

Bus Transportation—A Look Forward

JOHN DOCKENDORF, *Pennsylvania Department of Transportation*

HERBERT S. LEVINSON, *New Haven, Connecticut*

DONN FICHTER, *Albany, New York*

ALI HAGHANI, *University of Maryland*

RONALD J. HUNDENSKI, *San Francisco Municipal Railway*

CHARLES E. PRESTRUD, *Seattle, Washington*

As one looks to the future and attempts to predict the role of bus transit, it is helpful to look back a century to gain a better perspective on this challenge. For example, it is hard to imagine that in 1899 one could have anticipated many of the technological changes that have had such a major effect on public transportation. A century ago, street railways dominated the urban landscape, and transit buses did not even exist. It was probably inconceivable then that street railways would be almost totally replaced by the end of the century. Similarly, it appears unlikely that today's transit buses will be totally replaced by the end of the next century. However, the possibility exists that some unforeseen technological change could make transit buses a thing of the past by the end of the new millennium.

Because it is difficult to forecast technology that is as yet undiscovered, a more pragmatic approach to forecasting the role of transit buses is essential. An examination of current and expected settlement and street patterns suggests that, as long as there is a need for automobiles and roadways, there will be a need for transit buses. The key issue is not whether bus transit will survive, but rather how it will function. Will it continue the decline that has occurred since World War II, or will trends and policies evolve in the 21st century that are more favorable to its use?

In the early part of the new millennium, many of the trends that began after World War II, such as the decline of central cities, the growth of suburbs, the dispersion of employment, and the increase in automobile ownership, will continue. As a result, bus transit ridership may continue to decline.

However, a climate more favorable to bus transit will progressively emerge. Factors contributing to this change include an increased desire to avoid congestion and suburban sprawl and to revitalize cities and alleviate air pollution. Although this revival is not likely to match the heyday of bus transit after World War II, when more than twice as many individuals rode buses as do today, bus transit ridership in the 21st century is likely to increase significantly.

BACKGROUND

Today, except in the nation’s largest cities, buses provide most public transportation. Even in large cities with other modes of public transport, the transit bus is still the dominant mode and annually carries the most passengers, as indicated in Table 1.

TABLE 1 Major Bus Transit Data, 1997 (1)

Selected Bus Statistic	1997 Total	Bus Total as Percentage of Total for all Transit Modes
Total unlinked bus passenger trips	5,199,000,000	61
Total bus vehicle miles	2,307,000,000	60
Total bus passenger miles	20,357,000,000	47
Total bus vehicle hours	171,800,000	68
Total buses used for service	72,170	58
Total bus service employees	197,982	61

Despite the strong interest in new starts and the resurgence of light rail in many communities, bus transit will remain important in these areas. Buses will be needed to provide feeder service to existing and new rail lines and to cover areas not served by rail transit. Thus, the survival of the transit bus in the nation’s urban areas appears secure.

However, the relative importance of public transportation, both bus and rail, has declined since World War II, and it is likely that this decline will continue in the short run. A number of demographic and technological factors have contributed to the decline of public transportation in the United States. Population has declined substantially in many cities since World War II, especially in older cities of the East and the Midwest. The decline has adversely affected ridership on bus transit. The high population and employment densities and grid-system street layouts in central cities were especially conducive to efficient bus service, since the demand was concentrated and there were many short-haul trips. As people left cities, the remaining bus routes became less productive and triggered the adverse spiral of reduced service and higher fares that ultimately led to a substantial curtailment in levels of service.

The rapid population growth of the nation’s suburbs continues. A recent study indicated that the percentage of the nation’s population living in suburbs has doubled since 1950 and that suburban growth continues (2). Today, most urban residents live in suburban areas, where most jobs are concentrated. These suburban areas are not conducive to bus transit because their populations, activities, and employment are dispersed, and their street systems are often discontinuous with many circles, cul-de-sacs, T-intersections, and dead-end streets.

The general economic growth since World War II contributed greatly to the decline of public transit since it helped make automobile ownership economically feasible for most families. Today, most families have more than one car to meet their transportation needs.

The greater affluence also enabled many families to afford single-family homes, which generally had to be built in undeveloped suburban areas because of the limited land availability and the high cost of land in most cities. The convenience, comfort, and privacy of the suburban single-family home generally could not be matched by available housing alternatives in the central cities. Better schools and personal safety were also associated with suburban growth.

The rapid growth in automobile ownership and usage since World War II has contributed to the decline of bus transit. Nationally, 86 percent of all daily trips are made by automobile, whereas only 2.0 percent of these trips are made by public transportation (3). The convenience, comfort, flexibility, and privacy offered by the automobile generally cannot be matched by even the best public transit service alternative for most people. To accommodate the growing number of automobiles municipalities built more streets, roads, and freeways. Many of these roadways required buildings to be razed, residents to be relocated, and large amounts of land to be developed for garages and parking lots. The growth of automobile usage established a new lifestyle in the nation's suburbs. Residents became highly dependent on automobiles, since homes, schools, stores, and businesses usually were too dispersed for efficient public transportation and the distances between them were too great for walking.

Finally, the locations of employment centers have changed dramatically. Many businesses and factories have relocated to the suburbs to take advantage of the newer and better roads, cheaper land, and, to a lesser degree, closer access to more skilled employees. About 40 million people both live and work in the suburbs, approximately double the number of individuals who commute from suburbs to cities (4). This trend compounded the problem of providing efficient fixed-route public transit to serve dispersed employment and residential centers.

Collectively, these factors have resulted in a 50 percent decline in bus transit ridership since 1946, as shown in Table 2.

TABLE 2 Bus Passenger Trips as a Percentage of Total Passenger Trips (Millions) (1)

Calendar Year	Total Unlinked Bus Passenger Trips	Percent Change
1946	10,247	
1956	7,062	(31.1)
1966	5,764	(18.4)
1976	5,247	(9.0)
1986	5,753*	NA*
1996	4,887*	(15.1)

* Data from 1946 to 1976 are for linked passenger trips. Beginning in 1977, data are for unlinked passenger trips, which, because of the inclusion of transfers, are significantly higher than would be the case if transfers were excluded, as was the case before 1977.

FUTURE FAVORABLE TRENDS FOR BUS TRANSIT

One of the primary trends that should increase the demand for bus transit in the new millennium is the increasing concern with negative effects of sprawl and congestion. There has been a significant increase in the time it takes to commute and conduct personal business, and transportation costs have increased. For example, it is estimated that people in the Atlanta urban area drive an average of 35 miles per day and spend an average of 75 minutes in their vehicle as a result of traffic congestion and the dispersion of work sites, residences, and shopping centers (5). Another study indicates that commuters in the Los Angeles, Washington, D.C., and San Francisco urban areas spend an average of 65 to 70 hours per year stuck in traffic and that the annual cost of this congestion approaches \$1,000 per person per year (6). The same study indicates that traffic exceeds road capacity in 27 of the nation's 50 largest urban areas. Increased traffic congestion and travel costs will continue and will make it harder for many metropolitan areas to attract new residents and businesses, and eventually growth in these suburban areas may decline.

These conditions may prove conducive to a resurgence in the growth of the central city. They should be favorable to bus transit, both by individuals who may relocate back to cities and by suburban residents who are likely to rely more on public transit than they do now. Whereas this recentralization may be more favorable to fixed-guideway transit, there is likely to be a greater interest in busways as a transportation alternative, as well as better bus service to and from new fixed-guideway systems.

The increased public concern with air pollution is another countervailing trend that should be favorable to bus transit usage in the new millennium. A number of urban areas are not in compliance with the Clear Air Act, and a number of others are likely to fall out of compliance in the next century. The potential loss of substantial amounts of federal transportation funds could create a strong incentive to rely more on public transit to meet future mobility needs in these areas. For example, a recent study estimates that the Atlanta area, which has one of the worst ozone-level problems, stands to lose up to \$600 million of federal transportation funds annually (7).

In addition to reliance on public transit to help reduce air pollution, there may be an increased reliance on alternative fuels by automobiles to help meet Clear Air Act requirements in the next century. This is likely to increase the price of fuel, which could create another incentive to rely more on public transit for commuting. This development should also encourage more migration back to the cities to help reduce the cost of commuting.

Transit buses are also likely to use alternative fuels in the next century to reduce emissions. This will help improve bus transit's environmental image with both riders and nonriders, since despite statistics to the contrary, the public still believes that fossil-fueled transit buses contribute to the pollution problem rather than alleviate it.

The growing use and sophistication of computers will improve bus service reliability and ridership. Although some large transit systems use computers to improve efficiency, most transit systems have captured only a small fraction of the benefits that computerization could provide. For example, computers are widely used to manage inventory and for various other aspects of bus operation and maintenance, such as driver scheduling, vehicle location, and dispatching. However, the full potential of automatic vehicle location systems for customer service, ridership tracking, and vehicle scheduling will be better exploited by most of the transit industry in the future. Similarly, the capabilities of electronic

communication, such as those provided by the Internet, will be increasingly used by most of the nation's transit industry. As the cost of computers decreases in the next century, many public transit systems will use computers to help become more cost effective and efficient.

The increased use of computers by transit systems in the next century should also have a positive effect on transit's image by making transit more flexible and user friendly. For example, as electronic fare payment technology improves, more transit systems will abolish flat-fare systems and provide a wide range of fare incentives and options, such as distance- and time-based fare systems. Improved technology will enable transit operators to obtain better information on who their riders are and where and when they travel. This will help balance riders and seats, thereby reducing crowding and better customizing service to demand. More sophisticated dispatching, more direct routing, and more service coordination may achieve productivity gains that at least partially offset the higher costs of providing service to dispersed origins and destinations in many transit markets, such as those in most suburbs. Finally, as transit adopts more technology it will be perceived as being an innovative and progressive industry. This is likely to capture more choice riders, who currently have a negative perception of buses and sometimes go out of their way to avoid using them.

Several other technological changes will enhance bus industry productivity in the next century. For example, the greater reliance on low-floor buses, articulated buses, electric trolley buses, and dual-mode buses will encourage greater use of buses. Low-floor buses are especially attractive to the growing senior citizen transit market, and they will reduce passenger dwell time. Articulated buses in larger cities will alleviate the overcrowding that deters many city residents from riding transit buses. Selected applications of dual-mode buses should reduce journey times and avoid transfers, which are frequently cited as one of the most inconvenient aspects of using public transportation. Other improvements, including the development of more busways, more exclusive bus lanes, and related initiatives, also should increase bus ridership in the future.

An important institutional change that may improve transit industry efficiency is selective privatization. Although some transit systems have contract services to reduce costs, many large transit systems may take advantage of contracting in the future. Over time, the union contract restrictions that limit the use of private contractors today will be relaxed or eliminated, thereby enabling transit systems to adopt this potentially cost-saving strategy.

Finally, the increased number of senior citizens in the population should prove advantageous for bus transit in the new millennium. Increased life expectancy will create additional demand for public transit as senior citizens live longer, have more leisure time, and need increased health services, yet are often less able to drive. In addition, some senior citizens will tend to work and remain active longer than they do today. Therefore, public transit, and especially bus transit, will be needed to provide the additional transportation required to meet the additional commuting, shopping, and social needs of the growing senior citizen population.

CONCLUSION

The future of bus transit in the new millennium is promising. This optimism is based on an anticipated long-term slowdown in the growth of suburbs and the revitalization of central cities. It reflects an escalation of public concern with traffic congestion, sprawl, and pollution. The continued advance of technology and computerization will also support the growth of bus transit usage, as will demographic trends, such as the aging of the population.

Although we are unlikely to turn back the clock, it is probable that some lessons will be learned from our experiences in this century, and a greater effort will be made in the new millennium to establish residential areas, employment centers, and shopping centers that are more accessible to public transportation. These expected outcomes bode well for bus transit.

REFERENCES

1. *APTA Transit Fact Book*. American Public Transit Association, Washington, D.C., 1999.
2. One-Size-Fits-All Won't Control Urban Sprawl. *USA Today*, May 12, 1999.
3. On the Road Again. *The Patriot News*, Sept. 17, 1998.
4. You Can't Get There from Here. *USA Today*, Nov. 4, 1998.
5. New Recruits in the War on Sprawl. *New York Times*, April 13, 1999.
6. Commuters' Time is (Lots of) Money. *USA Today*, Dec. 11, 1998.
7. Georgia Setting Up Tough Anti-Sprawl Agency. *New York Times*, March 25, 1999.