and employees with transit pass for the whole year.
- Opt out available to disabled on case by case basis
    - Alternatively, opt-out could be available to everyone (except for people with parking spots). This option would impact pricing and enforcement (as discussed below)
- MIT ID would serve as transit pass (ideal case)
- Pass would cover Combo+ (core subway, bus and commuter rail) service area and commuter rail upgrades would continue to be sold through MIT
    - Alternatively, commuter rail privileges could be included for everyone (naturally, this would increase the per person cost)
- Pricing based on historic pass sales and estimate for cash revenue based on rideshare survey
    - Based on AFC data, pricing will be adjusted on an annual basis based on actual usage (use of average fare times actual trips taken)
    - Before availability of AFC data, the biennial surveys required for rideshare reporting can be used to determine usage of the U-Pass adjust pricing

- Provision for MBTA administrative cost and part of the expected ridership increase for the first year (as discussed in pricing model)
- Employees are able to use pre-tax payroll deduction to pay for their pass
- Students will see an increase in student life fees or tuition to cover the cost of the pass
- MIT will continue to subsidize both students and employees

MIT U-Pass Pricing Model

Since MIT has been a consignment customer for MBTA passes, reports of monthly pass sales are available. Along with mode share information from the state-required biennial rideshare report, a fairly accurate estimate of current revenue from both pass holders and other MIT students and employees can be established. A detailed description of the pricing model follows.

Pricing Model

The model described below is based on MIT's subsidized student and employee pass sales for the year from March 2003 – February 2004 and an estimate of cash business. All calculations are based on 2004 fares (monthly passes and cash fares).

In order to determine the price of a U-Pass for MIT, I calculated an annual revenue estimate the MBTA currently receives from MIT students and employees, added a partial provision for administrative costs and costs related to an estimated increase in ridership and divided that number by the total number of employees and students. The resulting price is the annual price MIT pays per employee/student.

The pricing model allows for the exploration of several scenarios, depending on the following adjustable factors: MBTA administrative and marketing costs, projected ridership increase, MIT subsidy levels, # of eligible students and employees, U-Pass coverage levels and whether or not the program is mandatory or has an opt-out component.

Scenario A – U-Pass covers Combo+

In Scenario A, the U-Pass would give all eligible participants a Combo Plus Pass[13] privileges. Commuter Rail riders would purchase an upgrade for their particular zone to complement their U-Pass.

Current Revenue

	MBTA revenue[14]	MIT Subsidy
Employee Pass Revenue	$ 2,213,236	$ 1,009,700
Student Pass Revenue	$ 1,254,962	$ 554,104
Cash Business (estimate)	$ 387,600	
Total	$ 3,855,198	$ 1,563,804

Since the MBTA will continue to receive revenue from commuter rail upgrades, this figure should be taken out of the revenue targeted from U-Pass sales:

Total revenue	$ 3,855,198
- Commuter rail upgrade	$ 705,704
Target U-Pass revenue	$ 3,149,494

To cover administrative program costs and an expected increase in ridership, the MBTA will want to add these costs to the calculations[15]:

Target U-Pass revenue	$ 3,149,494
+ est. Program costs[16]	$ 90,000
+ est. Ridership increase (5%)[17]	$ 192,760
Total target revenue	$ 3,432,254

This is the total amount the MBTA would charge MIT.

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[13] The Combo Plus Pass covers local and cross-town bus service, all subway lines, commuter rail zone 1A and 1B and the inner harbor ferries.

[14] Calculations are described from the standpoint of the MBTA. What is referred to as a revenue to the MBTA is a cost to the university.

[15] All estimates are the author's estimates. No estimates have been obtained from the MBTA

[16] Program costs (administrative & marketing) may decrease after the pilot phase when economies of scale set in and costs are spread across a larger number of participating colleges and universities

[17] Ridership increase is estimated at 5%. While estimates for the actual increase are higher, as discussed in the impact section, the 5% present a reasonable compromise granting an instant revenue increase to the MBTA without burdening the university with a substantial price increase based merely on estimates of future ridership increases (see also assumptions).

Assuming that participation is mandatory at MIT for all students (10,340) and all employees excluding those at Lincoln Laboratory (7068), the annual charge per person works out to be as follows:

Total annual charge/person $ 3,432,254 / 17,408 = **$197.17**

Assuming that MIT wants to keep its contribution at the current level, the university can afford to subsidize approximately $73 annually per U-Pass, plus a subsidy for commuter rail riders, which would apply their current subsidy percentage to the upgrade pass they would purchase. This would put the student/employee charge at approximately **$124** per year or **$10.33/month**.

With this program, all current riders -- 2540 employees and 2299 students -- would incur significant savings over the current system. 14,990 students and employees, who currently do not purchase transit passes, would pay an additional fee of $10.33 per month in return for unlimited access to the MBTA core system.

The model is based on a number of assumptions outlined below:

U-Pass coverage

- The U-Pass will grant unlimited rides equivalent to the Combo Plus pass.
- Commuter rail riders will purchase an additional upgrade pass.

MIT Subsidy

- MIT will subsidize the U-Pass at a certain percentage
- MIT will subsidize the commuter rail upgrade pass at the same level it subsidized the original commuter rail pass.
- The total MIT subsidy remains equal or close to the current subsidy

Current ridership assumptions

- Revenue calculation is based on actual pass sales for the year March 03 – February 04, which takes into account monthly variations including semester breaks.

- Cash business is calculated as the difference between the percentage of survey respondents stating that they are using public transit to commute and the percentage of MIT affiliates purchasing T passes (11%). Cash revenue was calculated assuming 40 rides a month at $1.25 per ride ($50 per month)[18].

Eligibility and participation

- All employees and students are eligible. The calculations exclude employees at Lincoln Labs, an off-campus location in Lexington with very limited public transit service.
- Participation is mandatory

MBTA Program costs

- MBTA program costs are estimates based on costs incurred by other transit agencies that have implemented U-Pass programs. These numbers are pure estimates and have not been discussed with the MBTA.
- Ridership increase is estimated at 5%. While estimates for the actual increase are higher, as discussed in the impact section, the 5% present a reasonable compromise granting an instant revenue increase to the MBTA without burdening the university with a substantial price increase based merely on estimates of future ridership increases. This approach also presents an opportunity to spread the price increase, which is expected to be largest during the first year, over a larger time frame. Pricing for subsequent years would be adjusted to bridge the gap between the 5% and the actual increase in ridership (measured with automated fare collection technology or through surveys). Depending on the extent of the ridership increase, the MBTA might allow the increase to be spread across several years (as is done at RTD Denver's EcoPass program), in order to avoid a cost increase so large, that the university's participation becomes endangered. The adjustment can be calculated by using a per-trip rate: as an example, the current revenue per trip from MIT employee and student pass sales is $1.01, based on the MBTA average of 59 trips per monthly pass (Boston MPO, 1999).

[18] I estimate that occasional transit commuters ride fewer than 40 times a month. However, I decided to use this conservative estimate in order to cover infrequent non-commute rides by students and employees, which are not captured in the commute survey.

The model does not take into account:

- Additional employee savings through pre-tax payment of transit passes
- Administrative costs or cost savings incurred by MIT due to the program change

Scenario B – U-Pass covers entire MBTA system

In Scenario B, the U-Pass would give all eligible participants Zone 8 pass privileges, which gives the pass holder access to the entire MBTA system including commuter rail.

Current Revenue

	MBTA revenue	MIT Subsidy
Employee Pass Revenue	$ 2,213,236	$ 1,009,700
Student Pass Revenue	$ 1,254,962	$ 554,104
Cash Business (estimate)	$ 387,600	
Total	$ 3,855,198	$ 1,563,804

To cover administrative program costs and an expected increase in ridership, the MBTA will want to add these costs to the calculations[19]:

Target U-Pass revenue	$ 3,855,198
+ estimated Program costs	$ 90,000
+ estimated Ridership increase (5%)	$ 197,259
Total target revenue	$ 4,142,458

This is the total amount the MBTA would charge MIT.

Assuming that participation is mandatory at MIT for all students (10,340) and all employees excluding those at Lincoln Laboratory (7068), the annual cost per person works out to be as follows:

Total annual cost/person $ 4,142,458 / 17,408 = $237.96

If MIT wants to keep its contribution at the current level, the university can afford to subsidize approximately $90 annually per U-Pass. This would put the student/employee cost at approximately $148 per year or $12.33/month.

[19] All estimates are the author's estimates. No estimates have been obtained from the MBTA

With this program, 507 current commuter rail riders would incur large savings over the current system. 4850 students and employees would incur significant savings as well, whereas 485 current bus riders would see their monthly cost increase from $12 to $12.33. 14,990 students and employees, currently non pass-holders, would pay an additional fee of $12.33 per month in return for unlimited access to the entire MBTA system.

The model is based on a number of assumptions outlined below:

U-Pass coverage

- The U-Pass will grant unlimited rides on the entire system.

MIT Subsidy

- MIT will subsidize the U-Pass at a certain percentage
- The total MIT subsidy remains equal or close to the current subsidy

All other assumptions are the same as in scenario A.

Scenario evaluation

While scenario B looks more favorable at first glance – only $2 more than in scenario A give U-Pass holders access to the entire MBTA system – equity considerations with regards to who becomes the beneficiary of the savings come into play.

Current bus pass holders, 66% of whom are students, would be charged more than they currently pay. The increase, however, is less than $4 a year and the individual only needs to take one round trip on commuter rail to break even. Current commuter rail riders, 11.3% of whom are students, would be receiving up to $126 discounts per month over the current system. From a political perspective, it might be more difficult to gain widespread support for this scenario. At the same time, including commuter rail access would target those who are most likely to drive alone under the current program. MIT might try to lessen the inequities in savings by increasing the student subsidy and decreasing the employee subsidy.

Another way to address inequities between student and employee pricing involves running the numbers separately for the student and employee population. Since a high percentage of students live on campus and do not commute on a regular basis, while most employees commute in some form, students would pay less for their U-Pass then employees. Based on the model discussed above and the two scenarios, the breakdown for the pass charges would be as follows:

Monthly U-Pass Charge	**Students**	**Employees**
Without Commuter Rail	$7.56*	$10.97*
With Commuter Rail	$8.17*	$18.42

* Plus the same commuter rail upgrade charge discussed in Scenario A for zones 1 - 8

On one hand, this approach would more accurately reflect ridership levels for the respective subgroup, even out the additional savings advantage employees have by using pre-tax money to pay for their passes, and increase the potential for wide-spread student support due to the low price. At the same time, gaining employee support might be more difficult, particularly for Scenario B, which includes commuter rail access, although one needs to remember that the employee charge gets deducted from their pre-tax income and that the actual net charge to the employee is lower. Since most of the reduction of SOV travel is expected to come from the employee group, it might be worth considering Scenario B, which charges both students and employees $12.33 a month for unlimited access to the entire system. Ultimately the university needs to weigh its options and decide which scenario better serves the needs of the MIT community in the long run. As mentioned above, other scenarios are possible and easily calculated with a spreadsheet model (see Appendix A and B).

Impacts

Impacts on student and employee pricing

Table 9 summarizes the fiscal impact the two different scenarios have compared to the existing pass program at MIT. Both scenarios offer significant improvements to existing transit riders (except for current bus riders under scenario B), however, scenario A offers a more balanced distribution of savings than scenario B, which provides much higher discounts to commuter rail riders than to bus and subway riders. The average savings remain constant at approximately 50% for each scenario.

Current Pass Program			Scenario A: U-Pass excluding Commuter Rail			Scenario B: U-Pass including Commuter Rail		
Pass Type	# Passes Sold	Current Price	Price	$$ savings	% savings	Price	$$ savings	% savings
Bus	5814	$12.00	$10.33	$1.67	13.92%	$12.33	$-0.33	-2.75%
Subway	29406	$22.00	$10.33	$11.67	53.05%	$12.33	$9.67	43.95%
Combo	15462	$35.50	$10.33	$25.17	70.90%	$12.33	$23.17	65.27%
Combo+	1429	$39.50	$10.33	$29.17	73.85%	$12.33	$27.17	68.78%
Zone 1	455	$53.00	$41.00	$12.00	22.64%	$12.33	$40.67	76.74%
Zone 2	980	$59.00	$46.00	$13.00	22.03%	$12.33	$46.67	79.10%
Zone 3	944	$69.00	$61.00	$8.00	11.59%	$12.33	$56.67	82.13%
Zone 4	897	$90.00	$74.00	$16.00	17.78%	$12.33	$77.67	86.30%
Zone 5	695	$111.00	$88.00	$23.00	20.72%	$12.33	$98.67	88.89%
Zone 6	736	$122.00	$97.00	$25.00	20.49%	$12.33	$109.67	89.89%
Zone 7	522	$132.00	$107.00	$25.00	18.94%	$12.33	$119.67	90.66%
Zone 8	854	$139.00	$118.00	$21.00	15.11%	$12.33	$126.67	91.13%

Table 9: Comparison of MIT U-Pass Pricing Scenarios

Impacts on MBTA ridership and revenue

Calculating an estimated increase in ridership is not an easy task. The high percentage of students living on or close to campus explains the high mode share of walking and bicycling. Not much of a shift is anticipated from those modes, although the University of Washington saw some decrease in bicycling when transit use increased. The target group that would create the most positive impact by increasing transit use for commuting purposes is that of graduate students and employees who currently drive alone. Below is a summary of reasons for driving alone reported in the 2002 commute survey:

Convenience	47%
Time constraints	20%
School/day care	14%
No other option	7%
Cost	3%
Second job	1%
Other	7%
Missing	2%

Among those who gave cost as a reason, 81.6% believe their driving cost per day is less than $2 or they do not know the cost. From these numbers, it could be deducted that providing a "free" transit pass would level the playing field and provide enough incentive for them to switch

to transit. Among those giving convenience as a reason, using the MIT student ID as the transit pass might be enough of an incentive to at least occasionally take transit instead of driving alone. Without further information, it is difficult to estimate, how many people would be inclined to switch modes based on MIT survey data.

Another way to estimate an increase in ridership is based on the fare elasticity for transit. Studying the ridership impacts of the Bruin GoPass, an unlimited access pass at UCLA, Brown, Shoup and Hess calculated a fare elasticity of -.28 and a cross elasticity with solo driving of .1 (a 10% fare reduction leads to a 1% decrease in solo driver trips) (Brown et al, 2003). Given the higher existing transit ridership in the Boston area, it is advisable to use the fare elasticity calculated for the Boston area by Gomez-Ibanez. According to his study, a 10% decrease in the price of transit would increase ridership by 2.2 – 2.3% (Gomez-Ibanez, 1998). Providing a fare free pass could conceivably lead to an increase in ridership of up to 23%, although fare elasticity might not be the best tool to predict ridership increases in the case of extreme fare changes, such as this one.

In order to estimate the ridership impact based on price elasticity, I am using two different scenarios. The first one assumes that students and employees will perceive riding transit as free of charge, since they paid the fee as part of student life fees, tuition or through a pre-tax payroll deduction at the beginning of the year. In that case, according to Gomez-Ibanez, ridership should increase by 22.5% (since the price was reduced by 100%). It is more conservative to assume that students and employees would react to the U-Pass based on the actual price reduction. On average, U-Pass pricing as calculated with the model outlined above is approximately 50% lower than the current pass pricing. The projected revenue increase is as follows:

Ridership Increase	**Instant MBTA Revenue Increase (1st year)**
5.00%	$197,259

Ridership Increase	**MBTA Revenue Increase in subsequent years**
11.25%	$433,710
22.50%	$867,420

During the first year, the MBTA will experience an increase of $197,259, which is built into the program pricing from the start. Based on the two ridership increase scenarios outlined above, the revenue increase in subsequent years could be as high as $867,420. If ridership increases to such an extent, the MBTA might consider spreading the price increase to the universities over several years in order to ensure that the program remains financially and politically viable in the long run. The revenue increase represents the increase the MBTA experiences over the current revenue prior to the program. It excludes the program administration and marketing charges that were included in the scenario calculations.

Impacts on the university's costs

The cost of parking at MIT has been increasing due to the elimination of surface parking lots for development projects and increasing land values in Cambridge. New parking requires the construction of parking garages or underground parking, which is estimated at a range of $20,000 - $65,000 per space. Current leasing or debt services cost range from $2400 - $2700 per parking space per year in the MIT area. Taking into account that MIT currently charges $518 per year to students and employees, the university's annual costs per parking space amount to $1882 - $2182. If we assume the above calculated ridership increases and estimate that 50% of the increase stems from commuters switching from driving to public transit, MIT's annual savings could be as follows (based on the two ridership scenarios):

Ridership Increase	**50% from SOV travel**	**MIT Parking Savings Range**
11.25%	5.625%	$ 512,268 - $ 593,927
22.50%	11.25%	$1,024,537 - $1,187,854

These savings in the cost of providing parking can result in immediate dollar savings in the case of those parking spaces that MIT currently leases from outside operators. In the case of MIT owned parking spaces, a decrease in the need for parking would free up valuable real estate for development projects. Since the university is growing, however, it is more likely that the savings translate into future savings incurred by not having to build additional parking facilities a high marginal cost.

By reducing the number of parking spaces needed on campus, the U-Pass program would also soften the increase in parking permit costs set forth by MIT over the next years. In an effort to tie parking fees to actual parking expenses the university is incurring, the transportation and parking office set a goal of 35% employee participation in actual parking costs similar to the employee contribution of medical benefits. The implication of this is that annual employee parking fees would increase to approximately $1,100 by the year 2006 (from the current $518) and that any increase in parking expenses that MIT incurs would also affect employee parking prices (The parking and transportation office has developed a plan that will spread the increases over a span of 9 years, such that permit prices will rise by 11% a year to reach the targeted $1,100 by 2011). Thus, even those, who will not take advantage of the U-Pass to commute to work, should have an interest in supporting the pass. Given the expected savings in parking costs, MIT could delay the increase in parking costs to reach the 35% slightly to reduce the financial burden otherwise incurred by parking permit holders who not only see an increase in permit costs, but also a mandatory U-Pass fee. The savings also offer an opportunity for MIT to increase its transit pass subsidy, which is particularly advisable if large ridership increases during the first year lead to a noticeable price increase for the second year.

The calculations show that the savings from having to provide fewer parking spaces more than offset the increase in the cost of the program. Whereas a 22.5% increase in ridership would lead to a price increase of $867,420 for MIT, the expected parking savings range from $1,024,537 to $1,187,854. This suggests that MIT could increase its student and employee subsidy in order to absorb part or all of the expected price increase that occurs as ridership increases.

Harvard Pilot Program

Harvard University Overview

Harvard University has several locations in the Boston area with its main campus located in Cambridge. It is a private university with a current enrollment of 6597 undergraduate and 12014 graduate students (2003/04) and approximately 14,000 faculty and staff. 97% of undergraduate and 37% of graduate students live on campus. The university's goal is to increase on-campus housing for graduate students to 50% in the future. 48% of all employees live within 3 miles of their work location. Harvard's administration is decentralized, spread over the 11 schools that make up the Harvard educational community.

The main campus is well-served by public transportation with its own subway stop and several bus lines (1, CT1, 66 and 86 from Cambridge to Allston and others). Harvard and MASCO operate the M2 shuttle connecting Harvard's main campus to the Longwood Medical Area. This shuttle is free for Harvard affiliates. Additional shuttles run by Harvard connect the Cambridge campus with the business school campus on the Allston side.

Parking fees are below market rate, but nonetheless significant ranging from annual commuter parking rates of $670 to residential garage parking of up to $1300 for students and $750 to $1620 respectively for faculty and staff. Students are discouraged but not prohibited from bringing cars to campus.

Harvard is running an extensive *CommuterChoice* program, including access to and subsidies for car sharing (with Zipcars on the Cambridge, Allston and Longwood campus), car- and vanpool matching. As part of the program, Harvard currently subsidizes MBTA passes for employees at 40% subsidy. Semester passes are made available to graduate students at the 11% discount granted by the MBTA. There is currently no university subsidy in place for students. Participation at the employee level is high, while the semester pass participation is relatively low (compared to MIT). Total Harvard MBTA pass subsidy for employees amounts to approximately $1.8 million per year.

According to Harvard's Rideshare Report (2002), the mode split of trips taken by employees and graduate students at the university is as follows:

Walking	36.34%
Public Transit	27.52%
SOV	21.26%
Bicycling	8.53%
Carpooling	6.13%
Vanpooling	.17%

Harvard has plans to outsource the administration of commute benefits to a third party in order to make passes available online and allow for pre-tax payroll deduction in addition to the existing 40% subsidy.

Harvard has a strong interest in negotiating a U-Pass program with the MBTA. A consultant has benchmarked comparable programs across the country to provide a base line to work with. The ideal scenario would allow Harvard affiliates to ride bus and subway using their Harvard ID card:

Harvard Criteria for an acceptable U-Pass program

- U-Pass type arrangement would provide students with transit privileges every semester and employees on an annual basis
- Use of Harvard ID as transit pass is preferred, as it would provide more convenience to students and employees and cut down on potential fraud. (ID is used to gain building access and for identification purposes).
- Price needs to be low enough to gain political support from the high level administrators of all Harvard schools[20]

Harvard U-Pass Pricing Model

The model described below is based on Harvard's subsidized employee pass sales (March 2004 pass sales), graduate student semester pass enrollment as of November 2003 and an estimate on cash business. All calculations are based on 2004 fares (monthly passes and cash fares).

In order to determine the price of a U-Pass for Harvard, I calculated an annual revenue estimate the MBTA currently receives from Harvard students and employees, added a provision for

[20] Bogle, Holly, Personal Communication, February 18, 2004

administrative costs and costs related to an estimated increase in ridership and divided that number by the total number of employees and students, to get an annual price per participant.

Scenario A – U-Pass covers Combo+

In Scenario A, the U-Pass would give all eligible participants a Combo Plus Pass[21] privileges. Commuter Rail riders would purchase an upgrade for their particular zone to complement their U-Pass.

Current Revenue

	MBTA revenue[22]	Harvard Subsidy
Employee Pass Revenue	$ 4,468,944	$ 1,823,736
Student Pass Revenue	$ 228,312	-
Cash Business (estimate)	$ 840,000	-
Total	$ 5,537,256	$ 1,823,736

Since the MBTA will continue to receive revenue from commuter rail upgrades, this figure should be taken out of the revenue targeted from U-Pass sales:

Total revenue	$ 5,537,256
- Commuter rail upgrade	$ 1,250,000
Target U-Pass revenue	$ 4,286,388

To cover administrative program costs and an expected increase in ridership, the MBTA will want to add these costs to the calculations[23]:

Target U-Pass revenue	$ 4,286,388
+ est. Program costs	$ 90,000
+ est. Ridership increase (5%)[24]	$ 276,863
Total target revenue	$ 4,653,251

[21] The Combo Plus Pass covers local and cross-town bus service, all subway lines, commuter rail zone 1A and 1B and the inner harbor ferries.

[22] The calculations are described from the MBTA standpoint. The MBTA revenue represents a cost to Harvard.

[23] All estimates are the author's estimates. No estimates have been obtained from the MBTA

[24] 5% is calculated of the total revenue (including commuter rail upgrade revenue), since the ridership is expected to increase across the board. Ridership increase is estimated at 5%. While estimates for the actual increase are higher, as discussed in the impact section, the 5% present a reasonable compromise granting an instant revenue increase to the MBTA without burdening the university with a substantial price increase based merely on estimates of future ridership increases (see also assumptions).

This is the total amount the MBTA would charge Harvard.

If participation is mandatory at Harvard for all students (18,559) and employees deemed eligible in the 2002 rideshare report (9,401), the annual cost per person works out to be as follows:

Total annual cost/person $ 4,653,251 / 27,960 = **$166.43**

Assuming that Harvard wants to keep its contribution at the current level, the university can afford to subsidize between $47 and $48 annually per U-Pass, plus a subsidy for commuter rail riders, which would remain at the 40% level as before. This would put the student/employee cost at approximately **$119.03** per year or **$9.92/month**.

With the U-Pass program, 5635 employees and 453 students would incur significant savings over the current system. 53 seniors would see their monthly price raised by a little less than $1. 21,819 students and employees, who currently do not purchase transit passes, would pay an additional fee of $9.92 per month in return for unlimited access to the MBTA core system. The out-of pocket expense would be even lower for employees, since they will be able to use pre-tax money to pay for the pass.

The model is based on a number of assumptions outlined below:

U-Pass coverage

- The U-Pass will grant unlimited rides equivalent to the Combo Plus pass.
- Commuter rail riders will purchase an additional upgrade pass.

Harvard Subsidy

- Harvard will subsidize the U-Pass at a certain percentage
- Harvard will subsidize the commuter rail upgrade such that commuter rail riders will pay the same (or close to the same) as they do now.
- The total Harvard subsidy remains equal or close to the current subsidy

Current revenue assumptions

- Student passes are calculated as combo passes purchased at 11% discount for 2 terms
- Cash business is calculated as 3% of undergraduates (percentage of undergraduates living off campus) and 10% of graduate students (assuming 40 rides a month, 12 months a year for both undergraduate and graduate students). This would cover occasional commute and non-commute rides.

Eligibility and participation

- All employees eligible under the last rideshare report (defined by the Massachusetts Department of Environmental Protection as all employees working more than 17 hours a week/20 weeks per year who commute during the hours of 6am to 8pm and use their car less than 5 times a month for work) and all students are eligible for the U-Pass (9,401 employees and 18,559 students). Applying different eligibility criteria would affect the number of participating students and employees and thus the cost per person.
- Participation is mandatory

MBTA Program costs

- MBTA program costs are estimates based on costs incurred by other transit agencies that have implemented U-Pass programs. These numbers are pure estimates and have not been discussed with the MBTA.
- Ridership increase is estimated at 5%. While estimates for the actual increase are higher, as discussed in the section "Impacts on MBTA ridership and revenue" later in this chapter, the 5% present a reasonable compromise granting an instant revenue increase to the MBTA without burdening the university with a substantial price increase based merely on estimates of future ridership increases. Pricing for subsequent years would be adjusted to bridge the gap between the 5% and the actual increase in ridership (measured with automated fare collection technology or through surveys). This can be done by using a per-trip rate: as an example, the current revenue per trip from Harvard employee and pass sales is $1.08, based on the MBTA average of 59 trips per monthly pass (Boston MPO, 1999).

The model does not take into account:

- Additional employee savings through pre-tax payment of transit passes

- Administrative costs or cost savings incurred by Harvard due to the program change

Scenario B – U-Pass covers entire MBTA system

In Scenario B, the U-Pass would give all eligible participants Zone 8 pass privileges, which gives the pass holder access to the entire MBTA system including commuter rail.

Current Revenue

	MBTA revenue	Harvard Subsidy
Employee Pass Revenue	$ 4,468,944	$ 1,823,736
Student Pass Revenue	$ 228,312	-
Cash Business (estimate)	$ 840,000	-
Total	$ 5,537,256	$ 1,823,736

To cover administrative program costs and an expected increase in ridership, the MBTA will want to add these costs to the calculations[25]:

Target U-Pass revenue	$ 5,537,256
+ est. Program costs	$ 90,000
+ est. Ridership increase (5%)	$ 276,863
Total target revenue	$ 5,904,119

This is the total amount the MBTA would charge Harvard.

Assuming that participation is mandatory at Harvard for all students (18,559) and employees deemed eligible in the 2002 rideshare report (9,401), the annual cost per person works out to be as follows:

Total annual cost/person	$ 5,904,119 / 27,960 = $211.16

If Harvard wants to keep its contribution at the current level, the university can afford to subsidize approximately $65 annually per U-Pass. This would put the student/employee cost at approximately $145.91 per year or $12.16/month.

[25] All estimates are the author's estimates. No estimates have been obtained from the MBTA

Unlike in the MIT scenario, almost all Harvard students and employees who are currently riding the system would see a decrease in cost, even if commuter rail is included (with the exception of 53 seniors who would pay $3.16 more per month). 6141 employees and students would see their pass costs decrease, some substantially, and 21,819 students and employees, currently non pass-holders, would pay an additional fee of $12.16 per month in return for unlimited access to the MBTA core system. The out-of pocket expense would be even lower for employees, since they will be able to use pre-tax money to pay for the pass.

The model is based on a number of assumptions outlined below:

U-Pass coverage

- The U-Pass will grant unlimited rides in the entire MBTA system.

Harvard Subsidy

- Harvard will subsidize the U-Pass at a certain percentage
- The total Harvard subsidy remains equal or close to the current subsidy

Scenario Evaluation

As in the MIT scenario, the main difference between the two scenarios is the distribution of savings and Harvard needs to weigh the costs and benefits of different scenarios in order to choose the one that best fits its goals.

Impact on Student and Employee Pricing

The savings per transit rider in table 10 below are, of course, not true savings, but a redistribution of cost. While existing transit riders save, all other members of the Harvard community pay more, albeit not without receiving a valuable good in return.

Current Pass Program			Scenario A: U-Pass excluding Commuter Rail			Scenario B: U-Pass including Commuter Rail		
Pass Type	# Sold	Current Price	Price	$$ savings	% savings	Price	$$ savings	% savings
Senior	636	$ 9.00	$9.73	$-0.73	-8.11%	$12.16	$-3.16	-35.11%
Bus	16476	$ 18.00	$9.73	$8.27	45.94%	$12.16	$5.84	32.44%
Subway	22524	$ 26.00	$9.73	$16.27	62.58%	$12.16	$13.84	53.23%
Combo	16500	$ 42.00	$9.73	$32.27	76.83%	$12.16	$29.84	71.05%
Combo Student	5436	$ 63.00	$9.73	$53.27	84.56%	$12.16	$50.84	80.70%
Combo +	1620	$ 47.00	$9.73	$37.27	79.30%	$12.16	$34.84	74.13%
Zone 1	924	$ 63.00	$52.33	$10.67	16.93%	$12.16	$50.84	80.70%
Zone 2	1224	$ 70.00	$58.33	$11.67	16.67%	$12.16	$57.84	82.63%
Zone 3	1440	$ 76.00	$71.53	$4.47	5.88%	$12.16	$63.84	84.00%
Zone 4	1620	$ 89.00	$77.53	$11.47	12.88%	$12.16	$76.84	86.34%
Zone 5	864	$ 102.00	$84.13	$17.87	17.52%	$12.16	$89.84	88.08%
Zone 6	1524	$ 108.00	$90.13	$17.87	16.54%	$12.16	$95.84	88.74%
Zone 7	1188	$ 114.00	$96.73	$17.27	15.15%	$12.16	$101.84	89.33%
Zone 8	1620	$ 118.00	$104.53	$13.47	11.41%	$12.16	$105.84	89.69%
Boat	96	$ 118.00	$104.53	$13.47	11.41%	$12.16	$105.84	89.69%

Table 10: Comparison of Harvard U-Pass Pricing Scenarios

Impacts on MBTA ridership and revenue

Since 97% of undergraduate students live on campus as opposed to 37% of graduate students, the majority of a ridership increase is expected to come from graduate students and employees. Given the already high mode share of public transit and walking and relatively low SOV mode share of 21.26%, the expected increase should be moderate. The rideshare survey reveals that while only 1% of those driving alone to Harvard find public transit too expensive, 11% said they would be very likely to use transit if higher discounts on transit passes were available. Transit is also mentioned as the 1st choice among the top three commuting options instead of driving by 14%, followed by walking with 9%, carpooling with 7%, biking with 6% and vanpooling with 2%. As it is hard to estimate from these numbers what the ridership increase will be during the first year, I used Gomez-Ibanez's elasticity figure for the Boston area – as in the MIT pilot case – to generate estimates for a revenue increase the MBTA might expect.

MBTA revenue increase from Harvard U-Pass program based on different expected ridership increases:

Ridership Increase	**MBTA Revenue Increase (1st year)**
5.00%	$ 276,863
Ridership Increase	**MBTA Revenue Increase in subsequent years**
11.25%	$ 622,941
22.50%	$ 1,245,883

During the first year, the MBTA will experience an increase of $276,863, which is built into the program pricing from the start. Based on the two ridership increase scenarios outlined above, the revenue increase in subsequent years could be as high as $1,245,883. If ridership increases to such an extent, the MBTA might consider spreading the price increase to the universities over several years in order to ensure that the program remains financially and politically viable in the long run. The revenue increase represents the increase the MBTA experiences over the current revenue prior to the program. It excludes the program administration and marketing charges that were included in the scenario calculations.

Impact on Harvard parking costs

The cost of parking at Harvard has been increasing due to the availability of surface parking lots, which has declined due to recent development projects, and increasing land values in Cambridge. New parking requires the construction of parking garages or underground parking, which is estimated at a range of $20,000 - $65,000 per space. Current leasing or debt services cost range from $2,400 - $4,200 per year in the Harvard University area. Taking into account that the majority of drivers pay on average $778 for the unreserved parking permit (rates for FY'05), the university's annual costs per parking space amount to $1,620 - $3,422. If we assume the above calculated ridership increases and estimate that 50% of the increase stems from commuters switching from driving to public transit, Harvard's annual savings are as follows:

Ridership Increase	50% from SOV travel	Harvard Parking Savings Range
11.25%	5.625%	$ 559,598 - $1,182,066
22.50%	11.25%	$1,119,197 - $2,364,131

As explained in the MIT section, these savings might not be immediate cash savings, but future savings incurred by not having to build (as many) additional expensive parking spaces as the university continues to grow and by being able to turn surface parking lots into developable land. As the cost of providing parking has been increasing steadily in the Boston and Cambridge area, it is safe to assume that the savings calculated above will increase in future years.

Harvard University's parking fees are based on 36% employee and 64% university contribution. As in the MIT case, that means that even those employees who will not use the U-Pass for public transit stand to gain from its effect on parking costs in the long run. Parking savings could be used to increase the Harvard subsidy after the first year to soften the expected pass price increase as ridership increases.

The calculations show that the savings from having to provide fewer parking spaces more than offset the increase in the cost of the program. Whereas a 22.5% increase in ridership would lead to a price increase of $1,245,883 for Harvard, the expected parking savings range from $1,119,197 to $2,364,131. This points toward an opportunity for Harvard to increase subsidy in order to absorb part or all of the expected price increase that occurs as ridership increases.

Mandatory versus opt-out program

The pricing model for both MIT and Harvard described above require mandatory participation of all university students and employees. While students and employees who currently buy transit passes or ride transit several times a month see clear financial benefits from the U-Pass program (some will pay close to the same as before and receive more coverage, others experience significant savings with the U-Pass program), those who do not currently use public transit might be harder to convince that they should pay an additional charge. This group will consist of individuals who will view the pass as valuable and change their commuting behavior to ride transit more often (this is the group that will make the program successful). Another

group will continue to drive, but support the program as they benefit from better parking availability and less congestion. A third group, most likely students living on campus and employees for which transit does not provide a feasible commute option, might oppose the program because the benefits are not immediately obvious to them. While opposition to this type of additional charge is understandable, the fact is that they do receive a tangible product/service in return. Health insurance premiums or athletic fees that provide access to the sports facilities on campus are examples of similar charges that are currently in place and that by its nature provide a better value for those who use it most. Educating students and employees about the costs and benefits of the program becomes an important part of implementation. Simple explanations of how few rides per month are necessary to break even might be enough to convince skeptics of the program's value.

Should a mandatory option be politically infeasible, an alternative would be to provide people with an opportunity to opt out of the program. This would have the advantage of pre-empting opposition by those who absolutely cannot or choose not to participate. The disadvantage would be a higher price for everyone else, since the total cost would be spread across fewer people. The mechanics would be similar to the mandatory option, the difference being that those who choose not to participate would have to return their pass and request a refund (or have the university or transit agency remove transit privileges from the smart card).

Since it is unknown what percentage of the population would choose to opt out, the initial pricing needs to be set assuming a certain participation level. Based on the University of Washington's example (where opt-out levels are at approximately 15%), these should probably be anywhere from 15% - 25% of the population. After the first year, data will be available to price the U-Pass more accurately.

In order to encourage switching from SOV commuting to public transit, one strategy would be to give every parking permit holder a "free" U-Pass and build the cost into the permit price, effectively making it impossible for parking permit holders to opt out. At the same time, offering a certain number of daily parking passes as an extra feature of the U-Pass would offer flexibility for those commuters who are on the verge of switching to transit and not buying a parking

permit, but might need their car occasionally. Including a few day permits thus increases the value and attractiveness of the U-Pass.

Many universities, including MIT, limit the number of cars and parking requirements on campus by prohibiting freshmen to bring their car or acquire a parking permit. This gets them accustomed to living on campus without a car, which presumably results in them being less likely to purchase or bring a car during following years. The same argument could be used to make the U-Pass mandatory for first-year students and only allowing students of subsequent years to opt-out of the program.

In theory, the risk of the unknown participation during the first year can be borne by the transit agency or by the university (in either case, it would mean increasing the price per person based on the expected opt-out percentage, such that the total amount collected equals the target amount calculated). In practice, the transit agency would be well advised to set a policy of insisting on payment of the agreed upon target amount and leave it up to the university to set the price per person based upon an expected opt-out percentage, since university administrators are more familiar with the specifics of their campus operations. This would also encourage universities to choose the mandatory option rather than offering an opt-out possibility.

If the university ID is used as a flash pass (students show the ID in order to ride the bus or enter the subway), the opt-out option becomes slightly more difficult to administer. Transit privileges will have to be made clear by adding a sticker to the ID or issuing ID cards in different colors to display eligibility. In the case of a smart card application, transit privileges can be easily added or removed from the card.

Technology and administrative considerations

While automated fare collection facilitates the data collection required to determine initial pricing and future updates, it is not a necessary prerequisite to introduce the pilot program. Since the MBTA has established consignment relationships with many Boston area colleges and universities, data for the number of passes sold should be currently available at the agency. Follow-up surveys can be used to measure ridership changes in subsequent years. Since many

institutions already have to survey their employees under the Massachusetts Rideshare Act every two years, requiring the addition of U-Pass related questions to the surveys should not be an undue burden.

The MBTA can choose to accept university ID cards as U-Passes or issue their own U-Passes (as the CTA does). Accepting the university ID cards is the most convenient way for students and employees to use the pass and the MBTA would save costs by not having to produce the transit passes. The ID cards would be shown to bus and green line drivers as well as station agents at subway entrances in order to gain fare free access. Additional costs might arise from training and informing MBTA employees, so that they know which colleges and universities are eligible to use their ID as a transit pass. Manual tracking would be possible, but would also add a small cost premium to the program. Should the MBTA decide to issue its own U-Passes, increased costs would incur from the production of the passes. Ideally, they would include the pass holder's photo to enable spot checks and prevent fraud. There might be opportunities to streamline the pass production process by having the universities produce the passes in their ID card offices.

Long-term the integration of smart card technologies between the MBTA and colleges and universities would be ideal. Multi-purpose smart cards provide customers with the convenience of using one card for several different transactions (transit agency, ID purposes, facilities access, parking payments and others) and the MBTA with valuable market research data. At the same time, introducing smart card technology and building multi-purpose abilities into the system involves additional costs for all parties. Those could be minimized by starting discussions as early as possible while the MBTA and the universities are considering different options.

The MBTA is currently working on a $100 - 150 million project to implement automated fare collection based on smart cards and magnetic stripes. Initial implementation is planned for 2005 with general roll-out expected in 2006. The MBTA's General Manager Mike Mulhern expects automated fare collection to yield a number of benefits. An increase in the fare revenue base of 5 – 10% is forecasted due to the prepayment of fares and the reduction of cash handling. In addition the MBTA expects to save up to 3% by reducing fare evasion. Overall, AFC could have

a positive revenue impact of $25 million (Mulhern, 2004). Implementing automated fare collection would open up tremendous opportunities for the MBTA to rethink its fare policy, structure and programs to offer more choices to customers and respond to customer needs. Additionally, data that were hard to collect before the advent of AFC will be readily available offering opportunities to develop and track programs aiming at specific target markets. The MBTA should not wait for the introduction of AFC in order to implement this U-Pass program. Starting with a pilot program now allows the agency to work out program details before AFC becomes a reality and offers an opportunity to explore and eventually move towards a joint smart card program with interested universities.

5.3 Expansion opportunity

In addition to MIT and Harvard, several other universities have expressed interest in a closer relationship with the MBTA, including a U-Pass program. Both Boston University and Boston College are served by the Green Line and are interested in exploring ways to deliver low cost transit options to their students and employees as incentives to choose public transit over driving to the campus. BU, a current consignment customer, has recently streamlined its internal ordering and distribution system for transit passes by putting it online and enabling pre-tax payroll deduction for employees. As a result, student and employee transit pass sales have increased from approximately 700 to over 4000 passes a month, proof that convenience, marketing and price incentives can yield positive results[26].

With the numerous colleges and universities in the Boston area, many of which are currently taking advantage of the MBTA's consignment program, there is a great opportunity to reach a large portion of the 200,000 students and additional university employees, a target market that is worth paying attention to.

There is no reason why the MBTA could not offer a large-scale employer-based program. While this case does not explore the dynamics of how a strictly employer based program would play out and what level of interest there may be in Boston, both the Denver RTD and Metro Transit case study show that a general level of interest exists. The limited and expensive parking supply in downtown Boston and Cambridge and the MA rideshare requirements may be enough

[26] Lancaster, Webster, "Personal Conversation", March 3, 2004

of an incentive for employers to consider subsidizing employee transit passes within the context of an EcoPass program, should the MBTA offer it. Since the MBTA has existing relationships with a large number of employers in its service area, offering a new program should not be a difficult or expensive undertaking. By developing the prototype elements of an employer EcoPass with MIT and Harvard, the MBTA would be well positioned to market the conversion from the current corporate pass program to an EcoPass program. The expected increase in ridership and revenue at the MBTA and the decrease in parking costs for employers would offset the conversion costs. A preliminary survey of those employers who currently participate in the MBTA's corporate pass program would provide a gage for their interest level, further reducing any risk involved in the program.

6) Conclusion

Summary of findings

The pilot program calculations for MIT and Harvard reveal a relatively low per-person cost for the U-Pass. Assuming that the university will maintain its current transit pass subsidy and that participation is mandatory for students and employees, MIT students and employees would pay between $10.33 and $12.33 a month (depending on coverage area, the higher price includes access to commuter rail). This is just over a quarter of their current price of a Combo+ pass at $39.50. At Harvard, the price would range from $9.73 to $12.16 compared to a current employee cost of $47 to a currently unsubsidized cost of $68 for students. Including an opt-out alternative at the university level would increase the price per student, but would have little impact on ridership and thus the expected results at the university and transit agency level.

Assuming that ridership increases by 22.5% (calculated based on fare elasticity for the Boston area) and conservatively estimating that half of that represents a switch from SOV travel, rough estimates show that MIT could save up to $1,187,854 annually in costs related to leasing of or debt services for parking spaces. Harvard's potential savings could amount to as much as $2,364,131 per year. Based on the same assumptions, the MBTA would experience an annual net revenue increase of $2,113,303 combined from both pilot programs after the first program year (or the first few years, depending on whether the price increase is spread out over several years). The universities' parking savings would more than offset the increase in cost. The program presents little risk for the MBTA as the pricing model includes a contingent for program expenses and builds a 5% ridership increase into the pricing for the first year. Adjustments to actual ridership levels (increases will most likely be higher than 5%, possibly up to the 22.5% mentioned earlier) occur after the first year and on an annual basis thereafter. While this might not sound like a large increase, one needs to remember that these universities only represent two of many colleges and universities in the Boston area and that the impact of a large-scale program – possibly including employers as well – could have a significant positive effect on the agency's finances.

The results of this research show that this program is financially feasible in an urban context where initial ridership is high. Even without any subsidies by the university, the per-person cost

shows a significant savings over the fully priced monthly pass or the existing semester pass (at an 11% discount). Naturally, university contributions help in securing student and employee acceptance of the program. And as the pilot calculations show, organizations that currently provide and subsidize parking stand to gain financially from implementing an unlimited access pass program.

More generally, the case studies show that UAP programs, if designed carefully and adapted to local conditions, can be powerful tools to increase ridership and revenue while maintaining equitable treatment of customers (institutional and end users). Concerns regarding potential revenue losses and abuse can be mitigated with a variety of measures and controls in place. Added program costs can be recovered by building them into the pricing and also tend to be counterbalanced by savings due to reduced transaction costs and other potential cost reductions. Pricing should reflect actual ridership at the organization in order to maintain equitable treatment of all participants and ensure that the transit agency receives revenue increases as ridership rises, which in the long run will cover a proportion of the resulting service needs. The critical aspect of the program is the recording and analyzing of actual ridership on a yearly basis and the use of that data to adjust the pricing accordingly. In order to avoid untenable price increases after the first year if ridership growth is large, a good policy would be to spread the increase over several years. By basing program pricing on ridership levels (used as a proxy for availability and convenience of using transit service), organizations pay based on actual usage, which presumably reflects transit service. At the same time, it does not treat certain population groups differently from others – it simply leaves it up to the organizations to distribute the cost of riding transit across a larger universe of members than only existing transit riders. Equity concerns are thus minimized, particularly if the program is offered to all organizations that express interest in participating.

While positive public relations, environmental gains and convenience are important benefits of a UAP program, it is ultimately driven by the financial incentives: the transit agency increases its revenue, the university or employer saves parking costs and existing transit riders decrease their commuting costs. Whether or not organizations and their members choose to adopt this type of program depends to a large extent on the per-person cost and the extent of a possible subsidy by the organization. These factors are influenced by the level of existing transit

ridership, which is intrinsically linked to the level of service available, whether or not regulation exists that mandates the reduction of SOV travel, and how high the price of parking is to the organization. If the base transit ridership is low, prices should be low enough to be palatable to the majority pass recipients. If parking prices are high or regulation mandates a reduction in SOV travel, the organization has an incentive to subsidize the passes to such an extent that the end user price reaches a similarly low level.

Compared to other measures to control costs and/or increase revenue (such as fare increases or service cuts), U-Pass programs are attractive, positive ways of increasing ridership and revenue. They are less politically charged (if at all) and provide benefits to all parties involved. Generally, they are viewed as positive by users, organizations and the city, and due to their potential to decrease SOV travel, support from environmental groups should be guaranteed.

Challenges of Moving Forward

Ultimately the success of a UAP program hinges on the acceptance of those who pay the bill. In some cases that is the student or employee, in others it is the university or employer and in many cases the cost will be split between the two. Gaining acceptance is only possible if all parties fully understand the concept and the expected costs and benefits of an unlimited access pass program. For the MBTA and other transit agencies this points toward a need for educating existing customers about the program and assisting them in reaching out to their members in order to gain support. Initial negotiations between parties, particularly during the pilot stage, might be long and slow. While this thesis offers suggestions on how the details of the program could be structured, the needs of each individual organization are different and will likely lead to differences in the program details. For universities the need to market this type of program is even more critical. Gaining support for an additional charge is never an easy task and it might take creative approaches to do so. Packaging the U-Pass program with improvements in other transportation services or tying it to parking fees are two ways to overcome potential resistance to the concept. There might be good reason to subsidize employees more than students (who already pay a student life fee for services around campus) or students more than employees (on the basis that employees can use pre-tax dollars to pay for their passes and thus effectively pay less than students). Whether or not to include commuter rail service is a similarly important consideration: on one hand it gives much larger discounts to commuter rail riders than to all

others, on the other hand, people driving in from the suburbs who could be using commuter rail are a very important group to target when trying to reduce SOV travel. Access to commuter rail at such a low cost would also be a nice benefit to students.

Next Steps

The next step of this research could be a broad-based survey of universities and employers in order to determine their interest and willingness to consider this type of program given the expected costs and benefits. This would be particularly interesting with regards to an implementation of an employer-based EcoPass program. Using the pricing model developed for the university pilot program, it would be beneficial to calculate pricing and expected impacts for a current corporate pass customer as a basis for an EcoPass pilot program. Implementation of a U-Pass program should start with the type of pilot program outlined in this thesis, then branch out to other universities, such as Boston College, Boston University, Northeastern University and Suffolk University. A step to an introduction to an employer-based program could be to include employees of public agencies, before targeting private companies, many of which are currently consignment customers of the MBTA. Additional targets could be the Longwood Medical Area, which already has an organization focused on transportation needs, and Logan Airport with its Logan TMA (Logan Airport Employee Transportation Management Association), which is about to experience new service from the Silver Line.

Epilogue

While the Chicago Transit Authority offered valuable lessons for the development of the MBTA pilot program, the reverse is true as well. The results of the research for the MBTA offer two main lessons for the CTA. First, the CTA could benefit from adopting a pricing model similar to the one suggested to the MBTA for its U-Pass programs. It would make the program more equitable, which might lead to increased enrollment, but would also allow the CTA to capture the increase in revenue as ridership increases. Secondly, the current program offers starting points for thinking about a potential employer-based EcoPass program in Chicago.

A more equitable U-Pass Program at the CTA

As detailed in chapter 4, the CTA has had a U-Pass program in place since 1998. By the CTA's own measures, the program has been very successful in reaching its primary goal: to generate new rides, particularly off-peak and by choice riders and has grown from 12 participating universities in 1998 to 26 in 2004. Despite the apparent appeal of the program to most universities, some have declined participation. The University of Chicago, located in the southern part of the city, names the high price as one of its reasons. The fixed price ("one-price fits all") approach the CTA has taken in determining the U-Pass pricing raises equity concerns between participating colleges universities and may be the reason why those located on the fringe of the system are less likely to join. Additionally, it does not allow the CTA to capture any revenue associated with an increase in ridership.

Unlike RTD Denver and Metro Transit, the CTA views the program as a discount program and wants to make sure that students pay "full price" once they graduate. While it could be difficult to change the pricing model to one similar to the one described in this thesis for the MBTA, the CTA might want to consider this option and research the potential financial implications of doing so.

The new pricing strategy would tie the CTA's U-Pass revenue to actual rides taken, not to the number of participating students. This would require more detailed analysis of AFC data than is done currently (at least within the context of the U-Pass program). At the same time, it would give the CTA a justifiable basis for adjusting the pricing based on actual ridership, not simply based on rough estimates. The resulting differences in pricing might convince colleges and universities that do not currently participate that they will get a fair value if they choose to join the program.

For participating universities this would mean that the pricing of program is less predictable because ridership varies over time. On the other hand the institution pays a fair price for actual ridership. That means the colleges and universities in outlying areas served by limited bus routes will pay significantly less than those downtown served by bus and rail, if it proves to be true that ridership reflects the service differentials. Universities with high ridership will see an increase in pricing, while universities with low ridership will experience a decrease. It might be a difficult undertaking to significantly increase a university's price, especially in those cases where a student body vote is necessary to approve the program. This could be mitigated by spreading the increase over a period of two or more years. Adjusting pricing for ridership levels, which presumably reflect service levels, should make the program much more attractive to universities in areas with less frequent transit service and might convince administrators to join the U-Pass program.

For the CTA, implementing this new pricing strategy will likely lead to an increase in revenue. Further research would allow for a better assessment of the potential costs and benefits to all parties.

Opportunities for an EcoPass Program at the CTA

The CTA's 11.1% decrease in ridership between 1990 and 2000 (459,947 and 19.4% mode share in 1990 and 409,067 and 17.3% mode share in 2000) -- although moderated by a slight increase during the last 3 years -- calls for actions that are more innovative than business as usual. While the CTA names off-peak ridership increases as an important goal, the Census numbers suggest that there should also be a focus on regaining commute riders, which has been achieved with EcoPass programs in other parts of the country. The successful U-Pass program and the transit benefit program with approximately 2,200 participating employees at the CTA show that there is an interest in affordable public transit passes and suggests that organizations will join the program if the CTA offered it.

The MBTA pilot case reveals that a UAP program is likely to be financially appealing in areas where parking is scarce and expensive, creating incentives for employers to invest in alternative transportation strategies in order to avoid paying large parking subsidies. The logical place to start an employer based EcoPass program would be with university employees at a university in a downtown location. Several universities are already familiar with the concept as they already offer the U-Pass program to their students and many colleges and universities in urban areas are struggling with the rising costs of providing adequate parking facilities to both students and employees. Pricing calculations similar to the ones described for the MBTA would give insight into the potential for this program to be successful in Chicago and could be a starting point for a pilot program.

After a successful pilot program primary target groups are organizations that draw employees from the area served by CTA, which increases the likelihood of employee support for the program. These include existing transit benefits customers and other employers in the loop and the east side of Chicago where parking is expensive and scarce, other universities, hospital complexes and city government and other public agencies.

The EcoPass program would provide several benefits over the existing transit benefits program. The program:

- Further reduces the cost of commuting by public transit, which is expected to lead to an additional increase in ridership.
- Targets those who otherwise would not consider purchasing a transit pass
- Provides a transit pass to all members of participating organizations encouraging occasional if not regular transit use.
- Levels the playing field for transit by eliminating the out-of-pocket costs associated with a transit ride as opposed to a car ride.
- Enables cross-subsidies within a perceived community of interest.
- Increases awareness of transit offerings among non-riders.
- Complements rather than replaces the existing program.

The development of an Area EcoPass would allow the CTA to offer a program with all the administrative benefits of the current U-Pass program (easy to administer and available to many interested organizations), but one that is attractive to organizations with varied levels of transit service. Instead of assessing each organization's pricing individually, the Area EcoPass would differentiate pricing based on transit ridership levels within a predetermined geographic area in which the organization is located. This model is currently successfully employed at King County Metro Transit in Seattle (see Area FlexPass Program in chapter 4.3).

Opportunities and challenges for the introduction of an EcoPass program are summarized below:

Opportunities

- Existing transit benefits program (employer contacts). The program will be most effective and accepted where parking is expensive and scarce, where employees are coming predominantly from within the CTA network, not the suburbs, and where there is familiarity with the program.
- Experience with the University based U-Pass program.
- Existing AFC and smart card operation allows for relatively easy tracking of program impacts
- Environmental groups lobbying for clean air might be valuable supporters
- While the City of Chicago has been reluctant to impose regulation aimed at reducing SOV travel, it might be supportive of voluntary programs such as this one.

Challenges

- Lack of legislation/regulation mandating a reduction in SOV travel, which would encourage alternative modes of transportation including public transit, car/vanpooling, biking and walking.
- Not much of a parking shortage outside the loop. Parking not expensive enough.
- Few transportation demand management organization that could provide political and marketing support
- Unlike the existing U-Pass program, an employer program would primarily increase peak ridership and might lead to increased service needs

Further research is necessary in order to more accurately estimate the feasibility of this program. It is quite possible that the EcoPass program will be successful in downtown Chicago, where parking is scarce and expensive, but not in the rest of the City. A survey of universities and existing corporate transit benefit customer would provide more insight into the feasibility of introducing this type of program at the CTA.

The potential for both the U-Pass program change and the introduction of an EcoPass program to increase ridership and corresponding revenues should warrant a closer look and further study of these program alternatives at the CTA.

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Appendix A – MIT Pricing Model for Combo+ U-Pass

MBTA Pass Costs starting 1/1/04				3/03 - 2/(	CURRENT PROGRAM				COMMUTER RAIL UPGRADE					U-PASS PROGRAM			
EMPLOYEES																	
	Standard	at 11% discount	Employee cost	MIT subsidy	in %	Annual Number	Employee Cost	MIT subsidy	T Revenue	Comm Rail Upgrade	New Comm Rail T Revenue	New MIT subsidy/pass	New employee cost	New MIT subsidy total		Annual	New T Rever
Bus	$31	N/A	$12	$19	61.29%	1984	$23,808	$37,696.00	$61,504						Existing total T revenue	3,855,198	
Subway	$44	N/A	$22	$22	50.00%	12498	$274,956	$274,956.00	$549,912						- comm rail upgrade revenue	-705,704	**3,149,494**
Combo	$71	N/A	$36	$36	50.00%	9381	$333,026	$333,025.50	$666,051						+ Admin cost	30,000	
Combo+	$79	N/A	$40	$40	50.00%	1213	$47,914	$47,913.50	$95,827						+ Mktg. Costs	60,000	
Zone 1	$106	N/A	$53	$53	50.00%	366	$19,398	$19,398.00	$38,796	$71	$25,986	$41	$41	$14,884		3,239,494	
Zone 2	$118	N/A	$59	$59	50.00%	806	$47,554	$47,554.00	$95,108	$81	$65,286	$46	$46	$36,807	+ Ridership Increase	5.00% 192,760	**4,047,958**
Zone 3	$128	N/A	$69	$59	46.09%	819	$56,511	$48,321.00	$104,832	$103	$84,357	$52	$61	$42,784		11.25% 433,710	**4,288,908**
Zone 4	$149	N/A	$90	$59	39.60%	794	$71,460	$46,846.00	$118,306	$113	$89,722	$49	$74	$38,776		22.50% 867,420	**4,722,618**
Zone 5	$170	N/A	$111	$59	34.71%	673	$74,703	$39,707.00	$114,410	$124	$83,452	$47	$88	$31,376			
Zone 6	$181	N/A	$122	$59	32.60%	693	$84,546	$40,887.00	$125,433	$134	$92,862	$47	$97	$32,604			
Zone 7	$191	N/A	$132	$59	30.89%	465	$61,380	$27,435.00	$88,815	$145	$67,425	$48	$107	$22,312			
Zone 8	$198	N/A	$139	$59	29.80%	779	$108,281	$45,961.00	$154,242	$158	$123,082	$50	$118	$39,075	**New total T revenue**	**3,432,254**	
						30471	**$1,203,536**	**$1,009,700**	**$2,213,236**		**$632,172**			**$258,619**			
				Estimated token sales			3876	0	193800							Cost	# of people
				Total		**30471**	**$1,207,412**	**$1,009,700**	**$2,407,036**						Total cost/person	$197.17	17408
															Employee	$124.00	7068
STUDENTS									Existing		New Comm Rail	New MIT subsidy/pass	New Student cost	New MIT subsidy total	MIT subsidy	$73.17	
	Standard	at 11% discount	Student cost	MIT subsidy		Annual Number	Student Cost	MIT subsidy	T Revenue	Comm Rail Upgrade	T Revenue				Student	$124.00	10340
Bus	$31	$28	$12	$16		3830	$45,960	$59,709.70	$105,670						MIT subsidy	$73.17	
Subway	$44	$39	$22	$17		16908	$371,976	$290,141.28	$662,117								
Combo	$71	$63	$36	$28		6081	$215,876	$168,382.89	$384,258								
Combo+	$79	$70	$40	$31		216	$8,532	$6,654.96	$15,187								
Zone 1	$106	$94	$53	$41		89	$4,717	$3,679.26	$8,396	$71	$6,319	$41	$41	$3,605			
Zone 2	$118	$105	$59	$46		174	$10,266	$8,007.48	$18,273	$81	$14,094	$46	$46	$7,917			
Zone 3	$128	$114	$69	$45		125	$8,625	$5,615.00	$14,240	$103	$12,875	$52	$61	$6,511			
Zone 4	$149	$133	$90	$43		103	$9,270	$4,388.83	$13,659	$113	$11,639	$49	$75	$5,017			
Zone 5	$170	$151	$111	$40		22	$2,442	$886.60	$3,329	$124	$2,728	$47	$88	$1,023			
Zone 6	$181	$161	$122	$39		43	$5,246	$1,680.87	$6,927	$134	$5,762	$47	$97	$2,018			
Zone 7	$191	$170	$132	$38		57	$7,524	$2,165.43	$9,689	$145	$8,265	$48	$107	$2,729			
Zone 8	$198	$176	$139	$37		75	$10,425	$2,791.50	$13,217	$158	$11,850	$50	$118	$3,755			
						27723	**$700,859**	**$554,104**	**$1,254,962**		**$73,532**			**$32,574**			
				Estimated token sales			3864	0	193200	(322 * 50 a mo)							
						27723	**$704,723**	**$554,104**	**$1,448,162**		**$705,704**			**$291,193**			
				old comm rail $$		6083	$582,348	$345,324	$927,672	new commra	$705,704			$291,193			
				old other		52111	$1,329,787	$1,218,480	$2,927,526					$1,273,662			
TOTAL				**Total**			**$1,912,135**	**$1,563,804**	**$3,855,198**		**$4,137,958.22**			**$1,564,855.09**			
											MBTA revenue change			MIT subsidy change			
											$282,759.92			**$1,051.29**			

Appendix B – MIT Pricing Model including Commuter Rail Access

MBTA Pass Costs starting 1/1/04			Year 3/03 - 2/04		CURRENT PROGRAM			U-PASS PROGRAM
EMPLOYEES								
	Standard	at 11% di	Employee	MIT subsidy	Number	Employee Cost	MIT subsidy	T Revenue
Bus	$31	N/A	$12	$19	1984	$23,808	$37,696.00	$61,504
Subway	$44	N/A	$22	$22	12498	$274,956	$274,956.00	$549,912
Combo	$71	N/A	$36	$36	9381	$333,026	$333,025.50	$666,051
Combo+	$79	N/A	$40	$40	1213	$47,914	$47,913.50	$95,827
Zone 1	$106	N/A	$53	$53	366	$19,398	$19,398.00	$38,796
Zone 2	$118	N/A	$59	$59	806	$47,554	$47,554.00	$95,108
Zone 3	$128	N/A	$69	$59	819	$56,511	$48,321.00	$104,832
Zone 4	$149	N/A	$90	$59	794	$71,460	$46,846.00	$118,306
Zone 5	$170	N/A	$111	$59	673	$74,703	$39,707.00	$114,410
Zone 6	$181	N/A	$122	$59	693	$84,546	$40,887.00	$125,433
Zone 7	$191	N/A	$132	$59	465	$61,380	$27,435.00	$88,815
Zone 8	$198	N/A	$139	$59	779	$108,281	$45,961.00	$154,242
					30471	**$1,203,536**	**$1,009,700**	**$2,213,236**
				Estimated token sales		3876	0	193800
					30471	**$1,207,412**	**$1,009,700**	**$2,407,036**
STUDENTS								
	Standard	at 11% di	Student co	MIT subsidy	Number	Student Cost	MIT subsidy	T Revenue
Bus	$31	$28	$12	$16	3830	$45,960	$59,709.70	$105,670
Subway	$44	$39	$22	$17	16908	$371,976	$290,141.28	$662,117
Combo	$71	$63	$36	$28	6081	$215,876	$168,382.89	$384,258
Combo+	$79	$70	$40	$31	216	$8,532	$6,654.96	$15,187
Zone 1	$106	$94	$53	$41	89	$4,717	$3,679.26	$8,396
Zone 2	$118	$105	$59	$46	174	$10,266	$8,007.48	$18,273
Zone 3	$128	$114	$69	$45	125	$8,625	$5,615.00	$14,240
Zone 4	$149	$133	$90	$43	103	$9,270	$4,388.83	$13,659
Zone 5	$170	$151	$111	$40	22	$2,442	$886.60	$3,329
Zone 6	$181	$161	$122	$39	43	$5,246	$1,680.87	$6,927
Zone 7	$191	$170	$132	$38	57	$7,524	$2,165.43	$9,689
Zone 8	$198	$176	$139	$37	75	$10,425	$2,791.50	$13,217
					27723	**$700,859**	**$554,104**	**$1,254,962**
				Estimated token sales		3864	0	193200
					27723	**$704,723**	**$554,104**	**$1,448,162**
TOTAL				**Total**		**$1,912,135**	**$1,563,804**	**$3,855,198**

		Annual
Existing T revenue		3,855,198
+ Admin cost		30,000
+ Mktg. Costs		60,000
		3,945,198
+ Ridership Increase	5%	192759.915
New total T revenue		**4,137,958**
Revenue change		**282,760**

	Annual cost/person
Total	237.7044011
Employee	148
MIT employee subsidy	89.70440114
Student	148
MIT student subsidy	89.70440114
New total MIT Subsidy	**$1,561,574**
Subsidy change	**-$2,230**
Monthly employee/student	12.33

Appendix C – Harvard Pricing Model for Combo+ U-Pass

Type of Pass	Full Price	Harvard Price	Per Pass Subsidy	# Sold March '04	annualized	Harvard Subsidy	MBTA Revenue	Comm Rail Upgrade	T Revenue	Subsidy/ pass	Price	Subsidy total
Senior	$ 16.00	$ 9.00	$ 7.00	53	636	$ 4,452.00	$ 10,176.00					
Bus	$ 31.00	$ 18.00	$ 13.00	1373	16476	$ 214,188.00	$ 510,756.00					
Subway	$ 44.00	$ 26.00	$ 18.00	1877	22524	$ 405,432.00	$ 991,056.00					
Combo	$ 71.00	$ 42.00	$ 29.00	1375	16500	$ 478,500.00	$ 1,171,500.00					
Combo +	$ 79.00	$ 47.00	$ 32.00	135	1620	$ 51,840.00	$ 127,980.00					
Zone 1	$ 106.00	$ 63.00	$ 43.00	77	924	$ 39,732.00	$ 97,944.00	$71	$65,604	$28.40	$52.52	$26,241.60
Zone 2	$ 118.00	$ 70.00	$ 48.00	102	1224	$ 58,752.00	$ 144,432.00	$81	$99,144	$32.40	$58.52	$39,657.60
Zone 3	$ 128.00	$ 76.00	$ 52.00	120	1440	$ 74,880.00	$ 184,320.00	$103	$148,320	$41.20	$71.72	$59,328.00
Zone 4	$ 149.00	$ 89.00	$ 60.00	135	1620	$ 97,200.00	$ 241,380.00	$113	$183,060	$45.20	$77.72	$73,224.00
Zone 5	$ 170.00	$ 102.00	$ 68.00	72	864	$ 58,752.00	$ 146,880.00	$124	$107,136	$49.60	$84.32	$42,854.40
Zone 6	$ 181.00	$ 108.00	$ 73.00	127	1524	$ 111,252.00	$ 275,844.00	$134	$204,216	$53.60	$90.32	$81,686.40
Zone 7	$ 191.00	$ 114.00	$ 77.00	99	1188	$ 91,476.00	$ 226,908.00	$145	$172,260	$58.00	$96.92	$68,904.00
Zone 8	$ 198.00	$ 118.00	$ 80.00	135	1620	$ 129,600.00	$ 320,760.00	$158	$255,960	$63.20	$104.72	$102,384.00
Boat	$ 198.00	$ 118.00	$ 80.00	8	96	$ 7,680.00	$ 19,008.00	$158	$15,168	$63.20	$104.72	$6,067.20
				5688	**68256**	**$ 1,823,736.00**	**$ 4,468,944.00**		**$1,250,868**			$500,347.20
			Token sales	**1400**	**16800**	**(times $50/month)**	**$ 840,000.00**					
			Total MBTA revenue				**$ 5,308,944.00**					
				CommRail	**10500**	**$669,324.00**	**$1,657,476.00**					$500,347.20
				Other	**57756**	**$ 1,154,412.00**	**$ 3,651,468.00**					1325304
						Total new T revenu	***4,653,251***			***New Subsidy***		***$1,825,651.20***
						Change	***$ (655,693.20)***			***Change***		***$1,915.20***

Total T revenue		5,537,256
		-1,250,868
+ Admin cost		30,000
+ Mktg. Costs		60,000
		4,376,388
+ Ridership Incr.	5%	276862.8
	11.25%	622941.3
	22.50%	1245882.6
		4,653,251
		Cost
Total cost/person		166.42528
Employee		119.02528
Harvard subsidy		47.4
Student		119.02528
Harvard subsidy		47.4

	Nov-03	MBTA Combo Pass Revenue at $63/mo (after 11% discount)	annualized
Students			
Divinity Scho	29	$ 1,827.00	$ 14,616.00
Harvard Colle	99	$ 6,237.00	$ 49,896.00
Harvard GSD	19	$ 1,197.00	$ 9,576.00
Grad Educati	239	$ 15,057.00	$ 120,456.00
Law School	67	$ 4,221.00	$ 33,768.00
	453	**$ 28,539.00**	**$ 228,312.00**

Appendix D - Harvard Pricing Model including Commuter Rail Access

Type of Pass	Full Price	Harvard Price	Per Pass Subsidy	# Sold March 2004	annualized	Harvard Subsidy	MBTA Revenue
Senior	$ 16.00	$ 9.00	$ 7.00	53	636	$ 4,452.00	$ 10,176.00
Bus	$ 31.00	$ 18.00	$ 13.00	1373	16476	$ 214,188.00	$ 510,756.00
Subway	$ 44.00	$ 26.00	$ 18.00	1877	22524	$ 405,432.00	$ 991,056.00
Combo	$ 71.00	$ 42.00	$ 29.00	1375	16500	$ 478,500.00	$ 1,171,500.00
Combo +	$ 79.00	$ 47.00	$ 32.00	135	1620	$ 51,840.00	$ 127,980.00
Zone 1	$ 106.00	$ 63.00	$ 43.00	77	924	$ 39,732.00	$ 97,944.00
Zone 2	$ 118.00	$ 70.00	$ 48.00	102	1224	$ 58,752.00	$ 144,432.00
Zone 3	$ 128.00	$ 76.00	$ 52.00	120	1440	$ 74,880.00	$ 184,320.00
Zone 4	$ 149.00	$ 89.00	$ 60.00	135	1620	$ 97,200.00	$ 241,380.00
Zone 5	$ 170.00	$ 102.00	$ 68.00	72	864	$ 58,752.00	$ 146,880.00
Zone 6	$ 181.00	$ 108.00	$ 73.00	127	1524	$ 111,252.00	$ 275,844.00
Zone 7	$ 191.00	$ 114.00	$ 77.00	99	1188	$ 91,476.00	$ 226,908.00
Zone 8	$ 198.00	$ 118.00	$ 80.00	135	1620	$ 129,600.00	$ 320,760.00
Boat	$ 198.00	$ 118.00	$ 80.00	8	96	$ 7,680.00	$ 19,008.00
				5688	**68256**	**$ 1,823,736.00**	**$ 4,468,944.00**
			Token sales	**1400**	**16800**	**(times $50/month)**	**$ 840,000.00**
			Total MBTA revenue				**$ 5,308,944.00**
			CommRail sales		**10500**	**$669,324.00**	**$1,657,476.00**
			Other sales		**57756**	**$ 1,154,412.00**	**$ 3,651,468.00**
			New Total			***$1,824,390.00***	***$ 5,904,118.80***
			Change			***$654.00***	***$ 595,174.80***

		Total T revenue		$ 5,537,256.00	
		+ Admin cost		$ 30,000.00	
		+ Mktg. Costs		$ 60,000.00	
				$ 5,627,256.00	
		+ Ridership Incr.	5%	$ 276,862.80	
				$ 5,904,118.80	
				Cost	# of people
		Total cost/person		$211.16	
		Employee		$145.91	9401
		Harvard subsidy		$65.25	
		Student		$145.91	18559
		Harvard subsidy		$65.25	

	Nov-03	MBTA Combo Pass Revenue	
Students		at $63/mo (af	annualized
Divinity School	29	$ 1,827.00	$ 14,616.00
Harvard College &	99	$ 6,237.00	$ 49,896.00
Harvard GSD	19	$ 1,197.00	$ 9,576.00
Grad Education	239	$ 15,057.00	$ 120,456.00
Law School	67	$ 4,221.00	$ 33,768.00
	453	**28539**	**$ 228,312.00**