"A Practical Approach to Bus Rapid Transit"

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Abstract

A growing number of cities are considering, developing or planning for bus rapid transit (BRT) systems. These cities initially have planned to draw mainly upon the experience of cities outside the United States, which are experimenting with a variety of novel technologies. However, many cities both here at home in North America as well as elsewhere have adopted very effective BRT systems that do not require unproven or overly complicated technologies. This article will compare the complicated, high-end BRT with the more practical approach, and illustrate with examples that the latter end of the continuum is where most cities are headed.

Introduction

The public transportation industry's interest in Bus Rapid Transit (BRT) in recent years is arguably more intense than that surrounding light rail in the late 1970s and early 1980s. Like the LRT boom, the BRT interest is borne out of desire to offer increasingly congested cities a flexible, relatively inexpensive alternative to highways. Just as LRT has proven to be more than a fad decades after the initial interest, so, too will BRT be a permanent fixture in the range of urban transportation planners' options.

The simplest and most often used definition of BRT is a public transport concept that "thinks like rail but uses buses." (1) The term "BRT" describes a broad range of bus-oriented applications, and no one definition prevails, even among federal officials who are grappling with how best to fund these projects.

At one end of the continuum is a set of applications that employ widely used and proven techniques to upgrade traditional fixed-route bus service. These include higher-frequency operations, priority at traffic signals, special signage and upgraded shelters at station stops.

At the higher-cost end of the continuum is a service that employs, in addition to the features mentioned earlier, specially designed vehicles (e.g., with doors on both sides or opposite-to-curb side, double-articulation, etc.); reserved rights-of-way; special guidance technologies (optically, mechanically or electromagnetically actuated); and boarding platforms level with vehicle height. Automatic vehicle location and real-time passenger information systems, electric or dual-mode propulsion systems, attractive civil works and landscaping and specialized self-service pre-paid fare collection are also typically incorporated into "high-end" BRT concepts, although they can be used in less complicated BRT schemes. Of course, there are also variations of sophistication at just about every combination between these two extremes.

There are many reasons offered to explain BRT's rise, but the most important include:

1. Mounting need for lower-cost options for high-quality transit service. Although the Transportation Equity Act for the 21st Century (TEA 21) provided record amounts of federal funding, the demand for new rail projects is outstripping the available funds. Indeed, federal officials estimate that more than $10 billion is being sought for more than 40 projects in advanced stages of design and engineering and more that $40 billion for more than 100 projects in early planning stages. Thus, it is no coincidence that many BRT projects currently under development, including Cleveland's Euclid Corridor and Boston's Silverline, were once rail projects but could not find sufficient funding to sustain their development.

2. A way to build ridership for future rail service in selected corridors. A classic example of this strategy is the Dulles Access Corridor in Washington, DC. Plans call for a BRT system to serve the rapidly growing population between Dulles Airport and the District of Columbia while final design and construction of an extension to Washington's heavy rail system takes place.

3. Desire to upgrade the image of bus service. Perhaps as much as a lower-cost rapid transit solution, BRT is often seen as a way that buses can match rail's image of higher-quality service. An example of where BRT is being employed to this end is in Los Angeles, which has two highly successful MetroRapid corridors currently in service and is looking to expand the program to perhaps 20 more routes.

FTA Forms the Bus Rapid Transit Consortium

To help foster the interest in BRT, in late 1998 Federal Transit Administrator Gordon Linton began to organize a group of U.S. cities interested in building a project. The BRT Consortium now comprises 17 cities in sections of the country, which share information and technical resources. They include Los Angeles, Santa Clara and Alameda County in California; Eugene (OR), Honolulu (HI), Louisville (KY), Miami (FL) San Juan (PR), Cleveland (OH), Chicago (IL), Pittsburgh (PA), Boston (MA), Albany (NY), Hartford (CT), Montgomery County (MD), Charlotte (NC) and Washington (DC). Of these 17 cities, the FTA has designated ten as demonstration sites: Eugene, Honolulu, Santa Clara, Miami, Cleveland, Charlotte, San Juan, Washington, Boston and Hartford.

Of these ten demonstration projects, Cleveland's Euclid Corridor, Washington's Dulles Corridor, Miami's South Busway Extension and Hartford's New Britain-Hartford Busway are in the preliminary engineering stage, which includes environmental assessment and public comment. Importantly, the FTA has given a "Recommended" rating or higher to these projects, which clears it for an important transaction known as a Full Funding Grant Agreement (FFGA) sometime this year. This decision commits the federal government to fund a project to a specified amount. Of all the BRT projects in the federal assistance pipeline, only the Hartford scheme has an FFGA on hand. (1) Thus, the BRT approach is now being considered a viable alternative in the "new start" transit projects.

Learning from Cities Abroad

To the rest of the world, BRT is not a new concept. Indeed, virtually every continent has operated programs that could be legitimately called BRT for years, almost all of them before the U.S. To mention just a few examples, guided busways have been in operation for years in Essen, Germany and Adelaide, Australia. Perhaps the most celebrated example of BRT in recent years has been in Curitiba, Brazil (above), where a network of articulated and bi-articulated buses on express routes anchored by distinctive looking tubular stations designed to work like rail lines has not only attracted significant ridership (70% of weekday journeys in the city are made by public transport) but also has drawn dignitaries from all over the world to study the system's success.

In recent years, innovative BRT concepts have taken root in Great Britain and France. In the former, BRT comes in the form of so-called "quality partnerships," where cities will enter into agreements with private sector operators to invest in upgraded civil works (e.g., guided busways and upgraded stations in Leeds) in exchange for the operators' providing nicer vehicles and more frequent service. In France, the cities of Rouen (pictured below) and Lyon are operating a new system called Civis, which consists of optical guidance technology developed by the French high-tech conglomerate Matra and attractive, rail-like articulated buses built by Irisbus. Moreover, in the Paris suburb of Val-de-Sienne, another guided-bus system called GLT, built by the multinational railcar firm Bombardier, is currently running. Both concepts also highly depend on segregated roadway (although their vehicles can also operate in mixed road traffic) and attractive infrastructure, and they are designed to present a lower-cost alternative to a tramline. The Civis system is also been selected by Las Vegas for a short "starter" line connecting the city's northern suburbs to the downtown gaming area.

Limitations to the High-End BRT Approach

While the advantages to reserved rights-of-way and upgraded stations with real-time passenger information clearly make buses more competitive with rail vehicles—in some cases perhaps even erasing the "quality gap" between the two altogether—the advantages of other technologies associated with high-end BRT concepts are less clear-cut. For example, most guidance technologies, whether optical or mechanical, remain in the experimental stage and thus have a much higher capital and operating costs associated with those BRT systems using them versus those that do not. (Perhaps the exceptions are the mechanical systems in Essen and Adelaide, which have been in service for decades now.) In the Leeds Superbus scheme, for example, the cost of installing the guidance curbs and onboard system alone is approximately $50,000 per mile. (2) The cost of a Civis-type vehicle is roughly $1 million, including some $10,000 to $20,000 for the optical guidance. The operating costs are less well known, because they are relatively new and because of their limitations in inclement weather. (2)

The table below compares various features of the types of BRT systems currently available in the world. As you can see, the costs associated with the high-end type of BRT are significantly higher than either low-end or medium-range systems, making the strategy of questionable value.

Thus, considerable value may be gained from simple yet high-quality upgrades to bus service. In the case of the Los Angeles MetroRapid program, ridership has grown by more than 30% in less than a year after the program's launch to rail-like levels (40,000 per weekday on the Ventura Boulevard line and nearly 100,000 on the Wilshire-Whittier line). All this was accomplished with a distinctive paint scheme on new buses purchased from NABI, signal priority and slightly upgraded bus shelters. The program is so successful that the Los Angeles County MTA plans to expand the concept to 20 other major routes in the service area.

Moreover, the success of these first two lines has encouraged the MTA board to commit recently to an upgrade the western segment of the Wilshire/Whittier line to a fully grade-separated BRT using articulated or bi-articulated vehicles. Construction is set to begin in 2003 with a revenue opening date slated for 2005. (3)

Manufacturers' BRT Products and Experience

North American Bus Industries and many others among the six major heavy-duty bus manufacturers have engaged in a variety of development and market efforts over the past several years that have become associated with BRT projects. The following list details that experience as well as the design and marketing philosophies that underpin those and future efforts.

- Conventional two-axle, low-floor and standard-floor 40-foot transit buses: These buses, powered by CNG, LNG and clean diesel are used in a variety of BRT applications, including Miami's South Busway, L.A.'s Metro Rapid Ventura and Wilshire/Whittier corridors and AC Transit's Translink service between Oakland and San Francisco.
- 45-foot composite-body two-axle buses, are being built for two cities' BRT applications, including an expanded Metro Rapid program in Los Angeles and Phoenix's BRT express interurban line. These vehicles will be designed with attractive, passenger-luring styling, yet will have the operational flexibility of two-axle 40-foot buses.
- 60-foot articulated buses, which are available in either low-floor and standard-floor configuration. These high-capacity buses have been the workhorses in many transit fleets throughout America.

Experience with U.K. Projects

In Great Britain, many cities and their bus builders have extensive experience in providing high-quality high-capacity and standard heavy-duty transit buses used by customers in a variety of applications that could be called BRT. For example, in Bradford and Leeds, two FirstGroup subsidiaries are using 12-meter conventional buses on a guided busway project. Such arrangements are called quality partnerships, whereby the city agrees to build such amenities as the busway infrastructure, upgraded bus stations, passenger information systems and signal priority systems, while the bus operator and/or its bus supplier agree to provide certain service, vehicle and onboard improvements.

This approach has been strengthened this past fall, when Parliament enacted a transport bill that widens cities' options with respect to quality partnerships but also provides for quality contracts. The latter technique will be a competitively tendered franchising arrangement tied to exclusive operating rights and tougher quality standards.

The Practical Approach's Development Philosophy

Whether here or abroad, bus rapid transit should be developed on a basis of best value for money. Interestingly, recent industry meetings have begun to shift their focus toward the lower-cost and more practical end of the BRT solutions continuum. A recent GAO report echoed these sentiments. (3) Accordingly, herein are five important principles that should govern a pragmatic approach:

1. Bus manufacturers should focus on platform design only. These companies' core competencies are bus builders. The industry almost always gets into trouble when it encourages or funds vehicle manufacturers to become creators or developers of advanced vehicle subsystems (e.g., hybrid propulsion, advanced passenger information, vehicle guidance systems and automated fare collection)—which unfortunately are the focus of so much attention in BRT circles.

These advanced technologies are not doubt attractive in BRT concepts but manufacturers should neither be interested in nor encouraged to becoming direct suppliers of such subsystems. To do so risks their focus on their core competencies, which could also threatened their very existence.

2. Vehicle designs will continue to be "change friendly." This might appear to be a contradiction of #1, but manufacturers should continue to offer buses that can comfortably and quickly accommodate newly commercialized technologies, including those that lend themselves to BRT applications. In addition to those mentioned above, these include innovative door designs, panoramic, rail-like windows and lighting and vehicle guidance technologies.

Indeed, most manufacturers have already performed substantial design work to accommodate future propulsion packages. For example, the first illustration depicts the application of a fuel cell propulsion system to the NABI Model 45C-LFW CompoBus. Moreover, its development in composite structure buses has demonstrated how any propulsion concept, whether clean diesel, natural gas or fuel cell, can be "downsized" thanks to the considerable weight savings with composite structures. Indeed, lighter-weight composite buses are better able to accommodate future propulsion ideas due to the fact that they tend to be heavier than traditional diesel powerplants.

3. BRT approaches must be workable. Regardless of how interesting an innovative concept may be, any new design must at the end of the day be able to "make pull-out." After all, how can new service concepts, however attractive, attract people out of their cars if these new vehicles are not reliable?

4. The industry must resist "blue sky" R&D exercises. The industry has been fraught with "bus of the future" projects that claim to design "with clean sheets of paper," then their sponsors prematurely claim that these vehicles are ready for revenue service. The result is that either such vehicles are never commercialized or, perhaps worse yet, the industry's customers become test subjects for experimentation.

However, research and development of promising technologies is an important role for the federal government. Indeed, NABI drew extensively from lessons of composite body technology learned in the Federal Transit Administration's Advanced Technology Transit Bus Project when the company launched its 40-foot CompoBus, the Model 40C-LFW. Still, no public sector body funded by taxpayers should engage in promoting innovation that does not hope to have a documented payback in terms of lower overall costs or increases in ridership that has an overall public policy cost-benefit.

5. The more practical end of the BRT continuum is exciting in its own right. There are plenty of exciting examples of lower-cost, practical BRT solutions scoring huge ridership gains. They include Los Angeles' MetroRapid program, as well as Oakland's TransBay service, not to mention overseas examples that could be applied in the U.S.

Related to this philosophy, bus builders will be quite eager to work with or as part of consortia that are given the responsibility of delivering these projects to customers. Indeed, a "turnkey" approach would be just as well suited to building and operating a BRT system as it would be for a rail public transport project. However, most bus manufacturers are simply insufficiently capitalized to be interested in providing project management oversight or some other larger function in such consortia.

Conclusion

In short, the best strategy to pursue with Bus Rapid Transit is that which has best served transit in any application: provide reliable, attractive vehicles that may be upgraded with new technologies as they are commercialized. To subject passengers and the general taxpaying public to endless experimentation not only wastes valuable resources and image but risks the squandering of an opportunity to achieve what public transport has so long worked to do: give Americans the freedom to leave their cars at home.

However, if implemented incrementally, BRT can achieve what has been an elusive promise in public transport: A systematic introduction to higher quality public transport that can later be a true bridge to higher capacity systems. Viewed in this way, BRT has a deserving place in the continuum of public transport service options.

Table I. NABI's engineering study of a hybrid propulsion system for its 45-foot composite bus, which someday might be well-suited to BRT concepts, when the technology matures. Thanks to the lighter weight composite structure, it more easily accommodates the weight penalty associated with the advanced propulsion systems' state-of-the-art.

Endnotes

1. Federal Transit Administration, BRT website (www.fta.dot.gov), 2002.
2. "Supertram," FirstLeeds' website www.firstleeds.com, 2002.
3. U.S. General Accounting Office, "Bus Rapid Transit Shows Promise," September 17, 2001.