

**IS PORTABLE TECHNOLOGY CHANGING
HOW AMERICANS TRAVEL?
A SURVEY OF THE USE OF ELECTRONIC DEVICES
ON INTERCITY BUSES, TRAINS, AND PLANES**



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Executive Summary

This study measures the use of portable electronic technology by travelers on intercity trains, planes, and buses. Using data obtained from field observations of 7,028 passengers in fourteen states, it shows that travelers on “curbside” bus operators, such as Boltbus and Megabus, and high-speed Acela Express trains are the heaviest users of portable technology. At randomly selected points during trips, 39.6% of passengers on curbside buses are using some form of portable technology— two percentage points more than on conventional Amtrak trains and more than twice that on commercial flights and Greyhound. Technology use on the high-speed Acela Express is higher than curbside buses on weekdays but lower on weekends.

The type of technology used by travelers differs widely between modes of travel and day of week. More than half of technology users on curbside bus services are engaged in *audio activities*, such as cell-phone calls, using digital music players, and other such activities. Usage on trains is much different, with users of *visually oriented technologies*, such as those involving laptop computers and other devices with LCD screens, outnumbering audio users by more than two-to-one.

These and other findings suggests that the ability to use portable electronics is an important factor offsetting the longer travel time associated with certain bus and train trips and providing a new incentive for travelers to use transportation services that operate to and from the downtown districts of major cities. To support this premise, the final section of the study shows that that intercity bus service expanded 5.1% in 2009—a rate of growth higher than all other major modes for the third straight year.

I. Introduction

Travelers on long-distance bus, train and airplane trips used to occupy their time in transit by performing relatively simple tasks, such as conversing with fellow passengers, reading, writing, or napping. Many relished their separation from the daily bustle of life by being caught in the “travel bubble” of a separate reality. Others, particularly business travelers, chafed at being “out of the loop” while “traveling incommunicado” en route to a destination.

Some travelers still adhere to the old ways, but the characteristics of long-distance travel have changed dramatically during the past two decades. Increasing numbers of travelers use cell phones, laptop computers, iPods, and other mobile electronic devices in order to use their time more effectively on the road. For many, the information age has evolved such that traveling incommunicado has changed to staying constantly in the loop, or “on all the time.”

Transportation companies have encouraged this through the installation of power outlets and signal boosters, thereby providing greater cell-phone coverage on the tarmacs and in the terminals. Every major airline now offers wireless Internet service (Wi-Fi) or plans to offer it soon; and there is a great movement toward allowing in-flight cell-phone calls as well. In early 2009, several major U.S. transportation companies—Airtran Airways and Megabus—for the first time offered free wireless through their entire systems.

Despite this, there has been remarkably little research about the role of portable electronic devices in intercity travel. As a result, some important research questions are unanswered. Which modes of travel are amenable to the use of portable electronic devices? How has the use of portable electronic devices changed people’s perceptions of the importance of speed in their chosen method of travel? How do people change their use of technology over the course of a trip? What does all this mean in terms of how people travel now and how they will travel in the coming years?

II. Goals of Study

This study attempts to fill in part of that research gap by reviewing newly collected data about technology use among travelers in the United States. One portion of the data comes from observing over 7,028 passengers traveling by bus, air, and train. The second portion of the data is part of an ongoing review of the evolution of intercity bus operations from 1960 to today.

Based on the collected data, this study makes two important conclusions.

- The use of portable devices is highest among travelers on “curbside” intercity buses and high-speed trains. On these modes, technology use is more than twice that on commercial flights and Greyhound.
- The advantages intercity bus and rail travel have with respect to the use of portable electronics is a contributing factor to their recent growth in popularity. This is particularly true for “curbside” bus operators like Boltbus and Megabus as well as high-speed and conventional Amtrak trains.

In support of this latter point, newly collected data show that, for the third year in a row, intercity bus service has grown much faster than other modes of transportation, and that nearly all the growth is by curbside operators offering free Wi-Fi and in many instances providing customers access to power outlets as well.

III. Consumer Technology and the American Travel Experience

For consumers, communication systems and passenger transportation services traditionally have been mutually exclusive rather than complementary operations. People wanting to interact with someone (or a group of people) in a distant location could either travel for a face-to-face interaction or use some form of electronic or non-electronic communication (such as courier service, UPS, and U.S. Postal Service) to eliminate the need for a trip. There was often little opportunity to communicate *while* you were traveling, let alone sending documents, photographs, and instant messages during a trip.

For business travelers, the cost of traveling was not just the fare; it was also the loss of productivity. An unwelcome implication of this lost productivity was the need to make an abrupt transition upon arrival. Business travelers dashed to pay phones to catch up on happenings at the office. Documents were faxed to hotels or shipped overnight to distant offices. Pleasure travelers nervously scanned waiting areas, hoping to see a familiar face, typically a family member or friend expected to meet them. Travelers on extended bus or train trips visited the station newsstand to see what had transpired while they were out of touch.

The idea of leisurely, incommunicado long-distance travel persisted in many travel markets well into the 1980s, despite advances in technology that quickened the pace of other aspects of everyday life. With few exceptions, transportation companies did little to imitate the efforts of hotels, which equipped their facilities with full-service business centers that allowed travelers to move seamlessly between work environments. Although the first commercial cellular phone service was introduced in January 1969 on the Penn Central *Metroliner* trains between New York and Washington, similar innovations did not immediately follow. Almost another generation would grow up before the widespread installation of pay phones (particularly the Airphone) on commercial flights in 1984.

Business travelers found these innovations to be modest compared to the services available at offices, hotels, and business centers, which by the late 1980s and early 1990s offered teleconferencing, faxing, and Internet services as well as computer rentals. For common transportation carriers, providing such services was considered

impractical. On-board telephone service was costly to provide. Airlines faced pressure to increase the number of passenger seats on flights, which resulted in great densities that reduced legroom and made coach cabins even less conducive to business activity. Amtrak and Greyhound, meanwhile, struggled merely to provide a safe and reliable product, making more sophisticated business-oriented amenities only a far-off dream.

By the late 1990s, however, technological innovation had advanced to the point that travelers had many more options at their disposal. Portable devices became smaller, less expensive, and more sophisticated. Starting with laptop computers and cell phones and followed in the early 2000s by Blackberries, iPhones, notebook computers, compact memory devices, and a wide array of portable entertainment systems, consumers began performing increasingly complex tasks on the road. Rather than providing the communication and entertainment themselves, carriers turned to supporting the use of devices carried by passengers and put less emphasis on centralized entertainment systems.

Previous research on the effects that technology is having on travel behavior is briefly described in Appendix A. Some of the more notable recent works are listed in the Reference Section at the back of this report.

IV. Accommodating Passengers with Portable Electronic Devices

To appreciate the transformative effects of portable electronic devices on travel over the past 25 years, consider some innovations made by air, motor coach, and rail carriers.

- Amtrak. Passenger trains have natural advantages over airlines with respect to technology use. Electronic equipment can be used continuously throughout trips, and the spacious configuration of train coaches is relatively conducive to the use of laptop computers and DVD players. Power outlets are now widely available on heavily traveled corridors. There are no constraints on the use of cell phones, although coverage is inconsistent on some routes, with “dead spots” occurring, particularly on routes outside of the Northeast corridors.

Despite the fact that commuter railroads in the metropolitan Boston and San Francisco areas installed wireless Internet service in 2007, making them the first U.S. rail-passenger carriers to offer this feature, Amtrak has been slow to match their achievement. Although Amtrak succeeded in installing electric outlets on its trains in many corridors, it ran into difficulties with wireless Internet due to the prevalence of tunnels and the length and capacity of its trains, both of which make installation difficult.

This year, however, Amtrak has made notable progress. The carrier has introduced free wireless service on Acela Express routes and hired a private contractor to begin installing Wi-Fi on its Capitol Corridor in California. Amtrak also rents portable DVD players and sells batteries on board its trains. For the foreseeable future, however, wireless will be available only on a small portion of its routes.

- Intercity Bus Companies. For decades, the onboard product delivered to intercity bus travelers was largely unchanged. Passengers could expect little except a cushioned seat in an air conditioned environment with a reading lamp overhead. Over the past three years, however, bus companies—particularly “curbside” operators that do

not operate from conventional bus stations and typically sell tickets only over the Internet—have pushed themselves to the forefront of the wireless Internet movement.

In the summer of 2007, DC2NY Bus, a curbside operator, launched service between Washington, D.C., and New York, becoming the first U.S. carrier on a major intercity route to offer free Wi-Fi. The carrier also pioneered the availability of power outlets on buses. These features became more prevalent when Boltbus, a joint venture of Greyhound and Peter Pan Bus Lines, launched services between New York, Boston, Philadelphia, and Washington, D.C., in April 2008.

Megabus quickly followed, offering wireless Internet service on all its routes, first in the Northeast and then in the Midwest. Wi-Fi gradually became the accepted standard for curbside operators, so much so that passengers felt slighted when it was not available. Various “Chinatown” carriers (bus operators linking the Chinatown districts of major cities, typically operated by Chinese-owned businesses), attempted to forestall their loss in market share by spending an estimated \$5,000 per vehicle to equip their buses with Wi-Fi. Greyhound is on the tail end of the trend. In late 2009, it introduced buses with wireless service and power outlets serving the major Northeastern corridors as well as the New York–Montreal route. Now, it anticipates having its entire system equipped with wireless within the next several years.

- Commercial Airlines. Passengers traveling by air understand that aircraft are not particularly amenable to the use of some electronic devices. Devices must be deactivated after leaving the gate and remain off for an extended period, leaving travelers on short flights with only a short time to use them. The design features of commercial airplanes make power outlets and centralized computer-equipped work stations impractical to install. Moreover, airlines discourage passengers from moving about, forcing self-service technology, such as pay telephones to either be made available at each seat or not at all.

Airlines make special allowances for passengers to travel with laptop and notebook computers. However, when flights are full, keeping such equipment at your seat can be awkward. Even the seemingly simple act of retrieving a laptop from an overhead compartment can be difficult, as many are filled to capacity. Due to gradual reductions in seat pitch, escalating load factors, and the “hassle factor” of airport security in the post-9/11 environment (requiring travelers to complete a series of tasks before boarding the plane and taking their seat), many travelers opt to bring only the smallest devices, such as cell phones and iPods, with them. Others aggressively use their frequent flyer status to upgrade to business or first class cabins where seating is more spacious.

Another problem, of course, is the lack of wireless Internet and cell-phone connectivity. Although the push to provide wireless Internet on commercial flights gathered momentum in 2004, it was not until 2008 that Wi-Fi became available on an appreciable share of domestic flights—generally at a considerable price. Since then, most airports have also installed wireless Internet systems and invested in making their gate areas and tarmacs “hot spots” for cell-phone users. Airtran now offers free wireless, and by early 2010, Delta expects to have Wi-Fi available for a fee on its domestic flights. Google attracted considerable attention by sponsoring free wireless in 47 airports in late 2009. Just how quickly airlines find a way to allow in-flight cell phone service remains to be seen.

TABLE 1:
CORRIDORS AND ROUTES SURVEYED

Amtrak (6,001 observations on 21 departures)

Northeast Corridor (New York – Washington, New York – Boston)
Keystone Corridor (Harrisburg – Philadelphia)
East Coast Service (Washington, D.C. – Jacksonville)
Wolverine Corridor (Chicago – Detroit)
Hiawatha Corridor (Chicago – Milwaukee)
Lincoln Service (Chicago – St. Louis)
Illini Corridor (Chicago – Carbondale)

Megabus/Boltbus routes (1,381 observations on 19 departures)

Baltimore – New York route
Boston – New York route
Chicago – Milwaukee/Twin Cities route
Chicago – Indianapolis route
Cincinnati - Indianapolis route
New York – Philadelphia route
New York – Washington route

Greyhound routes (355 observations on 10 departures)

Baltimore – New York route
Chicago – Champaign, Ill. route
Chicago – Milwaukee route
Chicago – Madison route
Chicago – Indianapolis route
Chicago - Quad Cities route
Philadelphia – Baltimore route

Commercial Flights (652 observations on 10 departures)

Atlanta - Chicago (Air Tran)
Indianapolis – Chicago (American)
Indianapolis – New York (Continental)
Chicago – New York (Southwest)
Chicago – Newark (Continental)
Chicago – Washington (United)
New York – Atlanta (Air Tran)
New York – Chicago (Southwest)
Washington – Chicago (United)
Washington – New York (United)

Commuter Railroads (1,716 observations on 16 departures)

Various routes on Metra and South Shore Line in metropolitan Chicago and Caltrain in metropolitan San Francisco. Data from Caltrain were not ready for inclusion in this analysis and will instead be evaluated in future publications.

V. Measuring the Use of Portable Electronic Devices

To understand the patterns of consumer use of portable electronic devices, field observations were made on common carriers between October and December 2009, primarily on intercity buses and Amtrak trains but also encompassing airline flights and commuter trains (see Table 1 on previous page).

Field researchers conducted visual surveys to measure the use of two basic features of electronic devices: (1) those using *audio features* of devices, such as cell phones, CD players, or other devices that can be used with earphones or headsets, and (2) those using *visual or audiovisual features*, such as the LCD screens of laptop computers, Blackberries and other smart phones, DVD players, and iPods (essentially, any travelers looking at a screen for the purpose of engaging in an activity more substantial than placing a phone call or changing a music selection fell into this category). These activities typically involve the observance of images or information on LCD screens (Table 2).

TABLE 2

CLASSIFICATION OF ACTIVITIES INVOLVING PORTABLE DEVICES

Notable Examples

Visual and Audio-Visual Activities

- Laptop and notebook computers with active LCD screens
- DVD players, and portable television sets
- Screen-based functions of
 - iPods and iPhones
 - Blackberries
 - Smart phones and similar devices.
- Electronic calculators
- GPS devices

Audio Activities

- Cell phones, Blue-Tooth headsets, and related communication device
- Voice recording devices
- Pocket radios and scanners
- Audio/telephone features of
 - iPods and iPhones
 - Blackberries
 - Smart phones and similar devices.

Our survey involved observations of 7,028 unique passengers on 82 different transportation departures to and from major cities (Table 3). The sample was limited to daytime services in corridors with multiple trains and buses per day rather than on long-

TABLE 3:
SAMPLE SIZE BY MODE OF TRANSPORT

<u>Mode</u>	<u>Carriers</u>	<u>Departures Surveyed</u>	<u>Unique Passengers Observed</u>	<u>Total Observations</u>
Train—Conventional	Amtrak	21	3,179	5,133
Train—High speed	Acela Express	6	868	868
Commuter train	Metra, South Shore Line	16	1,381	1,381
Bus—Curbside	Megabus, Boltbus	19	697	1,716
Bus—Conventional	Greyhound	10	251	355
Commercial flight	AirTran, Southwest, United, Continental, American	10	652	652
Total		82	7,028	10,105

distance runs with a single daily departure. On longer trips, passengers were surveyed multiple times, bringing the total number of passenger observations to 10,105. The data were collected in 14 states as well as the District of Columbia. We provide in the Appendix B a list of states in which data was collected.

VI. Principal Findings

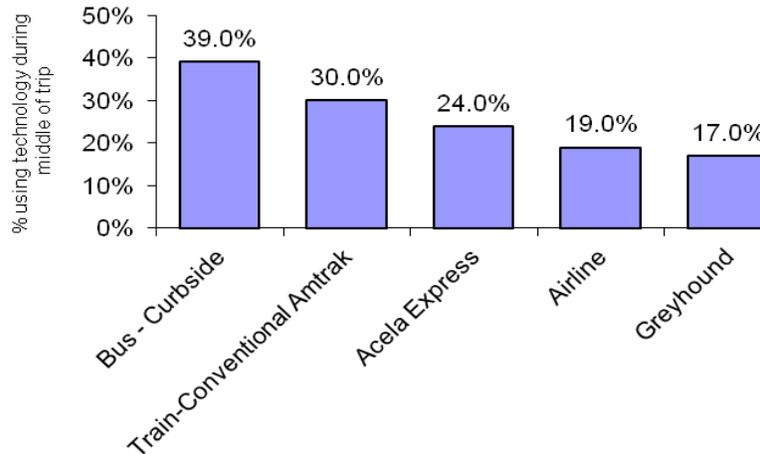
Our review allowed us to make six principal conclusions that show how technology use differs across travel modes and circumstances.

Finding 1: On weekends and weekdays after 7 p.m., technology use is higher on curbside buses than on any other mode. Nearly 40 percent of passengers are engaged with portable devices at any given point. Cumulatively, with all time periods combined, curbside bus use trails only the business-oriented Acela Express in technology usage.

Our observations involving curbside bus and Amtrak passengers during weekends/weekdays after 7 p.m. are limited primarily to the Midwest. We hope to build a more comprehensive national sample involving off-peak trips from other regions in the months ahead. In our sample, however, the differences between modes appear to be dramatic (Figure 1).

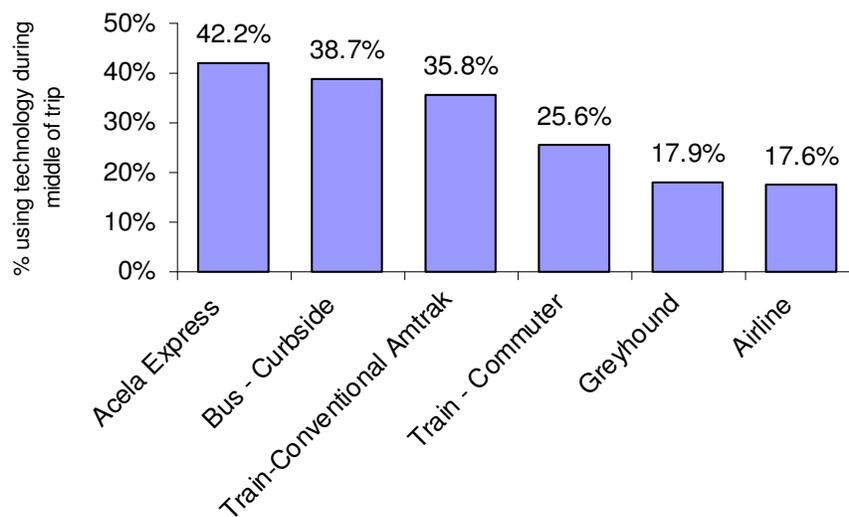
The use of technology on curbside buses during weekends/late evenings exceeds that of all other modes by an appreciable margin. Usage rates (39%) are far ahead of conventional Amtrak train's 30 percent, Acela Express' 23.5 percent, and airline's 19.5 percent. Moreover, unlike on trains, technology use on curbside buses is almost the same on weekdays before 7 p.m. and at other times.

Figure 1:
Technology Use by Mode of Travel
Weekends and Weekdays after 7 p.m.



When both weekday and weekend data is combined, the *cumulative* average rate of technology use on the Acela Express is highest at 42.2%, followed by curbside bus (38.7%) and conventional Amtrak trains (35.7%). On average, each of these modes see technology usage at more than twice the rate of commercial flights and Greyhound.

Figure 2:
Technology Use by Mode of Travel
Cumulative



We discuss the extensive usage on the Acela Express below in Finding 2. On curbside buses, the intensity of technology use appears to be partially attributable to the young and upwardly mobile demographic of customers served. These passengers appear quite savvy about technology, making Wi-Fi an important amenity. (Nearly all passengers purchase tickets online and a significant share of them display their electronic receipt on a smart phone to board the bus.) Unlike trains, which typically have lengthy “dead spots” in terminal areas and rural environments curbside-bus operations typically benefit from virtually uninterrupted cell-phone signals. In fact, cell phone towers are often along Interstate highways that these buses use.

The informal nature of the boarding process may also be significant. Whereas passengers on planes and trains typically turn off portable devices before boarding, perhaps due to boarding procedures which include the presentation of identification and finding assigned seats in crowded environments, curbside bus passengers need only allow a few seconds to find a seat. Some simply display their ticketless confirmation on an LCD screen when boarding and then continue to use the device for other purposes.

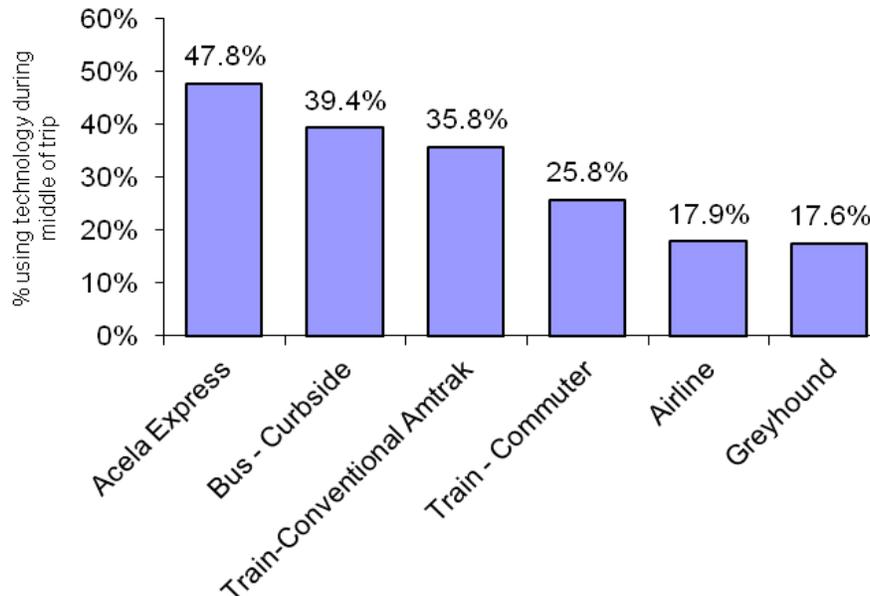
Another factor may be that there are fewer intermediate stops on curbside bus operations than on many Amtrak and Greyhound trips, thus minimizing disruptions and allowing passengers to more easily use technology as a means of insulating themselves from the surrounding environment. Although the seating density is high, load factors are often low, allowing passengers to spread out. Similarly, the lack of cabin pressurization creates a more relaxed travel environment than on airlines, making passengers feel much more comfortable using relatively complex devices.

Finding 2: The rates of use of portable technology on Amtrak’s Acela Express greatly surpasses usage on all other modes during weekdays before 7 p.m., when an estimated 48 percent of passengers are using portable technology at any given point. Approximately 85 percent of these technology users are engaged in activities involving visually oriented devices.

The differences between Acela Express service and other modes of intercity travel are striking. On weekdays prior to 7 p.m., 47.8 percent of passengers are using some form of technology, more than eight percentage points higher than conventional Amtrak runs (39.4 percent) and curbside bus operations (38.5 percent). It was not uncommon for Acela passengers to be engaged in multiple technology activities; many were talking on the phone or listening to music while working on laptop computers, apparently linked to the Internet. A summary of these differences appears in Figure 3.

None of the weekday Acela trips had fewer than four in ten passengers using technology at any time we conducted the survey. The lowest had a 41 percent usage rate, which was nearly double the highest technology usage observed on an airline trip (22 percent).

**Figure 3:
Technology Use by Mode of Travel
Weekdays before 7 p.m.**



The gap between Acela trains and commercial flights may be even greater than these numbers suggest. Acela service competes predominantly with short-distance flights by airlines, on which technology use is obviously limited by the need to keep devices deactivated during a higher proportion of the trip than on long-distance flights.

An overwhelming share of Acela Express passengers use devices for their visual capability (mostly laptop and notebook computers), an observation we discuss further in Finding 4 on the next page. On weekends, however, overall technology usage on Acela trains is far less intensive. In our sample of 240 passengers, only about 24 percent were using technology at various points. There appears to be a far greater tendency for passengers to travel in groups on the weekend, making reading and conversation more dominant uses of time.

Finding 3: Greyhound has only about half the technology use as curbside bus operators. This is apparently due to both the demographic segment it attracts and the types of routes it services. The lack of Wi-Fi service on the majority of Greyhound's routes appears to be only a secondary factor in explaining the low rates of technology use.

Technology use on conventional Greyhound trips averages just 17.6 percent. A mere 8 percent of passengers use devices strictly for their audio capacity (which generally don't require access to the Internet), the lowest of any mode observed in our sample except airlines. The fact that audio devices are so sparsely used suggests that there is an additional factor, other than the absence of Wi-Fi that limits technology use on Greyhound.

One such factor may be the clientele that Greyhound serves, which appears less affluent and less apt to use technology. Moreover, an appreciable share of travelers are in the midst of long journeys, even transcontinental trips. Driver announcements may also play a role. On two trips, for example, the bus drivers asked passengers after dark to be as quiet as possible and to put cell phones on “silent mode;” one driver even threatened to stop the bus if this rule was violated.

The uneven quality of Greyhound stations—some are located in high-crime areas—and the onboard atmosphere may also be factors. Similarly, there is a greater propensity for Greyhound buses to make intermediate stops than curbside bus operators, causing more potential disruptions to thru passengers as others exit and enter throughout the duration of their trip.

In the future, we plan to expand our data beyond the current sample of ten Greyhound departures. The consistency of technology use across our sample, however, suggests that there is high product differentiation in the intercity bus sector, between traditional and newer curbside operators.

Finding 4: Technology users on curbside bus carriers divide their time almost equally between using audio features and visual features. On Amtrak trains, however, the use of visual features outnumbers the use of audio devices by a two-to-one margin.

On both curbside bus operators and Greyhound, passengers divide their time almost equally between audio and visual technologies. On curbside bus operations, for example, the use of audio and visual devices is split 20 percent and 19 percent, respectively. Conversely, on conventional Amtrak trains, visual technology use exceeds audio use by a margin of two to one. On Acela Express, the ratio is six to one, as the dominant technologies are laptops and notebook computers. Some of the differences are summarized in Table 4.

TABLE 4:

USE OF TECHNOLOGY BY MODE OF TRANSPORTATION

	Percentage of Passengers Using Technology (Middle of Trip)		
	<u>Visual</u>	<u>Audio</u>	<u>Approx. Ratio Visual to Audio</u>
Train—High speed	36%	6%	6:1
Bus—Curbside	19%	20%	1:1
Train—Conventional Amtrak	24%	12%	2:1
Commuter Train	17%	8%	2:1
Commercial Flight	8%	9%	1:1
Bus—Greyhound	10%	8%	5:4

Sample size: 7,028

Demographics and environmental factors are also relevant. In comparison to other modes of travel, only a small proportion of curbside bus travelers are traveling for purely business purposes. These passengers appear more apt to use music players and cell phones than DVD players and laptop computers. Concerns over privacy may also contribute to the relative dearth of visual-technology use not only on buses, but on commuter trains and flights as well. Whatever the reasons, bus travelers seem to use visual technologies for shorter durations than their rail counterparts.

The emphasis on visual technology use on Amtrak is also noteworthy. Amtrak's generous seat pitch and fold-down tray tables make it more conducive to laptop computer use. Visual technology is most common on weekday trains, when 28 percent of passengers are using it at any given point, well above that of curbside buses (20 percent), commuter trains (17 percent) and airlines (6 percent).

Finding 5. On the average commercial flight, only 17.6 percent of passengers are using technology at any given point. The low usage does not appear to be a lack of interest in technology, but some other factor, such as the in-flight environment, the lack of wireless connectivity, or the short duration of many trips. In fact, the use of technology, particularly laptop computers, is much higher in terminal waiting areas than while in flight.

The density of seating as well as restrictions on the use of electronics at takeoff and landing create strong incentives for passengers to either avoid using technology or to limit use to devices that can be easily kept in their pocket. The start and end of trips appear to be critical times for the use of devices, particularly communication systems, thus putting airlines at a notable disadvantage. Once devices are turned off, many customers do not turn them back on until they disembark.

Our sample is not large enough to allow for definitive conclusions about how the time-of-day and availability of airline in-flight entertainment systems affects portable technology use on commercial flights. Preliminary analysis, however, suggests that weekend usage appears almost the same (at about 19 percent) as weekday usage. In terminal waiting areas, conversely, we estimate that technology use exceeds 30 percent.

The survey also provides evidence to suggest that the use of portable technology may not be appreciably different between flights with in-flight entertainment systems and those without it, averaging between 17 and 18 percent in both cases. It does *not* appear that many people are leaving portable technology devices off due to the availability of centralized entertainment systems.

Finding 6. The types of portable technology devices that bus and train travelers use are remarkably consistent during different phases of their trip. There is a slight tendency for curbside-bus travelers to shift away from using devices for their audio capacity in favor of visually oriented activities further into the trip.

Among all types of passengers, there is great consistency in the use of technology over the course of a trip. In the period between about 20 minutes into the trip and one hour into a trip, however, the share of curbside bus passengers using audio

technology drops from 21.2 percent to 19.7 percent while the share of visual-technology users increases from 17.8 percent to 18.9 percent. Although this change is slight, it suggests that more passengers use audio devices before transitioning to more intensive visual technology than the other way around.

VII. Implications and Conclusions

The above findings suggest that the growing prevalence and sophistication of portable electronic technology is diminishing the perceived cost of time spent on buses and trains for many travelers. As a greater share of communication is handled through text messages and emails as well as through social-interaction sites such as Facebook, it appears that many consumers place a premium on the ability to use portable devices when traveling. The rapid expansion of 3-G and 4-G wireless networks makes travel on buses and trains more attractive.

There is no regularly published data on the number of passengers using intercity buses. The Chaddick Institute, however, conducts an annual analysis of the *amount of service* provided by intercity bus lines. Using the same methods as in previous years, we estimate that the amount of growth between the 4th quarter of 2008 and the same period in 2009 to be 5.1%.

The rates of growth of various modes of transport are compared in Table 5. Amtrak service has remained relatively constant (falling by about 1%) while air service fell by 3.2%. For the third consecutive year, consequently, intercity bus service outpaced other modes of transport. Nearly all of the growth in the intercity bus industry is accounted for by curbside carriers offering express service with free wireless internet between major cities. The amount of service by Greyhound and other conventional bus operators remained virtually unchanged from the previous year.

TABLE 5

GROWTH RATES BY TRANSPORTATION MODE

AMOUNT OF SERVICE PROVIDED

Most recent data, 2008 vs. 2009

<u>Mode</u>	<u>Measure</u>	<u>Change</u>	<u>Source of Data</u>
Intercity Bus	departures	+5.1	Chaddick Institute
Commercial Airlines	departures	-6.8%	Bureau of Transportation Statistics
Amtrak	train-miles	-1%	Amtrak.com

Auto travel appears to be relatively flat. AAA estimates that it was sharply down 11% during Labor Day but was up 2.1% over Thanksgiving holiday.

Note: Amtrak data is for January through August 2008 relative to same period in 2009, the most recent month available. Air Transport Association data is for January - September 2009, the most recent month available. Air service has risen marginally since then, but remains lower than the same period last year.

Although the ability to use portable technology may be only a secondary factor in explaining the growth of bus travel—low fares are likely the principle reasons for the sector's growth—the evidence suggests that it is important to explaining the industry's continued growth in the midst of difficult economic circumstances. More than 90% of the growth in bus service is attributable to curbside bus operators with free Wi-Fi. Much of this growth was in the Northeast Corridor. Baltimore and Philadelphia service grew in particularly dramatic fashion over the past year.

Data collected in the coming months will allow for additional perspective on the role of portable electronic devices in intercity travel behavior. These updates will be posted on www.depaul.edu/~chaddick

VIII. Appendix

A. Notes on Previous Research

Previous research offers a useful framework for understanding the differing rates of technological adoption by populations but is limited in scope on matters related to the behavior of intercity travelers. Considerable research has been published, for example, exploring varying access to cellular phones and the Internet. As is evident in the reference section, much of the research can be classified into one of two subject areas: that focusing on the persistent “digital divide” and its implications for e-government, retail spending behavior, and career opportunities (Jackston, et. al., 2008), and that focusing on travel in an international setting, particularly Europe. Several studies (Sasaki and Nishii, 2009; Kim, Park, and Morrison, 2009) break new ground on how technology is affecting travel decisions. None of these studies, however, directly compare the use of portable devices by passengers while traveling on intercity routes, which is the primary focus of this study.

B. Notes on States involved in Sampling Process

The data collection for rail and bus passengers was conducted in 14 states as well as the District of Columbia. Rail passengers were observed on trains in California, Connecticut, Delaware, Illinois, Indiana, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, and Wisconsin. Bus passenger data was collected in each of those states, except for California, and also in Ohio. Station stops were made in each of these states except for the bus route through Rhode Island, which the bus passed through without making a stop. Flight data were collected between airports serving Atlanta, Chicago, Indianapolis, New York, and Washington, D.C. All flights were two hours and 45 minutes or less in duration.

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