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ABSTRACT

This study examined the demographic characteristics of Internet users compared with those of the general U.S. population, the characteristics of areas where broadband Internet transport is available and of consumers who selected a broadband transport provider, and the factors influencing consumers' choice of an ISP (Internet service provider) and how consumers rate the importance of content and applications offered by their ISP or over the Internet. Two groups of current Internet users, age 18 and over, were sampled--a group intended to be representative of the U.S. Internet-user population and a group living in geographic areas that were believed to have at least one broadband option available. Results indicated that: (1) significant demographic differences exist between Internet users and the general U.S. population; (2) broadband transport via DSL and cable modem was most prevalent in large metropolitan areas and wealthy areas; and (3) Internet users most often consider price and content when selecting an ISP and rank e-mail and World Wide Web surfing as the most important Internet applications. Copies of the survey with results for each of the groups sampled are appended. (MES)

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United States General Accounting Office

GAO

Report to the Ranking Minority Member, Subcommittee on Telecommunications, Committee on Energy and Commerce, House of Representatives

February 2001

TELECOMMUNICATIONS

Characteristics and Choices of Internet Users

ED 453 789

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Abbreviations

DSL	digital subscriber line
ESA	Economics and Statistics Administration
FCC	Federal Communications Commission
ISDN	Integrated Services Digital Network
ISP	Internet service provider
IP	Internet Protocol
kbps	kilobits per second
MSA	Metropolitan Statistical Area
NTIA	National Telecommunications and Information Administration

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United States General Accounting Office
Washington, D.C. 20548

February 16, 2001

The Honorable Edward J. Markey
Ranking Minority Member
Subcommittee on Telecommunications
Committee on Energy and Commerce
House of Representatives

Dear Mr. Markey:

Americans' use of the Internet has grown dramatically in the past few years. Today, there are well over 100 million Americans online.[1] Nationally, more than half of all households have a computer and over 80 percent of those households have access to the Internet.[2] A small but growing percentage of online households have a "broadband" connection to the Internet—a high-speed, high-capacity connection that provides better access to sophisticated forms of Internet content, such as streaming video. Yet during the past few years, even as Internet usage has continued to expand, concerns have arisen about whether a "digital divide" is occurring in America—that is, whether access to the Internet and other advanced telecommunications services is limited for Americans in lower socioeconomic classes or who live in rural areas. These concerns have arisen because the Internet offers Americans a gateway to a vast array of content and applications, and is expected to become a primary medium for communications, commerce, education, and entertainment in the 21st century.[3]

[1]According to the Department of Commerce, there were 116.5 million Americans online as of August 2000—31.9 million more than only 20 months earlier. U.S. Department of Commerce, *Falling Through the Net: Toward Digital Inclusion* (Oct. 2000), p. 33 ("Commerce Report").

[2]Commerce Report, p. 1.

[3]The Internet also makes it easier for citizens to interact with the government. Many federal, state, and local agencies now have Web sites where persons can find answers to questions or download forms.

The Department of Commerce has studied and reported on consumers' use of the Internet, while the Federal Communications Commission (FCC) has monitored and reported on the deployment of broadband services. To respond to your concerns about the possible emergence of a digital divide as well as your ongoing interest in telecommunications issues, we surveyed Internet users to gain a deeper understanding of issues related to Internet usage—such as which Internet access methods Internet users thought were available to them, why users chose their providers, and how various applications (e.g., e-mail) and content (i.e., information sources or Web pages) available from their Internet service provider (ISP) or on the Internet were used.[4] This information can aid understanding of how advanced telecommunications services are being deployed throughout the United States. As agreed with your office, we examined (1) the demographic characteristics of Internet users compared with those of the general U.S. population, (2) the characteristics of areas where broadband Internet transport is available and of consumers who selected a broadband transport provider,[5] and (3) the factors influencing consumers' choice of an ISP and how consumers rate the importance of content and applications offered by their ISP or over the Internet.

[4]Some of the findings from our Internet-user survey were included in an earlier GAO report that focused on the degree of choice consumers have among communications companies providing transport to the Internet and among Internet service providers (*Telecommunications: Technological and Regulatory Factors Affecting Consumer Choice of Internet Providers* (GAO-01-93, Oct. 12, 2000)). That report did not deal directly with concerns about a digital divide.

[5]FCC defines services with a transmission speed of at least 200 kilobits per second (kbps) in one direction as "high speed." It defines services capable of delivering a speed of 200 kbps or more in both directions as "advanced services" or as having "advanced telecommunications capability." We use the term "broadband" to refer to services of both types.

Because we were primarily interested in the choices made by those with access to the Internet, we surveyed current Internet users only.[6] Specifically, we contracted with a market research firm to sample a panel of Internet users over the Internet. The firm sampled two groups of Internet users: (1) a group intended to be representative of the U.S. Internet-user population and (2) a group living in geographic areas that we believed had at least one broadband option available.[7] In both instances, survey participants were 18 years and older. Because we sampled a panel of Internet users, the survey results presented in this report are estimates of the population values for that panel. Throughout this report, all references to "Internet users" denote members of that panel of Internet users. Since panel members were volunteers, they may represent a set of users that is somewhat more sophisticated than the general Internet-user population.

Unless otherwise noted, the survey results presented in this report are from the group intended to be representative of the U.S. Internet-user population. Demographic information about respondents was provided by the market research firm and was compared with Census Bureau data. Unless otherwise indicated in the text, the sampling error is plus or minus no more than 5 percentage points. Also, unless otherwise noted, all survey results are statistically significant at the 95-percent confidence level and refer to home Internet usage.[8] The percentages from our survey are rounded to the nearest whole number. See appendix I for more detailed information about our research methods.

Results in Brief

Our findings, like those of the Department of Commerce, show greater home usage of the Internet by more highly educated and wealthier individuals. In particular, we found that compared with the general U.S. population, Internet users were more likely to be white and well educated and to have higher-than-average household incomes (see fig. 1). Internet usage rates did not differ on the basis of gender, however. Furthermore,

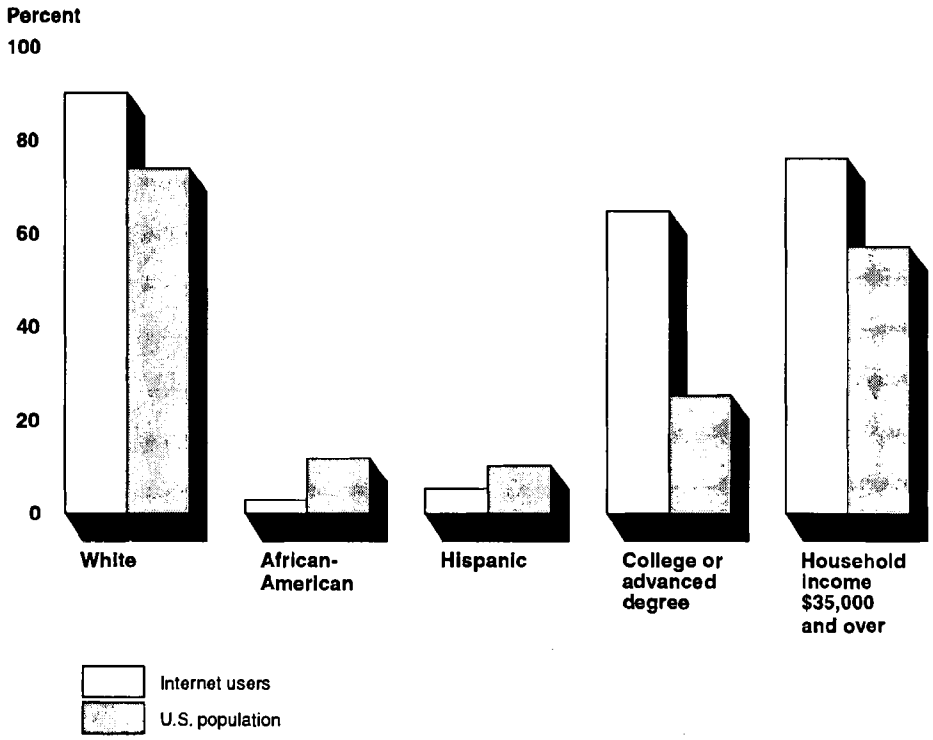
[6]Our methodology differs from that of the Department of Commerce, which used data from the Census Bureau's survey of households that included households with and without computers and Internet access. Our methodology also differs from that of FCC, which used data collected from companies providing Internet services.

[7]See apps. II and III for the complete results of our survey.

[8]It is important to note that many Americans have access to the Internet at their local school or library, although they may lack Internet access at home.

although we did not find Internet use to be statistically related to differences in community size, we did find less broadband availability in the more rural areas of America.

Figure 1: Demographic Information for Internet Users and the U.S. Population



Note: The survey results represent the demographic information for Internet users who are 18 years and older, with the exception of education where the minimum age is 25. The data for the U.S. population includes the same age groups.

Sources: GAO's Survey of Internet users (Apr. – May 2000); U.S. Census Bureau, *The Black Population in the United States*, Current Population Reports, P20-530, table 1 (1999); U.S. Census Bureau, *The Hispanic Population in the United States*, Current Population Reports, P20-527, table 1.1 (1999); U.S. Census Bureau, *Educational Attainment in the United States*, Current Population Reports, P20-528, table 10 (1999); and U.S. Census Bureau, *Money Income in the United States*, Current Population Reports, P60-209, table 13 (1999).

Note: We do not include results for Asian-Americans/Pacific Islanders, Native Americans, or other racial groups in the chart above because we found that the differences for these groups between Internet users and the U.S. population were not statistically significant.

Although over half (52 percent) of the survey respondents reported that broadband service was available to them via either digital subscriber line

(DSL) or cable modem,[9] only about 12 percent subscribed to broadband service. The vast majority of Internet users—an estimated 88 percent—had a "narrowband" connection to the Internet (i.e., a low-speed, low-capacity transport method, such as a conventional telephone line). We found little difference in the demographic characteristics of broadband and narrowband subscribers, except that the household income of broadband users was more likely to be at least $75,000. We also found broadband service to be more prevalent in large metropolitan areas and wealthy areas.

Broadband users were more likely to consider a range of factors when selecting an ISP, such as whether the ISP offered the content and applications that were important to them. Narrowband users most often based their selection of ISP on price. Once online, broadband and narrowband users spent a similar amount of time accessing content available directly from their ISP versus accessing content found by surfing the Internet.[10] We found, however, that frequent Internet users spent less time accessing content provided by their ISP than did infrequent users. Both broadband and narrowband users rated the importance of various Internet content and applications roughly the same.

Some of these findings suggest the existence of a "digital divide" at this time. However, it is often the case that individuals with greater education and income are the first to adopt new technologies, and individuals in rural areas are the last to be reached by the deployment of new telecommunications infrastructure. Since the Internet is still in a relatively early stage of commercial deployment, these socioeconomic and geographic differences in Internet usage are not surprising and may not be long lasting. The challenge for policymakers over the long run will be to determine whether any *continuing* disparities in the availability and use of the Internet among different groups of Americans threaten to deepen the socioeconomic divisions within our society.

[9]Other emerging forms of broadband services are available over various wireless methods, including satellite and fixed wireless technologies.

[10]While some ISPs only provide their subscribers with access to the Internet, many ISPs (such as America Online and EarthLink) also provide their subscribers with content that they have created or with direct links to other selected Web pages and content on the Internet. Other ways for consumers to navigate the Internet are to go to a known Web site directly or to search for, or "surf," the Internet for content of interest to them.

Background

To reach the Internet, a consumer needs service from two types of providers: (1) a communications company (i.e., a telephone, cable television, or wireless company) providing a transport service to physically transmit data to and from the consumer's home and (2) an ISP (e.g., America Online or EarthLink) providing access to the Internet.[11] Usually, consumers buy these services separately, but some providers (particularly cable companies) sell transport and ISP services as an integrated package. Some wireless providers also offer an integrated ISP as part of their Internet transport services.

Different transport providers, depending on the physical makeup of their network, can supply different amounts of "bandwidth," or data transmission capacity. A "narrowband" connection, such as that provided by a conventional telephone line, offers limited capacity resulting in relatively slow rates of data transmission. A "broadband" connection, such as that provided by cable modem service or by a telephone technology known as digital subscriber line (DSL), has greater capacity, giving the user faster data transmission rates and better access to sophisticated, "bandwidth-intensive" content. While many Internet users enjoy fast Internet transport at their place of work or school, no substantial commercial deployment of broadband connections to homes took place until the late 1990s. To date, the two most widely used broadband technologies in homes are cable modem service and DSL. Increased deployment of and subscription to competing broadband transport methods, such as satellite, terrestrial wireless, and optical fiber technologies, is expected in the future.

[11]While ISPs also provide transport of Internet Protocol (IP) packets, we refer to the communications company as a "transport provider" throughout the report to more clearly delineate the roles of the communications company and the ISP. A consumer needs the services of both of these kinds of providers to access the Internet.

An ISP is the consumer's "on-ramp" to the Internet, and once connected to the ISP, the consumer actually becomes part of the Internet. ISPs have routers, switches, and other equipment necessary to transmit traffic to and from the long-haul networks—known as the Internet "backbone"—which connect the computers and communications networks that are part of the Internet.[12] ISPs differ in the features and functions they offer to subscribers. While some only provide access to the Internet and an e-mail application, others offer a "home page"[13] with direct links to specific content on the Internet, as well as proprietary content and additional applications available only to the ISP's subscribers.

[12]We are conducting a review of the functioning and competitiveness of the Internet backbone market. We plan to release a report on this issue in September 2001.

[13]A home page is the first Web page that users see when they access a Web site.

Through section 706 of the Telecommunications Act of 1996, the Congress directed the FCC and the state commissions to "encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans...."[14] In its most recent report on the deployment of advanced telecommunications capability (released in August 2000), FCC identified certain categories of Americans who may have difficulty obtaining access to advanced services. These categories include low-income consumers, those living in sparsely populated areas, minority consumers, Native Americans, persons with disabilities, and those living in U.S. territories.[15] In particular, FCC concluded that several barriers might hinder the ability of low-income, inner-city residents to obtain advanced services. Such barriers include the poor quality of the telecommunications plant or of the inside wiring in multiple-tenant buildings, the relatively high price of advanced services, the lower rates of computer ownership among inner-city residents, and the lack of marketing by providers of advanced services to low-income populations.[16] FCC also found that for the majority of Americans who live in rural areas, lowest-cost access to advanced services was not readily available, and that some rural areas still lacked basic access to the Internet through a local telephone call.[17]

[14]47 U.S.C. 157 note. The Congress defined advanced telecommunications capability to mean "high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology" and without regard to any transmission media or technology.

[15]*In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, CC Docket No. 98-146, *Second Report*, FCC 00-290 (released Aug. 21, 2000) at paragraph 8 ("Second Section 706 Report").

[16]Second Section 706 Report at paragraph 239.

[17]Second Section 706 Report at paragraph 223.

Similarly, the Department of Commerce stated in a recent report that although a sharp upward trend in the number of Americans connecting to the Internet from their homes exists (a trend Commerce found to encompass every income category, education level, racial group, and family type and to include both urban and rural areas), some demographic groups are nevertheless still connecting to the Internet far less than others.[18] However, Commerce pointed out that there was a higher expansion rate of Internet use among these "lower usage" groups.[19] Over time, this suggests that the digital divide may narrow.[20]

Significant Demographic Differences Exist Between Internet Users and the General U.S. Population

Much attention has been directed recently to the question of whether a "digital divide" is occurring in our country—that is, whether Internet access is unevenly distributed across socioeconomic divisions within our society. Our survey results support the perception that access to and use of the Internet are influenced by a person's race, education, and income level. Geographically, however, we did not find that Internet use—when both narrowband and broadband users were measured together—was related to a person's residence in a small or large metropolitan area or rural area.

[18]Data for the Commerce Department's report came from the Census Bureau's August 2000 Current Population Survey of approximately 48,000 sample households.

[19]Commerce Report, p. 3.

[20]Similarly, in its first Section 706 report, FCC compared the deployment of broadband to the rollout of other technologies, such as the telephone, television, and cellular phone. FCC noted that all of these other services spread slowly in their initial years, yet eventually achieved nationwide penetration. *In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, CC Docket No. 98-146, *Report*, FCC 99-5 (released Feb. 2, 1999) at paragraph 33.

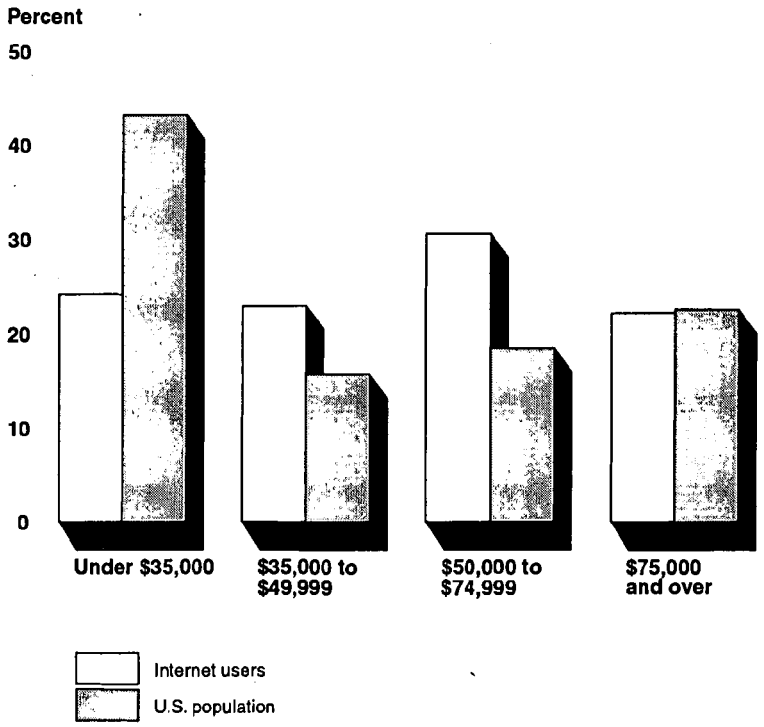
Internet Users Were More Likely to Be White, Well-Educated, and Have a Higher-Than-Average Household Income

One of the most important statistical findings of our survey was that Internet users tended to have a higher household income[21] and more education than the general U.S. population. For example, Internet users were more likely than the general population to be in a household with an income of $35,000 or more per year (see fig. 2).[22] Internet users over the age of 24 were also significantly more likely to be college graduates or to have a graduate degree than the general population. Additionally, our survey found that Internet users, compared with the general U.S. population, represented a higher percentage of whites and a lower percentage of African-Americans and Hispanics.

[21]The Census Bureau's official measure of household income is money income excluding capital gains. This also excludes noncash benefits. A household includes related family members and all unrelated people who share a housing unit, including people living alone in a housing unit.

[22]Internet users were more likely than the general population to be in the income categories between $35,000 and $75,000. They were less likely than the general population to be in the income categories under $35,000.

Figure 2: Household Income for Internet Users and the U.S. Population



Note: The survey results represent the household income of Internet users 18 years and older. The data for the U.S. population represents the income for all households.

Sources: GAO's survey of Internet users (Apr.–May 2000) and U.S. Census Bureau, *Money Income in the United States*, Current Population Reports, P60-209, table 13 (1999).

Other demographic findings from our survey include the following:

- The proportion of men and women online mirrored that of the general population. Surveys from just a few years ago, however, showed women lagging behind men in Internet usage.[23] Thus, our survey suggests that women have caught up in their use of Internet technology and are now just as likely to be online as men.

[23]For example, an October 1998 study showed the ratio of men to women on the Internet to be approximately 66 percent to 34 percent. See the Graphic, Visualization, & Usability Center's 10th WWW User Survey at <www.gvu.gatech.edu/>.

- Compared with the percentage of the general population in various age categories, users who accessed the Internet from home were more likely to be between 25 and 54 years old and less likely to be aged 55 and older.

Internet Usage Rates Were Similar in Urban Areas and Rural Areas

Another concern embodied in the digital divide concept is that people living in rural areas might have less access to the Internet than their more urban counterparts. Our analysis considered Internet use in five types of geographic areas across the United States: nonmetropolitan areas (areas with populations of less than 50,000) and four categories of metropolitan statistical areas (MSA), the largest of which included populations of 2.5 million or more. We found the proportion of Internet users living in each type of geographic area to approximate the breakdown of the overall U.S. population across these areas. This implies that people living in less populated areas are just as likely to obtain some form of Internet access as those in more populated areas.[24] This analysis, however, was based on whether users obtained *any* form of Internet access—narrowband or broadband. Special concerns surround the issue of whether deployment of broadband in rural areas will match that in urban areas. This issue is addressed in the section below.

Broadband Transport Via DSL and Cable Modem Was Most Prevalent in Large Metropolitan Areas and Wealthy Areas

Our survey of Internet users found that 12 percent of the respondents had a broadband connection to the Internet. At the same time, over 52 percent of the survey respondents reported that broadband transport via DSL or cable modem was available to them.[25] The reported availability of broadband, however, was uneven across local areas and was greatest in large metropolitan markets and in wealthy areas. Regardless of these geographic differences, narrowband and broadband subscribers shared many demographic characteristics. The reasoning behind their choice of an Internet transport provider often differed, however.

[24]The Department of Commerce reported a 75-percent increase in the number of rural households with Internet access between December 1998 and August 2000. Commerce found that in 2000, 38.9 percent of rural households had Internet access—close to the nationwide household Internet penetration rate of 41.5 percent. Commerce Report, p. xv.

[25]Internet transport services over satellite are offered throughout the United States. We found, however, that 71 percent of respondents did not know whether any wireless methods of transport—including satellite—were available to them.

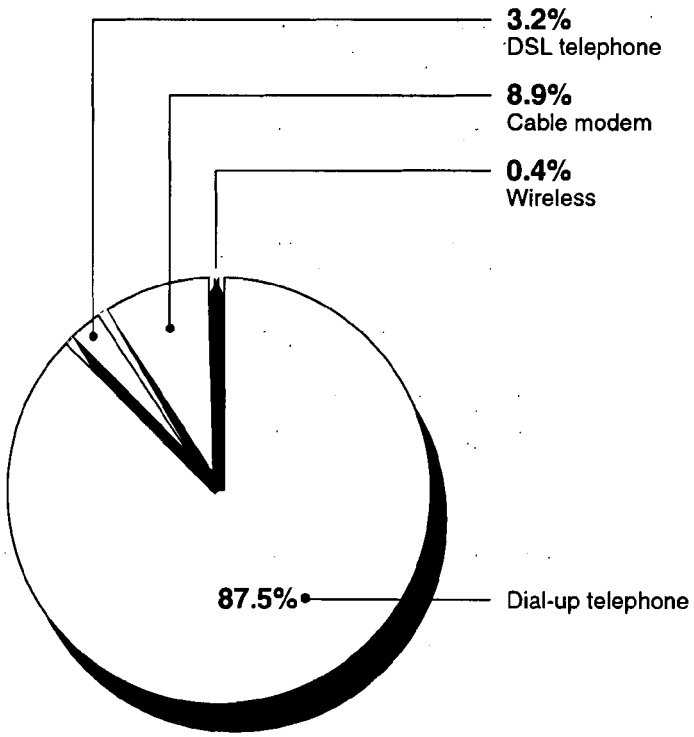
Approximately 12 Percent of Internet Users Subscribed to Broadband Transport to the Internet

We found that 12 percent of the respondents had a broadband method of transport to the Internet—9 percent used a cable modem and 3 percent used DSL.[26] The conventional telephone line was still the most common method of transport to the Internet, with about 88 percent of respondents using narrowband telephone transport. Figure 3 presents the distribution of the means of physical transport to the Internet based on our survey results. Although the vast majority of Internet users still rely on narrowband transport, there has been substantial growth in broadband usage. This point is illustrated by reports from two financial services firms, showing that as recently as 1998 only about 2 percent of Internet users subscribed to a broadband service.[27]

[26]Also, less than half a percent of our survey respondents reported using some form of wireless Internet access. Similarly, Commerce reported that 10.7 percent of online households have a broadband transport method. (We note, however, that Commerce included Integrated Services Digital Network, or ISDN, in its definition of broadband, whereas we did not.)

[27]Merrill Lynch and Company, *Internet/e-Commerce: The Quarterly Handbook: Q1 2000* (New York, N.Y.: 1999), p. 67, and Morgan Stanley Dean Witter and Company, *The Internet Data Services Report* (New York, N.Y.: 1999), p. 20.

Figure 3: Respondents' Means of Physical Transport to the Internet From Their Home



Notes: The survey results are based on responses from Internet users 18 years and older.

Wireless technologies include satellite, fixed wireless, and other wireless methods.

Source: GAO's survey of Internet users (Apr.–May 2000).

Broadband Technology Was More Prevalent in Large Metropolitan Areas and Wealthy Areas

Section 706 of the Telecommunications Act of 1996 directs FCC to initiate regular inquiries into the availability of advanced services (which include, but are not limited to, broadband Internet transport) to all Americans. In its most recent section 706 report, FCC gathered data from companies providing high-speed service lines and conducted case studies to examine the deployment and use of advanced services in different communities. FCC generally found significant investment in the facilities needed to provide advanced services, steadily rising subscription rates for advanced services, and a proliferation of providers in the marketplace.[28] However, FCC stated that less than 20 percent of sparsely populated areas had high-speed subscribers[29] and concluded that many rural Americans are "particularly vulnerable to untimely access to advanced services if left to market forces alone."[30] Likewise, the Commerce Department, which based its report on a survey of U.S. households, found the percentages of Internet users with a broadband transport method to be 12.2 percent in central cities and 11.8 percent in urban areas, but only 7.3 percent in rural areas.[31]

[28]Second Section 706 Report at paragraph 1.

[29]FCC's deployment data are based on its formal "Broadband Survey," which required any facilities-based firm that provided 250 or more high-speed service lines (or wireless channels) in a given state to report basic information about its service offerings and customers. These providers also reported a list of the zip codes where they had at least one customer of high-speed service. FCC noted that because only providers with 250 or more subscribers in a state had to report, many smaller providers that serve discrete communities in sparsely populated areas may not have reported.

[30]Second Section 706 Report at paragraphs 88, 220.

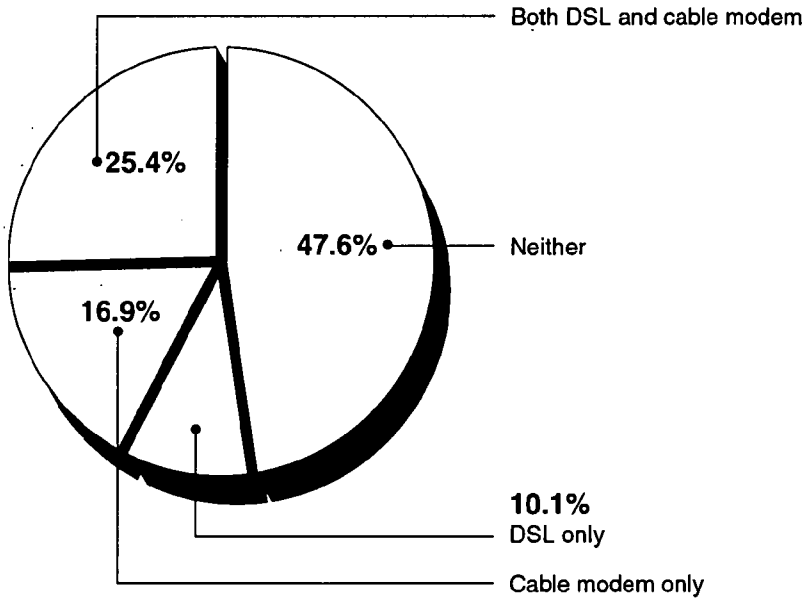
[31]Commerce Report, p. 24, fig. I-16.

To further gauge the level of broadband deployment, we asked current Internet users about the availability of DSL and cable modem services where they live.[32] Among all survey respondents, 52 percent reported that one or more broadband service was available to them: 17 percent reported that only cable modem service was offered, 10 percent reported that only DSL service was available, and 25 percent reported that they could choose from both cable modem and DSL services (see fig. 4). This slightly greater prevalence of cable modem services accords with the findings of FCC and the Commerce Department, both of which found cable to have a greater market share than DSL at this time.[33]

[32]This measurement includes consumers' *perceptions* about the availability of broadband in their area. Their perceptions would depend in part on their exposure to marketing by broadband service providers or to word-of-mouth about broadband services by friends and neighbors. In addition, a service may be available in a general area, yet not be available to particular households.

[33]Second Section 706 Report at paragraph 71 and Commerce Report, p. 23. However, Commerce did find that younger householders prefer DSL over cable modems.

Figure 4: Reported Availability of DSL and Cable Modem Service Where Respondents Live



Note: The survey results are based on responses from Internet users 18 years and older.

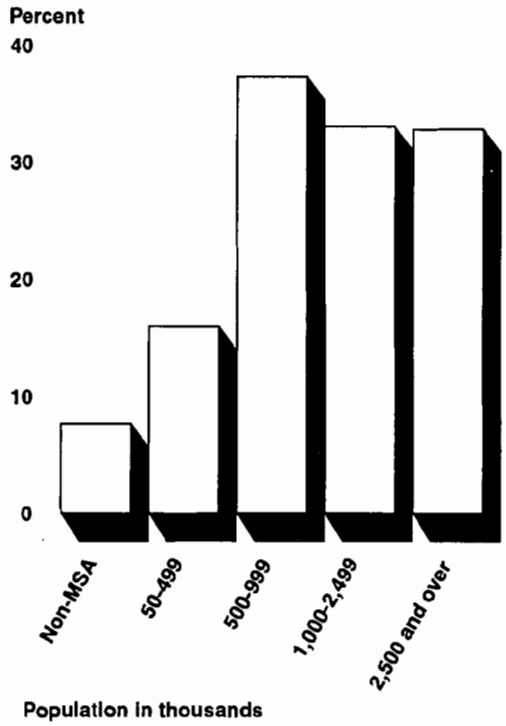
Source: GAO's survey of Internet users (Apr.–May 2000).

To determine whether the availability of broadband varies by community size, we examined the relationship between the population of the area where respondents live and whether they reported that DSL and cable modem services were obtainable. Similar to the other studies, our survey found the availability of broadband technology to be most prevalent in large metropolitan areas (see fig. 5). For example, more than 32 percent[34] of the survey respondents in a metropolitan area with a population of 2.5 million or more reported having both DSL and cable modem service available where they lived. The corresponding figure for rural areas was less than 8 percent.[35]

[34]Plus or minus 8 percent.

[35]Plus or minus 6 percent.

Figure 5: Reported Availability of Both DSL and Cable Modem Where Respondents Live (by Size of Metropolitan Area)



Notes: The survey results are based on Internet users 18 years and older who reported that both DSL and cable modem services were available where they live.

The difference in availability of both DSL and cable modem between small markets (non-MSA areas or MSAs with a population of 50,000 to 499,999) and any large markets (MSAs with populations of 500,000 and over) is statistically significant at the 95-percent level. There is no statistically significant difference between the two small market categories or between the three large market categories.

Source: GAO's survey of Internet users (Apr.–May 2000).

While nationwide and metropolitan area-level data provide insights on broadband deployment, additional insights can be gained by analyzing data at a more localized level.[36] To examine the characteristics of local areas with and without broadband availability, we used Census Bureau demographic data for areas designated by zip code. Within each zip code we looked at several variables including income, poverty rates, home values, and education levels. Using survey respondents' answers to whether DSL and cable modem services were available where they lived, we examined whether these Census Bureau variables differed between zip codes where users reported the availability or unavailability of broadband transport services.[37]

The data in table 1 suggest that residents of local areas where survey respondents reported broadband service to be available were, on average, wealthier than residents of local areas where survey respondents said broadband service was unavailable. Specifically:

- Median household income was higher where broadband service was available than where it was unavailable. Local areas where both DSL and cable modem service were available had an average median household income approximately 28 percent higher than areas where neither service was available.
- Poverty rates were lower in local areas where both DSL and cable modem service were available compared with local areas where neither was available.
- The average median home value was over 63 percent higher in local areas where both DSL and cable modem services were available than where neither was available.

[36]The results we present in this section are generally consistent with those found by David Gabel and Florence Kwan, *Accessibility of Broadband Telecommunication Services by Various Segments of the American Population*, unpublished paper presented at the 2000 Telecommunications Policy Research Conference, Alexandria, Va. Using company and technical data, the authors found that broadband service was more prevalent in urbanized areas where residents have high incomes.

[37]We excluded 39 survey respondents from the analysis because their zip codes—which we used to define local areas—were not in the Census Bureau's 1990 U.S. Census database. Because the populations within zip codes can differ, we computed weighted statistics for the zip code level analysis with population serving as the weight.

Table 1: Income and Wealth Measures for Local Areas Where Respondents Reported That Broadband Service Was or Was Not Available

	DSL and cable modem	
Characteristic	**Both available**	**Neither available**
Median household income	$35,633[a]	$27,822[b]
Poverty rate	10.2%	14.5%
Median home value	$124,265[c]	$76,015[d]

Note: Point estimates are mean values for zip codes based on Census Bureau data. The two categories, both DSL and cable modem available and neither DSL nor cable modem available, were derived from GAO's survey of Internet users. The sampling error for both poverty rate estimates is less than plus or minus 2 percentage points.
[a] Sampling error plus or minus $1,982.
[b] Sampling error plus or minus $2,049.
[c] Sampling error plus or minus $16,438.
[d] Sampling error plus or minus $10,724.

Sources: GAO's survey of Internet users (Apr.–May 2000) and U.S. Census Bureau, *Census of Population and Housing*, 1990: Summary Tape File 3B, Tables P80A, P117, and H61A.

Another notable characteristic of local areas where broadband service was reported to be available was the educational level of the residents. As shown in table 2, a larger percentage of the population had attained some amount of postsecondary education in local areas where respondents said broadband service was available. For example, 27 percent of people (aged 25 and older) in local areas where both DSL and cable modem service were said to be available had a college or advanced degree, compared with 19 percent in areas where neither service was reported to be available.

Table 2: Educational Attainment of People 25 and Older in Local Areas Where Respondents Reported That Broadband Service Was Available or Not Available

	DSL and cable modem	
Educational level	**Both available**	**Neither available**
High school degree or less	44.1%	53.9%
College or advanced degree	26.7%	19.0%

Notes: Point estimates are mean values for zip codes based on Census Bureau data. The two categories, both DSL and cable modem available and neither DSL nor cable modem available, were derived from GAO's survey of Internet users. In all instances, the sampling errors are less than plus or

minus 3 percentage points. The percent of the population in each category with some college education, but no college degree, was not statistically different at the 95-percent level.

Results in this table are presented for individuals in the zip codes who were 25 years and older because the *Census of Population and Housing*, 1990 provides data on these individuals for educational variables.

Sources: GAO's survey of Internet users (Apr.–May 2000) and U.S. Census Bureau, *Census of Population and Housing*, 1990: Summary Tape File 3B, Table P57.

Narrowband and Broadband Subscribers Shared Many Characteristics, Yet Differed in Their Reasoning for Selecting Transport Providers

Little difference existed in the demographic characteristics of survey respondents subscribing to narrowband service compared with those subscribing to broadband service. We found no differences in marital status, household size, race, Hispanic origin, education, or employment, between narrowband and broadband subscribers. However, we did find a statistically significant difference with respect to income: 40 percent[38] of broadband subscribers had an annual household income of $75,000 or more, compared with only 20 percent of narrowband users.

While narrowband and broadband subscribers shared many demographic attributes, they differed in their reasons for selecting their method of transport to the Internet. Among narrowband users, the most commonly reported reason for selecting narrowband service—cited by 38 percent of respondents—was its relatively low price. Survey respondents using narrowband transport reported spending less for both one-time initial fees and recurring monthly fees.[39] For example, only 18 percent of narrowband subscribers reported spending over $100 for one-time initial fees, whereas 39 percent[40] of broadband subscribers reported spending this much for initial installation and setup. The same pattern emerges for monthly fees (see fig. 6). Among narrowband subscribers, less than 18 percent reported spending more than $30 per month to access the Internet while the corresponding figure for broadband subscribers was 74 percent.[41] These

[38]Plus or minus 13 percent.

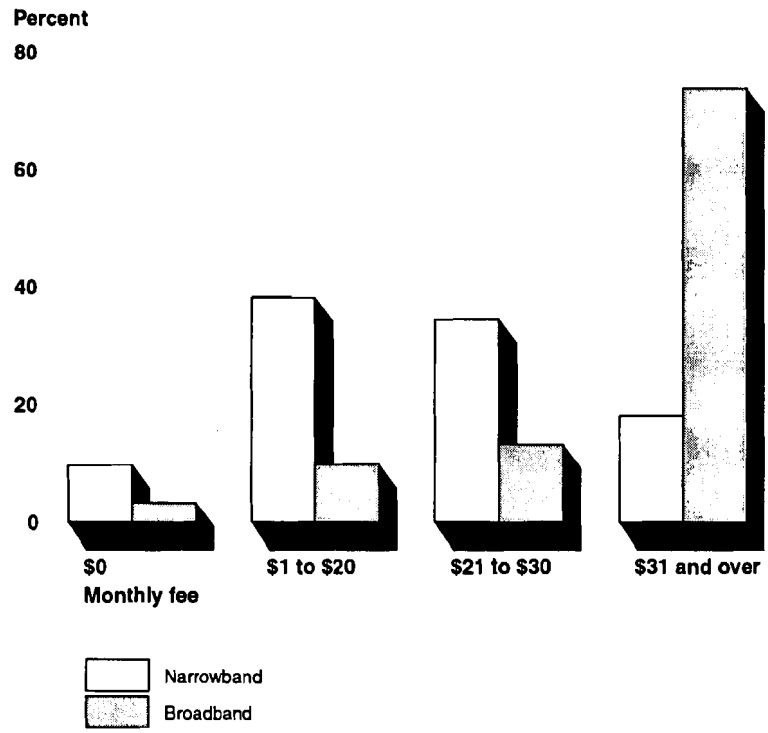
[39]Initial fees, for both broadband and narrowband subscribers, could include charges for items such as the purchase of an external modem, installation of a second telephone line, and initial service fees charged by an ISP; we excluded the cost of a computer in the initial fee. Monthly fees could include charges for a physical transport provider, a second telephone line, and an ISP.

[40]Plus or minus 13 percent.

[41]Plus or minus 11 percent.

pricing patterns held consistent across geographic areas: the monthly fees consumers encountered in rural areas, small metropolitan markets, and large metropolitan markets were similar.

Figure 6: Monthly Fees Respondents Reported Paying for Internet Service



Note: Monthly fees for Internet service include charges for Internet access, ISPs, and equipment leasing as reported by Internet users 18 years and older. Amounts reported reflect consumers' perceptions of their cost of Internet access, and may be affected by factors such as whether their services are bundled services, paid for by an employer, or other such circumstances.

Source: GAO's survey of Internet users (Apr.–May 2000).

Although most narrowband users based their selection of transport provider on price, many others were narrowband users by default—that is, almost 29 percent of narrowband subscribers reported the lack of a broadband alternative as their most important reason for choosing a narrowband transport provider. In fact, 19 percent of narrowband Internet users had made some attempt to obtain broadband service but were unsuccessful, often because companies were unable to or had elected not

to provide broadband service in their area at that time. Additionally, 12 percent of narrowband respondents reported that they were unaware of any choices other than a narrowband connection. Seven percent of narrowband respondents stated that they chose a narrowband connection so they would be able to choose their ISP; 6 percent said they chose narrowband because it was the easiest type of connection to use.

Among broadband users, the most commonly reported reason for selecting their transport mode—cited by 40 percent[42] of these respondents—was that the speed was appropriate for the services and applications they used most frequently. An additional 18 percent of broadband respondents said that they chose this kind of connection in order to free up their telephone line, which is in use during a dial-up Internet session unless the consumer purchases a second telephone line. Finally, 10 percent of broadband users said they chose this type of connection because it was the most user-friendly.

Internet Users Most Often Consider Price and Content When Selecting an ISP and Rank E-Mail and Web Surfing as the Most Important Internet Applications

Just as Internet users often based their selection of transport provider on price, they often based their selection of ISP on price. Broadband users, however, were more likely to consider other factors, such as whether the ISP offered the various content and applications that were important to them. Once online, all users rated the importance of various Internet features and applications roughly the same. Narrowband and broadband users spent a similar amount of time accessing their ISP's content compared with surfing the Internet. However, we found that infrequent users and new users tended to rely more on the content provided to them by their ISP.

Most Narrowband Users Based Their ISP Selection on Price, Whereas Broadband Users Based Their Choice on a Variety of Factors

As the Internet industry continues to evolve, so does the role of the ISP. In our prior report on Internet competition, we noted that many ISPs now serve as "content aggregators"—that is, they provide subscribers with applications, proprietary content, and direct links to content on the Internet. Concerns have been raised about how ISPs choose the content they offer subscribers—in particular, whether ISPs might favor material from affiliated content providers or discriminate against unaffiliated

[42]Plus or minus 13 percent.

content providers. Consumer choice among ISPs is thus seen as important to enhancing consumers' access to varied content. In our survey, we examined how Internet users selected their ISP and how they used the services provided by their ISP.

In the case of narrowband users, the most common reason given for their choice of ISP—cited by almost 35 percent of respondents—was price,[43] while only 13 percent[44] of broadband users identified price as the most important reason why they chose their particular ISP (see fig. 7). Among broadband users, the most common answer to this question—cited by 23 percent[45] of respondents—was that they selected their ISP because it was the company that provided the features and applications of most interest to them. Nearly 13 percent[46] of broadband users reported that the most important reason they chose their ISP was that they effectively had no choice—the ISP came bundled with their transport provider.[47] Among survey respondents in areas where broadband service was thought to be available, this response was the most frequent, cited by 24 percent[48] of broadband users.

[43]"Price" includes such responses as "least expensive," "free," "computer or ISP promotion," and "school or employer provided."

[44]Plus or minus 9 percent.

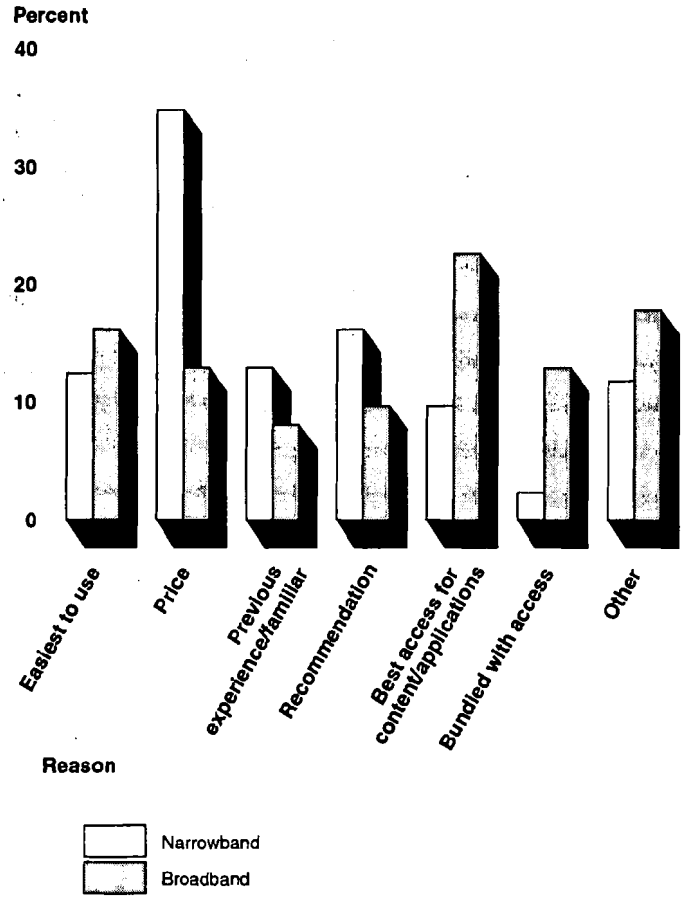
[45]Plus or minus 11 percent.

[46]Plus or minus 9 percent.

[47]These consumers effectively have no choice of ISP unless they choose to pay twice for a second ISP to get the features and applications they desire.

[48]Plus or minus 8 percent.

Figure 7: Reasons Respondents Reported for Selecting Their Internet Service Provider



Note: The survey results are based on responses from Internet users 18 years and older.

Source: GAO's survey of Internet users (Apr.–May 2000).

Because of concerns that ISPs might influence or restrict consumers' content choices, we asked users how much time they spent accessing content available on their ISP's Web site (or available through a direct link from the ISP's Web site) compared with the time they spent accessing content that they searched for on the Internet. Overall, users reported spending more time surfing the Internet for content or accessing sites already familiar to them than accessing ISP-provided content. We found that, on average, respondents spent 35 percent of their time online using applications or content available from their ISP's site. Narrowband users spent slightly more time on their ISP's site or accessing ISP-provided content than broadband users—36 percent versus 29 percent[49]—although the difference was not statistically significant.

The amount of time users spent online was a more important determinant of how long they spent on their ISP's site. Users whose households were online less than 10 hours per week (this included 18 percent of total respondents) spent an average of almost 43 percent[50] of their time accessing their ISP's content or linked content. However, for households with usage of 40 hours or more per week (this included 13 percent of total respondents), time spent on their ISP's content dropped to 26 percent.[51] For respondents from areas where broadband service was thought to be available, the number of years a respondent had been accessing the Internet was another factor associated with the time spent on their ISP's site. For example, new users (those online for less than 2 years, which constituted 18 percent of respondents) spent nearly 41 percent[52] of their time on their ISP's site while long-term users (those online for 5 or more years, which constituted 39 percent of respondents in this group) spent only 30 percent of their time accessing content and applications on their ISP's site. Respondents to our survey said the biggest advantage to using ISP-provided content was that it was readily available and, thus, easier to use than content that required searching on the Internet.

[49]Plus or minus 7 percent.

[50]Plus or minus 7 percent.

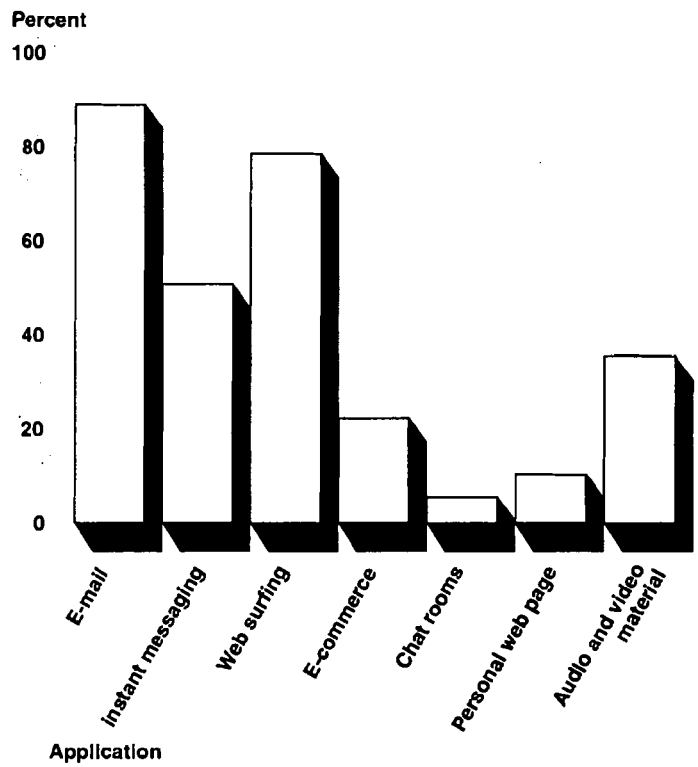
[51]Plus or minus 6 percent.

[52]Plus or minus 5 percent.

Little Difference Between How Narrowband and Broadband Users Rate the Various Features and Applications Available Online

Both narrowband and broadband Internet users rated e-mail and Web surfing as the most important applications available to them online, with 89 percent of users rating e-mail as "extremely important" or "very important," and 78 percent of users placing Web surfing in those categories (see fig. 8). Almost 80 percent of users said chat rooms were "not that important" or "not at all important," and almost 70 percent said the same about posting and maintaining a personal Web page. The results for e-commerce (such as online shopping), an Internet application that receives considerable attention, were mixed. Among all survey respondents, 22 percent said that e-commerce was "extremely important" or "very important." However, 39 percent of respondents said that e-commerce was "not that important" or "not at all important."

Figure 8: Percent of Respondents Rating Applications "Extremely" or "Very" Important



Note: The survey results are based on responses from Internet users 18 years and older.
Source: GAO's survey of Internet users (Apr.–May 2000).

The general absence of appreciable differences in how broadband users and narrowband users rated the features and applications available to them online may illustrate that, at this time, both narrowband and broadband subscribers are using the Internet in the same fashion, mostly for e-mail and Web surfing. This is likely due to the fact that little broadband-specific content is currently available. As more bandwidth-intensive content and applications are introduced in the market, consumers may begin to perceive narrowband and broadband Internet transport as distinct products with different capabilities. In turn, broadband users may begin to use the Internet in new and different ways.

Agency Comments

We provided a draft of this report to FCC and to the Department of Commerce's National Telecommunications and Information Administration (NTIA) and Economics and Statistics Administration (ESA) for their review and comment. NTIA and ESA provided written comments that are included in appendix IV. Also, FCC, NTIA, and ESA officials provided technical comments that were incorporated as appropriate.

As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 14 days after the date of this letter. At that time we will provide copies to interested congressional committees; the Honorable Michael K. Powell, Chairman, Federal Communications Commission; the Honorable John F. Sopko, Acting Assistant Secretary for Communications and Information, Department of Commerce; James Lee Price, Acting Under Secretary for Economic Affairs, Department of Commerce; and other interested parties. We will also make copies available to others on request.

If you or your staff have any questions about this report, please contact me at (202) 512-7631. Key contributors to this report are listed in appendix V.

Stanley J. Czerwinski

Stanley J. Czerwinski
Director, Physical Infrastructure Issues

Scope and Methodology

We conducted various statistical tests on the data from our survey of Internet users (conducted in April and May 2000) and reviewed relevant reports from the Federal Communications Commission (FCC) and the Department of Commerce. In our survey, we asked questions about what method of Internet transport consumers used, why consumers selected their method of Internet transport, why they selected their Internet service provider (ISP), what applications consumers believed were important, how consumers used the Internet, what costs consumers incurred for Internet services, and to what extent consumers found broadband Internet access available and easy to purchase. Participants were notified about the survey and responded to the survey over the Internet. We selected this approach, rather than a traditional mail or telephone survey, because we sought information only from current users of Internet services.

To provide the sample frame,[1] draw the sample, and manage the survey operations, we contracted with NPD Group, Inc. (NPD), a market research firm. NPD maintains a panel of approximately 400,000 Internet users that is intended to be representative of the Internet population. The panel consists of Internet users who have volunteered to respond to surveys NPD conducts for its clients over the Internet. Factors influencing the degree to which the panel is deemed representative include demographic information and usage patterns. We did not evaluate whether NPD's panel is representative of the Internet population.

We used information from existing documentary evidence and preliminary interviews from our earlier report to develop the survey instrument. We conducted two rounds of pretests. First, we conducted pretests in person to assess whether the survey instrument was understandable and unbiased. Second, the survey instrument was pretested by 34 randomly selected members of NPD's panel using NPD's Internet-based application. This allowed us to assess whether the performance of the online survey instrument was acceptable and to further identify any unclear portions of the survey and any potentially biased questions.

To detect any differences between users residing in areas where broadband Internet access may be available and the general U.S. Internet population, we asked NPD to draw two samples from its panel of Internet users. The first sample frame was intended to be representative of the U.S. Internet population, 18 years or older. The second sample frame was intended to be

[1]A sample frame is a list from which a sample can be drawn.

representative of the U.S. Internet population, 18 years or older, who reside in areas where broadband Internet access was likely to be available. NPD developed this second sample frame using zip code information that we had developed.

We used a three-step process to identify zip codes where broadband Internet access was likely to be available. First, we consulted an industry publication to get a preliminary list of geographic areas where cable modem service was deployed.[2] Second, we developed a list of zip codes that corresponded to these geographic areas. We gathered the zip code information from the U.S. Postal Service's Web site and one additional commercial Web site. Third, we checked the Web sites of cable companies identified by the industry publication to confirm the geographic locations where they provide cable modem service. We excluded all geographic locations that we could not confirm as having cable modem service available; we also added geographic locations to the list if the cable company reported providing cable modem service in those areas. Because broadband service is generally available on a neighborhood-by-neighborhood basis in a given geographic area, we probably included zip codes where broadband service was not available to all consumers. However, our approach did identify areas where broadband service was available or was available in the immediate geographic area. NPD used the final list to develop the second sample frame.

The survey was available to participants over an 18-day period (Apr. 21, 2000, through May 8, 2000) on NPD's secure Web site. Participants were notified by e-mail that a survey was available to be completed; they could complete it any time during the period. At our request, NPD sent a follow-up e-mail to increase the response rate for both samples. For the first sample, a total of 1,225 people were notified. A total of 604 people responded to the survey (a 49.3-percent response rate). Of the respondents, 97 were excluded because they did not make the household's primary decisions about Internet access and therefore did not complete the entire

[2]To develop a list of where broadband Internet access may be available, we considered only cable modem access. While digital subscriber line (DSL) is a broadband Internet access technology, we found no source that provided comprehensive information on DSL deployment by geographic area. We justified relying on cable modem access alone because information gathered while researching the earlier report on consumer choice of Internet providers suggested that cable modem service availability often precedes the availability of DSL. Thus, by focusing on areas where cable modem access was available, the list was likely to include many areas where multiple broadband Internet access technologies were available.

survey. Additionally, 11 observations were removed because the respondent provided inconsistent answers to questions 2 and 4 (see app. II for the questions in the survey). This left 496 complete responses (40.5 percent of the sample). For the second sample, 2,525 people were notified of the survey. A total of 1,209 people responded to the survey (a 47.9-percent response rate). We excluded 409 responses (16.2 percent of the sample) as recommended by NPD to ensure that the sample was representative of the target population. Of the remaining respondents, 140 were excluded because they did not make the primary decisions about Internet access and therefore did not complete the entire survey. Additionally, 21 observations were removed because the respondent provided inconsistent answers to questions 2 and 4 (see app. III for the questions in the survey) or because the respondent was under 18 years old. This left 639 complete responses (25.3 percent of the sample).

The sample frame determines the population to which we can generalize the survey results. For the first sample, the sample frame was intended to be representative of the U.S. Internet user population 18 years or older. The second sample frame was intended to be representative of the U.S. Internet user population, 18 years or older, who reside in areas where broadband access was likely to be available. While demographic and usage patterns for survey participants were intended to be representative of the U.S. Internet user population, some biases might be present because participants were volunteers.

Because we used a sample to develop the estimates of Internet characteristics presented throughout this report, each estimate has a measurable precision, or sampling error, that may be expressed as a plus or minus figure. A sampling error indicates how closely we can reproduce from a sample the results that we would obtain if we were to take a complete count of the population we are analyzing using the same measurement methods. By adding the sampling error to and subtracting it from the estimate, we can develop upper and lower bounds for each estimate. This range is called a confidence interval. Sampling errors and confidence intervals are stated at a certain confidence level—in this case, 95 percent. For example, a confidence interval at the 95-percent confidence level means that in 95 out of 100 instances, the sampling procedure used would produce a confidence interval containing the universe value we are estimating.

To assess the demographic characteristics of Internet users and of local areas where broadband service was expected to be available, we relied on

a number of Census Bureau data sets. We compared the proportion of Internet users in various categories of each demographic variable with the proportion of the general population in the same categories using the most recent Census Bureau data available. This permitted us to assess whether Internet users were more or less prevalent in certain categories of demographic variables than the general population. To assess the demographic characteristics of local areas where broadband service was reported to be available, we relied on Census Bureau zip code data. For each respondent, NPD provided a corresponding zip code for the area where the respondent lived. We gathered demographic data for each zip code from the *Census of Population and Housing*, 1990: Summary Tape File 3B, Tables P57, P80A, P117, and H61A (the most recent data available). On the basis of respondents' answers about the availability of broadband service, we made inferences about the demographic characteristics of local areas with and without broadband service as indicated by Census Bureau data at the zip code level.

Survey Results for Sample Intended to Be Representative of the U.S. Internet Population

The following tables show the questions included in our survey of Internet users and the responses, by percentage of respondents. For this sample, we randomly surveyed 1,225 Internet users and received 604 responses (a 49.3-percent response rate). Question 1—which asked whether the respondent was the primary decisionmaker for Internet purchases in the household—was asked of all survey participants. Only those participants who responded "Yes" to this question (507 participants) continued with the remainder of the survey. Additionally, 11 observations were removed because the respondent provided inconsistent answers to questions 2 and 4. This left 496 responses for questions 2 through 18.

For this sample, the sample frame—that is, the entire panel of potential survey respondents—consisted of 389,593 individuals. This is the population to which the survey results can be generalized. With a 49.3-percent response rate, our survey results can thus be interpreted as estimates for the 192,096 potential individuals that we estimate would have responded to our survey if we had contacted all individuals in the panel. For questions 2 though 18, the relevant population estimate was 157,748 because observations from respondents who did not make the household's primary decisions about Internet purchases were excluded.

Unless otherwise noted in footnotes to the questions, there were no missing observations.

Question 1: Are you the primary decisionmaker for your household regarding what form of Internet access to purchase for your home? ***(Select one)***

Answer	Percent
Yes	83.9
No	16.1

Note: Population is 192,096 individuals.

Question 2: Which of the following do you most frequently use to access the Internet from your home? *(Select one)*

Answer	Percent
Conventional dial-up telephone service provided by a telephone company (this includes ISDN service)	87.5
High-speed "digital subscriber line" (or "DSL") telephone service	3.2
High-speed cable modem service (this includes using the cable modem as the downlink and a telephone line for the return path or uplink)	8.9
Wireless service (for example, satellite service such as DirecPC, fixed wireless service such as Winstar or Teligent, or other wireless service)	0.4

Note: Population is 157,748 individuals.

Question 3A: What is the most important reason you use conventional dial-up telephone service for your Internet access from home?[a] *(Select one)*

Answer	Percent
No choice; only method of Internet access available to me	28.8
Not aware of other choices of Internet access	11.8
Least expensive/best priced	36.6
Company's service quality reputation and/or experience	2.3
Easiest/most user-friendly	6.5
Most appropriate for the applications/services I use most frequently	3.7
Ability to select the Internet service provider I wanted	7.1
Other (Please specify)[b]	3.2

Note: Population is 138,029 individuals.

[a]Information based on respondents who indicated that they use conventional dial-up telephone service in question 2.

[b]Among "Other," 0.9% of respondents reported free as the most important reason for selecting conventional dial-up telephone service.

Question 3B: What is the most important reason you use (high-speed DSL service, high-speed cable modem service, or wireless service) for your Internet access from your home?[a] *(Select one)*

Answer	Percent[b]
Least expensive/best priced	9.7
Easiest/most user-friendly	9.7
Company's service quality reputation and/or experience	1.6
Ability to select the Internet service provider I wanted	6.5
Speed appropriate for the applications/services I use most frequently	40.3
Speed equivalent to the access I have at work or at other locations where I have Internet access	4.8
To free up my regular telephone line for voice call	17.7
Other (Please specify)	9.6

Note: Population is 19,718 individuals.

[a]Information based on respondents who said that they use DSL, cable modem, or wireless service in question 2.

[b]Percentages do not equal 100 because of rounding.

Question 4: In addition to conventional dial-up telephone Internet access, is any other form of Internet access available in the area where you live? *(Select one for each row)*

Query statement	Yes	No	Don't know
High-speed "digital subscribers line" (or "DSL") telephone service	35.5%	19.4%	45.2%
High-speed cable modem service	42.3%	19.6%	38.1%
Wireless service (e.g., satellite, fixed wireless, other wireless)	16.7%	12.3%	71.0%

Note: Population is 157,748 individuals.

Question 5: For those methods of Internet access that are not available in your area, or not available to you, do either of the following reasons describe why such methods are not available?[a] *(Select one in each row)*

Query statement	Yes	No	Don't know
My apartment/condominium building does not allow other telecommunications companies to provide Internet access or other communications services	4.7%	87.6%	7.8%
I am prohibited or unable to use a satellite dish or other wireless receiving devise for wireless Internet access where I live	10.9%	79.1%	10.1%

Note: Population is 41,027 individuals.

[a]Information based on respondents who reported that one or more of DSL, cable modem, and wireless service is not available where they live in question 4.

Question 6: Which of the following is the most important reason you selected your current Internet service provider (e.g., AOL, Excite@Home, MindSpring, etc.)? *(Select one)*

Answer	Percent[a]
Easiest to use	12.9
Least expensive ISP available	19.2
Previous experience/was familiar with my ISP prior to subscribing	9.3
Provided the best access to the content/applications that I use and/or want most	11.3
Did research on my ISP prior to subscribing	3.0
Recommended to me by family, friends, co-workers, etc.	15.3
Part of a promotion with the purchase of my computer (e.g., a cash rebate, a free trial, etc.)	10.1
Offered as part of a package of services by a telecommunications company	4.8
My Internet service provider came bundled with my Internet access	3.6
Other (Please specify)[b]	10.4

Note: Population is 157,748 individuals.

[a]Percentages do not equal 100 because of rounding.

[b]Among "Other," 0.4% respondents report free, 1.6% respondents report other ISP promotions, and 0.8% respondents report provided by employer/school as the most important reason for selecting their current ISP.

Question 7A: Assessing the Importance of Internet Applications

How important to you is _____ *(Select one for each row)*	Not important	Not that important	Moderately important	Very important	Extremely important	Don't know application
Having an e-mail application?	1.0%	1.8%	7.3%	30.2%	58.7%	1.0%
The ability to send and receive e-mail messages in real time (real-time messaging)?[a]	2.8%	13.9%	25.5%	28.7%	22.0%	7.1%
Surfing the Internet for various Web pages and content?[a]	0.4%	2.4%	18.2%	37.8%	40.6%	0.6%
E-commerce (online shopping)?[a]	11.5%	27.9%	37.8%	14.5%	7.7%	0.6%
Access to chat rooms?[a]	41.0%	38.4%	15.2%	3.2%	2.2%	0.0%
Posting and maintaining a personal Web page?[a]	35.8%	34.1%	19.0%	4.8%	5.5%	0.8%
Accessing audio or video material on the Internet?[a]	6.1%	17.4%	40.8%	24.2%	11.1%	0.4%

Note: Population is 157,748 individuals.

[a]Missing observation = 0.2%.

Question 7B: Assessing the Availability of Internet Applications

Is (are) _____ *available* to you through your Internet service provider (you don't necessarily have to be using the application)? *(Select one for each row)*	Yes	No	Don't know
E-mail	96.6%	1.6%	1.8%
Real-time messaging[a]	59.2%	6.7%	34.1%
Web/content surfing[a]	92.5%	1.4%	6.1%
Online shopping[a]	90.7%	2.2%	7.1%
Chat rooms[a]	84.8%	6.5%	8.7%
Posting/maintaining a personal Web page[a]	77.0%	4.4%	18.6%
Accessing audio or video material[a]	83.0%	3.2%	13.7%

Note: Population is 157,748 individuals.

[a]Missing observation = 0.2%.

Question 8: Thinking about a typical Internet session, what percentage of your time is spent on your ISP's home page accessing content or service applications, such as e-mail, as opposed to the percentage of time spent surfing the Internet for content and applications?[a] ***(Please enter appropriate percentage)***

Percentage of time spent on ISP's home page content	Percentage
0	10.9
1	3.0
2	1.8
3	0.8
4	0.2
5	5.1
7	0.2
8	0.2
10	11.5
14	0.2
15	3.0
20	5.5
24	0.2
25	6.7
30	4.2
32	0.2
33	0.4
34	0.2
35	1.2
40	4.8
43	0.2
45	0.8
49	0.2
50	10.7
51	0.2
55	0.8
60	6.7
65	1.0
67	0.2
70	4.0
74	0.2
75	5.5

(Continued From Previous Page)

Percentage of time spent on ISP's home page content	Percentage
77	0.2
80	3.2
85	1.0
86	0.2
90	3.0
95	1.0
97	0.2
100	0.2

Note: Population is 157,748 individuals.

[a]Missing observation = 0.2%.

Question 9: What are the advantages to using applications or accessing content that appear on your ISP's home page?[a] *(Select all that apply)*

Query statement	Percent
Easier to use the readily available content[b]	41.8
ISP's home page has links to reach appropriate content faster than downloading from the Internet[c]	25.2
ISP's content provides me with all I need[c]	12.9
No advantages[c]	12.9

Note: Population is 140,553 individuals.

[a]Information based on respondents who said that they spend more than 0 percent of their time on their ISP's home page in question 8. Percentages do not equal 100 percent because respondents could select multiple items.

[b]Missing observation = 0.5%.

[c]Missing observation = 0.2%.

Question 10A: How interested would you be in purchasing a package of communications services from a single company (for example, telephone, cable television, Internet access, etc.)?[a] *(Select one)*

Answer	Percent
Very interested	24.6
Somewhat interested	53.9
Not interested	21.4

Note: Population is 157,748 individuals.

[a]Missing observation = 0.2%.

Question 10B: Which best describes why you would be interested in purchasing a package of communications services?[a] *(Select one*

Answer	Percent
Receiving one bill for multiple services	13.1
Receiving price discounts for purchasing multiple services	66.6
Obtaining assistance and maintenance on all my services from one company	4.1
Ease and convenience of purchasing all services from one company	16.2

Note: Population is 123,832.

[a]Information based on respondents who said that they were somewhat or very interested in purchasing a package of communications services in question 10A.

Question 11: In addition to your home, from which other locations do you access the Internet?[a,b] *(Select all that apply)*

Query statement	Percent
Work	53.5
School	17.8
Library	19.2
A remote location using my laptop (for example, a hotel, an airport, etc.)	13.9
A remote location using my mobile wireless device (for example, Palm Pilot)	1.2
Other (Please specify)	6.9

Note: Population is 157,748 individuals.

[a]Percentages do not equal 100 percent because respondents could select multiple items.

[b]Missing observation = 0.2%.

Question 12: On average, how many hours per week do you and all members of your household spend on the Internet from your home using any and all applications (for example, e-mail, Web surfing, working, shopping, etc.)?[a] ***(Select one)***

Answer	Percent
Less than 1 hour	0.0
1 to less than 4 hours	6.3
4 to less than 10 hours	12.1
10 to less than 15 hours	19.4
15 to less than 25 hours	29.3
25 to less than 40 hours	19.8
40 to less than 60 hours	6.3
60 or more hours	6.9

Note: Population is 157,748 individuals.

[a]Missing observation = 0.2%.

Question 13: Including your work experience, how long have you been accessing the Internet?[a] ***(Select one)***

Answer	Percent
Less than 1 year	5.3
1 year to less than 2 years	11.1
2 years to less than 3 years	16.0
3 years to less than 5 years	31.5
5 years to less than 7 years	21.2
7 years to less than 9 years	7.7
9 or more years	7.3

Note: Population is 157,748 individuals.

[a]Missing observation = 0.2%.

Question 14A: About how much did you initially pay to obtain Internet access from your home? Please include in your amount such items as

- **the purchase of an external modem,**
- **any initial fee for your Internet service provider, and**
- **any installation charge for a second phone line if you purchased one to be used primarily for your Internet use.**

Do *not* include in your amount the purchase of a computer.[a] *(Select one)*

Answer	Percent
None	18.2
Less than $25	32.9
$25 to $50	16.0
$51 to $100	12.3
$101 to $150	9.5
$151 to $200	5.3
$201 to $250	3.2
$251 to $300	1.0
$301 to $350	0.8
$351 to $400	0.2
More than $400	0.6

Note: Population is 157,748 individuals.

[a]Missing observation = 0.2%.

Question 14B: About how much do you pay per month to access the Internet from your home? Please include in your amount such items as

- **access (via telephone, cable, etc.),**
- **the monthly charge for a second phone line if you purchased one to be use primarily for your Internet use,**
- **the monthly charge for your Internet service provider, and**
- **any equipment leasing.[a] *(Select one)***

Answer	Percent
Nothing	8.9

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(Continued From Previous Page)

Less than $5	1.4
$5 to $10	3.8
$11 to $15	8.3
$16 to $20	21.0
$21 to $30	31.7
$31 to $40	11.1
$41 to $50	8.7
More than $50	5.1

Note: Population is 157,748 individuals.

[a]Missing observation = 0.2%.

Question 15: About how much more would you be willing to pay over and above what you are currently paying per month for high-speed Internet access (for example, high-speed DSL service, high-speed cable modem service, or wireless service)?[a] ***(Select one)***

Answer	Percent
Nothing	37.8
Less than $5	14.3
$5 to $10	27.4
$11 to $15	7.1
$16 to $20	6.7
$21 to $30	4.1
$31 to $40	0.9
$41 to $50	1.2
More than $50	0.5

Note: Population is 138,029 individuals.

[a]Information based on respondents who said that they use conventional dial-up telephone service in question 2.

Question 16: About how much more per month would you be willing to pay over and above what you are currently paying per month for your high-speed Internet access before you would either discontinue the service and/or change to a conventional dial-up telephone line for Internet access?[a,b] ***(Select one)***

Answer	Percent
Nothing	50.8
Less than $5	6.6
$5 to $10	26.2
$11 to $15	3.3
$16 to $20	3.3
$21 to $30	0.0
$31 to $40	4.9
$41 to $50	1.6
More than $50	3.3

Note: Population is 19,718 individuals.

[a]Information based on respondents who said they use DSL, cable modem, or wireless service in question 2.

[b]Missing observation = 1.6%.

Question 17: Overall, how easy or difficult was the process of purchasing high-speed Internet access from your home (for example, the amount of time, the number of calls made to the Internet access provider, the number of visits made to your home by the provider's technician, etc.)?[a,b] ***(Select one)***

Answer	Percent
Very easy	63.9
Somewhat easy	21.3
Somewhat difficult	8.2
Very difficult	6.6

Note: Population is 19,718 individuals.

[a]Information based on respondents who said that they use DSL, cable modem, or wireless service in question 2.

[b]Missing observation = 1.6%.

Question 18: Have you ever tried to get high-speed Internet access (high-speed DSL service, high-speed cable modem service, or wireless service) but been unable to?[a] ***(Select one)***

Answer	Percent
Yes	19.4
No	80.6

Note: Population is 138,029 individuals.

[a]Information based on respondents who said that they use conventional dial-up telephone service in question 2.

Survey Results for Sample Representative of the U.S. Internet Population in Areas Where Broadband Is Believed to Be Available

The following tables show the questions included in our survey of Internet users and the responses by percentage of respondents. For this sample, we surveyed 2,525 Internet users who lived in areas of the country that we had determined were very likely to have at least one broadband choice available to them. We received 1,209 responses (a 47.9-percent response rate). Question 1—which asked whether the respondent was the primary decisionmaker for Internet purchases in the household—was asked of all survey participants. Only those participants who responded "Yes" to this question (1,069 participants) continued with the remainder of the survey. We also excluded 409 responses (16.2 percent of the sample) as recommended by NPD to ensure that the sample was representative of the target population. Additionally, 21 observations were removed because the respondent provided inconsistent answers to questions 2 and 4 or because the respondent was under 18 years old. This left 639 responses for questions 2 through 18.

For this sample, the sample frame consisted of 72,600 individuals; this is the population to which the survey results can be generalized. For questions 2 through 18, the relevant population estimate was 57,989 because of the excluded observations mentioned above.

Unless otherwise noted in footnotes to the questions, there were no missing observations.

Question 1: Are you the primary decisionmaker for your household regarding what form of Internet access to purchase for your home? (*Select one*)

Answer	Percent
Yes	83.3
No	16.7

Note: Population is 72,600 individuals.

Question 2: Which of the following do you most frequently use to access the Internet from your home? *(Select one)*

Answer	Percent
Conventional dial-up telephone service provided by a telephone company (this includes ISDN service)	80.8
High-speed "digital subscriber line" (or "DSL") telephone service	4.4
High-speed cable modem service (this includes using the cable modem as the downlink and a telephone line for the return path or uplink)	14.7
Wireless service (for example, satellite service such as DirecPC, fixed wireless service such as Winstar or Teligent, or other wireless service)	0.2

Note: Population is 57,989 individuals.

Question 3A: What is the most important reason you use conventional dial-up telephone service for your Internet access from home?[a] *(Select one)*

Answer	Percent
No choice; only method of Internet access available to me	17.1
Not aware of other choices of Internet access	11.2
Least expensive/best priced	47.1
Company's service quality reputation and/or experience	2.1
Easiest/most user-friendly	6.0
Most appropriate for the applications/services I use most frequently	5.2
Ability to select the Internet service provider I wanted	6.8
Other (Please specify)[b]	4.5

Note: Population is 46,855 individuals.

[a]Information based on respondents who indicated that they use conventional dial-up telephone service in question 2.

[b]Among "Other," 1.2% of respondents reported that they would be changing soon from conventional dial-up telephone service to a broadband service.

Question 3B: What is the most important reason you use (high-speed DSL service, high-speed cable modem service, or wireless service) for your Internet access from your home?[a] *(Select one)*

Answer	Percent
Least expensive/best priced	8.1
Easiest/most user-friendly	8.9
Company's service quality reputation and/or experience	3.3
Ability to select the Internet service provider I wanted	3.3
Speed appropriate for the applications/services I use most frequently	44.7
Speed equivalent to the access I have at work or at other locations where I have Internet access	10.6
To free up my regular telephone line for voice call	17.1
Other (Please specify)	4.0

Note: Population is 11,134 individuals.

[a]Information based on respondents who said they use DSL, cable modem, or wireless service in question 2.

Question 4: In addition to conventional dial-up telephone Internet access, is any other form of Internet access available in the area where you live? *(Select one for each row)*

Query statement	Yes	No	Don't know
High-speed "digital subscribers line" (or "DSL") telephone service	54.1%	9.5%	36.3%
High-speed cable modem service	67.4%	8.5%	24.1%
Wireless service (e.g., satellite, fixed wireless, other wireless)	23.6%	5.0%	71.4%

Note: Population is 57,989 individuals.

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Question 5: For those methods of Internet access that are not available in your area, or not available to you, do either of the following reasons describe why such methods are not available?[a] *(Select one in each row)*

Query statement	Yes	No	Don't know
My apartment/condominium building does not allow other telecommunications companies to provide Internet access or other communications services	11.1%	78.9%	10.0%
I am prohibited or unable to use a satellite dish or other wireless receiving devise for wireless Internet access where I live	20.0%	62.2%	17.8%

Note: Population is 8,168 individuals.

[a]Information based on respondents who reported that one or more of DSL, cable modem, and wireless service is not available where they live in question 4.

Question 6: Which of the following is the most important reason you selected your current Internet service provider (e.g., AOL, Excite@Home, MindSpring, etc.)? *(Select one)*

Answer	Percent[a]
Easiest to use	13.6
Least expensive ISP available	17.7
Previous experience/was familiar with my ISP prior to subscribing	8.5
Provided the best access to the content/applications that I use and/or want most	10.0
Did research on my ISP prior to subscribing	3.1
Recommended to me by family, friends, co-workers, etc.	15.2
Part of a promotion with the purchase of my computer (e.g., a cash rebate, a free trial, etc.)	10.0
Offered as part of a package of services by a telecommunications company	3.9
My Internet service provider came bundled with my Internet access	7.4
Other (Please specify)[b]	10.7

Note: Population is 57,989 individuals.

[a]Percentages do not equal 100 because of rounding.

[b]Among "Other," 0.8% respondents report free, 1.9% respondents report other ISP promotions, and 1.7% respondents report provided by employer/school as the most important reason for selecting their current ISP.

Question 7A: Assessing the Importance of Internet Applications

How important to you is _____ (*Select one for each row*)	Not important	Not that important	Moderately important	Very important	Extremely important	Don't know application
Having an e-mail application?	0.9%	1.9%	8.6%	22.7%	65.3%	0.6%
The ability to send and receive e-mail messages in real time (real-time messaging)?	3.0%	15.2%	26.0%	28.0%	22.8%	5.0%
Surfing the Internet for various Web pages and content?	0.3%	2.2%	16.7%	34.9%	45.5%	0.3%
E-commerce (online shopping)?	8.1%	27.7%	40.2%	15.0%	8.5%	0.5%
Access to chat rooms?	43.7%	35.7%	13.8%	4.4%	2.2%	0.3%
Posting and maintaining a personal Web page?	33.5%	31.5%	21.3%	8.9%	4.2%	0.6%
Accessing audio or video material on the Internet?	3.1%	20.3%	41.3%	23.2%	12.1%	0.0%

Note: Population is 57,989 individuals.

Question 7B: Assessing the Availability of Internet Applications

Is (are) _____ *available* to you through your Internet service provider (you don't necessarily have to be using the application)? (*Select one for each row*)	Yes	No	Don't Know
E-mail	96.2%	1.6%	2.2%
Real-time messaging	62.0%	8.5%	29.6%
Web/content surfing	94.7%	0.6%	4.7%
Online shopping	92.3%	1.1%	6.6%
Chat rooms	85.4%	2.7%	11.9%
Posting/maintaining a personal Web page	77.8%	4.2%	18.0%
Accessing audio or video material	86.9%	2.3%	10.8%

Note: Population is 57,989 individuals.

Question 8: Thinking about a typical Internet session, what percentage of your time is spent on your ISP's home page accessing content or service applications, such as e-mail, as opposed to the percentage of time spent surfing the Internet for content and applications? ***(Please enter appropriate percentage)***

Percentage of time spent on ISP's home page content	Percentage
0	10.0
1	4.2
2	2.3
3	0.5
4	0.3
5	5.9
8	0.2
10	11.3
15	2.0
17	0.2
19	0.2
20	5.5
25	5.6
26	0.2
28	0.2
30	6.1
33	0.2
35	1.6
37	0.2
38	0.2
40	5.6
45	0.6
46	0.2
50	11.6
51	0.3
53	0.2
55	0.5
56	0.3
58	0.2
60	5.3
65	1.4
68	0.2

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Percentage of time spent on ISP's home page content	Percentage
69	0.2
70	4.4
72	0.2
75	5.0
80	2.3
83	0.2
85	1.4
90	2.0
91	0.2
95	0.8
97	0.2
98	0.3

Note: Population is 57,989 individuals.

Question 9: What are the advantages to using applications or accessing content that appear on your ISP's home page?[a] *(Select all that apply)*

Query statement	Percent
Easier to use the readily available content[b]	42.4
ISP's home page has links to reach appropriate content faster that downloading from the Internet[c]	29.4
ISP's content provides me with all I need[b]	12.0
No advantages	32.5

Note: Population is 52,190 individuals.

[a]Information based on respondents who said that they spend more than 0 percent of their time on their ISP's home page in question 8. Percentages do not equal 100 percent because respondents could select multiple items.

[b]Missing observation = 0.4%.

[c]Missing observation = 0.2%.

Question 10A: How interested would you be in purchasing a package of communications services from a single company (for example, telephone, cable television, Internet access, etc.)? *(Select one)*

Answer	Percent
Very interested	25.7
Somewhat interested	52.7
Not interested	21.6

Note: Population is 57,989 individuals.

Question 10B: Which best describes why you would be interested in purchasing a package of communications services?[a] *(Select one)*

Answer	Percent
Receiving one bill for multiple services	16.4
Receiving price discounts for purchasing multiple services	60.5
Obtaining assistance and maintenance on all my services from one company	6.0
Ease and convenience of purchasing all services from one company	17.2

Note: Population is 45,463 individuals.

[a]Information based on respondents who said that they were somewhat or very interested in purchasing a package of communications services in quesiton 10A.

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Question 11: In addition to your home, from which other locations do you access the Internet?[a] *(Select all that apply)*

Query statement	Percent
Work	57.7
School	16.3
Library	17.8
A remote location using my laptop (for example, a hotel, an airport, etc.)	13.9
A remote location using my mobile wireless device (for example, Palm Pilot)	1.4
Other (Please specify)	4.4

Note: Population is 57,989 individuals.

[a]Percentages do not equal 100 percent because respondents could select multiple items.

Question 12: On average, how many hours per week do you and all members of your household spend on the Internet from your home using any and all applications (for example, e-mail, Web surfing, working, shopping, etc.)? *(Select one)*

Answer	Percent
Less than 1 hour	0.6
1 to less than 4 hours	3.9
4 to less than 10 hours	15.5
10 to less than 15 hours	16.1
15 to less than 25 hours	27.7
25 to less than 40 hours	20.3
40 to less than 60 hours	9.4
60 or more hours	6.4

Note: Population is 57,989 individuals.

Question 13: Including your work experience, how long have you been accessing the Internet? *(Select one)*

Answer	Percent
Less than 1 year	6.7
1 year to less than 2 years	11.1
2 years to less than 3 years	13.8
3 years to less than 5 years	29.3
5 years to less than 7 years	23.9
7 years to less than 9 years	8.0
9 or more years	7.2

Note: Population is 57,989 individuals.

Question 14A: About how much did you initially pay to obtain Internet access from your home? Please include in your amount such items as

- **the purchase of an external modem,**
- **any initial fee for your Internet service provider, and**
- **any installation charge for a second phone line if you purchased one to be used primarily for your Internet use.**

Do *not* include in your amount the purchase of a computer. (*Select one*)

Answer	Percent
None	19.6
Less than $25	30.0
$25 to $50	14.6
$51 to $100	13.9
$101 to $150	10.0
$151 to $200	5.5
$201 to $250	2.7
$251 to $300	1.3
$301 to $350	0.8
$351 to $400	0.5
More than $400	1.3

Note: Population is 57,989 individuals.

Question 14B: About how much do you pay per month to access the Internet from your home? Please include in your amount such items as

- **access (via telephone, cable, etc.),**
- **the monthly charge for a second phone line if you purchased one to be use primarily for your Internet use,**
- **the monthly charge for your Internet service provider, and**
- **any equipment leasing.** ***(Select one)***

Answer	Percent
Nothing	10.3
Less than $5	0.9
$5 to $10	4.1
$11 to $15	7.8
$16 to $20	18.8
$21 to $30	30.4
$31 to $40	11.7
$41 to $50	10.6
More than $50	5.3

Note: Population is 57,989 individuals.

Question 15: About how much more would you be willing to pay over and above what you are currently paying per month for high-speed Internet access (for example, high-speed DSL service, high-speed cable modem service, or wireless service)?[a] ***(Select one)***

Answer	Percent
Nothing	36.4
Less than $5	15.1
$5 to $10	22.5
$11 to $15	7.9
$16 to $20	12.4
$21 to $30	4.5
$31 to $40	0.8
$41 to $50	0.4
More than $50	0.0

Note: Population is 46,855 individuals.

[a]Information based on respondents who said they use conventional dial-up telephone service in question 2.

Question 16: About how much more per month would you be willing to pay over and above what you are currently paying per month for your high-speed internet access before you would either discontinue the service and/or change to a conventional dial-up telephone line for Internet access?[a] *(Select one)*

Answer	Percent
Nothing	44.7
Less than $5	13.8
$5 to $10	23.6
$11 to $15	8.1
$16 to $20	2.4
$21 to $30	4.1
$31 to $40	0.0
$41 to $50	1.6
More than $50	1.6

Note: Population is 11,134 individuals.

[a]Information based on respondents who said that they use DSL, cable modem, or wireless service in question 2.

Question 17: Overall, how easy or difficult was the process of purchasing high-speed Internet access from your home (for example, the amount of time, the number of calls made to the Internet access provider, the number of visits made to your home by the provider's technician, etc.)?[a] *(Select one)*

Answer	Percent
Very easy	61.8
Somewhat easy	30.9
Somewhat difficult	6.5
Very difficult	0.8

Note: Population is 11,134 individuals.

[a]Information based on respondents who said that they use DSL, cable modem, or wireless service in question 2.

Question 18: Have you ever tried to get high-speed Internet access (high-speed DSL service, high-speed cable modem service, or wireless service) but been unable to?[a] *(Select one)*

Answer	Percent
Yes	14.7
No	85.3

Note: Population is 46,855 individuals.

[a]Information based on respondents who said that they use conventional dial-up telephone service in question 2.

Comments From the Department of Commerce

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and
Information Administration
Washington, D.C. 20230

JAN 24 2001

Mr. Stanley J. Czerwinski
Director, Housing and Telecommunications Issues
Resources, Community and Economic Development Division
United States General Accounting Office
Washington, D.C. 20548

Dear Mr. Czerwinski:

Thank you for providing an opportunity for NTIA to review and comment on the General Accounting Office's draft report, Telecommunications Characteristics and Choices of Internet Users. NTIA provided technical edits directly to your staff late last week.

I would also like to thank you and your staff for the professional courtesies extended to NTIA during the development of this report.

Sincerely,

John F. Sopko
Acting Assistant Secretary for
Communications and Information

UNITED STATES DEPARTMENT OF COMMERCE
The Under Secretary for Economic Affairs
Washington, D.C. 20230

January 22, 2001

Mr. Stanley J. Czerwinski
Director, Housing and Telecommunications Issues
Resources, Community and Economic Development Division
United States General Accounting Office
Washington, D.C. 20548

Dear Mr. Czerwinski:

Thank you for the opportunity to comment on the draft report *Telecommunications: Characteristics and Choices of Internet Users*. The findings in this report are generally consistent with the Economics and Statistics Administration's (ESA) own research on Internet access and use.

In conversation with researchers at the General Accounting Office, ESA's analysts have offered a few technical comments and suggestions. It is our understanding that these will be incorporated in the final report.

Sincerely,

Lee Price

Lee Price
Acting Under Secretary for Economic Affairs

ECONOMICS AND STATISTICS ADMINISTRATION

GAO Contacts and Staff Acknowledgments

GAO Contacts

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