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Residential Broadband Survey Results

Prepared for Harford County, Maryland
April 2019

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Contents

Figures

Tables

1 Executive Summary

Harford County, Maryland, enjoys a diverse community, with farmland and rural areas to the north and suburban communities and towns to the south. A critical foundation for the area's quality of life is the use of technology, including reliable and robust internet access.

As part of its efforts to evaluate and improve the area's internet access and quality—and to support its application for a federal ReConnect rural broadband grant—Harford County conducted a survey of residents in underserved "north end" areas of the County in 2019. A key focus of the survey was to assess respondents' use of internet services and whether customers' needs are being met. Respondents were segmented into connectivity groups based on their type of internet service in relation to the grant criteria:

1. No internet service
2. Below minimum criteria (dial-up, satellite, cellular/mobile)
3. Possibly below minimum criteria (DSL, fixed wireless, other)[1]
4. Above minimum criteria (fiber, cable modem)

The survey achieved a high response rate of over 30 percent, providing a dataset from which to draw statistically valid conclusions and suggesting a high level of interest overall in the topic of broadband among the targeted population.

Key results from the survey include:

- **The market for a robust, high-speed product is extremely strong.** At a cost of $60 per month, 84 percent of the respondents report that they would purchase the service; at $80 per month, 57 percent of the respondents would purchase the service; and at $100 per month, 40 percent of respondents would purchase the service (see Figure 1, below).

[1] We have completed an engineering analysis of the "Possibly Below Minimum" category to estimate service performance in regard to the ReConnect grant requirements.

Figure 1: Willingness to Switch to High-Speed Internet at Price Levels (Mean Ratings)

- **The County's north end is conclusively unserved/underserved.** Most residents (94 percent) have some form of home internet access, although 79 percent of households have a connection below (61 percent) or possibly below (18 percent) minimum criteria. This includes 40 percent who use a cellular/mobile connection primarily and 18 percent with satellite internet. Another 12 percent of respondents have DSL, and only 12 percent have a cable modem as their primary home internet service.

- **Survey respondents prioritize service reliability and speed foremost.** Reliability and speed of the internet connection ranks as the most important service aspects. Residents are only slightly to moderately satisfied with the speed and reliability of their internet service overall, and the extremely high importance placed on these factors may signal some willingness to switch providers if needs are not being met.

- **Teleworking is a significant driver of demand for improved broadband access.** Although similar proportions of households across connectivity groups have a member who already teleworks, a greater share of households with a connection below the minimum criteria have a household member who *would like to* telework. They are also somewhat more likely to have a household member who plans to start a home-based business or who uses the internet for education.

- **Many unserved residents are willing to pay upfront fees or installation.** Willingness to switch to high-speed internet service (100 Mbps) is very high at $60 per month (84

percent extremely willing), but it drops considerably as the price increases. However, internet users with a slower connections would be more willing to switch providers at various price points, and they would be more willing to pay a one-time fee for access to high-speed internet, compared with those who already have internet service above the minimum criteria.

- **North end residents are generally unsatisfied with what the market has to offer.** Additionally, those with a connection below or possibly below minimum criteria were less likely to agree that the market offers affordable high-speed internet, and they were more likely to agree that high-speed internet is an essential service and that they would be willing to pay a premium for access.

- **North end residents want the County's help to address the lack of broadband availability.** Eight in 10 respondents indicated that Harford County should have some role in expanding broadband internet access, although they were split as to whether that role should be to install and lease to private companies, or to encourage private firms to build a high-speed network. There is strong support for County intervention to address broadband needs in a manner that would require some form of upfront financial investment.

This report documents the survey process, discusses methodologies, presents results, and provides key findings that will help Harford County assess the current state and ongoing needs of its residents regarding high-speed communications services.

2 Survey Process

As part of an effort to evaluate and improve high-speed communications services in the area, Harford County conducted a mail survey of residents in selected areas of the County in January 2019. The survey specifically targeted geographic areas that the County believes are significantly "unserved" on the basis of thresholds set by the U.S. Department of Agriculture (USDA) for its ReConnect grant program.[2] The survey omitted addresses for which cable modem services that exceed these thresholds are known to be available.

The survey captured information about residents' current communications services, satisfaction with those services, desire for improved services, willingness to pay for faster internet speeds, and opinions regarding the role of the County regarding internet access and service. A copy of the survey instrument is included in Appendix A.

The County acquired the services of CTC Technology and Energy (CTC) to help assess internet access in the region and evaluate options to improve service in select areas of the County. Coordination and Responsibilities

In the project planning phase, County staff and the CTC team discussed the primary survey objectives, the timing of the survey and data needs, and options for the survey process. The project scope, timeline, and responsibilities were developed based on those discussions.

The CTC team developed the draft survey instrument based on the project objectives and provided it to County staff for review and comment. County staff provided revisions and approved the final questionnaire and specified geographies to be included in survey sampling. The County provided a mailing list of residences in selected areas of Harford County. The CTC team coordinated all printing, mailing, and data entry efforts; provided regular updates regarding survey responses; and performed all data coding and cleaning, statistical analyses, response summaries, and reporting of results.

2.1 Survey Mailing and Response

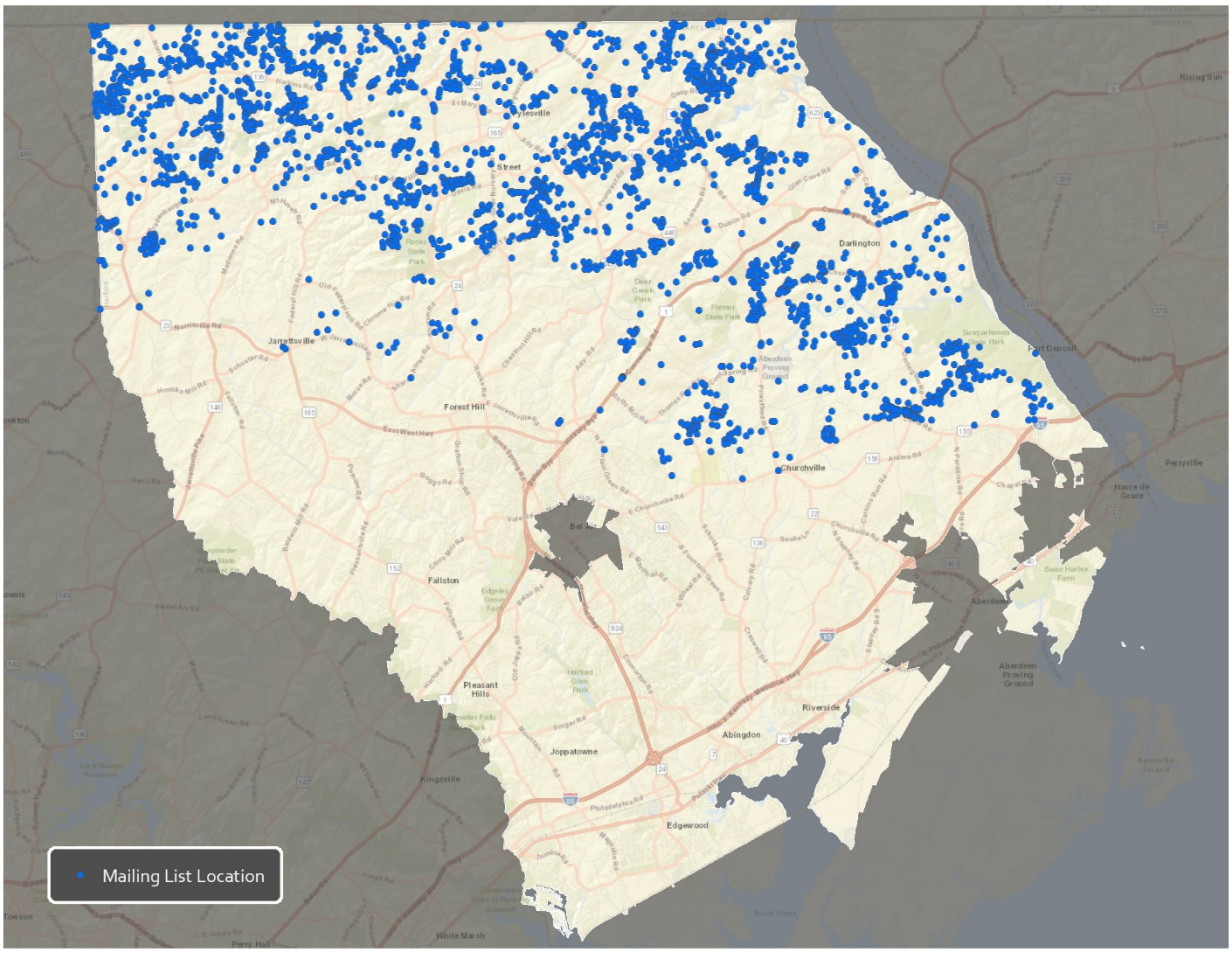
A total of 2,556 survey packets were mailed first-class to residential households in January 2019 with a goal of receiving at least 380 valid responses. Recipients were provided with a postage-paid business reply mail envelope in which to return the completed questionnaire.

[2] The USDA defines "unserved" as the lack of availability of a fixed broadband service providing capacity levels of 10 Mbps downstream and 1 Mbps upstream. See: "Program Overview," USDA, https://www.usda.gov/reconnect/program-overview.

Harford County provided a mailing list of approximately 4,000 addresses in underserved areas of the County, pulled from County property records, from which to draw the sample. Duplicate contact names and addresses were removed from the list.

Figure 2 illustrates the addresses to which surveys were mailed.

Figure 2: Locations of Survey Recipients

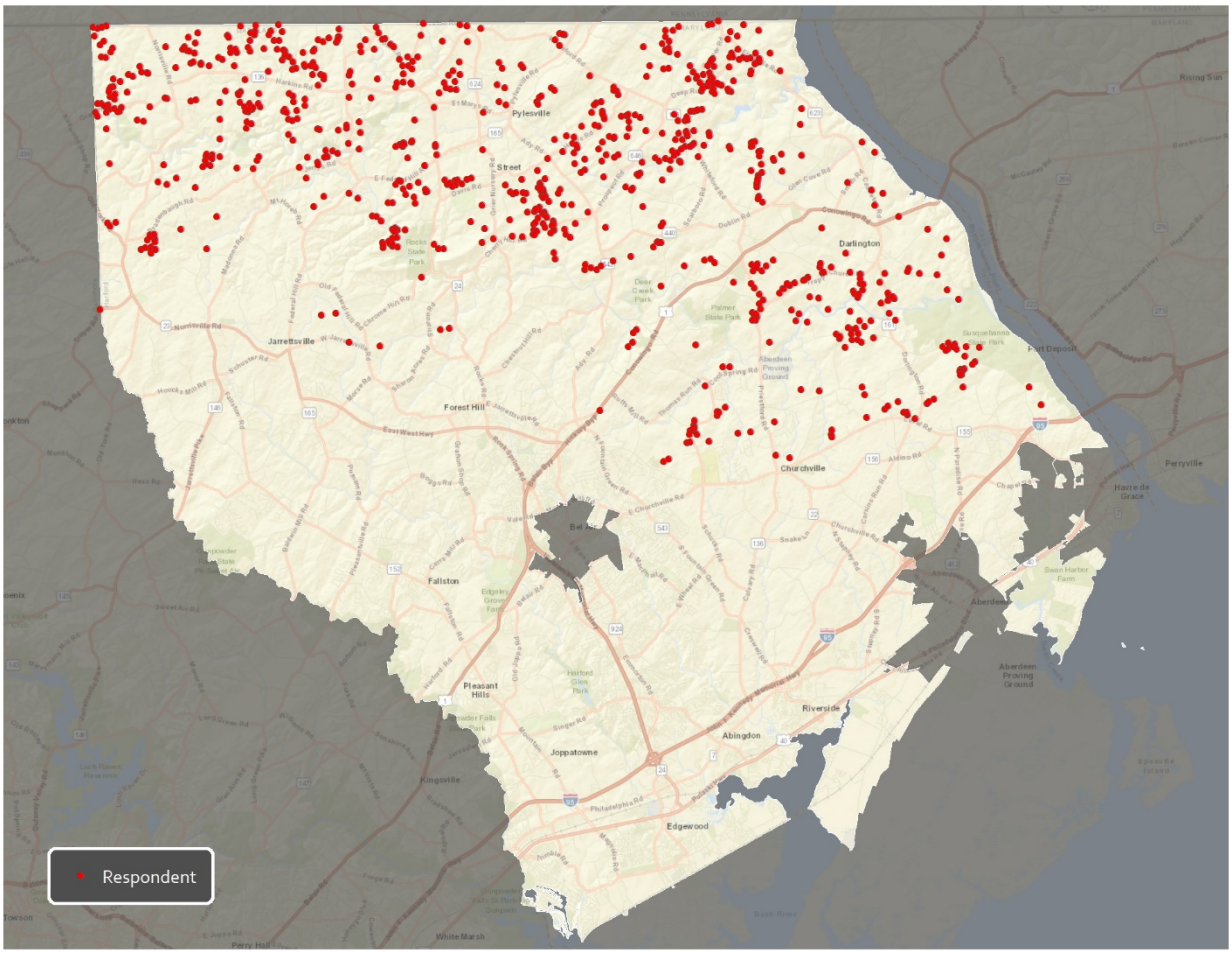


A total of 804 useable questionnaires were received by the date of analysis,[3] providing a gross[4] response rate of 31 percent. The margin of error for aggregate results at the 95 percent confidence level for 804 responses is ±3.1 percent, within the initial sample design criteria. That is, for questions with valid responses from all survey respondents, one would be 95 percent confident (19 times in 20) that the survey responses lie within ±3.1 percent of the target population as a whole.

[3] At least 62 responses were received after analysis had begun, and are not included in these results.
[4] 18 surveys were undeliverable, mostly vacant residences. The "net" response rate is 804/(2,556-18) = 31.7%.

Figure 3 illustrates the locations of residents who responded to the survey.

Figure 3: Locations of Survey Respondents



2.2 Data Analysis

The survey responses were entered into SPSS[5] software and the entries were coded and labeled. SPSS databases were formatted, cleaned, and verified prior to the data analysis. Address information was merged with the survey results using the unique survey identifiers printed on each survey. The survey data was evaluated using techniques in SPSS including frequency tables, cross-tabulations, and means functions. Statistically significant differences between subgroups of response categories are highlighted and discussed where relevant.

The survey responses were weighted based on the age of the respondent. Since older persons are more likely to respond to surveys than younger persons, the age-weighting corrects for the potential bias based on the age of the respondent. In this manner, the results more closely reflect

[5] Statistical Package for the Social Sciences (http://www-01.ibm.com/software/analytics/spss/)

the opinions of the County's adult population in the defined geographic area. Note that the age distribution of the market area's adult population is estimated using Census data for Harford County as a whole.

Table 1 and Figure 4 summarize the weighting used for survey analysis.

Table 1: Age Weighting

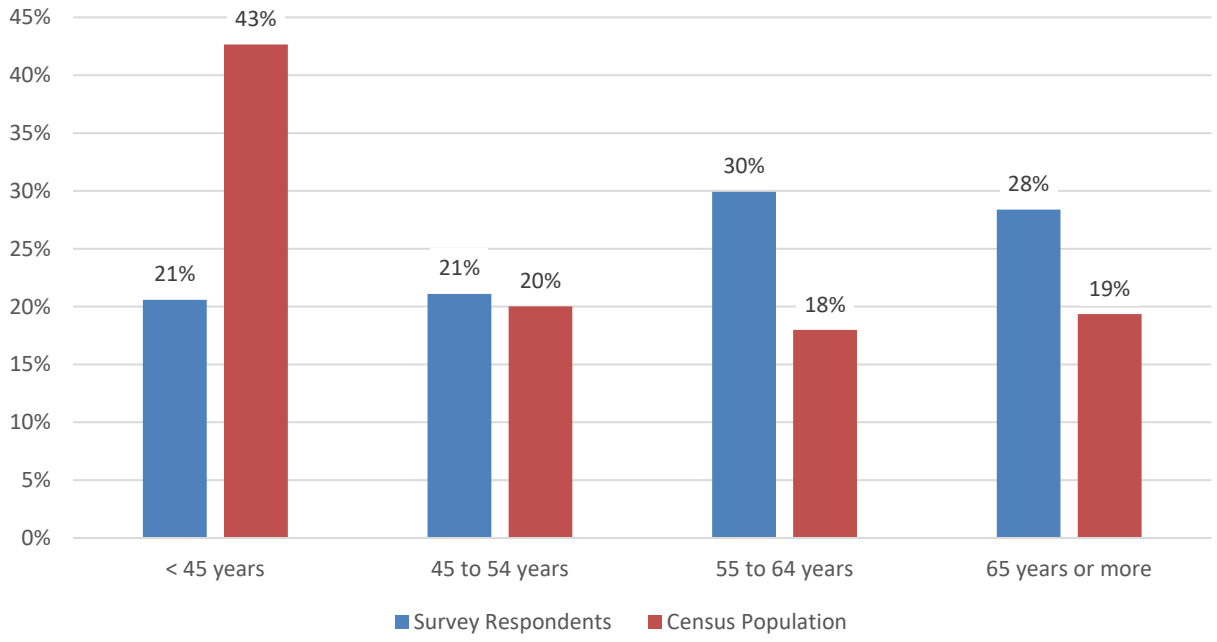
Age Cohort	Census Population (Adult)	**Survey Responses	Weight
18-44*	82,368	161	2.07
45-54	38,639	165	0.95
55-64	34,719	234	0.60
65+	37,368	222	0.68
Total	193,094	782	

The Census data used represents individuals in the entire Harford County area as a proxy for the selected areas included in the survey.

*The 18-34 and 35-44 age cohorts were grouped together due to small numbers in the sample.

**Not all respondents provided their age.

Figure 4: Age of Respondents and Adult Population



The following sections summarize the survey findings.

3 Survey Results

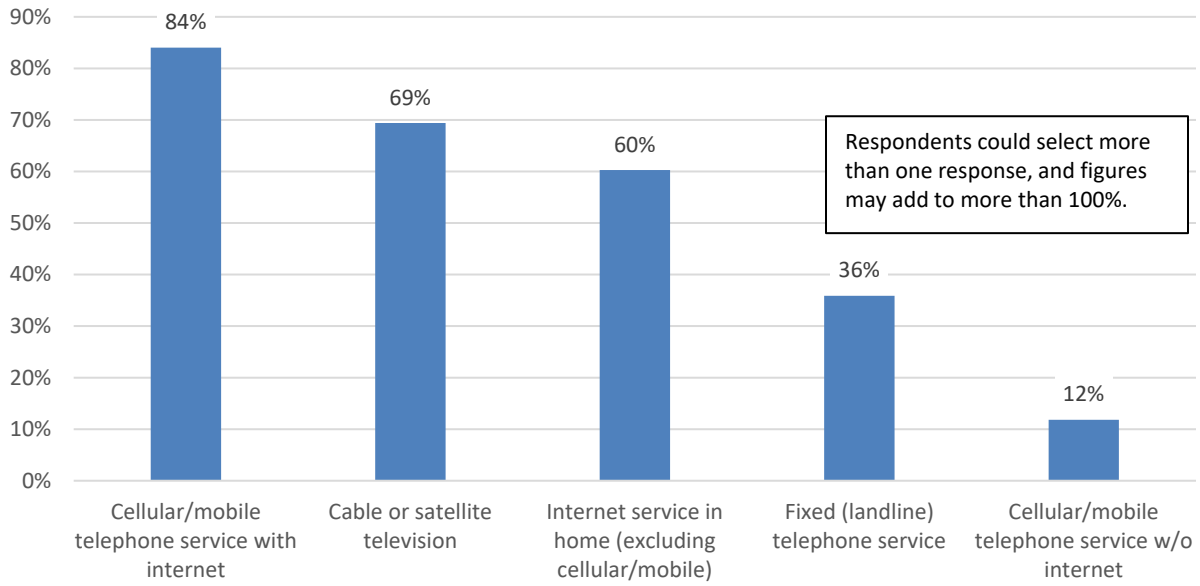
The results presented in this report are based on analysis of information provided by 804 respondents from an estimated 4,000 residences in selected areas of Harford County. Results are representative of the set of households with a confidence interval of ±3.1 percent at the aggregate level.

Unless otherwise indicated, the percentages reported are based on the "valid" responses from those who provided a definite answer and do not reflect individuals who said "don't know" or otherwise did not supply an answer because the question did not apply to them. Key statistically significant results ($p \leq 0.05$) are noted where appropriate.

3.1 Overview of Communications Services

Respondents provided information about the communications services currently purchased for their households. As illustrated in Figure 5, most respondents have cellular/mobile telephone service with internet, cable/satellite television service, and home internet service (excluding cellular/mobile), while fewer have landline telephone service or cellular/mobile phone without internet. Overall, 94 percent have some internet access—either a home connection or via smartphone.

Figure 5: Communications Services Purchased



Purchase of fixed (landline) telephone service or cellular/mobile service without internet is higher among those ages 65 and older, as well as those earning less than $75,000 per year (who are disproportionately older), while use of cellular/mobile telephone with internet is lower among these cohorts (see Figure 6 and Figure 7).

Figure 6: Services Purchased by Age of Respondent

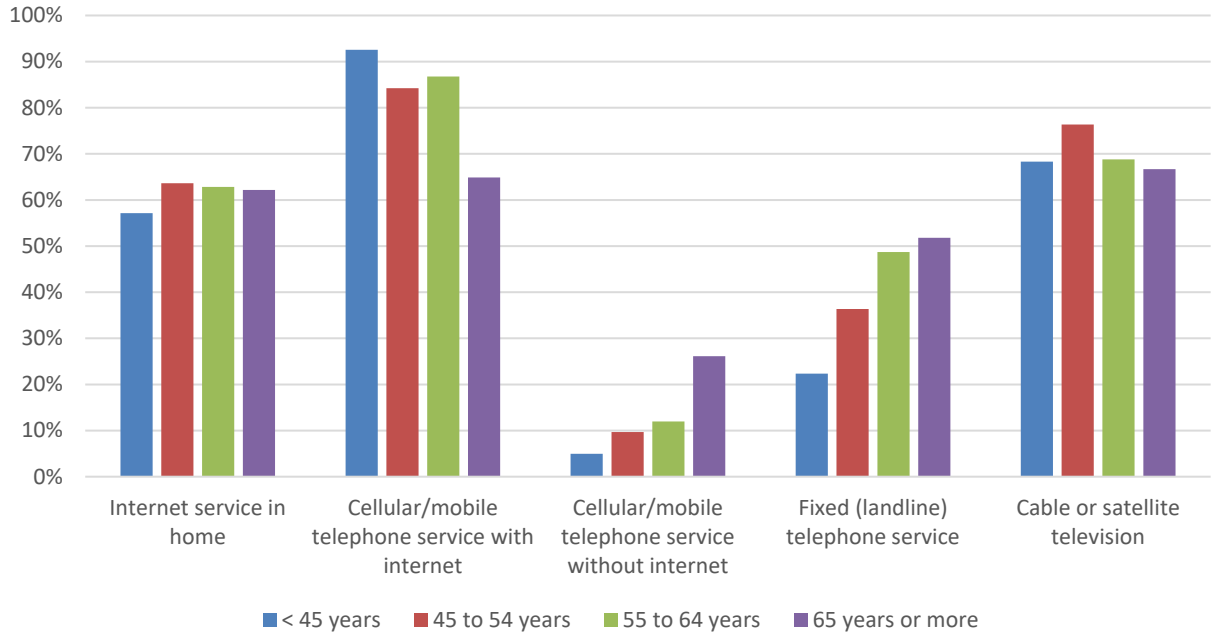
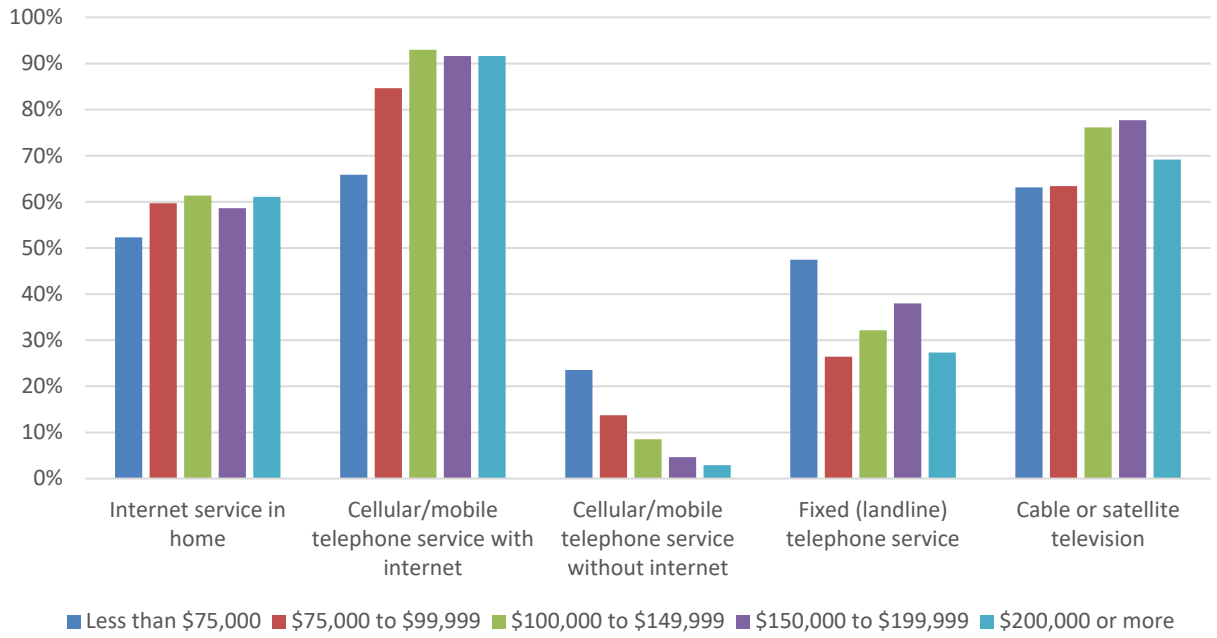


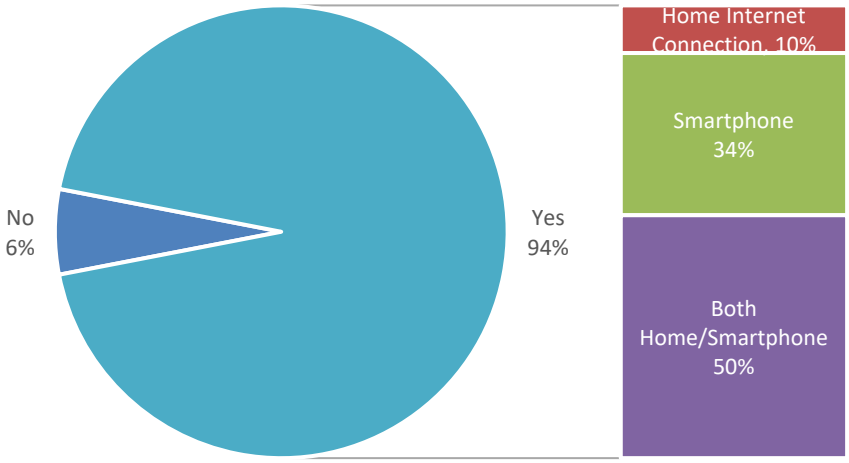
Figure 7: Services Purchased by Household Income



As discussed previously, a majority of respondents have some internet access, including 50 percent who have both home internet service and a cellular/mobile telephone service with internet (smartphone). Figure 8 illustrates that another 34 percent of respondents have a

smartphone only (no home internet), and 10 percent have a home connection only (no smartphone).

Figure 8: Purchase Internet Services



3.2 Importance of Communications Services

Respondents were asked to indicate the importance of various communications services to their households, using a scale where 1 is "Not at All Important" and 5 is "Extremely Important." The mean importance of various service aspects is illustrated in Figure 9, while detailed responses are illustrated in Figure 10. Cellular/mobile phone and internet services are extremely important to respondents, while premium cable television service and fixed (land-line) telephone service are significantly less important.

Figure 9: Importance of Communication Service Aspects (Mean Ratings)

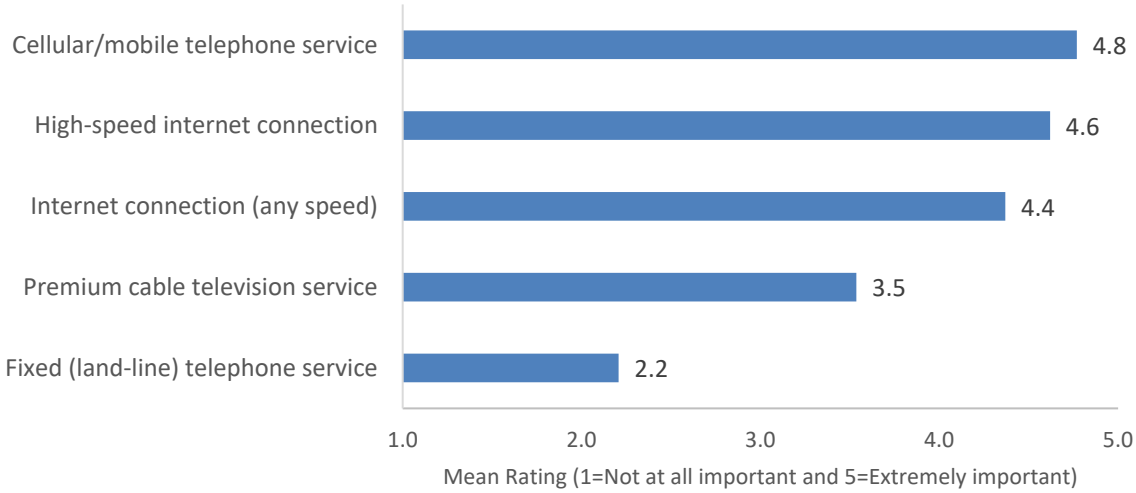
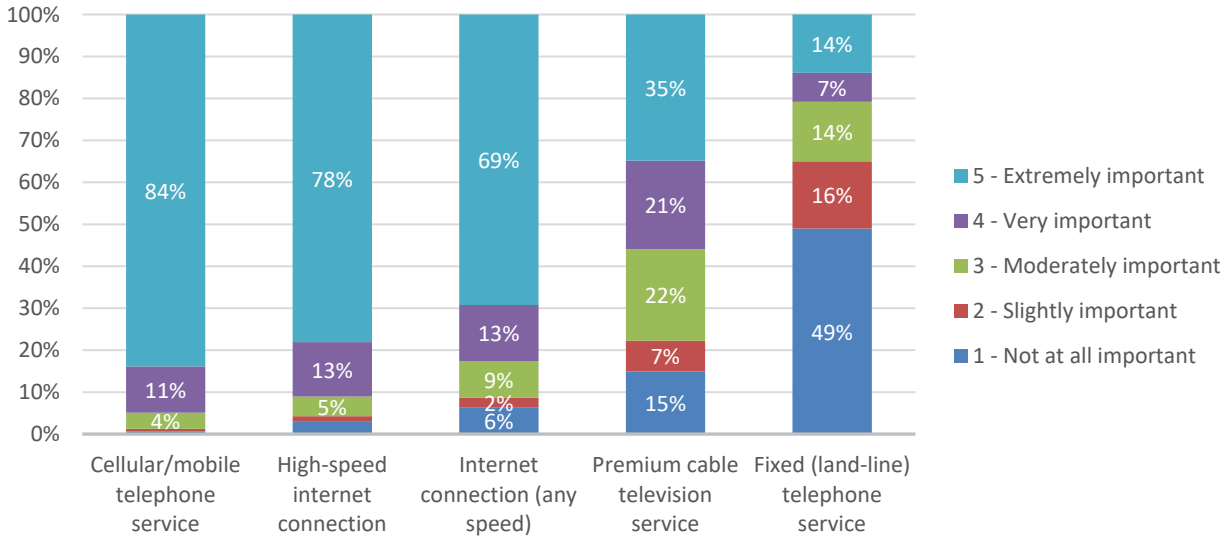


Figure 10: Importance of Communication Service Aspects



Specifically, 84 percent said cellular/mobile phone service is extremely important. More than three-fourths of respondents said high-speed internet is extremely important, while seven in 10 said an internet connection of any speed is extremely important, as illustrated in Figure 10.

Figure 11 and Figure 12 illustrate the importance of high-speed internet service by the age of the respondent and by household income, respectively. The importance of high-speed internet is lower for those ages 65 and older (51 percent "extremely important") and those earning under $75,000 annually (59 percent "extremely important"), compared with their counterparts.

Figure 11: Importance of High-Speed Internet by Age of Respondent

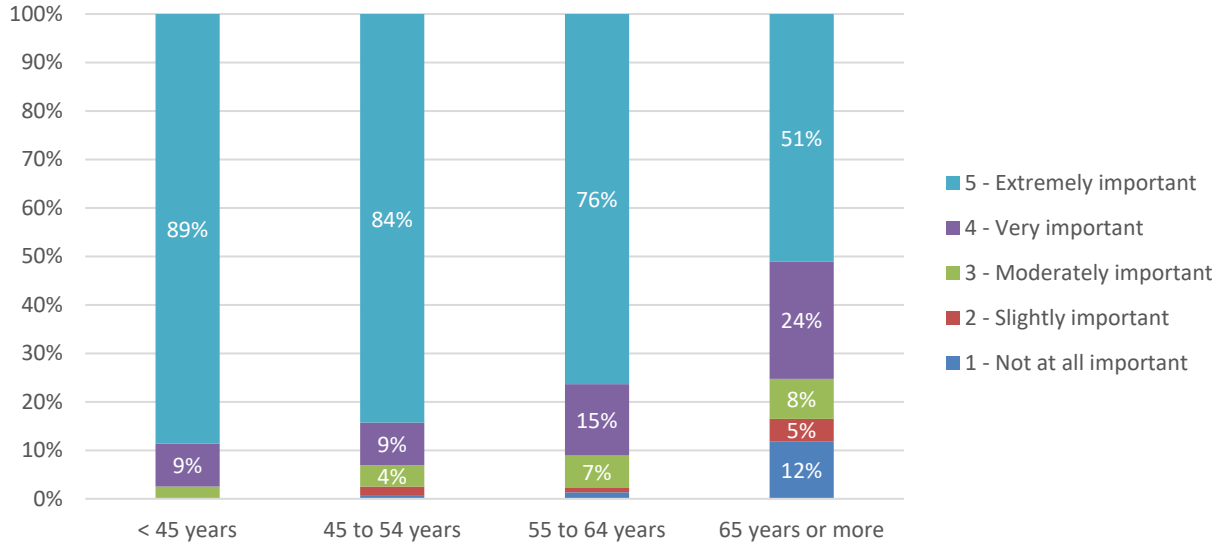
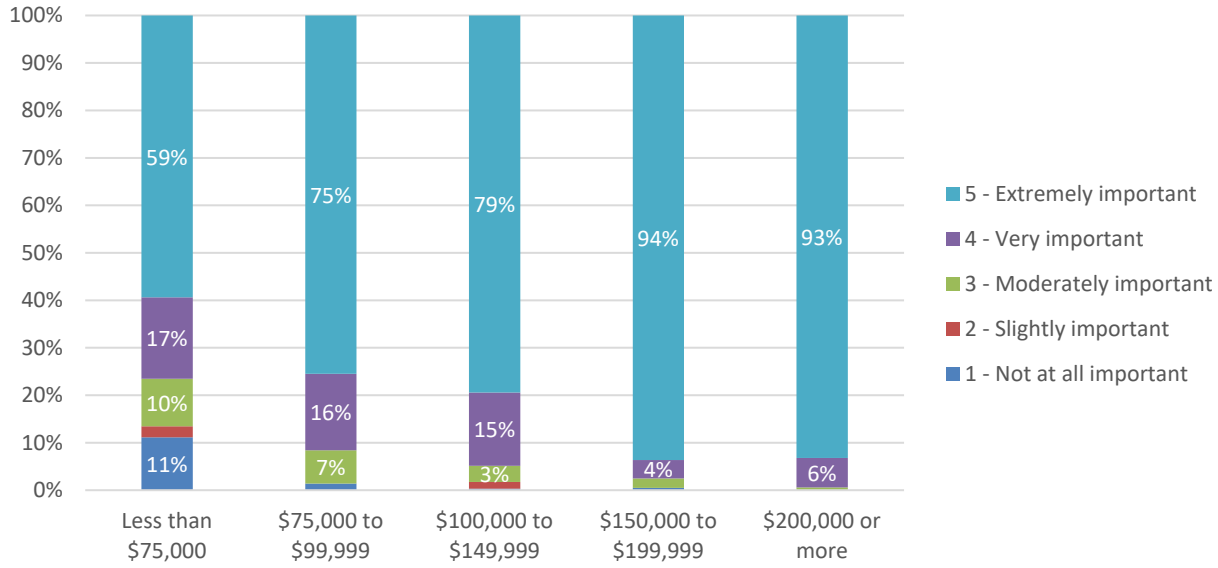


Figure 12: Importance of High-Speed Internet by Household Income



3.3 Internet Service

Respondents were asked about the types and providers of their various communications services, use of the internet for various activities, and satisfaction and importance of features related to these services. This information provides valuable insight into residents' need for various internet and related communications services.

3.3.1 Internet-Enabled Devices

Respondents were asked to indicate the number of personal computing devices and other internet-enabled devices they have in the home. Almost all respondents have a personal computing device, and 58 percent have five or more devices in the home. Additionally, three-fourths of respondents have other internet-enabled devices in the home (see Figure 13 and Figure 14).

Figure 13: Number of Personal Computing Devices

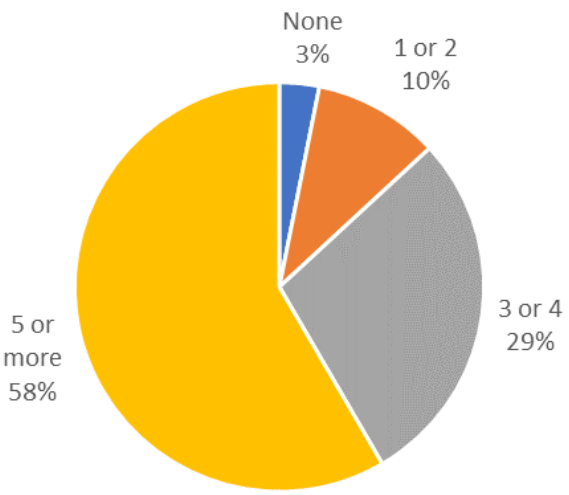
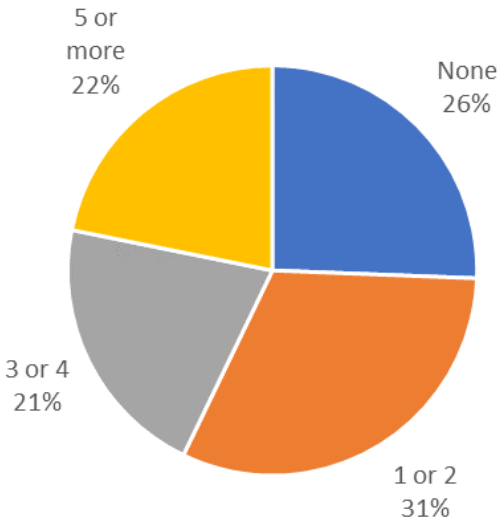
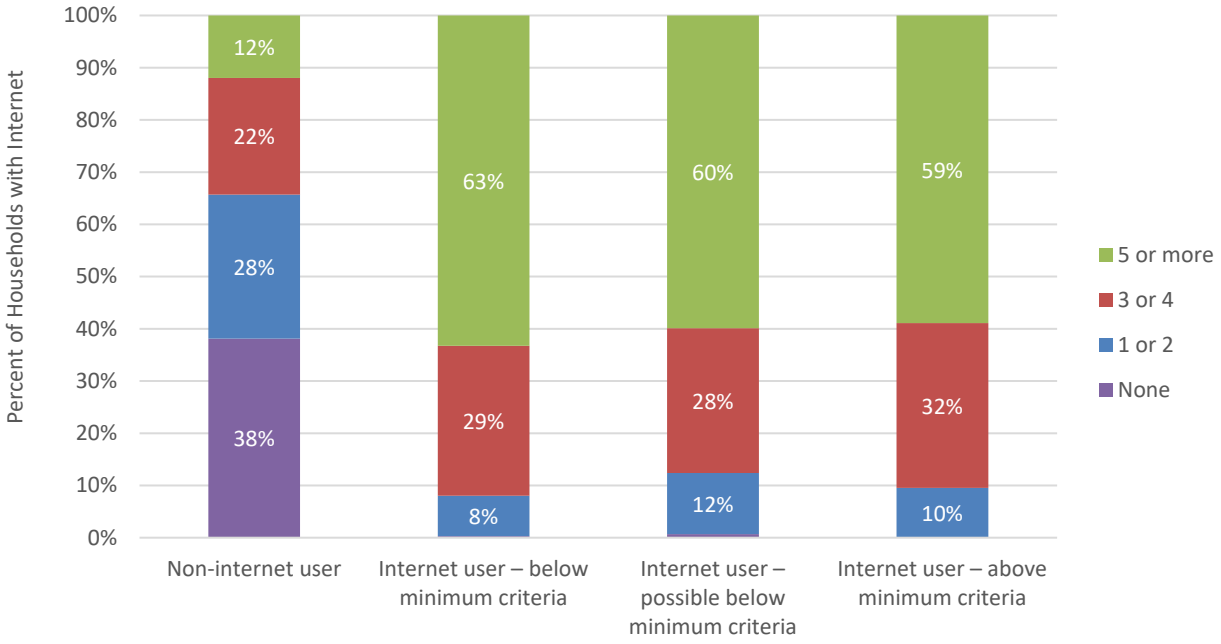


Figure 14: Number of Other Internet-Enabled Devices



For those households with internet service, the number of personal computing devices does not vary greatly by level of internet service (see Figure 15).

Figure 15: Number of Personal Computing Devices in Home by Internet Connectivity Group



Saturation of personal computing devices and other internet-enabled devices is high among households with multiple members. Households with at least three members are significantly more likely than smaller households to have at least five personal computing devices and to have any other internet-enabled devices (see Figure 16 and Figure 17).

Figure 16: Number of Personal Computing Devices in Home by Household Size

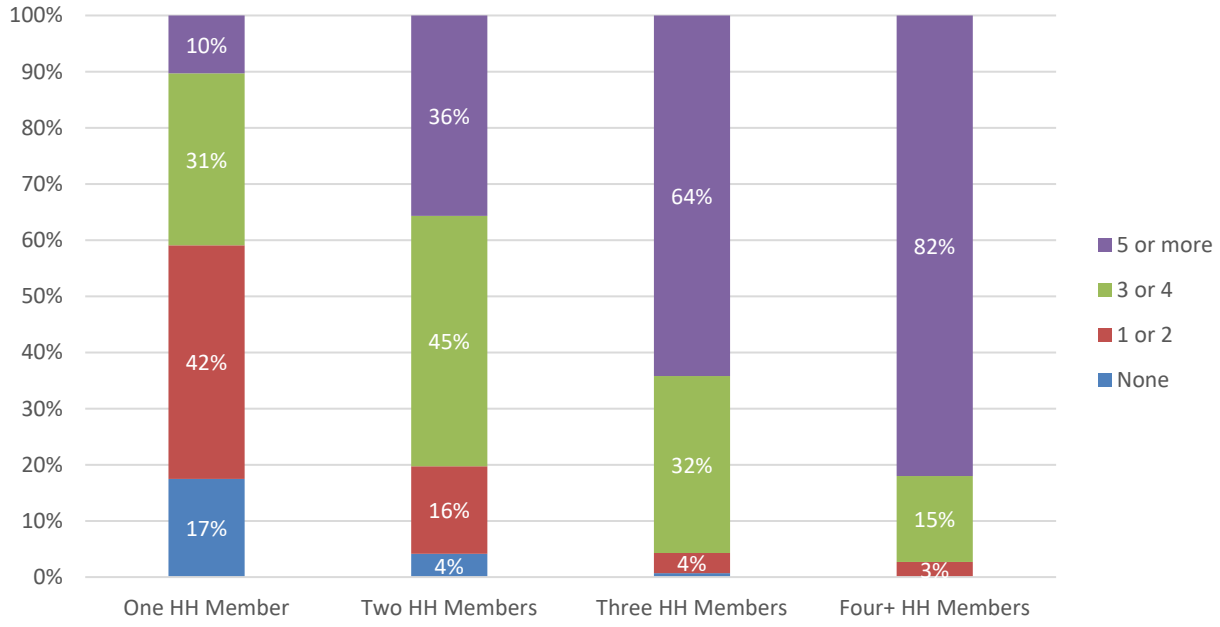
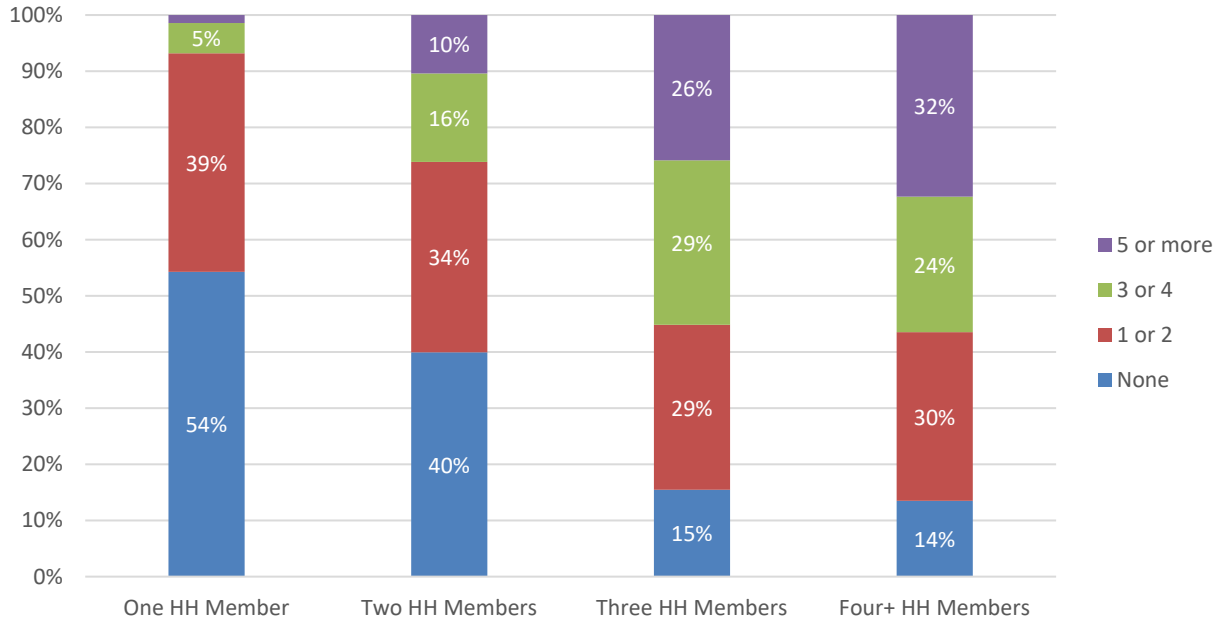


Figure 17: Number of Other Internet-Enabled Devices in Home by Household Size



The number of computing devices in the home is also correlated with household income. Two-thirds of those earning $100,000 to $150,000 and approximately three-fourths of those earning $150,000+ per year have at least five computing devices, compared with fewer than one-half of those earning less than $75,000 (see Figure 18).

Figure 18: Number of Personal Computing Devices in Home by Household Income

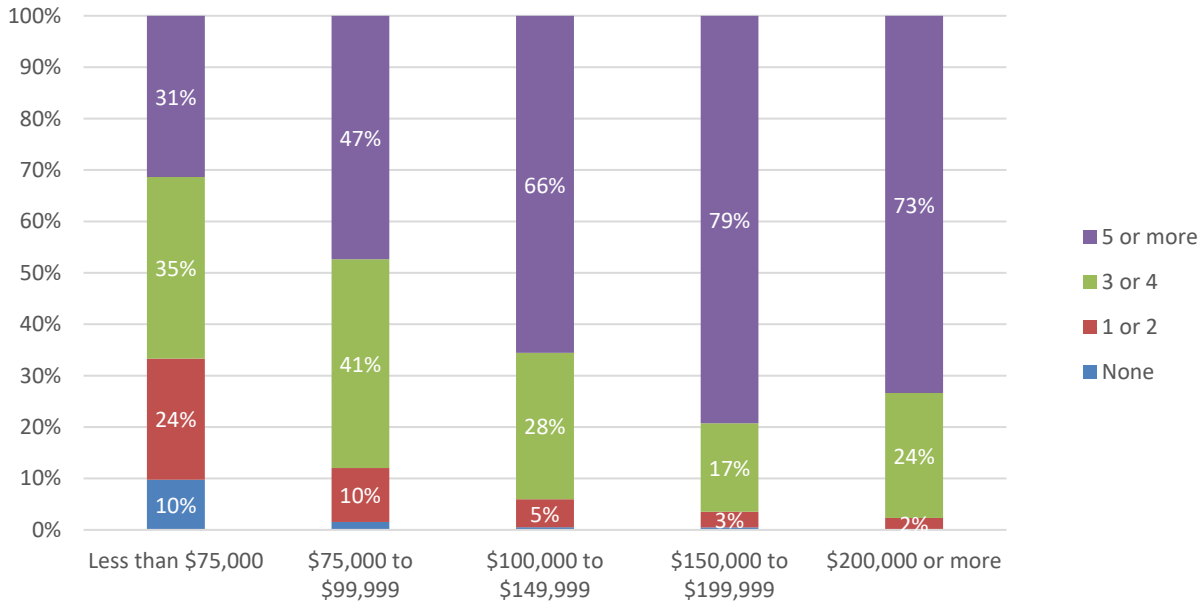
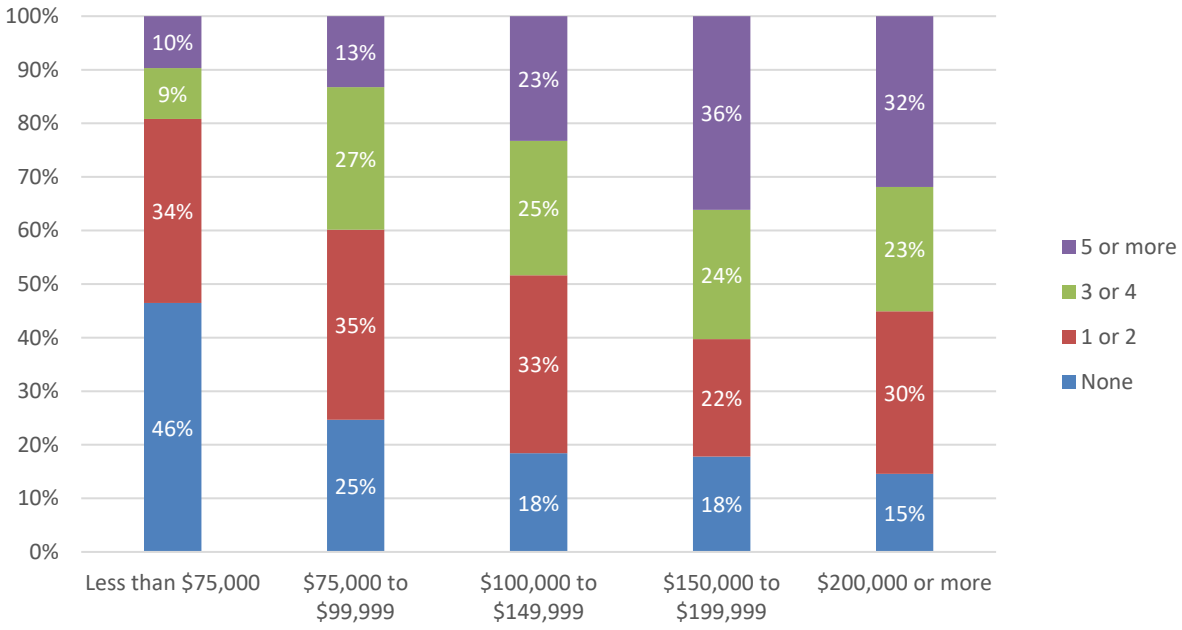


Figure 19: Number of Other Internet-Enabled Devices in Home by Household Income

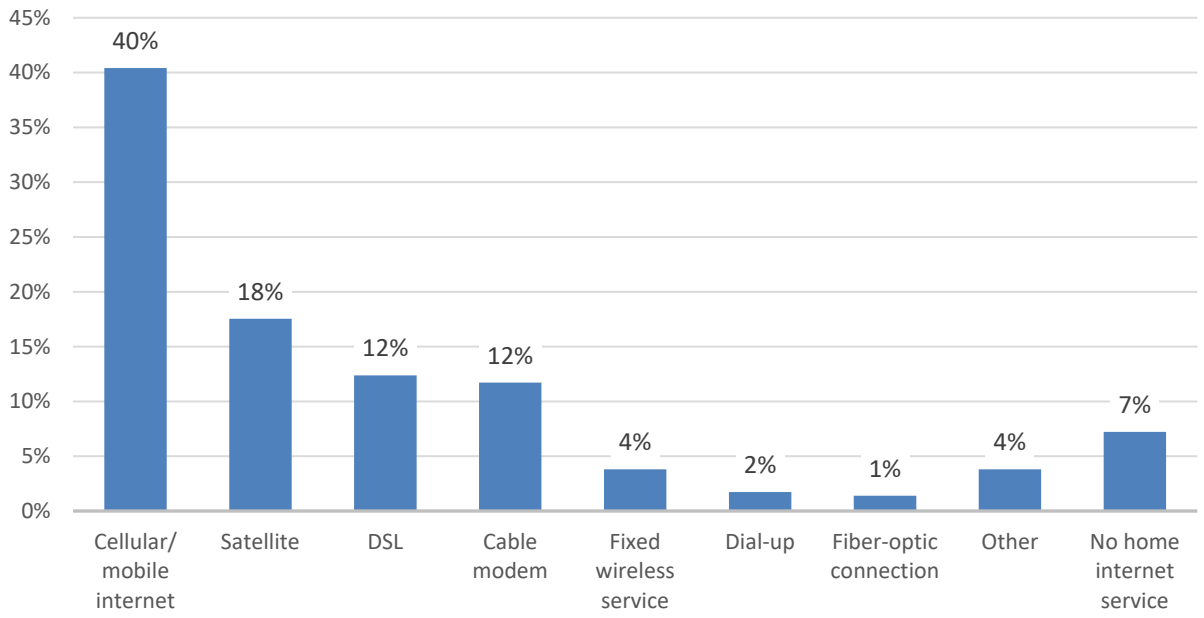


3.3.2 Internet Services Purchased

Respondents were asked about their purchase of internet services for their home, as well as the cost and speed of services purchased. As shown in Figure 20, a majority of homes (93 percent) reported having home internet service, consistent with 94 percent reporting internet access via a home connection or via a smartphone in Question 1. Four in 10 households use a

cellular/mobile connection as their primary home internet service, while other connection types represent much smaller shares of the Harford County market area.

Figure 20: Primary Home Internet Service



Respondents were segmented into connectivity groups based on type of internet service:

1. No internet service
2. Below minimum criteria (Dial-up, satellite, cellular/mobile)
3. Possible below minimum criteria (DSL, fixed wireless, other)
4. Above minimum criteria (fiber, cable modem)

Figure 21 illustrates the types of internet services used by respondents' locations, while Figure 22 illustrates the category of services used (i.e., internet service above or below the minimum criteria, or non-internet users).

Figure 21: Communications Services Purchased (by Location)

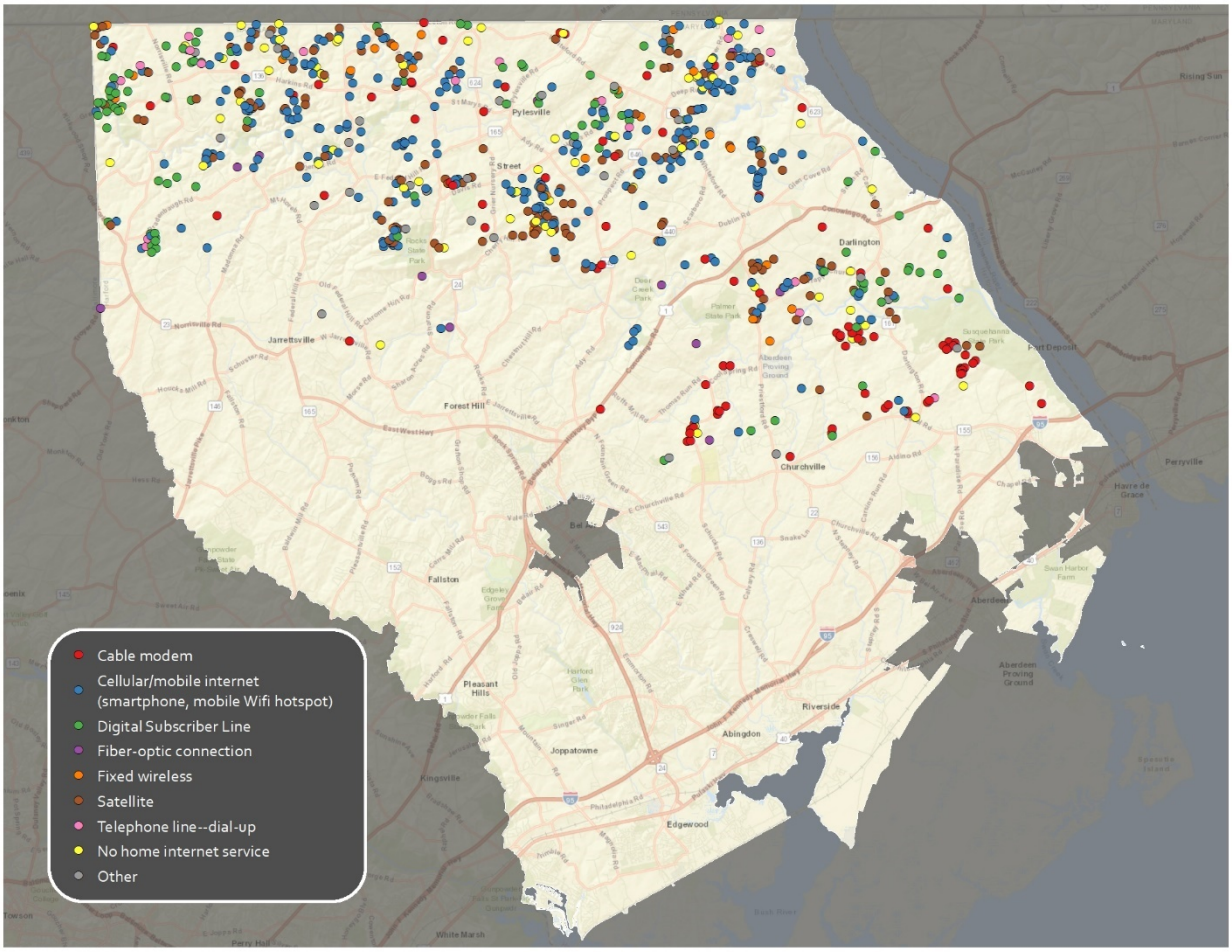
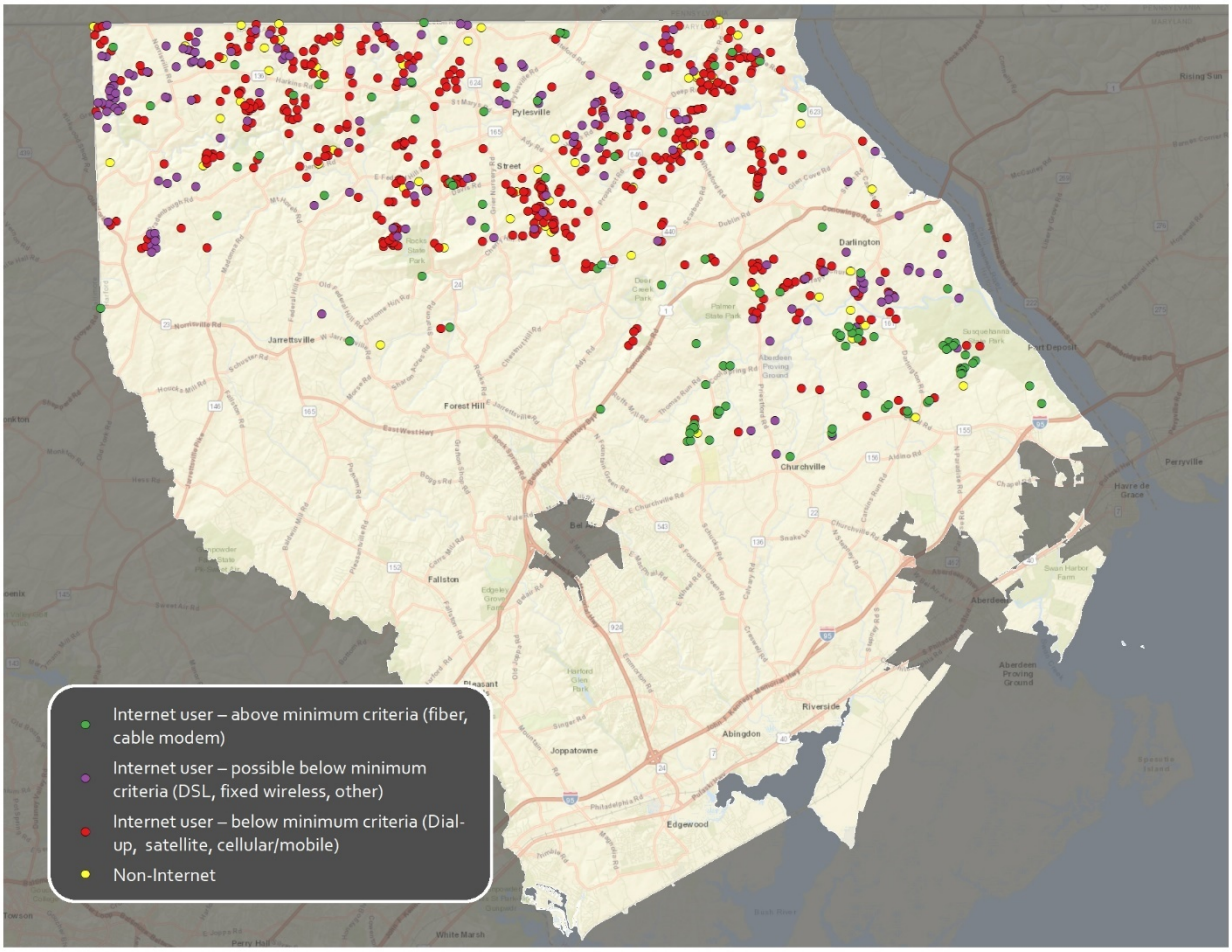


Figure 22: Category of Internet Used (by Location)



Although most households have internet access in the home, six in 10 have service that is below the minimum criteria, and another 18 percent have service that is possibly below the minimum criteria (see Figure 23).

At the same time, no statistically significant difference in importance of internet service was found between those with service below or possibly below the minimum criteria and those with service above the minimum criteria. In other words, the results suggest that high-speed internet service is just as highly important to households with below criteria service, as shown in Figure 24. ***This also suggests that service needs are possibly not being met for a large number of households in the market area.***

Figure 23: Internet Connectivity Groups

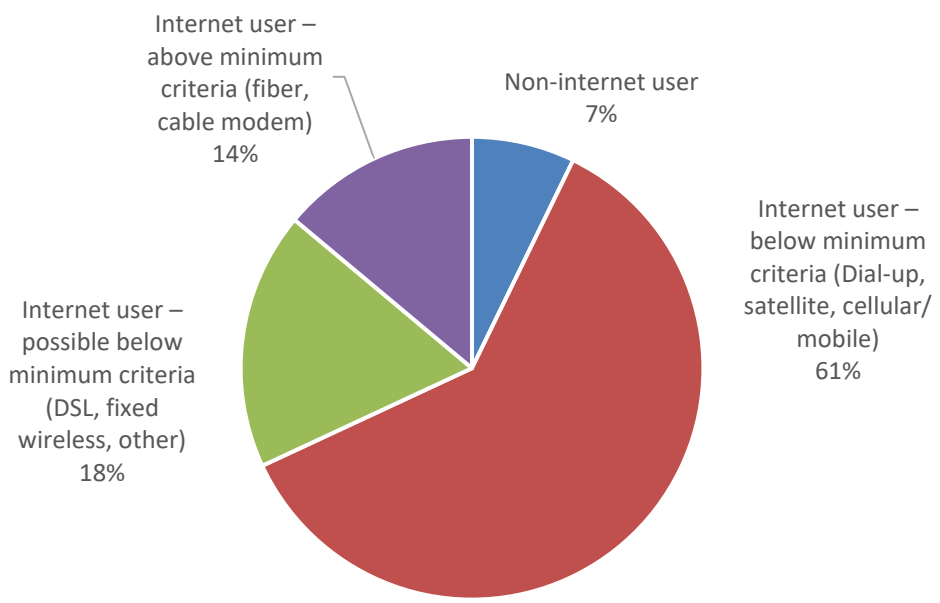
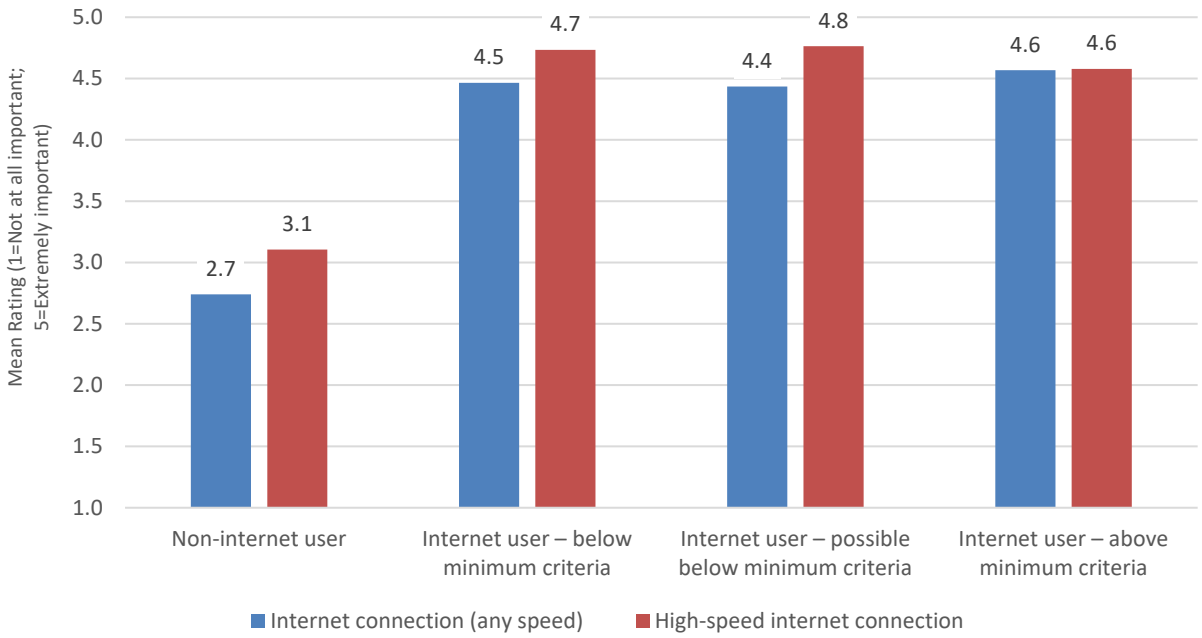


Figure 24: Importance of Internet Services by Internet Connectivity Group



Older respondents, those with a lower household income, those with a lower level of education, and those with one household member (and no children in the household) are among those who are somewhat less likely to have internet, although saturation is high among all demographic groups, as illustrated in Table 2.

Table 2: Internet Connectivity Group by Key Demographics

		Non-Internet User	Below Minimum Criteria	Possible Below Minimum Criteria	Above Minimum Criteria	Total Internet Access	*Weighted Count*
TOTAL		**6%**	**10%**	**34%**	**50%**	**94%**	**804**
Age group	< 45 years	4%	67%	15%	13%	**96%**	*323*
	45 to 54 years	5%	61%	25%	9%	**95%**	*156*
	55 to 64 years	4%	62%	20%	13%	**96%**	*136*
	65 years or more	17%	49%	15%	19%	**83%**	*147*
Highest level of education	HS education or less	16%	53%	20%	12%	**84%**	*137*
	Two-year college or technical degree	7%	63%	19%	11%	**93%**	*172*
	Four-year college degree	4%	66%	14%	16%	**96%**	*267*
	Graduate degree	3%	60%	23%	13%	**97%**	*186*
Approximate 2018 household income	Less than $75,000	19%	57%	11%	13%	**81%**	*122*
	$75,000 to $99,999	9%	66%	16%	9%	**91%**	*118*
	$100,000 to $149,999	2%	61%	21%	17%	**98%**	*183*
	$150,000 to $199,999	5%	71%	15%	9%	**95%**	*135*
	$200,000 or more	2%	63%	24%	10%	**98%**	*107*
Children in Household	No Children in HH	11%	56%	18%	15%	**89%**	*408*
	Children in HH	1%	68%	19%	12%	**99%**	*354*
Total Household Size (Adults + Children)	One HH member	33%	39%	15%	12%	**67%**	*47*
	Two HH members	9%	57%	17%	17%	**91%**	*247*
	Three HH members	4%	69%	18%	9%	**96%**	*137*
	Four+ HH members	2%	65%	20%	13%	**98%**	*330*
Number of years lived at current residence	Less than 1 year	10%	81%	5%	5%	**90%**	*45*
	1 to 2 years	1%	81%	5%	13%	**99%**	*62*
	3 to 4 years	6%	67%	20%	7%	**94%**	*82*
	5 or more years	7%	58%	20%	15%	**93%**	*571*

3.3.3 Cost of Internet Service

As illustrated in Figure 25 and Figure 26, more than one-third of subscribers pay over $100 per month for home internet, and the estimated monthly average cost for internet service is $86. DSL internet subscribers pay slightly less per month on average, compared with cable modem, satellite, and cellular/mobile internet subscribers (the leading connection types).

Figure 25: Monthly Price for Internet Service

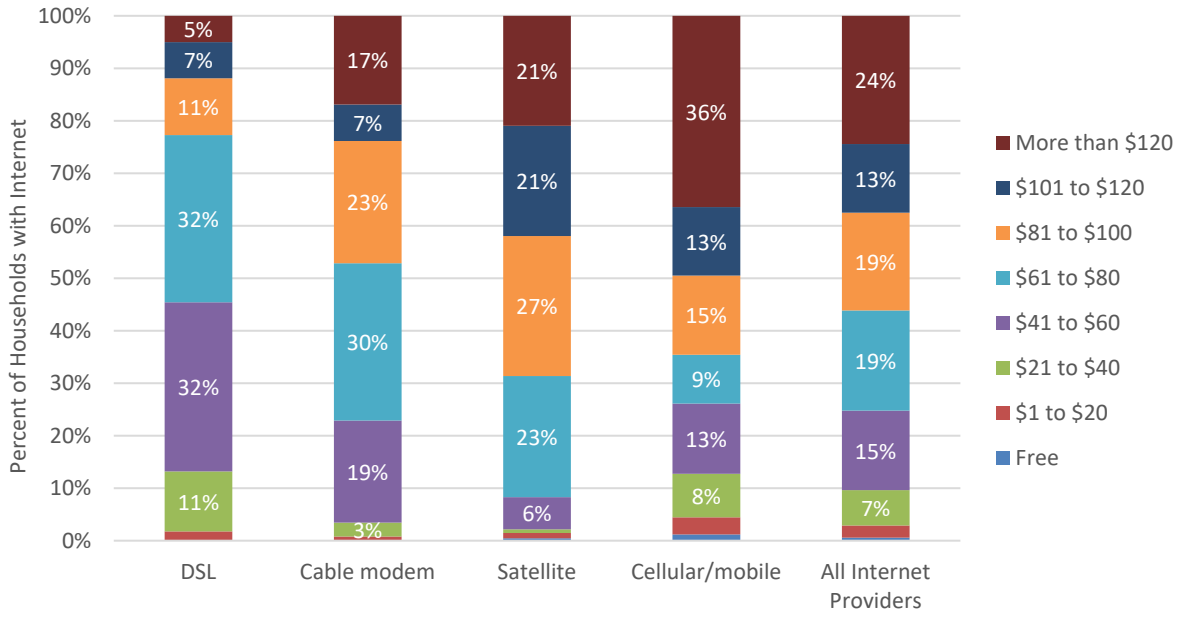
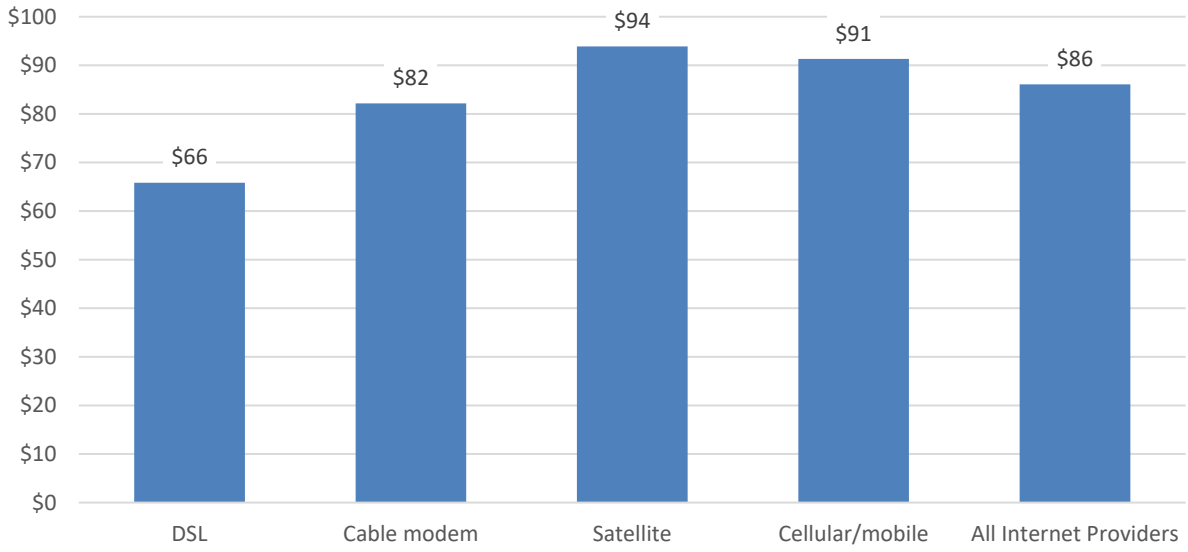


Figure 26: Estimated Average Monthly Price for Internet Service



Four in 10 internet subscribers said their monthly internet fee is part of a bundled service (see Figure 27). Estimated monthly prices for bundled and unbundled services is shown in Figure 28.

Figure 27: Monthly Internet Fee Is Part of Bundled Service

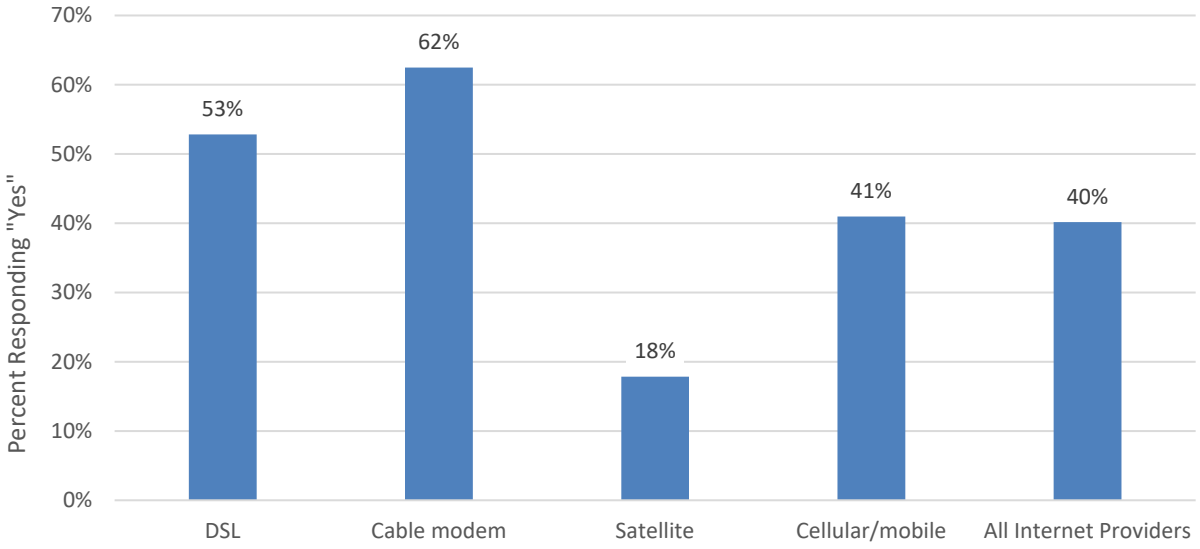
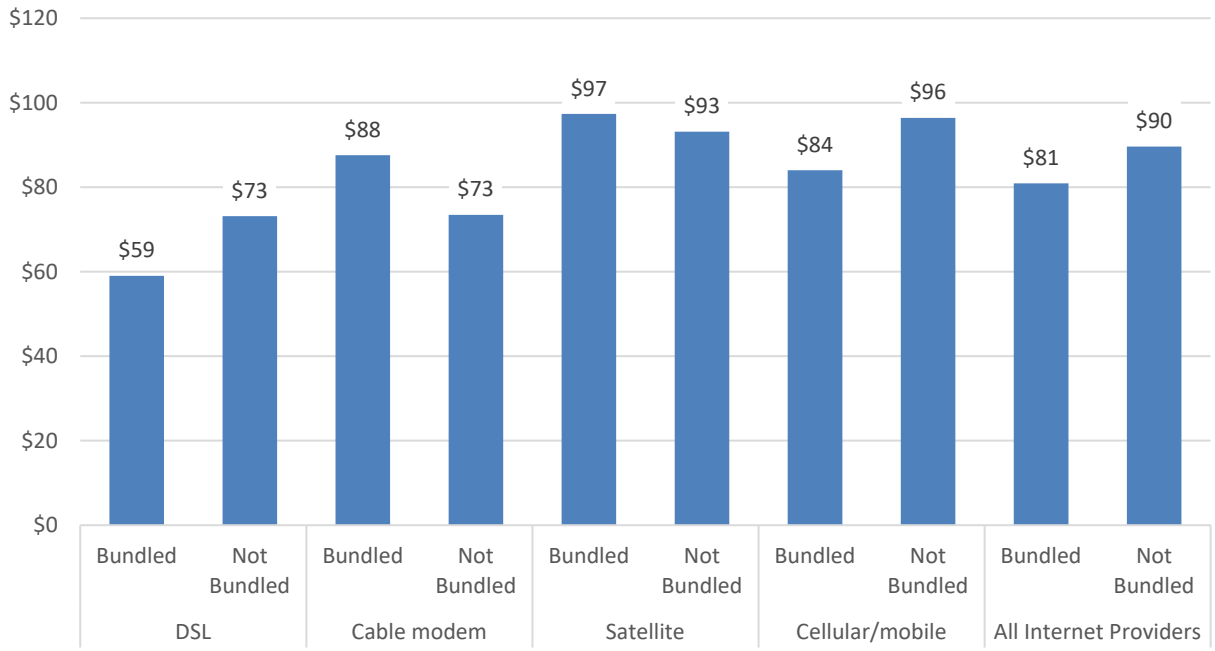


Figure 28: Estimated Average Monthly Price for Bundled and Non-Bundled Internet Service

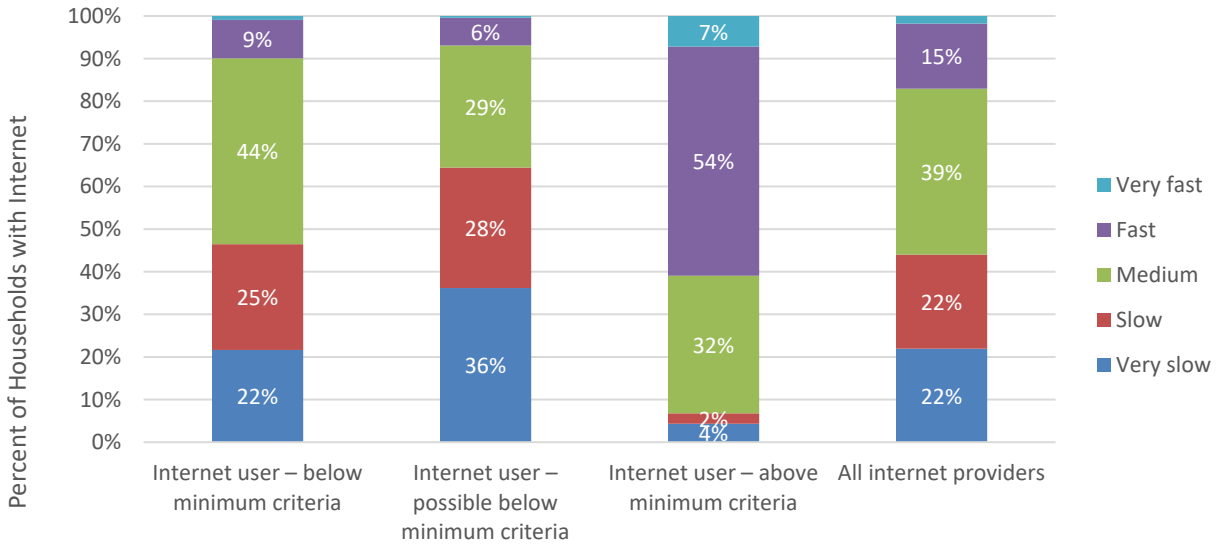


3.3.4 Speed of Internet Service

Overall, very few internet subscribers in the market area have “fast” or “very fast” internet service, according to respondents. Six in 10 subscribers with internet service above the minimum

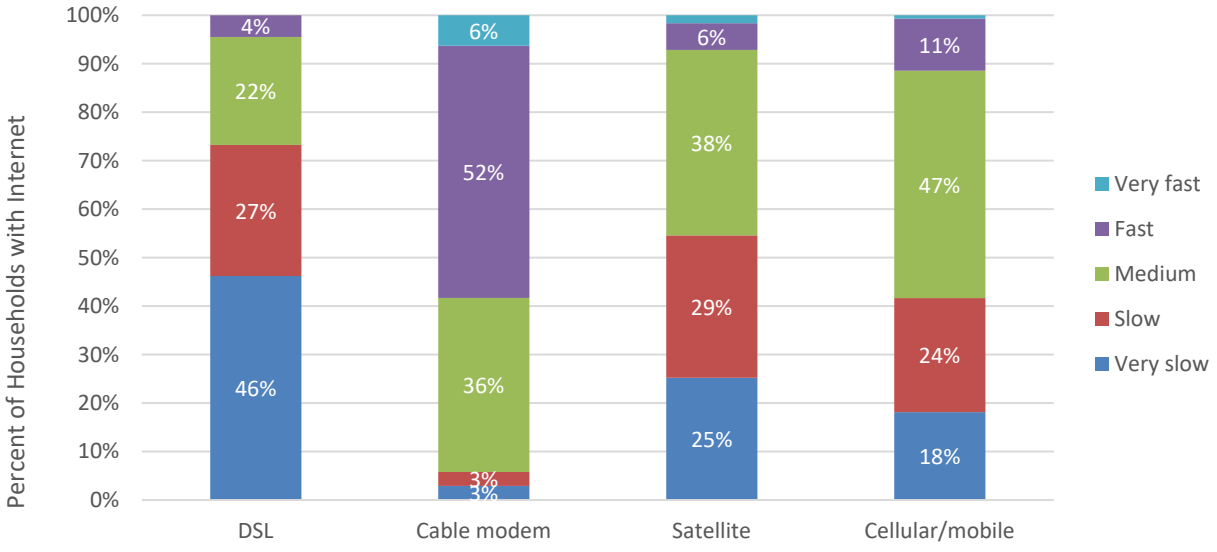
criteria (cable modem, fiber) have fast or very fast service, compared with less than one in 10 of those with internet service below or possibly below the minimum criteria (see Figure 29).

Figure 29: Internet Speed (Respondent Opinion) by Internet Connectivity Group



Specifically, most DSL subscribers perceive their internet service to be slow, while most cable modem subscribers view their service as fast (see Figure 30).

Figure 30: Internet Speed (Respondent Opinion) by Primary Home Internet Service



3.3.5 Internet Service Aspects

Respondents were also asked about the importance of, and satisfaction with, a number of internet service aspects. The importance and satisfaction levels are compared in the following tables and graphs.

3.3.5.1 Importance

Respondents were asked to rate their levels of importance and satisfaction with various internet service aspects. Respondents rated connection reliability and speed as the most important aspects, as shown in Table 3. The ability to bundle with television service is moderately important compared with other service aspects.

Table 3: Importance of Internet Service Aspects

Service Aspect	Mean	Percentages
Speed of Connection	4.7	5% 17% 77%
Reliability of Connection	4.8	10% 88%
Price of Services	4.3	16% 23% 57%
Overall Customer Service	4.3	15% 29% 52%
Ability to Bundle with TV service	3.0	24% 14% 26% 13% 23%

1 - Not at all important; 2 - Slightly important; 3 - Moderately important; 4 - Very important; 5 - Extremely important

3.3.5.2 Satisfaction

Overall, respondents are only slightly to moderately satisfied with aspects of their internet service, as shown in Table 4. Respondents rated overall customer service and reliability of service as the aspects with which they are most satisfied. The lowest satisfaction aspects are for the price of service, ability to bundle service, and connection speed.

Specifically, more than one-half of subscribers are not at all satisfied or only slightly satisfied with price of services, ability to bundle service, and connection speed. Nearly one-half of subscribers are not at all satisfied or only slightly satisfied with connection reliability, while more than one-fourth are very satisfied or extremely satisfied.

Table 4: Satisfaction with Internet Service Aspects

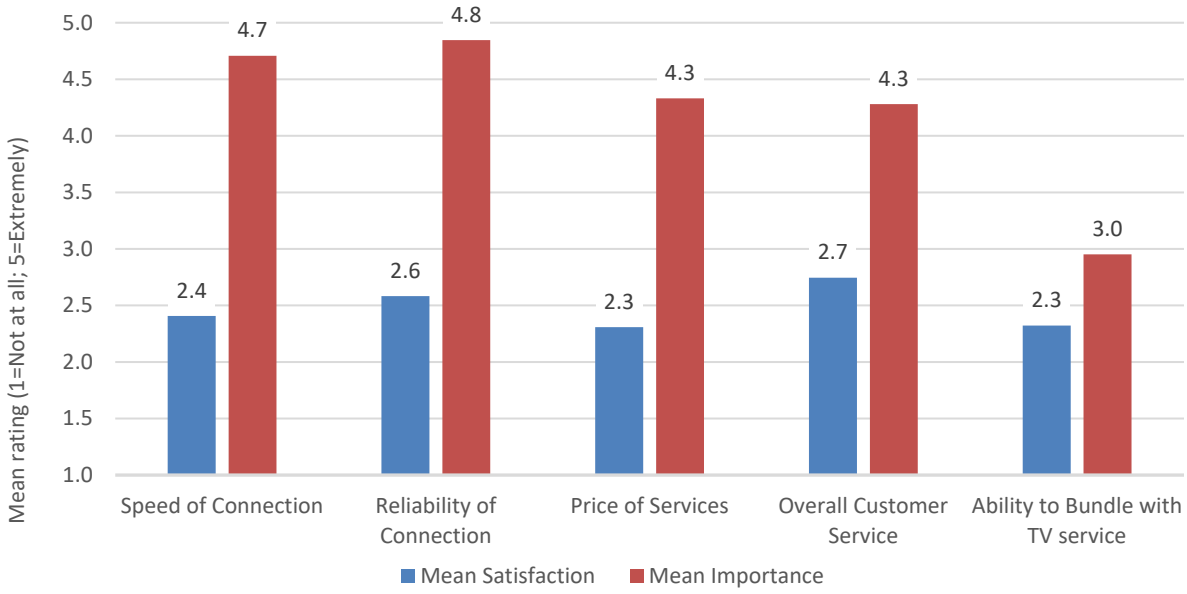
Service Aspect	Mean	Percentages
Speed of Connection	2.4	34% 18% 27% 17% 4%
Reliability of Connection	2.6	28% 19% 27% 19% 7%
Price of Services	2.3	32% 22% 31% 11% 3%
Overall Customer Service	2.7	19% 17% 37% 22% 5%
Ability to Bundle with TV service	2.3	40% 14% 26% 13% 7%

1 - Not at all satisfied; 2 - Slightly satisfied; 3 - Moderately satisfied; 4 - Very satisfied; 5 - Extremely satisfied

3.3.5.3 Performance

Comparing respondents' stated importance and satisfaction with service aspects allows an evaluation of how well internet service providers are meeting the needs of customers (see Figure 31). Aspects that have higher stated importance than satisfaction can be considered areas in need of improvement. Aspects that have higher satisfaction than importance are areas where the market is meeting or exceeding customers' needs. However, it should be cautioned that the extremely high level of importance placed on some aspects (such as reliability) may make it nearly impossible to attain satisfaction levels equal to importance levels.

Figure 31: Importance of and Satisfaction with Internet Service Aspects



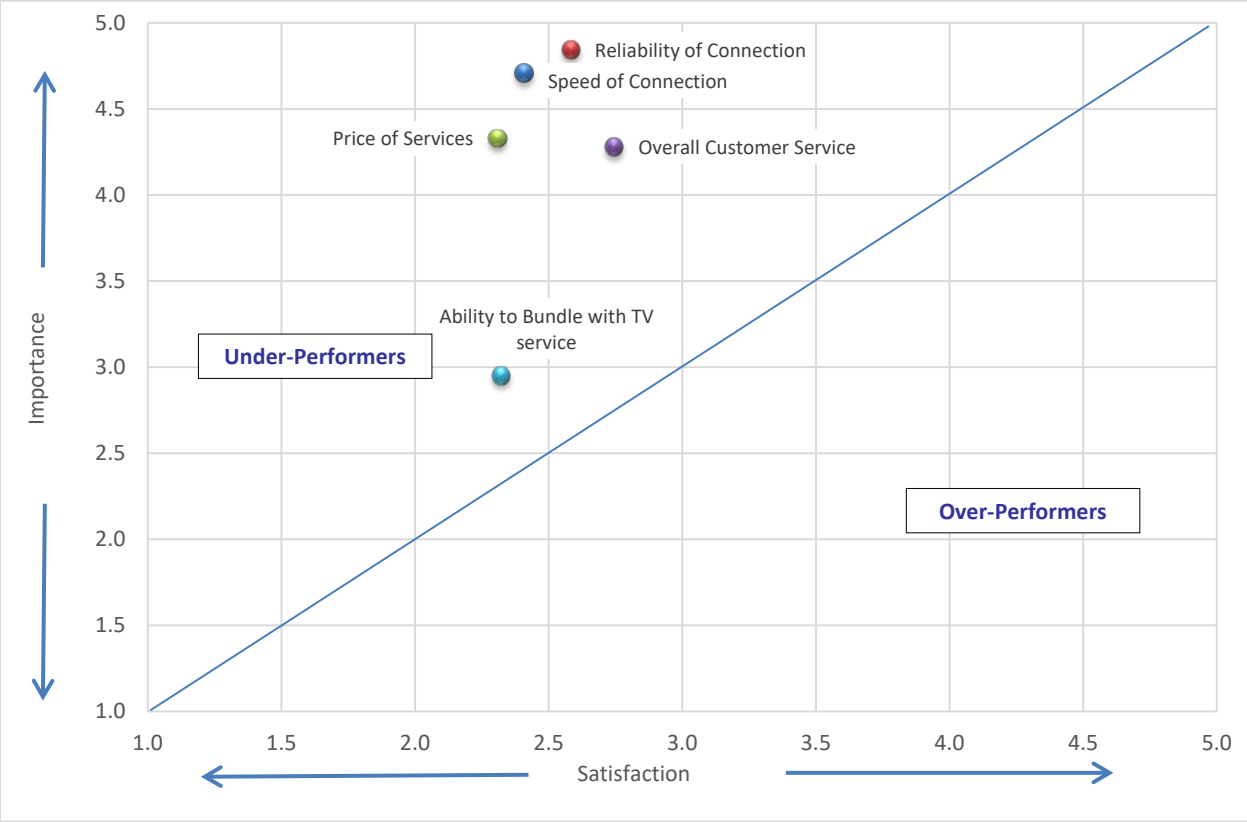
The difference between importance and satisfaction of home internet aspects is also presented in the "gap" analysis table (see Table 5). The largest gap between importance and performance is for speed of connection and reliability of connection, followed by price of services.

Table 5: Internet Service Aspect "Gap" Analysis

	Mean Satisfaction	Mean Importance	GAP < = >	Customer Expectations
Speed of Connection	2.4	4.7	-2.3	Not Met
Reliability of Connection	2.6	4.8	-2.3	Not Met
Price of Services	2.3	4.3	-2.0	Not Met
Overall Customer Service	2.7	4.3	-1.5	Not Met
Ability to Bundle with TV service	2.3	3.0	-0.6	Not Met

The importance scores and performance scores were plotted to help visually determine areas in which internet service providers are doing well and areas that might need improvement. Figure 32 compares the importance and satisfaction in a "quadrant" analysis. Those aspects for which importance is higher than satisfaction are above the equilibrium line and are defined as "underperformers." As is typical, the cost of internet service is well off the line, as satisfaction with costs is typically low. Reliability, connection speed, and customer service are other under-performing service areas. The low satisfaction levels could indicate a desire for improved service offerings or a willingness to switch internet service providers if needs are not being met.

Figure 32: Internet Service Aspect "Quadrant" Analysis



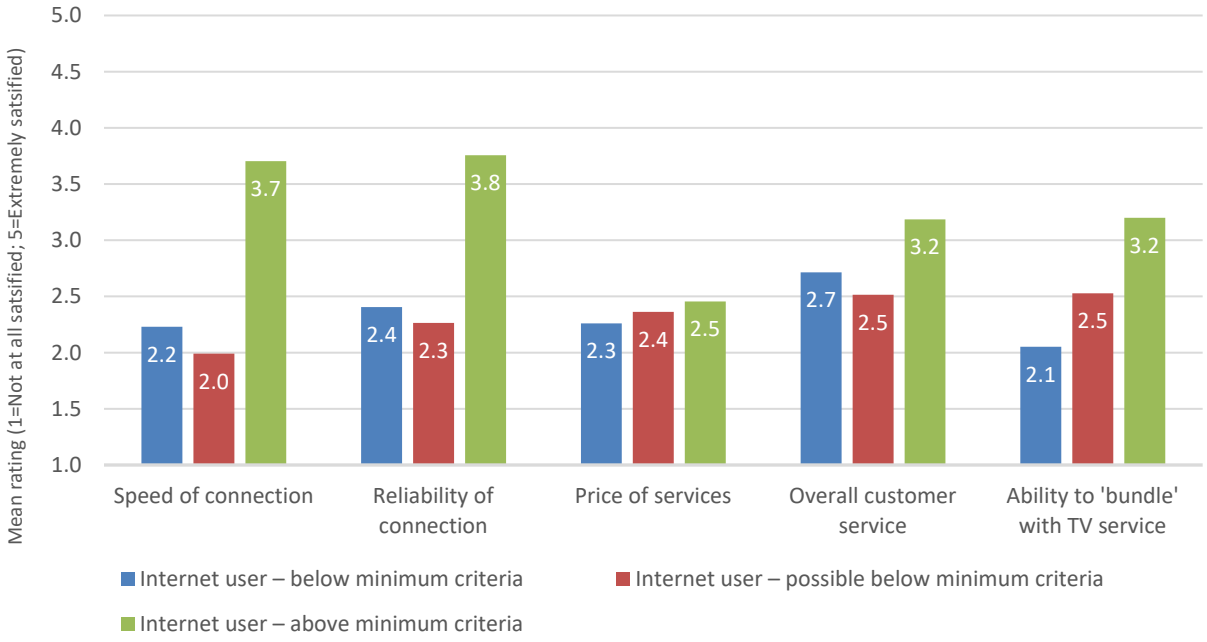
3.3.5.4 Internet Connectivity Group

As indicated in Figure 33, respondents with internet service above the minimum criteria placed more importance on price of service, compared with other internet subscribers. No other statistically significant differences were found for importance of service aspects by internet connectivity group.

However, there are significant differences in satisfaction by internet connectivity for most key aspects of service, as illustrated in Figure 34. Specifically, those with internet service above the minimum criteria are more satisfied with connection speed, reliability, overall customer service, and ability to bundle services compared with subscribers with service below or possibly below the minimum criteria.

Figure 33: Importance of Internet Service Aspects by Internet Connectivity Group

Figure 34: Satisfaction with Internet Service Aspects by Internet Connectivity Group



The gap between importance and satisfaction for the leading connection types was converted to an index score for each service aspect. This illustrates "the percentage of expectations fulfilled." Gap index scores are shown in Table 6. Providers of internet service above the minimum criteria are better meeting expectations (high ratio of satisfaction to importance) for all services except price, as discussed previously.

Table 6: Gap Index Score by Internet Connectivity Group

	Satisfaction / Importance Gap Index*				
	Speed of connection	Reliability of connection	Price of service	Customer service	Ability to bundle
Internet user – below minimum criteria	47%	50%	53%	64%	69%
Internet user – possible below minimum criteria	42%	47%	55%	57%	88%
Internet user – above minimum criteria	81%	78%	53%	73%	107%
ISP Average	51%	53%	53%	64%	79%
Percent of expectations met = Satisfaction / Importance					

Specifically, cable modem subscribers have a higher level of satisfaction with connection speed, connection reliability, customer service, and ability to bundle service, compared with DSL, satellite, and cellular/mobile internet users (the leading connection types in the market area) as

shown in Figure 36. At the same time, importance of these services is equally high across connection types, which indicates that cable modem providers are better meeting customer needs (see Figure 35).

Figure 35: Importance of Internet Service Aspects by Primary Home Internet Service

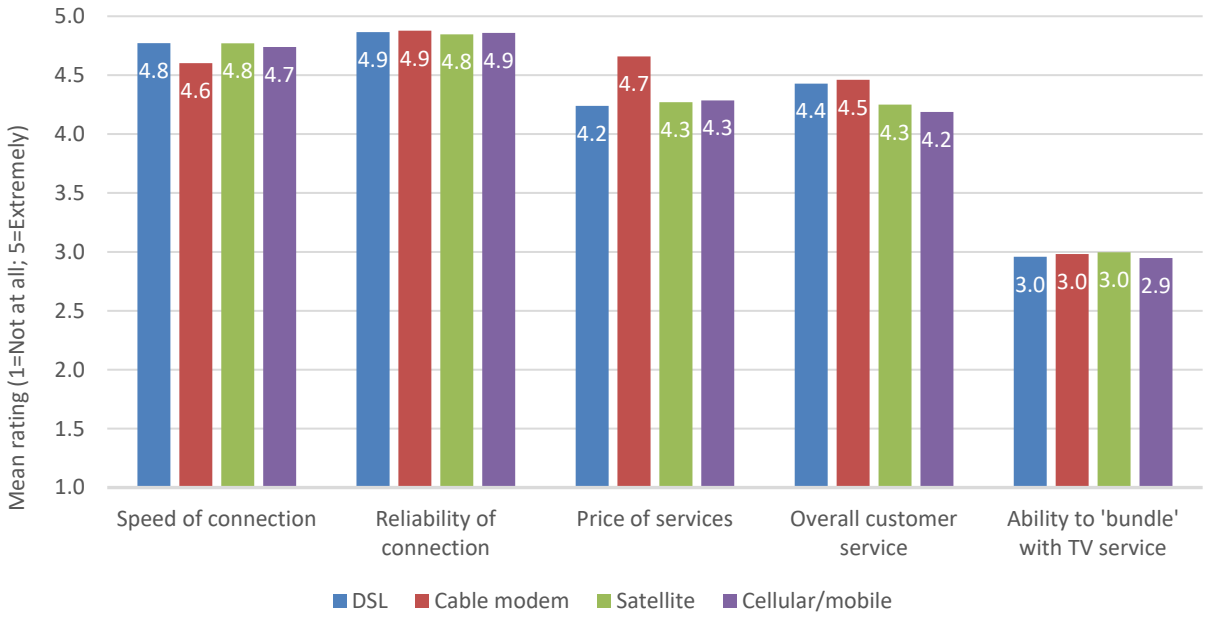
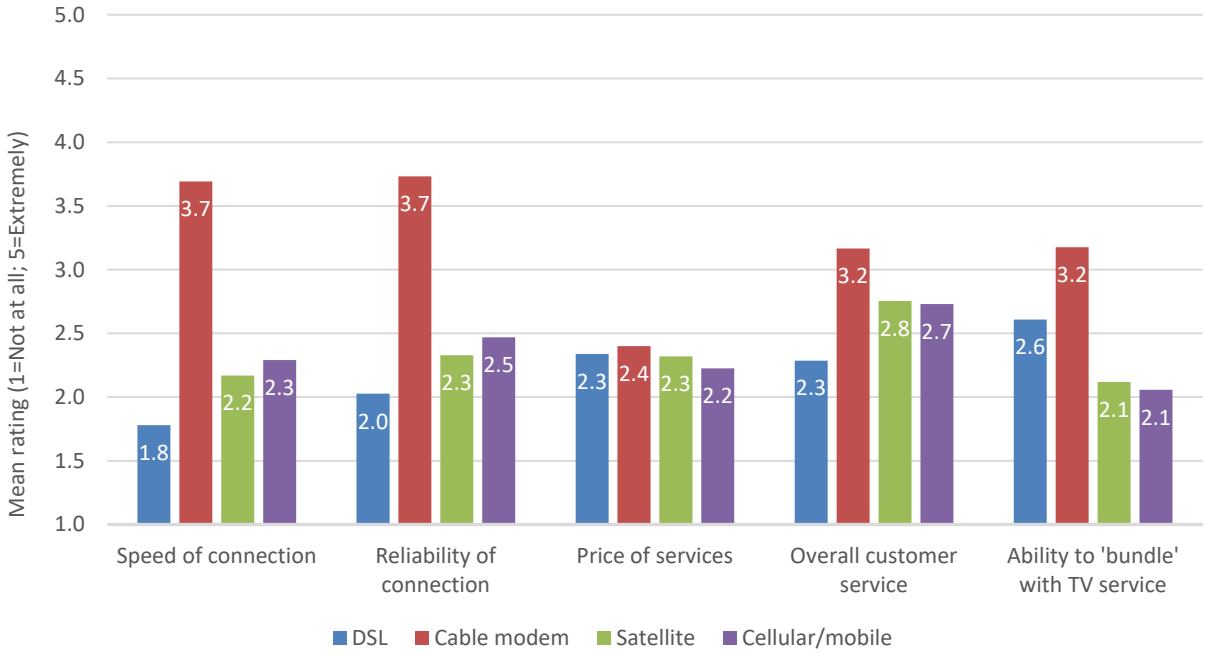


Figure 36: Satisfaction with Internet Service Aspects by Primary Home Internet Service



As indicated above and illustrated in Table 7, cable modem providers are better meeting customer expectations compared with DSL, satellite, and cellular/mobile internet providers, particularly for speed and reliability of internet connection.

Table 7: Gap Index Score by Primary Home Internet Service

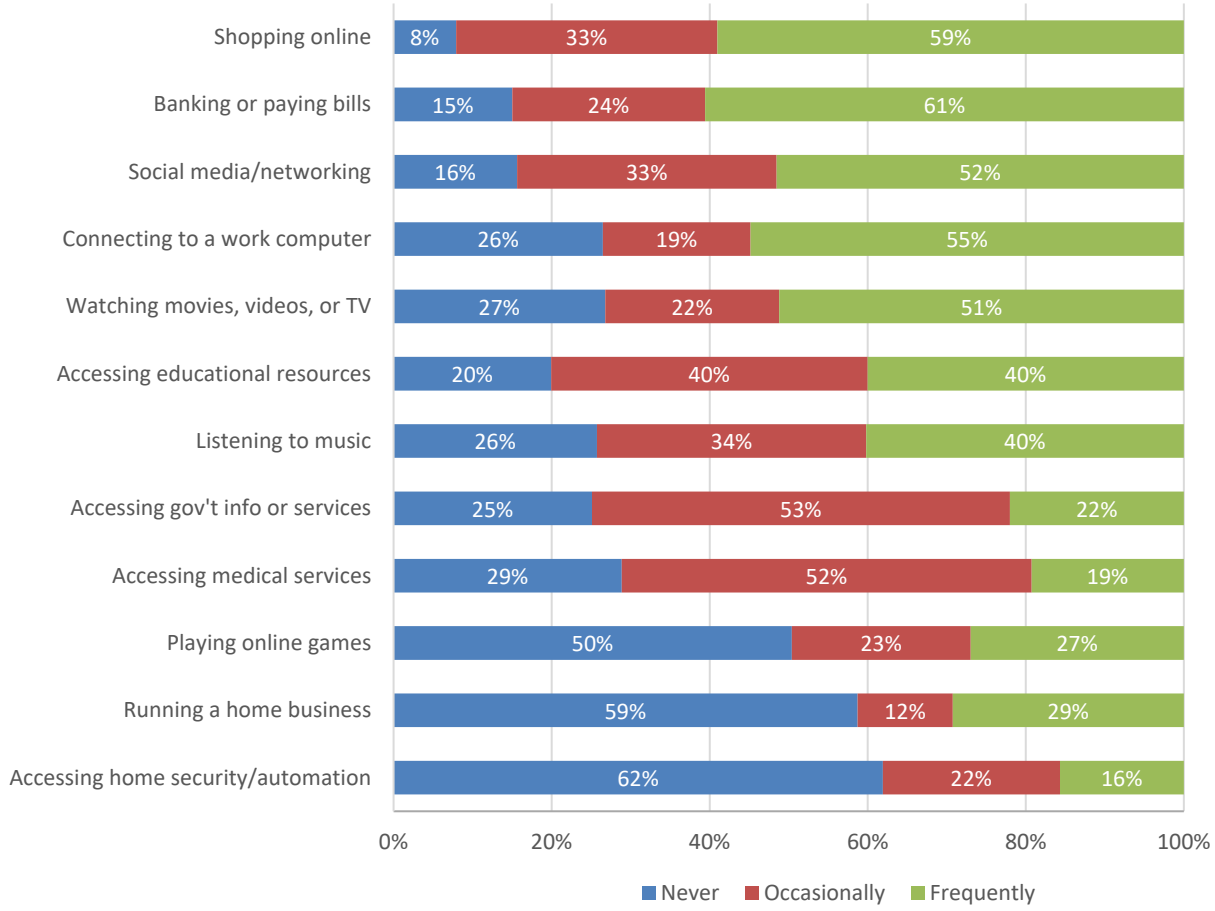
	Satisfaction / Importance Gap Index*				
	Speed of connection	Reliability of connection	Price of service	Customer service	Ability to bundle
DSL	37%	42%	55%	52%	88%
Cable modem	80%	77%	52%	71%	107%
Satellite	45%	48%	54%	65%	71%
Cellular/mobile	48%	51%	52%	65%	70%
ISP Average	51%	53%	53%	64%	79%
Percent of expectations met = Satisfaction / Importance					

3.3.6 Internet Uses and Importance

Respondents were asked about their use of the internet for various activities, as illustrated in Figure 37. Among those items listed, the internet is most frequently used for shopping online, with 92 percent of subscribers using the internet at least occasionally for this activity, and six in 10 using it frequently. Other top activities include banking or paying bills, social media networking, connecting to a work computer, and watching movies, videos, or TV, with at least one-half of subscribers using the internet frequently for these activities.

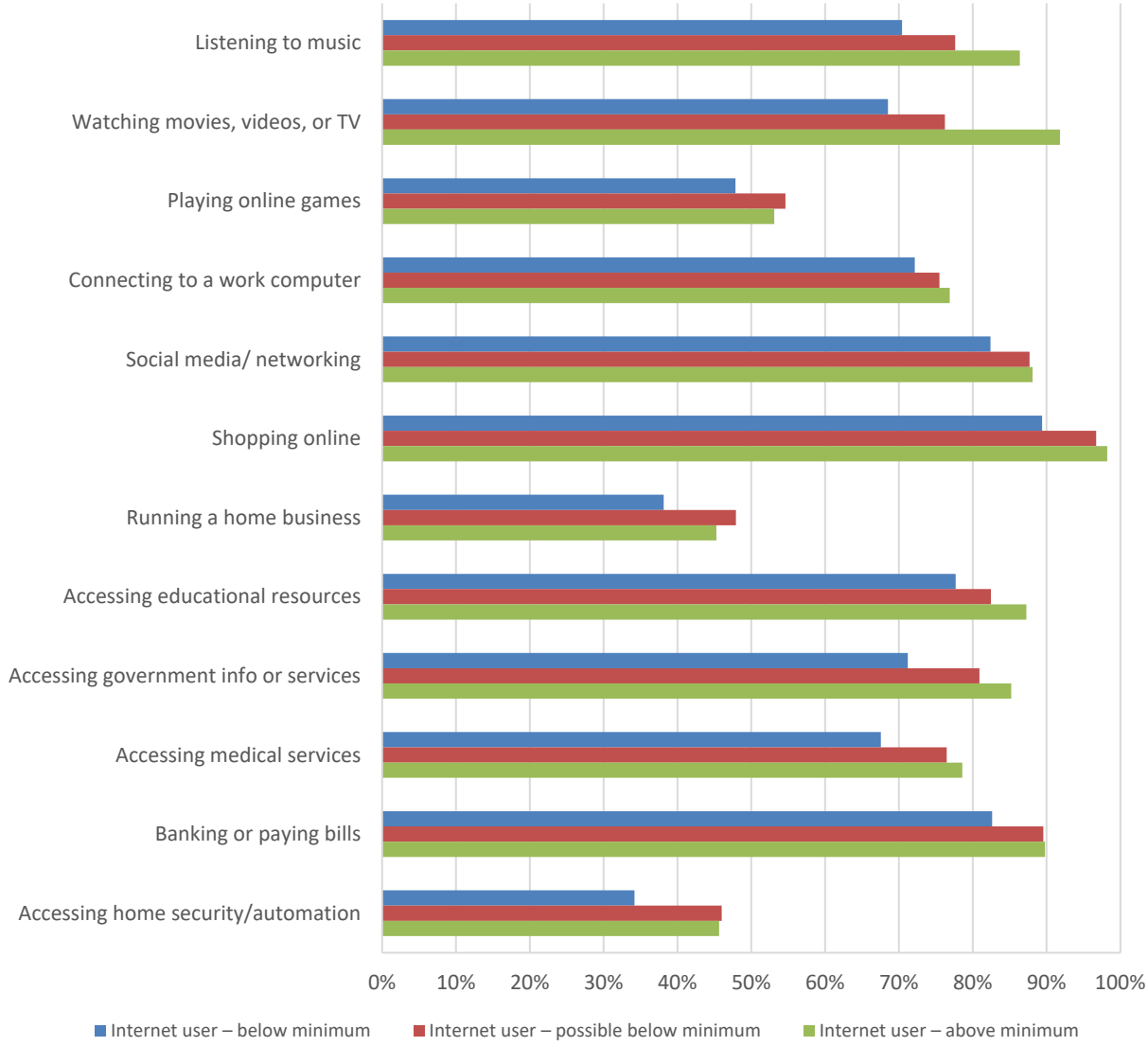
Four in 10 subscribers frequently access the internet for education or for listening to music. A small segment of subscribers (less than one-fourth) use the internet frequently to access government information or services or medical services, but more than one-half of subscribers use the internet occasionally for these activities. Use of the internet for playing online games, running a home business, and accessing home security/automation applications is less frequent than the other activities included in this question.

Figure 37: Frequency of Home Internet Activities



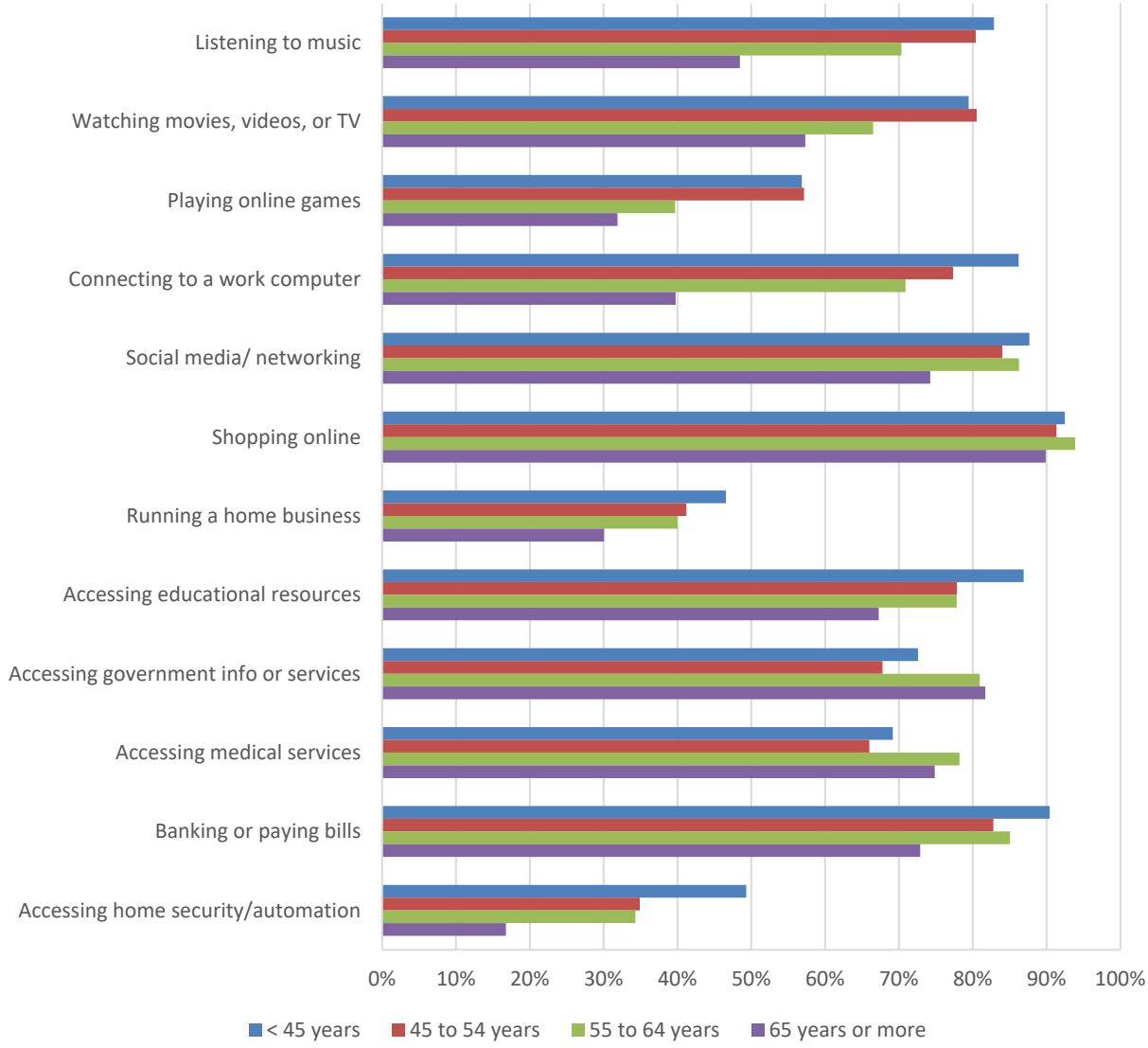
As may be expected, internet subscribers with a connection above the minimum criteria are the most likely to make use of the internet for various activities, while those with a connection below the minimum connection are the least likely to use their internet, particularly for listening to music and watching movies, videos, or TV (see Figure 38).

Figure 38: Home Internet Activity by Internet Connectivity Group (Percent Ever Using)



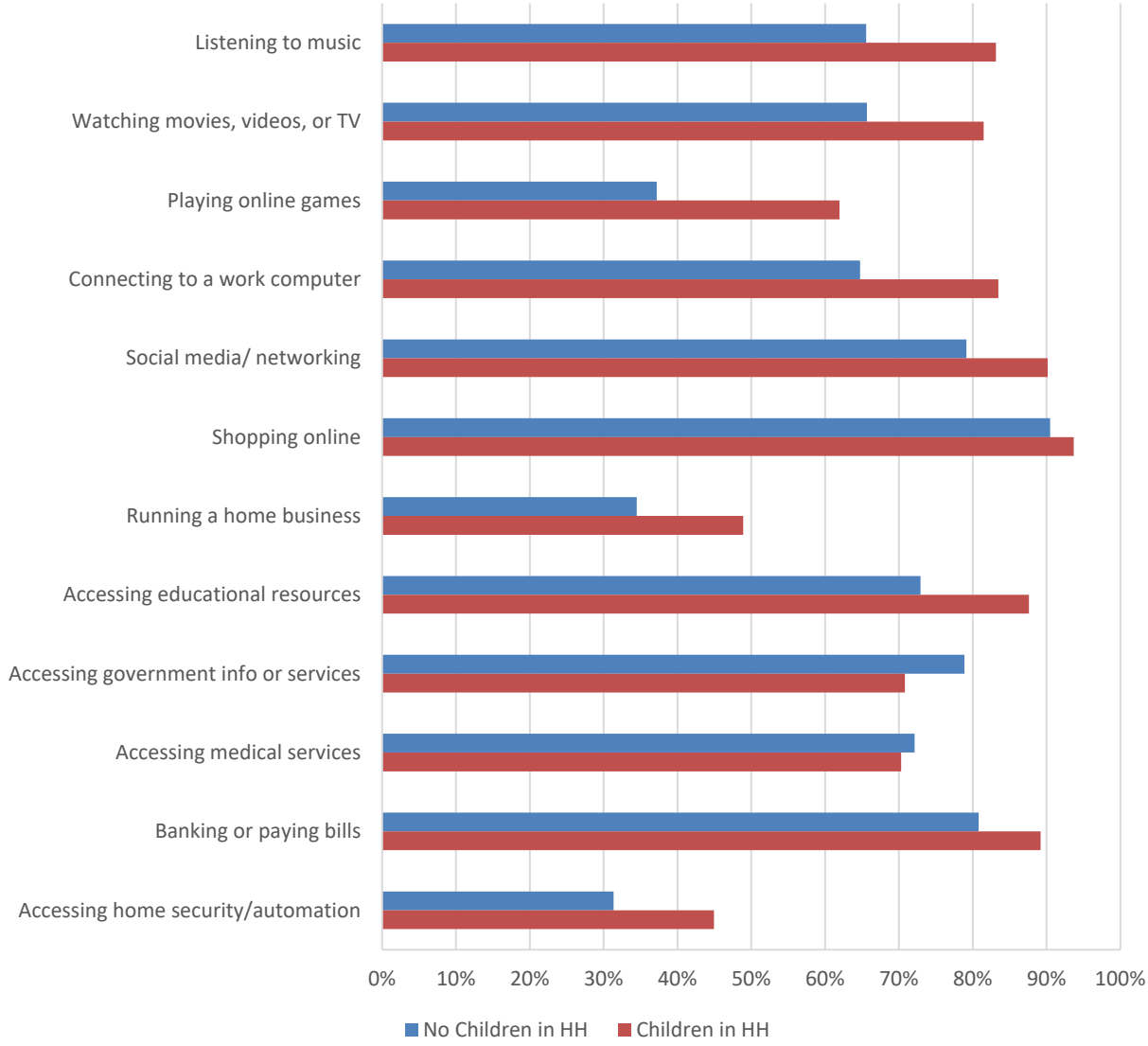
The use of the internet for some activities varies by age, as illustrated in Figure 39. Younger respondents are much more likely to use the internet for many applications, especially listening to music, watching videos or movies or TV, playing online games, connecting to a work computer, accessing educational resources, and accessing home security/automation applications. Internet subscribers ages 65 and older are less likely to ever use the internet for most activities, with the exception of online shopping and accessing government or medical services.

Figure 39: Home Internet Activity by Age of Respondent (Percent Ever Using)



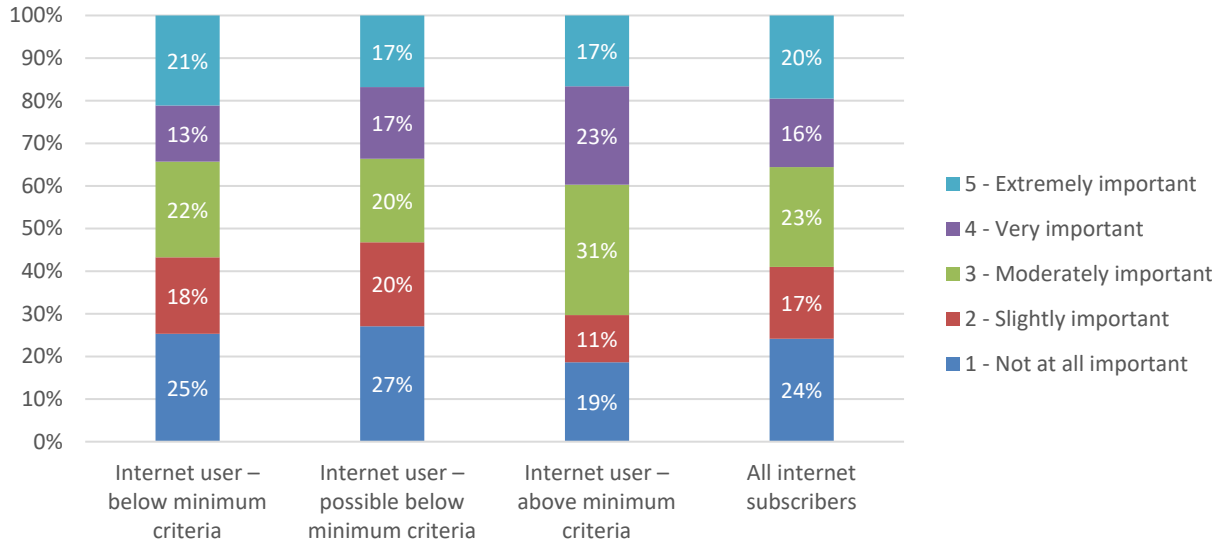
Similarly, respondents with children under age 18 in the household are more likely to use the internet for various activities, particularly for listening to music, watching movies or videos or TV, playing online games, connecting to a work computer, social media, accessing educational resources, and accessing home security/automation applications (see Figure 40).

Figure 40: Home Internet Activity by Children in Household (Percent Ever Using)



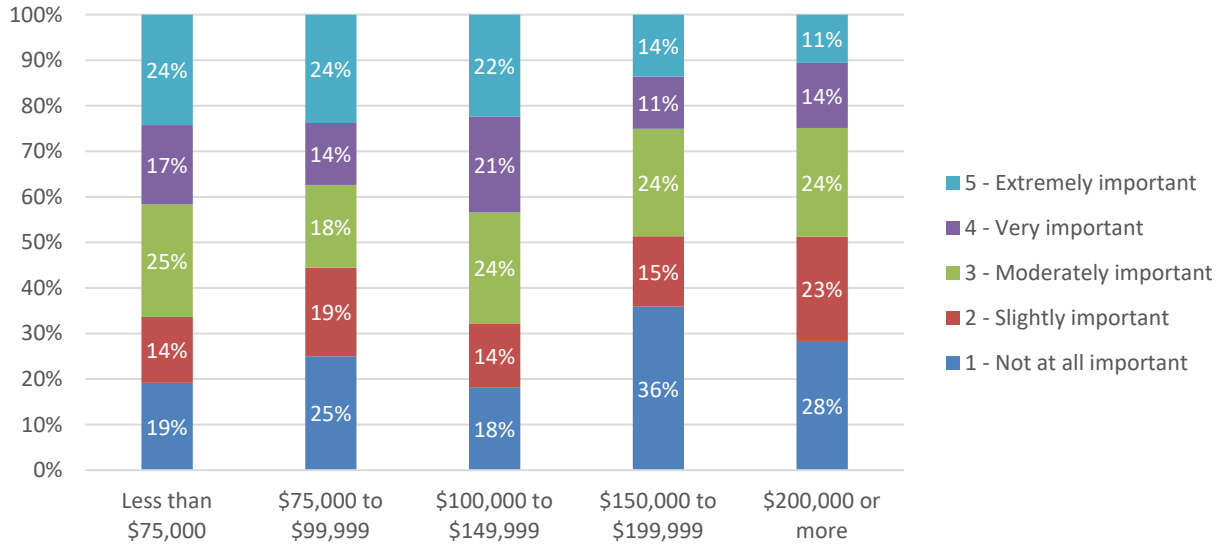
Additionally, respondents were asked to evaluate the importance of access to free Wi-Fi hotspots at libraries and community centers. As illustrated in Figure 41, there was sizeable variation in responses, with one-fourth of all internet subscribers saying access is not at all important, and one-fifth saying it is extremely important. Internet users with service above the minimum criteria placed slightly more importance on this service, compared with other internet users.

Figure 41: Importance of Access to Free Wi-Fi Hotspots at Libraries and Community Centers



Respondents with a household income below $150,000 placed somewhat more importance on having access to free Wi-Fi at libraries and community centers, compared with those with a higher household income (see Figure 42).

Figure 42: Importance of Access to Free Wi-Fi Hotspots by Household Income



3.3.7 Willingness to Switch Internet Service

Respondents were asked if they would be willing to switch to high-speed internet service (defined as 100 Mbps) for various price levels. The mean willingness to switch across this array of questions is illustrated in Figure 43, while detailed responses are illustrated in Figure 44.

Figure 43: Willingness to Switch to High-Speed Internet at Price Levels (Mean Ratings)

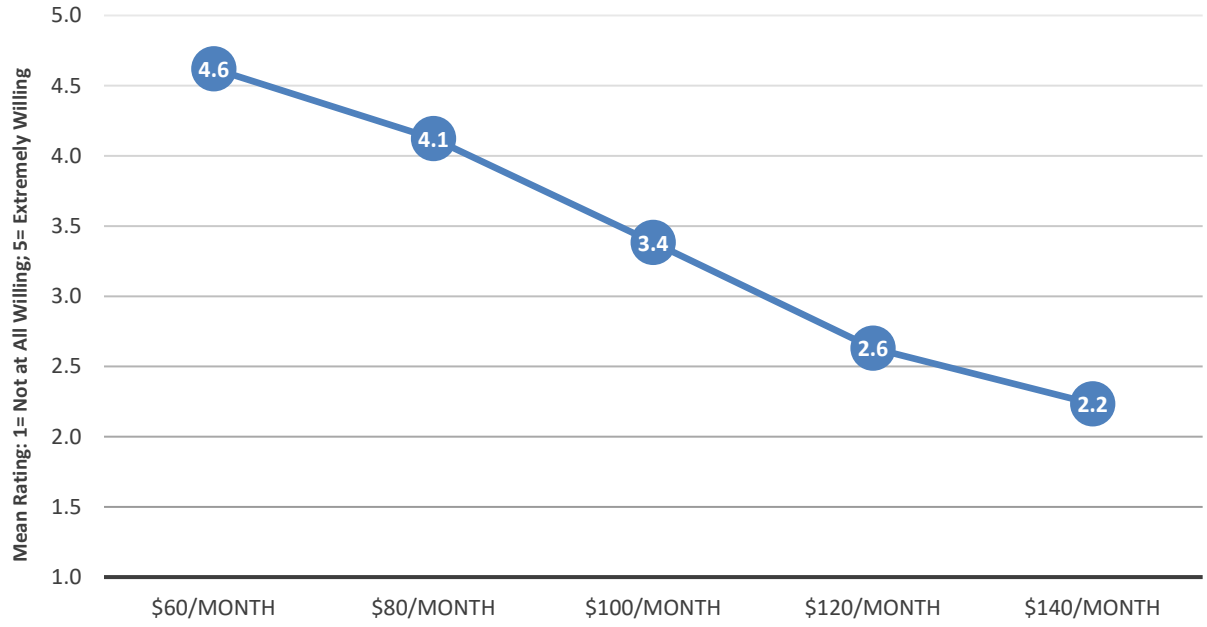
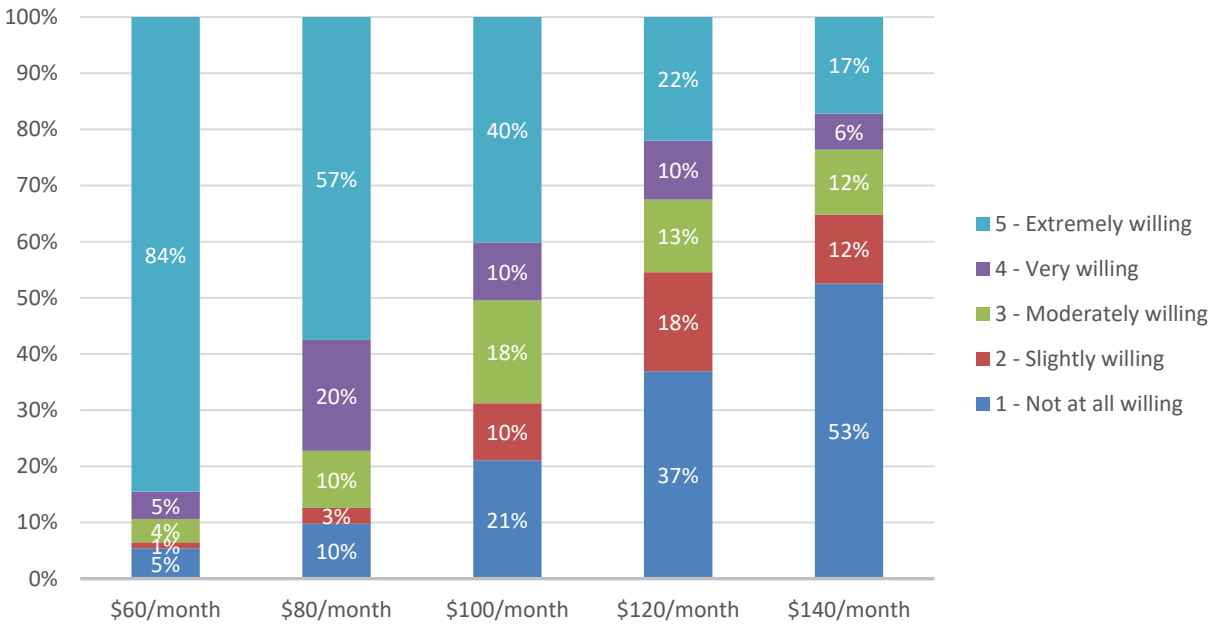


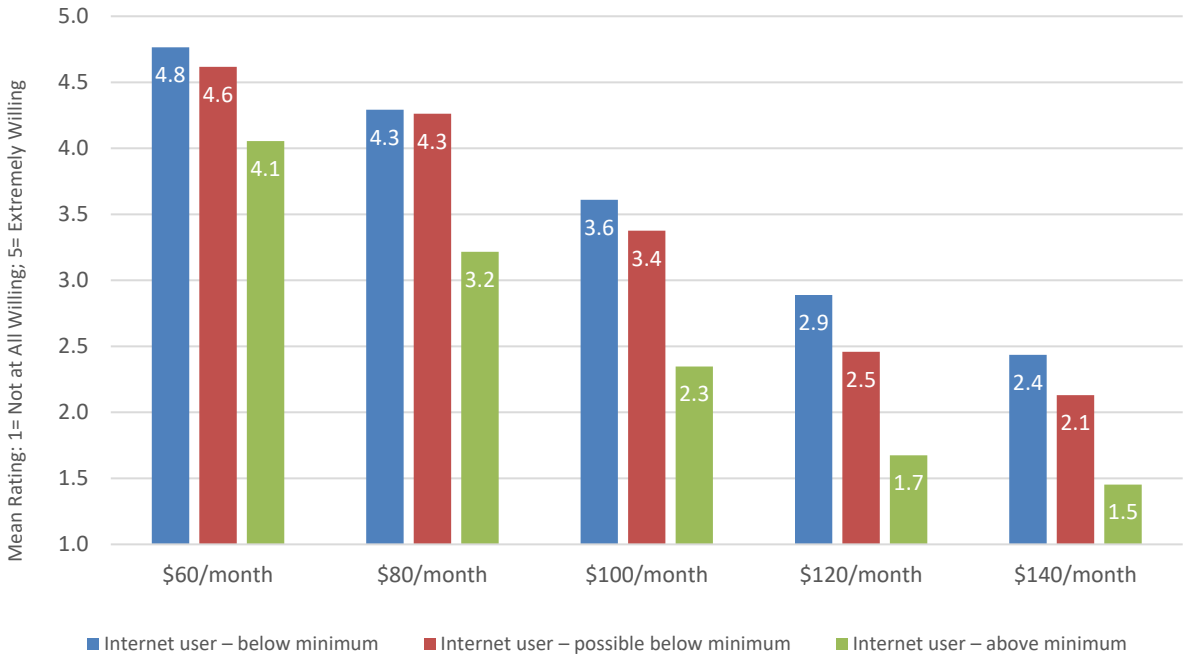
Figure 44: Willingness to Switch to High-Speed Internet at Various Price Levels



As depicted in Figure 43 and in Figure 44, respondents' willingness to switch to high-speed internet service (100 Mbps) is very high at $60 per month, but it drops considerably as the price increases. At a price of approximately $120 per month, the mean rating falls to 2.6 (slightly to moderately willing). From another perspective, 84 percent are extremely willing to switch to high-speed internet for $60 per month, dropping to 17 percent at $140 per month.

Subscribers with an internet connection above the minimum criteria (i.e. who already have sufficiently fast internet service) would be less likely to switch internet service, as might be expected (see Figure 45). Respondents with internet service below or possibly below the minimum criteria would be very to extremely likely to switch providers for $60 or $80 per month.

Figure 45: Willingness to Switch to High-Speed Internet by Internet Connectivity Group



Similarly, cable modem subscribers (service above the minimum criteria) would be less likely than DSL, satellite, or cellular/mobile internet subscribers to switch service, as illustrated in Figure 46.

The willingness to switch to very fast internet service is also correlated with some demographic characteristics of the respondents, including respondent age, education, and household income, as depicted in Figure 47 through Figure 44. Specifically, those ages 65 and older would be less likely than younger respondents to switch to a high-speed connection at various price points. Similarly, those with children in the household, who are younger on average, would be more willing to switch providers. Additionally, the likelihood of switching providers tends to increase as education and household income increases.

Figure 46: Willingness to Switch to High-Speed Internet by Primary Home Internet Service

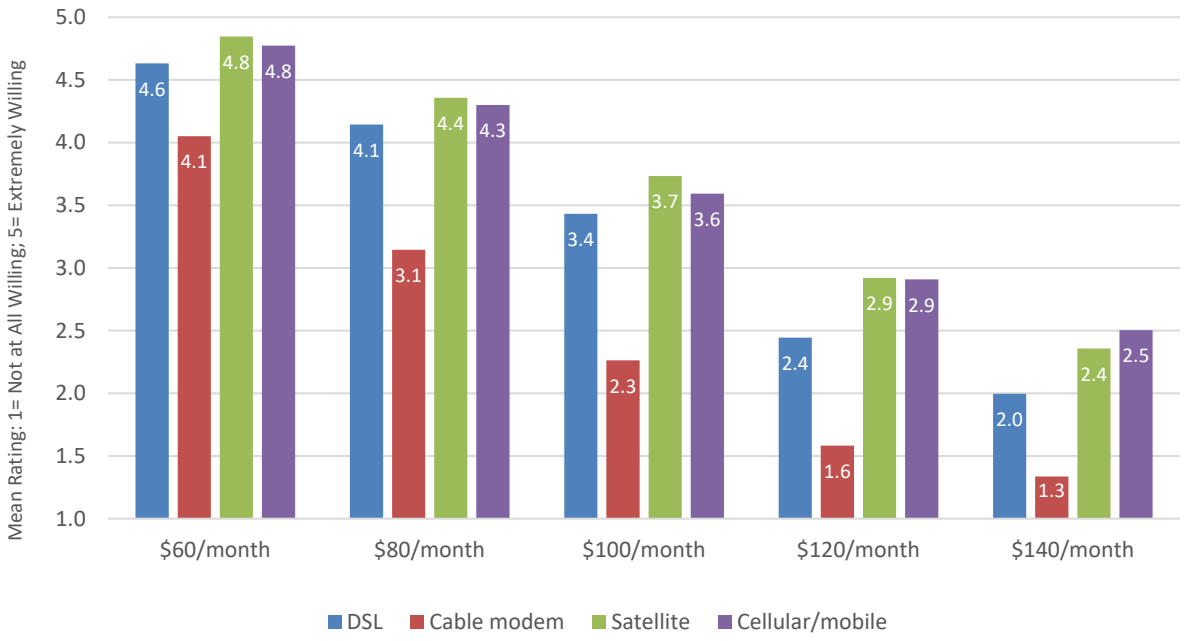


Figure 47: Willingness to Switch to High-Speed Internet by Age of Respondent

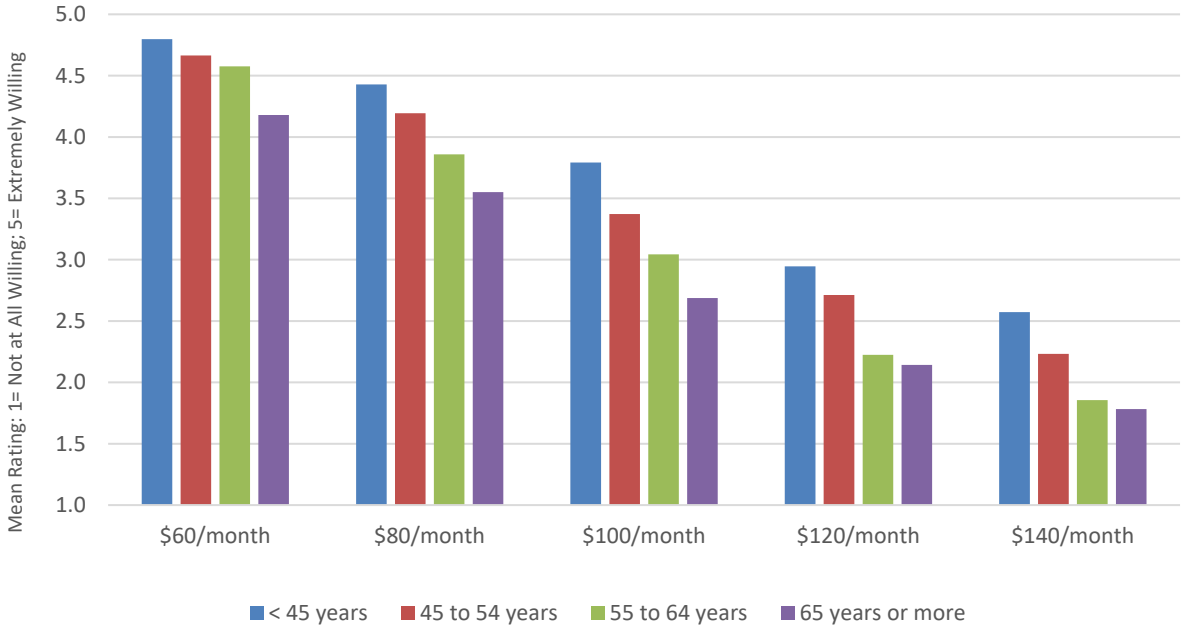


Figure 48: Willingness to Switch to High-Speed Internet by Education

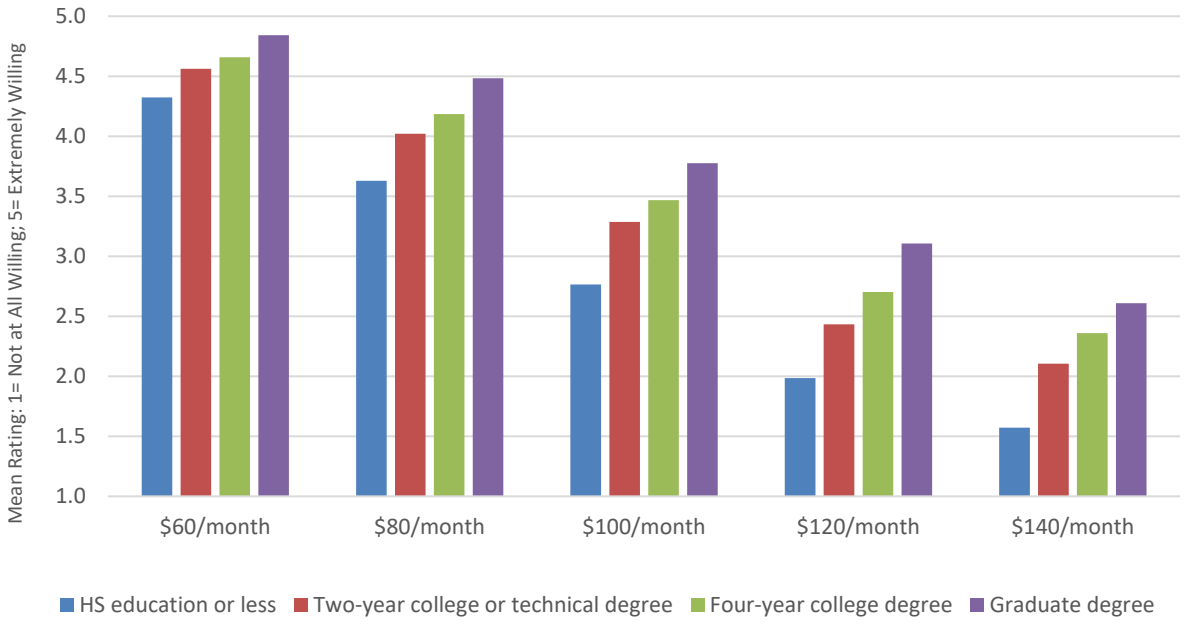


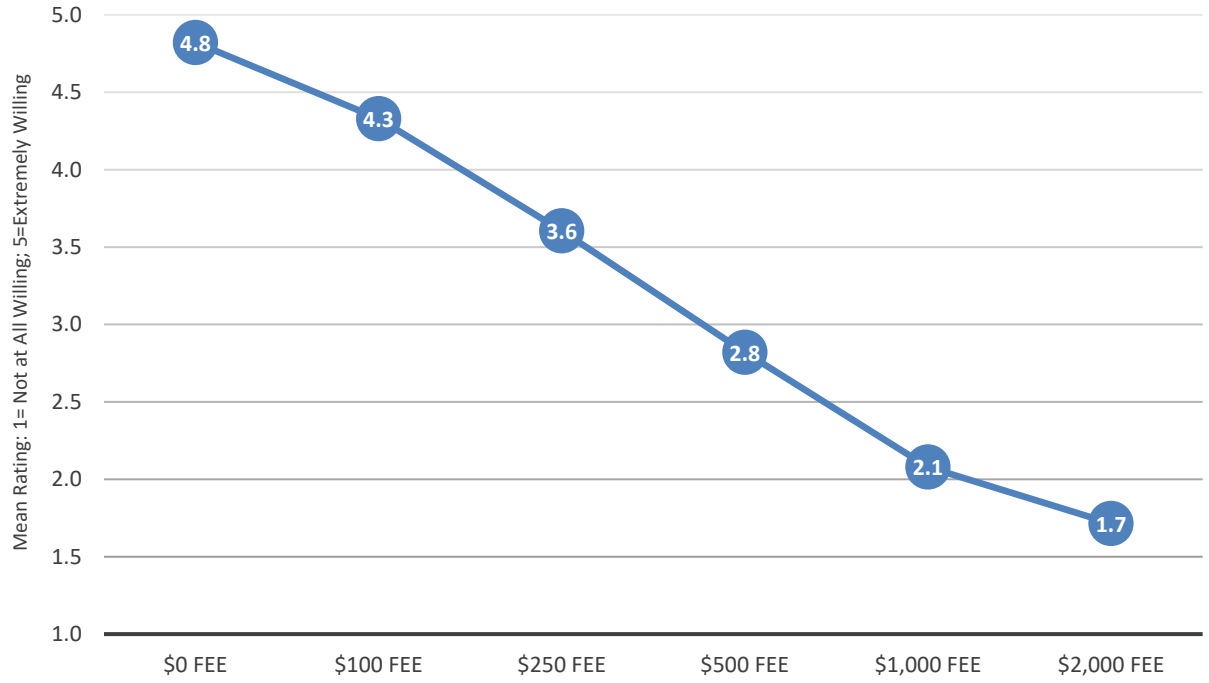
Figure 49: Willingness to Switch to High-Speed Internet by Household Income

3.3.8 Willingness to Pay Hook-Up Fee for High-Speed Network

Respondents were asked if they would be willing to pay an upfront hook-up fee to connect to 100 Mbps internet service. Almost all respondents would be extremely willing to switch to the

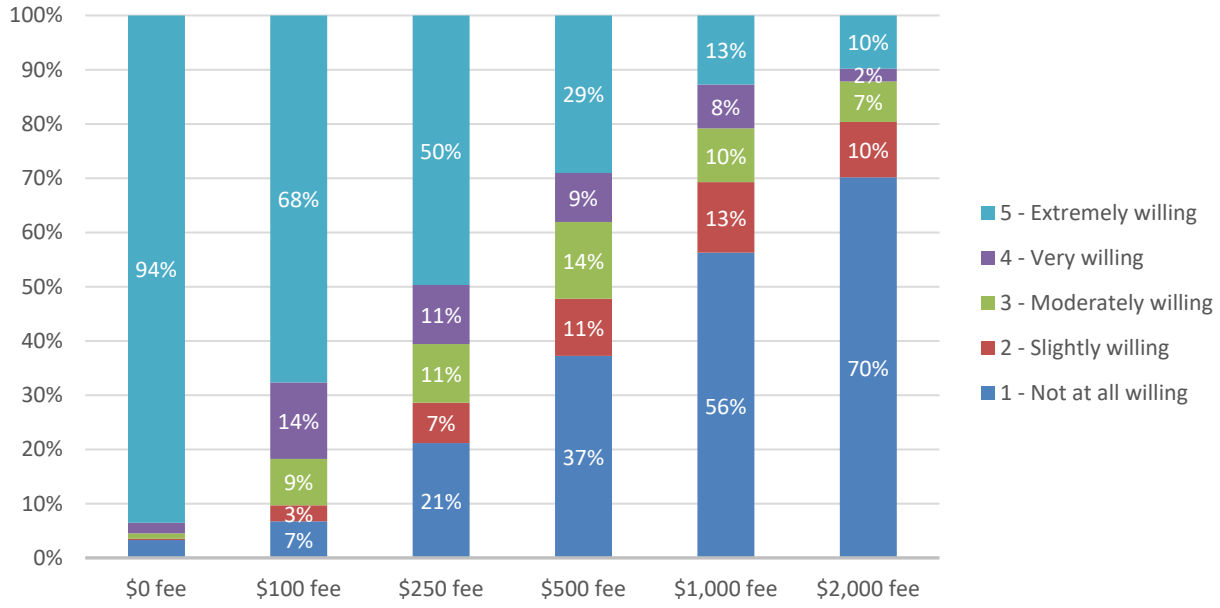
network for no hook-up fee, as would be expected. They would be very willing to pay a $100 hook-up fee and moderately willing to pay a $250 hook-up fee. Willingness to pay a hook-up fee falls sharply at higher price points, as shown in Figure 50.

Figure 50: Average Willingness to Pay Upfront Hook-Up Fee for High-Speed Internet



Specifically, two-thirds of subscribers would be extremely willing to pay a $100 hook-up fee for fast internet service, and one-half of subscribers would be extremely willing to pay a $250 hook-up fee for this service. Respondents were split at the $500 price point and overall would not be willing to pay a hook-up fee of $1,000 or more (see Figure 51).

Figure 51: Willingness to Pay Upfront Hook-Up Fee for High-Speed Internet



Those who already have internet service above the minimum criteria would be less likely to pay an upfront hook-up fee for access to 100 Mbps service. Similarly, cable modem subscribers would be less likely than connections below or possibly below the minimum criteria to pay a fee for fast service (see Figure 52 and Figure 53).

Figure 52: Willingness to Pay Upfront Hook-Up Fee by Internet Connectivity Group

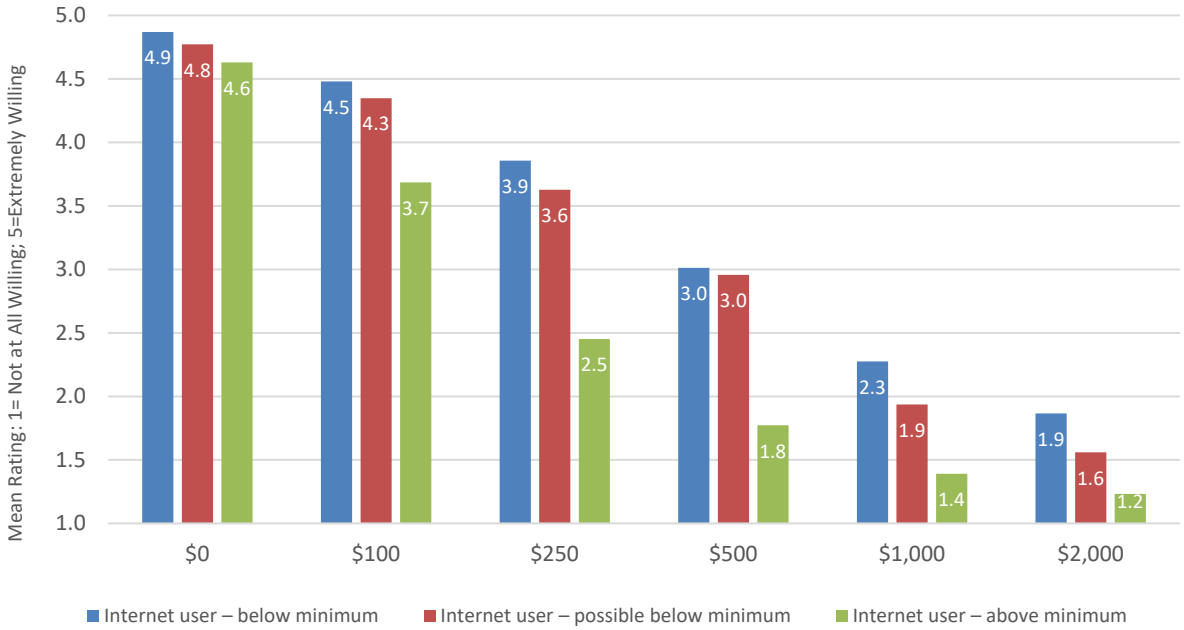
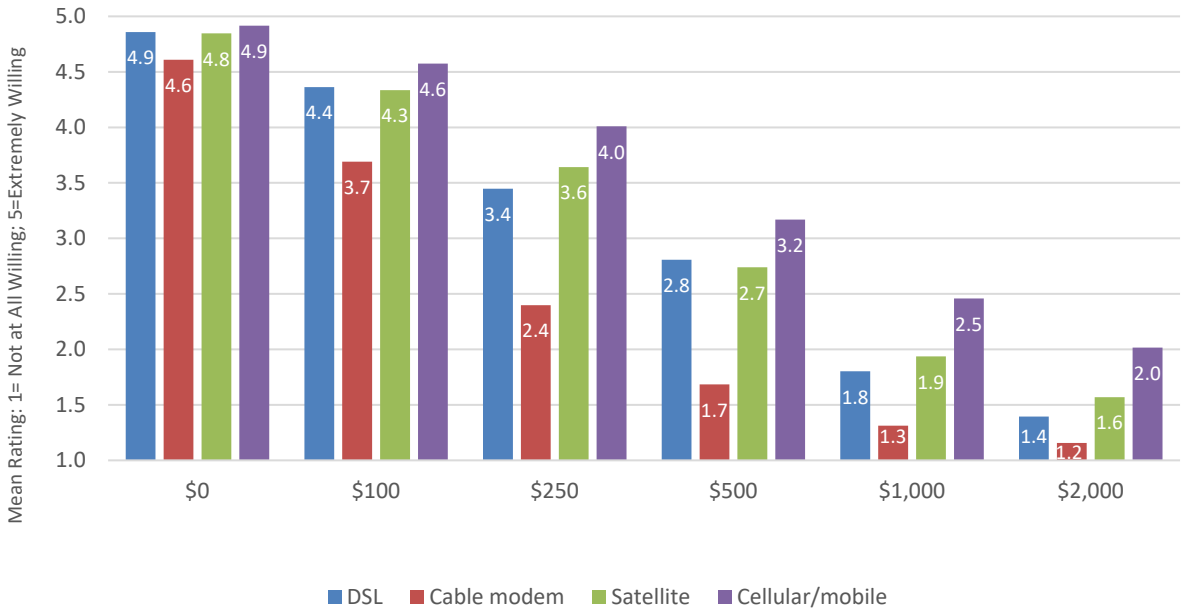
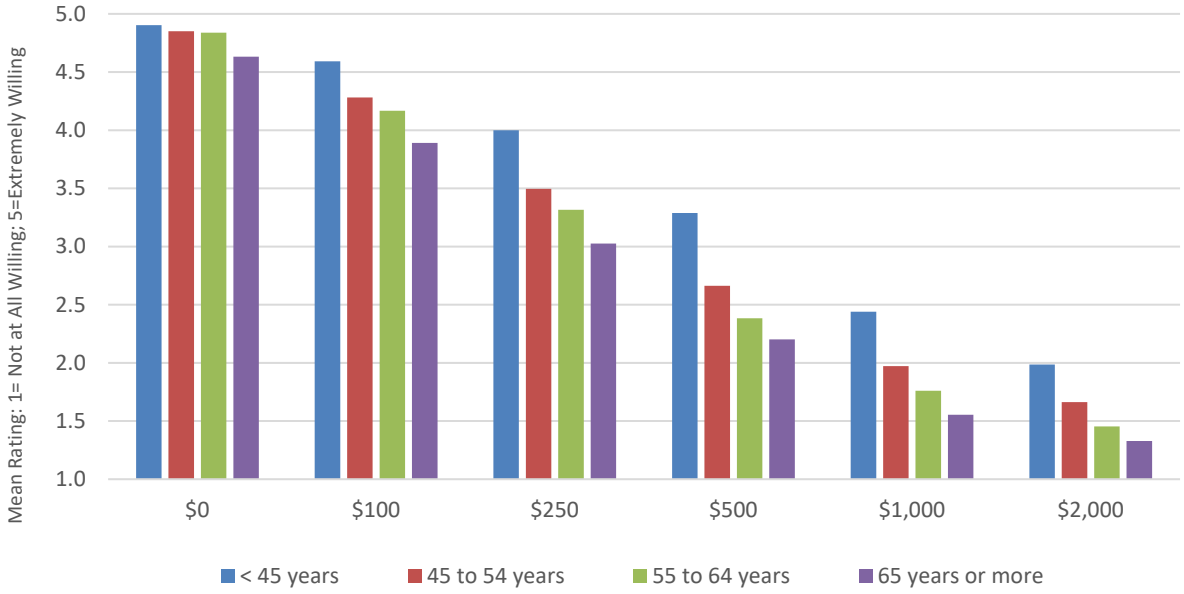


Figure 53: Willingness to Pay Upfront Hook-Up Fee by Primary Home Internet Service



Willingness to pay an upfront hook-up fee for fast internet service is correlated with respondent age, as illustrated in Figure 54. Those ages 65 and older are less willing to pay a hook-up fee for access to fast internet.

Figure 54: Willingness to Pay Upfront Hook-Up Fee by Household Income



Willingness to pay an upfront hook-up fee increases as household income increases. Similarly, those with more than a high school level of education, which is correlated with household income, would be more willing to pay the hook-up fee (see Figure 55 and Figure 56).

Figure 55: Willingness to Pay Upfront Hook-Up Fee by Education

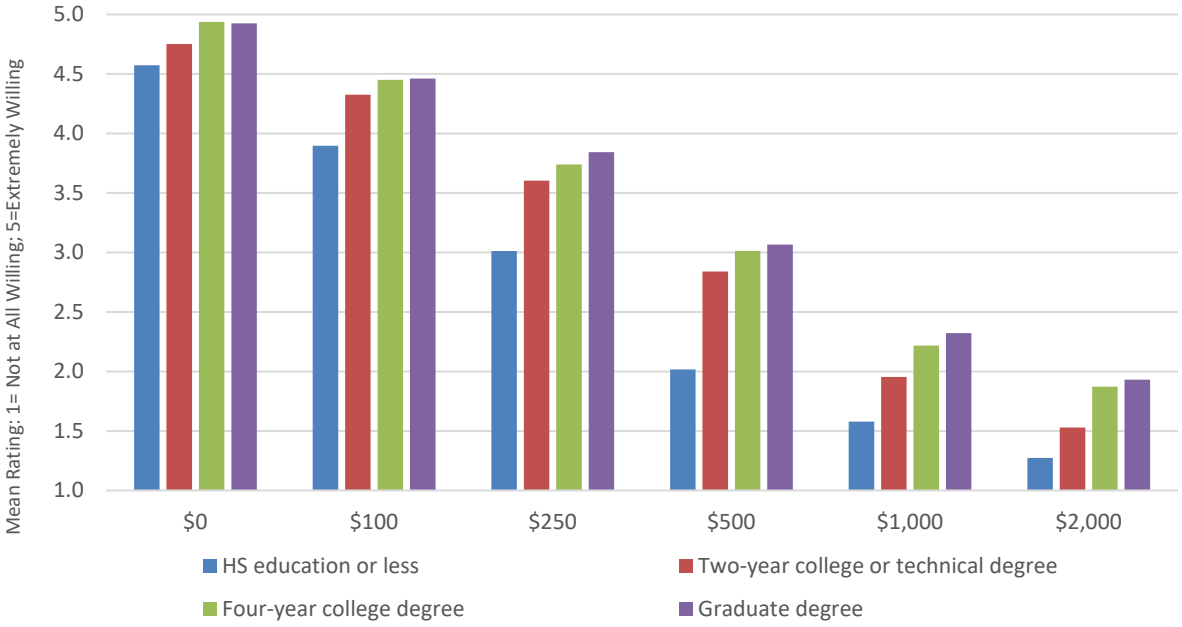
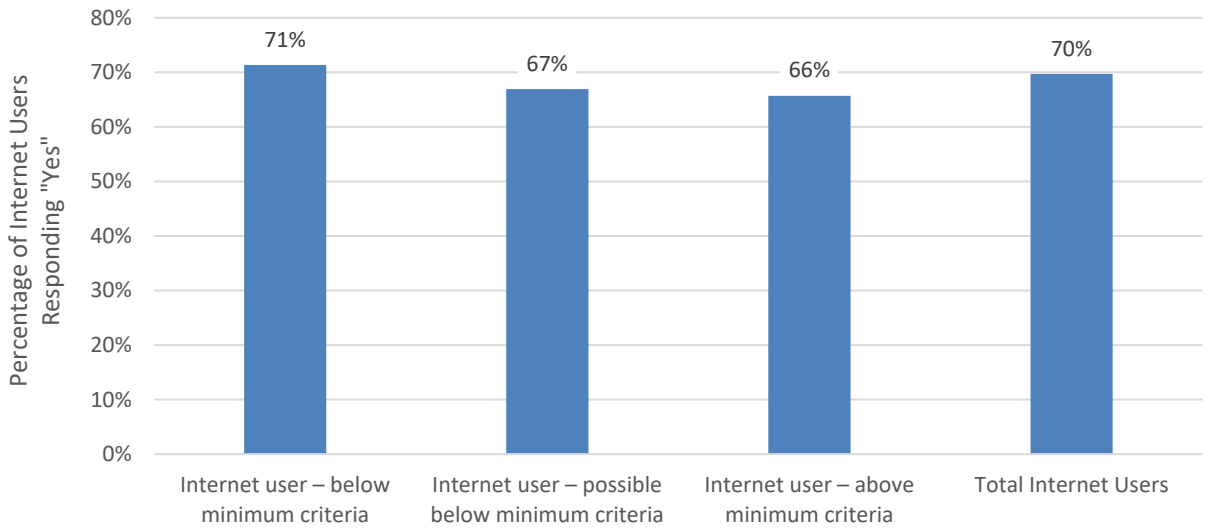


Figure 56: Willingness to Pay Upfront Hook-Up Fee by Household Income

3.3.9 Internet Use for Jobs/Careers

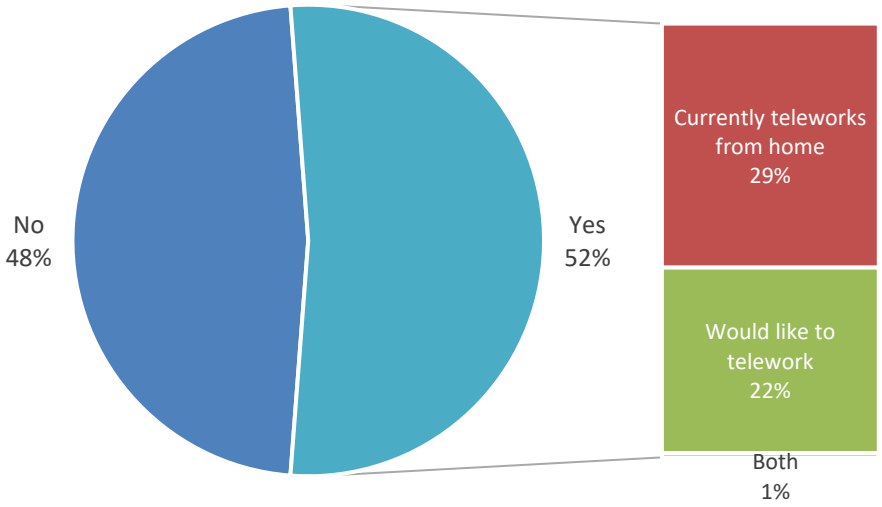
Internet subscribers were asked if their job requires internet access at home. As illustrated in Figure 57, the results point to a high need for internet access across all connectivity groups. No statistically significant difference was found, suggesting that respondents with internet service below or possibly below the minimum criteria have similar needs as those with service above the minimum criteria. Overall, seven in 10 internet subscribers need internet access at home for their job.

Figure 57: Internet Access Required for Job



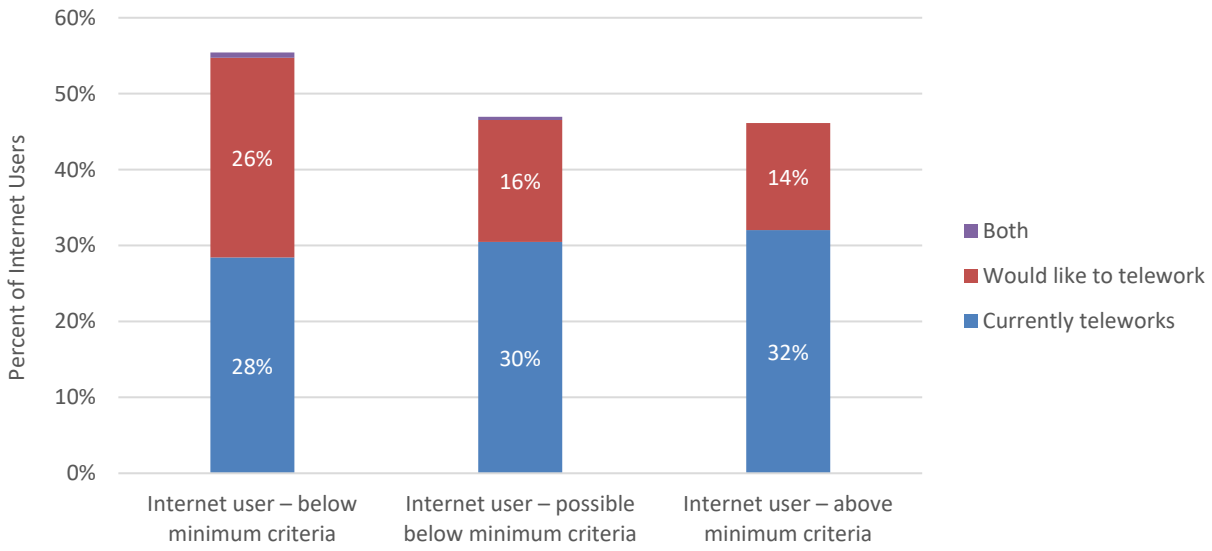
As shown in Figure 58, 29 percent of respondents indicated that someone in their family already teleworks from home, and another 22 percent would like to telework.

Figure 58: Household Member Teleworking



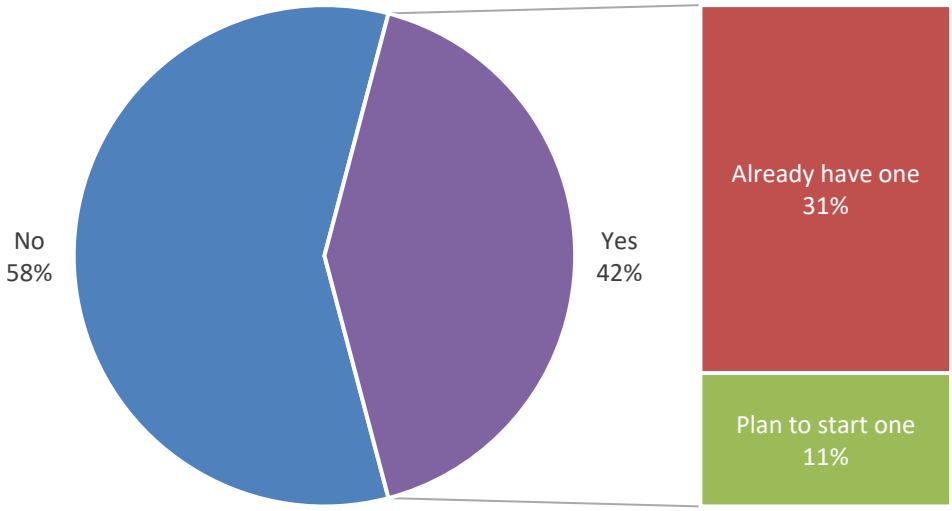
Internet users with service below the minimum criteria are more likely than other subscribers to have a household member who would like to telework, as shown in Figure 59. This highlights a possible gap in service, where those without sufficient internet service want to telework but do not, although the correlation between desire to telework (but not currently) and internet connectivity may be spurious.

Figure 59: Teleworking Status by Internet Connectivity Group



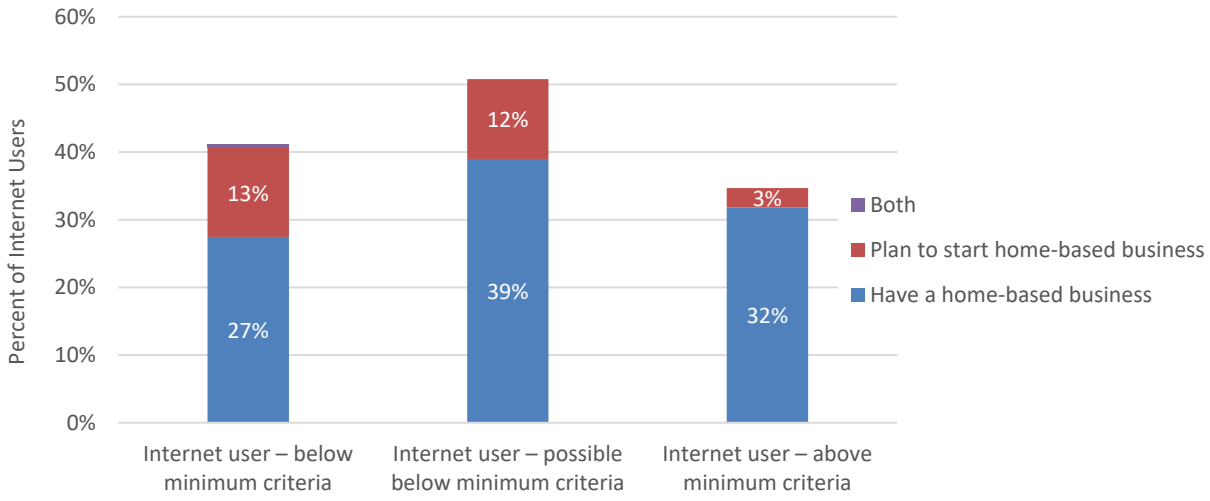
More than four in 10 respondents either have a home-based business or are planning to start one within the next three years, as illustrated in Figure 60.

Figure 60: Own or Plan to Start a Home-Based Business



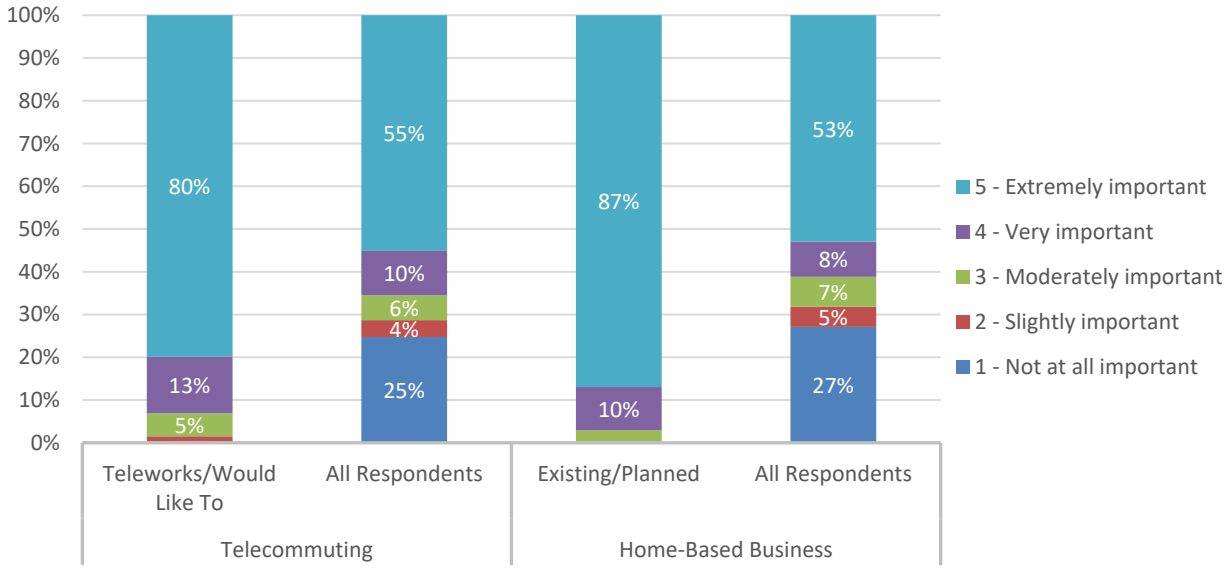
As shown in Figure 61, those with an internet service below or possibly below the minimum criteria are more likely than those with internet above the minimum criteria to plan to start a home-based business in the next three years. This suggests a greater need for fast internet service for individuals with insufficient internet service to support home businesses.

Figure 61: Own or Plan to Start a Home-Based Business by Internet Connectivity Group



A high-speed data or internet connection is extremely important for most of those who telework or would like to telework (80 percent) and for those with a planned or existing home-based business (87 percent), as shown in Figure 62. Intuitively, those who do not telework or have a planned/existing home-based business find the need for high-speed internet for these aspects to be less important.

Figure 62: Importance of High-Speed Internet for Teleworking and Home-Based Business



Respondents ages 65 and older (who are more likely to be retired) are less likely to have a job that requires internet access, to telecommute, or to have a home-based business. Additionally, those with lower levels of education or a lower household income are less likely to need internet access for a job, to telecommute, or to have a home-based business (see Table 8).

Table 8: Saturation of Internet Use, Telecommuting, and Home-Based Businesses by Demographic Groups

		Job Requires Internet	Telecommute/ Would Like To	Have/Plan to Start Home-Based Business	*Total Count*
Age group	< 45 years	86%	68%	48%	*334*
	45 to 54 years	77%	57%	43%	*156*
	55 to 64 years	59%	45%	43%	*141*
	65 years or more	29%	17%	26%	*151*
Highest level of education	HS education or less	48%	29%	35%	*139*
	Two-year college or technical degree	69%	55%	36%	*177*
	Four-year college degree	78%	61%	51%	*272*
	Graduate degree	73%	54%	40%	*194*
Household income	Less than $75,000	47%	35%	35%	*126*
	$75,000 to $99,999	60%	40%	41%	*122*
	$100,000 to $149,999	75%	60%	38%	*187*
	$150,000 to $199,999	83%	65%	46%	*138*
	$200,000 or more	88%	71%	51%	*107*
Children in Household	No Children in HH	56%	43%	37%	*419*
	Children in HH	84%	63%	48%	*363*
	One HH member	34%	25%	17%	*51*

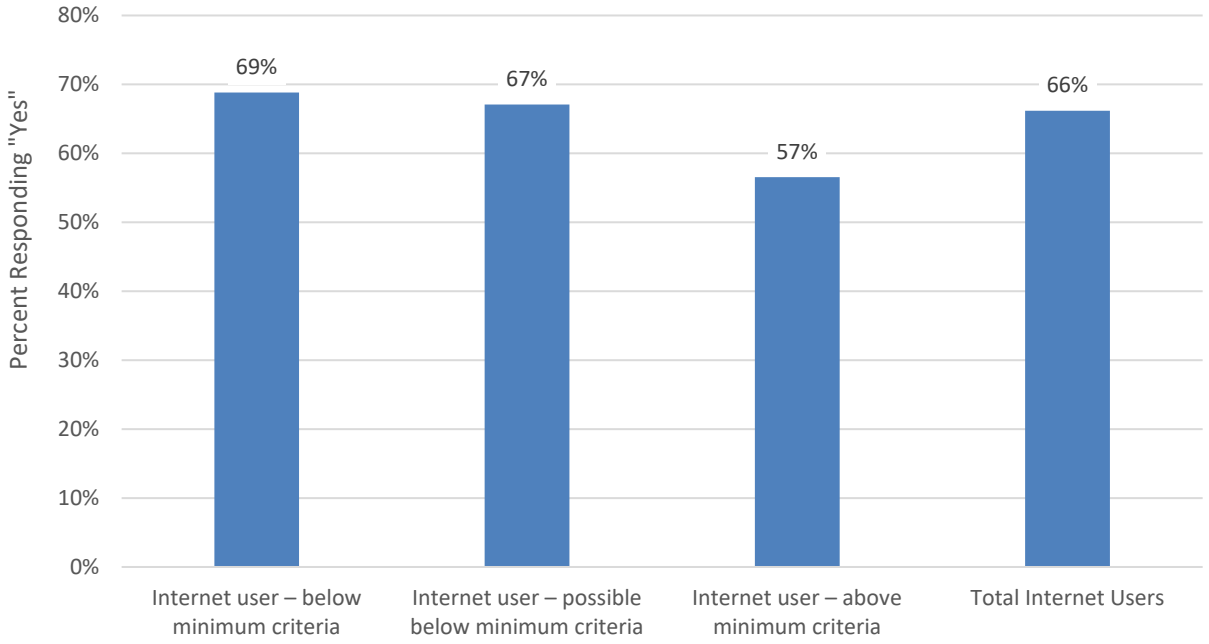
		Job Requires Internet	Telecommute/ Would Like To	Have/Plan to Start Home-Based Business	*Total Count*
Total Household Size (Adults + Children)	Two HH members	54%	41%	34%	*253*
	Three HH members	72%	64%	45%	*138*
	Four+ HH members	83%	59%	50%	*339*
Number of years lived at current residence	Less than 1 year	85%	69%	36%	*45*
	1 to 2 years	83%	63%	49%	*64*
	3 to 4 years	82%	73%	40%	*84*
	5 or more years	65%	47%	42%	*587*

The table shows the percentage of each demographic group who answered "yes" to each question related to internet use for job/careers. Read across rows for the percentage within each demographic group who answered "yes" to these aspects (e.g. 86% of respondents under age 45 have a job that requires internet access, 68% have a household member who telecommutes or would like to telecommute, and 48% have a household member who has a home-based business or would like to start one). Read down columns to compare responses by demographic groups for a particular question (e.g. 86% of respondents under age 45 have a job that requires internet access, compared with 77% of those ages 45-54, 59% of those ages 55-64, and 29% of those ages 65 and older).

3.3.10 Internet Use for Education

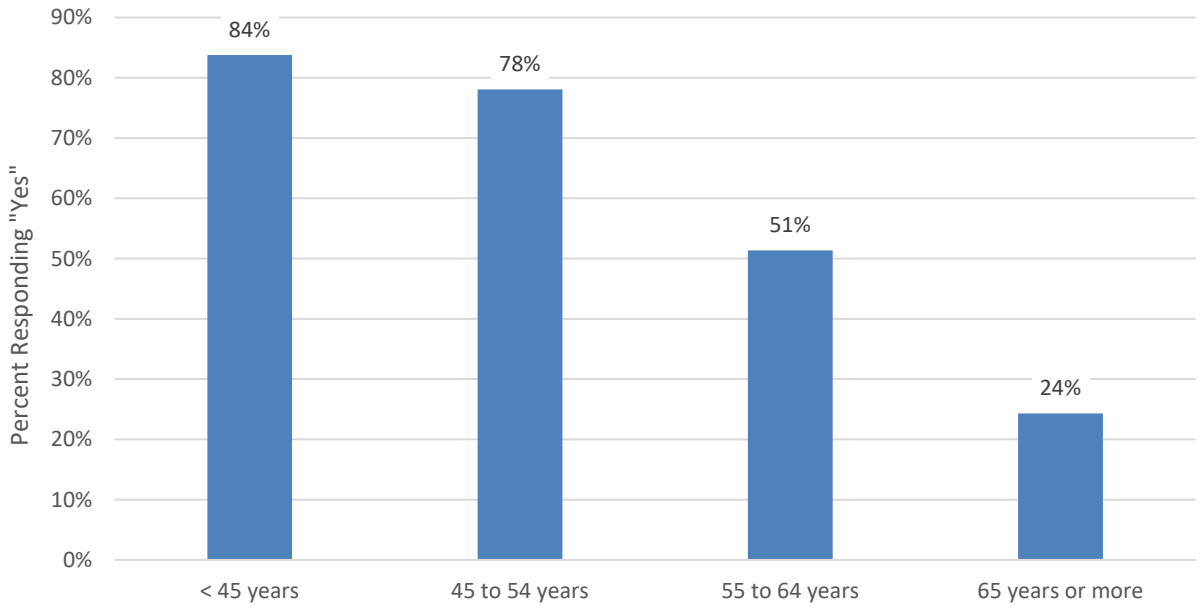
Respondents were asked if they or a household member use an internet connection for educational purposes, such as completing assignments, research, or study related to coursework or formal education. Households with an internet connection below or possibly below the minimum criteria are somewhat more likely to use the internet for educational purposes, compared with households with an internet connection above the minimum criteria. Overall, two-thirds of subscribers reported using the internet for educational reasons, as shown in Figure 63.

Figure 63: Use of Internet for Educational Purposes



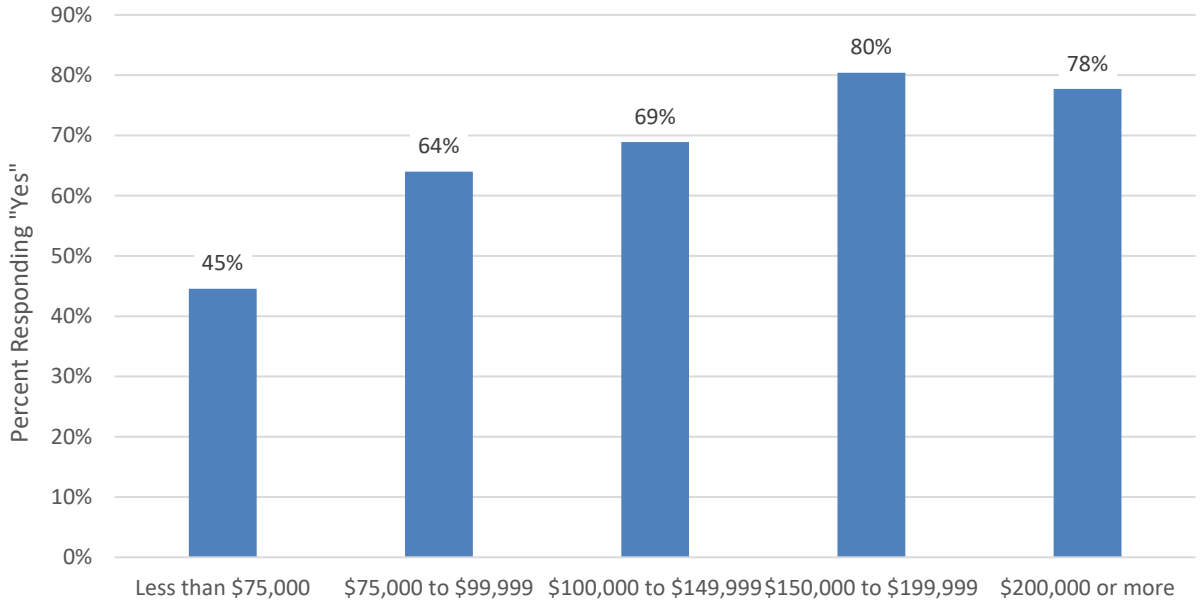
Respondents younger than age 55 are more likely than older respondents to have a household member who uses the internet for educational purposes (see Figure 64); they are also more likely to have children age 18 and under in the household. Nine in 10 of those with children in the household use the internet for educational purposes, compared with 44 percent of those without children in the home.

Figure 64: Use of Internet for Educational Purposes by Age of Respondent



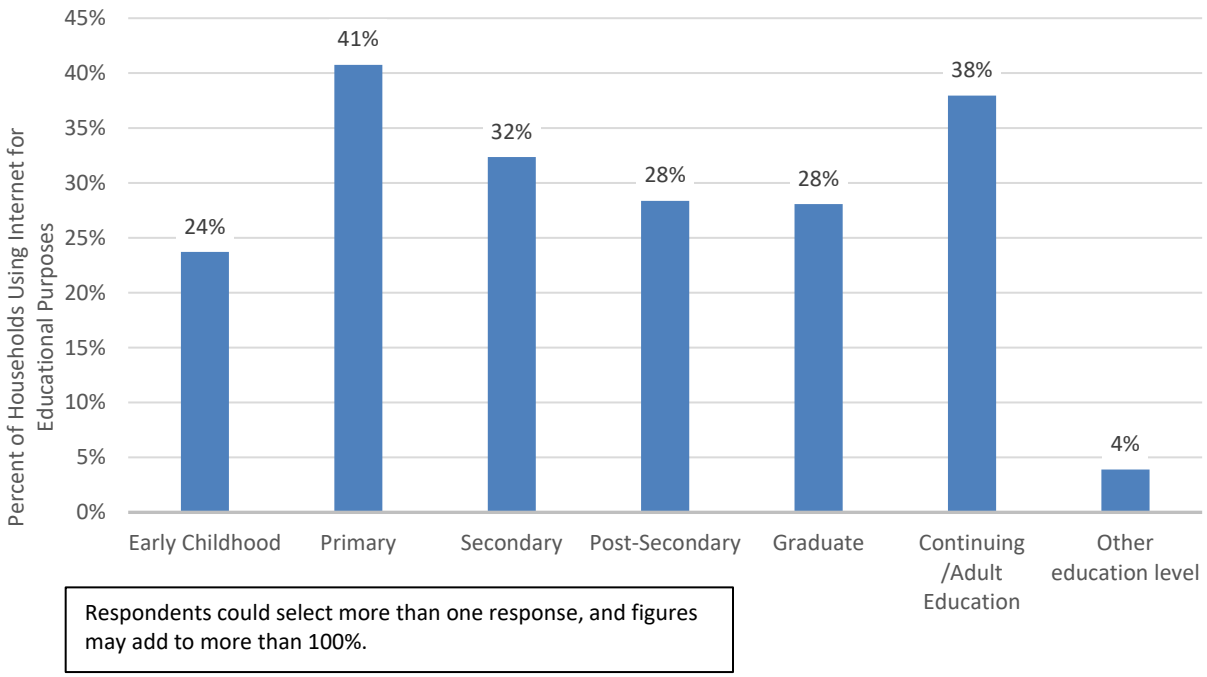
Respondents with a household income of less than $75,000 are also less likely to use the internet for educational purposes, although the lower-income group is also more likely to be age 65 or older and to have no children in the home (Figure 65).

Figure 65: Use of Internet for Educational Purposes by Household Income



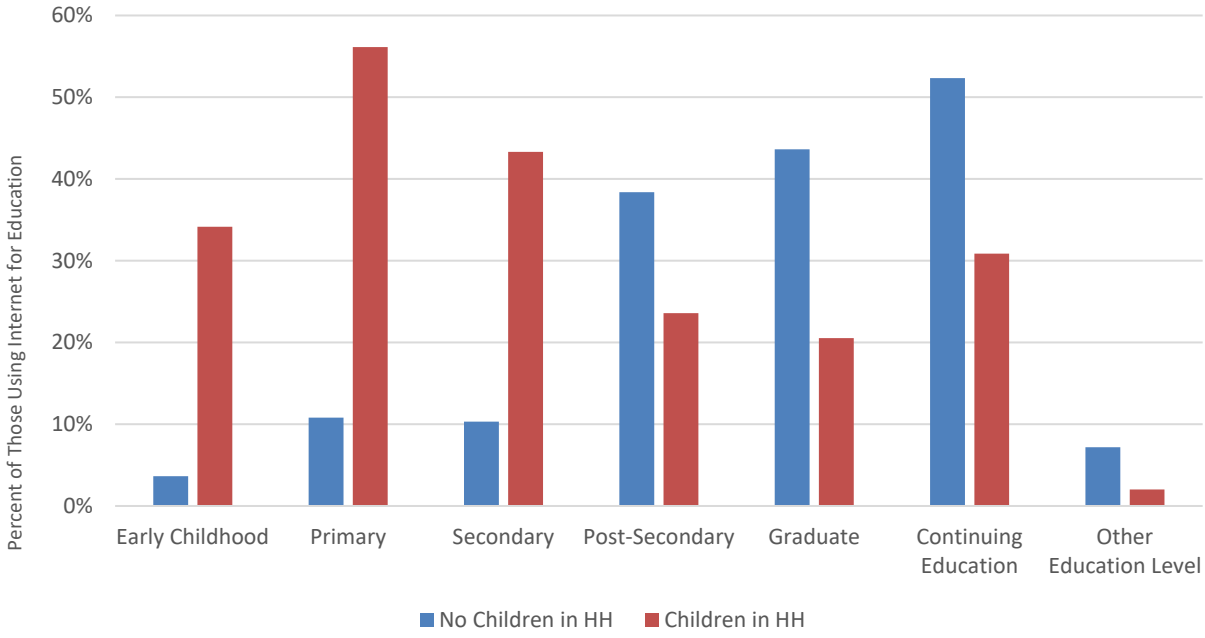
Respondents use the internet for a range of education levels. Among those who use the internet for educational purposes, 41 percent use it for primary education, 32 percent use it for secondary education, and 24 percent use it for early childhood education. Additionally, 28 percent use the internet for post-secondary, 28 percent use it for graduate level education, and 38 percent use it for continuing/adult education (see Figure 66).

Figure 66: Education Level for Which Internet Connection Is Used



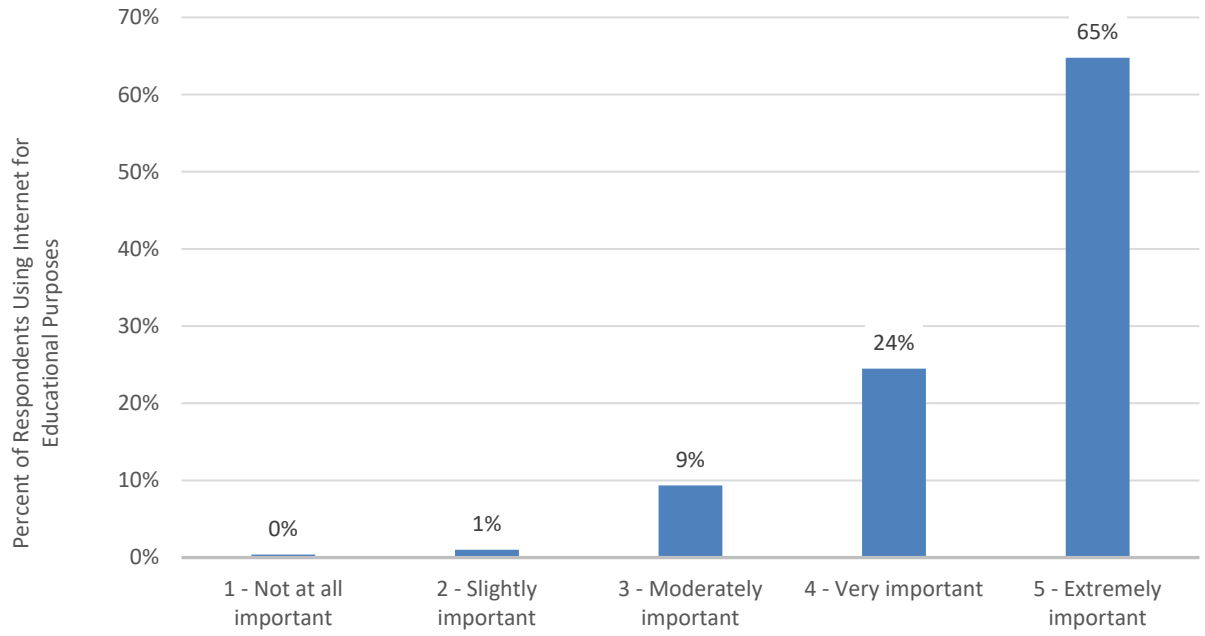
Use of the internet for educational purposes is related to presence of children in the household, as might be expected, particularly for early childhood, primary, and secondary education needs. Those without children in the home are more likely to use the internet for post-secondary, graduate, or continuing education (see Figure 67).

Figure 67: Education Level for Which Internet Connection Is Used by Children in Household



Among those who use the internet for educational purposes, 65 percent said that a high-speed internet connection is extremely important, and 24 percent said it is very important for their education needs (see Figure 68).

Figure 68: Importance of High-Speed Internet for Education Needs



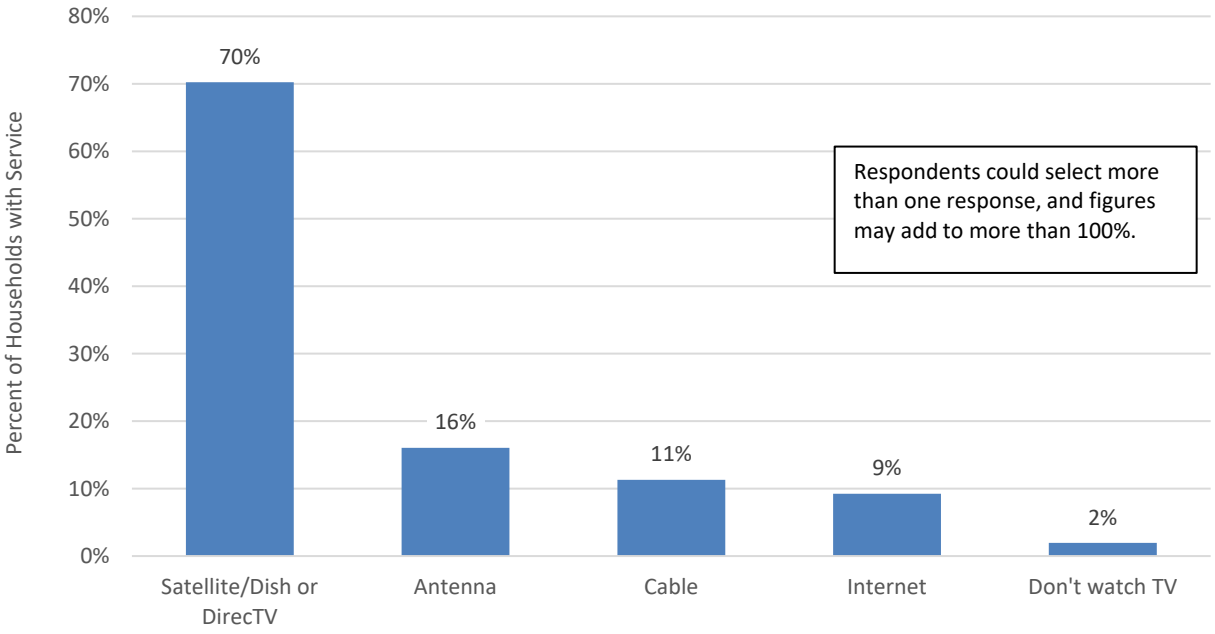
3.4 Television and Telephone Service

Respondents were asked to indicate what television and telephone services are used, as well as cost of services and the importance of various features.

3.4.1 Television Service

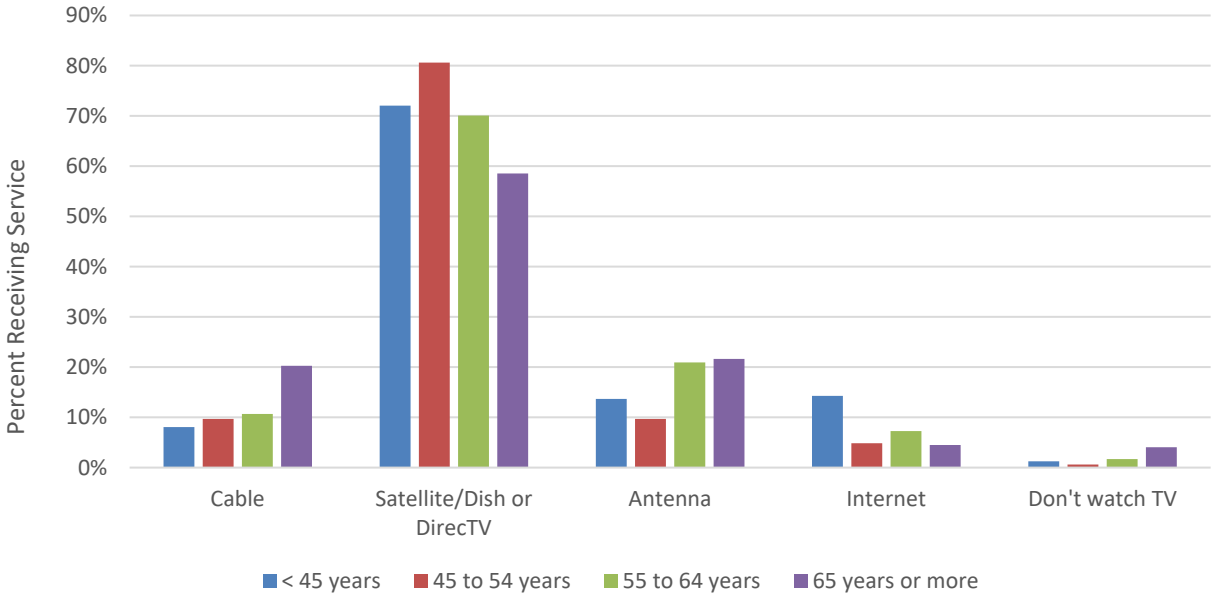
Seven in respondents purchase satellite/Dish or DirecTV service. Much smaller shares of the market have antenna (over-the-air) service (16 percent), cable television service (11 percent), or internet-based television service (9 percent). Just two percent do not watch television (see Figure 69).

Figure 69: Types of Television Service in Home



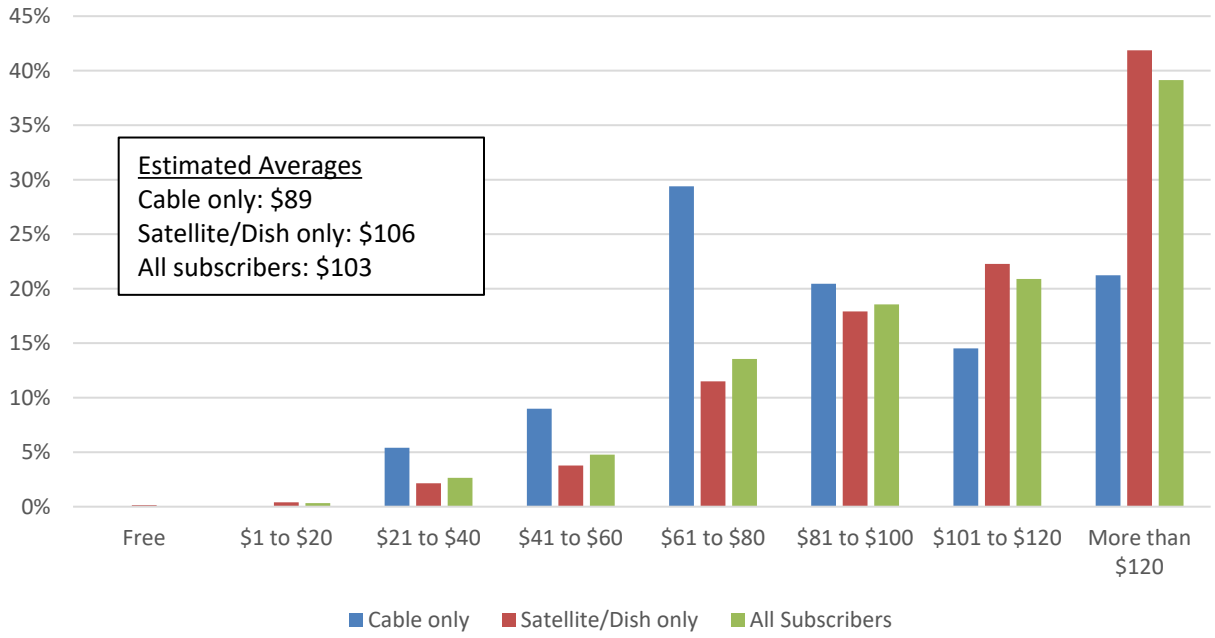
The use of television service is correlated with respondent age. Respondents ages 65 and older are more likely than younger respondents to have cable television service and are less likely to have satellite/Dish or DirecTV (although the latter is the leading service type among all age cohorts). Additionally, those under age 45 are more likely than older respondents to use internet television services (see Figure 70).

Figure 70: Types of Television Service in Home by Age of Respondent



The estimated average monthly price for satellite/Dish or DirecTV service is $106, with more than four in 10 paying over $120 per month, as illustrated in Figure 71. The estimated average monthly price is slightly higher for satellite services vs. cable services ($106 vs. $89), but this is based on a relatively small number of respondents who subscribe to cable television.

Figure 71: Monthly Price of Cable or Satellite TV Service



Respondents were asked to evaluate the importance of television programming features. The most important aspects are local programming and news programming, while the least important is children's programming, as shown in Figure 72 and Figure 73. Specifically, six in 10 respondents said local programming is extremely important, and 54 percent said news programming is extremely important.

Figure 72: Importance of Television Programming Features

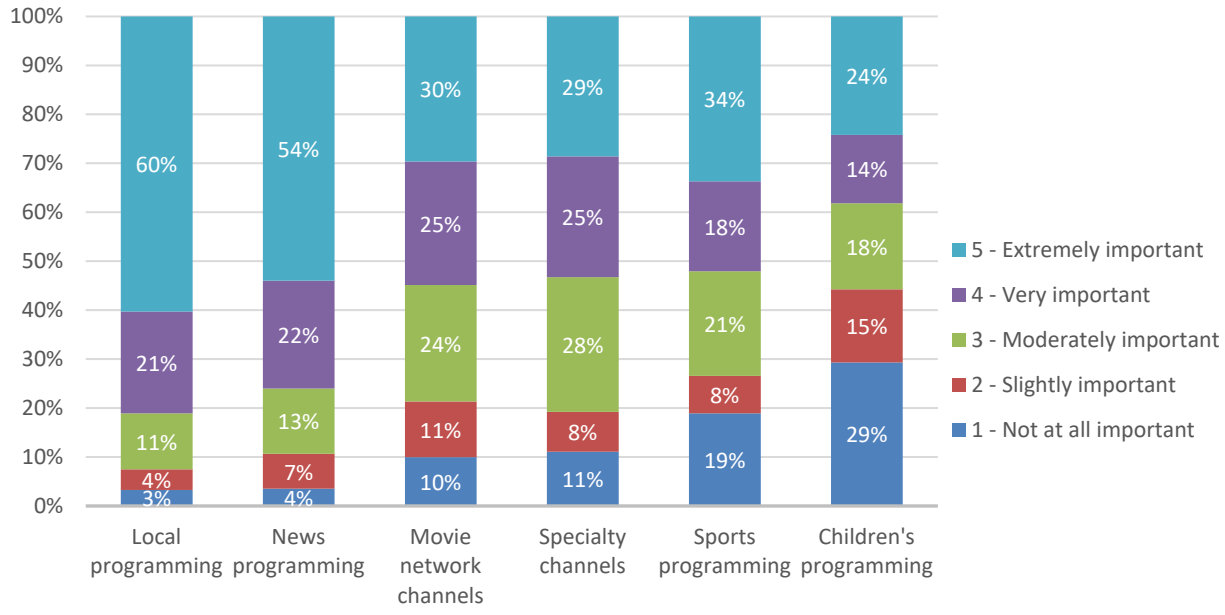
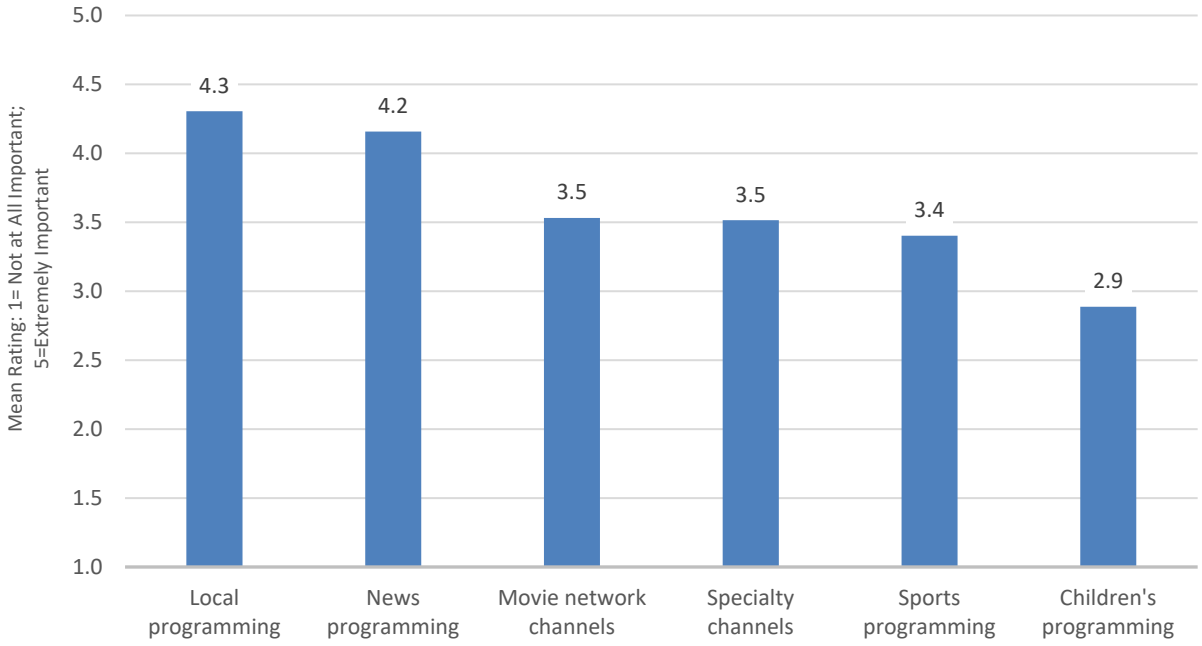
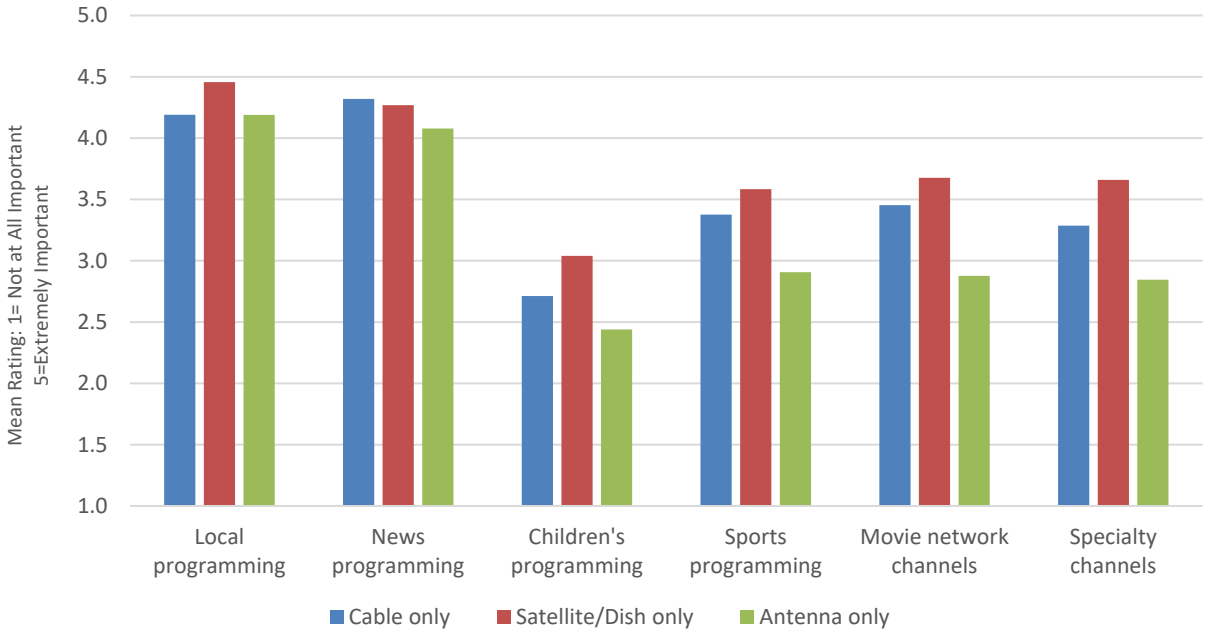


Figure 73: Mean Importance of Television Programming Features



Respondents with cable or satellite television service placed more importance on key programming features (children's programming, sports programming, movie network channels, and specialty channels) compared with those with over-the-air service (see Figure 74). Also, respondents with children in the household (who are more likely to be under age 45 and have a higher household income) placed more value on children's programming compared with those with no children in the household (3.7 vs 2.2 mean rating).

Figure 74: Importance of Television Programming Aspects by Television Service



3.4.2 Telephone Service

Respondents were asked about their home and mobile telephone services. As illustrated in Figure 75, nine in 10 respondents have a cellular/mobile telephone. More than one-third of respondents have a landline from a traditional telephone provider, and five percent have a landline from a cable provider. Just three percent of respondents have internet-based phone service.

The saturation of landline telephone service increases as the age group of householder increases, although cellular/mobile is the leading service across all age cohorts (see Figure 76). Landline use from a traditional provider increases from 24 percent of those ages 18 to 44 to 56 percent of those ages 65 and older.

Figure 75: Home Telephone Service(s)

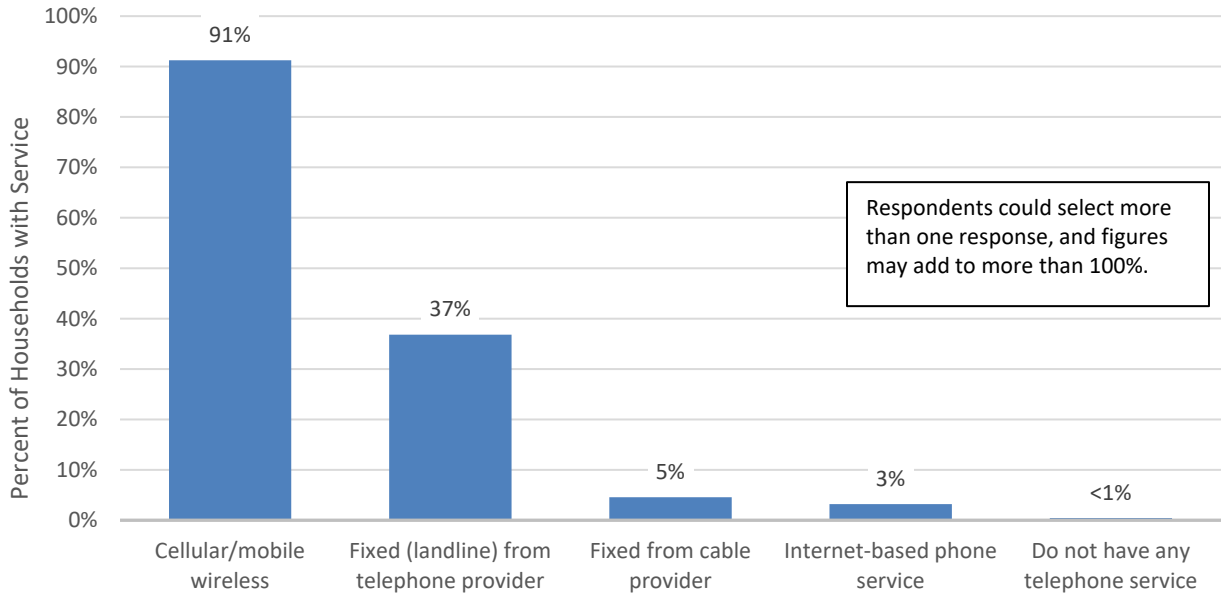
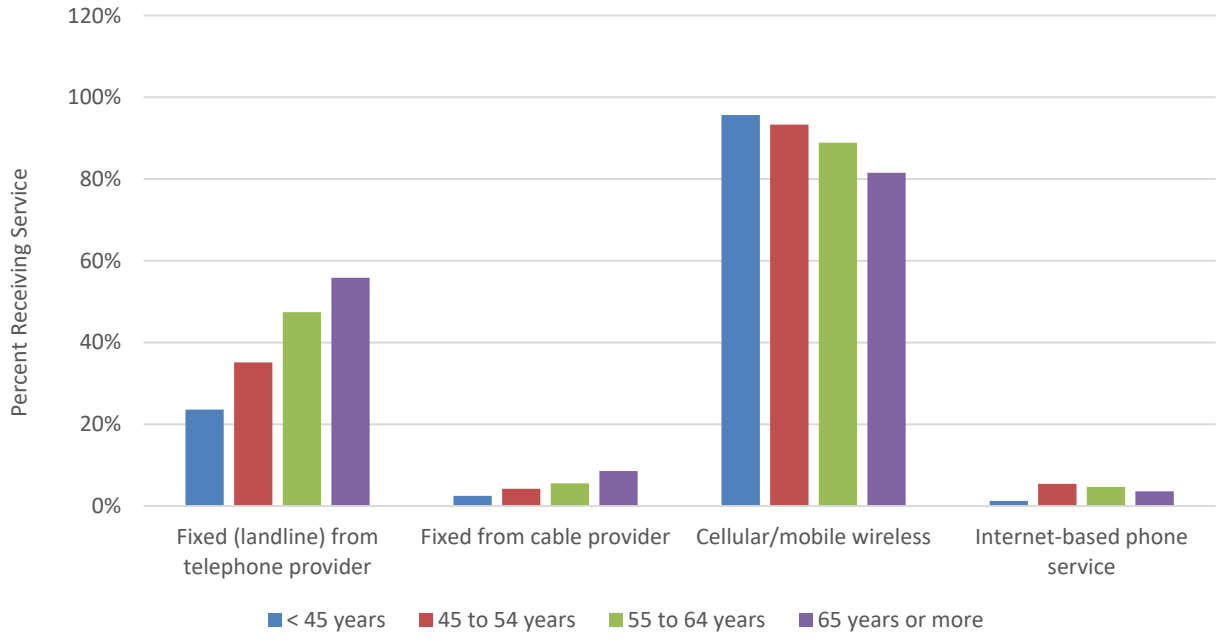


Figure 76: Home Telephone Service(s) by Age of Respondent



3.5 Respondent Opinions

Respondents were asked their opinions about the County's role in providing or promoting broadband communications services within the area. The most favorable opinions were for the County to help ensure that all residents, students, and teachers have access to competitively-priced broadband services. A majority of respondents strongly agreed with these statements. Overall, there is moderate agreement that the County should build a publicly-financed network. Figure 77 illustrates the mean ratings, while Figure 78 provides detailed responses to each portion of the question.

Figure 77: Opinions About the Role(s) for Harford County (Mean Ratings)

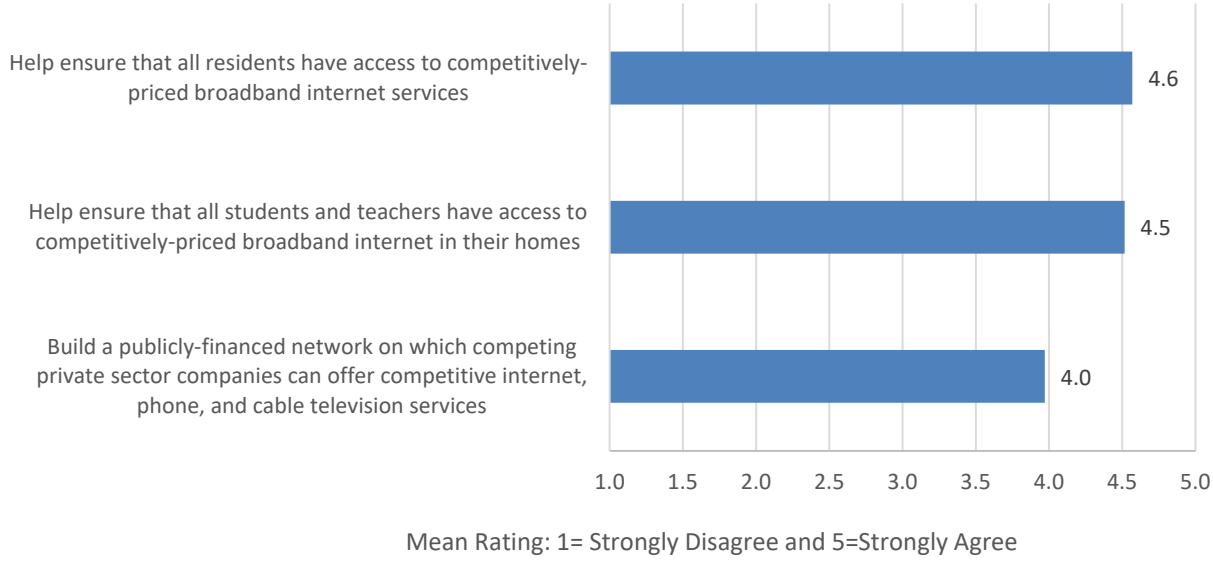
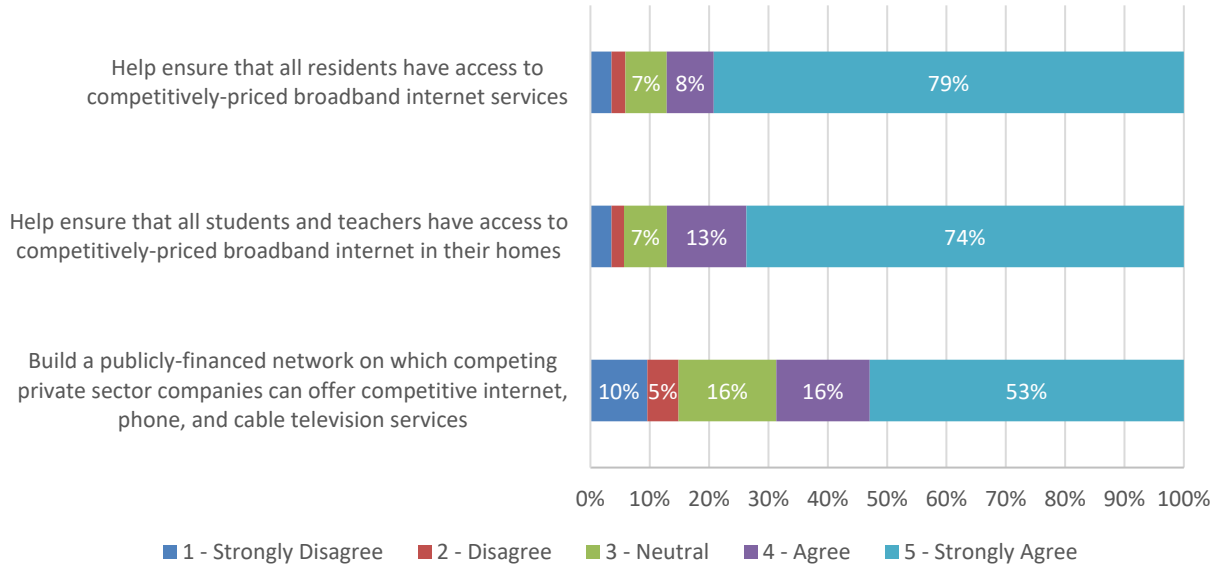
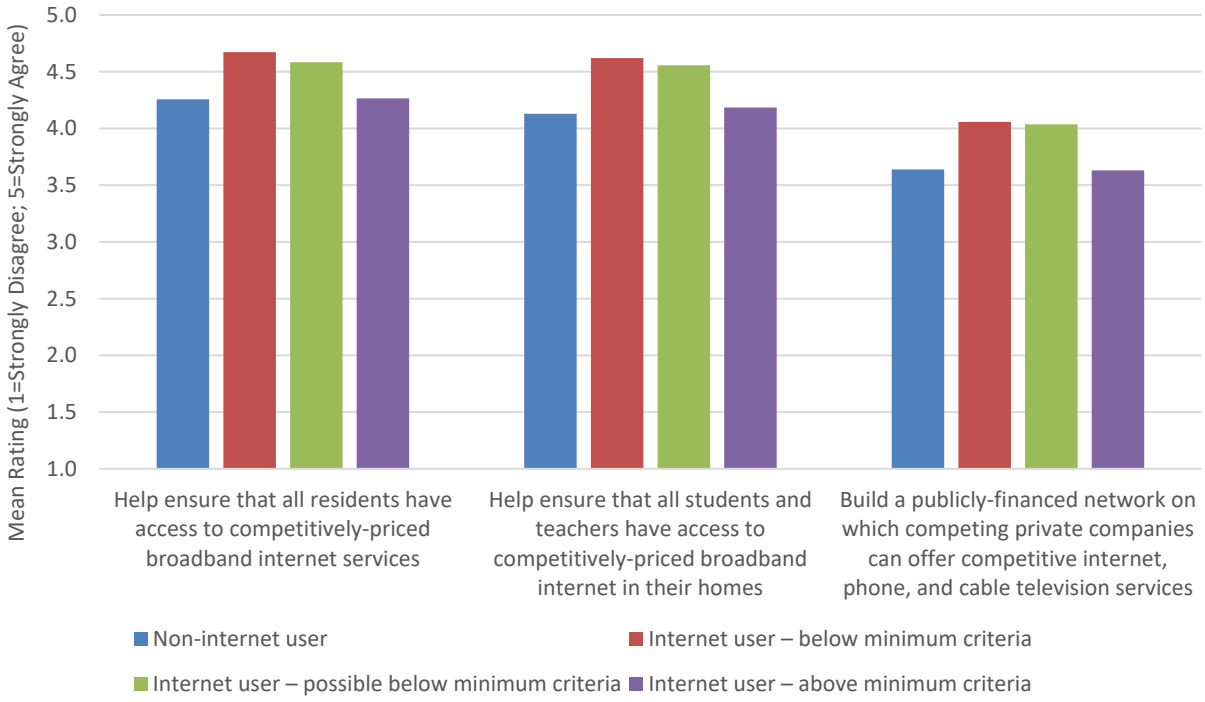


Figure 78: Opinions About the Role(s) for Harford County



As illustrated in Figure 79, internet users with a connection below or possibly below the minimum criteria were more likely to agree with statements about internet service in Harford County, compared with non-internet users and internet users with a connection above the minimum criteria.

Figure 79: Opinions About the Role(s) for Harford County by Age of Respondent



Respondents were also asked their opinion of the current broadband market. More than one-half of respondents strongly agreed that high-speed internet is important for their work/job (and seven in 10 agreed or strongly agreed). One-half of respondents agreed or strongly agreed that high-speed internet is an essential service. At the same time, 38 percent strongly disagreed, and another 16 percent disagreed, that the market currently provides high-speed internet at prices they can afford; only one-fifth agreed or strongly agreed, suggesting a need for affordable broadband internet among a sizeable segment of respondents.

Detailed responses to statements about broadband availability are illustrated in Figure 80. The average agreement with broadband availability statements are shown in Figure 81.

Figure 82 shows that respondents with an internet connection below or possibly below the minimum criteria are more likely to agree that high-speed internet is an essential service and are more willing to pay a premium for access to high-speed internet. These results reinforce other survey results that show a gap between customers' desire for fast internet and the service they are receiving.

Figure 80: Opinions About the Broadband Internet Market

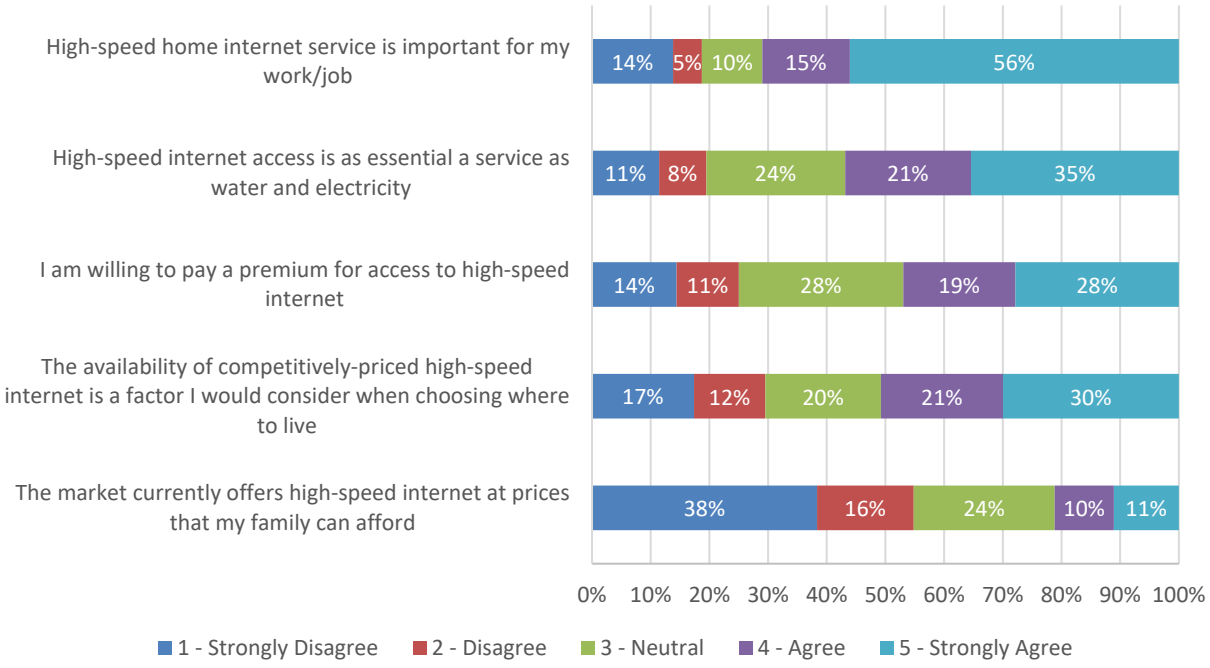


Figure 81: Opinions About the Broadband Internet Market (Mean Ratings)

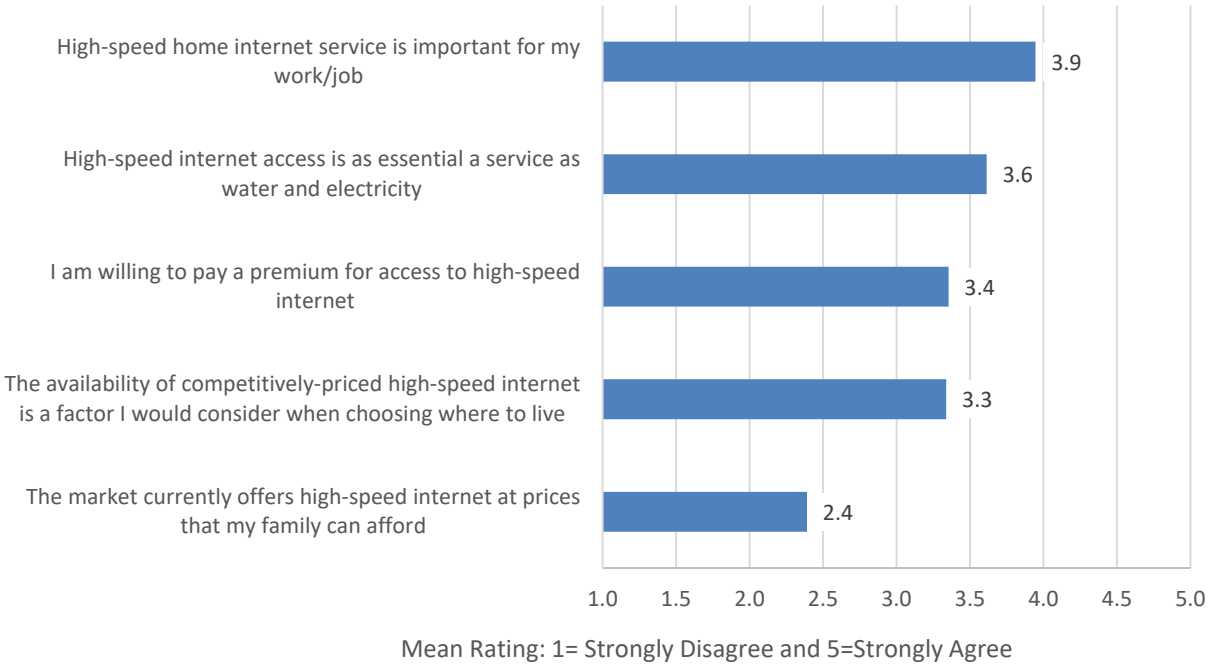
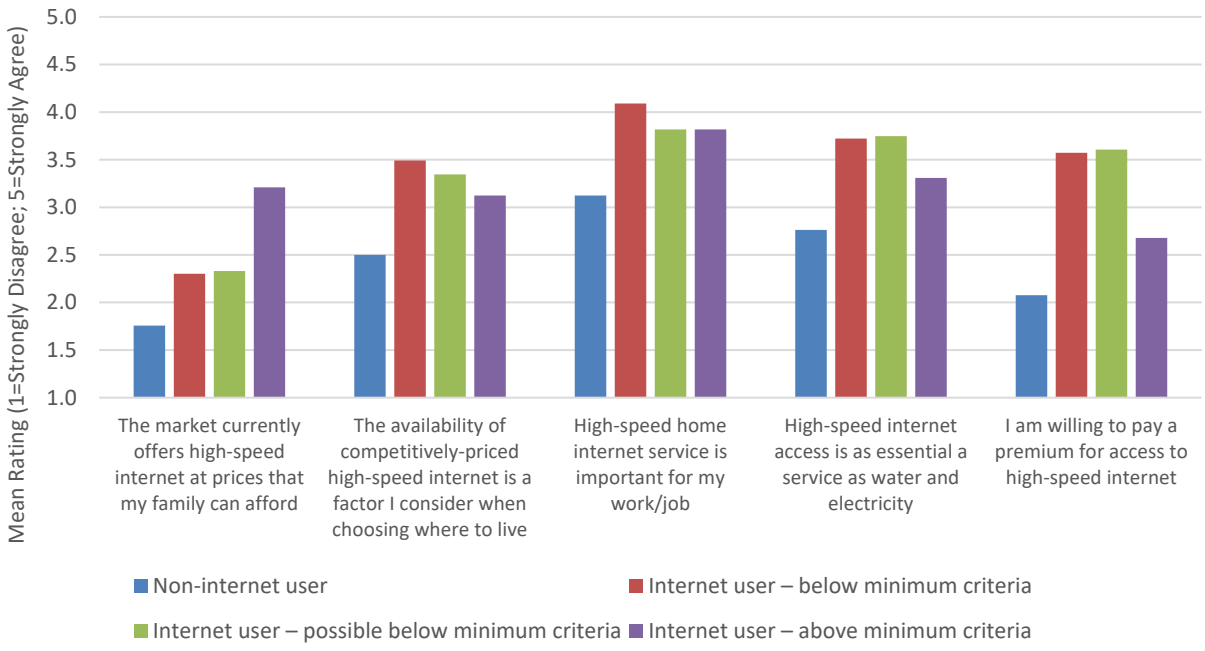
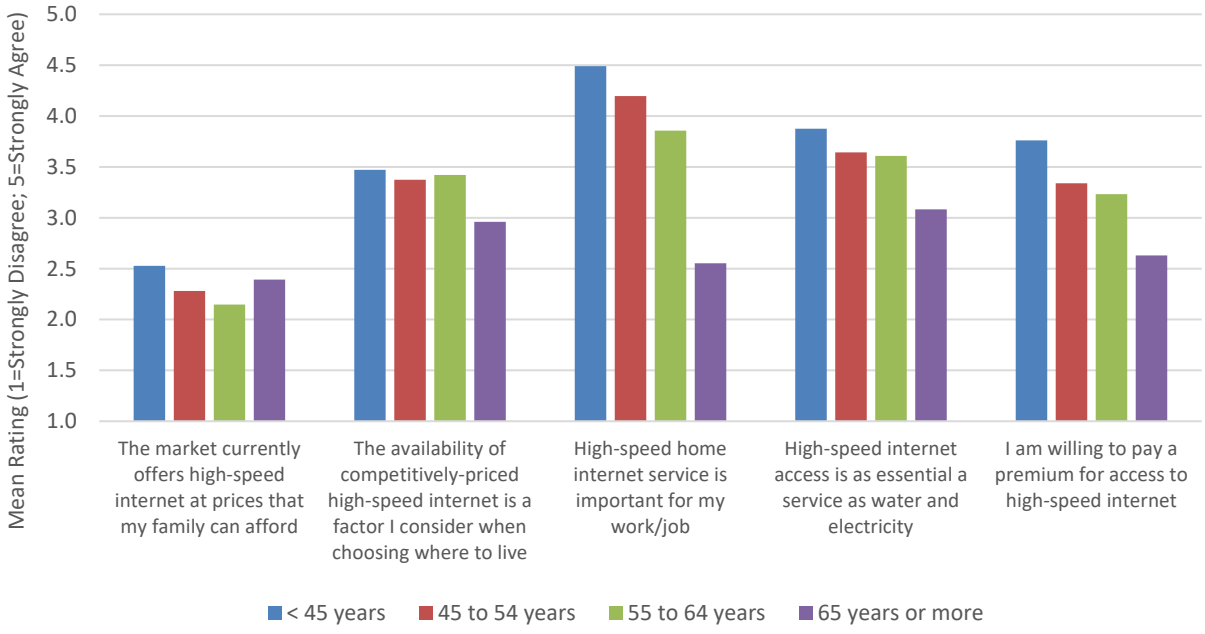


Figure 82: Opinions About Broadband Internet by Internet Connectivity Group



As illustrated in Figure 85, respondents ages 65 and older were less likely to agree with most statements about the broadband internet market in Harford County.

Figure 83: Opinions About Broadband Internet by Age of Respondent



Also, agreement with statements about the broadband internet market tends to increase as education and household income increases (see Figure 84 and Figure 85).

Figure 84: Opinions About Broadband Internet by Education

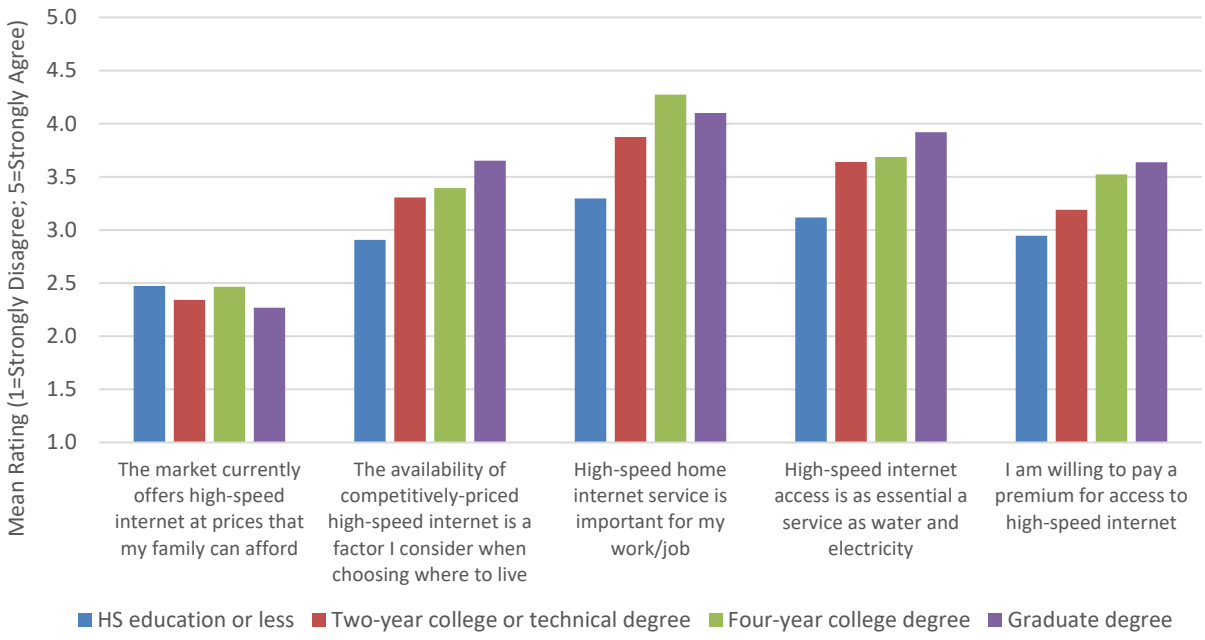
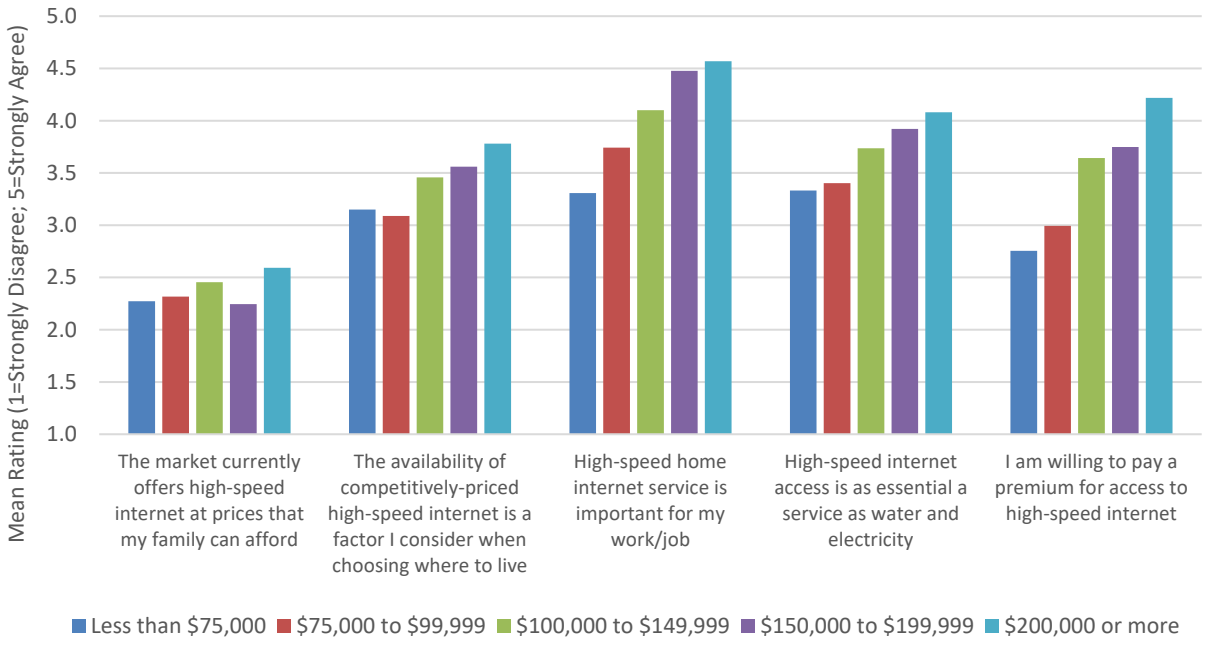


Figure 85: Opinions About Broadband Internet by Household Income



Respondents were asked what Harford County's ***main*** role should be with respect to broadband internet access. About 37 percent of respondents indicated that the County should install a state-of-the-art network and lease it to private companies, and 35 percent said the County should encourage a private firm to build a high-speed network. Only five percent said the County should play no role, and 15 percent of respondents were unsure, as illustrated in Figure 86.

Figure 86: Main Role of Harford County in Broadband Access

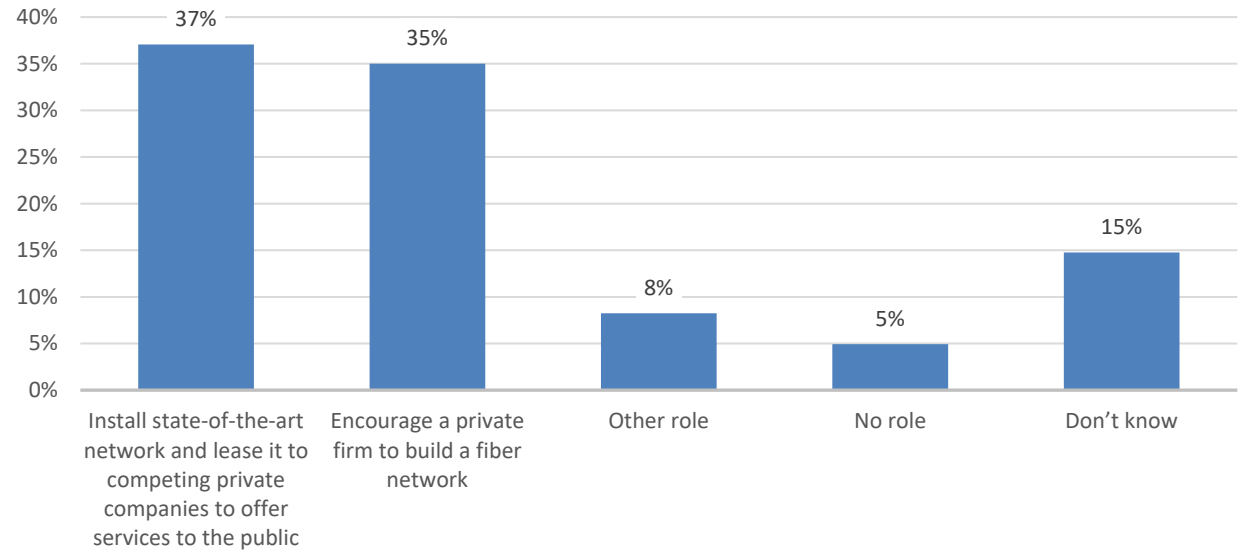
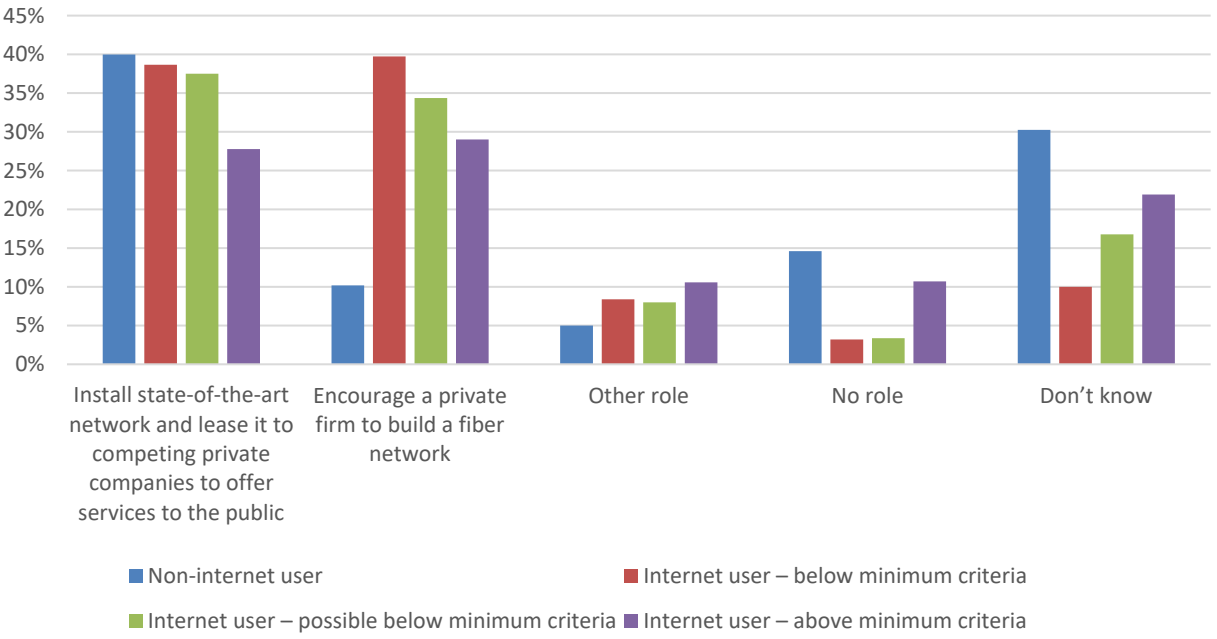
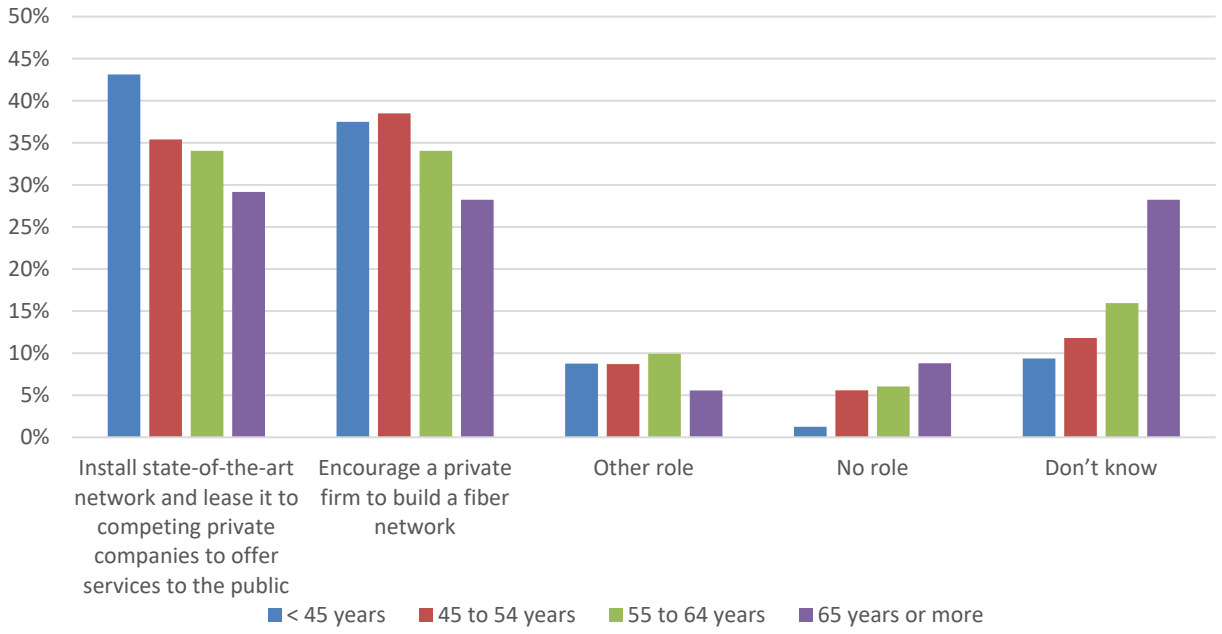


Figure 87: Main Role of Harford County in Broadband Access by Internet Connectivity Group



As shown in Figure 87, internet users with a connection below or possibly below the minimum criteria were more likely to indicate that the County should have some role in providing broadband internet access, compared with non-users and internet-users with a connection above the minimum criteria.

Figure 88: Main Role of Harford County with Respect to Broadband Access by Income



The proportion of respondents who said the County should install a state-of-the-art network and lease it to competing private companies increases as age of the respondent increases. Respondents ages 65 and older were less likely to state that the County should have some role with respect to broadband access, and they were more likely to be unsure (see Figure 88).

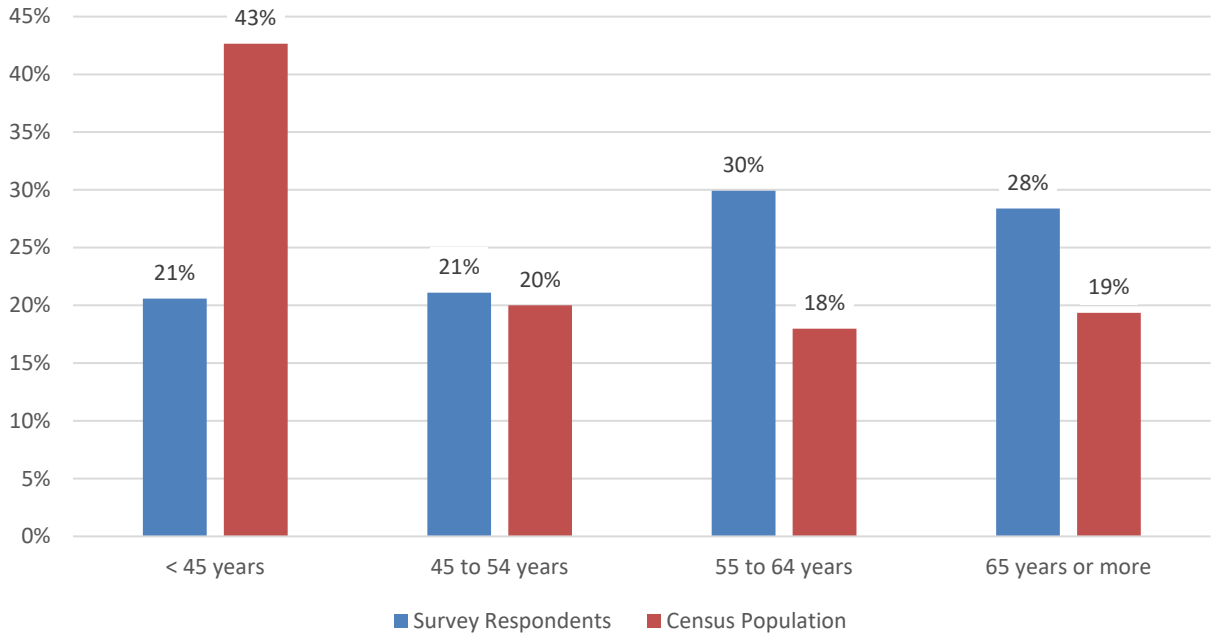
These responses indicate a relatively clear signal about residents' desire to have a state-of-the-art communications network and for Harford County to play *some* role in its installation. It should be noted that this question did not specifically ask about how that network should be financed or funded. Questions regarding consumers' willingness to pay monthly fees or hook-up costs for access to that network were presented previously.

3.6 Respondent Information

Basic demographic information was gathered from survey respondents and is summarized in this section. Several comparisons of respondent demographic information and other survey questions were provided previously in this report.

As indicated previously in Figure 1 regarding age-weighting, disproportionate shares of survey respondents were in the older age cohorts relative to the County's adult population as a whole. Approximately 28 percent of survey respondents are ages 65 and older, compared with only 19 percent of the population. Conversely, only 21 percent of survey respondents are under age 45, compared with 43 percent of the population (see Figure 89). The weighted survey results presented in this report are adjusted to account for these differences and to provide results that are more representative of the County's population, as discussed previously.

Figure 89: Age of Respondents and Harford County Adult Population



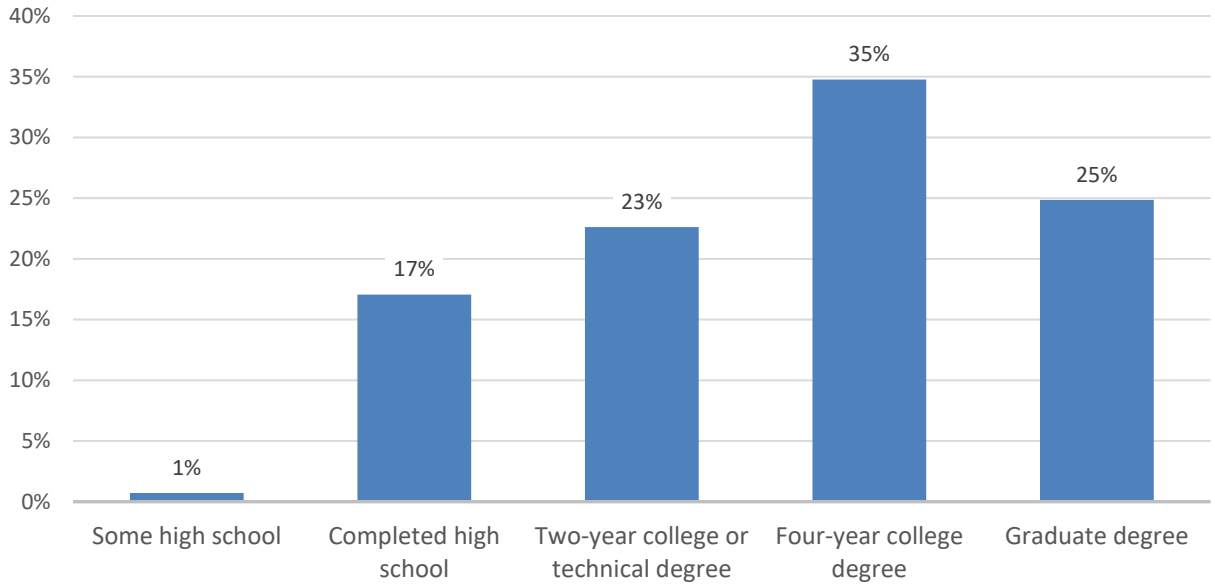
Respondents younger than age 55 are more likely than older respondents to have children in the household. Two-thirds of those younger than age 45 have four or more household members, as do 57 percent of those ages 45 to 54. Respondents ages 55 or older are most likely to live in a two-person household. Additionally, respondent ages 65 and older are much more likely than younger respondents to earn under $75,000 per year (see Table 9).

Table 9: Demographic Profile by Age of Respondent

AGE COHORT		< 45	45-54	55-64	65+	Total
Internet connectivity group	Non-internet user	4%	5%	4%	17%	7%
	Below minimum criteria	67%	61%	62%	49%	61%
	Possibly below minimum criteria	15%	25%	20%	15%	18%
	Above minimum criteria	13%	9%	13%	19%	14%
	Weighted Count	*323*	*156*	*136*	*147*	*783*
Highest level of education	HS education or less	10%	18%	26%	28%	18%
	Two-year college or technical degree	24%	18%	27%	20%	23%
	Four-year college degree	40%	43%	27%	23%	35%
	Graduate degree	26%	21%	21%	30%	25%
	Weighted Count	*334*	*156*	*140*	*150*	*782*
Approximate 2018 household income	Less than $75,000	8%	16%	22%	48%	18%
	$75,000 to $99,999	19%	12%	20%	19%	18%
	$100,000 to $149,999	30%	30%	26%	20%	28%
	$150,000 to $199,999	27%	21%	15%	8%	20%
	$200,000 or more	16%	22%	17%	6%	16%
	Weighted Count	*311*	*138*	*118*	*112*	*680*
Presence of children in household	No Children in HH	24%	44%	87%	97%	54%
	Children in HH	76%	56%	13%	3%	46%
	Weighted Count	*334*	*155*	*140*	*151*	*782*
Total Household Size (Adults + Children)	One HH member	2%	3%	3%	23%	7%
	Two HH members	16%	20%	53%	63%	32%
	Three HH members	17%	20%	25%	10%	18%
	Four+ HH members	65%	57%	20%	5%	43%
	Weighted Count	*334*	*155*	*140*	*151*	*782*
Number of years lived at current address	Less than 1 year	11%	2%	3%	0%	6%
	1 to 2 years	14%	5%	3%	2%	8%
	3 to 4 years	18%	11%	3%	1%	11%
	5 or more years	56%	81%	91%	97%	75%
	Weighted Count	*332*	*156*	*140*	*149*	*779*

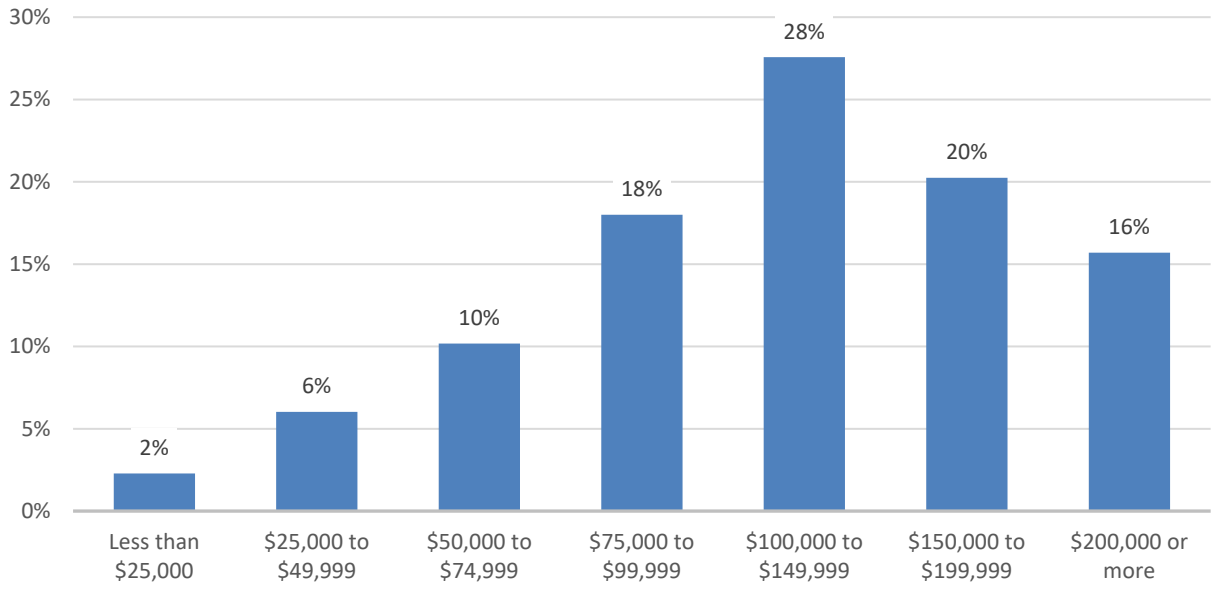
The respondents' highest level of education attained is summarized in Figure 90. One-fourth of respondents have a graduate degree, and 35 percent have a four-year college degree.

Figure 90: Education of Respondent



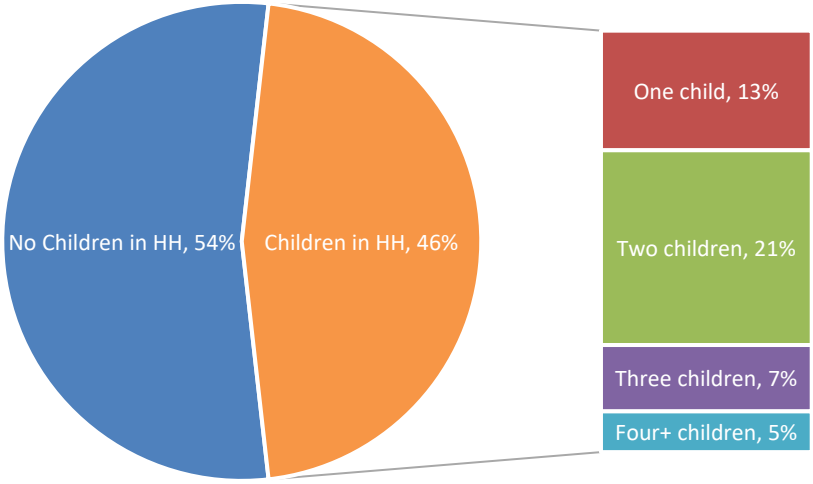
Nearly one-fifth of respondents earned under $75,000 in 2018, while 18 percent earned $75,000 to $99,999. Nearly two-thirds of respondents had a household income of at least $100,000, including 16 percent earning $200,000 or more, as shown in Figure 91.

Figure 91: 2018 Household Income



Respondents were asked to indicate the number of adults and children in their household. Nearly one-half of respondents have at least one child under age 18 living at home, as shown in Figure 92.

Figure 92: Number of Children in the Household



Only seven percent of respondents have just one person living in the household, and 32 percent have two household members (including both adults and children). Another 18 percent have three household members, and 43 percent have four or more household members.

The majority of respondents own their home. Three-fourths of respondents have lived at their residence for five or more years, as shown in Figure 93.

Figure 93: Length of Residence at Current Address

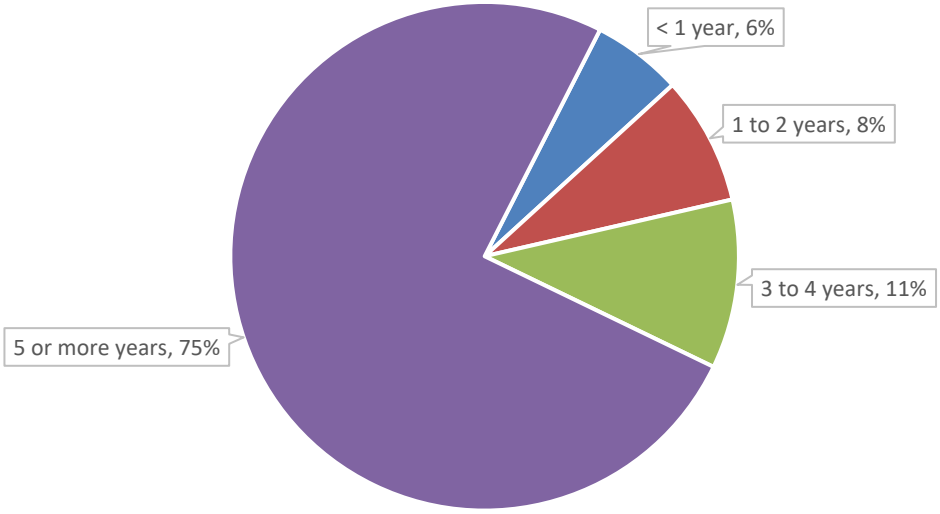


Table 10 shows the demographic profile for each internet user group. As previously discussed, non-internet users are more likely than internet users to be ages 65 and older, have a high school education or less, earn less than $75,000, and to have one household member (and no children in the household). The demographic profile among internet users in the various connectivity groups does not vary significantly.

Table 10: Demographic Profile by Internet Connectivity Groups

		Non-Internet User	Below Minimum Criteria	Possible Below Minimum Criteria	Above Minimum Criteria	Total
Age Group	< 45 years	25%	46%	36%	42%	43%
	45 to 54 years	15%	20%	29%	14%	20%
	55 to 64 years	12%	18%	19%	17%	18%
	65 years or more	49%	15%	16%	26%	19%
	Weighted Count	*51*	*469*	*139*	*103*	*782*
Highest level of education	HS education or less	43%	15%	19%	16%	18%
	Two-year college or technical degree	26%	23%	23%	18%	23%
	Four-year college degree	19%	38%	26%	42%	35%
	Graduate degree	13%	24%	31%	24%	25%
	Weighted Count	*50*	*470*	*139*	*103*	*782*
Approximate 2018 household income	Less than $75,000	51%	17%	11%	20%	18%
	$75,000 to $99,999	24%	19%	16%	13%	18%
	$100,000 to $149,999	6%	26%	33%	38%	28%
	$150,000 to $199,999	15%	23%	18%	15%	20%
	$200,000 or more	4%	16%	22%	14%	16%
	Weighted Count	*45*	*423*	*116*	*81*	*680*
Children in household	No Children in HH	89%	49%	52%	60%	54%
	Children in HH	11%	51%	48%	40%	46%
	Weighted Count	*50*	*470*	*139*	*103*	*782*
Total Household Size (Adults + Children)	One HH member	31%	4%	5%	6%	7%
	Two HH members	46%	30%	30%	40%	32%
	Three HH members	10%	20%	18%	12%	18%
	Four+ HH members	12%	46%	47%	42%	43%
	Weighted Count	*50*	*470*	*139*	*103*	*782*
Number of years lived at current address	Less than 1 year	9%	8%	2%	2%	6%
	1 to 2 years	1%	11%	2%	8%	8%
	3 to 4 years	10%	12%	12%	6%	11%
	5 or more years	79%	70%	84%	85%	75%
	Weighted Count	*49*	*471*	*136*	*103*	*779*

Appendix A: Survey Instrument

Harford County, Maryland

Residential Internet Survey

January 2019

Even if you do not have home internet access, please complete the relevant portions of this survey form and return to us. Your opinions, experiences, and information are important to us.

Conducted by CTC Technology and Energy

on behalf of

CTC Technology and Energy, an independent IT engineering consulting firm, has been contracted by Harford County, Maryland to conduct research into the availability and use of internet services in Northern Harford County.

The information gathered will not be used to sell you anything.

The information will not be used for any purpose other than its stated intention – *to provide an opportunity to understand how Harford County residents use internet services and to explore strategies to improve internet accessibility and affordability throughout the northern part of the County.*

Even if you do not have internet access at your home, please complete the relevant portions of this survey. We value your input.

How long will the survey take?
This survey should take approximately 10 minutes to complete. It should be completed by the person who makes purchase decisions for your household's internet services.

What is the due date to complete the survey?
Please return your completed form in the enclosed postage-paid envelope by **January 26, 2019**.

What if I have questions about the survey?
If you have questions regarding this survey, please contact:

Nicholas Kuba, Director,
Office of Information and Communication Technology
Harford County Government
410.638.3213
nlkuba@harfordcountymd.gov

Thank you in advance for your participation!

HOME INTERNET CONNECTION AND USE

1. **Which of the following services do you currently purchase for your household?** *(✓ all that apply)*

   - [1] Internet service in my home (excluding cellular/mobile)
   - [2] Cellular/mobile telephone service with internet (smartphone)
   - [3] Cellular/mobile telephone service without Internet (basic phone)
   - [4] Fixed (land line) telephone service
   - [5] Cable or satellite television
   - [6] Don't know
   - [7] None of the above

2. **How important are the following services to your household?** *(please circle your response for each aspect, where 1=Not at all important, 2=Slightly important, 3=Moderately important, 4=Very important, 5=Extremely important)*

Aspect	*Not at all important*				*Extremely important*
(a) Internet connection (any speed)	1	2	3	4	5
(b) High-speed internet connection	1	2	3	4	5
(c) Cable television service	1	2	3	4	5
(d) Fixed (land-line) telephone service	1	2	3	4	5
(e) Cellular/mobile telephone service	1	2	3	4	5

3. **How many personal computing devices (desktop/laptop computers, tablets, smartphones) do you have in your home?**

   - [1] 1 or 2
   - [2] 3 or 4
   - [3] 5 or more
   - [4] I do not have any personal computing devices in my home

4. **How many other internet-enabled devices (smart TV, home security system, doorbell camera, gaming system) do you have in your home?**

   1 1 or 2
   2 3 or 4
   3 5 or more
   4 I do not have any other internet-enabled devices in my home

5. **What is your primary home internet service connection?** *(✓ only one)*

   1 No home internet service **(Please skip to Question 22)**
   2 Telephone line—dial-up
   3 Digital Subscriber Line (DSL) (from Verizon, or other)
   4 Cable modem (from Armstrong, Comcast, or other)
   5 Satellite (from DirecTV, Dish Network, or HughesNet, etc.)
   6 Cellular/mobile internet (Smartphones)
   7 Fiber-optic connection
   8 Fixed wireless service (not just wireless router in home)
   9 Other (Please specify: _____)

6. **Approximately how much does your family pay PER MONTH for your *home* internet service (not including television or phone service if you bundle services)?**

   1 Free
   2 $1 to $20
   3 $21 to $40
   4 $41 to $60
   5 $61 to $80
   6 $81 to $100
   7 $101 to $120
   8 More than $120

7. **Is the fee in Question 6 part of a bundled package?**

   1 Yes
   2 No

8. **How would you describe the speed of your *home* internet connection?**

   1 Very Slow
   2 Slow
   3 Medium
   4 Fast
   5 Very Fast

2

9. **How IMPORTANT are the following aspects of *home* internet service to you?** *(please circle your response for each aspect, where 1=Not at all important,3=Moderately important, and 5=Extremely important)*

Aspect	*Not at all important*				*Extremely important*
(a) Speed of connection	1	2	3	4	5
(b) Reliability of connection	1	2	3	4	5
(c) Price of services	1	2	3	4	5
(d) Overall customer service	1	2	3	4	5
(e) Ability to "bundle" with TV and phone	1	2	3	4	5

10. **How SATISFIED are you with the following aspects of current *home* internet access?** *(please circle your response for each aspect, where 1=Not at all satisfied, 3=Moderately satisfied, and 5=Extremely satisfied)*

Aspect	*Not at all Satisfied*				*Extremely Satisfied*
(a) Speed of connection	1	2	3	4	5
(b) Reliability of connection	1	2	3	4	5
(c) Price of services	1	2	3	4	5
(d) Overall customer service	1	2	3	4	5
(e) Ability to "bundle" with TV and phone	1	2	3	4	5

3

11. How often does your family use your *home* internet connection (excluding cellular/mobile) for: *(please circle your response for each activity)*

Home Internet Activity	Never	Occasionally	Frequently
(a) Listening to music (streaming)	1	2	3
(b) Watching movies, videos, or TV	1	2	3
(c) Playing online games	1	2	3
(d) Connecting to a work computer	1	2	3
(e) Using social media	1	2	3
(f) Shopping online	1	2	3
(g) Running a home business	1	2	3
(h) Accessing educational resources	1	2	3
(i) Accessing government information	1	2	3
(j) Accessing medical services	1	2	3
(k) Banking or paying bills	1	2	3
(l) Accessing home security/automation applications	1	2	3

12. How IMPORTANT is access to free Wi-Fi hotspots at libraries and community centers?

- 1 Not at all important
- 2 Slightly important
- 3 Moderately important
- 4 Very important
- 5 Extremely important

13. Consider what price level would make you interested in switching to another internet service. How willing would you be to switch to 100 Mbps (fast cable modem or fiber optic level of service) for the following monthly price? *(please circle your response at each price level, where 1=Not at all willing, 2=Slightly willing, 3=Moderately willing, 4=Very willing, 5=Extremely willing)*

Monthly Price	Not at all willing				Extremely willing
(a) $60 per month	1	2	3	4	5
(b) $80 per month	1	2	3	4	5
(c) $100 per month	1	2	3	4	5
(d) $120 per month	1	2	3	4	5
(e) $140 per month	1	2	3	4	5

14. How willing would you be to pay a one-time fee in exchange for having access to a 100 Mbps service (fast cable modem or fiber optic level of service)?: *(please circle your response at each price level, where 1=Not at all willing, 2=Slightly willing, 3=Moderately willing, 4=Very willing, 5=Extremely willing)*

Price of Installation (one-time)	Not at all willing				Extremely willing
(a) $0 (zero)	1	2	3	4	5
(b) $100	1	2	3	4	5
(c) $250	1	2	3	4	5
(d) $500	1	2	3	4	5
(e) $1,000	1	2	3	4	5
(f) $2,000	1	2	3	4	5

INTERNET USE FOR JOBS/CAREERS

15. Does your job require you to have internet access at your home?

- [1] Yes
- [2] No

16. Are you or is any member of your household currently teleworking, or interested in telework opportunities?

- [1] Someone in my household currently does telework from home
- [2] Someone in my household would like to telework
- [3] No

17. Does someone in your household have a home-based business or plan to start a home-based business in the next three years?

- [1] Yes, I/we already have a home-based business
- [2] Yes, I/we plan to start one in next three years
- [3] No

18. How important is a high-speed data or internet connection for: *(please circle your response for each aspect, where 1=Not at all important, 2=Slightly important, 3=Moderately important, 4=Very important, 5=Extremely important)*

Aspect	*Not at All Important*				*Extremely important*	*N/A*
(a) Teleworking	1	2	3	4	5	9
(b) Planned/existing home-based business	1	2	3	4	5	9

INTERNET USE FOR EDUCATION

19. Does a member of your household use the internet connection for educational purposes, such as completing assignments, research, home schooling, or study related to coursework or formal education?

- [1] Yes
- [2] No **(Please skip to Question 22)**

20. For what education level is your internet connection used?
(✓ all that apply)

- [1] Early Childhood (Preschool, 3K, 4K)
- [2] Primary (Grades 5k – 8)
- [3] Secondary (Grades 9 – 12)
- [4] Post-Secondary (Technical/vocational training, college, etc.)
- [5] Graduate (Graduate, post-graduate, professional degree)
- [6] Continuing/Adult Education
- [7] Other _____

21. How important is a high-speed internet connection for your education needs?

- [1] Not at all important
- [2] Slightly important
- [3] Moderately important
- [4] Very important
- [5] Extremely important

TELEVISION AND TELEPHONE SERVICE

22. How do you receive television service at your home? *(✓all that apply)*

- [1] Cable
- [2] Satellite/Dish or DirecTV
- [3] Antenna (over-the-air)
- [4] Internet
- [5] Don't watch television

→ **Please answer Question 23**

23. Approximately how much do you pay PER MONTH for cable or satellite television service (not including internet or phone)?

- [1] Free
- [2] $1 to $20
- [3] $21 to $40
- [4] $41 to $60
- [5] $61 to $80
- [6] $81 to $100
- [7] $101 to $120
- [8] More than $120

24. How important are the following television programming features to you? *(please circle your response for each aspect, where 1=Not at all important, 2=Slightly important, 3=Moderately important, 4=Very important, 5=Extremely important)*

Programming Content	*Not at all important*				*Extremely important*
(a) Local programming	1	2	3	4	5
(b) News programming	1	2	3	4	5
(c) Children's programming	1	2	3	4	5
(d) Sports programming	1	2	3	4	5
(e) Movie network channels	1	2	3	4	5
(f) Specialty channels	1	2	3	4	5

25. Please indicate which type(s) of telephone service you have: *(✓all that apply)*

- [1] Fixed (landline) from telephone provider (Verizon or other)
- [2] Fixed from cable provider (Armstrong, Comcast, other)
- [3] Cellular/mobile wireless (AT&T, Verizon, Sprint, T-Mobile, etc.)
- [4] Internet-based phone service (Vonage, Skype, Ooma, etc.)
- [5] Do not have any telephone service
- [6] Other phone service (please specify: _____)

8

ROLE OF THE COUNTY AND YOUR OPINION

26. Please indicate to what degree you agree or disagree that Harford County should do the following: *(please circle your response for each statement, where 1=Strongly Disagree, 3=Neutral, 5=Strongly Agree)*

Aspect	*Strongly Disagree*				*Strongly Agree*
(a) Help ensure that all residents have access to competitively priced broadband internet services	1	2	3	4	5
(b) Help ensure that all students and teachers have access to competitively priced broadband internet in their homes	1	2	3	4	5
(c) Build a publicly financed network on which competing private sector companies can offer competitive internet, phone, and cable television services	1	2	3	4	5

27. Please indicate to what degree you agree or disagree with the following statements: *(please circle your response for each statement, where 1=Strongly Disagree, 3=Neutral, 5=Strongly Agree)*

Aspect	*Strongly Disagree*				*Strongly Agree*
(a) The market currently offers high-speed internet at prices that my family can afford	1	2	3	4	5
(b) The availability of competitively priced high-speed internet is a factor I would consider when choosing where to live	1	2	3	4	5
(c) High-speed home internet service is important for my work/job	1	2	3	4	5
(d) High-speed internet access is as essential a service as water and electricity	1	2	3	4	5
(e) I am willing to pay a premium for access to high-speed internet	1	2	3	4	5

28. What do you think the MAIN role for the County should be with respect to broadband access? *(✓MAIN role)*

- [1] Install state-of-the-art network and lease it to competing private companies to offer services to the public
- [2] Encourage a private firm to build a high-speed network
- [3] Other role _____
- [4] No role
- [5] Don't know

9

INFORMATION ABOUT YOUR HOUSEHOLD

The following questions will help describe the total group of survey respondents. Your individual information will not be reported separately—it will be reported only as a part of a larger group to help ensure that the respondents are a representative sample of the citizens of Harford County.

29. Which of the following best describes your age?

- [1] 18 to 34 years
- [2] 35 to 44 years
- [3] 45 to 54 years
- [4] 55 to 64 years
- [5] 65 years and older

30. What is the highest level of education you have completed?

- [1] Some high school
- [2] Completed high school
- [3] Two-year college or technical degree
- [4] Four-year college degree
- [5] Graduate degree

31. What was your approximate 2018 household income?

- [1] Less than $25,000
- [2] $25,000 to $49,999
- [3] $50,000 to $74,999
- [4] $75,000 to $99,999
- [5] $100,000 to $149,999
- [6] $150,000 to $199,999
- [7] $200,000 or more
- [8] Prefer not to answer

32. How many people reside in your home (adults and children)?

Adults (including yourself)	Children age 18 and younger
[1] 1	[0] None
[2] 2	[1] 1
[3] 3	[2] 2
[4] 4 or more	[3] 3
	[4] 4 or more

33. Do you own or rent your residence?

- [1] Own
- [2] Rent

34. How long have you lived at your current address?

- [1] Less than 1 year
- [2] 1 to 2 years
- [3] 3 to 4 years
- [4] 5 or more years

Thank you for completing this survey!