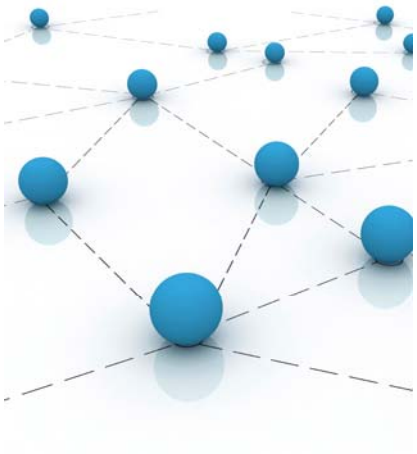

Report for

West Virginia Broadband Type 1 2 3 Determination

Prepared for

West Virginia Broadband Deployment Council

March 2012 ©

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EXECUTIVE SUMMARY

The State of West Virginia contracted with L.R. Kimball to develop a grant program which would fund projects deploying broadband service to un-served portions of West Virginia. As part of that process, L.R. Kimball was tasked to classify areas un-served by existing broadband providers into three distinct categories: Type 1, Type 2 and Type 3.

A Type 1 un-served area is an area in which broadband may be deployed by service providers in an economically feasible manner. A Type 2 un-served area is an area in which broadband may be deployed by broadband service providers and other entities in an economically feasible manner, provided some form of public money is made available. A Type 3 un-served area is an area in which, at present, cable or wireline broadband cannot be deployed in an economically feasible manner and an intermodal approach employing other technologies, such as satellite and wireless, is required to provide that area with high-speed internet access.

The purpose of this report is to document L.R. Kimball's process for classifying a given un-served area as either Type 1, 2 or 3.

Broadband service providers each have unique processes for determining when it is economically feasible to deploy broadband service to a given area. The process varies from provider to provider and depends greatly on the technology being deployed. Because no consistent formula exists and the definition of a Type 1, 2 or 3 un-served area is not strictly defined, L.R. Kimball developed an objective means to classify un-served areas based upon known metrics for populations more likely to have broadband service today. Metrics regarding current broadband deployment were obtained from Federal Communications Commission (FCC) reports. Factors including structure points, population density, median income, age, distance from existing networks and terrain were considered in classifying un-served areas as Type 1, 2 or 3.

1. METHODOLOGY

L.R. Kimball initially documented the known areas currently served by broadband service providers from the state broadband mapping program through the geographic information systems (GIS) coordinator's office and the West Virginia Geological and Economic Survey (WVGES). Areas currently served by broadband service were excluded from the determination. Un-served areas were then subdivided based on proximity to structure points and road segments. Each area was then correlated with 2000 and 2010 census data for population density, income and population age to determine likelihood for deploying broadband service.

Criteria used to determine the likelihood of a given area receiving broadband service was based on metrics provided by the FCC for areas where broadband is currently deployed[1]. Specific categories considered in the determination included population density, population age, income and proximity to existing networks. Each category was weighted on a scale of one to five, with a score of five indicating a high likelihood to receive broadband service and a score of one indicating a low likelihood to receive broadband service. Based on the average of the four considered categories, each subdivided area was classified as Type 1, 2 or 3.

Based on the determination, a map was developed which depicts the Type 1, 2 and 3 classifications across the state. A 1,000 foot boundary was included within the documented area around each structure point to reflect the area that a wireline provider may be willing to lay cable from a roadway in order to provide broadband service. Served areas are reflected with a yellow color. Each un-served area is color classified according to the Type 1, 2 and 3 determinations.

Challenging terrain is a criterion that could deter the deployment of broadband service. However, no simple means are available to correlate challenging terrain with individual structure points. To include terrain as a considered factor, terrain contours were overlaid on the map to provide the viewer a clearer picture of where terrain may deter the deployment of broadband service.

[1] Broadband Adoption and Use in America, OBI Working Paper Series No. 1, John B. Horrigan

2. FINDINGS

2.1 Structure Points

L.R. Kimball's initial task was to define the level of granularity for making Type 1, 2 or 3 determinations. Classifications according to county and census blocks were initially considered, but ultimately dismissed because of the large size and variation within each subdivision. With too large of a geographic area lumped into a single category, the Type 1, 2 or 3 determination may not have been representative of the entire county or census block area. Certain challenges existed with classifications according to these areas because boundaries for known data values could not be directly correlated to county or census block geographic areas. The data used to make the Type 1, 2 or 3 determinations was based primarily on U.S. census data. Census data for 2010 were used where possible; however, 2000 data had to be used for income levels because 2010 income data was not yet available. Because census block boundaries changed between the 2000 and 2010 census, data classified according to 2000 census blocks could not be correlated.

L.R. Kimball determined that structure points provide the most granular and representative means to evaluate the likelihood of receiving broadband service. Because a structure will represent a single potential broadband customer, use of structure points to derive a standardized polygon feature within the determination is a better indicator of potential broadband customers than population alone. Because the polygon areas created from structure points are smaller than individual census blocks, data from both the 2000 and 2010 censuses could be correlated to each area.

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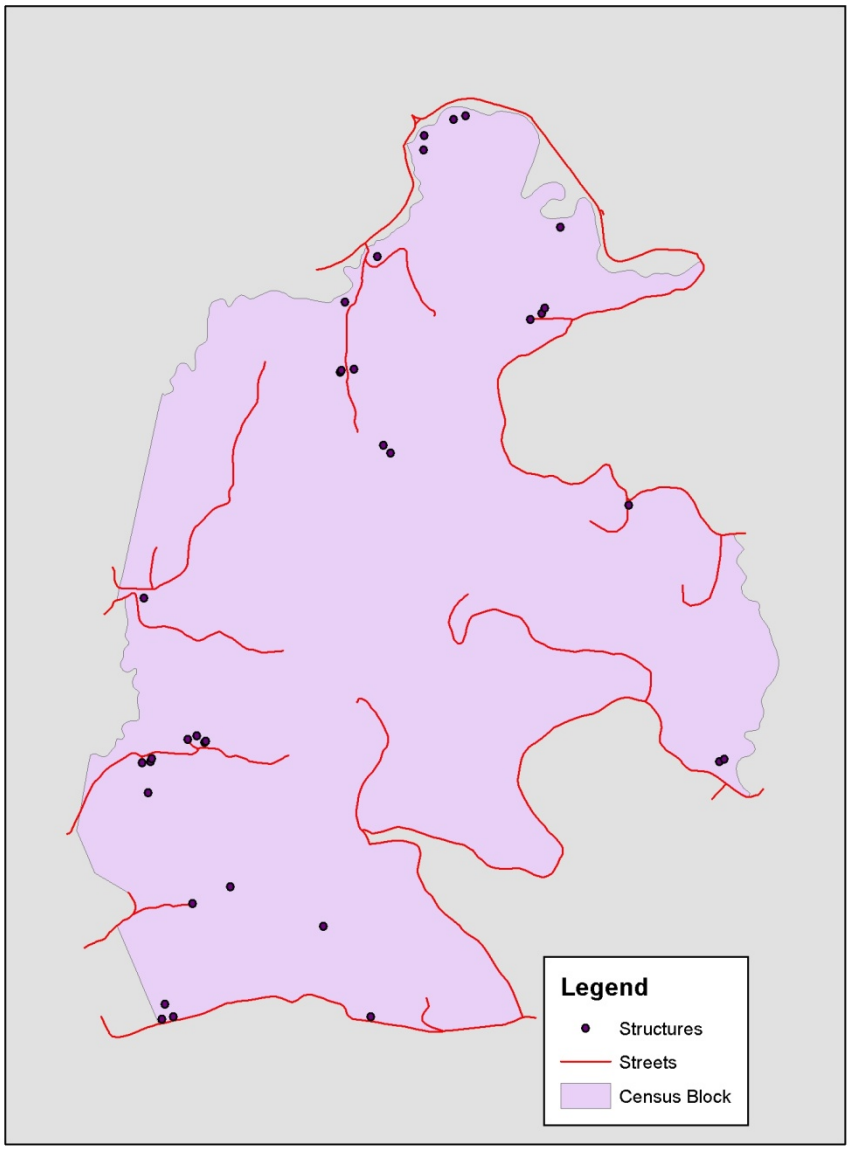

Figure 1—Census Block with Road and Structure Points

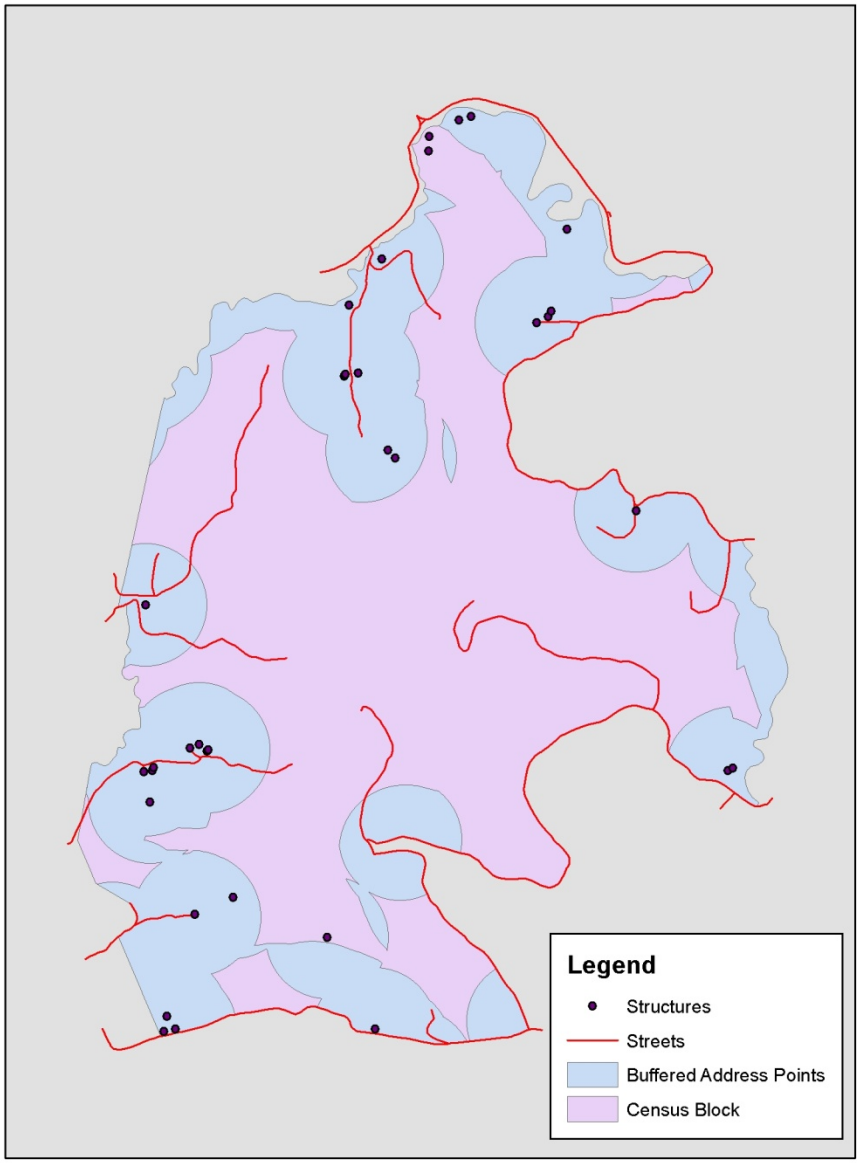

Figure 2—Structure Polygons with 1000 Foot Boundaries

The structure point data used in the analysis was obtained from the state of West Virginia. Structures that would not benefit from receiving broadband service (e.g., group mailboxes, fire hydrants) were excluded from the analysis. Polygons were then created from the structure points, by applying a 1,000 foot buffered area around each eligible structure and dissolving the boundaries of any overlapping buffer "rings" that were created during the process. These structure-derived polygons

represent eligible area by which a wireline service provider could easily extend service from a roadway or nearby structure by laying cable. The 1,000 foot boundary also serves to provide additional geographic area to each structure so that un-served areas can be better visualized on a map.

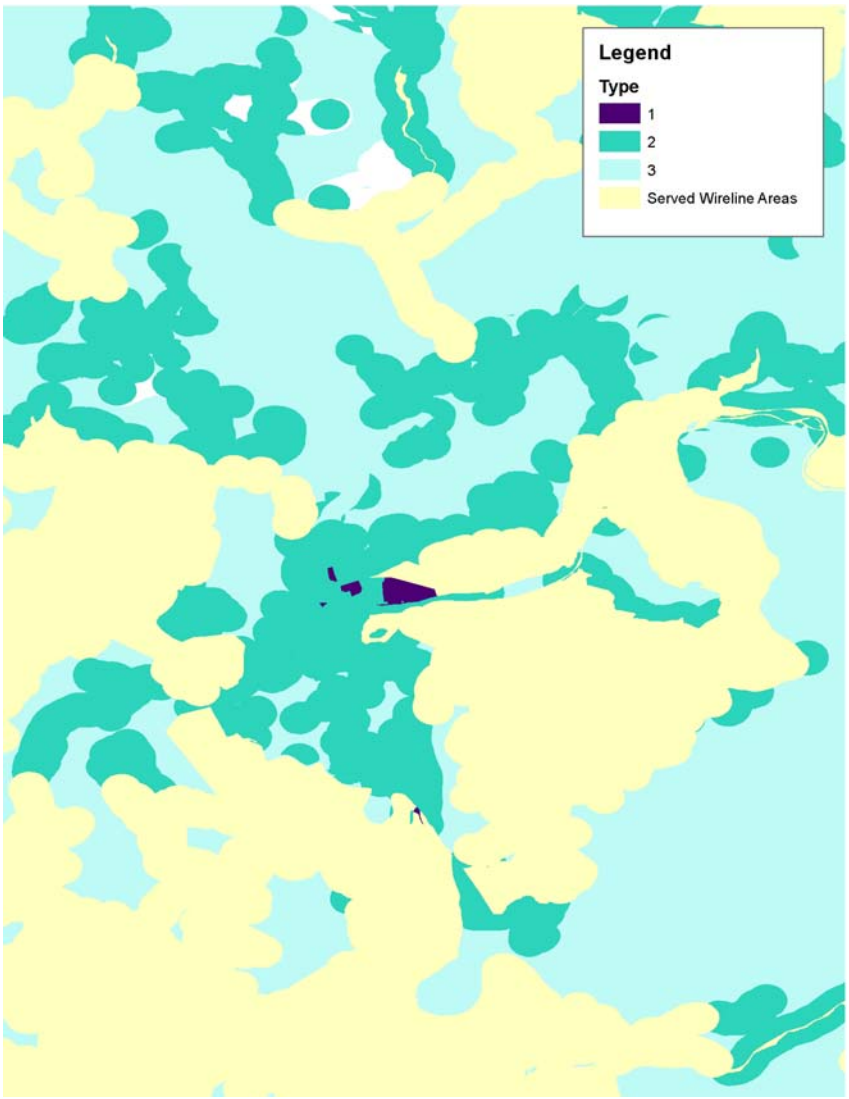

Figure 3—Type 1, 2 and 3 with Served Areas

2.2 Population Density

Population is a key criterion for whether or not broadband service will be deployed to a given area. The higher the population, the more potential customers a broadband service provider can expect. However, population alone is insufficient to determine likelihood to receive broadband service without a geographic reference. A highly populated area in close concentration represents a target market where a broadband provider can extend service to more customers while incurring less network costs. A highly populated area spread over a large geographic area will result in additional network expenses for the provider.

Population data from the 2010 census is available according to census blocks. However, census blocks are not of uniform size and therefore could provide misleading information. Larger blocks would be more heavily weighted than smaller blocks. Therefore, population density was used as the criterion for evaluating likelihood of receiving broadband service instead of population alone. Population density (per square mile) was determined by dividing the total number of people within a given 2010 census block by the summed area of the buffered structure polygons located in the block. Because population density is calculated per eligible broadband service area (buffered structures) as opposed to per block, the varying sizes of the census blocks will not affect/skew the results.

Population density for each structure was scored from one to five. The following table outlines the population density ranges assigned each value.

Weighting Factor	Population Density
1	Population Density less than 100 people/sq mile
2	Population Density between 100 and 200 people/sq mile
3	Population Density between 200 and 300 people/sq mile
4	Population Density between 300 and 400 people/sq mile
5	Population Density greater than 400 people/sq mile

Table 1—Population Density Ranges

Population density weighting factor were based upon the range of population density data received across the state. The intent of the distribution is to provide an even distribution across the state.

2.3 Income

Family income is a significant factor as to whether or not a household purchases broadband access. Therefore, the median family income of a target population is an essential criterion for evaluating the likelihood of broadband service to be provided to a given area. According to the Omnibus Broadband Initiative (OBI) Working Paper 1, "52 percent of Americans in households with annual incomes of $50,000 or below have broadband at home, compared with 87 percent of those in households with incomes above that level. Among low-income Americans—those whose annual household incomes fall below $20,000—broadband adoption stands at 40 percent." According to the OBI Working Paper 1, cost is the greatest limiting factor for families that do not have broadband access.

Median family income data is available from the 2000 census. Income levels from the 2010 census are not yet available. It is recognized that the income levels presented in the 2000 census are outdated. However, variations among different income groups between 2000 and 2010 are not anticipated to create a great variation in Type 1, 2 or 3 determinations. Income levels from the 2000 census according to census block are correlated with structure polygons.

Income for each structure polygon was scored from one to five. The table on the following page outlines the median family income ranges assigned each value.

Weighting Factor	Median Family Income
1	Median Family Income less than $20,000
2	Median Family Income between $20,000 and $35,000
3	Median Family Income between $35,000 and $50,000
4	Median Family Income between $50,000 and $65,000
5	Median Family Income greater than $65,000

Table 2—Median Family Income Ranges

Income weighting factor was based upon the range of income data received across the state. The intent of the distribution is to provide an even distribution across the state.

2.4 Age

Population age plays a contributing role in the likelihood of an individual to adopt broadband usage. According to the OBI Working Paper 1, only nine percent of individuals 65 and older reported broadband usage at home. Individuals 65 and older also made up the largest population of non-internet users at 41 percent when compared to different age ranges. The median age of broadband users at home is reported at 43 and the median age of non-internet users is reported at 60.

Age breakdown data are available from the 2010 census. The data list the number of individuals in various age brackets within each census block. Age brackets include the following groupings: under 18, 18 – 24, 25 – 29, 30 – 34, 35 – 39, 40 – 44, 45 – 49, 50 – 54, 55 – 59, 60 – 64 and over 65.

To categorize each census block in terms of the likelihood to deploy broadband, L.R. Kimball determined that age proportions would be the most feasible to calculate based on the census data provided. For each age bracket, the total population within each group was divided by the total population for the census block to determine that percentage of the population each age group represents within each census block. Using the percentages, L.R. Kimball calculated the age groups within each census block which represent a majority of the population. Each census block was then scored according to what age group the majority of the population fell under. Populations with a majority age under 40 were scored high compared to populations with a majority age over age 60.

Population age for each census block was scored from one to five. The following table outlines the population age ranges assigned each value.

Weighting Factor	Population Age
1	No population in block
2	Majority of population over age 60
3	Majority of population under age 60
4	Majority of population under age 50
5	Majority of population under age 40

Table 3—Population Age Ranges

Age weighting factors are based on data extrapolated from the OBI Working Paper 1 and upon the calculated range of age data across the state. The intent of the distribution is to provide an even distribution across the state.

2.5 Distance from Existing Networks

Distance from existing served areas to a target population for broadband service plays a significant factor in whether a broadband service provider will choose to extend service to a given area. Broadband infrastructure depends heavily on extremely high bandwidth backhaul circuits, often described as the network "backbone". Extending backhaul networks great distances represents a significant cost to network providers. For this reason it may be more economical for a provider to serve a less optimal population in lieu of cheaper network costs for providing service to that area.

Wireline service providers typically utilize major roadways for deploying high bandwidth backhaul networks; typically in the form of copper or fiber optic cabling. From roadways, service can be extended to end-user houses or businesses via "last mile" lower bandwidth connections.

To calculate the distance from existing networks, L.R. Kimball first identified areas served by wireline broadband service. Wireless coverage areas were ignored because wireless coverage is provided by remote radio sites and extending the edge of coverage areas for wireless systems will not represent significant cost efficiencies. Distance from existing covered areas to un-served areas was calculated based on distances along roadways.

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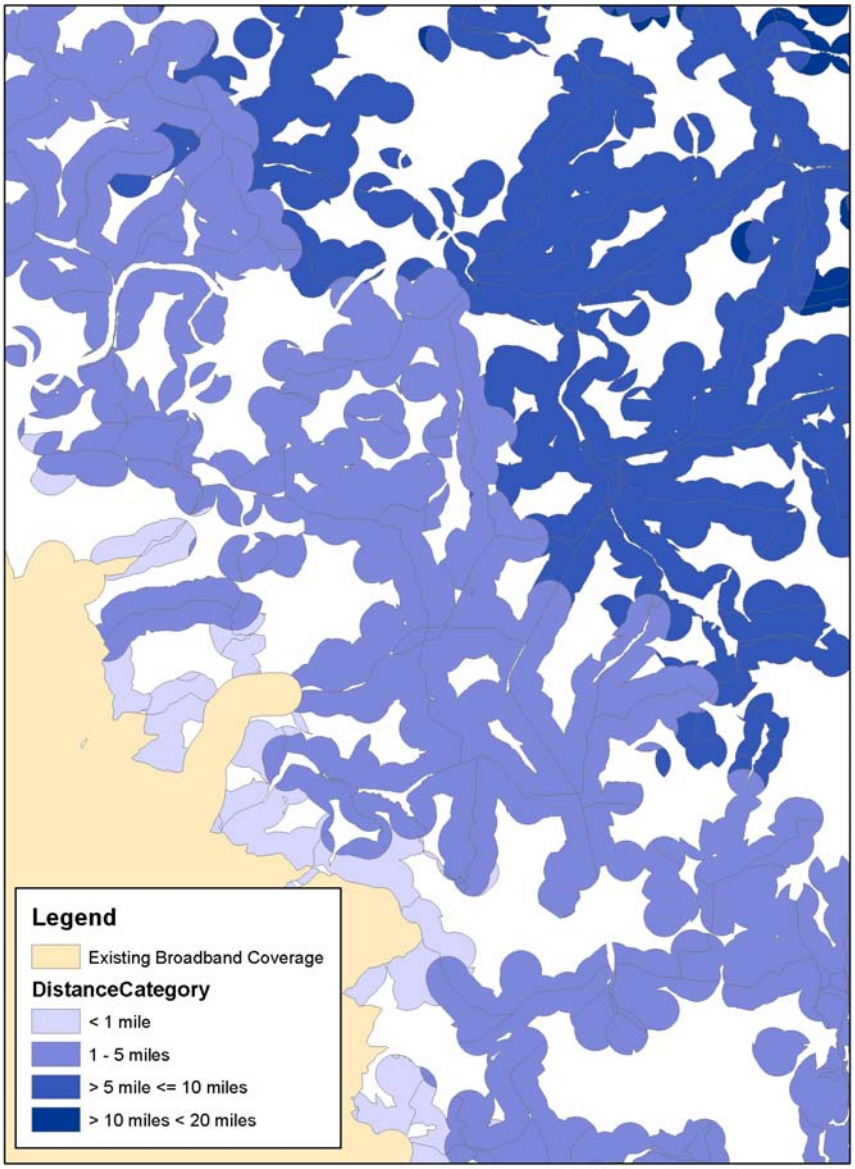

Figure 4—Distance from Existing Networks Sample

Distance from existing served areas with wireline coverage was calculated for each structure point and was scored from one to five. The table on the following page outlines the distance from existing network ranges assigned each value.

Weighting Factor	Distance from Existing Network
1	Greater than 4 miles from existing network
2	Between 3 and 4 miles from existing network
3	Between 2 and 3 miles from existing network
4	Between 1 and 2 miles from existing network
5	Within 1 mile of existing network

Table 4—Distance From Existing Network Ranges

Distances from existing network weighting factors were calculated to provide more points for networks within 4 miles of an existing served area. Areas outside of 4 miles will require extensive infrastructure deployments including lengthy land lines or multiple microwave hops.

Speed tiers outlined in the Broadband Mapping guidelines were utilized to create 3 separate proximity results. Wireline coverage with a maximum download speed of 768 kbps or greater was the criterion used for the initial proximity area.

The second proximity area was created using only the areas with a maximum download speed of 1.5 mbps or greater. The final proximity area was created using only the areas with a maximum download speed of 3 mbps or greater.

All other analysis factors and processes remained the same when using the 3 different proximity criteria to create the separate Type 1, 2 and 3 maps.

2.6 Terrain

Areas with challenging terrain have a lower likelihood to receive broadband service because network elements are more expensive to deploy. For wireline service, availability of space to lay cable along roadways may be limited and digging may be more complicated because of hard rock formations. For wireless coverage, signal is limited significantly by mountains, valleys and other geological formations. Even when a target population would otherwise be a good target for broadband deployment, provider costs for deploying networks over challenging terrain may outweigh the benefits.

Based on the data available to L.R. Kimball, no realistic means to weight challenging terrain on a structure point level was determined. Therefore, terrain could not be calculated on a scale of one to five as was done with the previous categories. To consider terrain in the Type 1, 2 and 3 determinations, elevation maps were overlaid on the determination map which considered all other factors besides terrain. The resultant map was then evaluated subjectively to locate areas where Type 1 or 2 areas fall in areas with challenging terrain. In most cases, structures falling within these areas were already evaluated at Type 3. This is likely due to the limited population that falls within areas with challenging terrain. In some cases, Type 1 and 2 determinations were adjusted to reflect the impact of terrain.

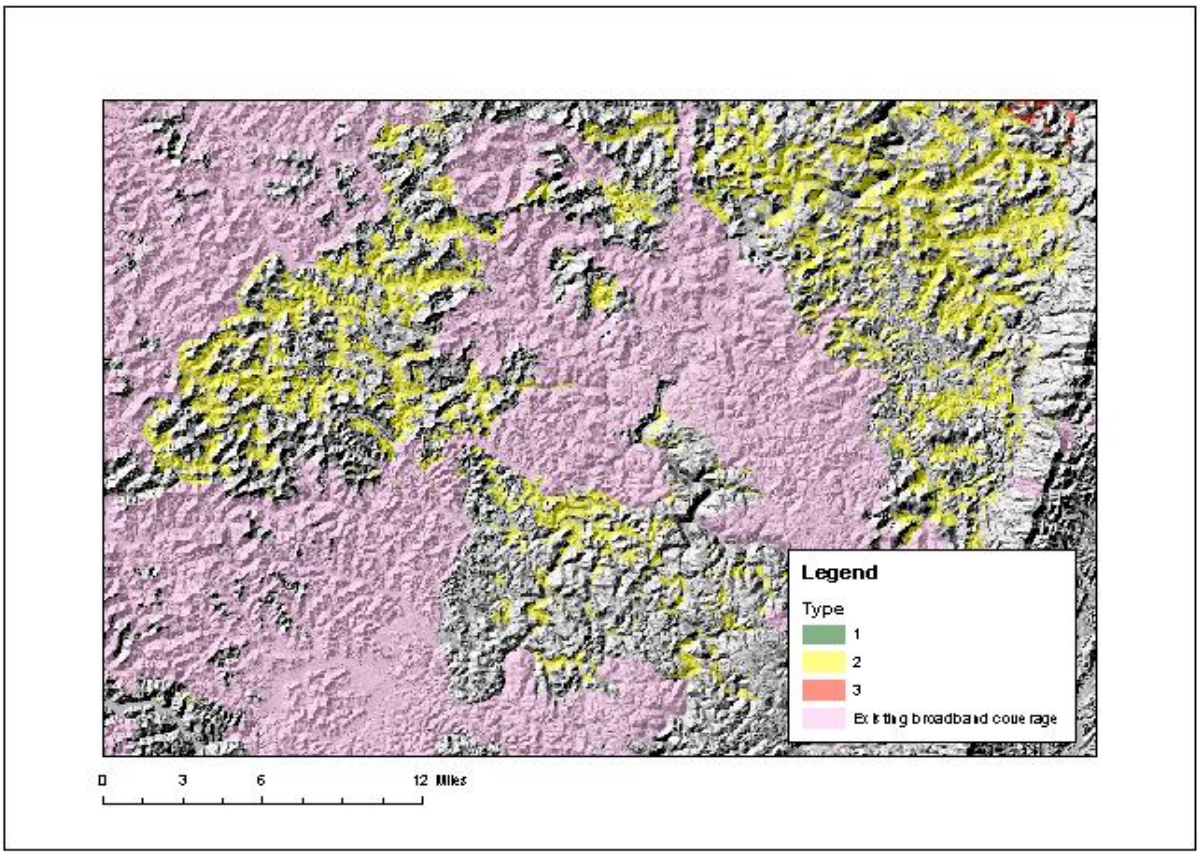

Figure 5—Terrain Sample

2.7 Type 1/2/3 Calculations

Based on the weighting factors designated for population density, income, age and distance from existing networks, a calculation was used to determine whether an area would be classified as a Type 1, 2, or 3 un-served area. The average of the four weighting criteria was calculated. Based on the average, a determination was made.

The following table outlines how each area was classified as Type 1, 2, or 3. A greater range was assigned to Type 2 structures as these areas are the most likely to receive funding for broadband projects.

Un-served Area	Average of Weighting Factors
Type 1	Greater than 4
Type 2	Between 2 and 4
Type 3	Less than 4

Table 6—Distance From Existing Network Ranges

2.7.1 Prioritized Projects

At the request of the West Virginia Broadband Council, L. R. Kimball was tasked to identify Type 2 un-served areas in higher population centers to prioritize for grant funding. To identify prioritized projects in an un-biased manner, L. R. Kimball used the average weighting factors to identify areas with a higher likelihood of utilizing broadband service. Initially, Type 2 areas were defined as those areas with average weighting factors between 2 and 4. To prioritize a subset of these areas, L. R. Kimball divided the Type 2 range into two categories: prioritized Type 2 areas, and un-prioritized Type 2 areas.

The following table outlines the division between prioritized and un-prioritized Type 2 areas.

Type 2 Areas	Average of Weighting Factors
Prioritized Type 2 Areas	Between 3 and 4
Un-prioritized Type 2 Areas	Between 2 and 3

Table 7—Division Between Prioritized And Un-Prioritized Type 2 Areas

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APPENDIX A—OBI WORKING PAPER 1

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BROADBAND ADOPTION AND USE IN AMERICA

OBI WORKING PAPER SERIES NO. 1

BY JOHN B. HORRIGAN, PH.D.

The FCC Omnibus Broadband Initiative (OBI) Working Paper Series presents analysis and research by broadband team staff members. These papers reflect work performed in support of the National Broadband Plan and provide context for the Plan. The analyses and conclusions in the OBI Working Paper Series are those of the authors and do not necessarily reflect the view of other Commission staff, or any Commissioner.

SUMMARY OF FINDINGS

The Federal Communications Commission's October-November 2009 survey finds that nearly two-thirds (65 percent) of American adults use high-speed Internet connections to go online from home.

The FCC conducted a survey of 5,005 Americans in October and November 2009 in an effort to understand the state of broadband adoption and use, as well as barriers facing those who do not have broadband at home. The main findings are:

- 78 percent of adults are Internet users, whether that means broadband, dial-up, access from home or access from someplace other than home.
- 74 percent of adults have access at home.
- 67 percent of U.S. households contain a broadband user who accesses the service at home.
- 65 percent of adults are broadband adopters. The discrepancy of two percentage points between household and individual home use is because some survey respondents are nonbroadband users but live with someone who, at home, is.
- 6 percent of Americans use dial-up Internet connections as their main form of home access.
- 6 percent are Internet users but do not use it from home; they access the Internet from places such as work, the library or community centers.

For the purposes of this report, home broadband users are those who said they used any one of the following technologies to access the internet from home: cable modem, a DSL-enabled phone line, fixed wireless, satellite, a mobile broadband wireless connection for your computer or cell phone, fiber optic, T-1. In other words, home broadband users opt in to that classification through a survey question not by adhering to definition of broadband by speed that might be read to them.

The main dividing lines for access are along socioeconomic dimensions such as income and education.

- 46 percent of adults whose highest level of education is a high school degree are broadband users at home; 82 percent of adults who have attended or graduated from college are broadband users at home.
- 52 percent of Americans in households with annual incomes of $50,000 or below have broadband at home, compared with 87 percent of those in households with incomes above that level.
  - Among low-income Americans—those whose annual household incomes fall below $20,000—broadband adoption stands at 40 percent.

African-Americans and Hispanics trail the average in broadband access, although gaps have narrowed since early 2009.

- 59 percent of African-Americans have broadband at home.
- 49 percent of Hispanics (English and Spanish speaking) have broadband at home.
  - For Hispanics who took the survey in Spanish, broadband adoption is only 20 percent.
  - For Hispanics who opted to take the survey in English, 65 percent have broadband.

These figures represent increases from levels registered in surveys conducted in early 2009 by the Pew Research Center, which found in April that 46% of African Americans and 40% of Hispanics (English and Spanish speaking) used broadband at home.

Some 42 percent of Americans with disabilities have broadband at home.

The FCC survey asked adults a series of six questions to determine whether a respondent should be classified as having a disability. Nearly one-quarter (24 percent) responded "yes" to at least one of the questions, indicating they have a disability; their broadband adoption rate is two-thirds the national average. Looking at the data differently, 39 percent of all Americans without broadband have some type of disability.

Senior citizens (those over the age of 65) continue to trail the national average in broadband adoption with a 35 percent broadband-at-home penetration rate.

- Nearly half (48 percent) of senior citizens are Internet users, regardless of connection type.

On average, Americans pay nearly $41 per month for broadband service, but half of those who receive their broadband in a bundle with other services cannot identify the Internet portion of their bill.

- When asked the level of their monthly Internet bill, to the nearest dollar, broadband users, on average, cited a figure of $40.68
- Most users (70 percent) receive broadband bundled with other services. Of these, 50 percent could specify their bundled monthly price: $37.70.

- Among broadband users who subscribe to a stand-alone high-speed service at home (i.e., they do not have service in a bundle), the average monthly bill reported was $46.25.

Broadband users overwhelmingly view the social aspects of the Internet as very important to them, while watching TV, videos or movies online and playing games were deemed less important.

When asked what types of online applications are important to them, here is what broadband users said were *very important* to them.

- 68 percent cited the Internet's capacity to ease communication with family and friends.
- 39 percent said the ability to use the Internet to keep up with community news.
- 35 percent mentioned the ability to share content, such as photos, videos or text.
- 24 percent cited online shopping.
- 10 percent said watching television shows, videos or movies online.
- 9 percent identified playing games online is very important.

Although most users of broadband at home have positive perspectives on the Internet, worries about inappropriate online content and security of personal information can put a damper on online activity.

Most broadband users see the Internet as a tool for learning and productivity.

- 81 percent strongly agree that the Internet is a valuable resource for information and learning.
- 74 percent strongly agree that it is important for children to learn to use the Internet.
- 56 percent strongly agree that people can be more productive using the Internet.

Nonetheless, broadband users view the Internet as having pitfalls.

- 56 percent strongly agree that too much pornography and offensive material is online.
- 39 percent strongly agree that it is too easy for personal information to be stolen online.
- 24 percent strongly agree that the Internet is too dangerous for children.

Users with positive outlooks about the Internet tend to be more active online (as measured by how many online activities they do) than those with less upbeat views on the Internet. Similarly, broadband users with strong concerns about the three pitfalls cited are *less* active online than those who do not share those views. These relationships do not show cause and effect, but they do suggest how attitudes influence the way people engage with the Internet.

Non-adopters are almost 50 percent more likely than broadband users to say they believe it is too easy for personal information to be stolen online.

- By a 57 percent to 39 percent margin, non-adopters of broadband at home say they strongly agree that it is too easy to have their personal information stolen online.

This is one factor linked to their lower likelihood of adoption. Although this concern is not necessarily a causal factor behind non-adoption decisions, there is a significant positive correlation between high levels of worries about personal privacy and non-adoption.

Broadband users exhibit varying degrees of understanding of digital concepts. That, in turn, influences what they do online.

Respondents received a series of questions asking how well they understood various terms relating to computers and the Internet; such questions serve as proxy measures for people's online skill levels. What follows is the share of broadband users who say they understood *very well* the listed terms:

- 61 percent—refresh or reload
- 44 percent—operating system
- 42 percent—Internet browser cookie
- 41 percent—JPEG file
- 40 percent—spyware or malware
- 16 percent—widget

Those with greater understanding of these terms are heavier online users. Some 29 percent of broadband users said they did not understand *any* of the listed terms very well, while 24 percent understood five or six of the terms very well. On average, the former group engaged in about half as many online activities as their more informed counterparts. Again, a causal relationship is not suggested here, but the findings indicate how skills can shape how heavily they use the internet.

People take advantage of multiple devices and services to go online, but these are usually supplementary access paths for them.

- 30 percent of American adults have used a handheld device (e.g., cell phone or smart phone) to access the Internet.[1]
- This behavior is more prevalent among minority groups.

  - 39 percent of African-Americans have accessed the Internet with a handheld device.
  - 39 percent of Hispanics have accessed the Internet with a handheld device.
- 84 percent of those who use the Internet via a handheld device have broadband at home. That figure is somewhat lower for African-Americans (78 percent) and Hispanics (68 percent).
- 15 percent of all Americans use a mobile wireless broadband service with their laptop computers.[2]
  - The vast majority (92 percent) of wireless broadband users have wireline broadband at home.
- Broadband users also access the Internet from places other than home.
  - 67 percent have at some time used the Internet at the homes of friends or family.
  - 62 percent have used the Internet at work.
  - 33 percent have used the Internet at a public library.
  - 30 percent have used the Internet at school.
  - 13 percent have used the Internet at a community center.
  - 5 percent have used the Internet at a place of worship.

Thirty-five percent of Americans do not use broadband at home. They fall into three categories, each with distinct demographic characteristics.

- 22 percent of adults are not Internet users. They are the oldest non-adopting group, with a median age of 60, and include the highest share of Hispanics (at 20 percent). Some 84 percent have high school degrees or less and half live in households with annual incomes of $30,000 per year or less.
- 6 percent of adults have dial-up connections at home. Nearly one-third (29 percent) of them live in rural areas, twice the rate for broadband users, and one-quarter (23 percent) have college degrees, which modestly lags the national average. The median age is 53.
- 6 percent of adults are Internet users, but do not have access from home. The group is relatively young (the median age is 38) and female (59 percent), but they tend to have low incomes and low levels of educational attainment.[3]

Of these non-adopters, 12 percent say they cannot get broadband where they live. This translates into a 4 percent share of Americans—on the basis of their reports on infrastructure availability in their neighborhood—who say they are unable to obtain broadband because it is not available. This means that 31 percent of all Americans can get service but do not.

There are three primary reasons why the 35 percent of non-adopting Americans do not have broadband: cost, lack of digital literacy and broadband is not sufficiently relevant for them to purchase it:

- 36 percent of non-adopters cite **cost** as the *main* reason they do not have high-speed Internet at home. This breaks out in the following ways:
  - 15 percent say the price of the monthly bill is too much for them.
  - 10 percent say the cost of a computer is too much.
  - 9 percent say they do not want a long-term service contract or cannot afford the installation fee.
  - 2 percent cite a combination of these reasons.
- 22 percent of non-adopters cite factors pointing to lack of **digital literacy** as the main reason they are not online. These include people who are not comfortable with computers or, for non-internet users, are "worried about all the bad things that can happen if I use the Internet." As people who cite digital literacy as barrier tend to be older (the median age is 62), concerns about the safety of the online environment is understandable.
- 19 percent of non-adopters do not have broadband because they question its **relevance** to their lives. They do not believe digital content is sufficiently compelling to justify getting it. Specifically, these non-adopters say the Internet is a "waste of time," do not think there is anything worth seeing online and (for dial-up users) say they are content with their current service. Dial-up users make up a disproportionate share of those citing lack of relevance as a barrier.

Non-adopters concerned with cost would be willing to pay, on average, $25 per month for broadband.

Non-adopters who cited the monthly cost of broadband as a reason they did not have service received a follow-up question asking them to estimate how much they would pay for service. Among this group:

- 52 percent were able to provide an estimate; it averaged $25 per month.
- 28 percent answered "don't know" to this question.
- 20 percent said they were not willing to pay anything for broadband.

Some 65 percent of those who estimated their willingness to pay (WTP) cited a figure of $20 per month or more.

- If all of those who cited this figure had a service offering at $20 before them <u>and</u> took service, broadband adoption would be 6 percentage points higher in the United States.

Nearly all (91 percent) who provided a WTP estimate identified a figure of $10 per month or more.

- If all of those who cited this figure had a service offering at $10 before them and took service, broadband adoption would be 8 percentage points higher in the United States.

Non-adopters have a variety of outlooks on the Internet and information and communications technologies (ICTs).

Some non-adopters, notwithstanding worries they may have about the Internet and their capacity to use it, have a hopeful outlook on the benefits it may confer. Many are users of ICTs, just not broadband at home. Among nonbroadband adopters:

- 80 percent have premium television, i.e., either satellite or cable.
- 70 percent have cell phones.
- 42 percent have at least one working computer at home.

With respect to attitudes, most express high degrees of worry about the privacy of their personal information and inappropriate online content:

- 65 percent strongly agree there is too much pornography and offensive material on the internet.
- 57 percent strongly agree that it too easy for their personal information to be stolen online.
- 46 percent strongly agree that the internet is too dangerous for children.

At the same time, many non-adopters see the upsides to online access

- 59 percent strongly agree that the Internet is a valuable tool for learning.
- 54 percent strongly agree that it is important for children to learn to use the Internet.
- 37 percent strongly agree that people can be more productive using the Internet.

One-quarter (24 percent) of non-adopters have had experience with broadband, meaning they once had service at home or have used it at work or someplace else:

- 17 percent of all non-Internet users had home access in the past.
  - Of this group, 49 percent said they had home high-speed Internet access.
- 46 percent of dial-up or "not-at-home" Internet users have used a broadband connection from somewhere other than home, such as at work, school or a friend or family member's house.

Together, users in these two groups with direct experience with broadband equate to 24 percent of the non-adopting population, or 8 percent of all adults.

"Proxy Internet" use is evident for 22 percent of non-Internet or "not-at-home" users who live with someone with online access. Among these users:

- 16 percent ask the Internet user in the home to carry out an online task at least once a week.
- 20 percent ask the Internet user in the house to carry out an online task about once a month.
- About half of this "proxy access" is done using a broadband connection in the home.

When it comes to outlooks toward the Internet and levels of ownership of ICT products, non-adopting Americans fall into four categories, each with different barriers to broadband adoption.

Digitally Distant non-adopters make up 10 percent of the general population, and members of this group do not see the point of being online. Few in this group see the Internet as a tool for learning and most see it as a dangerous place for children. This is an older group (the median age is 63), nearly half are retired and half say that either *lack of relevance* or *digital literacy* are barriers to adoption.

The **Digital Hopefuls** make up 8 percent of the population. They like the idea of being online but lack the resources for access. Few have a computer and, among those who use one, few feel comfortable with the technology. They are most likely to cite *cost* as a barrier to adoption, with affordability of the computer playing an important role. They are also more likely than average to say *digital literacy* is a barrier. Demographically, this group is heavily Hispanic (26 percent), has a high share of African-Americans (20 percent) and is low-income.

The **Digitally Uncomfortable** make up 7 percent of the population, and are the mirror image of the Digital Hopefuls; they have the resources for access but not a bright outlook on what it means to be online. Nearly all of the Digitally Uncomfortable have computers, but they lack the skills to use them and have tepid attitudes toward the Internet. This group reports a *variety of barriers*, including cost, lack of available infrastructure where they live, low perceptions of the Internet's relevance and low digital literacy.

The **Near Converts**, who make up 10 percent of the population, have many of the same characteristics of broadband adopters. They have high rates of computer ownership, positive

attitudes about the Internet and are, relative to other non-adopters, youthful (at a median age of 45). Many are dial-up or "not-at-home" users, and *monthly access cost* is the largest reason for non-adoption among this group.

Looking across various population segments reveals differences in what they do online and what keeps them from having broadband.

Families: Parents with minor children at home are more likely than average to have broadband at home, by a 75 percent to 65 percent margin. The strong majority (87 percent) has at least one working computer at home, leaving a 13-percentage-point gap between adopters and those with a functioning computer. Among those without broadband, nearly half (48 percent) cite cost as the main barrier to adoption, with 24 percent specifically pointing to the level of the monthly access fee.

Low-income Americans: Some 40 percent of low-income Americans (with annual household incomes at $20,000 or below) have broadband, compared with 91 percent among those living in homes with annual incomes above $75,000. Low-income broadband users are more likely than well-off broadband users to look for or apply for a job online – by a 77 percent to 60 percent margin. Not surprisingly, 47 percent of this group identifies cost as the biggest barrier to broadband adoption. That is twice the rate of the (relatively few) upper-income nonbroadband adopters.

African-Americans: Although African-Americans trail the average in overall broadband adoption, the adoption gap does not exist for adults under age 30; some 75 percent of African-Americans in this younger age group have broadband, which equals the average. By contrast, 21 percent of African-American senior citizens have broadband; that compares with the 35 percent average. African-American broadband users are highly likely to have used their broadband connection to look for or apply for a job; 83 percent versus the 60 percent average. African-Americans with broadband are also more likely to take a class for credit online (37 percent versus the 26 percent average). With respect to barriers to adoption, 42 percent of African-Americans say cost is the main reason they do not have broadband.

Hispanics: Half (49 percent) of Hispanics have broadband at home. While young African-Americans have broadband access on par with the average, "under 30" Hispanics trail the average for their age cohort, 57 percent versus 75 percent. Those Hispanics with broadband use it for downloading and streaming music (69 percent have done this, in comparison with the 52 percent average). They also find broadband very important for keeping up with news about their community; 52 percent say this compared with the 39 percent average. As to adoption barriers, 52 percent of Hispanic non-adopters cite cost, equally split between those who point to the monthly fee and those who say they cannot afford a computer.

People with disabilities: Of the 24 percent of respondents who have some sort of disability, 42 percent have broadband. The online activities of broadband-using people with disabilities are narrower in scope than others; that is, they do fewer things online. That may reflect difficulties some people with disabilities have in using the devices to get online or interacting with Web pages. Barriers for non-adopting people with disabilities do not differ significantly from the average.

Rural Americans: Fifty percent of rural residents have broadband, a rate that reflects in part the older and less wealthy rural population but also the lack of available infrastructure. One in 10 rural non-adopters say they cannot get broadband where they live. That is more than twice the average. Rural Americans *with* broadband, meanwhile, are as active as their urban and suburban counterparts in using the Internet for shopping and taking classes online, suggesting that they use broadband as a way to virtually access the benefits associated with urban or suburban living.

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INTRODUCTION

The Federal Communications Commission in the fall of 2009 fielded a national survey of Americans under authority granted by the Broadband Data Improvement Act (BDIA). The BDIA, which became law in October 2008 but needed and received funding approval under the American Recovery and Reinvestment Act (ARRA), requires the FCC to conduct periodic surveys that explore the broadband experience of American consumers. Specifically, the BDIA directs the survey to probe the types of technology people use for their home broadband service, what they pay, the applications they use and, for those who do not use broadband, the barriers to adopting broadband.

This paper reports the national findings from the random digit dialing telephone survey that interviewed 5,005 adult Americans, 2,671 of whom are broadband-at-home users. The remaining 2,334 either do not have broadband at home, report that they do not use the Internet or say they are Internet users but without access at home. The number of non-adopters surveyed represents an oversample of this population; this was done to facilitate statistical analysis of non-adopters.

The Methodology section in the report's appendix provides detail on the sampling design for this survey, and also discusses such issues as response rate and use of cell phone numbers in the sample. Cell phone numbers were used in the sample in recognition of the fact many Americans do not have landline telephone service at home, but rather rely only on their cell phones. Overall, interviewers conducted 31% of the surveys with respondents who were on a cell phone; 13% said they were "cell phone only" households, while 18% had a landline, yet were contacted on their cell phone.

It is also worth noting that the data presented throughout is weighted to take into account characteristics of the sample, including the oversample of non-adopters. The weighting corrects for the fact that, in the figures noted in above, 2,671 adopters does not represent 65% of 5,005 respondents, the home broadband adoption figure highlighted at the outset. In results reported within, percentage figures represent weighted results; the number of cases reported for various sub-samples are actual number of cases.

For the survey, the margin of error based on results based on the entire sample of 5,005 is plus or minus 1.6 percentage points. For results on 2,671 home broadband adopters, the margin of error is plus or minus 2.1 percentage points; for the oversample of non-adopters (n=2,334) the margin of error is plus or minus 2.2 percentage points. Finally, results based on all internet users (n=3,555), the margin of error is plus or minus 1.8 percentage points. Interviewers conducting the survey provided a Spanish-language option for respondents wishing to take the survey in Spanish.

The FCC's survey results compare favorably to a similar survey conducted in the fall of 2009 by the Census Bureau for the National Telecommunications and Information Administration, which found that 63.5 percent of American households used high-speed internet to go online.[4]

WHAT IS NEW ABOUT THIS SURVEY

The survey is unique for the FCC, in that it is the first time that the Commission has conducted its own survey of end-users of the Internet. The Commission, using data gathered from FCC Form 477 (a semi-annual reporting document for telecommunications entities) has previously reported on the number of broadband lines in service to end users based on carrier-reported data at the Census tract level.[5] This survey, as it involves interviewing adults, presents adoption data based on what users say about how they access the Internet at home.

The survey is distinct in a broader sense owing to its focus on non-adopters of broadband at home. There have been other national surveys that have examined why people do not use the Internet, most notably the Pew Internet & American Life Project's 2002 survey on why people did not use the (mainly) dial-up Internet.[6] Other Pew Internet research has analyzed non-adoption of broadband based on a few questions in national surveys.[7]

Finally, the FCC survey develops segments of non-adoption. This segmentation permits non-adopters to be placed in categories that yield insights into the reasons people do not have broadband—and possible solutions that might be targeted at non-adopters. The British regulator Ofcom undertook a similar segmentation of non-adoption[8] but this is the first time national data collected by the U.S. government has been examined in that way.

I. ADOPTION: WHO USES BROADBAND AT HOME—AND WHO DOESN'T

WHO USES BROADBAND AT HOME—AND WHO DOESN'T

The October-November FCC survey finds that a strong majority of Americans use the Internet. Among adults, 78 percent are Internet users, meaning they have access from home or someplace other from home, and with any type of connection (i.e., dial-up or broadband). The findings about access:

- 65 percent of adults use broadband at home.
- 67 percent of households have broadband. The survey asked non-adopters whether another person in the house uses the Internet with a home high-speed connection. Affirmative answers to that question add two additional percentage points to overall penetration.
- 6 percent of Americans have dial-up Internet connections at home.
- 6 percent of Americans are Internet users but do not access the Internet from home.

This means that 22 percent of Americans are not Internet users (1 percent of respondents did not know the type of Internet connection they have at home and thus are not classified as broadband, dial-up or "not at home" online users).

Although broadband access and reasons for not having it are the principle themes of the survey, respondents were asked about several other assets pertaining to information and communications technology (ICT), such as use of computers, TVs and cell phones. Specifically:

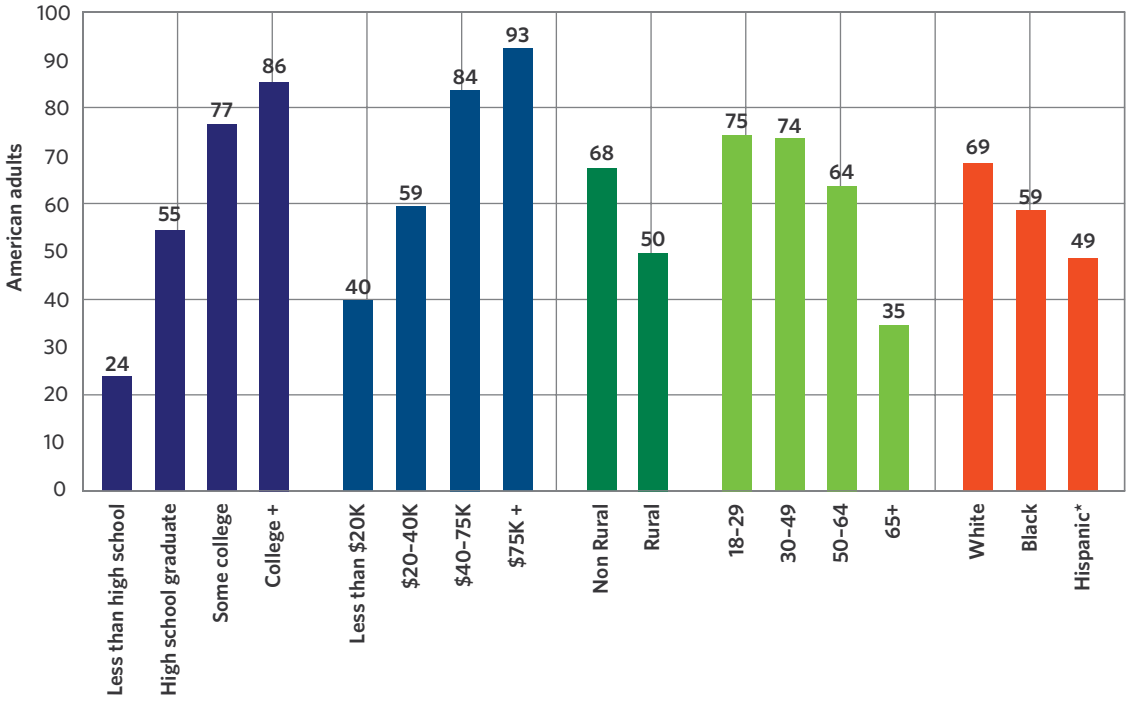
- 86 percent of Americans have a cell phone.
- 65 percent have cable TV at home.
- 66 percent have a desktop computer at home.
- 52 percent have a laptop computer at home.
- 29 percent have satellite TV.

Combining cable and satellite TV, as well as desktop and laptop adoption, yields the following figures for home computer and home premium TV use:

- 86 percent of Americans have either cable TV or satellite TV.
- 79 percent of Americans have either a desktop or laptop computer at home.

The appendix to this paper provides detail on adoption patterns for each of these technologies across demographic and socio-economic categories.

Exhibit 1: Broadband Adoption by American Adults by Socio-Economic and Demographic Factors



*Hispanics includes both English and Spanish-speaking Hispanics

DIVIDING LINES ON BROADBAND ACCESS

Broadband adoption is not distributed evenly in the population *(See Exhibit 1)*. The differences in adoption break out prominently along two particular dimensions, which are not mutually exclusive:

Education: Among adults, roughly half of Americans have had some college experience (even if they have not or did not graduate). Among those who have some college experience, 82 percent have broadband at home, compared with 46 percent of those whose highest level of educational attainment is a high school degree.

Income: Americans in the lower half of the income distribution demographic, meaning an annual household income of $50,000 per year or less, are much less likely to have broadband at home than those with higher incomes. Among respondents reporting household incomes of $50,000 or less, 52 percent have broadband at home, far below the 87 percent adoption rate for those above that income threshold.

ADOPTION PATTERNS FOR KEY POPULATION SEGMENTS

Surveys conducted by the Pew Research Center's Internet & American Life Project found that broadband adoption within two minority groups, African-Americans and Hispanics, lags the average and, for African-Americans, has grown very little from 2007 to the beginning of 2009. The FCC survey shows some breaks from those patterns.

African-Americans: FCC figures found 59 percent of African-Americans had broadband at home in the October-November survey, up considerably from 46 percent in Pew's April survey.

Hispanics: Slightly less than half (49 percent) of Hispanics have broadband at home in the FCC survey compared with 40 percent of Hispanics in a Pew Research Center April 2009 survey. In the FCC survey, 3 percent of respondents chose to take the survey in Spanish; among these Spanish speakers, broadband adoption was 20 percent.

People with disabilities: The FCC survey finds that 42 percent of those who identify themselves with disabilities has broadband at home. A July 2003 survey from the Pew Internet Project showed that 10 percent of those with disabilities had broadband at a time when 18 percent of Americans had broadband.[9]

The FCC survey sampled all Americans, but for several racial or ethnic categories, there were not enough respondents to draw statistically reliable inferences. For Asian-Americans, American Indians, and Alaskan natives, the sample yielded fewer than 100 respondents in each group. The first two groups in particular have a sizable population that may not speak English or that have low telephone penetration rates. Because of that and the small sample of respondents, it is inadvisable to report results.

HOW PEOPLE CONNECT TO THE INTERNET AT HOME

The survey asked respondents what type of Internet connection they use at home. The question, which is the same one used in surveys conducted by the Census, allowed respondents to pick any of the categories listed that the respondent believed described his home broadband connection. In other words, respondents could pick more than one type of home broadband connection from the list *(See Exhibit 2)*.

The answers underscore the difficulty in asking people about the technological dimensions of their home Internet access points. Although it is possible that some consumers have more than one home high-speed connection, these figures suggest that most Americans have two broadband connections. It is likely that a significant number of consumers do not know the details of their home Internet connections. Some, for instance, may confuse a wireless home network working off wireline broadband with a "fixed wireless provider." Given the opportunity to pick more than one category, in conjunction with uncertainty over how they connect to the internet

Exhibit 2:
At home, what do you now use to connect to the Internet (figures as a percent of home Internet users)

Cable modem	58
DSL-enabled phone line	44
Mobile broadband wireless connection for your computer or cell phone	44
Fixed wireless provider	29
Dial-up telephone line	12
Satellite connection	10
A fiber optic connection such as FiOS	10
T-1 connection	5

Source: Federal Communications Commission survey of 5,005 adult Americans, October-November 2009.

at home, some respondents inaccurately chose more than one category of connection type.

Notwithstanding the possible confusion reflected in the survey responses, it seems likely that the vast majority of home broadband access is wireline. In fact, estimates place wireless home broadband access at 2 percent of homes—that would include fixed wireless or satellite service.[10]

The survey also made extensive efforts to determine whether a respondent had dial-up service at home or not. First, interviewers asked respondents first whether they connect at home "through a slow-speed connection such as dial-up or...a high-speed, broadband connection." Among home users (72 percent of respondents), 8 percent said they had a slow-speed connection.

Second, a follow-up question for the 8 percent who said they had a slow speed connection asked them to confirm that they "now use a dial-up connection to the Internet at home, not a higher-speed connection." Most (93 percent) who first said they had a slow-speed connection confirmed that they *now* have dial-up at home. For the purposes of this report, only those who were able to confirm in the second question that they have dial-up at home are defined as home dial-up users. This amounts to 6 percent of the entire adult population.

With the questioning approach isolating home dial-up users, home broadband users are defined, in this report, as respondents who chose any of the options listed in *Exhibit 2* that are home high-speed connections, that is, cable modem, a DSL-enabled phone line, fixed wireless, satellite, a mobile broadband wireless connection for your computer or cell phone, fiber optic, T-1. Thus, home broadband users opt in to that classification through a survey question not by adhering to definition of broadband by speed that might be read to them.

MONTHLY COST OF SERVICE

As the BDIA directs, the survey also asked consumers what they pay per month for home broadband service. This question presents another challenge for respondents, separate and apart from knowing the details about home connection technology. Many consumers have Internet service bundled with other services (such as telephone or cable TV), making it difficult for the respondent to know what portion of the total bill reflects the cost of Internet service.

To address bundling, the survey asked consumers if they paid for various services (cell phone, landline phone, Internet, cable TV, satellite or wireless broadband) in conjunction with other services. If consumers said they paid for the Internet in a separate bill, they were asked to tell interviewers what their average monthly bill was to the nearest dollar. If respondents said their Internet service was bundled with another service, follow-up questions addressed what the monthly bills were for the entire bundle, whether the respondents knew the Internet portion and, if so, what the monthly Internet bill was.

This careful approach to bundling has the advantage of stripping out those who do not know the Internet portion of their bundle before they are asked to quantify their monthly Internet bill. Those who do not know are not asked to make an estimate. However, by appropriately excluding these respondents, the overall sample of respondents offering cost estimates is reduced. One-third of broadband users did not give an estimate of their monthly broadband payments.

For Internet users, bundling their bill with other services is common. A majority of home broadband users (70 percent) say their Internet service is bundled with another service in their monthly bill, with 29 percent saying they receive a stand-alone bill for broadband.

Among those who bundle Internet with another service, 50 percent said they knew what the Internet portion of the bill was, a figure that was the same for broadband and dial-up users alike.

The survey finds that:

- Overall, users report paying $40.68 per month for their broadband Internet connections.[11]
- Those who report they take service in a bundle (among those who can report what the Internet portion of the bundle is), the average bill is $37.70.
- Those with stand-alone broadband service report a monthly bill of $46.25.
- Those use dial-up at home to go online report a monthly bill of $22.98.

Several other sources gather data on what people pay for broadband and offer points of comparison. They are:

- The Pew Internet Project found in its April 2009 survey that users report an average monthly broadband bill of $39.
- TNS Telecoms, through analysis of consumer bills, 90 percent of which are bundled offerings, finds an average broadband bill of $34.50.
- Telogical Systems examines stand-alone nonpromotional offers of providers, and its figures show an average broadband bill of $46 per month.

Telogical's figures for stand-alone prices track reasonably well with what respondents in the FCC survey say about stand-alone bills. Those in the FCC survey able to identify the Internet component of their bundle cited an average figure about $3 more than the bill analysis of TNS Telecoms, which focuses mainly on bundled offerings.[12]

II. ONLINE BEHAVIORS: WHAT SHAPES THEM AND WHAT MATTERS TO USERS

This section describes the kinds of online activities people engage in, as well as two factors that influence intensity of use. This involves analyzing: a) how attitudes toward the Internet influence how much they do online; and b) how the level of understanding of computers and the Internet influences what they do online. The section concludes by looking at what people find most important about their online activities.

ONLINE ACTIVITIES

The Internet, as has been well documented, is a means for communication, collaboration and content creation directed at users, shoppers, social networkers, information seekers and people searching for entertainment. The survey asked Internet users if they had ever engaged in particular online activities, with the topics chosen to reflect the variety of activities people may pursue online.

To economize on the survey length, half the respondents received eight of the listed activities in *Exhibit 3,* and the other half received the other eight. Among the first set of activities (designated with an asterisk in the chart), broadband users on average participated in five of them. For the second set, broadband users did 3.7 of them, on average.

Those averages are affected by a host of factors. Young people are generally more attuned to digital life, so it is no surprise that adults under the age of 30 are typically more active. Respondents in that group say, on average, that they do 5.9 and 4.6 of the online activities across the two sets. The better educated also do more things online: College graduates say they have done 5.3 and 3.9 activities, on average, of the activities listed. A table in the appendix details how online activities break out along demographic dimensions.

As influential as demographics may be in explaining the scope of what people do online, there are two other relevant factors: attitudes about the Internet (its strengths and hazards) and skills (using measures of people's understanding of computers and the Internet as a proxy for their level of skill).

ATTITUDES ABOUT THE INTERNET

Respondents were read a series of six statements about the Internet—three about the Internet's upsides and three about its less attractive qualities *(See Exhibit 4).*

In general, broadband users who showed strong levels of concern about potential hazards online reported doing a narrower scope of online activities than respondents without such worries. Similarly, those with positive perspectives were more active

Exhibit 3: Online Activities of American Adults (figures as a % of users in each group)

	All Internet users	Dial-up users	Broadband users
Buy a product online*	78	56	83
Get local or community news*	75	55	80
Visit local, state or federal government Web site*	75	53	79
Use a social networking site*	52	41	55
Submit a review for a product or service*	52	36	55
Download or stream music*	47	22	52
Upload or share content*	45	26	48
Play games online*	46	38	48
Get international or national news	73	54	77
Bank online	63	43	69
Get information about or apply for a job	57	39	60
Get advice from a government agency about a health or safety issue	50	39	54
Download or stream video	38	18	42
Post to own blog or group blog	23	7	26
Take a class online	22	8	24
Play complicated role-playing games online	14	9	14

Source: Federal Communications Commission survey of 5,005 adult Americans, October-November 2009. Draft final results. For broadband users, n=1,378 for activities marked by * and n=1,278 for other activities. For dial-up user, n=212 for activities marked by * and n=247 for other activities.

online. It is important to note that worries about online dangers do not always translate into behavioral changes. People may register concerns about identity theft, but this may not prevent many users from sharing personal information at online social networking or shopping sites.

The following analysis shows how scope of activity varies by respondents' attitudes. Recall that half the sample was asked about eight different online activities, and the other half asked about a separate set of eight activities. To show the interaction of attitude and activity, the analysis below reports the average number of activities (across both sets) among those who strongly agree with a specific attitudinal proposition. That is then contrasted, in percentage terms, with those who did not share that view.

The Internet is too dangerous for children: Those who strongly agreed with this did an average of 4.3 and 3.1 activities, 19 percent lower than those who do not share this view (averaged across both sets of activities).

It is important for children to know how to use the Internet: : Those who strongly agreed with this did an average of 5.2 and 3.8 activities, 16 percent more than those who do not share this view (averaged across both sets of activities).

The Internet is a valuable source for information and learning: As was the case for the importance of the Internet for learning among children, those who strongly agreed with this engaged in an average of 5.2 and 3.8 activities, 25 percent more than those who do not share this view (averaged across both sets of activities).

There is too much pornography and offensive material on the Internet: Those who strongly agreed did an average of 4.7 and 3.4 activities, 11 percent lower than those who do not share this view (averaged across both sets of activities).

People can be more productive using the Internet: Those who strongly agreed with this did an average of 5.2 and 4.0 activities, 18 percent more than those who do not share this view (across both sets of activities).

It is too easy for my personal information to be stolen online: Those who strongly agreed with this did an average of 4.6 and 3.4 activities, 11 percent lower than those who do not share this view (across both sets of activities).

Overall, broadband users who strongly registered any of the three worries listed above (theft of personal information, inappropriate content, online dangers for children) engaged in 4.8 and 3.5 of the online activities probed. The share of all broadband users who cited any of those three things as *strong* concerns is 70 percent and, when compared with the 30 percent of broadband users who share *none* of these concerns strongly, they do 14 percent fewer online activities. These comparisons do not mean that the attitudes in question *cause* or are sole drivers of the differences identified. However, they do indicate that how people perceive the Internet shapes how they use it. It is worth noting that the differences identified above are statistically significant when controlling for other respondent characteristics, such as age, race, education and income.[13]

SKILLS: UNDERSTANDING INFORMATION AND COMMUNICATIONS TECHNOLOGY

The scope of activities people do online may also have to do with the skills they bring to the online experience. Measuring the level of skill or literacy for a user is challenging in a survey environment. Merely asking people to rate how well they can carry out a given task can be problematic, and research has found that such self-assessment about skill is not the best predictor of actual skill levels. A better predictor of actual skill comes from asking respondents to rate on a scale their understanding of various concepts relating to the Internet or computers.[14]

The FCC survey borrowed this approach, asking Internet users how well they understand six terms relating to the Internet or computers *(See Exhibit 5)*.

Not surprisingly, education is strongly associated with the likelihood that people say they understand a particular concept very well *(See Exhibit 6)*.

An important consequence of low levels of digital literacy is less engagement with online life. Those who say they understand the queried concepts "very well" are likely to do more of the online activities discussed. This correlation is significant

Exhibit 4: Public Attitudes about the Internet (% of broadband users who strongly agree)

The Internet is a valuable source for information and learning	81
It is important for children to learn how to use the Internet	74
There is too much pornography and offensive material on the Internet	56
People can be more productive using the Internet	56
It is too easy for my personal information to be stolen online	39
The Internet is too dangerous for children	24

Source: Federal Communications Commission survey, October-November 2009, n=2,671 for broadband users.

when holding constant income, education, age and other factors that might also affect people's probability of doing a range of things online.[15]

Exhibits 7, 8 and 9 demonstrate this point by showing, for broadband users, how the number of online activities in which they engage increases in tandem with the number of computer and Internet terms they say they understand "very well." For the first set of activities, broadband users who did not say they understood any of the computer or Internet terms listed (29 percent of respondents) engaged in an average of 3.8 of the online activities about which they were asked. Those who understood very well all of them (24 percent of respondents) did, on average, 6.1 activities. The differences are more pronounced for the second set of activities, with those who understand all of the terms very well doing, on average, more than twice as many activities as those who understood none of them.

THE ACTIVITIES PEOPLE SAY ARE MOST IMPORTANT

What people do online and how they value a particular activity can differ for a number of reasons, often due to the context in which an activity is undertaken. More Internet users have, at some point, bought something online (78 percent) than have uploaded content they have created (45 percent) or participated in a blog (23 percent). However, seeing a video of a child's birthday party may be more important to some people than buying a product online – especially if offline shopping opportunities are abundant. Conversely, coming upon a hard-to-find

Exhibit 5:
Broadband Users' Understanding of Computer and Internet Concepts (figures as a % of users)

	Very well	Somewhat well	Not too well	Not well at all
Internet browser cookie	42	30	12	15
Spyware and malware	40	34	11	14
Operating system	44	29	11	16
Refresh or reload	61	22	5	11
Widget	16	13	15	54
JPEG file	41	22	8	27

Source: Federal Communications Commission survey, October-November 2009; n=2,671 for home broadband users.

Exhibit 6:
By Education, Broadband Users' Understanding of Computer and Internet Concepts (% "very well" in each group)

	Less than High School	High school grad	Some college	College+
Internet browser cookie	23	32	44	50
Spyware and malware	26	33	41	47
Operating system	21	31	44	55
Refresh or reload	46	52	64	68
Widget	4	11	15	22
JPEG file	17	28	41	55

Source: Federal Communications Commission survey, October-November 2009; n=2,671 for home broadband users.

Exhibit 7:
Number of Online Activities and Digital Literacy

	Average number of online activities (first set of eight activities)	Average number of online activities (second set of eight activities)
None	3.8	2.5
One term	4.9	3.3
Two terms	5.1	3.5
Three terms	5.4	4.2
Four terms	5.6	4.0
Five or more terms	6.1	4.8

Source: Federal Communications Commission survey, October-November 2009; n=1,378 for home broadband users for first set of activities and n=1,293 for home broadband users for second set of activities.

good in the far- flung corner of the Web may be extremely important if the buyer is a collector or shopping for a special occasion.

Even though context is key to interpreting how people value different online activities, the survey nonetheless sought to explore this by asking Internet users to assess the importance of six different categories of online activities. *Exhibits 8 and 9* show results for all users and broadband users when they were asked to assess how important each online activity was to them.

For most Internet users, the communicative aspects of the Internet are most important to them, followed by keeping up with news in the community and sharing content with others. Applications oriented to entertainment rate notably low, perhaps because (for watching TV shows or movies) excellent offline alternatives exist. Young broadband users are more likely to cite entertainment applications or online entertainment as "very important" than average, with 20 percent and 13 percent saying this. They are also more likely to say communicating with family and friends (79 percent) and sharing content (45 percent) are very important online activities.

WHY NEW USERS GET ONLINE

What existing users value about online activities and what triggers new adoption can be two different things. To address this, the survey asked about new users' motives for getting online.

The level of Internet penetration has not grown substantially in recent years. As noted, the FCC survey finds that 78 percent of Americans use the Internet, whether that is at home or somewhere else, dial-up or broadband. Surveys conducted by the Pew Internet Project show that Internet penetration first exceeded 70 percent in early 2006, with that figure reaching 75 percent for the first time at the end of 2007. The FCC asked how long respondents have been using the Internet; just 6 percent report that they have been online for two or fewer years. Those who have been online for two or fewer years received follow-up questions asking them to cite the reasons they chose to get Internet access and then the *most* important reason for getting access.

As *Exhibit 9* shows, most new users cite social reasons as a motive for beginning to use the Internet, with e-mail communication and content sharing as chief reasons. Accessing video or

Exhibit 8: Broadband Survey Users on the Importance of These Activities

% as a share of broadband Internet users at home	Very important	Somewhat important	Not too important	Not important at all
Making it easy to communicate with friends and family, even if they are far away	68	23	5	4
Keeping up with the news in my community	39	39	11	10
Sharing content with others, such as photos, videos or text	34	38	15	13
Shopping online	23	41	19	18
Watching TV shows, movies and other video online	10	26	24	39
Playing games online	9	18	23	50

Source: Federal Communications Commission survey, October-November 2009; n=2,671 for home broadband users.

Exhibit 9: Broadband Survey Users on Their Reasons for Getting Online (% among Internet users who have been online for 2 years or less)

	% who cite reason	% who cite as most important reason
To e-mail and stay in touch with family and friends	61	31
To gain access to music, movies and other entertainment	46	9
To share my photos or videos with family and friends	41	3
My children wanted Internet access	41	7
My children needed it for school	35	19
I needed it for school	27	10
An Internet provider made a special offer too good to pass up	21	2
My job required online access	20	6

Source: Federal Communications Commission survey of adult Americans, October-November 2009. N=92 for new users.

other Internet entertainment online also was a factor for many new users. A great offer by an Internet service provider was not widely cited by new users. When pressed about the most important reason, social and educational uses are most prominent. E-mail is the main reason for one-third of new users, while school—either for themselves or children—is the main reason for another one-third of new users. It is worth pointing out the small number of cases (92) for the subset of new users who received these questions.

III. ALTERNATIVE ACCESS: DIFFERENT PLACES, DIFFERENT PLATFORM

Access to the Internet is portable and shareable. People may take access with them or, if they cannot, they may access the Internet from different places. The survey looked at this in three contexts: handheld access, mobile broadband (from a laptop computer) and Internet access from places outside the home (often public access points).

THE PLACES PEOPLE ACCESS THE INTERNET

Although most online users have access from home, there are plenty of places outside the household where people can go online. To examine how people access the Internet away from home, respondents received questions that tried to fix whether they have gone online from someplace other than home and, if so, where. *Exhibit 10* shows the places from which people access the Internet.

These results show that 93 percent of Internet users have some form of access at home. Yet, it is apparent people access the Internet in other contexts as well—particularly at work or a friend or family member's house.

Exhibit 11 indicates that a majority of Americans (59 percent) who access the Internet do so in more than three places; 17 percent of Americans go online in 5 or more places.

Focusing on alternative access places that *exclude* home or work, 57 percent of all Americans (or 73 percent of Internet users) have at one point gone online at some place other than home or work, often at a friend or family member's house. Eliminating the latter from consideration, 39 percent of Americans (or 48 percent of Internet users) have gone online

Exhibit 10 : Broadband Survey Users on Where They Access the Internet

	All Internet users	Broadband at home	Dial-up at home	Not-at-home users
Home	92%	100%	99%	7%
Friend or family member's house	65	67	48	67
Work	58	62	36	48
Public library	35	33	32	57
School	29	30	17	21
Community Center	14	13	9	25
Church	5	5	4	5
Number of cases	3,555	2,671	459	392

Source: Federal Communications Commission survey, October-November 2009.

Exhibit 11: Broadband Survey Users on the Number of Places They go Online

(% of Internet users)	
One access point	17
Two access points	24
Three access points	25
Four access points	17
Five or more access points	17%

Source: Federal Communications Commission survey, October-November 2009.

at a library, school, community center or church. It is worth noting that these figures do not include those who may access the internet at a local coffee shop.

Exhibit 12 shows how incidence of using the internet at different access sites varies across demographic and socio-economic characteristics of the respondent.

USE OF THE HANDHELD FOR ONLINE ACCESS AND OTHER PURPOSES

With Internet access increasingly in people's pockets, it is important to probe the activities people pursue using their handheld devices. Fully 86 percent of Americans have a cell phone. Estimates of the share of people with "smart phones" that permit online access vary, but Forrester Research places the share of the adult population with smart devices at 17 percent in November 2009.[16] The survey did not ask directly whether a respondent had a smart phone, but rather whether cell users did specific activities—some of which are likely to require having a smart phone.

Exhibit 13 shows the findings from these questions, with a breakout by age, as young adults are more frequent users of mobile devices than their elders.

Although basic communication functions dominate the portfolio of cell phone activities, there is a substantial incidence of information seeking, such as accessing Web pages or searching for directions. Twenty percent of cell phone users say they have downloaded an application to their device, suggesting that at least that share has a smart phone; the actual level of

Exhibit 12: Use of Public Access Points and Respondent Characteristics

(% of those surveyed)	Public library	School	Community center	Church
Male	33	26	15	5
Female	38	31	13	5
Parents with minor children at home	35	28	13	5
Those who report they have a disability	35	22	16	4
18–29	56	58	26	5
30–49	33	26	13	4
50–64	25	14	8	4
65+	20	6	5	5
White (not Hispanic)	31	25	11	4
Black (not Hispanic)	51	36	21	6
Hispanic (English or Spanish speaking)	46	43	26	5
Less than high school	41	24	19	2
High school graduate	33	21	14	4
Some college	41	34	15	5
College +	31	31	11	6
Under $20K	55	41	25	4
$20K–$30K	44	30	20	6
$30K–$40K	41	33	13	5
$40K–$50K	30	23	12	4
$50K–$75K	28	24	10	5
$75K–$100K	31	27	11	5
Over $100K	28	30	10	4
Urban	38	33	16	5
Suburban	33	27	12	4
Rural	34	22	13	4

Source: Federal Communications Commission survey, October-November 2009.

smart phone usage is probably higher since not all smart phone users are likely to download applications.

As documented by the Pew Internet Project, use of mobile devices for non-voice data applications is particularly popular among African-Americans and Hispanics.[17] Unlike the Pew survey, the FCC survey had a Spanish-language option, which means data reported here on mobile use among Hispanics represents a more complete sample of the Hispanic population. Still, African-Americans and Hispanics, consistent with prior research, are the most frequent users of the handheld device for a variety of applications *(See Exhibit 14)*.

Not all of the activities listed in *Exhibit 14* constitute Internet use on a handheld. Texting is not an application that runs on the Internet while downloading maps and directions may require Global Positioning System (GPS) capability. Not all downloading or streaming of music or video to a handheld requires Internet access.

In defining the scope of Internet use on a mobile handheld, the activities chosen for inclusion in the definition are: sending or receiving e-mail, accessing Web pages on the Internet and downloading an application to a cell phone. When those three items constitute accessing the Internet on a cell phone, 36 percent of all cell users have used the Internet on their devices. Since not everyone has a cell phone, this means 30 percent of all adults have gone online with a cell phone or smart phone.

As with the entire suite of handheld activities, minorities are more active in handheld Internet use than whites. This is how results break down across racial categories:

- 39 percent of Hispanics and of African-Americans have used the Internet on their mobile handheld device.
- 27 percent of whites have accessed the Internet on a mobile handheld.

A question to consider is if the differences are racial in origin or whether they can be explained by other factors, such as age or income, which may vary systematically across racial

Exhibit 13:
Cell Phone Activity

	All adults	Age 18–29	Age 30–49	Age 50–64	Age 65+
% with a cell phone	86	94	93	86	66
% as a share of those with cell phone					
Send or receive text messages	66	94	79	51	15
Send or receive pictures	52	77	61	38	14
Send or receive e-mail	26	40	30	17	5
Send or receive Instant Messages	28	42	35	20	8
Access Web pages on the Internet	28	48	32	15	5
Get a map or directions to another location	27	44	30	16	8
Download an application to your cell phone	20	36	24	9	3
Download or stream music or video	17	32	18	8	3

Source: Federal Communications Commission survey of 5,005 adult Americans, October-November 2009.

Exhibit 14:
By Race, Cell Phone Activities

	Whites	African-Americans	Hispanics
% with a cell phone	87	86	85
% as a share of those with cell phone			
Send or receive text messages	63	75	75
Send or receive pictures	50	61	58
Send or receive e-mail	24	34	28
Access Web pages on the Internet	24	36	36
Get a map or directions to another location	23	36	34
Send or receive Instant Messages	23	47	47
Download an application to your cell phone	17	26	24
Download or stream music or video	13	28	25

Source: Federal Communications Commission survey of 5,005 adult Americans, October-November 2009.

categories. White adults in the sample are, on the whole, older than the African-American respondents and much older than the Hispanics. The median age for white adults in the sample is 49; for African-Americans it is 46, and for Hispanics it is 33. As seen above, younger respondents are heavier users of mobile devices than older ones. While age, education and income are all indicators of the likelihood of using the Internet on a handheld device, the racial or ethnic classification of the respondent also emerges as a predictor—even when other factors are held constant. In other words, the differences that appear across races are not simply due to age or educational level.

Another issue is whether mobile Internet access is a substitute for home access. African-Americans and Hispanics report lower levels of home broadband adoption than whites yet are more likely to use the Internet on their handheld device *(See Exhibit 15)*.

Are lower home adoption rates attributable to mobile Internet use? The survey results indicate the answer is, for the most part, "no." There is a positive correlation between home Internet adoption and mobile Internet use—91 percent of mobile Internet users have Internet at home and 84 percent have broadband. Yet while African-Americans and Hispanics are more likely to be mobile Internet users, most users in these groups have broadband at home. More than three-quarters (78 percent) of African-American mobile Internet users have broadband at home, and more than two-thirds (68 percent) of Hispanic mobile Internet users have high-speed access at home.

Viewed from the perspective of nonbroadband adopters, few non-adopters access the Internet on their handheld devices, though African-Americans and Hispanics do this at a higher rate than average. Specifically, among those who do not go online at home with a broadband connection:

- 14 percent of all non-adopters have accessed the Internet on their mobile devices.
- 20 percent of African-American non-adopters have accessed the Internet on a mobile device.
- 25 percent of Hispanic non-adopters have accessed the Internet on their mobile devices.

Overall, there is not a high incidence of mobile Internet access replacing home Internet connection. Rather—since most mobile Internet users also have broadband—it is an additional pathway to access. This pattern is not quite as strong for African-Americans and Hispanics, but the general trend is, nonetheless, the same for those groups.

It is important not to confuse mobile Internet use with mobile broadband. To be sure, some of those using their mobile device for online access do so via relatively fast 3G and WiFi networks. However, it is difficult, using a survey, to determine what portion of mobile Internet users do this or how often.

MOBILE WIRELESS BROADBAND

Another access pathway for people is mobile wireless broadband service on a laptop. The survey asked laptop users the following question to probe mobile broadband use:

"Do you use a service with your laptop computer that is called wireless broadband, allowing you to access the Internet virtually anywhere? This is usually a service that you have to pay a monthly fee for, either by itself or as part of another communications bill. This is NOT what is called Wi-Fi."

This access pathway appears at only modest levels in the general population. Among laptop users (52 percent of all adults), 28 percent said they used wireless broadband. As a percentage of the *entire* adult population, this comes to 15 percent who use wireless broadband.

African-Americans and Hispanics who have laptops were more likely than average to say they use such a service. Looking at the racial breakdown:

- Among African-Americans with laptops, 36 percent report using a mobile broadband service.
- Among Hispanics with laptops, 30 percent report using a mobile broadband service.
- Among whites with laptops, 26 percent report using a mobile broadband service.

The context for these findings is important. First, these figures apply to respondents with laptop computers—devices that Hispanics and African-Americans are less likely to have. (Some 54 percent of whites have a laptop, while 44 percent of

Exhibit 15:
By Race, Mobile and Home Internet Use

(% of mobile Internet users)

	Internet at home	Broadband at home
White	94	89
African-American	92	78
Hispanic	78	68
Total	91	84
Number of cases	3,455	2,671

Source: Federal Communications Commission survey of 5,005 adult Americans, October-November 2009.

African-Americans and 43 percent of Hispanics do.) As a share of the entire population of each of these groups, mobile broadband use unfolds as follows:

- Among all African-Americans, 16 percent say they use a mobile broadband service.
- Among all whites, 14 percent say they use a mobile broadband service.
- Among all Hispanics, 13 percent say they use a mobile broadband service.

Second, as noted, mobile broadband users are overwhelmingly home broadband users; 94 percent of all mobile broadband users have broadband at home, figures that are only modestly lower for African-Americans (91 percent) and Hispanics (84 percent). Although some may be using their mobile broadband connection as their principle home access means, those saying they use mobile broadband were as likely as the average to say they use DSL, cable modem service and other wireline means such as fiber. As with mobile Internet use, mobile broadband is mainly a supplementary broadband access pathway.

WHAT PEOPLE PAY FOR CELL PHONE SERVICE

The survey asked cell phone users what their monthly bill was, and the question included a prompt for respondents to include charges for texting or long-distance service. Only respondents who receive a stand-alone cell phone bill—80 percent of respondents—received this question. The average figure they gave was $92 per month.

By comparison, bill analysis from TNS Telecoms shows an average monthly cell phone bill of $99 per month. Many cell users have more than one line on their bill; for TNS, the average bill covered 1.9 lines. The FCC survey did not ask how many lines users had on their plan.

IV. NON-ADOPTERS: WHO THEY ARE AND THE BARRIERS THEY FACE

OVERVIEW OF NON-ADOPTERS

Roughly one-third of Americans do not use broadband Internet at home. They fall into three categories of non-adoption:

- 22 percent of Americans do not use the Internet at all.
- 6 percent use the Internet but do not have access at home.
- 6 percent use dial-up Internet connections to go online from home.

Overall, 35 percent of Americans do not use broadband at home. (One percent of respondents were not broadband users, but could not be placed in any of three categories above). A small share—just 4 percent—say they cannot get service where they live. This is an imperfect measure of infrastructure availability, as it relies on the user accurately knowing about infrastructure in the neighborhood. This means that about one-third (31%) of Americans do not have broadband at home but could subscribe. However, the full cohort of non-adopters (35 percent) is included in our analysis and discussion.

Key demographic differences when contrasting all non-adopters with adopters are:

- **Gender:** 57 percent of non-adopters are women versus 49 percent of home broadband adopters.
- **People with disabilities**: 39 percent of non-adopters have a disability, compared with 15 percent of adopters.
- **College graduates**: Just 11 percent of non-adopters have college degrees versus 37 percent of broadband users.
- **Age**: 32 percent of non-adopters are age 65 or older versus 9 percent of adopters.
  - Nearly two-thirds (65%) of non-adopters who are senior citizens are women.
- **Income**: 43 percent of non-adopters live in households with annual incomes of $20,000 or less, compared with 17 percent of home broadband users.
- **Rural**: 24 percent of non-adopters live in rural areas versus 13 percent of broadband adopters.

Exhibit 16 presents detail on the demographic and socio-economic profiles for each of the three categories of non-adopters. Non-Internet users, the largest group, are older, lower-income and the least educated of the three. Online users who do not have home access tend to be younger women, usually with no more than a high school degree and low incomes. Dial-up users, though not as well off economically as broadband users, are higher on the socioeconomic scale than the other groups of non-adopters.

PAST AND PROXY BROADBAND USE FOR NON-ADOPTERS

Although those classified as non-adopters are not broadband users at home today, this does not mean that all of them are completely cut off from modern ICT goods or services. Many have a working computer at home (discussed below) and 49 percent uses computers occasionally, either at home, work or school.

Additionally, some have had experience with broadband. Among dial-up users or "not-at-home" users, 46 percent have

used broadband at some point—maybe at work, perhaps a friend's house or possibly somewhere else. Among the wider set of all non-Internet users, 17 percent in this group were once Internet users at home. Of these former users, 49 percent say broadband was the type of home connection they had.

Combining these two sets of nonusers' past broadband

Exhibit 16: The Demographics of Non-adopters

	Broadband at home	Dial-up at home	Internet users, not at home	Non-Internet users
Gender				
Male	51%	49%	41%	45%
Female	49	51	59	55
Families				
Parents with minor children at home	36	24	27	19
Disabled				
Those who report they have a disability	15	19	28	47
Age				
18-29	25%	16%	39%	11%
30-49	39	27	34	20
50-64	26	33	20	28
65+	9	24	8	41
Median Age	**43**	**53**	**38**	**60**
Race/ethnicity				
White (not Hispanic)	74%	75%	64%	63%
Black (not Hispanic)	10	10	15	13
Hispanic (English or Spanish speaking)	10	10	15	20
Educational attainment				
Less than high school	5%	12%	8%	39%
High school graduate	29	37	50	45
Some college	29	28	23	11
College +	37	23	19	5
Household income				
Under $20K	10%	16%	30%	32%
$20K-$30K	7	13	16	17
$30K-$40K	9	11	18	7
$40K-$50K	9	15	7	8
$50K-$75K	16	14	11	6
$75K-$100K	15	8	6	1
Over $100K	20	5	3	2
Don't know/refused	15	19	10	27
Community type				
Urban	31	24	22	31
Suburban	51	43	40	45
Rural	14	29	21	22
Number of cases	2,671	459	392	1,450

Source: Federal Communications Commission survey, October-November 2009. Total number of cases in this table is 4,972. This does not reflect the entire sample size of 5,005 because some responses did not permit classification into any of the categories.

experience yields reveals that one-quarter of non-adopters have had some experience with broadband—meaning they once had broadband access at home or have used it at work, a friend's house *or* some other place. Put differently, 8 percent of the general population have had some exposure to broadband but do not presently have it at home.

As to prospects for moving nonusers to broadband, 20 percent of nonusers say they would be interested in getting online access. Among current "not-at-home" Internet users, 46 percentwould be interested in getting home access, while 41 percent of dial-up users say they would be interested in getting broadband. Only 17 percent of dial-up users say they are very likely to get broadband in the next year. Similarly, among *all* interested nonusers, broadband access is not a sure bet in the near future. Out of all non-adopters, 26 percent say it is very likely they will get broadband in the next 12 months, with another 28 percent saying this is somewhat likely.

There is also the phenomenon of proxy access, that is, nonusers who cohabit with another Internet user. Among respondents who are non-Internet users or who do not use the Internet at home, 22 percent live with someone who uses the Internet at home. These nonusers often ask their online housemates to carry out tasks online for them. One in six (16 percent) say they ask their online housemates to do something online for them once a week. Another 20 percent say they do this once a month, while an additional 24 percent say they do a few times a year.

A portion of the proxy access that nonusers' housemates carry out is broadband. Nonusers who live with someone who goes online from home were asked about the household's access. Some 21 percent say it is a dial-up connection, 47 percent state it is some other way and 32 percent do not know. Assuming that the response "some other way" reflects a home high-speed connection, these questions suggest that 2 percent of the general population fall into the category of nonusers who live in a broadband-connected household.

THE ROLE OF DISABILITIES IN NON-ADOPTION

The largest group of nonbroadband adopters—non-Internet users—has a high likelihood of having some sort of disability. Overall, 39 percent of non-adopters have some sort of disability. The survey posed six questions, which, if any one yielded a "yes" answer, classified the respondent as a disabled American *(See Exhibit 17)*.

Collectively, 24 percent of respondents had an affirmative response to one of those questions and, for purposes of this report, are classified as people with disabilities.[18] Within this group, 42 percent have broadband at home—much lower than the 65 percent average. Some 56 percent of those with disabilities are Internet users, below the 78 percent average. As the exhibit presenting the demographic and socioeconomic profiles of non-adopters shows, nearly half (47 percent) of non-Internet users report having some sort of disability.

It is important to note that people with disabilities and non-adopters overlap quite a bit and in fact share many characteristics with non-adopters: They are generally older and have lower incomes. For that reason, it is not a surprise that non-adopters include a disproportionately high share of people with disabilities. Some of the difference in adoption rates is due to individuals' disabilities and some is due lower incomes, advanced age or other factors associated with low adoption.

WHY NON-ADOPTERS DO NOT HAVE BROADBAND

The survey sought to determine with as much specificity as possible why people without broadband choose not to have the service at home. Respondents were read a list of possible reasons for not having broadband and permitted to list as many as they chose as barriers. They then received a follow-up question asking the *most important* reason they did not have broadband.

The question wording and choices offered varied slightly across different non-adopter groups. Dial-up users, for example, were offered the choice of "happy with current service," which is not a relevant choice for those who do not use the Internet at all. A number of the exhibits show how people responded to the question that allowed them to list multiple

Exhibit 17: Questions Used to Determine Disability (by Percentage)

Do you have serious difficulty walking or climbing stairs?	12
Because of a physical, mental or emotional condition, do you have serious difficulty concentrating, remembering or making decisions?	8
Are you deaf or do you have serious difficulty hearing?	8
Because of a physical, mental or emotional condition, do you have difficulty doing errands alone such as visiting a doctor's office or shopping?	6
Are you blind or do you have serious difficulty seeing even when wearing glasses?	5
Do you have difficulty dressing or bathing?	2

Source: Federal Communications Commission survey of 5,005 adult Americans, October-November 2009.

reasons for non-adoption, then how they responded to the question asking about the most important reason.

Non-Internet users—22 percent of the adult population

Those who do not use the Internet offer a range of reasons for not being online. Nearly half cite the monthly cost, and similar numbers point to comfort with computers or worries about online content—that is, digital literacy looms as a barrier for them. The affordability of the computer is also a prominent reason for nonusers *(See Exhibit 18)*.

The survey permitted respondents to choose more than one reason from the list of barriers to adoption. Fifty percent of nonusers picked at least three reasons, and one-quarter (24 percent) cited at least five of the reasons listed.

When asked the most important reason for not using the Internet, no single reason stands out for nonusers. About 16 percent cite lack of comfort in using a computer as the main barrier, but cost (either monthly fee, cost of computer or activation fee) is the main reason cited by 25 percent of dial-up users. Some 12 percent are worried about risks online, and 14 percent cite factors that suggest they are unclear about the Internet's relevance to them (with 7 percent saying the Internet is a waste of time and 7 percent saying there is nothing they want to see online). *(See Exhibit 19)*

Those who cited monthly cost as a barrier (47% in this category of non-users) received follow-up questions on what they would be willing to pay for service. The responses sorted into three categories:

- 40 percent of nonusers provided an estimate and, among this group, the average monthly figure they said they would pay for Internet access at home was **$26**; the median figure was **$20**.
- 31 percent said either they don't know or refused to answer.
- 29 percent said they were not willing to pay anything for access.

Exhibit 18: Reasons Nonusers Do Not Use the Internet (by Percentage)

Monthly cost is too expensive	47
I am not comfortable using a computer	46
I am worried about all the bad things that can happen if I use the Internet	45
The activation and installation fee to get service is too much	42
I cannot afford a computer	40
There is nothing on the Internet I want to see or use	35
The Internet is just a waste of time	33
I can access the Internet all I need to at work	14
It's not available where I live	13

Source: Federal Communications Commission survey, October-November 2009; n=1,450 for nonusers.

Exhibit 19: Main Reasons Nonusers Do Not Use the Internet (by Percentage)

I am not comfortable using a computer	16
I cannot afford a computer	14
I am worried about all the bad things that can happen if I use the Internet	12
Monthly cost is too expensive	11
The Internet is just a waste of time	7
There is nothing on the Internet I want to see or use	7
The activation and installation fee to get service is too much	5
It's not available where I live	2
I can access the Internet all I need to at work	1
None of above reasons	9
Combination of reasons	5
Other reason	5
Don't know/refused	3

Source: Federal Communications Commission survey, October-November 2009; n=1,450 for nonusers.

As with nonusers, it is common for dial-up users to cite more than one reason that keeps them from using the Internet. Fifty-six percent cite at least three reasons and 18 percent cite five or more *(See Exhibit 20)*.

About half of dial-up users are satisfied with their service or are not heavy Internet users. Half also cite the monthly cost, with a significant share saying the installation fee is a barrier. Nearly one-third say broadband is not available where they live. However, it is important to put this figure in proper context. First, dial-up users make up 6 percent of the adult population; if 30 percent truly cannot get broadband where they live, this means just 2 percent of adults (from this set of respondents who received the question) lack broadband availability. Second, since this is self-reported data on infrastructure availability, it is possible that respondents are wrong as to whether broadband is available where they live. Nonetheless, most (74 percent) of dial-up users who say availability is a barrier report that they would get broadband if it were available in their area.

When probed further on the *most important* barrier, issues pertaining to the relevance of the service (that is, not using the Internet very much, being content with current dial-up service and not needing additional speed) together loom largest (38 percent) for dial-up users. Cost issues—monthly fee, activation fee, unwillingness to enter into a long-term contract—are next, cited as most important by 28 percent of dial-up users.

Dial-up users who cited cost as a barrier then received a follow-up question asking how much they would be willing to pay for a broadband connection at home *(See Exhibit 21)*. As with nonusers, responses fell into three categories. Among dial-up users citing monthly cost as a reason they do not have broadband:

- 62 percent provided an estimate. The average amount this group was willing to pay for broadband was **$28** per month and the median figure was **$25**.
- 25 percent said they did not know or refused to answer the question.
- 13 percent said they would not be willing to pay anything for broadband.

Not-at-home users—6 percent of the adult population

Although the vast majority of Internet users have the means to go online from home, 6 percent do not. They use the Internet from elsewhere—perhaps work, perhaps the library—but not where they live.

For "not-at-home" users, worries about comfort with a computer or thinking there is nothing worthwhile online are not big barriers. Rather, affordability (e.g., monthly fee, activation

Exhibit 20: Reasons Dial-Up Users, Who Make Up 6% of the Adult Population, Have Not Switched to Broadband (by Percentage)

The monthly cost is too expensive	50
I'm happy with my current service	49
I do not use the Internet that much	44
I do not want to enter into a long-term service contract	44
The activation or installation fee to get service is too much	44
I do not need the additional speed it would offer	31
It's not available where I live	29

Source: Federal Communications Commission survey, October-November 2009; n=567 for home dial-up users or those who did not know connection type.

Exhibit 21: Reasons Dial-Up Users Have Not Switched to Broadband (by Percentage)

The monthly cost is too expensive	19
I do not use the Internet that much	18
It's not available where I live	17
I'm happy with my current service	16
I do not want to enter into a long-term service contract	4
I do not need the additional speed it would offer	4
The activation or installation fee to get service is too much	5
None of these reasons	7
Other/Don't know	2

Source: Federal Communications Commission survey, October-November 2009; n=567 for home dial-up users or those who did not know connection type.

charge or computer cost) plays a larger role. While those reasons are front and center, "not-at-home" users cite multiple reasons why they are not online. Two-thirds (66 percent) list at least three reasons and 11 percent cite five or more *(See Exhibit 22)*.

Affordability clearly comes to the forefront when "not-at-home" users are asked about the most important barrier they face. Some 41 percent cite the monthly cost or the outlay for a computer as the reasons they do not use the Internet from home.

As with prior groups, "not-at-home" users who said monthly cost was a barrier received a follow-up question on what they would be willing to pay for Internet access at home. Among "not-at-home" users for whom cost is a barrier *(See Exhibit 23)*:

- 74 percent gave a dollar estimate; the average figure cited as this group's willingness to pay for broadband was **$21** per month and the median figure was **$20**.
- 16 percent said they did not know or refused to answer the question.
- 10 percent said they would not be willing to pay anything for broadband.

WHAT NON-ADOPTERS ARE WILLING TO PAY

Across the three categories, 51 percent of all non-adopters said monthly cost was a barrier, although fewer said it was the *primary* reason they lack service. As is evident from the preceding discussion, not all of those who said cost was a barrier were able to respond to follow-up questions on how much they would be willing to pay for service. Across all three categories, just more than half (52 percent) of those who said monthly cost was a barrier could provide an estimate to the nearest dollar of what they would pay for service. As a share of all non-adopters, 26 percent provided an estimate of willingness to pay for service. The willingness-to-pay figure for all non-adopters was $25 per month.

The $25 average does not mean that all non-adopters asked the question would purchase service if they faced a price at that level. Some respondents cited a figure above $25, many cited a figure below. In fact, among those who offered an answer, 65 percent cited a figure of $20 per month or more for WTP. The vast majority (91 percent) of those who gave an answer cited a figure of $10 per month or more.

Taking these respondents at their word—that they really would get broadband at the price they state—and representing

Exhibit 22: Reasons "Not-at-Home" Users Have Not Switched to Broadband (by Percentage)

Monthly cost is too expensive	57
The activation and installation fee to get service is too much	51
I can access the Internet all I need to at work	34
I cannot afford a computer	32
I am worried about all the bad things that can happen if I use the Internet	31
It's not available where I live	15
There is nothing on the Internet I want to see or use	14
The Internet is just a waste of time	14
I am not comfortable using a computer	13

Source: Federal Communications Commission survey, October-November 2009; n=392 for not-at-home users.

Exhibit 23: Reasons "Not-at-Home" Users Have Not Switched to Broadband (by Percentage)

Monthly cost is too expensive	27
I cannot afford a computer	15
I can access the Internet all I need to at work	11
I am worried about all the bad things that can happen if I use the Internet	9
The activation and installation fee to get service is too much	6
It's not available where I live	5
I am not comfortable using a computer	5
The Internet is just a waste of time	4
There is nothing on the Internet I want to see or use	2
None of these reasons	7

Source: Federal Communications Commission survey, October-November 2009; n=392 for not-at-home users.

the figures above for $20 per month and $10 per month as a share of *all* adults:

- A $20 offer would yield an increase in overall broadband adoption of 6 percentage points.
- A $10 offer would yield an increase of 8 percentage points.

These small impacts reflect the fact that the survey tested the hypothesis that there are multiple reasons for non-adoption, with cost being one among them. The survey found that people had multiple barriers with, as noted previously, 51 percent citing cost as one of them, followed up by a question on willingness-to-pay. Just more than half cited a figure, while 28 percent answered "don't know" and the balance said they would pay nothing for broadband.

Finally, it is important to underscore the uncertainties inherent in measures of willingness-to-pay. Respondents are asked to make judgments on the value of a service that, many at least, have used sparingly (if at all); they therefore lack information on service attributes, which is key to placing a dollar value. For that reason, measures of willingness to pay, and the scenario on how much additional adoption would ensue from specific price offerings, should be taken as illustrative, not predictive.

SUMMARY ON MOST IMPORTANT REASON FOR NON-ADOPTION

The three baskets of non-adopters were asked similar kinds of questions about why they do not have broadband or any Internet service at home. Pulling the reasons together across all three groups of non-adopters yields the following consolidated reasons for non-adoption among ***all*** those who do not have broadband at home.

Cost: 36 percent of non-adopters cite a cost-related reason as their main barrier to adoption, with 15 percent pointing to the monthly cost of service, another 10 percent citing affordability of a computer and 9 percent saying they do not want a long-term service contract or find the installation fee too high. The remaining 2 percent cited a combination of these reasons.

Digital Literacy: 22 percent of non-adopters give a digital literacy-related topic as their main barrier. These are non-adopters who said that "they are not comfortable using a computer" or they "are worried about all the bad things that can happen on the Internet." Digital literacy breaks down as follows: 10 percent of non-adopters cite "worries about bad things" and 12 percent said they are "not comfortable with computers." Although worries about online hazards (e.g., exposure to inappropriate content or the possibility of identity theft) exist for many current broadband users, some non-adopters are concerned enough to avoid the Internet altogether. This may have to do with the age of those citing digital literacy as a barrier. Their median age is 62.

Relevance: 19 percent of non-adopters say they do not think digital content delivered using broadband is sufficiently compelling to justify getting it. Many view broadband as an avenue to irrelevant content, and others seem content with the offline alternatives currently available to them. These respondents say, for instance, that the Internet is a "waste of time," they do not believe there is anything worth viewing online or, for dial-up users, they cite contentment with their current service. Each of those reasons indicates that these non-adopters are on the other side of a perceptual chasm with respect to broadband. Unlike broadband users, they are not attuned to online content's potential to provide information or opportunities for learning.

Other: 11 percent of non-adopters cited a variety of reasons that did not group into an identifiable category or offered no response.

Combination: 4 percent of non-adopters cited as their main reason a combination of reasons listed, whether that was price, worries about "bad" things online or other items.

Lack of availability: 5 percent of non-adopters said that the main reason they do not have the Internet or broadband is that it is not available where they live. This response is highest among dial-up users, 21 percent of whom say that broadband is not available where they live.

Use high-speed at work: Finally, 3 percent of non-adopters said the main reason they do not have broadband at home is because they use broadband as much as they want at the workplace.

For the "lack of availability" reason, it is also important to distinguish respondents citing lack of availability as the most important reason for not having broadband from those who cited it as one of several reasons. Because people could list multiple reasons for not adopting (prior to being asked the most important reason), some who cited lack of infrastructure availability could (and did) not cite that as their most important reason for non-adopting. The upshot is that 12 percent of non-adopters cited lack of availability as a reason for not having broadband, while 5 percent of non-adopters cited it as the most important reason. The 12 percent of non-adopters citing lack of available infrastructure translates into 4 percent of all Americans who say they cannot get broadband because it is not

available where they live. Finally, it is important to underscore that this is a self-reported assessment about the availability of broadband infrastructure, not an actual measure of whether broadband is in the respondent's neighborhood.

WHEN RESPONDENTS CAN CITE MULTIPLE REASONS FOR NOT ADOPTING

It is also worth summarizing, for all non-adopters, what share cited any of the reasons listed as possible barriers. The survey permitted non-adopters to list several reasons for not adopting before asking them to state the most important reason. Because respondents could list more than one reason—in fact most cited multiple reasons—the figures below sum to more than 100 percent.

Cost: 66 percent of non-adopters cited any of the reasons that constitute the "cost" category, that is, two-thirds of non-adopters listed monthly access fee, cost of computer, installation fee, or reluctance in entering into a long term contract, as a reason they do not use the internet or broadband.

Relevance: 52 percent of non-adopters said that they found the internet to be a waste of time, they did not think there is anything worth seeing online, or they were content with their current service.

Digital literacy: 47 percent of non-adopters listed their lack of comfort with computers or worries "about all the bad things that can happen on the internet" as reasons for not having broadband.

Lack of availability: 12 percent of non-adopters said that their inability to get service where they live is why they do not have broadband.

To underscore how barriers to access interact in users' minds, the following shows the frequency with which those who cited a particular barrier also pointed to others.

Among the 66 percent of non-adopters who cited cost as a barrier:

- 50 percent also listed a digital literacy-related barrier.
- 48 percent also listed concerns about the relevance of the internet as a barrier.

Among the 52 percent of non-adopters who listed lack of relevance as a barrier:

- 45 percent also listed a digital literacy-related barrier.
- 28 percent also listed on the cost-related reasons.

Among the 47 percent of non-adopters who listed digital literacy as a barrier:

- 70 percent also listed cost as a barrier.
- 57 percent also listed lack of relevance as a barrier.

An important consequence of this analysis is that non-adopters typically face multiple barriers to adoption. Even though cost leads the way, most of the time even those who worry about cost need help in other areas. Likewise, those who say lack of relevance is a barrier also have issues with digital literacy and, to a less extent, cost.

SEGMENTING THE POPULATION OF NON-ADOPTERS

Each of the three baskets of non-adopters reveals tendencies as to why people do not have broadband. Financial matters are critical for not-at-home Internet users, while dial-up users seem distant from the Internet, apparently not seeing a lot online that might lure them to faster service. Nonusers—the largest group of non-adopters, constituting two-thirds of non-adopters—are harder to pin down. Many cite reasons suggesting they do not see the relevance of the Internet, yet some point to costs and others worry about risks in being online.

Even if the survey responses yielded crisp reasons for non-adoption across categories of nonbroadband users, it would be worthwhile to know more than just a person's stated barrier to adopting. In particular, it would help to know something about the person's ability to clear the barrier.

One technique to do this is to segment the population of non-adopters into several groups based on measures of a respondent's relationship to the Internet. The following analysis does this and it is built on two dimensions:

- **Proximity to ICTs**: All survey respondents were asked whether they have computers, cell phone or premium TV at home. Nonbroadband adopters also were asked if they had ever used a computer.
- **Attitudes about the Internet and computers**: Respondents received questions about their overall comfort with computers and attitudes about the Internet.

The survey details the specific attitudinal questions and responses for broadband adopters and non-adopters. It is clear that people without broadband at home use ICTs. Among non-adopters:

- 80 percent have premium TV, either cable or satellite television.
- 70 percent have a cell phone.
  - On average, these cell phone users spend $73 per month on service.
- 49 percent say they use computers, at least occasionally.
- 42 percent have at least one working computer at home.

➤ Among nonbroadband-adopting computer users, 34 percent say they are *very* comfortable using them.

On the second issue, non-adopters have a mix of attitudes about the Internet—some positive, others less so. *Exhibit 24* compares "strongly agree" responses for broadband adopters and non-adopters.

The attitudinal and proximity questions serve as input into statistical analysis that classifies respondents based on their responses. That analysis includes all non-adopters—dial-up, not-at-home users and nonusers. The analysis yielded four groups of non-adopters, each with distinct characteristics described below. The analysis also identifies the key adoption barriers in each group, although answers to those questions were not inputs into the statistical analysis that created the groups.[19]

Group 1: Digitally Distant: 10 percent of the general population

This group does not see the point of being online and does not have the computer skills to dive in even if its members were so inclined. Few (15 percent) in this group see the Internet as a tool for learning and most see it as a dangerous place, either for children (53 percent) or personal information (56 percent). Very few (11 percent) have a computer. Many (25 percent) cite digital literacy as a barrier to adoption, and nearly half are retired from the work force. Just 8 percent of this group have any experience with broadband (i.e., they used at a place other than home or used to have home high-speed service). The Digitally Distant group has a *low probability of adoption* in the near future.

The important demographic characteristics of this group have to do with age. With a median age of 63, it is the oldest of any of the groups; 47 percent are age 65 or older. The Digitally Distant also has the highest rate of retirees across the four groups, at 45 percent. They are also not well off economically, with 50 percent reporting annual household incomes below $30,000.

Group 2: Digital Hopefuls: 8 percent

The Digital Hopefuls like the idea of being online, but lack the resources to connect using broadband. Members of this group have positive attitudes about how the Internet might be a tool for learning and personal productivity; 86 percent strongly believe it is a useful tool for learning and 68 percent believe people can be more productive using the Internet. But 22 percent cannot afford a computer (and only 3 percent have one at home), 15 percent cannot afford the monthly access fee and only 9 percent have past experience using broadband. A significant share (28 percent) cites digital literacy as a barrier, the highest of any group. Given help—likely a lot of it—in clearing cost hurdles to access, members of this group have a *positive probability* of adopting broadband.

Consistent with their lack of resources to connect, the Digital Hopefuls are the least well off economically of any group. Some 44 percent live in households with annual incomes of $20,000 or less. Nearly half (49 percent) have not graduated from high school. This group, with a median age is 57, has the highest share of Hispanics (26 percent). One in five are African-Americans and 50 percent are white.

Group 3: Digitally Uncomfortable: 7 percent

The Digitally Uncomfortable has the equipment for access (nearly all have a computer), but the group has tepid attitudes about the usefulness of the Internet and low comfort levels with computers. Just 24 percent say they are very comfortable using them, and just more than one-third (37 percent) see the internet as a productivity tool. Although some in the Digitally Uncomfortable group could use a break on the monthly access fee (16 percent), more need help learning about relevant content (18 percent) and improving their digital literacy (17 percent). Twenty-one percent cite a lack of available infrastructure as a reason they do not have broadband.

As to attitudes, 53 percent worries about security of personal information online, although a majority (68 percent) sees the Internet as a useful tool for learning and information gathering. The path to access and robust use might be long for this group. Because they have already cleared the computer ownership hurdle and because one-third (35 percent) have

Exhibit 24: How Strongly Do You Agree or Disagree With the Following Statements (% of Non-adopters Who "Strongly Agree")

There is too much pornography and offensive material on the Internet	65
It is too easy for my personal information to be stolen online	57
The Internet is a valuable source for information and learning	59
It is important for children to learn how to use the Internet	54
The Internet is too dangerous for children	46
People can be more productive using the Internet	37

Source: Federal Communications Commission survey, October-November 2009; n=2,334 for non-adopters.

past experience with broadband, the Digitally Uncomfortable, with the right support, *stand a reasonable chance of adopting broadband.*

From a socioeconomic perspective, members of the Digitally Uncomfortable group are very much the average non-adopter. The median age is 55 (versus 54 for all non-adopters), 63 percent are white (the same as the average), and 27 percent have either graduated from college or at least attended college (also the average).

Group 4: Near Converts: 10 percent

This group has many of the qualities of broadband adopters—a high rate of computer ownership (76 percent use them occasionally and 68 percent own one), comfort with computers (56 percent describe themselves as very comfortable with the device) and positive attitudes about the Internet's usefulness (three-quarters say it is a valuable learning tool). And 42 percent have used broadband in the past. However, nearly 41 percent cite financial issues as the main barrier to home broadband access, principally the monthly access fee. Concerns about the Internet's relevance to their lives also play a role. At 10 percent of the general population, this group has a *high probability of adopting broadband*—if they clear financial constraints.

The Near Converts are much younger than other non-adopters (their median age is 45) and they have much higher levels of educational attainment. Half have either graduated from college or attended college. Their incomes are in the middle ranges (30 percent have annual household incomes between $40,000 and $75,000) and most are employed full or part time.

Exhibit 25 summarizes the main barriers that each segment of non-adopters faces. A clear implication of *Exhibit 25* is this: The greater the conversion probability, the larger role the monthly Internet bill plays as a barrier. The Near Converts have the highest probability of becoming broadband adopters; the monthly access cost is the main hurdle. The most difficult-to-convert group is the Digitally Distant; they have no single reason standing out as a barrier. In between the two extremes, cost plays a role in slightly different ways (computer affordability for the Digitally Adrift, monthly bill for the Digitally Disposed), but other factors are important, too.

At the same time, although cost leads as a primary barrier for non-adopters, nearly two-thirds cite a reason other than cost. As noted earlier, non-adopters generally mention more than one obstacle for adoption—meaning interventions to lure people to broadband should be comprehensive in nature. Cost relief will work effectively for many non-adopters but only when accompanied by training programs to bolster their digital skills and information about content that is relevant to their lives. Similarly, addressing digital literacy in isolation is not likely to be effective unless cost is addressed and efforts are made to inform people about online content relevant to them.

V. FOCUS ON KEY POPULATION GROUPS

Although this paper has referred to differences among population subgroups, this section has key figures for several groups of interest, as well as discussion of notable variations in behavior and attitudes for these groups. This focus on specific groups covers data on adoption and non-adoption.

FAMILIES (RESPONDENT IS THE PARENT OF CHILD UNDER 18 WHO LIVES IN HOUSEHOLD)

With the integration of information technology into so many dimensions of family life—whether is communicating with one another or schools—it is no surprise that those with children under age 18 in the house generally have a lot of information technology. Nine out of 10 (87 percent) have Internet access, and 74 percent have broadband at home. The survey interviewed parents, of whom 92 percent have a cell phone, and many (39 percent) use it sometimes to access the Internet. Among kids under 18 living at home, 45 percent have cell phones. For children between the ages of 12 and 17, some 75 percent have cell phones.

Exhibit 25: Summary of Most Important Barriers by Segment

Segment	% as share of all Americans today	Adoption barriers faced
1. Near Converts	10	Cost (mostly monthly bill)
2. Digital Hopefuls	7	Cost (mostly monthly bill), relevance
3. Digitally Uncomfortable	8	Cost (mostly PC), digital literacy, accessibility
4. Digitally Distant	10	Cost, digital literacy, relevance, accessibility
Total Non-adopters	**35**	

Although families with minor children at home have higher broadband adoption rates, there is still a gap between broadband adoption and computer ownership. Among such families, 87 percent have a working computer at home—a 13-percentage-point gap compared with 74 percent of those without children who have a working computer at home.

The survey asked parents or guardians the ages of their children. When it came broadband adoption, there was little difference between parents with children from ages 5 to 12, and those with children between 13 and 17; the level was 72 percent for families with younger children and 75 percent for families with older ones. To the extent large adoption differences unfold by age, younger parents are less likely to have broadband at home than older ones. For parents with offspring at home in the 18-to-29 age range, 65 percent have broadband at home, compared with 77 percent of parents older than that.

As to online activities, parents tend to engage in activities that focus on convenience and community. Fully 86 percent have used their broadband connection to keep up with community news, 85 percent for online purchases and 57 percent to get advice or information from a government agency about a health or safety issue; all of these exceed the average. When asked what activities are *very* important to them, 44 percent cite keeping up with news about the community; that is above the average.

Non-adopters

Cost—and the monthly fee in particular—comes front and center as the barrier to adoption for non-adopting families. Half (48 percent) say that cost is the primary reason they are not online, with 24 percent specifically citing the monthly. Issues such as digital literacy (16 percent) or lack of relevance (13 percent) figure much less. Note that the "other" category in *Exhibit 26,* and ones that follow, refers to all other reasons cited by respondents, which may include items such as lack of availability and ability to use the Internet from work.

LOW-INCOME AMERICANS

There is a clear relationship between broadband adoption and income. Some 40 percent of those with household incomes of $20,000 per year or less have broadband at home, while 91 percent of those with household incomes above $75,000 per year have it *(See Exhibit 27)*.

Not only does broadband adoption vary by income, individuals with broadband at home exhibit some differences in behavior and attitude toward broadband depending on their income. In general terms, lower-income broadband users are more likely to use their home high-speed connections to address important life issues, such as job searches or education, and for entertainment. Higher-income broadband users, however, are more likely than low-income ones to shop online, contact government and bank *(See Exhibit 27)*.

When asked whether particular online activities were very important to them, low-income and upper-income broadband users share the idea that communicating with family and friends is very important. By a modest margin (74 percent to 68 percent), low-income broadband users are more likely to say that than upper-income ones. Low-income users are also more likely to say that entertainment activities are very important to them. One in five (21 percent) low-income broadband users say that watching TV, movies or videos online is very important to them, compared with 8 percent of upper-income users who say this. However, upper-income broadband users are nearly twice as likely to say that shopping online is very important to them; 32 percent say this versus 17 percent of low-income broadband users.

Non-adopters

Unsurprisingly, those with the lowest incomes are most likely to cite cost as the main barrier to having broadband at home *(See Exhibit 28)*.

For the other barriers—digital literacy and relevance—the stories are mixed. For digital literacy, aside from low-income

Exhibit 26: Barriers to Adoption: Families with Minor Children at Home (by Percentage)

Main reason cited for not having the Internet or broadband	Families with minor children at home	Other non-adopters
Cost	46	31
Digital literacy	16	24
Relevance	13	21
Other	25	25

Source: Federal Communications Commission survey, October-November 2009.

people citing it less often, around one-fourth of non-adopters point to it as a primary barrier. The Internet's perceived lack of relevance is more of an issue in the middle-income ranges. For higher-income non-adopters (of which there are few), hard-to-categorize "other" reasons dominate.

AFRICAN-AMERICANS

For African-Americans, online access is, relative to the average, somewhat less oriented to home high-speed wireline access and more focused on mobile Internet. Nearly three in five (59 percent) African-Americans have broadband at home, but 39 percent have used the Internet on their mobile handheld device. For African-Americans, home broadband adoption trails the national average by six percentage points; for mobile Internet use, African-Americans outpace the national average by nine percentage points.

To an extent greater than average, African-Americans without broadband at home use the mobile Internet as a substitute, but it is not a very widespread practice. Among African-Americans who have gone online with their mobile device, 78 percent have broadband at home; for all mobile Internet users, the home broadband adoption rate is 89 percent. For African-Americans *without* broadband at home, 20 percent have used the Internet on their handheld devices; that figure is just 9 percent for all non-adopters.

Another distinctive pattern among African-Americans is that broadband adoption gaps are particularly acute for older African-Americans. In fact, broadband adoption for African-Americans is 76 percent in the 18–29 age group, essentially the same others. Thereafter, however, African-Americans are much less likely than average to adopt broadband at home when the

Exhibit 27:
By Income, Reasons for Broadband Use (by Percentage)

	Low-income broadband users (annual household income of $20K or less)	Upper-income broadband users (annual household income of $75K or more)
	Activities in which low-income users lead	
Get information about a job or apply for one	77	60
Play games	70	44
Stream music to your computer	64	55
Take a class for credit	31	25
Play complicated role-playing games	21	9
	Activities in which upper-income users lead	
Buy a product	74	93
Go to local, state, or government Web site	68	86
Get international news	64	85
Banking	51	80
Review a product or service	49	62
Contact a government agency about health or safety issue	42	62

Source: Federal Communications Commission survey, October-November 2009.

Exhibit 28:
Reasons for Not Adopting Broadband (by Percentage)

	Cost	Digital literacy	Relevance	Other
Under $20K	47	17	15	21
$20K–$30K	37	23	18	23
$30K–$40K	38	21	14	27
$40K–$50K	29	24	23	25
$50K–$75K	25	23	26	23
Over $75K	25	20	12	43

Source: Federal Communications Commission survey, October-November 2009.

focus is on age and the gap is most pronounced among senior citizens *(See Exhibit 29)*.

Because of the high share of young people in the ranks of African-American broadband adopters, the online activities of African-American broadband users takes on a youthful cast. Some 83 percent of African-Americans with broadband have used the connection to search for or apply for a job, far above the 57 percent rate for other broadband users. African-American broadband users are also more likely to take a class for credit online or participate in a blog *(See Exhibit 30)*.

As to what they see as very important, African-American broadband users are very likely to say communicating with family and friends, although at a somewhat lower rate than average. African-Americans are, however, more likely to say that the Internet is very important to them for keeping up with community news and entertainment *(See Exhibit 31)*.

Non-adopters

For African-Americans without broadband access at home, cost is cited as the main reason—and it weighs in at a rate somewhat higher than average. Forty-two percent of African-Americans cite cost as the primary reason they do not have broadband at home; this compares to an average 36 percent among non-adopters *(See Exhibit 32)*.

Dissecting the cost factor shows that 15 percent of African-Americans point to the affordability of a personal computer (above the 10 percent average), and 15 percent cite the level of the monthly bill (right at the average).

HISPANICS

The gap separating Hispanics' home broadband use from the average is wider than the comparable figure for African-Americans; 49 percent of Hispanics have broadband at home. There is also a gap in adoption within the groups, as Spanish-speaking Hispanics are far less likely to have broadband at home than those whose facility with English is such that they opted to take the survey in English. For Hispanic respondents who chose to take the survey in Spanish, just 20 percent have broadband at home. Hispanics who took the survey in English are right at the 65 percent average for home high-speed adoption *(See Exhibit 33)*.

The adoption gap for Hispanics is most acute among young adults. Some 57 percent of Hispanics between the ages of 18 and 29 have broadband, more than 20 points below the average. Just

Exhibit 29:
Broadband Adoption by Age: African-Americans (by Percentage)

	African-Americans	All others in sample
All	59	66
Ages 18–29	76	75
Ages 30–49	67	75
Ages 50–64	49	66
Ages 65+	21	36

Source: Federal Communications Commission survey, October-November 2009.

Exhibit 30:
Online Activities: African-Americans (by Percentage)

	African-Americans	All other broadband adopters
Get information about or apply for a job	83	57
Update a blog (either own or group blog)	37	24
Take a class toward a degree	37	22

Source: Federal Communications Commission survey, October-November 2009.

Exhibit 31:
Online Attitudes: African-Americans

% who say this is very important to them	African-Americans	All other broadband adopters
Communicating with family & friends	61	67
Keeping up with news in the community	51	38
Watching TV shows, movies or other video	18	9

Source: Federal Communications Commission survey, October-November 2009.

more than half (53 percent) of those between the ages of 30 and 49 have broadband, 25 points behind the average.

Hispanics are not laggards when it comes to the cell phone. The vast majority (85 percent) has one and, along with African-Americans, members of this group are active users of the mobile Internet; 39 percent have taken advantage of online access with their handheld. To a somewhat greater extent than African-Americans, mobile access takes the place of broadband at home. One-quarter of Hispanics who *do not* have broadband at home access the Internet using their mobile device. Among Hispanics who have used the Internet via handheld devices, 68 percent have broadband at home, another indication that the mobile Internet fills the wireline void for some Hispanics.

As to online activities, Hispanics stand out, relative to the average, in two clear ways.

- **Job Search**: Hispanics are more likely to use their high-speed connection to search for or apply for a job—68 percent versus the 59 percent average.
- **Streaming or downloading music**: Consistent with the youthful Hispanic population, they are more likely to download or stream music—69 percent versus the 49 percent average.

At the same time, the broadband connection is also important for Hispanics for following what is going on in the community. Fully 80 percent use the Internet for getting local or community news, and 52 percent identify this kind of activity as very important to them, compared with the 38 percent figure for others.

Non-adopters

The story among Hispanic non-adopters is cost. Half cite it as the *main* barrier to adoption. Twenty-one percent *(See Exhibit 34)* say the monthly online bill is too much for them, and 23 percent say they cannot afford a computer.

Exhibit 32: Barriers to Adoption: African-Americans (by Percentage)

Main reason cited for not having the Internet or broadband	African-Americans	Other non-adopters
Cost	42	35
Digital literacy	20	22
Relevance	13	20
Other	25	24

Source: Federal Communications Commission survey, October-November 2009.

Exhibit 33: Broadband Adoption by Age: Hispanics (by Percentage)

	Hispanics	All others in sample
All	49	67
Ages 18–29	57	81
Ages 30–49	53	78
Ages 50–64	32	67
Ages 65+	23	36

Source: Federal Communications Commission survey, October-November 2009.

Exhibit 34: Barriers to Adoption: Hispanics (by Percentage)

Main reason cited for not having the Internet or broadband	Hispanics	Other non-adopters
Cost	52	32
Digital literacy	18	22
Relevance	14	20
Other	16	26

Source: Federal Communications Commission survey, October-November 2009.

PEOPLE WITH DISABILITIES

As noted earlier, 23 percent of respondents in this survey answered "yes" to one of six questions intended to identify an individual as having a disability. In the survey, those with a disability were older than most respondents, with a median age of 57. This explains, in part, the lower overall Internet penetration rate for this group (56 percent) and the low rate of home high-speed adoption (42 percent). Although 74 percent have a cell phone, people with disabilities are not very likely to access the Internet with it (only 18 percent have).

One-third of respondents with a disability were over the age of 65 in the survey, and only 25 percent have broadband at home. At the other end of the spectrum, one-third is under the age of 50, and 57 percent has broadband at home—more than 20 points below average. It is notable that senior citizens with disabilities are 76% less likely to have broadband than seniors who do not have a disability. *(See Exhibit 35)*

Notable among those with disabilities is the narrower scope of online activities. For some activities, people with disabilities who have broadband are nearly as likely to engage in them as the overall average. Three quarters (73 percent) of people with disabilities use their broadband connection to get news about their communities, not too far from what other broadband users say (81 percent). People with disabilities are also within range of others for use of their broadband connection to visit a government Web site (71 percent versus the 80 percent average).

On the whole, however, broadband-using people with disabilities do fewer things online than average. The survey asked half of all respondents about eight different online activities, and the other half about another eight activities. Among both sets of activities, respondents with disabilities and broadband were less active than the average. For one set, broadband-using people with disabilities did 4.6 activities on average compared to 5.1 for broadband users without a disability. For the other set, the figures were 3.3 and 3.7, respectively, for broadband users with disabilities and other broadband users. The differences may not seem great, but they indicate a level of online activity for broadband users with disabilities that is about 12 percent lower than that of broadband users who are not disabled.

People with disabilities share have many of the characteristics that are often associated with lower levels of Internet use—advanced age and lower income. However, having a disability—even when those other characteristics are taken into account—is significantly correlated with lower levels of online activity.

Non-adopters

People with disabilities do not differ greatly from the average in terms of why they do not have broadband at home. They are somewhat more likely to say they cannot afford a computer (15 percent cite it as the main reason versus the 10 percent average), which may be due to the extra expense for some users for fitting a computer with the capability to allow them to use broadband *(See Exhibit 36)*.

Exhibit 35: Broadband Adoption by Age for People with a Disability (by Percentage)

	People with disabilities	All others in sample
All	42	72
Ages 18–29	59	78
Ages 30–49	56	77
Ages 50–64	43	72
Ages 65+	25	44

Source: Federal Communications Commission survey, October-November 2009.

Exhibit 36: Barriers to Adoption: People with Disabilities (by Percentage)

Main reason cited for not having the Internet or broadband	People with Disabilities	Other non-adopters
Cost	37	35
Digital literacy	25	19
Relevance	17	19
Other	21	27

Source: Federal Communications Commission survey, October-November 2009.

RURAL AMERICANS

In the survey, rural Americans are people living in counties that do not contain any portion of a metropolitan statistical area (MSA). This is distinct from urban areas, defined as central cities in MSAs, and suburban areas, which are any portion of an MSA county that is not a central city. Place of residence is typically easy to determine from the respondents' landline telephone number. Cell phone numbers may not map as easily to place of residence, and for that reason, respondents are asked to name the zip code for where they live. This is used to determine place of residence (rural, urban, or suburban) for respondents contacted on their cell phone. Using these two methods, 17 percent of respondents met the definition of residents of rural America.

There is a sizable gap between rural Americans with any sort of access to the Internet (71 percent) and those with broadband at home (50 percent). Ten percent of rural residents have dial-up Internet connection, above the average, reflecting the difficulty in running broadband infrastructure to some corners of rural America *(See Exhibit 37)*. Fully 80 percent of rural Americans have cell phones, but just 20 percent have used them for Internet access.

Rural Americans tend to be older than their suburban and urban counterpart (the median age for rural adults is 50 compared with 46 for all American adults) and with somewhat lower incomes. Younger rural Americans are far behind when it comes to broadband adoption by age; 56 percent of rural residents between 18 and 29 have broadband at home, compared with the average of 75 percent.

It appears that some rural high-speed users take advantage of the distance-bridging capacity of broadband. More than three-quarters (77 percent) of rural broadband users have bought a product online. Although this is below the average 84 percent rate for other broadband users, it is notable in light of the fact that rural Americans have a higher share of two qualities that discourage online buying: age and lower incomes. Similarly, 25 percent of rural Americans have taken a class online—something more the province of young people—matching the 24 percent rate for other broadband users.

As to what is important to them, 60 percent of rural broadband users say communicating with family and friends is very important, followed by 33 percent who value keeping up with community news and 33 percent who say sharing content with others is very important.

Non-adopters

The reasons rural Americans cite for not having broadband at home differ modestly from the average—with one exception. Rural non-adopters are twice as likely as urban or suburban non-adopters to say broadband is not available where they live (by a 10 percent to 4 percent margin, which is reflected in the "other" category below). They are less likely than other non-adopters to say cost is a barrier (31 percent to 38 percent) and relatively few (9 percent) say that the expense of a computer keeps them from broadband *(See Exhibit 38)*.

Exhibit 37: Broadband Adoption by Geographic Location (by Percentage)

	Rural residents	All others in sample
All	50	68
Ages 18–29	56	78
Ages 30–49	63	76
Ages 50–64	51	67
Ages 65+	29	37

Source: Federal Communications Commission survey, October-November 2009.

Exhibit 38: Barriers to Adoption: Rural Americans (by Percentage)

Main reason cited for not having the Internet or broadband	Rural residents	National Average
Cost	31	38
Digital literacy	23	21
Relevance	19	18
Service not available	10	4
Other	18	19

Source: Federal Communications Commission survey, October-November 2009.

Appendix: Tables on Demographics and Use

Demographic and socio-economic overview of those with various technological assets (as a percentage of Americans)

	Cable or satellite TV	Landline phone	Cell phone	Working computer at home
Gender				
Male	48	46	50	50
Female	52	54	50	50
Parents with minor children at home	33	33	34	36
Those who report they have a disability	23	25	20	18
18–29	20	15	24	24
30–49	34	34	37	38
50–64	27	29	26	26
65+	17	20	13	12
White (not Hispanic)	71	74	71	73
Black (not Hispanic)	11	11	12	10
Hispanic (English or Spanish speaking)	12	10	12	11
Less than high school	13	12	10	7
High school graduate	34	35	34	32
Some college	25	24	26	28
College +	29	29	30	34
Under $20K	15	14	15	12
$20K–$30K	9	9	9	8
$30K–$40K	9	8	10	10
$40K–$50K	9	9	9	10
$50K–$75K	14	14	15	16
$75K–$100K	11	11	12	13
Over $100K	15	15	15	17
Don't know/refused	18	20	17	16
Urban	29	28	30	29
Suburban	50	52	49	51
Rural	17	18	16	17
Number of cases	4,301	4,373	4,268	3,650

Source: Federal Communications Commission survey, October-November 2009.

Appendix:

Demographic & socio-economic overview of those who do various activities online
(% broadband adapters in group)

	Get local or community news*	Upload or share content*	Visit local, state or federal government Web site*	Download or stream music*	Buy a product online*	Use a social network-ing site*	Submit a review for a product or service*	Play games online*
Male	78	44	79	54	82	52	53	41
Female	82	52	78	49	84	58	57	56
Parents with minor children at home	86	51	82	58	85	59	56	53
Those who report they have a disability	73	41	71	45	73	47	57	52
18–29	86	67	75	75	86	85	57	63
30–49	85	49	80	58	84	57	58	50
50–64	74	37	83	34	84	38	53	38
65+	58	26	68	17	69	16	39	27
White (not Hispanic)	79	48	81	49	87	54	55	46
Black (not Hispanic)	80	48	70	52	69	56	63	63
Hispanic (English or Spanish speaking)	80	45	74	70	70	59	49	49
Less than high school	75	48	60	57	64	55	51	76
High school graduate	73	36	66	48	74	50	47	47
Some college	81	48	83	53	84	58	56	54
College+	85	56	87	53	92	57	60	40
Under $20K	80	46	68	64	74	58	49	70
$20–30K	78	50	78	56	64	57	55	58
$30–40K	78	43	77	58	76	48	51	54
$40–50K	80	51	70	48	84	53	57	38
$50–75K	75	42	80	42	87	54	52	45
$75–$100K	84	49	87	52	92	60	54	45
Over $100K	86	60	85	58	95	61	69	43
Don't know/ refused	73	40	72	42	73	45	48	43
Number of cases	1,378	1,378	1,378	1,378	1,378	1,378	1,378	1,378

Source: Federal Communications Commission survey, October–November 2009.

Appendix:

Demographic & socio-economic overview of those who do various activities online
(% broadband adapters in group)

	Get international or national news*	Get information about or apply for a job	Post to own blog or group blog	Get advice from a government agency about a health or safety issue	Download or stream video	Do any banking online	Take a class online	Play complicated role playing games online
Male	70	60	23	52	46	69	21	18
Female	78	65	27	57	44	73	28	14
Parents with minor children at home	78	65	27	57	44	73	28	14
Those who report they have a disability	66	50	24	49	41	58	19	21
18–29	80	83	45	52	66	72	38	23
30–49	80	65	26	55	43	75	27	16
50–64	75	47	16	56	29	64	13	7
65+	64	14	6	44	18	55	6	7
White (not Hispanic)	77	55	24	53	40	71	22	11
Black (not Hispanic)	72	83	37	55	54	57	37	31
Hispanic (English or Spanish speaking)	78	68	27	56	47	68	25	22
Less than high school	65	64	22	43	38	46	19	17
High school graduate	67	60	25	42	43	59	17	18
Some college	77	61	27	57	42	70	30	18
College+	87	58	26	62	43	78	25	9
Under $20K	64	77	30	43	47	51	32	22
$20–30K	70	63	29	45	36	62	28	21
$30–40K	76	64	33	59	48	64	22	19
$40–50K	79	53	23	45	36	68	13	13
$50–75K	76	56	25	52	48	77	27	15
$75–$100K	86	66	26	55	52	77	25	14
Over $100K	84	56	24	67	49	82	26	5
Don't know/ refused	73	50	20	50	36	57	18	15
Number of cases	1,293	1,293	1,293	1,293	1,293	1,293	1,293	1,293

Source: Federal Communications Commission survey, October–November 2009.

Appendix:

Demographic and socioeconomic overview of non-adopters by selected barriers
(% of those facing barrier, by demographic)

	Cost	Digital Literacy	Relevance	Lack of availability
Male	40	45	43	49
Female	60	55	57	51
Parents with minor children at home	32	17	15	33
Those who report they have a disability	41	46	37	21
18–29	24	6	10	18
30–49	29	22	21	30
50–64	26	28	22	35
65+	19	44	44	16
Median Age	47	61	61	50
White (not Hispanic)	54	65	71	78
Black (not Hispanic)	16	13	9	11
Hispanic (English or Spanish speaking)	27	16	14	5
Less than high school	34	29	27	10
High school graduate	42	51	47	38
Some college	14	12	15	33
College+	9	8	11	20
Under $20K	38	24	24	22
$20–30K	15	15	14	15
$30–40K	10	10	7	10
$40–50K	7	9	10	7
$50–75K	5	8	11	5
$75–$100K	3	4	2	3
Over $100K	2	2	3	2
Don't know/refused	21	28	30	21
Urban	37	28	24	8
Suburban	38	44	47	42
Rural	21	26	25	46
Number of cases	738	516	445	148

Source: Federal Communications Commission survey, October–November 2009.

Appendix:

Demographic & socio-economic overview of non-adopter segments
(% of non-adopters)

	Digitally Distant	Digital Hopefuls	Digitally Uncomfortable	Near Converts
Male	37	42	43	50
Female	63	58	57	50
Parents with minor children at home	18	22	25	28
Those who report they have a disability	49	51	35	24
18–29	10	13	17	21
30–49	18	22	22	37
50–64	25	26	27	30
65+	47	38	34	12
Median Age	63	57	55	45
White (not Hispanic)	66	50	63	71
Black (not Hispanic)	11	20	10	13
Hispanic (English or Spanish speaking)	18	26	22	10
Less than high school	36	49	30	5
High school graduate	48	38	43	45
Some college	9	9	17	28
College+	6	4	10	22
Under $20K	36	44	27	13
$20–30K	14	15	22	9
$30–40K	8	8	12	12
$40–50K	5	3	8	14
$50–75K	3	3	7	16
$75–$100K	1	1	3	8
Over $100K	1	0	3	8
Don't know/refused	32	26	20	22
Urban	25	20	27	25
Suburban	43	35	44	43
Rural	29	39	26	27
Number of cases	649	450	478	757

Source: Federal Communications Commission survey, October–November 2009.

Appendix:

Non-adopter segments' attitudes towards the Internet and technological assets
(% of non-adopters)

	Digitally Distant	Digital Hopefuls	Digitally Uncomfortable	Near Converts
The Internet is dangerous for children	53	48	43	40
It is important for children to learn to use Internet	16	76	63	66
The Internet is valuable for info/learning	15	86	68	74
There is too much offensive or questionable material on the Internet	62	68	65	65
People can be more productive with Internet	0	68	37	49
It is too easy for personal information to be stolen online	56	66	53	54
Number of cases	649	450	478	757

Source: Federal Communications Commission survey, October–November 2009.

Appendix:

Information and Communication Technologies by Segment
(% of segment)

	Digitally Distant	Digital Hopefuls	Digitally Uncomfortable	Near Converts
Cable TV	59	56	46	61
Satellite TV	27	26	37	33
Cable OR Satellite TV	78	75	75	86
Desktop computer	9	2	83	55
Laptop computer	3	1	38	32
Desktop OR laptop computer	11	3	97	68
Cell phone	52	56	76	93
Number of cases	649	450	478	757

Source: Federal Communications Commission survey, October–November 2009.

METHODOLOGY

Broadband Consumer Survey
Prepared by Princeton Survey Research Associates Internationalfor the Federal Communications Commission
December 2009

SUMMARY

The Broadband Service Capability Survey, sponsored by the Federal Communications Commission, obtained telephone interviews with a nationally representative sample of 5,005 adults living in the United States. The survey was conducted by Princeton Survey Research International. Interviews were conducted in English and Spanish by Princeton Data Source LLC from October 19 to November 23, 2009. The data was weighted to correct known demographic discrepancies. The margin of sampling error for the complete set of weighted data is ±1.6 percentage points.

Details on the design, execution and analysis of the survey are discussed below.

DESIGN AND DATA COLLECTION PROCEDURES

Sample Design

Two samples were used for data collection—a random digit dial (RDD) landline sample and an RDD cell sample. The landline sample frame was an equal probability sample across all active blocks.[20] All blocks within a county were sorted in ascending order by area code, exchange and block number. A sampling interval was computed for each county in our sample by summing all eligible blocks in the county and dividing that sum by the quota assigned to the county. From a random start between zero and the sampling interval, blocks were systematically selected from each county. Once a block was selected, a two-digit random number was appended to the block to create a phone number. Business numbers were not excluded at the sampling stage. Rather they were flagged during sampling and purged before dialing. Additionally, protected numbers were not excluded from the sample frame.[21]

The cellular sample was not list-assisted because no list of cellular numbers exists. Rather, cellular phone numbers were systematically sampled from dedicated wireless 100-blocks and shared service 100-blocks with no directory-listed landline numbers.

Contact Procedures

Interviews were conducted from October 19 to November 23, 2009. As many as 15 attempts were made to contact every sampled landline telephone number and as many as 7 attempts were made to contact every sampled cellular telephone number. Sample was released for interviewing in replicates, which are representative subsamples. Using replicates to control the release of sample helps ensure that complete call procedures are followed. Calls were staggered over times of day and days of the week to maximize the chance of making contact with potential respondents. Interviewing was spread as evenly as possible across the field period.

For the landline sample, interviewers asked to speak with the adult in the household who had the most recent birthday. If the selected adult was not at home or could not complete the interview at the time of contact, interviewers arranged to call back the selected person at a later time. For the cellular sample, interviews were conducted with the person who answered the phone. Interviewers verified that the person was an adult and in a safe place before administering the survey. Cellular sample respondents were offered a post-paid cash reimbursement for their participation.

The interviewing was done in two phases that ran concurrently. The first phase included interviews with all adults while the second phase obtained interviews with an oversample of adults who were not broadband adopters (i.e., the non-adopter oversample). Respondents who were contacted in phase two and were adopters were screened out.

WEIGHTING AND ANALYSIS

Weighting is generally used in survey analysis to compensate for sample designs and patterns of non-response that might bias results. The data was weighted to correct for three sample elements that could potentially bias survey estimates—[1] the oversampling through screening of additional non-adopters, [2] different probabilities of selection based on the number of adults in each household and the number of telephones that each respondent has access to and [3] disproportionate non-response.

Non-adopters Oversample

A sample adjustment was made to account for the non-adopters oversample. This adjustment simply adjusted the proportion of non-adopters in our total sample to match the proportion of non-adopters in the first phase of interviewing. This adjustment was made individually for the landline and cell samples. *Table 1* shows the oversample adjustment (OSADJUST) that was made to the data.

Different Probabilities of Selection

We made two sample adjustments to the data that address unequal selection probabilities. One adjustment accounts for within household clustering and is a function of the number of adults in each household while the second adjustment accounts

for the overlapping landline and cell sample frames and the number of landline telephones in each household.

The Probability of Selection Adjustment (PSA) corrects for the fact that respondents in the landline sample have different probabilities of being sampled depending on how many adults live in the household. Since we only sample one person per household, adults who live with no other adults have a greater chance of being sample than adults who live with one or more other adults.

To compute the PSA, first define n_1 as the number of people in the landline sample who live in single-adults households and n_2 as the number of people in the landline sample that live in multi-adult households. The PSA equals:

$$\frac{n_1 + n_2}{n_1 + 2n_2}$$ *for landline respondents in single-adult households*

$$\frac{2(n_1 + n_2)}{n_1 + 2n_2}$$ *for landline respondents in multiple-adult households*

$$1$$ *for cellphone respondents*

The Phone Use Adjustment (PUA) corrects for different probabilities of selection based on the number of landline phones in each respondent's household and whether or not the respondent has a cell phone.

To compute the PUA, first define p_1 as the number of respondents with only one phone, p_2 as the number of respondents with two phones and p_3 as the number of respondents with three or more phones, the PUA equals:

$$\frac{3(p_1 + p_2 + p_3)}{3p_1 + 2p_2 + p_3}$$ *for respondents with one phone*

$$\frac{2(p_1 + p_2 + p_3)}{3p_1 + 2p_2 + p_3}$$ *for respondents with two phones*

$$\frac{(p_1 + p_2 + p_3)}{3p_1 + 2p_2 + p_3}$$ *for respondents with three or more phones*

Differential Non-response

The final step in weighting the data consisted of raking sample demographics to match population parameters. The sample was balanced—by form—to match national population parameters for sex, age, education, race, Hispanic origin, region (U.S. Census definitions), population density, and telephone usage. The basic weighting parameters came from a special analysis of the Census Bureau's 2009 Annual Social and Economic Supplement (ASEC) that included all households in the United States. The population density parameter came from an analysis of Census 2000 data. The telephone usage parameter came from an analysis of the most recently available National Health Interview Survey data.[22]

Raking was accomplished using Sample Balancing, a special iterative sample weighting program that simultaneously balances the distributions of all variables using a statistical technique called the *Deming Algorithm*. An input weight equal to the product of OSADJUST, PSA and PUA was used for the raking. Weights were trimmed to prevent individual interviews from having too much influence on the final results. The use of these weights in statistical analysis ensures that the demographic characteristics of the sample closely approximate the demographic characteristics of the national adult population. *Table 2* compares weighted and unweighted sample demographic distributions to population parameters.

Effects of Sample Design on Statistical Inference

Post-data collection statistical adjustments require analysis procedures that reflect departures from simple random sampling. PSRAI calculates the effects of these design features so that an appropriate adjustment can be incorporated into tests of statistical significance when using these data. The so-called "design effect" or *deff* represents the loss in statistical efficiency that results from disproportionate sample designs and

Table 1:
Oversample Adjustment

	Main sample	Main sample + oversample	Adjustment (OSADJUST)
Landline			
Non-adopters	36.2%	48.6%	0.745
Adopters	63.8%	51.4%	1.241
Cellular			
Non-adopters	21.2%	37.7%	0.562
Adopters	78.8%	62.3%	1.265

systematic non-response. The total sample design effect for this survey is 1.37.

PSRAI calculates the composite design effect for a sample of size n, with each case having a weight, w_i as:

$$deff = \frac{n \sum_{i=1}^{n} w_i^2}{\left(\sum_{i=1}^{n} w_i \right)^2} \quad \textit{formula 1}$$

Table 2:
Sample Demographics

	Parameter	Unweighted Sample	Weighted Sample
Gender			
Male	48.5	45.1	48.1
Female	51.5	54.9	51.9
Age			
18–24	12.6	7.4	12.1
25–34	17.8	10.6	16.8
35–44	18.2	13.9	17.8
45–54	19.6	20.2	19.5
55–64	15.1	19.2	15.0
65+	16.6	26.3	16.8
Education			
Less than high school	14.1	10.0	13.0
High school graduate	34.7	33.3	34.1
Some college	24.1	22.8	24.3
College +	27.1	33.1	28.0
Race/Ethnicity			
White (not Hispanic)	68.8	74.1	68.8
Black (not Hispanic)	11.5	9.2	11.1
Hispanic	13.7	8.7	12.6
Other (not Hispanic)	6.0	6.6	6.1
Region			
Northeast	18.5	17.6	18.3
Midwest	22.0	25.8	22.5
South	36.8	37.5	37.0
West	22.7	19.1	22.1
County Pop. Density			
1—Lowest	20.1	24.7	20.5
2	20.0	22.5	20.4
3	20.1	20.5	20.4
4	20.2	17.7	20.0
5—Highest	19.6	14.7	18.6
Phone Use			
LLO	13.6	14.7	13.6
Dual users	65.6	72.8	66.4
CPO	20.8	12.6	20.1

In a wide range of situations, the adjusted *standard error* of a statistic should be calculated by multiplying the usual formula by the square root of the design effect ($\sqrt{deff}$). Thus, the formula for computing the 95% confidence interval around a percentage is:

$$\hat{p} \pm \left(\sqrt{deff} \times 1.96 \sqrt{\frac{\hat{p}\,(1-\hat{p}\,)}{n}} \right) \quad \textit{formula 2}$$

where $\hat{p}$ is the sample estimate and n is the unweighted number of sample cases in the group being considered.

The survey's *margin of error* is the largest 95% confidence interval for any estimated proportion based on the total sample—the one around 50%. For example, the margin of error for the entire sample is ±1.6 percentage points. This means that in 95 out every 100 samples drawn using the same methodology, estimated proportions based on the entire sample will be no more than 1.6 percentage points away from their true values in the population. The margin of error for estimates based on non-adopters is ±2.4 percentage points. It is important to remember that sampling fluctuations are only one possible source of error in a survey estimate. Other sources, such as respondent selection bias, questionnaire wording and reporting inaccuracy, may contribute additional error of greater or lesser magnitude.

RESPONSE RATE

Table 3 reports the disposition of all sampled telephone numbers ever dialed from the original telephone number samples. The response rate estimates the fraction of all eligible

Table 3: Sample Disposition

	Landline—combined	Cell—combined
Total Numbers Dialed	75,974	33,914
Non-residential	6,069	618
Computer/Fax	3,602	34
Cell phone	61	
Other not working	39,194	12,847
Additional projected not working	3,330	868
Working numbers	23,718	19,547
Working Rate	31.2%	57.6%
No Answer / Busy	1,110	289
Voice Mail	2,989	4,730
Other Non-Contact	123	12
Contacted numbers	19,496	14,516
Contact Rate	82.2%	74.3%
Callback	2,372	2,278
Refusal	11,661	8,310
Cooperating numbers	5,463	3,928
Cooperation Rate	28.0%	27.1%
Language Barrier	213	78
Child's cell phone	—	1,105
Adopter screen-out	1,580	1,169
Eligible numbers	3,670	1,576
Eligibility Rate	67.2%	40.1%
Break-off	188	53
Completes	3,482	1,523
Completion Rate	94.9%	96.6%
Response Rate	21.9%	19.4%

respondents in the sample that were ultimately interviewed. At PSRAI it is calculated by taking the product of three component rates:[23]

- Contact rate—the proportion of working numbers where a request for interview was made[24]
- Cooperation rate—the proportion of contacted numbers where a consent for interview was at least initially obtained, versus those refused
- Completion rate—the proportion of initially cooperating and eligible interviews that were completed

Thus the response rate for the landline sample was 22 percent. The response rate for the cellular sample was 19 percent.

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ENDNOTES

1 Because it is difficult to tell whether such access meets the standards to qualify as broadband, users of wireless handheld access are not counted as home broadband users—though most wireless handheld internet users qualify as home broadband users.

2 Mobile wireless broadband users are counted as home broadband users if that is their source of home access.

3 1 percent of non-adopters could not be classified into any of the three groups of non-adopters.

4 National Telecommunications and Information Administration, *Digital Nation: 21st Century America's Progress Toward Universal Broadband Internet Access.* February 2010. Available online at: http://www.ntia.doc.gov/reports/2010/NTIA_internet_use_report_Feb2010.pdf.

5 More information is available at the FCC's Web site: http://www.fcc.gov/form477/.

6 Lee Rainie et.al., *The Ever Shifting Internet Population.* Pew Internet & American Life Project, April 2003. Available online at: http://www.pewInternet.org/Reports/2003/The-EverShifting-Internet-Population-A-new-look-at-Internet-access-and-the-digital-divide.aspx, accessed on January 18, 2010.

7 John B. Horrigan. *If you build it, will they log on?* Pew Internet & American Life Project, January 2009. Available online at: http://www.pewInternet.org/~/media//Files/Reports/2009/PIP_Broadbandpercent20Barriers.pdf, accessed on January 18, 2010.

8 Ofcom, *Accessing the Internet at Home,* June 2009. Available online at: http://www.ofcom.org.uk/research/telecoms/reports/bbresearch/bbathome.pdf, accessed on January 18, 2010.

9 John B. Horrigan, *How Americans Get in Touch with Government,* Pew Internet & American Life Project, May 2004. Available online at: http://www.pewInternet.org/Reports/2004/How-Americans-Get-in-Touch-With-Government.aspx, accessed on January 18, 2010.

10 Omnibus Broadband Initiative (OBI) internal analysis of various industry sources.

11 Respondents were asked simply to estimate their monthly bill to the nearest, but not prompted to make that estimate exclusive or inclusive of taxes or fees that may be imposed on service.

12 Internal OBI analysis of data from TNS Telecoms and Telogical Systems.

13 The finding that the correlations are statistically significant is derived from an ordinary least squares (OLS) regression in which the dependent variable is the number of activities a user has done and the independent variables include gender, race, education, income, level of online skills (as discussed in the next section) and the specific attitudinal variable of interest.

14 Eszter Hargittai, "An Update on Survey Measures of Web-Oriented Digital Literacy." *Social Science Computer Review,* Volume 27, no. 1, February 2009, pp. 130–137.

15 As in the example above, the findings that the correlation between skills and number of activities is the result of an OLS regression in which the dependent variable is the number of activities a user has done and the independent variables include gender, race, education, income and the number of tech terms the user reports understanding "very well."

16 Cody Barbierri, "Smartphone usage continues to grow in US, according to Forrester Research." Demo Beat, http://demo.venturebeat.com/2010/01/05/smartphone-usage-continues-to-grows-in-us-according-to-forrester-research/. Accessed on February 12, 2010.

17 John B. Horrigan, *Wireless Internet Use,* Pew Internet & American Life Project, July 22, 2009.

18 According to the Census, 54 million people have a disability, including speech, hearing, vision, mobility or cognitive disorders. U.S. Census Bureau, Americans With Disabilities: 2005, Current Population Reports, 3, 4 (2008), http://www.census.gov/Press-Release/www/releases/archives/income_wealth/013041.html.

19 In constructing the segments, a statistical cluster analysis was performed only on those respondents who did not have broadband at home. Several different cluster solutions were evaluated for their effectiveness in producing cohesive groups that were distinct from one another and substantively meaningful. The final solution selected was judged to be strongest on a statistical basis and to be most persuasive from a substantive perspective.

20 Active blocks are defined as 100 contiguous phone numbers (e.g., 609-924-9200 to 609-924-9299) with at least one residential directory listings.

21 Phone numbers in SSI random-digit database are flagged as "protected" if they have recently been pulled for any sample order. While excluding protected numbers results in a "fresher" sample (i.e., one that consists of numbers that have not been recently pulled), we feel that excluding these numbers would potentially bias our sample.

22 Blumberg SJ, Luke JV. Wireless substitution: Early release of estimates from the National Health Interview Survey, July-December, 2008. National Center for Health Statistics. May 2009.

23 PSRAI's disposition codes and reporting are consistent with the American Association for Public Opinion Research standards.

24 PSRAI assumes that 75 percent of cases that result in a constant disposition of "No answer" or "Busy" are actually not working numbers.