

Demographic, Behavioral and Attitudinal Changes in the Migration from Low-Speed to High-Speed Internet Access

By Max Kilger

This paper explores some of the demographic, behavioral and attitudinal differences between home users with low-speed and high-speed Internet access. In addition, a logistic regression analysis is performed to help determine which of these differences are drivers for migration and which ones might instead be the consequences of migration.

Introduction

The migration of the American household from low-speed to high-speed Internet access appears to be following a fast, but more complex roadway than perhaps earlier expected and a number of “speed bumps” slowing this migration have appeared along the way. According to the Pew Internet and American Life Project approximately 109 million adult Americans have access to the Internet from home and of those, 31% or about 33.9 million have broadband Internet access at home” (Pew, 2003). As price and availability of service begin to recede as major factors in the pathway to high-speed Internet access, other factors will become more prominent. In this paper we will examine some of the fundamental demographic, media and psychographic differences between low-speed and high-speed users in order to identify some of the non-commodity based factors that may influence the migration path for high-speed Internet adoption. In addition, we will look at possible factors that are encouraging respondents to change from low-speed to high-speed access in the next 12 months.

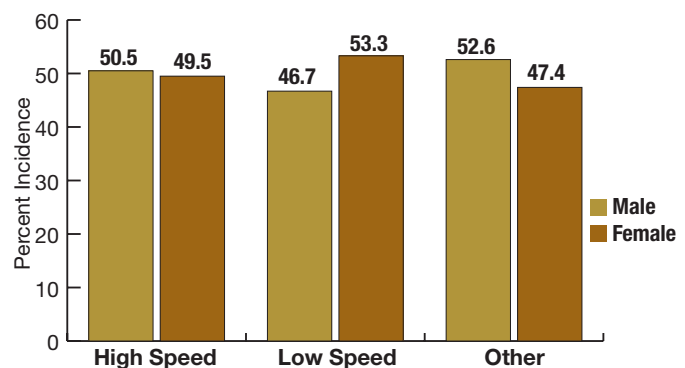
Data Sample and Definitions

The data set used in this analysis comes from a subset of Simmons' Fall 2003 Unified National Consumer Survey, a nationally representative sample of 25,389 respondents. The subset consists of 11,609 respondents who indicate that they most often access the Internet from home. Weighted to the national adult population of the contiguous 48 states these 11,609 respondents represent approximately 103,583,000 adults, which corresponds roughly to the Pew estimate given the small differences in population universes. High-speed Internet access was defined as most often accessing the Internet via cable modem, DSL, ISDN, interactive TV, Wireless modem or the more general 'broadband' category. Low-speed Internet access was defined as most often accessing the Internet via phone modem (e.g. dial up). A third category labeled "Other" in the survey is also displayed for completeness – this category most likely consists of small incidence such as satellite access, dedicated T1 or other unusual configurations. As will be seen in the subsequent figures the "Other" category has a profile similar to high-speed Internet users. The final distribution of access methods among respondents in the subsample was 35.9% high speed access, 58.9% low-speed access and 5.1% other access method. The high speed figure compares reasonably with Pew's estimate of 31% home broadband access (Pew, 2003) as well as Nielsen/NetRatings' estimate of 57.1% low-speed access users (Nielsen/NetRatings, 2004).

Fundamental Demographic Comparisons

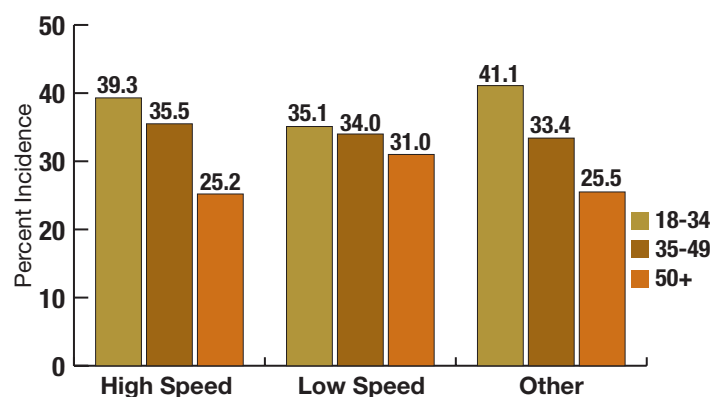
Basic demographics are the first key areas to explore for differences between low-and high-speed Internet net users. Figure 1 reveals a stereotypical and not unexpected result where males are just slightly in the majority in the composition of high-speed Internet users. In addition, the older low-speed dial-up access method shows a non-trivial reversal of that trend with females constituting 53.3% of the low-speed access method while males make up 46.7%. The Other access method shows an even more male skew than high-speed access as males make up 52.6% of this group while females compose only 47.4%. This suggests that new technologies such as high-speed Internet access are still somewhat of a male-oriented arena.

Figure 1: Gender



Internet access, as a new technology, should appeal to somewhat younger individuals. In particular, newer forms of new technology should follow this trend to an even greater extent. Figure 2 reveals the percentages of age groups within each Internet access method.

Figure 2: Age



The percentage of high-speed access users who are 18-34 years old is 39.3% compared to only 35.1% of low speed users. The same trend holds but is less noticeable for 35-49 year olds where 35.3 percent of high-speed users are in this age bracket while 34%

of low-speed users appear in this age group. The oldest age group – age 50 years plus – is more prevalent in the low-speed dial-up method (31%) as opposed to only 25.2% for high-speed access. This provides some confirming evidence for the idea that newer technologies attract younger participants.

Race is another interesting variable in relationship to Internet access. While earlier studies showed definite gaps between Whites and African-Americans in accessing the Internet (U.S. Census, 2000; Ono and Zavodny, 2002), others suggest that this gap is beginning to close (U.S. Department of Commerce, 2002). Examining racial differences among Internet access methods may also shed some light on this trend. Figure 3 reveals that among Whites there is approximately a 4% relative difference (79.9% high-speed versus 83.1% low-speed) between access methods.

Among African-Americans there is about a 3.4% relative differential (8.8% high-speed versus 9.1% low speed) between access methods. This suggests that given there is Internet access in the home, differences between access methods are small between Whites and African-Americans. The interesting statistic here is the 65% relative difference in racial composition between the two access methods for Asians.

Approximately 7.1% of at-home high-speed users are Asian compared with 4.3% of low-speed users. This suggests that Asians are more engaged in new technologies such as high-speed Internet access from home. This correlates with previous higher percentages of Internet access from home figures for Asians reported by the U.S. Census (2000).

Education has always figured as an important variable in Internet use and this trend is borne out at least partially in the composition of educational attainment in the Simmons' data. In Figure 4 it can be seen when comparing education composition between low- and high-speed Internet access from home that college graduates constitute a much higher proportion of high-speed Internet access users than they do in the low-speed category (37.8% of all high speed users versus 28.8% of all low-speed users).

While those with some college education appear at par between the two access groups those with just a high school education make up a smaller proportion of high speed Internet users (31.5%) versus low-speed users (38.7%). This is consistent with the traditional assumption of positive association of educational attainment with new technologies.

Household income is also commonly cited as one of the important factors in Internet usage (Census, 2000; U.S. Department of Commerce, 2002). This trend also appears to hold true for differences in low-speed versus high-speed Internet access from home.

Figure 3: Race

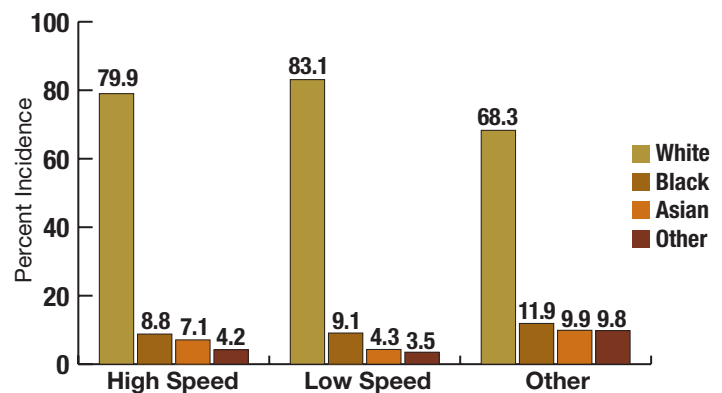
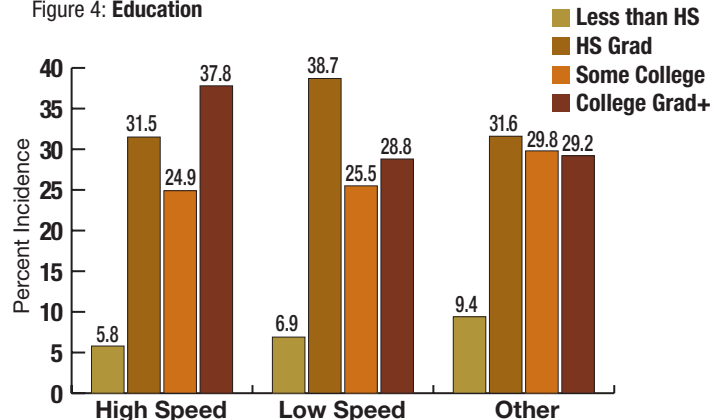


Figure 4: Education



In Figure 5 we can compare household income composition for the two access methods and see that for high-speed access the highest income bracket (\$75,000+) makes up 53.6% of the users while for the low-speed category this income group composes only 37.1% of users. As household income declines the figure reveals that lower income groups comprise higher and higher percentages of the low-speed access category while making up lower and lower percentages of the high-speed access group. This provides some further evidence that newer and more expensive technologies are by themselves somewhat self-limiting to higher income households. This phenomena of price sensitivity also appears to be reflected in the marketplace (Businessweek, 2002).

Another basic demographic question that arises is one of household size. Is there a difference in access methods among households of certain sizes? In particular, is there a difference among single versus multiple adult households? The reason for this particular comparison is that high-speed Internet access by its reliance upon network-like features such as TCP-IP protocols and faster access speeds encourages networking multiple computers to a single Internet point-of-presence. Multiple computers at home suggest multiple users and thus multiple adult households. Internet access at home is suggested to be more prevalent among multiple person households (Census, 2000) so this is a reasonable hypothesis.

Figure 6 shows that there is at least a slightly higher proportion of multiple person households with high speed Internet access at home (88.4%) than single person households (86.3%) This could be due to either to the benefits of networking hypothesis just described or perhaps just due to higher household incomes among multiple person households.

Internet Activity and Method of Access

Pew (2003) suggests that having a broadband connection increases the intensity (e.g. frequency) of Internet access and activities. Figure 7 outlines low, medium and high categories of number of hours on the Internet in the last 7 days for different access.

Notice that 19.4% of high-speed users are in the high usage category versus only 12.3% for low-speed dial-up users. People who used the Internet for 5-14 hours in the last seven days (medium users) also composed a higher proportion of high-speed access users than low-speed access users (26.7% high-speed versus 21.8% low-speed). Low-level

Figure 5: Household Income

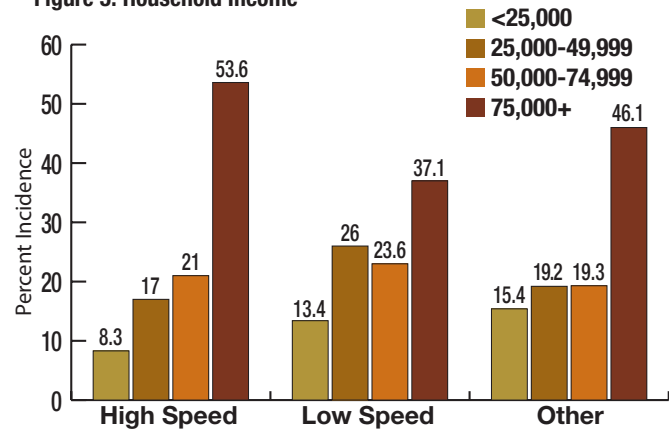


Figure 6: Single and Multiple Adult Households

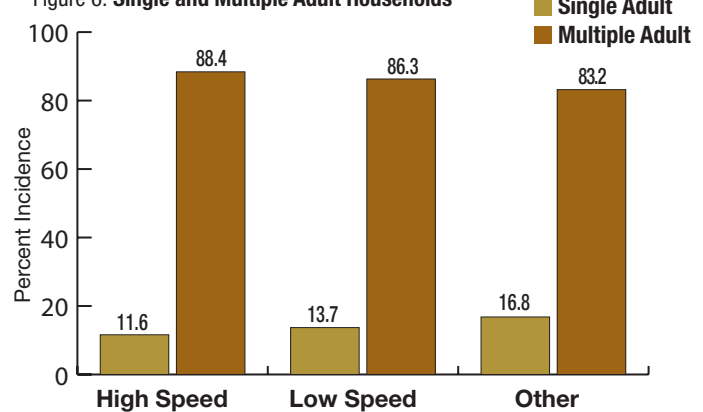
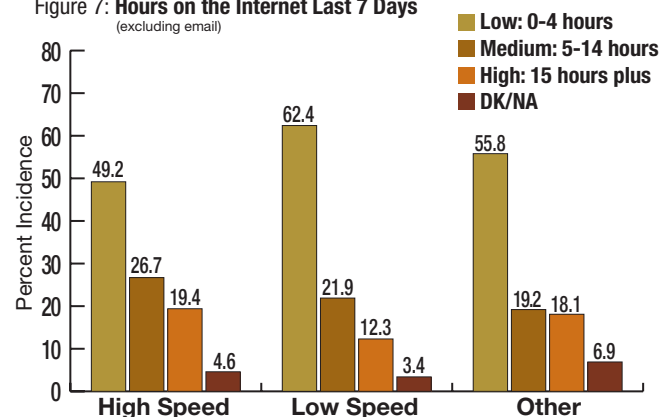


Figure 7: Hours on the Internet Last 7 Days
(excluding email)



users of the Internet at home were by far the larger group in the low-speed category (62.4%) versus the high-speed group (49.2%). This suggests that people are willing to invest more time in Internet activities if there is a higher return on investment (e.g. ability to perform more activities in less time).

The data also suggests that high-speed access encourages more access events than low-speed access. Figure 8 reveals that there is a much higher percentage of “frequent accessers” (e.g. the high category for number of times accessed the Internet in the last 7 days) for high-speed at-home users than low-speed access users - 45.5% high-speed versus 25.1% low-speed users.

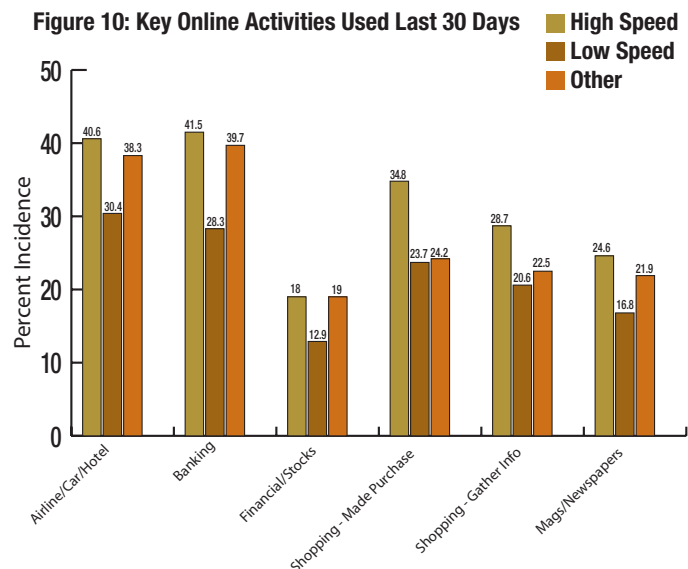
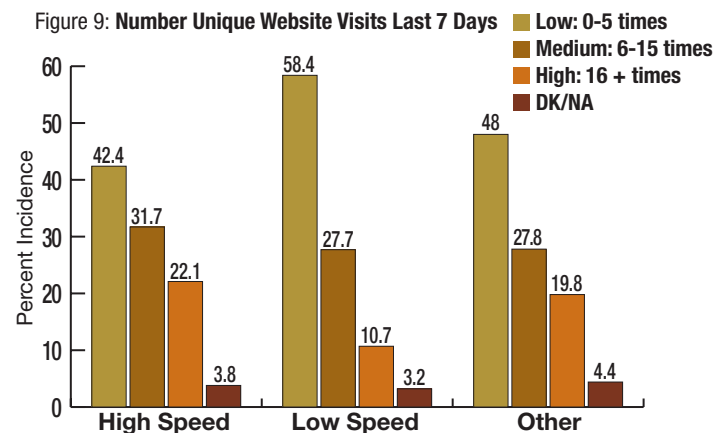
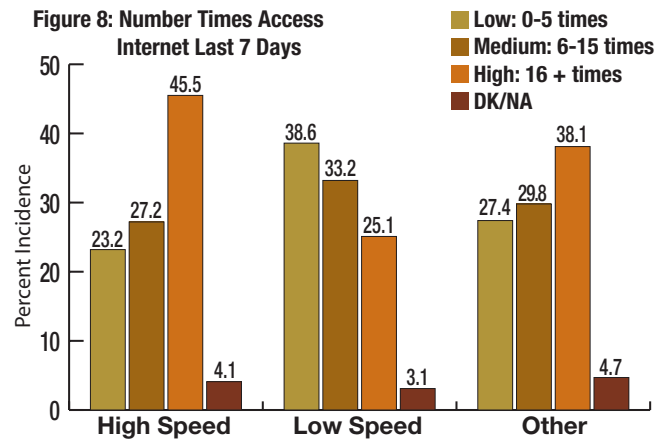
Notice that this relationship is also present for medium and low access users – that is, the number of times individuals access the net is positively correlated with the speed of access. This evidence also suggests that there is a higher return on effort investment as people are more likely to access the Internet more often when they have a high-speed connection.

One of the main activities of using the Internet besides email is visiting websites. Theoretically high-speed users will have more opportunity to visit websites since the investment in searching for interesting sites as well as the time loading these websites will be considerably smaller for high-speed users. Indeed, looking at Figure 9, it can be seen that individuals with high volume website visits are twice as prevalent in the high-speed access category (22.1%) versus the low-speed access method (10.7%).

As unique web site frequency goes down, there is a corresponding trend between the two access categories. As can be seen in the low-speed access category 58.4% of users reside in the low visit group while only 42.4% of high-speed users belong to this low activity category.

Finally, given that high-speed at-home users access Internet more often, for longer periods of time each week and appear to visit more websites, does this mean that they are more likely to engage in activities that are important to marketers and businesses? Figure 10 shows how the percentage of individuals that have engaged in activities important to business vary by access method.

For example, 40.6% of high-speed access users have made airline, hotel or car rental reservations in



the last 30 days as opposed to only 30.4% of low-speed access users. Almost 35% of high-speed users have made an online purchase in the last 30 days versus only 23.7% of low-speed users. What is clear is that in each category high-speed users are more likely to have engaged in that commerce-or media-related activity than low-speed users. While a part of that is likely due to the differences in household income between the two groups of users, this does suggest that there are definite commercial advantages for businesses to connect with high-speed Internet users.

Method of Access and Psychographics

Social and psychological factors can also play an important part in how one approaches new technologies. One of the key concepts that relates to this is how individuals perceive the Internet to have changed their lives. There is the perception that the Internet has broad-ranging effects on the lives of individuals and so an investigation to see how these effects may vary by method of access is useful.

Figure 11 is the first part of this investigation. Looking at the chart, we can not only examine individual levels but also compare access methods. First notice that almost 21% (over 1/5) of high-speed access respondents agreed a lot that the Internet has changed the way they spend their free time. Only 12.4% of low-speed access respondents felt this way. As one might expect, almost a third (31.4%) of respondents with high-speed access agreed a lot that the Internet changed the way in which they get information about products and services. Interestingly enough, only 20.9% of low-speed individuals felt this way.

While stereotypes and the media convey the image of people “hooked” on the Internet and not even able to sleep, our data reveals that regardless of access method, only a small proportion of individuals agreed a lot with the statement that the Internet caused them to spend less time sleeping (5.9% high-speed; 4.3% low-speed). Interestingly, another surprising result was that only 5.6% of high-speed and 3.6% of low-speed access method respondents agreed a lot with the statement that the Internet changed the way they shop for products and services. Given the significant media attention and corporate expenditures in e-commerce and websites, it is interesting to note how few people feel that the Internet has changed the way they shop. However, because e-commerce still plays a fairly small role in terms of sales for many businesses this figure may not be quite so surprising.

Relevant to media consumption are the responses to questions about spending less time with non-Internet media. In Figure 11 we can see not only that people perceive the Internet in general as reducing the time spent on television viewing and magazine readership but that high-speed Internet access appears to accentuate this trend. This trend is also repeated for radio and print news in Figure 12 later on. While this is not entirely reflective of the more drastic predictions of the negative effects of the Internet on traditional media, it does suggest that the Internet is beginning to erode the time spent on these conventional forms of media.

Figure 11: **How Internet Has Changed Respondent's Life**
(Top Box - Agree A Lot)

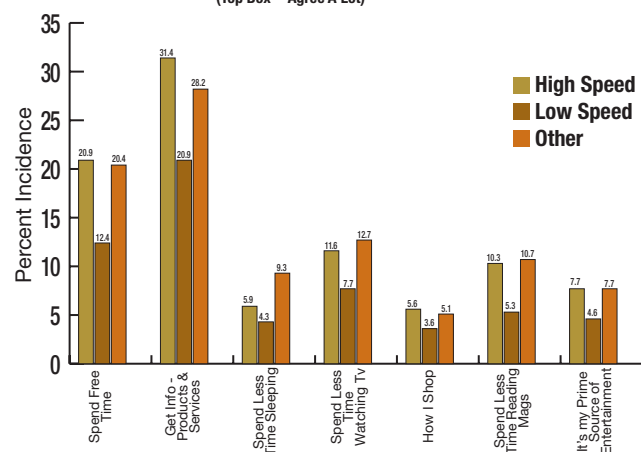


Figure 12 is a continuation of how the Internet and access method have changed perceptions of everyday life. It is interesting to notice that while there is a definite difference between high- and low-speed access methods in the ways that people worked, the actual percentages for this important aspect of people's lives is much smaller than expected.

Because many more people are using computers at their workplace, perhaps the having a computer at home with Internet access hasn't really changed the way they work – just the location they work from.

Another interesting result is the general perception that using the Internet at home, whether from a low- or high-speed – has increased the respondent's desire to learn. The availability and ease with which information can be quickly collected and examined on the Internet no doubt plays a large role in this perception. Also note that this effect is much more pronounced for those who have a high-speed connection (20.2%) versus those who have a low-speed connection (13.2%). Coupled with this desire to learn is how many people resort to the Internet as the first place to look for information. Over 25% of respondents said they agree a lot with this statement. On the other hand, only 16.4% of respondents stated that they agree a lot with the statement that the Internet is the first place they look for information. The data seems to suggest that high-speed connections promote both learning as well as the promoting the Internet as the first place to look for information.

Given the idea that the Internet is a primary information source it would be useful to have a better understanding of how receptive individuals are to advertising, especially on the Internet. Figure 13 below reveals how receptive respondents with home Internet access are to advertising both in general as well as on the web.

Advertising Receptivity is a proprietary scale in the Simmons NCS that represents receptiveness to advertising, including finding advertising as interesting, a high level of "ad curiosity", and enjoyment in reading advertising. Several interesting trends emerge here.

First, notice that in terms of general ad receptivity respondents with high-speed Internet access were non-trivially less receptive to advertising (28.9%) than were those with low-speed connections (34.4%). However, when looking at Internet advertising receptivity notice that high-speed Internet at-home users were just slightly more receptive (25.2%) than low-speed users (23.9%). Why is the gap between general and Internet advertising receptivity much larger for low-speed users than high-speed users? One reason for this might be that given the limited bandwidth of low-speed Internet connections these users may resent having to wait longer for web pages to completely load because they contain advertising content or even Flash or java code that must be downloaded.

Figure 12: How Internet Has Changed Respondent's Life
(Top Box - Agree A Lot)

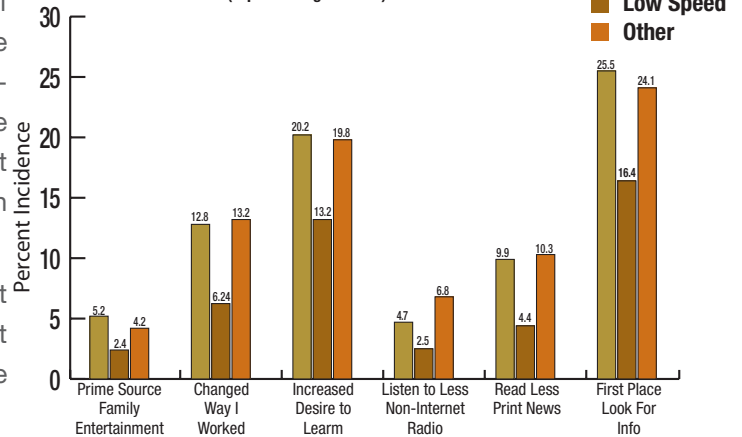
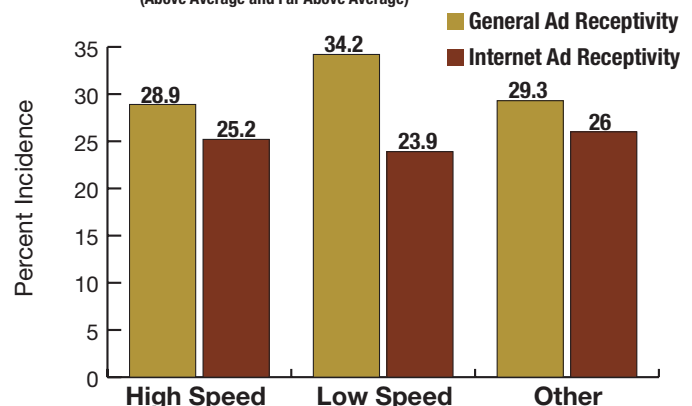


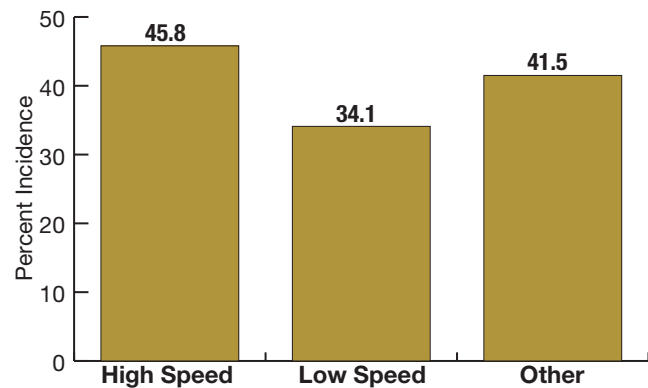
Figure 13: General and Internet Ad Receptivity
(Above Average and Far Above Average)



Finally, we take a look at an obvious but useful variable – the incidence of early adopters of technology. Figure 14 below shows the incidence of early adopters of technology across access methods.

The early adopters scale is a proprietary Simmons NCS scale that represents the desire to be the first to have the latest in electronic equipment, the willingness to pay almost anything for an electronic product and actively be a source of information on electronic equipment to others. As one might expect, there is a much higher incidence of early technology adopters in the high-speed access category (45.8%) than the low-speed Internet access category (34.1%). Given that high-speed Internet access is a newer technology we would expect to see this result.

Figure 14: **Early Adopter of Technology** (Above Average and Far Above Average)



Model of Migration from Low-Speed to High-Speed Access

The preceding discussions have presented some of the variables that highlight differences between low-speed and high-speed Internet access at home for individuals. Some of these differences may be drivers that motivate people to migrate from a low-speed to high-speed connection. Other characteristics that belong to these high-speed Internet users may be ones that are absent in the low-speed user population but emerge as a consequence of switching to high-speed access.

To examine some of the variables previously discussed to see if they appear to be motivators or post hoc consequences of migration, the subsample in the previous analyses was further reduced to a smaller sample of 6,857 respondents who currently had low-speed access in the home. Of these, 1,109 or about 16% indicated that they were planning to migrate from low-speed to high-speed Internet access in the next 12 months.

The response variable in this case was constructed such that respondents who indicated they were going to change to high-speed access in the next 12 months were coded as one while all others were coded zero. A number of variables present in the discussions were used as predictor variables. A logistic regression was estimated to see which variables might be related to the decision to migrate from low-speed to high-speed Internet access. Table 1 reveals the result of the analysis.

Eight of the twelve independent variables achieved statistical significance at the .05 level or less. From the table it can be seen that males were more likely than females to plan to migrate. In addition, the results also confirm other research that associates higher educational and household income levels with high-speed Internet access. One interesting note is that the analysis reveals that there is negative relationship between age and the likelihood of migrating. Earlier research (U.S. Census, 2000) suggests that higher propor-

Table 1
Regression of Decision to Move to High Speed Internet

Variable	df	Estimate	Std Error	Wald Chi ²	Pr > Chi ²
Intercept	1	-2.9779	0.2826	111.0004	< .0001
Sex	1	0.2005	0.0745	7.2408	.0071*
Education	1	0.0400	0.0163	6.0339	.0140*
Household Income	1	0.00002	0.0000007	6.9927	.0082*
Age	1	-0.0184	0.00263	48.9652	< .0001*
Early Adopter of Tech	1	0.0918	0.0258	12.6957	.0004*
# Times Access Web	1	0.0878	0.0223	15.5654	< .0001*
Hours on Web per Week	1	0.0183	0.0072	6.4419	.0111*
Change How Spend Free Time	1	0.0271	0.0393	0.4742	.4911
Change How Get Info	1	0.0149	0.0417	0.1277	.7208
Spend Less Time Watching TV	1	-0.0255	0.0340	0.5649	.4523
Increase Desire to Learn	1	0.1364	0.0361	14.3071	.0002*
First Place to Go for Info	1	0.0339	0.0333	1.0347	.3090

* = P < .05

tions of somewhat older individuals are more likely to have high-speed Internet access but this analysis shows that there is some evidence that the trend is a reaching younger audience. Perhaps it is the fact that price competition for broadband services is beginning to appear and these services may be beginning to become affordable for younger individuals who often earn less than their older counterparts.

As expected, early adopters of technology are more likely to be planning to migrate to high-speed Internet access than people who adopt technology later in the market curve. Also from the table it can be seen that there are positive relationships between time spent online and number of access times per week. This makes logical sense since people that are more engaged in the Internet are more likely to spend more time and access the Internet more often and thus are interested in gaining more productive, faster access to the Net.

Surprisingly, only one of the five psychographic statements about how the Internet had changed their lives was statistically significant. There was a positive relationship between the desire to learn and the likelihood to migrate to high-speed access. One explanation for this might be that even for individuals with low-speed Internet access, they have already experienced changes in terms of how they spend their free time, get information about product and services, allocate television viewing time and use the Internet as the first place they look for information due to their exposure to the Internet even using a low-speed connection. That is, the digital revolution has already occurred for them, although it's a "low-speed" revolution.

Summary

In summary, we have found that there are a number of demographic, activity and psychographic differences between at-home low-speed and high-speed Internet users. We have also shown that some of the factors are also likely to be involved in the probability that a low-speed Internet user will migrate to high-speed access. As the broadband market continue to grow and price competition begins to become more prevalent it is likely that there will be changes in the relationships we have uncovered as well as other variables emerging as significant factors in describing the differences between at-home low-speed and high-speed Internet populations.

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