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Broadband in Kansas: Availability and Use Among Residents

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Columbia Telecommunications Corporation

10613 Concord Street • Kensington, MD 20895 • Tel: 301-933-1488 • Fax: 301-933-3340 • www.ctcnet.us

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1 Abstract: Broadband Availability and Use Among Kansas Residents

The Kansas Statewide Broadband Initiative (KSBI), a program of the Kansas Department of Commerce, hired Columbia Telecommunications Corporation (CTC) to assess the availability, uses of, and anticipated needs for broadband among Kansas residents. CTC conducted a benchmarking survey of the residential broadband market across the state.¹ Based on our analysis of the data and our experience nationwide, we note the following key findings:

- **87 percent of residents have Internet service—a *significant* overall increase since the state’s 2010 market survey**, which measured residential broadband use at 72 percent.
- **Broadband use is up across urban, suburban, and rural areas.** Residents in suburban and urban areas are the most likely to have a home broadband connection.
- **Kansans use the Internet for education, job searches, home-based businesses, and entertainment.** 85 percent of respondents with students use the Internet for school work. More than 60 percent of respondents had looked for a job online, and more than 50 percent had applied for a job online.
- **Broadband supply is not keeping pace with residential demand throughout much of Kansas.** Demand will likely continue to grow, given national and state data trends.
- **Residential broadband infrastructure is an important consideration for home-based businesses, telecommuters, and after-hours work.** Economic trends blur the line between residential and business broadband use. Approximately one-fifth of households statewide are engaged or planning to be engaged in home-based business; respondents said that high-speed Internet was “very important” to those businesses.
- **Broadband-enabled telework is a potential area of economic growth for Kansas.** Residents increasingly use their home broadband connections for after-hours work purposes, as well.
- ***In summary:* Residential broadband adoption has increased but supply is not matching demand; lack of availability may hinder economic development (in terms of home-based businesses and telecommuters) and educational outcomes.**

¹ Because KSBI has prioritized assessing the current and future ability of Kansans to participate in economic and educational activities that rely on high-speed Internet access, the survey asked respondents to report on their existing Internet connections, their current use of the Internet, and their interest in using the Internet for a range of purposes.

2 Executive Summary

This report documents the Kansas Department of Commerce's ongoing exploration of the availability and use of broadband among residential users throughout Kansas.

2.1 Project Background

The Kansas Statewide Broadband Initiative (KSBI), a program of the Kansas Department of Commerce, hired Columbia Telecommunications Corporation (CTC) to assess the broadband needs of its community anchor institutions, and to conduct studies of the availability and use of broadband among Kansas homes and businesses.

In early 2013, CTC completed a needs assessment of Kansas community anchor institutions and published a report, *Building the Broadband Future: The Communications Needs of Kansas Schools, Libraries, and Hospitals*.² That report detailed CTC's findings with respect to these entities' increasing need for high-speed Internet access in the context of the elimination of the statewide Kan-ed communications network.

Following the publication of that first report, in the summer of 2013, CTC began its analysis of broadband availability, uses, and anticipated needs among the state's residents and businesses. This report documents CTC's findings in the residential market. A companion report documents findings in the business market.

2.2 Description of Broadband Surveys

CTC conducted two surveys of the broadband market in Kansas on behalf of KSBI—one of homes and one of businesses. The central goal of these surveys was to benchmark the availability and use of broadband in the residential and business sectors. Because KSBI has prioritized assessing the current and future ability of Kansans to participate in economic and educational activities that rely on high-speed Internet access, the surveys asked respondents to report on their existing Internet connections, their current use of the Internet, and their interest in using the Internet for a range of purposes.

In addition to asking about broadband technology adoption and use, the surveys asked a battery of questions about demographics, household characteristics, business profiles, and the respondents' communities. One of the state government's central goals is finding ways to ensure that Kansans in rural areas have the same broadband options and opportunities as residents in cities and suburbs. We sorted the responses geographically. The cross-tabulation of the broadband questions with the demographic and geographic information associated with each respondent provided the basis for differentiating broadband markets across Kansas.

² See full report here: <http://www.ctcnet.us/KansasCAINeeds.pdf>

This was a statewide study with regional perspectives. Accordingly, as a means of making sure that the different sectors of the state were covered in terms of geography as we evaluated the survey data, we used the approximate geographic boundaries of the state's congressional districts to define our regions 1, 2, 3, and 4. *This was in no way an analysis of the congressional district itself or the politics of those regions.* Rather it was an attempt to understand different parts of the state with relatively equal populations.

We felt this was a sound approach because there were sufficient data from each of these areas to be able to make statistically meaningful conclusions—which would not have been the case if we had segmented the data into smaller groupings.³ The regions encompassed by the district boundaries are roughly equivalent in terms of population size, but have dramatically different densities and demographic characteristics. They provide a basis for analyzing broadband markets based on differences among the state's urban and rural communities.⁴

The population densities of the regions offer a good basis for analyzing broadband user groups by community type. Respondents' answers regarding Internet use, availability, and current and anticipated demand varied significantly based on location; these variances are often clearer when viewing the results by community type in this way than by rural/urban community type as defined by the respondents themselves.

For example, on the residential survey, the results showed that a significantly higher number of homes have fiber Internet connections as their primary type of service in the rural regions than in the urban regions. (The presence of fiber connections in those areas likely speaks to the presence of circuits built by rural telephone companies using federal subsidies.) This result is somewhat less apparent when breaking down the responses by the urban/rural categories as chosen by the respondents themselves. (See Figure 22 and Figure 23 on page 33). Using the regions instead of these categories has the benefit of relying on clearly defined boundaries rather than the variable and somewhat subjective interpretations of each individual respondent in deciding whether their community is rural, urban, suburban, etc.

³ Based on the number of responses received, we did not have sufficient data for comparison by geographic segments. Ideally we would have been able to compare the most rural and most urban parts of the state, but given the lower population in rural areas, we did not receive the level of responses required from rural areas to support that level of analysis. There are inherent limitations when analyzing rural broadband, and the relatively weak response received from rural areas illustrates that challenge. Thus, to analyze the survey data, we had to accept larger segments.

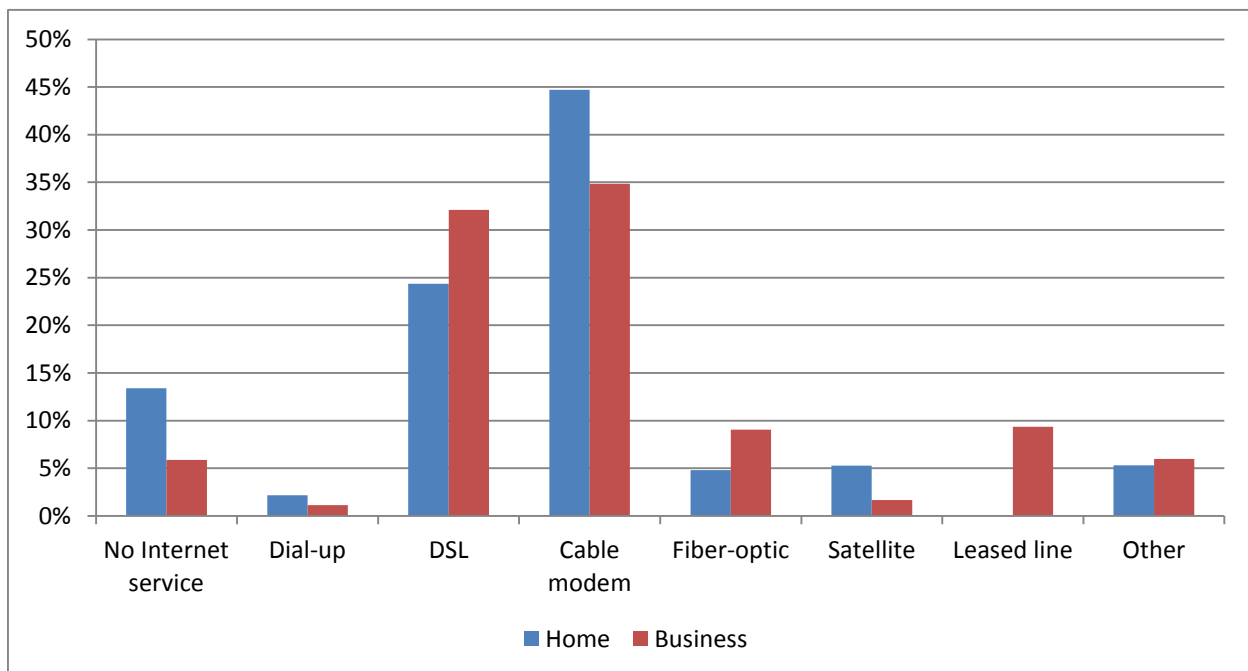
⁴ The 1st region encompasses highly rural areas and small towns in the western portion of the state; it can generally be viewed as a proxy for rural Kansas. The 2nd region contains significantly more population density, and includes the state capital of Topeka, but nevertheless includes a significant rural population. The 3rd region includes Kansas City and the surrounding suburbs, as well as the City of Lawrence. The 4th region contains significant portions of both rural and urban residents, including the City of Wichita and the surrounding counties. The 3rd and 4th region can be viewed as representing the state's dense urban clusters.

2.3 Survey Results Indicate that Location and Community Type Affect Broadband Availability, While Price and Speed Affect Broadband Adoption

The survey results show a mixed broadband landscape across the state. While overall Internet use is widespread across Kansas among both residents and businesses, the type of service varies heavily by the type of community.

Eighty-seven percent of residents and 94 percent of businesses have Internet service (see Figure 1). Only 2 percent have non-broadband dial-up service. We note that this reflects a *significant* overall increase of business broadband adoption since the state's previous market survey, conducted in 2010, which measured home broadband use at just 72 percent of the state's residents.⁵ These results back up a well understood evolution in the digital economy, and demonstrate the enormous growth of broadband interest and use over the past few years. The next step that many residents will expect to take is upgrading to better broadband service.

Figure 1: Primary Home and Business Internet Services



Residents in suburban and urban areas are the most likely to have a home Internet connection. Suburban Kansans in particular appear to be the most likely residents to have cable modem

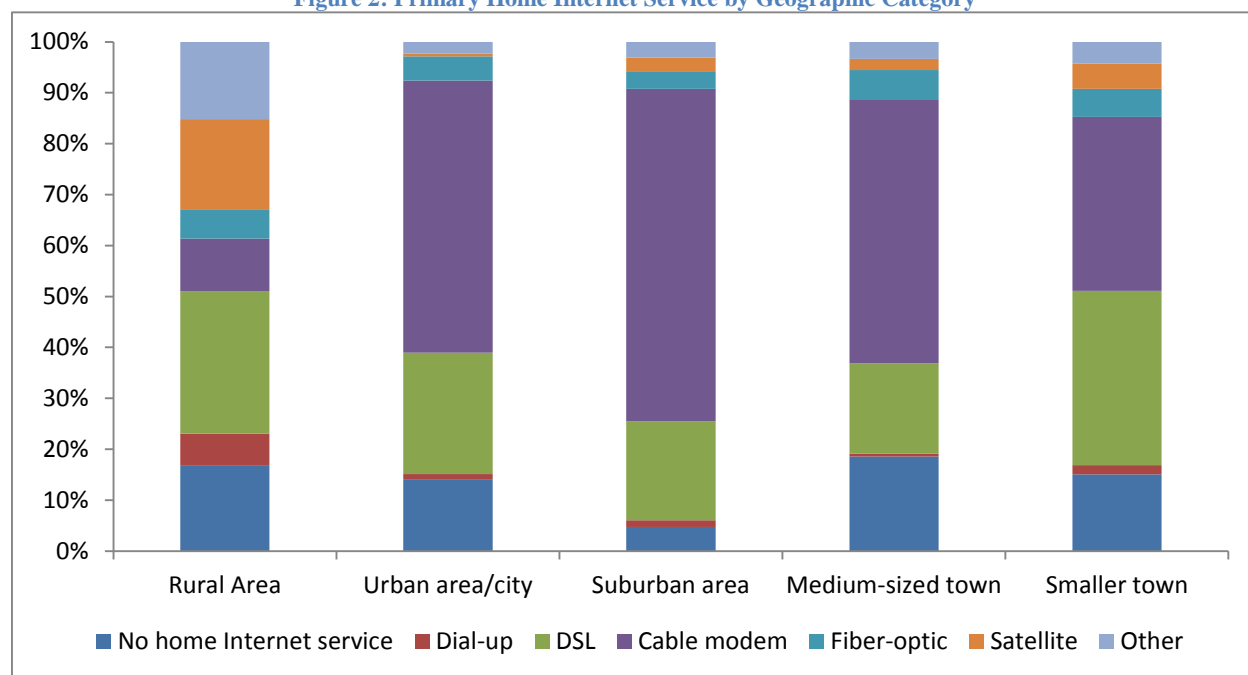
⁵ Connect Kansas, Business Technology Assessment, 2010.

service, which is the highest capacity service available in much of the state (see Figure 2, below).

Internet technologies used in the predominantly rural areas tend to include more satellite and dial-up services. More urban and suburban areas have access to cable modem service. A minority of users have access to fiber optic service in all locations, while a higher percentage of fiber users are in rural areas.

Fiber optic service was reported the most frequently by rural residents, likely offered by local rural telecommunications companies and cooperatives that have built fiber networks using federal subsidies from Universal Service Fund programs such as the Connect America Fund. Still, even in the most rural communities, less than 10 percent of respondents reported using a fiber optic connection, and cable modem usage was dramatically lower among rural residents.

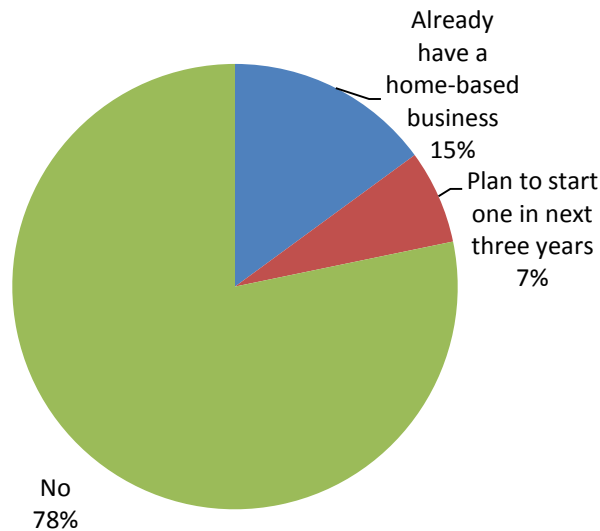
Figure 2: Primary Home Internet Service by Geographic Category



The data seem to indicate that supply is not keeping pace with demand throughout much of Kansas' broadband market. The surveys further indicate that the demand for broadband will likely continue to increase, particularly with the growth of telework and home-based businesses.

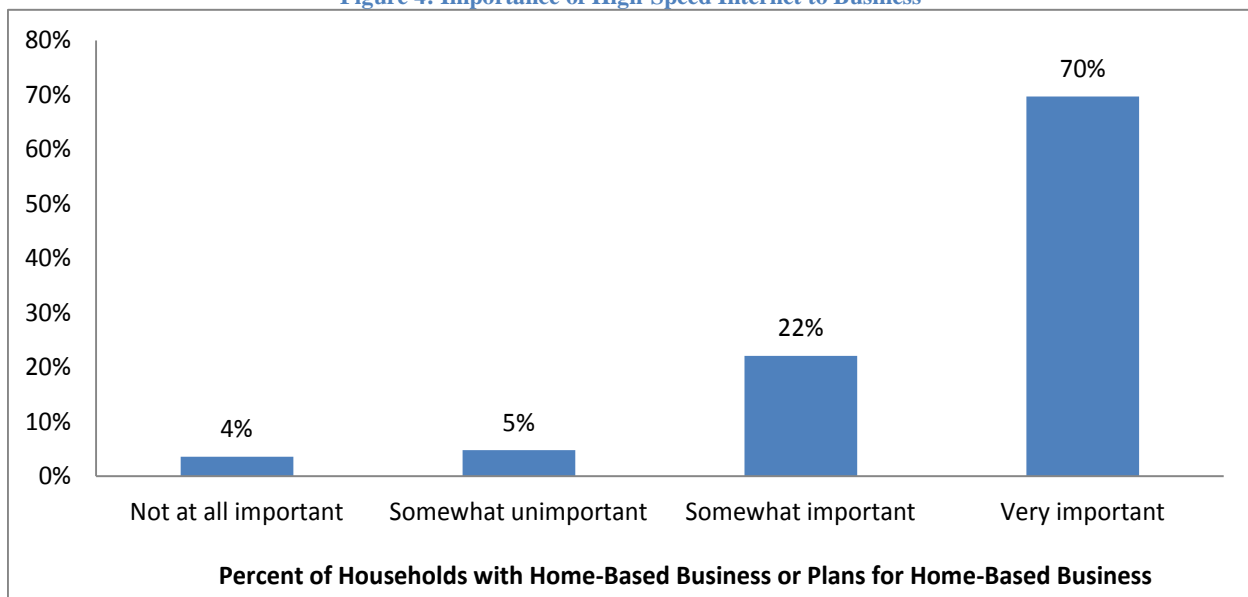
Across the various regions of the state, a significant number of respondents (about 20 percent, and closer to 25 percent in the most densely populated areas), reported having a home-based business or plans to start one within three years. A similar rate of respondents indicated that they used home and mobile Internet services to run a home-based business, either occasionally or frequently.

Figure 3: Have a Home-Based Business



Though the home-based business community represents a minority of the population, it is nevertheless economically significant. If approximately one-fifth of households statewide are engaged or planning to be engaged in home-based business, this is a segment of the state's economy that will have a significant effect on driving residential infrastructure needs. An overwhelming majority of residential respondents said that high-speed Internet was "very important" to their existing or future home-based business (see Figure 4). Furthermore, since home-based business owners appear to use both home and mobile Internet connections to run their businesses in comparable amounts, the demands will likely be felt in both the wireline and wireless markets.

Figure 4: Importance of High-Speed Internet to Business



In addition to home-based businesses, home Internet is also important for jobs that allow employees to work remotely. About a quarter of business respondents reported that they already permit telecommuting. By comparison, about 15 percent of residential respondents reported that someone in their household currently telecommutes. This alone suggests that telework is a potential area of economic growth for Kansas. In addition, 16 percent of businesses reported that they both allowed telecommuting, and had employees working remotely from out of state. This helps illustrate how enabling telework can help Kansas create and retain jobs while appealing to a workforce beyond its own borders.

Figure 5: Business Survey—Business Permits Telecommuting

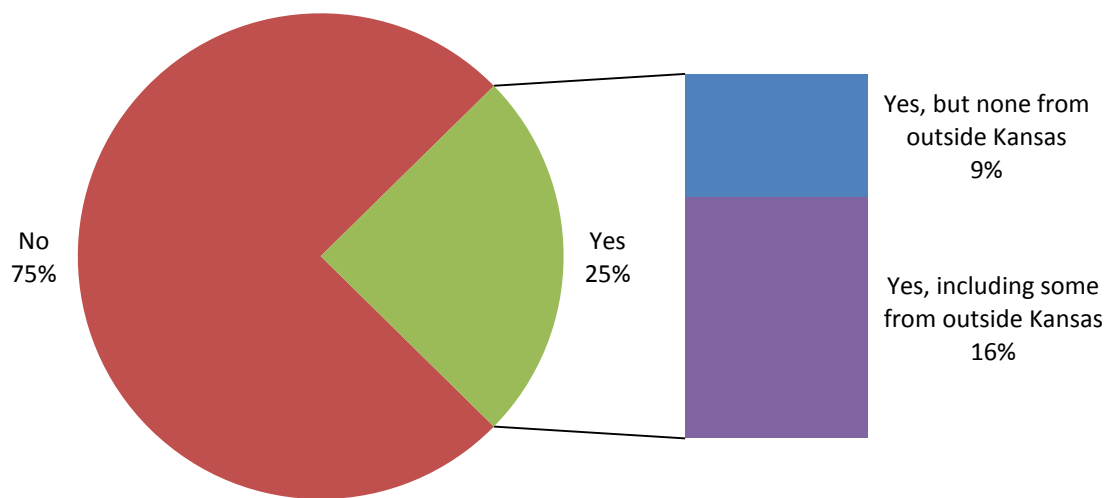
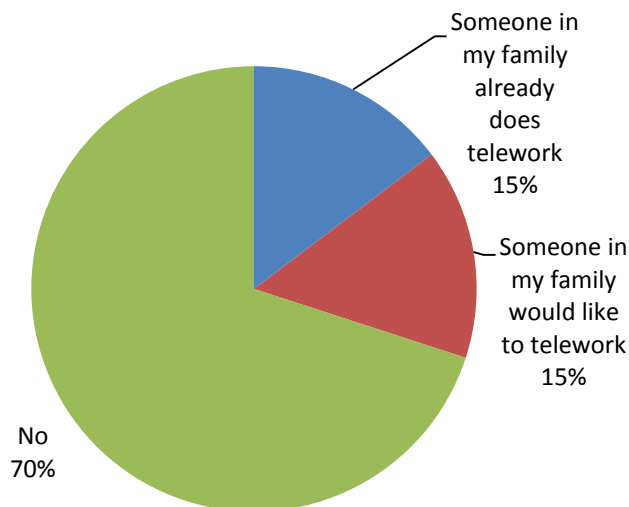
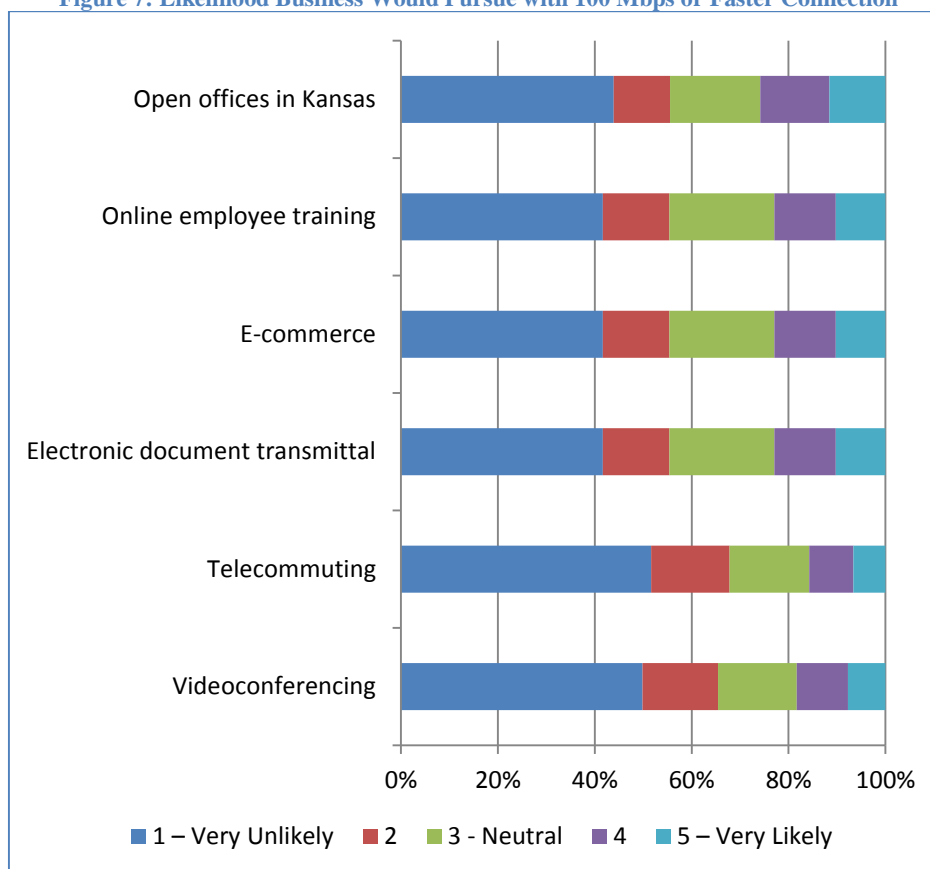


Figure 6: Member of Household Currently or Interested in Telecommuting



Though most businesses report that access to very fast Internet connections would not prompt them to pursue increased telecommuting, those that do express interest are, again, an economically significant minority. Over 10 percent of businesses across the state expressed that they would be somewhat or very likely to expand telecommuting—as well as other important business practices—if they had access to a 100 Mbps or faster connection. An even higher proportion responded that they would be more likely to open offices within Kansas with such a connection. The important takeaway from this result is that, for at least some businesses, lack of high-end broadband has some degree of impact on their employment practices, and that access to such connections may enable them to use new business approaches.

Figure 7: Likelihood Business Would Pursue with 100 Mbps or Faster Connection



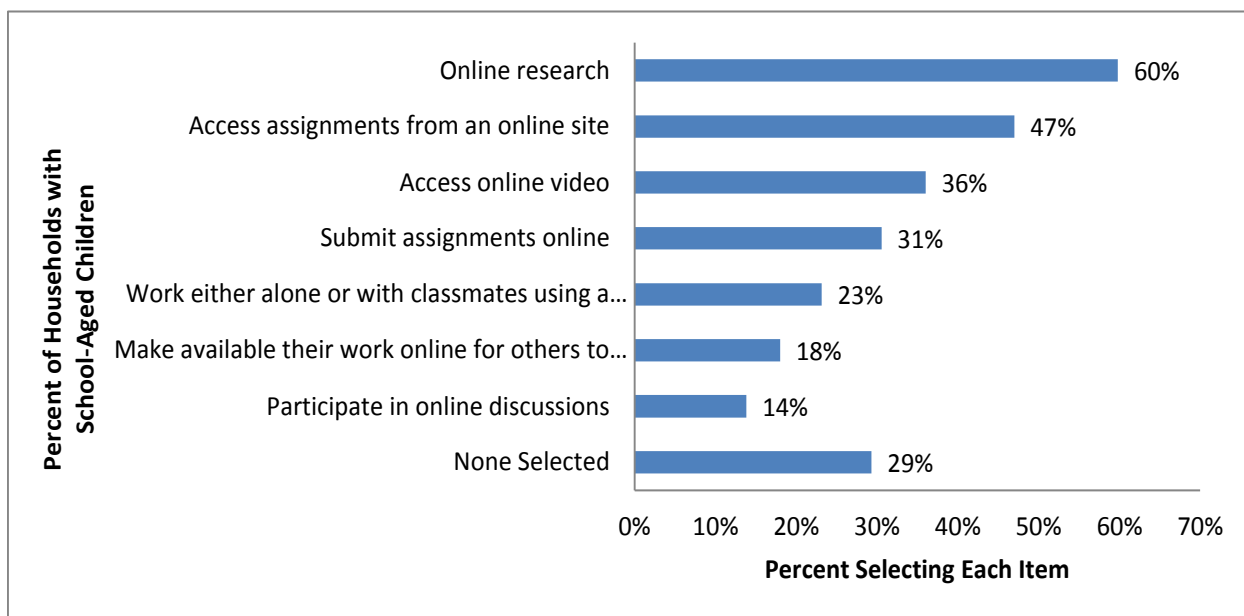
Furthermore, our finding that 25 percent of businesses permit telecommuting is an increase over the state’s finding in 2010; the previous survey found that only 20 percent of businesses permitted telecommuting.⁶ This further suggests that Kansas businesses are trending toward embracing telework.

⁶ Connect Kansas, Business Technology Assessment, 2010.

The responses from both the residential and business surveys illustrate how new economic trends blur the line between strict residential and business Internet use. Both home-based business and telework contribute to this trend. Residents increasingly have the ability to use their home Internet connections for business and work-related purposes. There already appears to be room for growth in this area based on the number of employers permitting telework, and the number of Kansans pursuing business opportunities from home.

On the educational side, a majority of respondents with school-aged children across the state reported that the child’s school asked children to use the Internet outside of school to some extent. These requirements appeared at lower frequencies in the rural areas; but even in the rural western portion of the state, a majority of respondents (50.4 percent) reported that their children had been asked to perform online research outside of school. For children in households without Internet access—more of which exist in rural areas—these requirements reinforce an educational “digital divide” separating them from children who do have home Internet access. (See Figure 8.)

Figure 8: Schools Request Students Engage in Various Activities



Beyond K-12 education, a majority of respondents across the state said they were interested in taking either an online class or a class requiring some online content. Again, the rural western region returned the lowest number of affirmative responses, but a clear majority nevertheless (56.9 percent).

Overall, the two surveys present a broadband picture that indicates considerable demand for additional services beyond the current market supply. Both cost and availability of broadband service appear to have some negative pressure on broadband use for businesses in particular. Though broadband use is high overall throughout the state among both residents and businesses, the quality and type of service is highly variable, making some parts of the state

competitive over others for capturing segments of the new economy that rely more heavily on high-end Internet connectivity.

2.4 Analysis of Findings—Residential Survey

Responses to the statewide residential survey established key benchmark data regarding Kansas citizens' use of the Internet and broadband in their homes: Approximately 87 percent of Kansas homes have Internet service; of that group, only 2 percent report having dial-up connections. Approximately 63 percent of homes purchase mobile Internet data plans—including one-third of the residents who do not have other Internet service at their homes. The most urban areas (including Kansas City, Kansas) have greater availability, and greater use, of Internet services than the state's rural and semi-rural regions.

We discuss the significance of these findings in the following sections.

2.4.1 Kansas Residential Broadband and Internet Use Is Higher than U.S. Averages

We find that access and use of the Internet is higher in Kansas than in the United States as a whole (on average). Further, Kansans' broadband use is higher not only in urban and suburban areas, but also in smaller communities and in rural markets.

The survey of households in Kansas revealed a broadband landscape that varies significantly across the state. According to the survey, 85 percent of Kansas homes have a non-dial-up Internet connection; however, home Internet use is significantly greater in suburban areas than in either rural or urban areas. Suburban areas also show a greater use of cable modem service, which on the whole is the fastest broadband technology available in the state. Fiber optic service is significantly less available.

Approximately 87 percent of Kansas homes have Internet service, including 45 percent with a cable modem connection and 24 percent with DSL. Smaller shares of homes have satellite, fiber optic, dial-up, or another type of connection. (See Section 5.4.2 for more information about home versus mobile Internet use across demographic groups.)

By comparison, the Pew Research Center estimates that 76 percent of American adults ages 18 and older have an Internet connection at home.⁷ In Table 1 we show the homes in Kansas with Internet access as compared to the Pew findings for the United States. Internet access is significantly higher in Kansas.

⁷ "Home Broadband 2013," Pew Internet & American Life Project, Pew Research Center, August 26, 2013. <http://www.pewinternet.org/Press-Releases/2013/Home-Broadband-2013.aspx>

Table 1: Homes with Internet Access

Location		U.S. (%)	Kansas (%)
All Homes		76	87
Geographic Category	Urban	76	86
	Suburban	79	95
	Medium Town	n/a	81
	Smaller Town	n/a	85
	Rural	70	83

The percentage of Kansas homes with broadband access is also higher than the Pew-reported U.S. average. This is true even if we exclude satellite users from our tabulation of broadband users in Kansas. (We would exclude satellite users from the Kansas broadband penetration figures because satellite provides a functional service more similar to dial-up. Although satellite connectivity technically meets some minimal definitions of broadband, it does not support interactive voice or video applications, and often cannot support transfers of large data files.⁸)

Pew reports that 70 percent of U.S. households have broadband, including those with satellite connections; in Kansas, 79.2 percent (excluding satellite) or 84.5 percent (including satellite) have broadband (see Table 2).⁹

Table 2: Homes with Broadband Internet Access

Location		U.S. Including Satellite (%)	Kansas Excluding Satellite (%) ¹⁰	Kansas Including Satellite (%) ¹¹
All Homes		70	79.2	84.5
Geographic Category	Urban	70	84.3	84.9
	Suburban	73	91.1	93.9
	Medium Town	n/a	78.7	80.9
	Smaller Town	n/a	78.3	83.2
	Rural	62	59.1	76.9

With the exception of rural areas, dial-up access is lower in Kansas than the Pew-reported U.S. average (see Table 3). As in the tables above, Pew's definition of rural seems to include medium and small towns; if this is the case, dial-up use in Kansas would likely also be lower than the U.S. average in the rural areas as well.

⁸ The U.S. Small Business Administration's 2010 study, "The Impact of Broadband Speed and Price on Small Business," offers an illustrative case study on the nature of satellite connectivity. The report, which we reference in Section 1.5.2, is available here: <http://www.sba.gov/content/impact-broadband-speed-and-price-small-business-1>

⁹ Our classifications of medium and small towns are likely to be included in Pew's rural classification.

¹⁰ Includes cable modem, DSL, fiber optic, and other Internet services from the Kansas surveys.

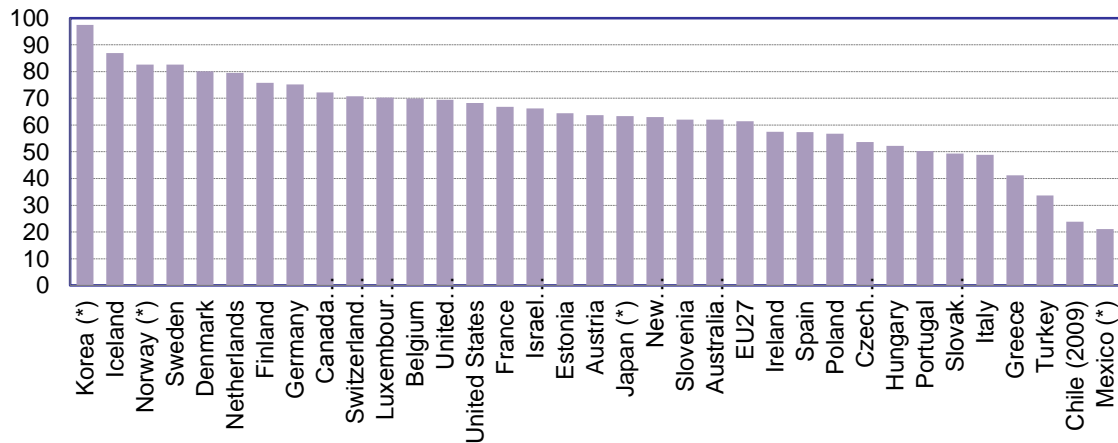
¹¹ Includes cable modem, DSL, fiber optic, satellite, and other Internet services from the Kansas surveys.

Table 3: Homes with Dial-Up Internet Access

Location		U.S. (%)	Kansas (%)
All Homes		3	2.2
Geographic Category	Urban	2	1.1
	Suburban	3	1.3
	Medium Town	n/a	0.5
	Smaller Town	n/a	1.8
	Rural	4	6.2

To put Kansans' relatively higher use of broadband into context, however, we note that U.S. residential broadband and Internet use lags behind other developed nations. The Organization for Economic Cooperation and Development (OECD) tracks worldwide broadband use. As seen in Figure 9, the United States ranked 14th in broadband access and lagged the top five countries by at least 10 percent in 2010, the most recent year for which data are available.

Figure 9: Households with Broadband Access Worldwide (2010)¹²



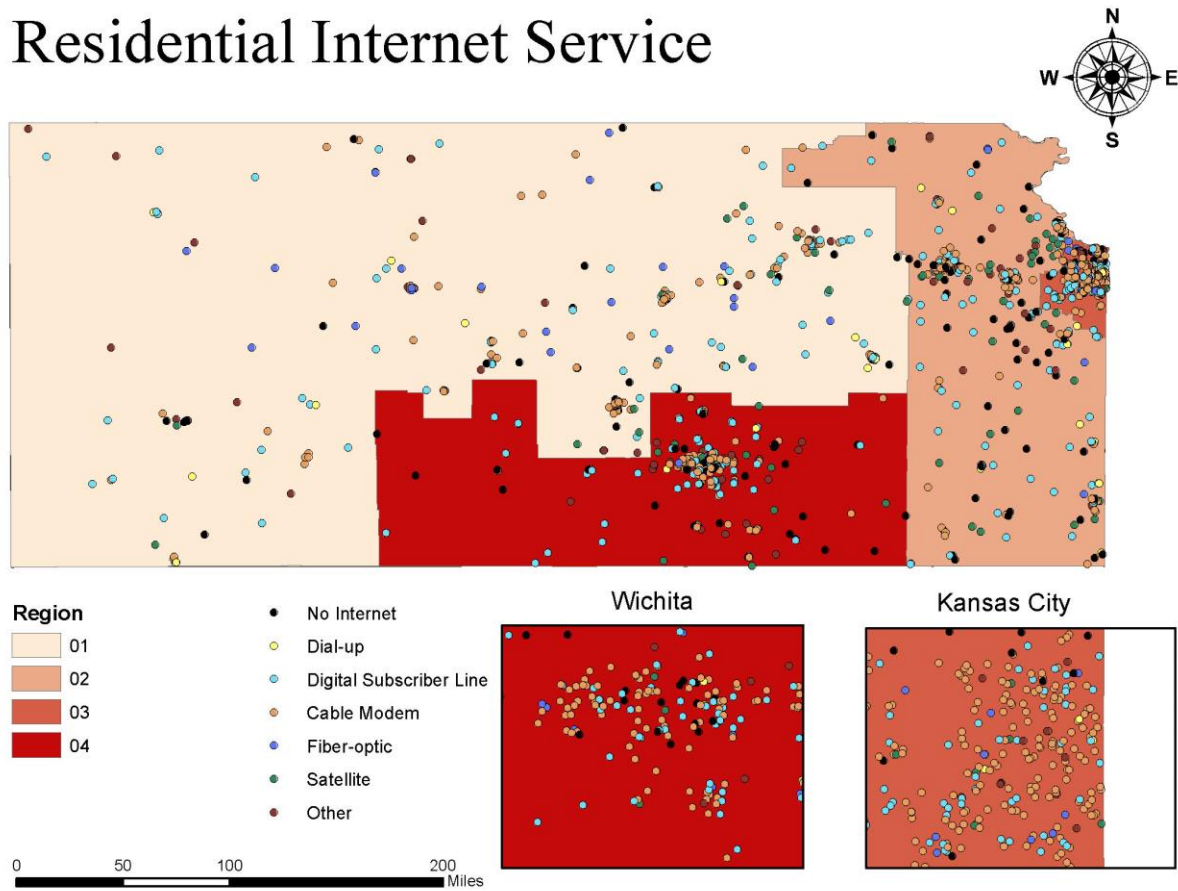
2.4.2 The Availability and Use of Home Internet Service in Kansas Varies by Region

The distribution of home Internet service by technology type is apparent when breaking down the responses by region. The following map shows the location of survey respondents and their home Internet connection type across each region.

¹² Organization for Economic Cooperation and Development (OECD), ICT database and Eurostat, Community Survey on ICT usage in households and by individuals, November 2011. See also: OECD Broadband Portal, <http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm>

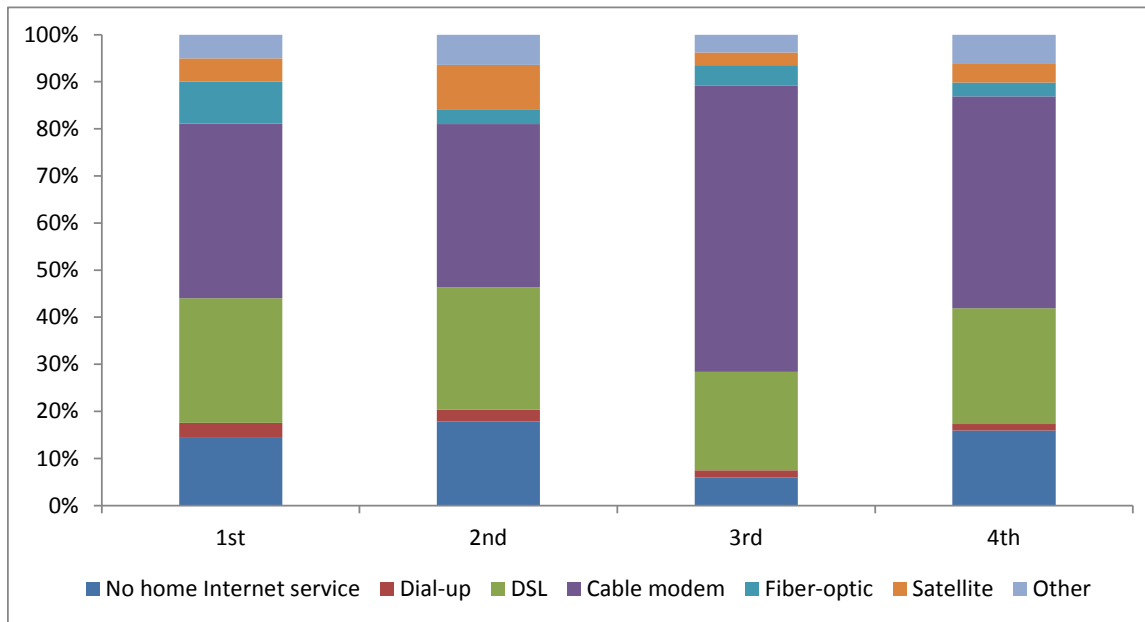
Figure 10: Map of Residential Responses by Region

Residential Internet Service



The urban regions represent the part of the state best served by broadband (see Figure 11).

Figure 11: Residential Survey—Primary Home Internet Service by Region



The urban areas have the lowest number of unserved homes (i.e., respondents indicating “no home service”) and the highest rate of cable modem service. The 3rd region includes the cities of Kansas City and Lawrence, as well as the suburban communities of Wyandotte and Johnson counties. A clear majority of the 3rd region respondents classified their communities as suburban (see Table 4), reflecting the largely suburban nature of this area.

Table 4: Geographic Categories of Region

Geographic Category	Region			
	1 st	2 nd	3 rd	4 th
Rural area	23.6%	32.9%	2.9%	15.9%
Urban area/city	17.3%	22.9%	24.1%	42.7%
Suburban area surrounding a city	3.5%	8.4%	67.7%	15.9%
Medium-sized town (population more than 10,000)	24.0%	16.7%	3.3%	8.9%
Smaller town (population less than 10,000)	31.7%	19.1%	2.1%	16.6%
<i>Total</i>	<i>100.0%</i>	<i>100.0%</i>	<i>100.0%</i>	<i>100.0%</i>

The survey also requested that respondents classify their communities based on population. Those who identified as living in a suburban community also showed the highest home broadband use and the highest cable modem use (see Figure 12 below). For reference, Figure 13 shows the geographic distribution of how respondents classified their community by urban-rural category).

While rural areas have similar Internet service saturations as other locations, they have much higher levels of satellite, dial-up, and “other” connections. Use of fiber optic Internet service, the fastest and most future-proof broadband technology, is also higher in rural areas. As in

other parts of the country, fiber-to-the-premises (FTTP) service is offered by various rural telephone companies throughout the state.

Figure 12: Primary Home Internet Service by Geographic Category

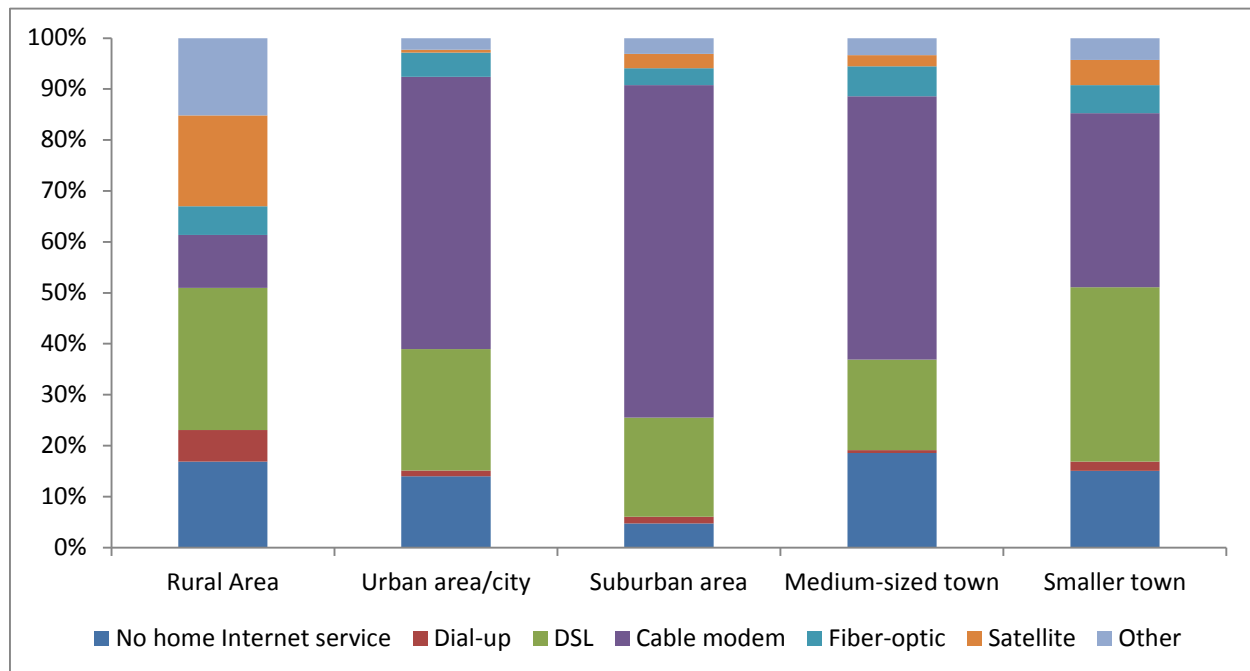
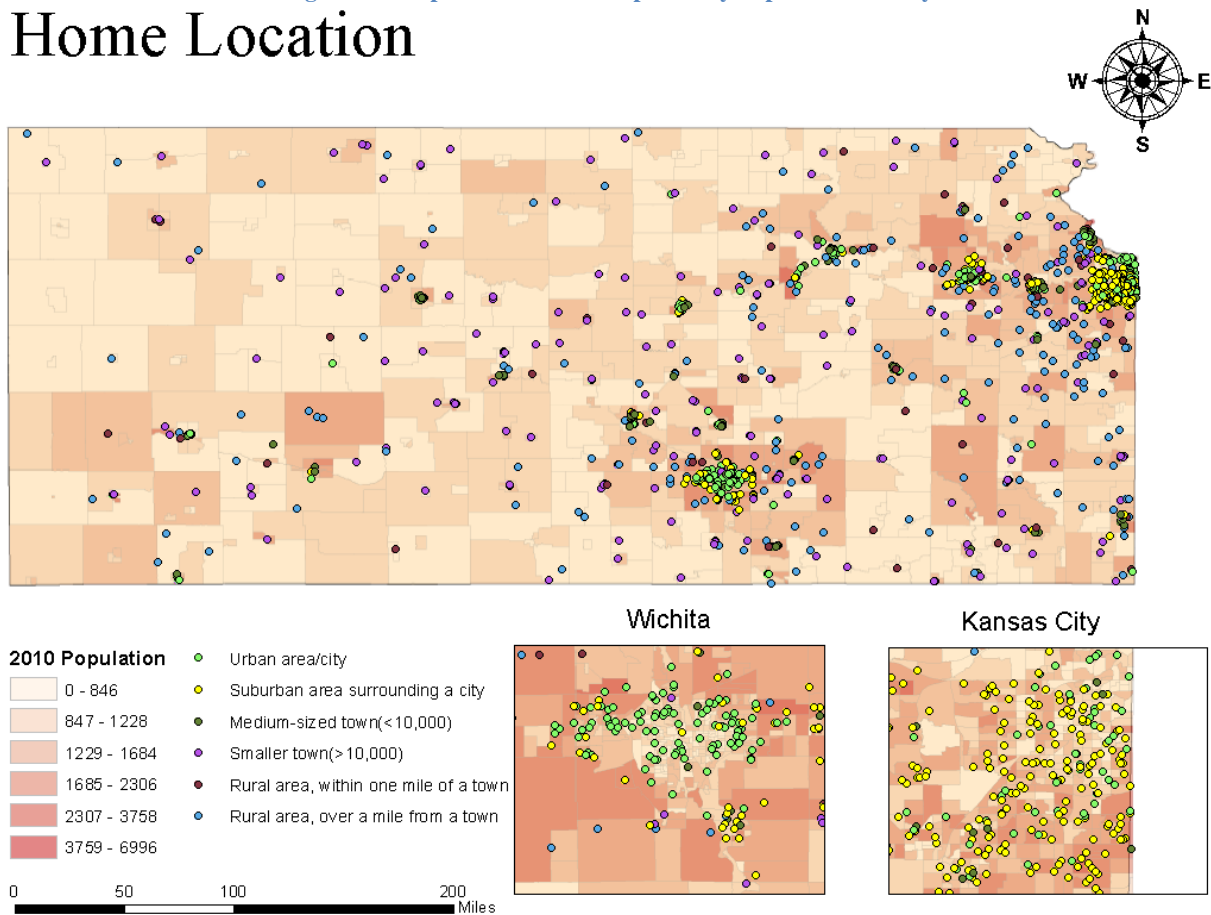


Figure 13: Map of Residential Responses by Population Density

Home Location



Notably, a comparison of these data with the state’s 2010 survey shows a significant overall increase in broadband adoption. The earlier survey showed the following breakdown of broadband adoption by urban, suburban, and rural categories:¹³

Table 5: 2010 Survey Results--Broadband Adoption

Statewide	Urban	Suburban	Rural
72%	72%	80%	64%

Regardless of whether the results of the 2013 survey are broken down by region or by urban-rural categories as chosen by the respondents, each type of community’s broadband adoption is significantly higher than they were in 2010. Even in the most rural region, about 83 percent of respondents indicated having a broadband connection; (no home Internet service was reported by 14.3 percent and dial-up service by 3.2 percent). This is 20 percentage points higher than the rural respondents from the 2010 survey.

¹³ Connect Kansas, Business Technology Assessment, 2010.

2.4.3 Fiber Service Is Used by a Small Minority of Residences

Fiber service is used by a small minority (about 5 percent) of Kansans overall (see Table 6). The most rural region had the highest reported home fiber Internet use, at 8.9 percent, still far below cable and DSL usage rates. Fiber access in Kansas is also lower than the U.S. average reported by the Pew Research Center.¹⁴

Table 6: Homes with Fiber-Based Internet Access

Location		U.S. (%)	Kansas (%)
All Homes		6 ¹⁵	4.8
Geographic Category	Urban	Not specified	4.8
	Suburban	Not specified	3.3
	Medium Size Town	n/a	5.9
	Smaller Town	n/a	5.5
	Rural	Not specified	5.7

Interestingly, fiber access is highest in the more rural areas of Kansas. Google's FTTP deployment in Kansas City is early in deployment and as such has not had a significant impact on this survey's fiber use projection. We suspect the rural deployments are largely the result of federal subsidies, such as the Connect America Fund, meant to bring high-speed access to unserved areas. The higher rate of fiber optic use outside of the urban and suburban areas in Kansas may also be a testament to the effects of grants from the National Telecommunications and Information Administration (NTIA), which oversaw the Broadband Technology Opportunities Program (BTOP).

For example, the independent telecommunications provider Rural Telephone Service Co. and its wholly owned subsidiary Nex-Tech received a BTOP grant and a Rural Utilities Services (RUS) loan to support FTTP deployments in central and western Kansas.¹⁶

2.4.4 Kansans Use the Internet for Education, Job Searches, Home-Based Businesses, and Entertainment

Additional key findings from the residential survey include the following data points, which are discussed in more detail in Section 5.

¹⁴ "Home Broadband 2013," Pew Internet & American Life Project, Pew Research Center, August 26, 2013. <http://www.pewinternet.org/Press-Releases/2013/Home-Broadband-2013.aspx>

¹⁵ Eight percent of 76 percent of homes with Internet access

¹⁶ "Public Notice Submission: Rural Telephone Service Co./Nex-Tech," National Telecommunications and Information Administration. <http://www2.ntia.doc.gov/files/RuralTelephoneServiceCoNexTech.pdf>. See also: "Construction of Hays Fiber Network Complete," press release, Nex-Tech. July 24, 2013. <http://www.nex-tech.com/Portals/0/News%20Releases/Construction%20of%20Hays%20Fiber%20Network%20Complete%20072413.pdf>

- Eighty-five percent of homes with students report that their student uses the Internet for school work, including online research and accessing class assignments online.
- More than 60 percent of respondents had looked for a job online, and more than 50 percent had applied for a job online.
- The most common uses of home Internet are online shopping and watching TV/movies. The most common use of mobile Internet is streaming music.
- Fifteen percent of respondents telework and an additional 15 percent would like to telework. Only 2 percent were allowed to telework but could not, due to slow Internet.
- Of those with a home-based business or planning to start a business, 70 percent report that high-speed Internet is “very important” to their business.

3 Understanding Broadband Performance

As a framework for understanding the survey results described in the following sections, it is important to understand the performance differences among broadband connectivity options.

The most common way that consumers compare the performance of a data connection is by evaluating its speed (which is measured in bits per second, and is typically discussed in units of Mbps or 1,000,000 bits per second). However, this measurement can be quite deceptive. For example, a 30 Mbps cable modem connection may cost a residential consumer \$50 per month, while a business-grade 10 Mbps Metro Ethernet service can exceed \$500 per month.

Why would a service with one-third the speed cost 10 times the price of the “faster” alternative? The answer is that all Mbps are not created equal. Factors such as latency, the availability of the connection speed, and the network’s Internet oversubscription rate affect the connection’s overall performance. In the example above, the 10 Mbps Metro Ethernet service’s total set of performance attributes provides a more robust connection than a 30 Mbps cable modem.

Key attributes that impact performance include:

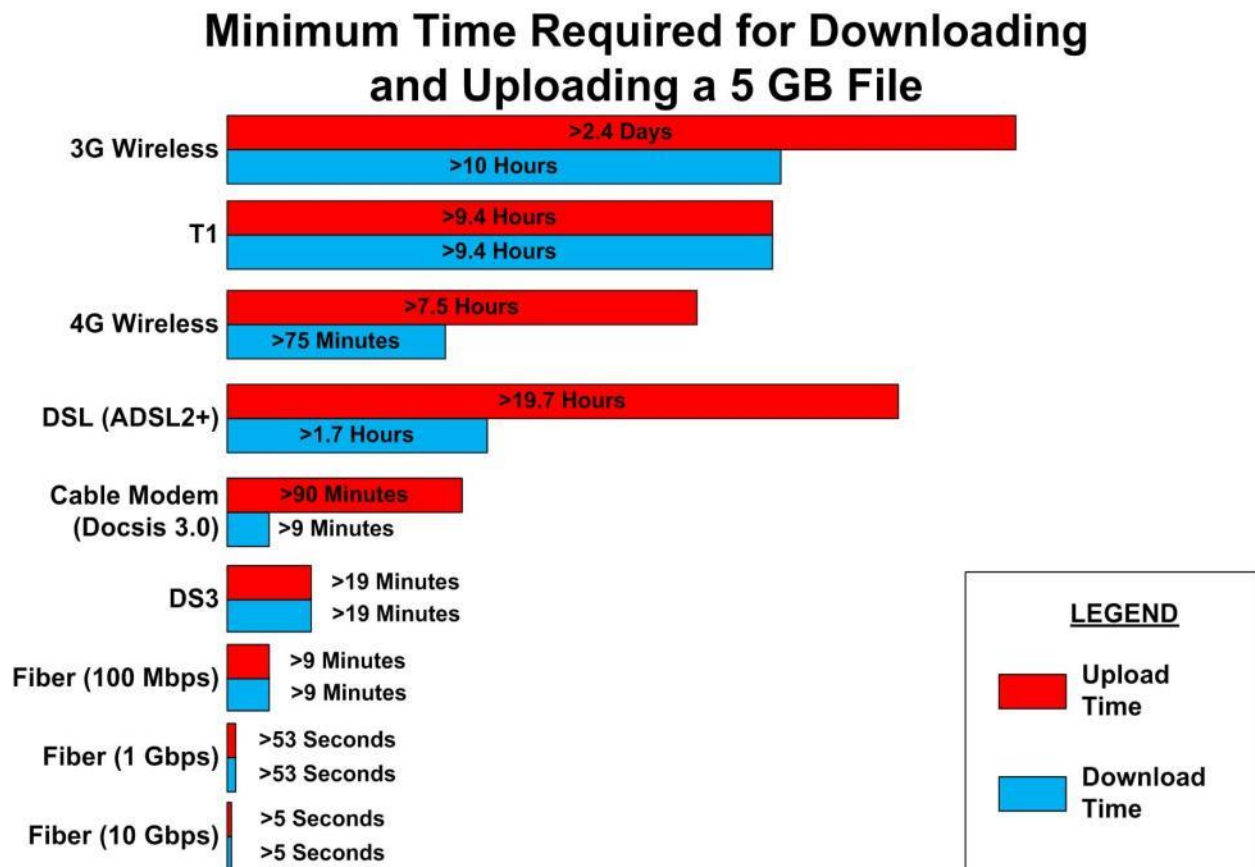
- *Symmetry*: Cable modem and DSL services are typically “asymmetrical,” meaning that their upload¹⁷ and download¹⁸ speeds are different. Typically the download speed is greater than the upload speed by a factor of 10. Metro Ethernet services, on the other hand, are typically “symmetrical,” meaning that the upload and download speeds are the same. For businesses that produce and transfer large data or video files, “asymmetrical” services often present a bottleneck to both internal users and external customers.

An example of the impact of service symmetry is shown in the figure below. A typical cable modem service can download a 5 GB file in less than 10 minutes, but it would take more than 90 minutes to upload—which would not be acceptable to a business creating and distributing large files, such as those seen in production or other studios.

¹⁷ Transfer of data from the users’ devices.

¹⁸ Transfer of data to the users’ devices.

Figure 14: Illustration of Service Symmetry on Download Times



- Oversubscription to Internet:** Internet service providers (ISP) recognize that users in a given area do not all access the Internet at the same time; therefore, ISPs only subscribe to a portion of their networks' total potential demand. For example, an ISP that has 1,000 subscribers with 10 Mbps service might contract for a 100 Mbps connection rather than the maximum 10,000 Mbps Internet connection its users might require. The ratio of a network's maximum potential demand to its contracted rates is its oversubscription ratio. In this example, the oversubscription ratio is 100:1.

Cable modem and DSL providers often have a 100:1 or greater oversubscription ratio for residential users and a 50:1 ratio for business users. If an ISP bundles Internet access with a Metro Ethernet service, the oversubscription ratio is often 10:1 or less. In addition, with a Metro Ethernet service, users often will contract for specified Internet connections, thus defining their own performance. At times, users will not notice the oversubscription, while at other times oversubscription brings the user experience to a crawl—no different than traffic on the weekend vs. traffic during a weekday rush hour.

- *Availability*¹⁹ of the *Data Transport Rate*: Metro Ethernet providers will specify a committed interface rate (CIR), which is the guaranteed transport speed of the circuit connecting the users' location(s). Cable modem and DSL services are often "burstable," meaning that users may at times experience the advertised data rates, but that the average speed realized will vary greatly based on the traffic being generated over the provider's distribution network. Performance parameters on a given burstable service are rarely publicized or realized. Often the network operator cannot change this parameter without changing the network physical connections. During heavy use burstable subscribers will experience the same traffic discrepancies as do drivers on the weekend vs. drivers slogging through the weekday rush hour.
- *Capacity*: The data rate specifies the speed (in bytes) at which data is being transferred, whereas capacity is the measure of how much data was transmitted in a given period. For connections supporting burstable services, capacity limits may defer required network upgrade. For example many data plans for a wireless service will specify the Gigabytes (1,000,000,000 Bytes, or GB) allowed during the month. These plans will carry extra fees for exceeding the limit and will actually slow down your connection speed as you approach your capacity limit. Cable modem and DSL providers have raised the possibility of adding capacity limits on their services (e.g., Comcast has trials of bandwidth limits), but to date implementation of such policies have been limited.
- *Latency*: This is the delay between the instant a message is sent and the instant it is received. Latency occurs on a provider's network and, if a connection is made over the Internet, additional delays are added there. With cable modem and DSL services latency is not an attribute users can specify. For Metro Ethernet and other higher end transport services latency is often a quality-of-service (QoS) feature for which a user can contract (at an added price). At times networks with high latency will prevent users from running certain applications. For example, satellite-based ISP services have an extremely high latency due to propagation delays (i.e., the time it takes for a signal to reach the satellite). These delays will prevent effective use of interactive services such as voice calls or interactive video.
- *Overhead*: This is not typically an option that a user can specify. Each transaction over the network will contain data regarding how to handle the message and where to deliver it (i.e., network control and operation). For cable modem services, overhead is typically part of each transaction; for Metro Ethernet, overhead is not part of a user's bandwidth.

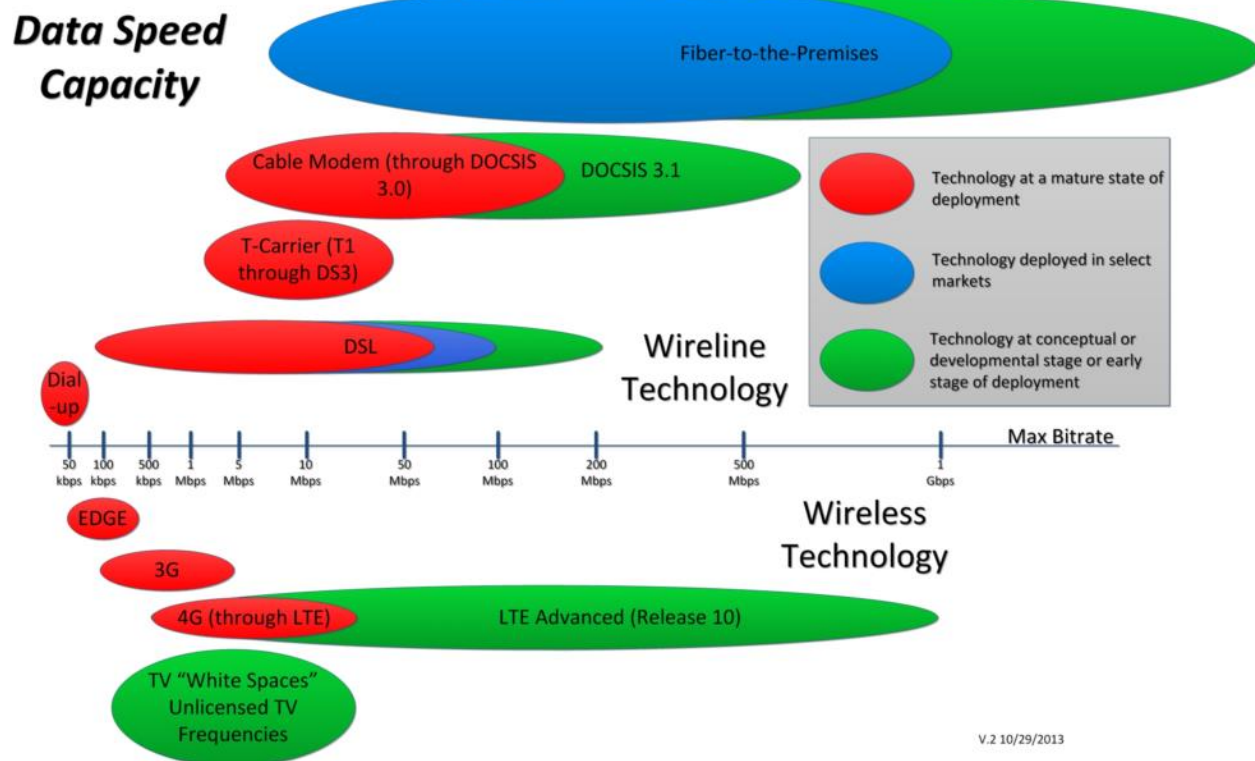
¹⁹ Availability is often confused with oversubscription to the Internet. Oversubscription applies to the Internet connection, whereas availability applies to the connection or transport between user locations or the access point to the Internet.

- *Connection Type:* This attribute describes how a connection is made with other locations. For example, on a cable modem or DSL service, all connections to other locations are made through the Internet with Internet addressing schemes. This includes any Virtual Private Networks (VPNs) set up between user locations. With higher end data services a user might be able to “route” traffic over the provider’s network without connecting to the Internet, set up direct point-to-point connections, or specify which locations will connect among each other (e.g., point-to-point or multipoint-to-multipoint).
- *Security:* Although security is primarily a function of encryption and other techniques applied by the user or the application sites accessed, traffic over a private network is inherently more secure than traffic on a network that establishes connectivity over the Internet. For example a cable modem or DSL user with multiple sites will transmit packets over the Internet to connect between sites. With a higher-end service such as Metro Ethernet connecting user sites, the transport would remain on the provider network. In addition, higher end services often have encryption options at the transport layer.
- *Port Rate:* Not all connections are equal. The network connection, drop, and customer premises equipment (CPE) will define the potential connection speed at the customer site. The port rate is the maximum speed that the demarcation point to the customer can support. For cable modem services this is defined by the incorporated standard²⁰ for adding data on a cable television system.

An example of the impact of capacity (Bytes) and speed (Mbps) for selected services and network architecture is shown in the figure below. As indicated, fiber-to-the-premises (FTTP) architecture offers far superior performance (capacity and speed) as compared to cable modem or DSL services.

²⁰ Data over cable service interface specification (DOCSIS) is an international standard that defines how broadband data transfer is accomplished over an existing cable television system.

Figure 15: Capacity and Speed of Broadband Technologies



4 Survey Methodology

To develop the appropriate data for this report, CTC conducted two surveys of the broadband market in Kansas—one of homes and one of businesses—in early 2013. This section summarizes the survey methodology.

4.1 Background and Objectives

The business and residential surveys were completed as part of a broader evaluation of Internet services used by community anchor institutions (CAIs), businesses, and homes across the State of Kansas. This survey and subsequent evaluations were sponsored by the Kansas Statewide Broadband Initiative²¹ (KSBI). KSBI is a partnership among the Kansas Department of Commerce, Kansas communities, government officials, the private sector, and the National Telecommunications and Information Administration (NTIA) to analyze the changing nature of our broadband footprint and to encourage economic growth in Kansas through greater use of the Internet and advanced communications networks.

The KSBI residential survey was designed to capture substantial information about Kansans' use of home Internet services, including:

- Availability of Internet services at homes
- Current Internet services and costs
- Internet use, importance, satisfaction, and opinions about service
- Use of the Internet for key activities including careers and education
- Opinions regarding the value of high-speed Internet services
- Other Internet-related communications uses such as mobile phone and video services
- Basic demographic information about residential broadband users

By assessing the current state of residential high-speed Internet services available across Kansas, KSBI hopes to identify ways in which the state may support improvements in those services to better meet the needs of its citizens.

4.2 Survey Process

This project required coordination between staff from the Kansas Department of Commerce and the consultants involved in managing the project. The Department of Commerce helped coordinate the overall project, defined the project objectives and schedule, coordinated activities, provided input into the questionnaire development, responded to questions by survey recipients, and reviewed preliminary study findings.

²¹ www.kansascommerce.com/index.aspx?NID=360

The Department of Commerce hired Columbia Telecommunications Corporation²² (CTC) to develop the Internet services studies and to manage all aspects of the project. CTC was responsible for all project communications, coordination, methodologies, and reporting of results.

In May 2013, survey booklets were mailed first-class to 6,700 randomly selected homes in Kansas. The survey packet included a postage-paid envelope in which to return responses directly to the survey processor. The sample selection was designed to provide at least 1,000 valid responses statewide and approximately 250 responses within each region. A response rate of 15 percent was assumed for planning purposes.

A total of 1,248 completed responses²³ were received by June 17, 2013 and are included in the survey analysis, providing a “gross” response rate of 18.6 percent.²⁴

Aggregate results across all responses are available with a confidence interval of ± 2.8 percent at the 95 percent probability level. That is, 19 times out of 20, the survey results would capture the actual values for all Kansas households within ± 2.8 percent.²⁵ Survey results for selected questions are also summarized at the regional level or within other sub-categories. A breakdown of response rates within each region and the corresponding confidence intervals are summarized as follows.

Table 7: Residential Survey Responses by Region

	<u>Mailed</u>	<u>Responses</u>	<u>Response Rate</u>	<u>Conf. Interval</u>
Region 1	1,636	307	18.8%	$\pm 5.6\%$
Region 2	1,705	329	19.3%	$\pm 5.4\%$
Region 3	1,747	328	18.8%	$\pm 5.4\%$
Region 4	1,612	281	17.4%	$\pm 5.8\%$
Total (Kansas)	6,700	1,245*	18.6%	$\pm 2.8\%$

* Three additional surveys were returned with identification information removed

Many of the results presented in this report include a breakout of responses by region for comparative purposes. Results within each subcategory should be evaluated using the confidence intervals noted in the previous table. In addition, survey responses are also broken into rural, urban, and other geographic categories as defined by the survey respondent. Since the total number of homes in each of these categories is unknown, confidence intervals cannot be determined for those subcategories. However, the comparisons provide valuable insight into the similarities or differences between homes located in different locations. Note that there is a

²² www.ctcnet.us

²³ At least 12 additional surveys were received after the cut-off date, and are not included in the results.

²⁴ Excluding 219 undeliverable survey packets, the “net” response rate was 19.3%

²⁵ Based on Census estimates of 1.11 million households in Kansas (approximately 282,000 per region).

correlation between regions and geographic categories. (See Figure 16 below for a mapped distribution of the respondents by geographic category, as defined by the respondents.)

Table 8: Geographic Categories of Regions

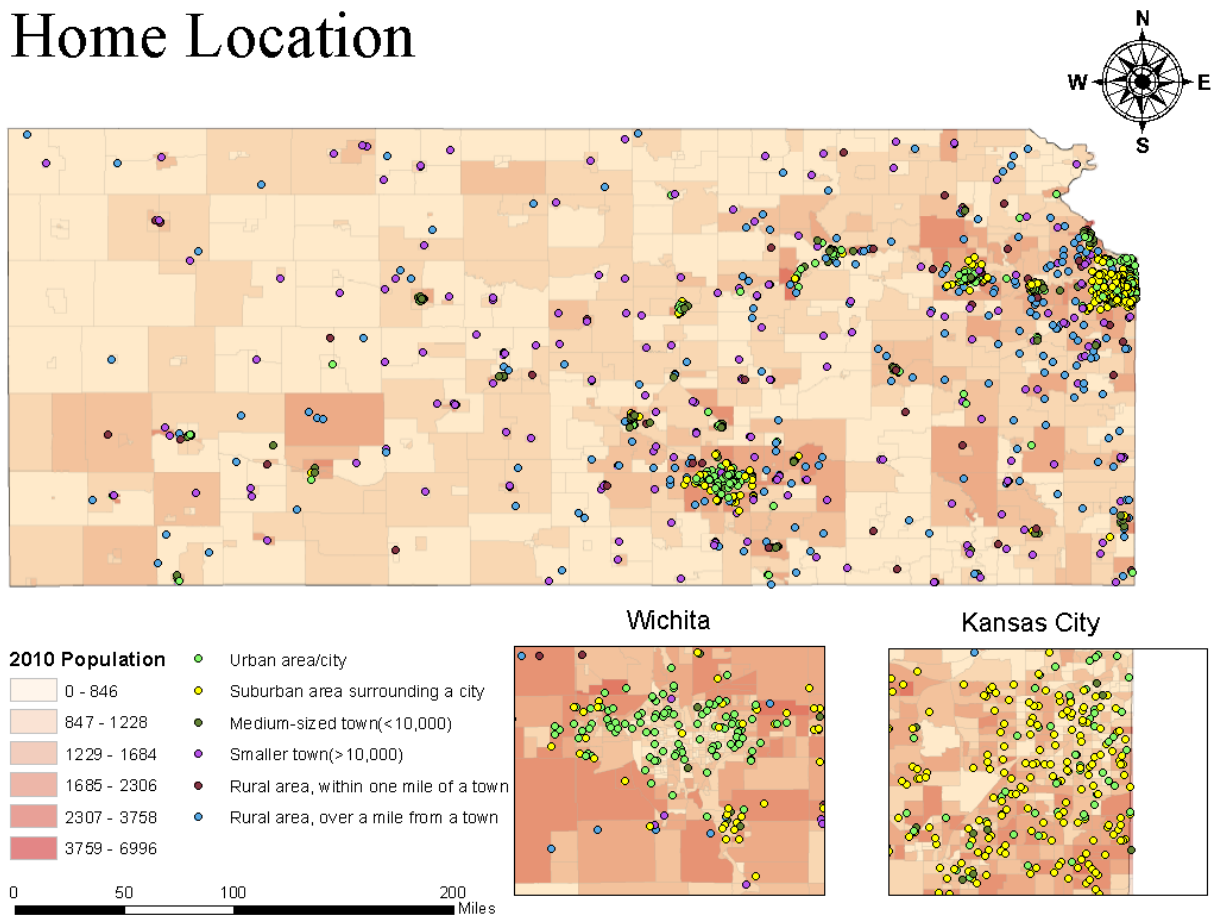
Geographic Category	Region			
	1 st	2 nd	3 rd	4 th
Rural area	23.6%	32.9%	2.9%	15.9%
Urban area/city	17.3%	22.9%	24.1%	42.7%
Suburban area surrounding a city	3.5%	8.4%	67.7%	15.9%
Medium-sized town (population more than 10,000)	24.0%	16.7%	3.3%	8.9%
Smaller town (population less than 10,000)	31.7%	19.1%	2.1%	16.6%
<i>Total</i>	<i>100.0%</i>	<i>100.0%</i>	<i>100.0%</i>	<i>100.0%</i>

Results of the residential survey are weighted by the age of the respondent such that the results reflect the Kansas population as a whole. As is typical in most mail and telephone surveys, older residents are more likely to respond than younger residents. To better correlate the survey results with the actual population of householders (heads of household) in Kansas, the following weights are applied to responses based on the age of the respondent:

State of Kansas - Age of Householder (2010 Census)				
	<u>Popl'n #</u>	<u>Popl'n %</u>	<u>Response %</u>	<u>Weight</u>
34 years & Younger	253,867	22.8%	12.6%	1.817
35 to 44 years	186,712	16.8%	14.5%	1.155
45 to 54 years	229,444	20.6%	20.9%	0.985
55 to 64 years	197,388	17.7%	25.0%	0.709
<u>65 years and over</u>	<u>244,685</u>	<u>22.0%</u>	<u>26.9%</u>	<u>0.817</u>
Total	1,112,096	100.0%	100.0%	

Figure 16: Map of Residential Responses by Geographic Category

Home Location



As shown in the previous table, 22.8 percent of the heads of household in Kansas were 34 years or younger, while only 12.6 percent of responses were received from persons in this age category. Responses submitted by persons in the youngest age cohort are weighted more heavily than respondents in other age categories. Similar adjustments are made for other age categories. In this manner, the survey results better match the actual population of households across the State of Kansas.

5 Residential Survey

In May 2013, a survey was mailed to 6,700 homes across Kansas soliciting information about their home Internet service, use of the Internet for various activities, satisfaction with Internet service options, and desire for enhanced Internet services. A total of 1,248 useable surveys were returned.

This attachment outlines the survey's key findings, followed by a detailed discussion of specific results.

5.1 Key Findings

Key findings from the residential survey include:

- Approximately 87 percent of Kansas homes have Internet service, with only 2 percent having dial-up connections.
- Approximately 63 percent of homes purchase mobile Internet data plans.
- One-third of homes with no home Internet service have mobile/cellular data plans.
- The 3rd region (including Kansas City, Kansas) has greater availability, and greater use, of Internet services than the other three regions.
- Eighty-five percent of homes with students report that their student uses the Internet for school work, including online research and accessing class assignments online.
- Over 60 percent of respondents had looked for a job online, and over 50 percent had applied for a job online.
- The most common uses of home Internet are online shopping and watching TV/movies. The most common use of mobile Internet is streaming music.
- Satisfaction levels for home and mobile Internet services are very similar.
- Fifteen percent of respondents telework and an additional 15 percent would like to telework. Only 2 percent were allowed to telework but couldn't due to slow Internet.
- Of those with a home-based business or planning to start a business, 70 percent state that high speed Internet is "very important" to their business.
- While rural areas have similar Internet service saturations as other locations, they have much higher levels of satellite, dial-up, and "other" connections.

The following sections discuss the survey objectives, process, and results. Statements referring to "Kansas households" refer to the 1,248 respondents, who are representative of the larger

population within the statistical parameters discussed previously. All of the results discussed in subsequent sections represent age-weighted data unless otherwise specified.

5.2 Home Internet Connection and Use

Questions were asked related to home Internet service types and providers, use of the Internet for various activities, and satisfaction and importance of features related to Internet service. This information provides valuable insight into residents' need for various Internet and related communications services.

5.2.1 Types of Non-Dial-Up Internet Service Available

Respondents were asked what types of Internet services, other than dial-up, were available for purchase at their home. The most frequently cited service types are cable modem, DSL, satellite, and cellular/mobile wireless, each mentioned by at least one-half of respondents. Another 18 percent said fixed wireless is available, and 10 percent said fiber optic is available. (See Figure 17.)

Figure 17: Types of Non-Dial-Up Internet Service Available

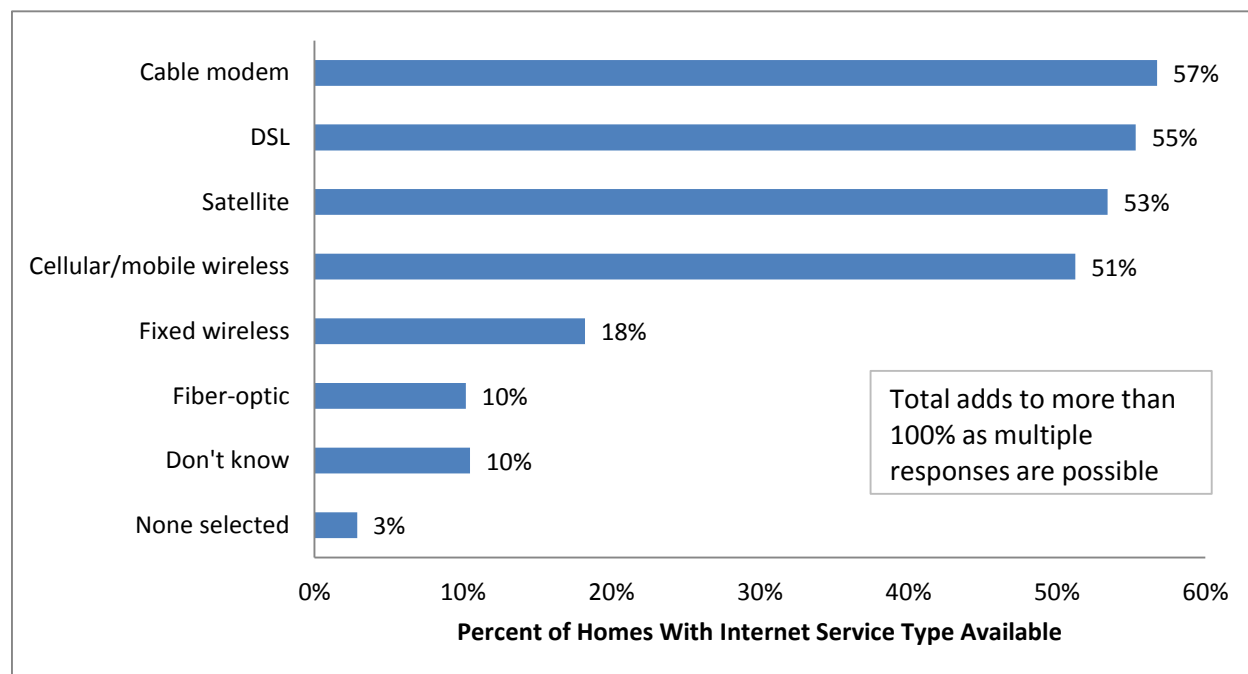


Figure 18: Non-Dial-Up Internet Service Available by Location

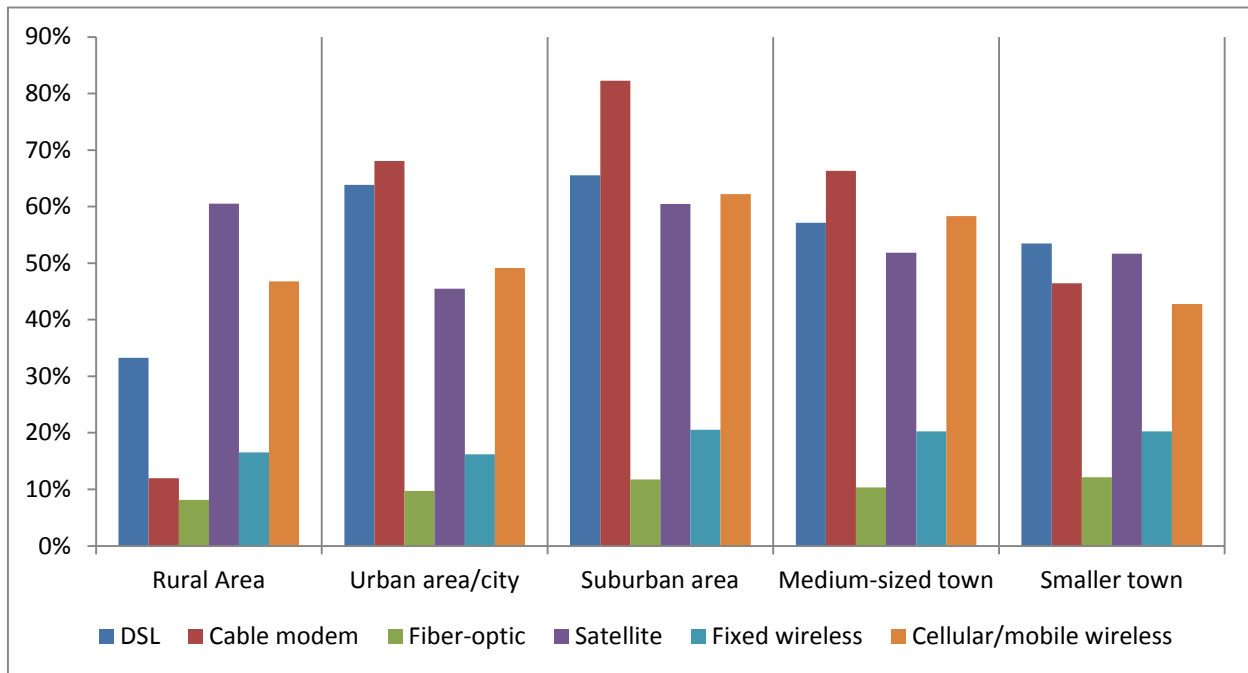
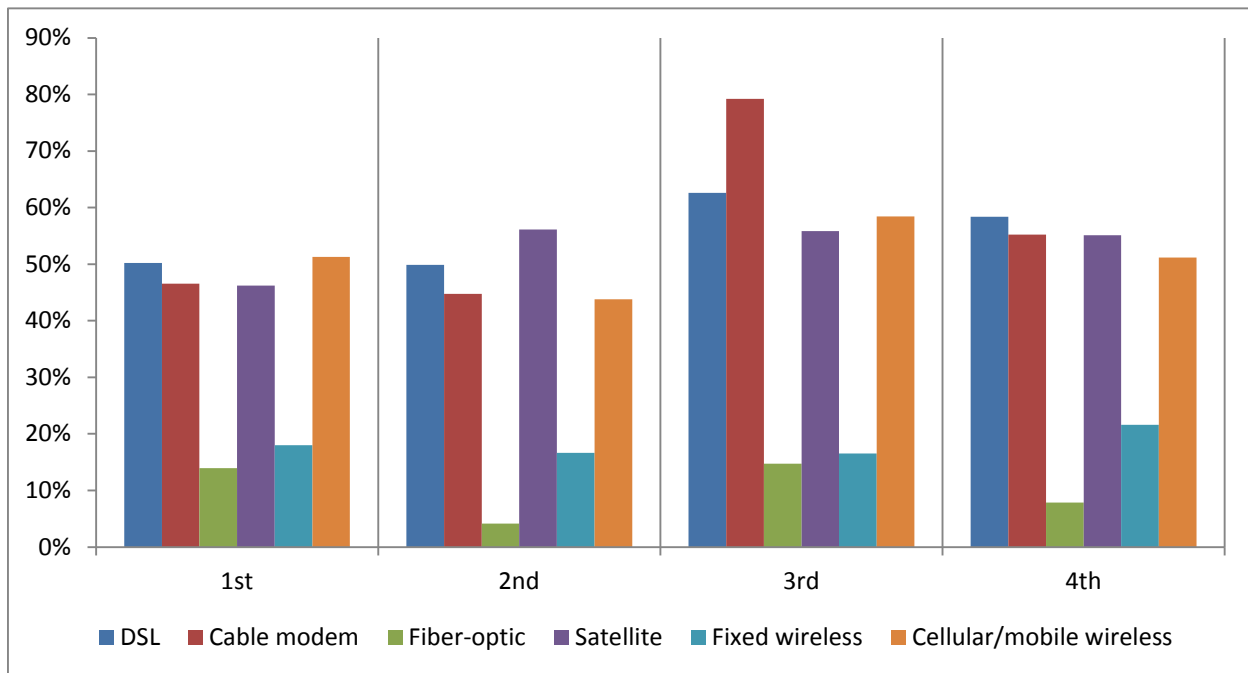


Figure 19: Non-Dial-Up Internet Service Available by Region



According to respondents, availability of DSL and cable modem Internet service is far less in rural areas, while the availability of satellite Internet service is somewhat greater than in urban areas. (See Figure 18.) Also, the availability of DSL and cable is greater in the 3rd region compared with other regions. (See Figure 19.)

5.2.2 Television Service

More than one-half of homes have cable television service, 28 percent have satellite television service, and 17 percent have neither. (See Figure 20.) Subscription to cable television service is higher in the 3rd region, which has a higher concentration of suburban areas. Those in rural areas and small towns are more likely to have satellite television service than those living in more populated areas. (See Table 9.)

Figure 20: Purchase Cable or Satellite Television Service at Home

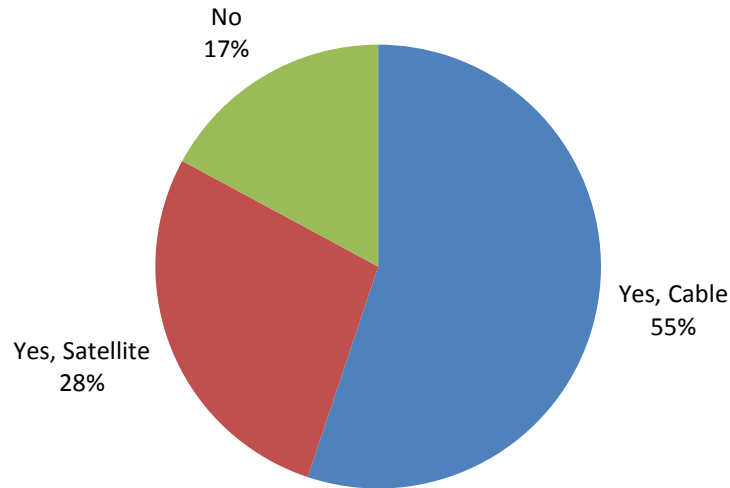


Table 9: Type of Television Service by Region and Location

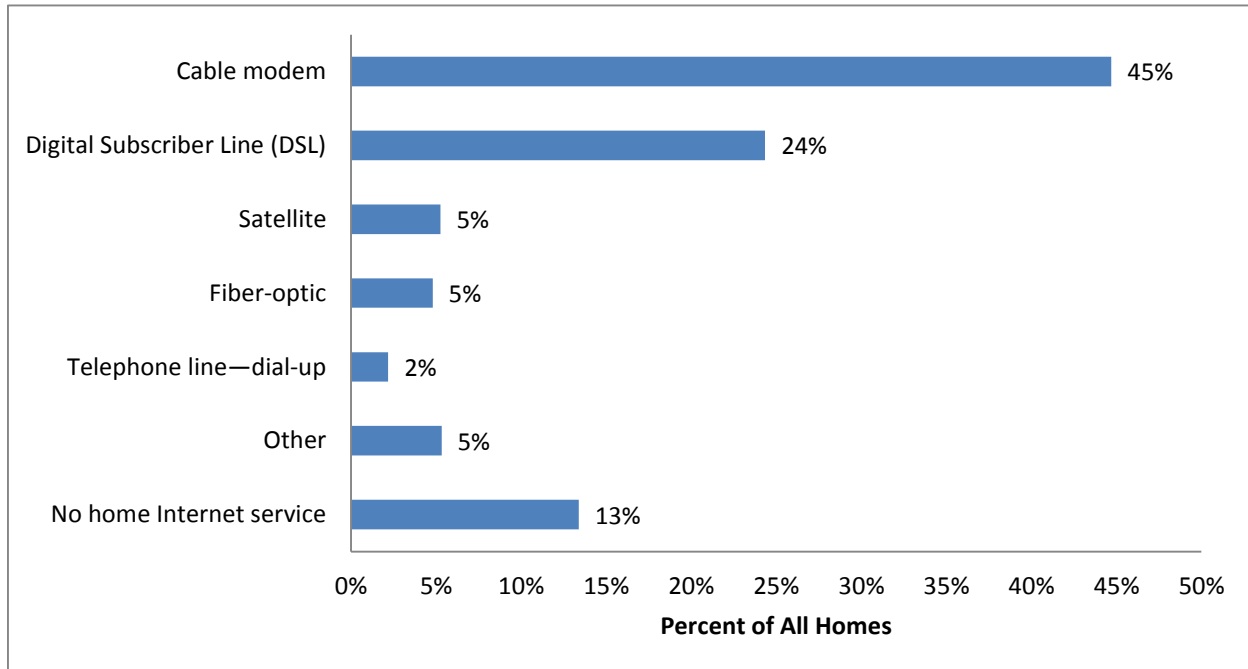
		Purchase Cable or Satellite Television			
		Cable	Satellite	Neither	Total
Region	1 st	50%	36%	14%	100%
	2 nd	47%	34%	20%	100%
	3 rd	71%	15%	14%	100%
	4 th	52%	27%	21%	100%
Location	Rural Area	20%	57%	23%	100%
	Urban area/city	66%	18%	16%	100%
	Suburban area surrounding a city	75%	12%	13%	100%
	Medium-sized town (popl'n > 10,000)	45%	41%	14%	100%
	Smaller town (popl'n < 10,000)	59%	19%	22%	100%

Percentages are to be read across rows e.g. 50% of respondents in region 1 have cable television service, 36% have satellite, and 14% have neither. Read down columns to compare responses by demographic groups, e.g. 71% of respondents in region 3 have cable television service, compared with 50% in region 1, 47% in region 2, and 52% in region 4.

5.2.3 Home Internet Service

Approximately 87 percent of homes have home Internet service, including 45 percent with a cable modem connection and 24 percent with DSL. (See Figure 21.) Smaller shares of homes have satellite, fiber optic, dial-up, or another type of connection. See Section 5.4.2 for more information about home versus mobile Internet use across demographic groups.

Figure 21: Primary Home Internet Service



As Figure 22 indicates, those in the 3rd region (61 percent) are more likely than those in the 1st region (37 percent), 2nd region (35 percent), and 4th region (45 percent) to have a cable modem connection. Similarly, homes in suburban areas (which are mostly in the 3rd region) are more likely to have a cable modem connection. (See Figure 23.) Homes in rural areas are more likely than those in more populated areas to have dial-up or a satellite Internet connection. Figure 24 shows a mapped distribution of home Internet service by technology type.

Figure 22: Primary Home Internet Service by Region

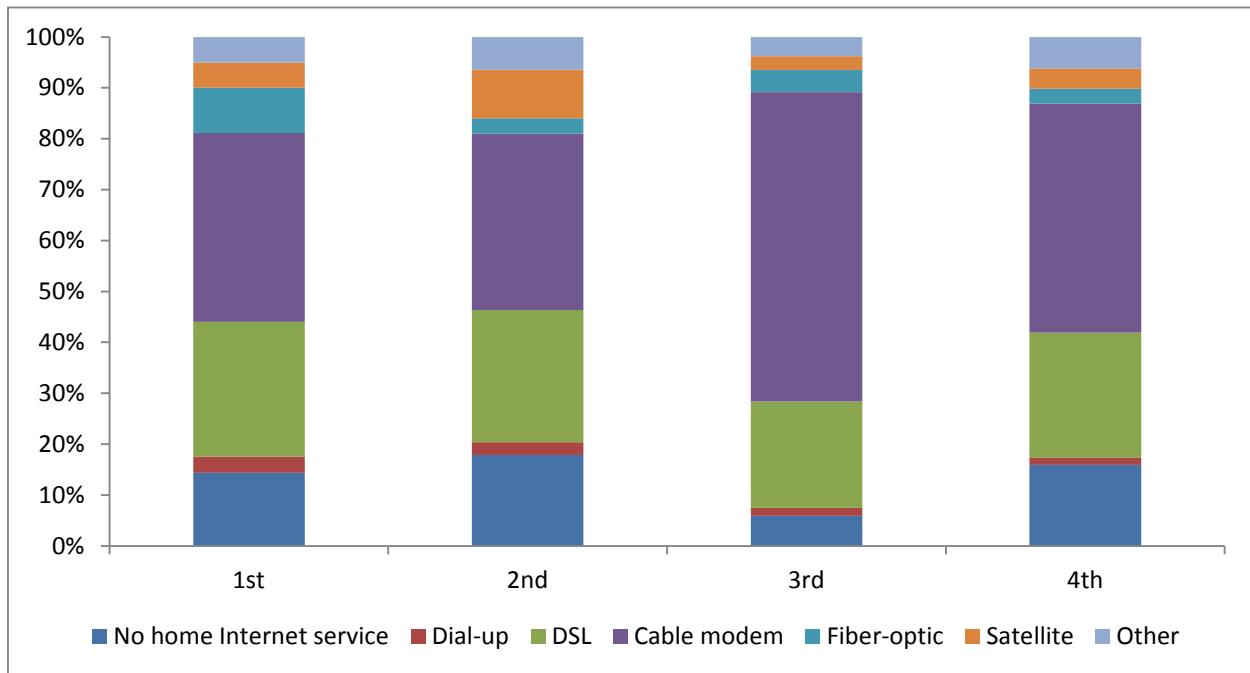


Figure 23: Primary Home Internet Service by Geographic Category

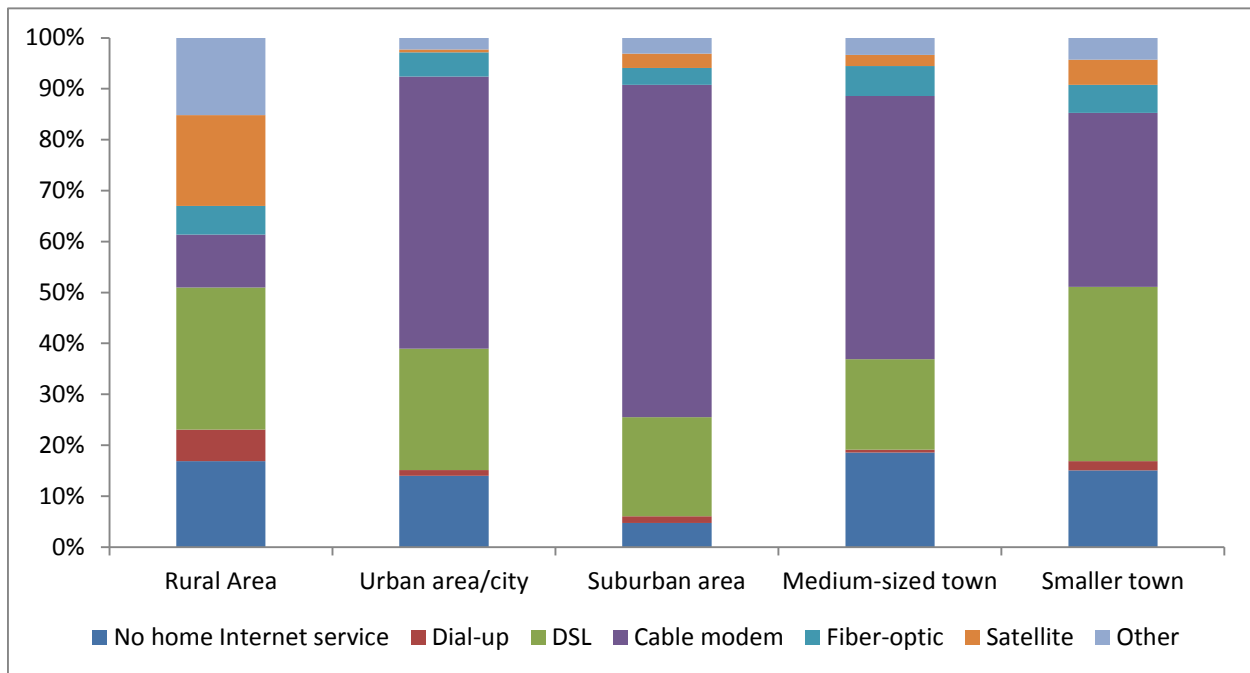
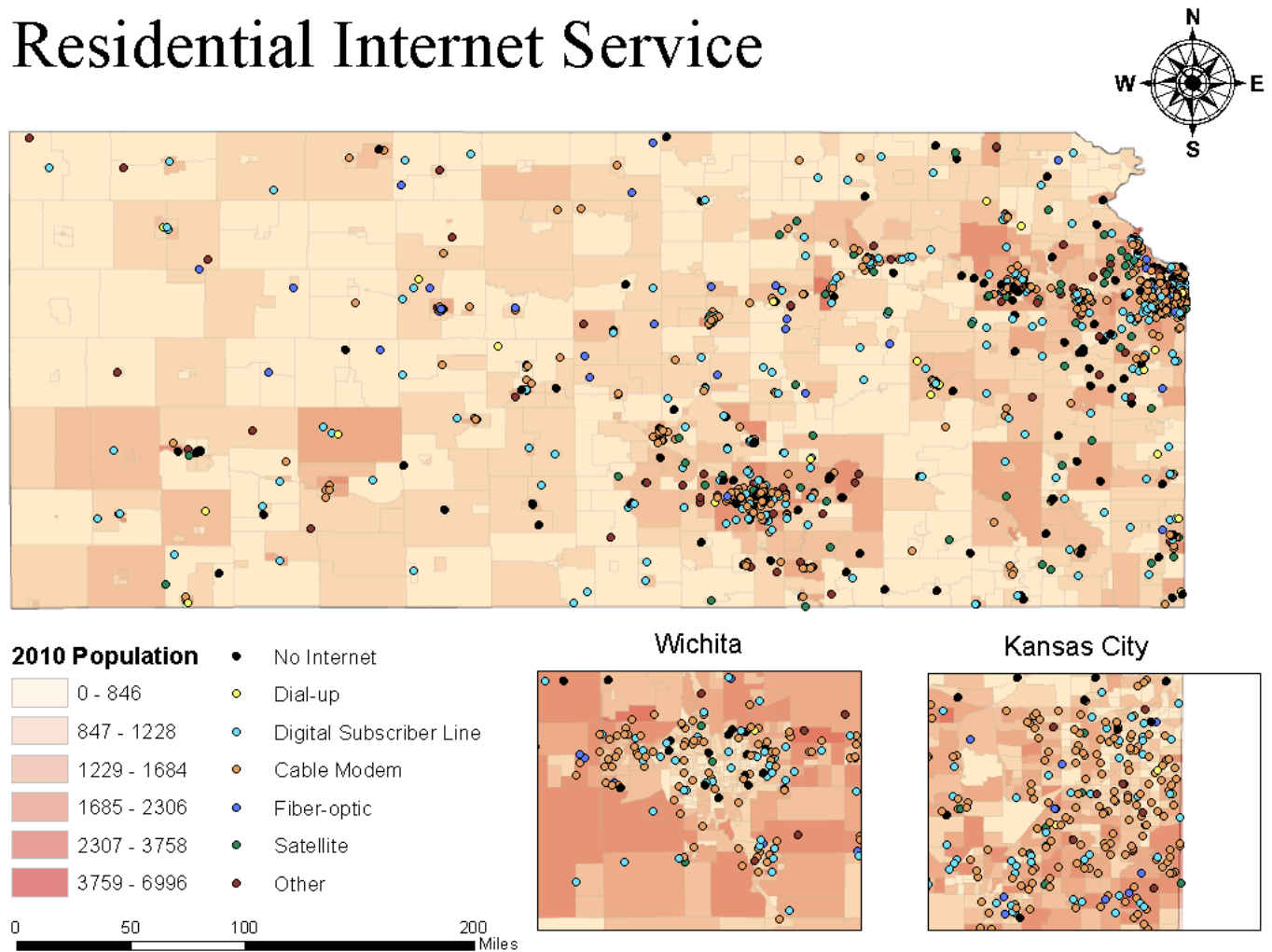


Figure 24: Map of Responses by Primary Home Internet Technology

Residential Internet Service



5.2.4 Cost of Home Internet Service

Most of those with home Internet service pay \$20 to 59 per month for their service. (See Figure 25.) The estimated average monthly cost is \$49. (See Figure 26.) The average cost is highest for satellite and lowest for dial-up, although some of these estimates are based on a relatively small number of responses.

Figure 25: Average Monthly Cost of Home Internet Service

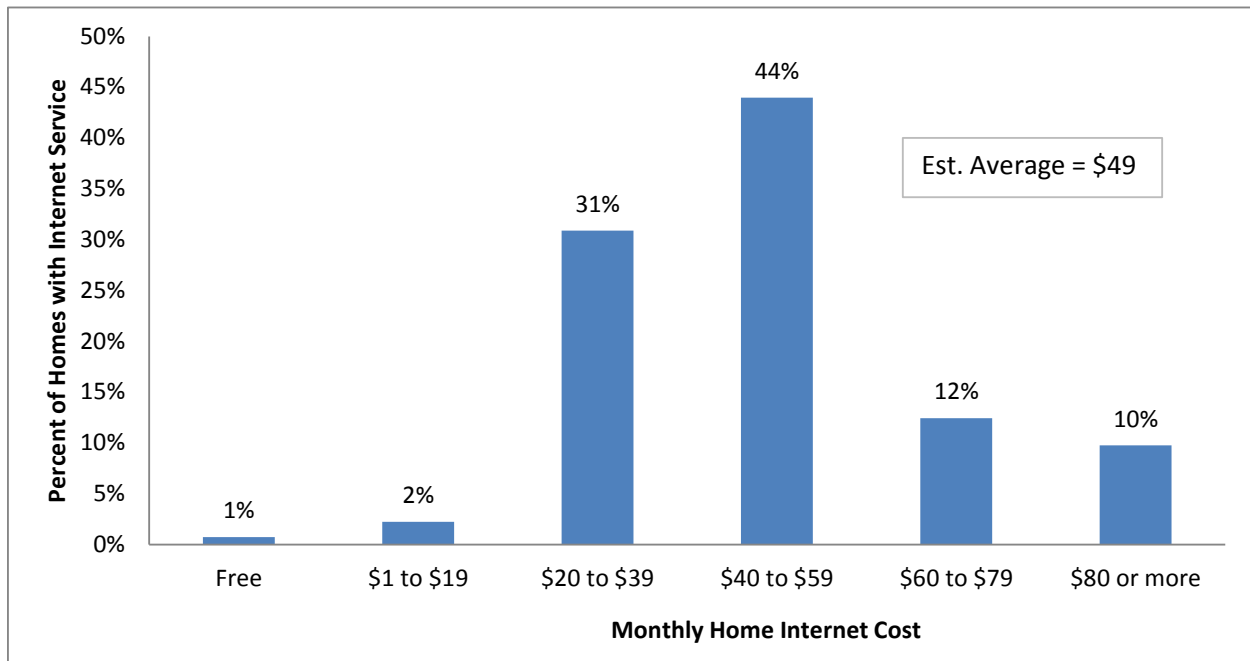
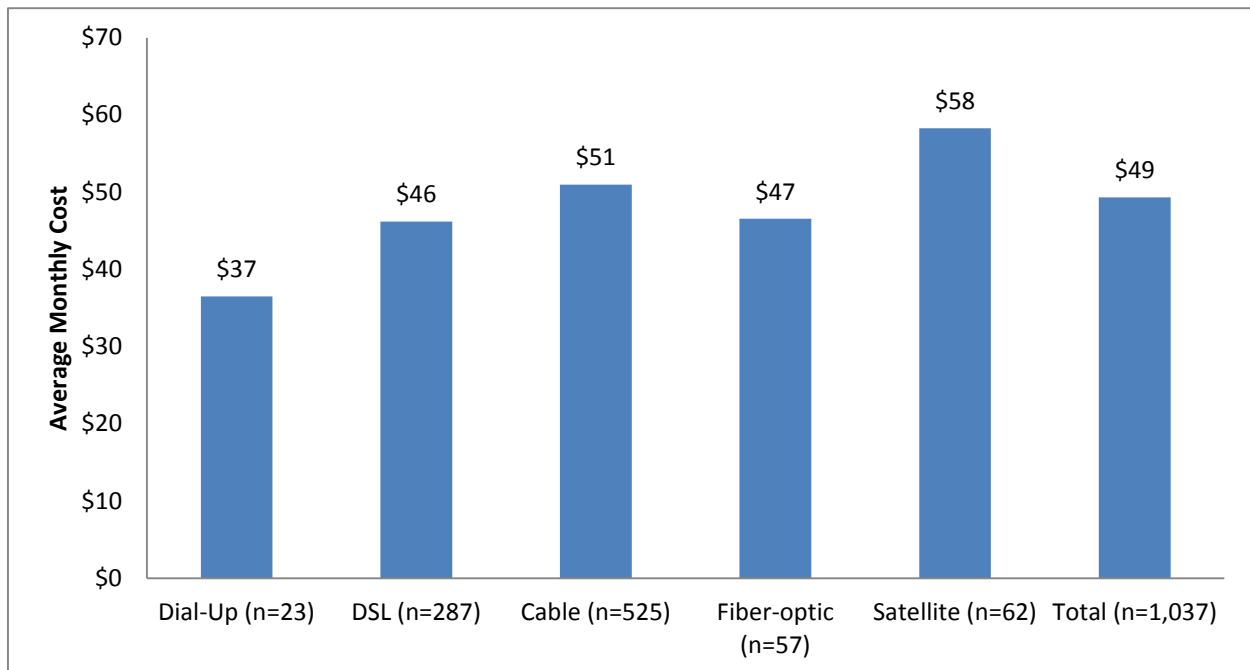


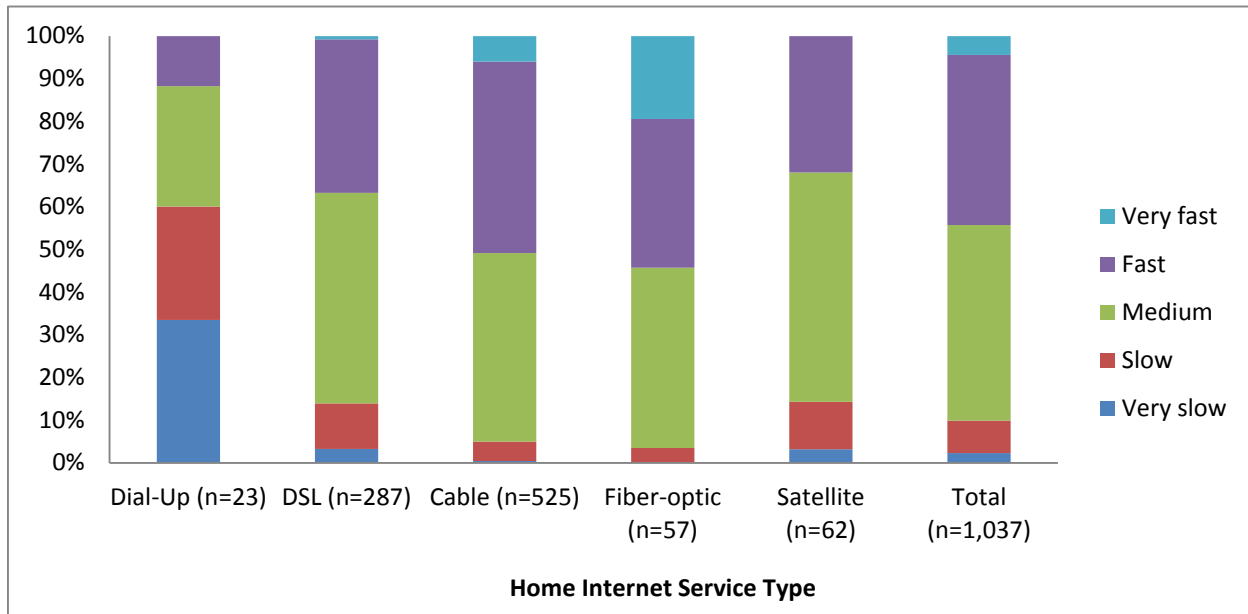
Figure 26: Average Monthly Cost of Home Internet Service by Connection



5.2.5 Connection Speed

Just one in 10 respondents with home Internet access reported their connection to be slow or very slow. (See Figure 27.) Another 46 percent said it is medium, 40 percent said it is fast, and 4 percent said it is very fast. Although based on a relatively small number of cases for some types of connection, it appears that fiber optic is considered to be the fastest connection, followed by cable, DSL or satellite, and dial-up.

Figure 27: Speed of Home Internet Connection by Connection Type



5.2.6 Number of Users

Respondents were asked the number of people in the household who use the home Internet connection. Most homes have multiple users, with just 17 percent reporting one user in the household. (See Table 10.) This is highly correlated with the number of people in the household, with most responding that all household members use the Internet connection. About one-third of households with three or more members reported a smaller number of people in the household using the home Internet connection (presumably, young children are not Internet users).

Table 10: Number of People in Household Using Home Internet Connection

		Number of People in Household				Total Households
		One	Two	Three	Four or more	
Number of People Using Home Internet Connection	One	95%	14%	0%	0%	17%
	Two	3%	82%	32%	15%	45%
	Three	2%	4%	62%	19%	18%
	Four or more	0%	1%	6%	66%	20%
	Total	100%	100%	100%	100%	100%

Assumes non-permanent household member uses the home's Internet connection.

5.2.7 Video Gaming

More than one-half of respondents with home Internet access reporting having a video gaming console, including one-third (32 percent) who connect it to the Internet. (See Figure 28.) Younger individuals, those with children in the household, and those with higher levels of income were more likely to have an Internet-connected video gaming console. Those residing in

suburban areas, which are heavily concentrated in the 3rd region, are somewhat more likely to have an Internet-connected video gaming console. (See Table 11.)

Figure 28: Own a Video Gaming Console

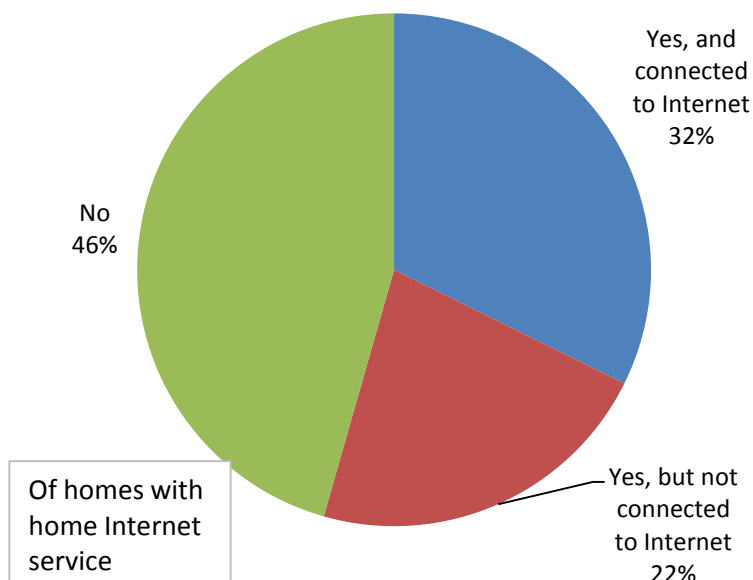


Table 11: Use of Video Gaming Consoles by Location

		Have Video Gaming Console			Total
		Yes, Internet Connected	Yes, Not Internet Connected	No, Do Not Have	
Region	1 st	29%	25%	47%	100%
	2 nd	28%	24%	48%	100%
	3 rd	39%	19%	42%	100%
	4 th	33%	22%	45%	100%
Location	Rural Area	27%	23%	50%	100%
	Urban area/city	33%	22%	44%	100%
	Suburban area surrounding a city	40%	18%	42%	100%
	Medium-sized town (popl'n > 10,000)	28%	26%	46%	100%
	Smaller town (popl'n < 10,000)	27%	24%	49%	100%

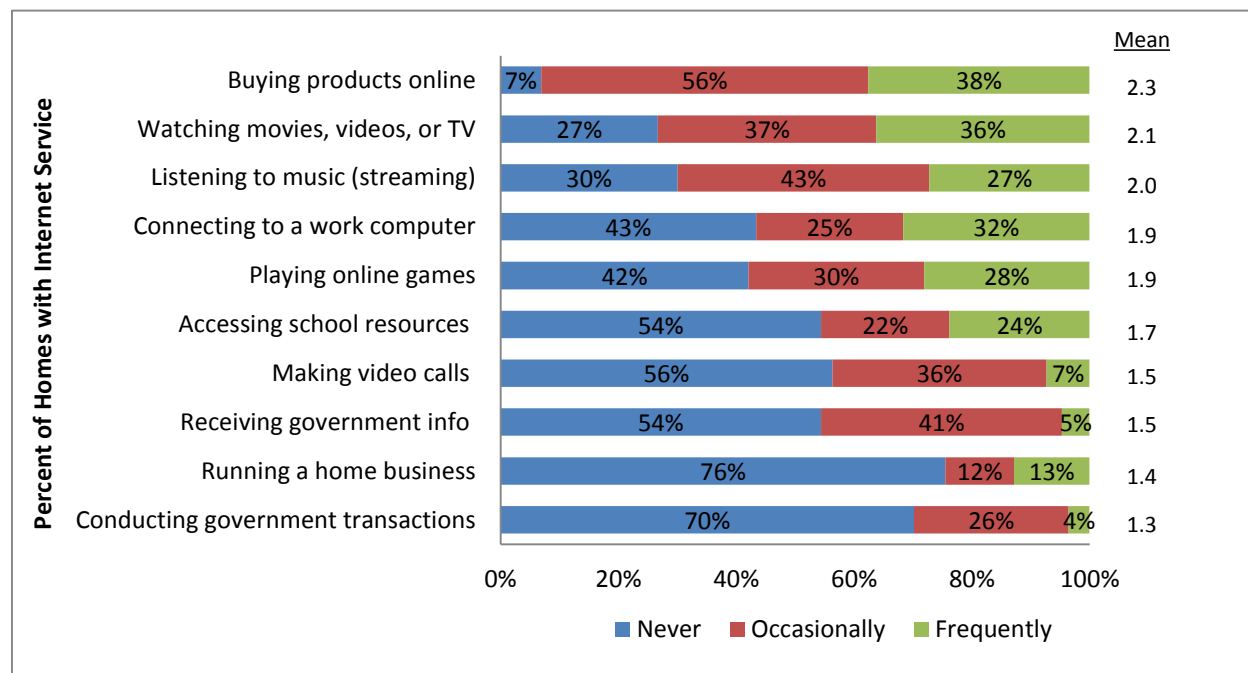
Percentages are to be read across rows e.g. 29% of respondents in region 1 have a video gaming console that is connected to the Internet, 25% have a video gaming console that is not connected to the Internet, and 47% do not have a video gaming console. Read down columns to compare responses by demographic groups, e.g. 40% of respondents in region 3 have a video gaming console that is connected to the Internet, compared with 33% in region 1, 28% in region 2, and 27% in region 4.

5.2.8 Uses of Home Internet

The most common use of home Internet connections, among those evaluated, is buying products online, followed by watching movies, videos, or TV and listening to music (streaming). (See Figure 29.) Also, more than one-half use it for connecting to a work computer or playing online games at least occasionally. Just under one-half use a home Internet connection at least

occasionally for accessing school resources, making video calls, or receiving government information. Fewer use it for running a home business or conducting government transactions.

Figure 29: Uses of Home Internet Connection



In general, younger respondents were more likely to report someone in the household using their home Internet for a variety of entertainment and other purposes. (See Table 12.) Specifically, the frequency of using the Internet for listening to music (streaming) or watching movies, videos, or TV tends to decrease as age increases. The majority of respondents ages 18 to 34 reported a household member using their home Internet for these purposes. Older adults are much less likely to use their home Internet for connecting to a work computer or accessing school resources, as these activities are likely not applicable to them.

Table 12: Uses of Home Internet Connection by Age of Respondent

		Age of Respondent				
		18 to 34 years	35 to 44 years	45 to 54 years	55 to 64 years	65 years and older
Listening to music (streaming)	Never	11%	18%	25%	45%	58%
	Occasionally	46%	46%	44%	42%	34%
	Frequently	43%	36%	31%	13%	8%
Watching movies, videos, or TV	Never	9%	10%	24%	42%	55%
	Occasionally	32%	43%	42%	38%	28%
	Frequently	59%	46%	33%	20%	18%
Playing online games	Never	40%	22%	42%	56%	52%
	Occasionally	31%	40%	29%	23%	26%
	Frequently	29%	38%	29%	22%	23%
Connecting to a work computer	Never	36%	31%	36%	49%	69%
	Occasionally	33%	29%	22%	27%	12%
	Frequently	32%	40%	42%	24%	18%
Making video calls (Skype, etc.)	Never	46%	51%	56%	59%	71%
	Occasionally	43%	39%	37%	36%	26%
	Frequently	11%	10%	7%	5%	3%
Running a home business	Never	83%	75%	71%	70%	80%
	Occasionally	8%	13%	16%	12%	8%
	Frequently	9%	12%	13%	19%	12%
Receiving government info such as service locations or contact info	Never	64%	57%	53%	47%	49%
	Occasionally	33%	37%	43%	46%	47%
	Frequently	3%	6%	5%	7%	4%
Conducting government transactions such as permit payments	Never	74%	67%	67%	66%	78%
	Occasionally	23%	28%	30%	28%	21%
	Frequently	2%	5%	4%	6%	1%
Buying products online	Never	2%	4%	8%	7%	15%
	Occasionally	51%	53%	53%	60%	61%
	Frequently	47%	43%	39%	33%	25%
Accessing school resources (for parents of school-aged children)	Never	45%	22%	45%	77%	89%
	Occasionally	29%	33%	22%	14%	8%
	Frequently	26%	46%	33%	9%	2%

Percentages are to be read down columns, e.g. 11% of respondents ages 18-34 never use their home Internet for listening to music (streaming), 46% use it occasionally, and 43% use it frequently for this purpose. Read across rows to compare percentages by demographic groups, e.g. 55% of those ages 65+ never use their home Internet for watching movies, videos, or TV, compared with just 9% of those ages 18-34.

5.2.9 Importance and Satisfaction with Home Internet Service Aspects

Customers were asked to rate their level of satisfaction (using a scale where 1=Very Dissatisfied and 5=Very Satisfied) with various aspects of their Internet service, along with the importance (using a scale where 1=Not at All Important and 5=Very Important) of those factors.

Overall, the most **important** service aspects are connection reliability (73 percent Very Important; 4.7 mean) and cost (68 percent Very Important; 4.6 mean), followed by speed (55 percent Very Important; 4.4 mean), technical support service (53 percent Very Important; 4.3 mean), billing and account service (31 percent Very Important; 4.0 mean), and clarity of bills (31 percent Very Important, 3.9 mean). (See Table 13.)

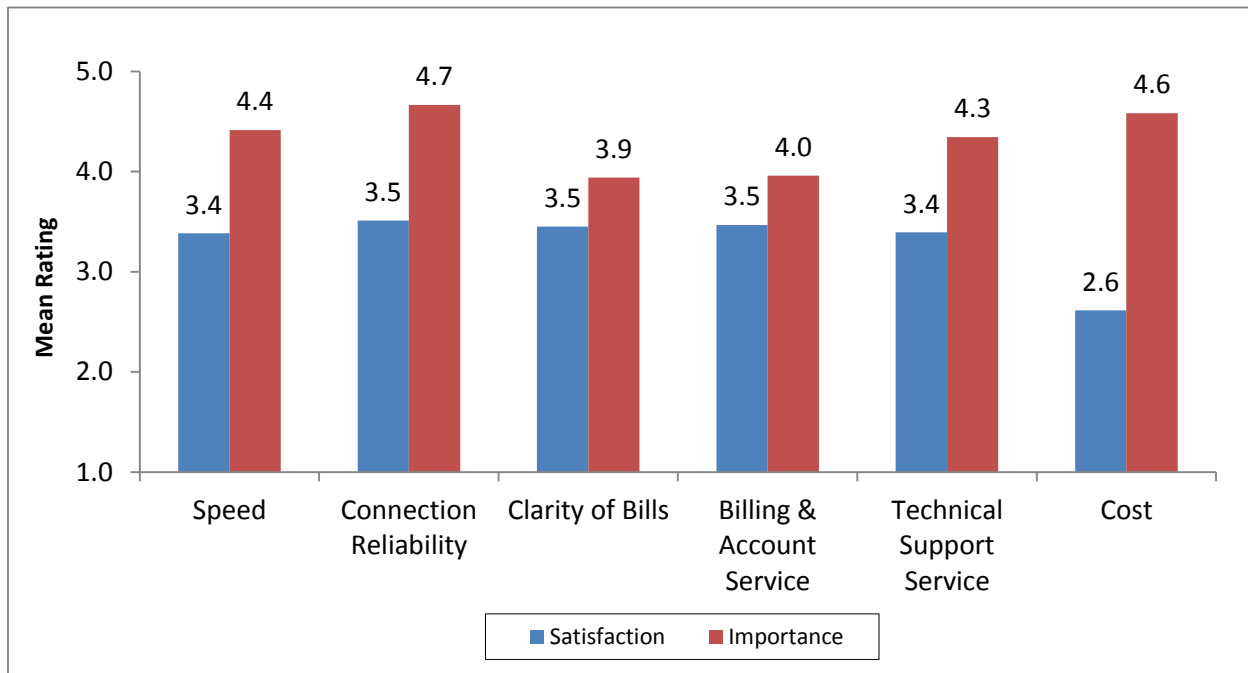
Most home Internet users appear to be moderately satisfied with most aspects of their Internet service, although there is some room for improvement. (See Table 13.) Home Internet users appear to be less satisfied with cost of service compared with other aspects, which is a common finding.

Table 13: Importance and Satisfaction with Home Internet Service Aspects

		Speed	Connection Reliability	Clarity of Bills	Billing & Account Service	Technical Support Service	Cost
Importance	1-Not at All Important	0%	0%	1%	1%	1%	0%
	2	1%	0%	4%	3%	2%	1%
	3	11%	5%	27%	26%	13%	7%
	4	33%	22%	37%	39%	32%	25%
	5-Very Important	55%	73%	31%	31%	53%	68%
	<i>Mean</i>	<i>4.4</i>	<i>4.7</i>	<i>3.9</i>	<i>4.0</i>	<i>4.3</i>	<i>4.6</i>
Satisfaction	1-Very Dissatisfied	4%	4%	4%	4%	5%	16%
	2	11%	12%	13%	11%	13%	31%
	3	37%	30%	33%	35%	35%	33%
	4	37%	39%	34%	33%	32%	15%
	5-Very Satisfied	11%	16%	16%	17%	15%	5%
	<i>Mean</i>	<i>3.4</i>	<i>3.5</i>	<i>3.5</i>	<i>3.5</i>	<i>3.4</i>	<i>2.6</i>

Gap Analysis: Although most Internet users are satisfied overall, assessing the **gaps** between **importance** and **satisfaction** can help identify what features might need improvement. (See Figure 30.) The results suggest that customers are only moderately satisfied with the most important aspects of service. There is a sizeable “service gap” (difference between importance and satisfaction) with all aspects of home Internet service.

Figure 30: Evaluation of Home Internet Service



The gaps for these aspects are partially driven by the relatively high importance placed on most of these aspects by respondents. At the same time, these gaps identify aspects where Internet service can be improved in Kansas. In addition to cost for service (it is typical for price to have a large gap compared with other items), the largest gap occurs for connection reliability. The clarity of bills and billing/account service aspects received somewhat lower importance ratings, and therefore are performing better in terms of meeting expectations compared with other service areas (i.e. have a smaller service gap between importance and satisfaction). (See Table 14.)

Table 14: Gap Between Satisfaction and Importance Ratings for Home Internet Service

	Mean Satisfaction	Mean Importance	GAP < = >	Significance
Speed	3.4	4.4	-1.0	Expectations not met
Connection Reliability	3.5	4.7	-1.2	Expectations not met
Clarity of Bills	3.5	3.9	-0.5	Expectations not met
Billing & Account Service	3.5	4.0	-0.5	Expectations not met
Technical Support Service	3.4	4.3	-1.0	Expectations not met
Cost	2.6	4.6	-2.0	Expectations not met

Internet service aspects are considered "under-performers" in the regard that satisfaction scores are lower than importance scores. Kansas residents are only moderately satisfied with aspects deemed as somewhat to very important to Internet customers.

The satisfaction with various Internet aspects was also evaluated by major connection type. Cable modem users are generally more satisfied with connection speed and reliability, but less satisfied with cost compared with DSL users. (See Figure 31 and Table 15.)

Figure 31: Satisfaction with Home Internet Service by Service Type

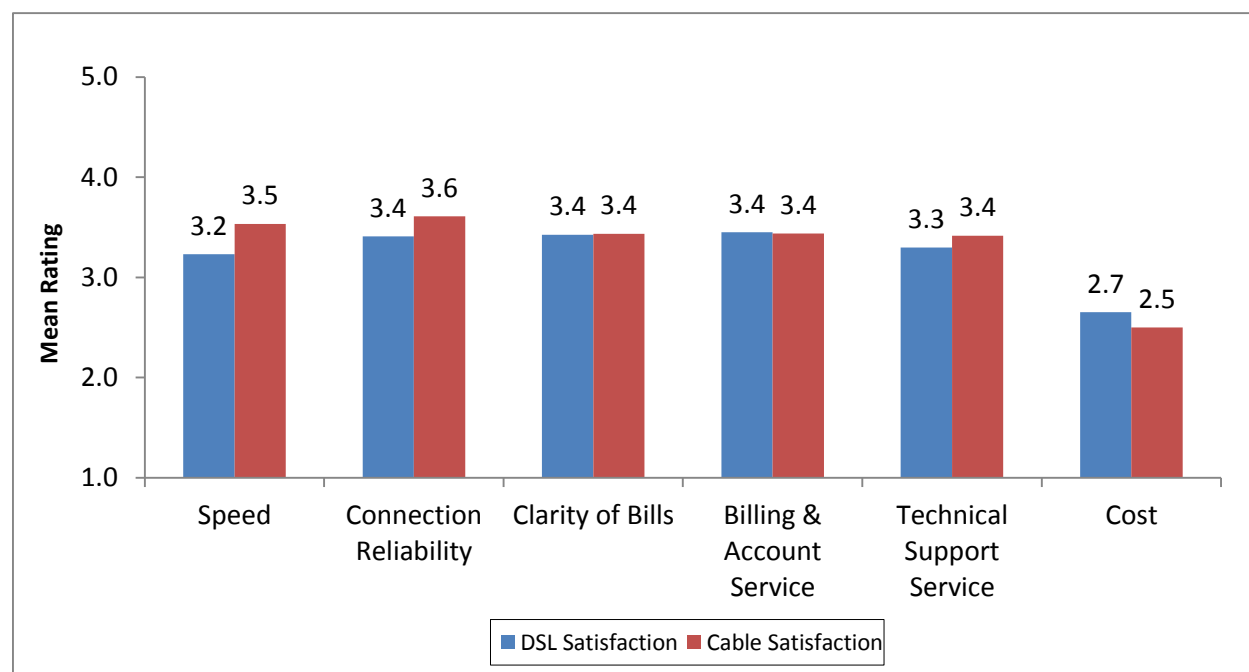


Table 15: Mean Importance and Satisfaction Ratings by Home Internet Connection Type

	Importance			Satisfaction			Gap (Satisfaction - Importance)		
	DSL	Cable	Total	DSL	Cable	Total	DSL	Cable	Total
Connection Speed	4.4	4.4	4.4	3.2	3.5	3.4	-1.2	-0.9	-1.0
Connection Reliability	4.6	4.7	4.7	3.4	3.6	3.5	-1.2	-1.1	-1.2
Clarity of Bills	4.0	3.9	3.9	3.4	3.4	3.5	-0.5	-0.5	-0.5
Billing/Account Service	3.9	4.0	4.0	3.4	3.4	3.5	-0.5	-0.5	-0.5
Tech Support Service	4.3	4.3	4.3	3.3	3.4	3.4	-1.0	-0.9	-1.0
Cost	4.6	4.6	4.6	2.7	2.5	2.6	-1.9	-2.1	-2.0

Mean Importance ratings based on a scale where 1=Not at All Important and 5=Very Important. Mean Satisfaction ratings based on a scale where 1=Very Dissatisfied and 5=Very Satisfied.

5.3 Homes with No Internet Service

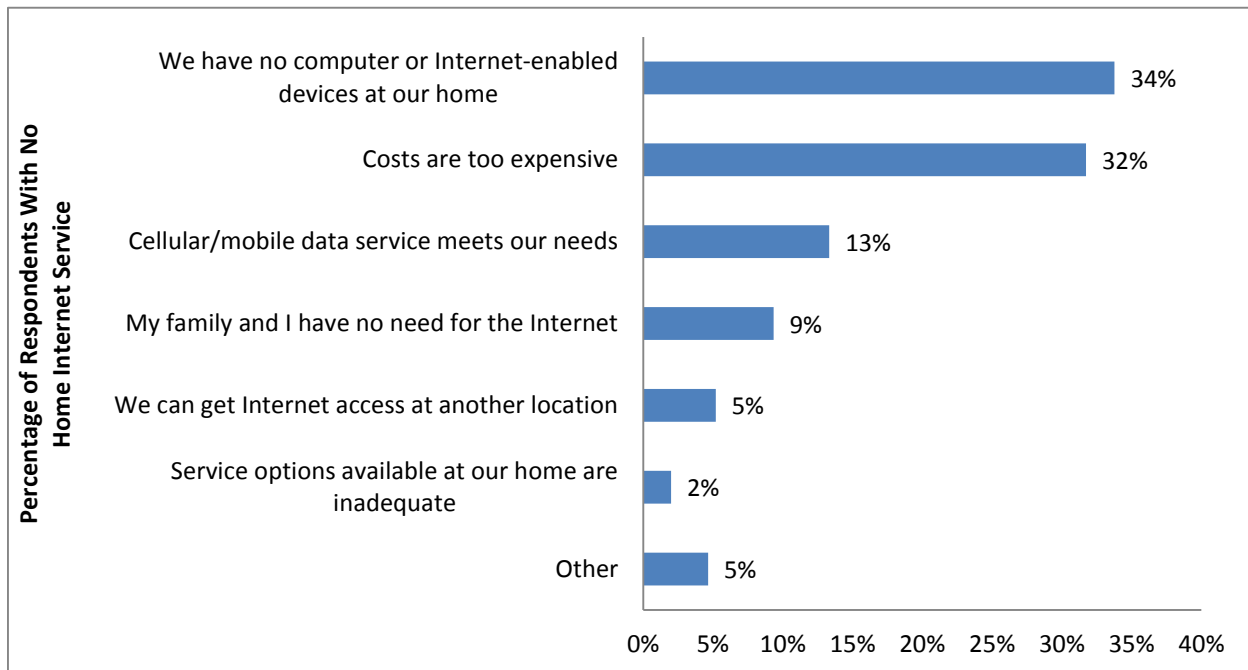
Those with no home Internet access (13 percent of households) were asked a few questions about why they do not have home Internet service, their awareness of low-cost Internet services, and whether they have an Internet-enabled device in the home.

5.3.1 Main Reason for Not Purchasing Home Internet Service

Respondents were asked to name the main reason for not purchasing any home Internet service. The top reasons cited were not having a computer or Internet-enabled device in the home (34 percent) and costs are too expensive (32 percent), selected by more than twice as many as any other reason. (See Figure 32.)

Those without an Internet-enabled device in the home were most likely to cite this as a reason for not purchasing home Internet service (66 percent). Those with an Internet-enabled device in the home were most likely to cite the cost as a factor for not having home Internet service (55 percent), followed by having a cellular or mobile data service that meets their needs (24 percent).

Figure 32: Main Reason for Not Purchasing Home Internet Service

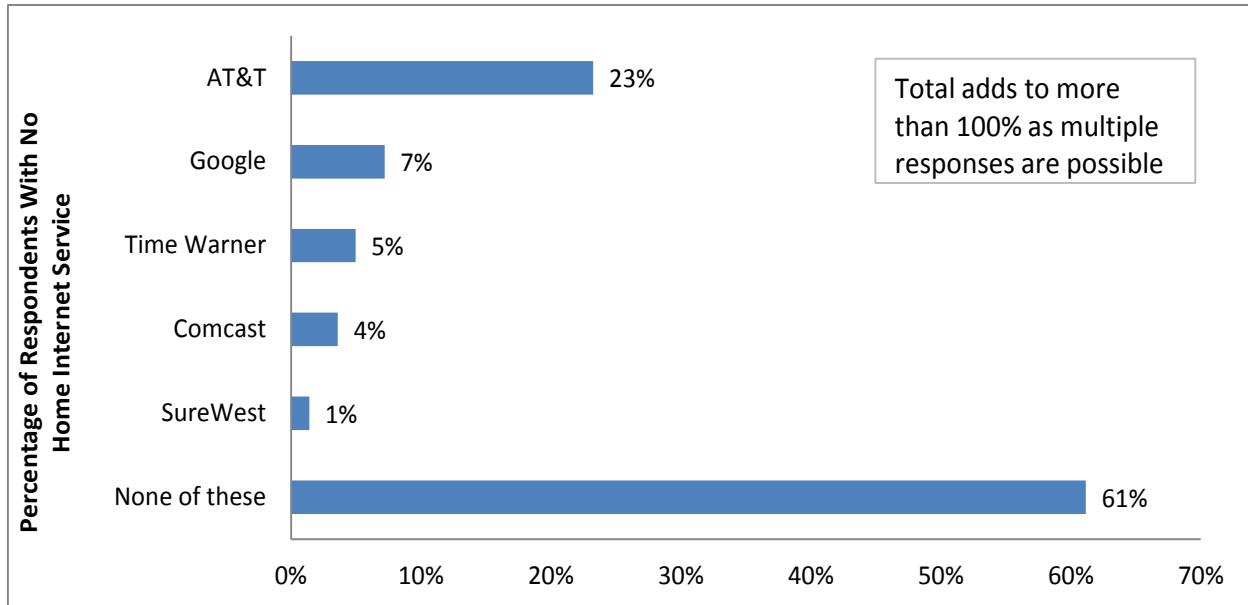


5.3.2 Awareness of Low-Cost Providers

Those without home Internet service were asked if they were aware of various Internet service providers that offer low-cost Internet service to qualifying customers. Most non-users of home Internet were not aware of these low-cost Internet services (63 percent), although nearly one-

fourth had heard about low-cost service options provided through AT&T. (See Figure 33.) Awareness of low-cost Internet services does not vary significantly by location or other key demographic variables.

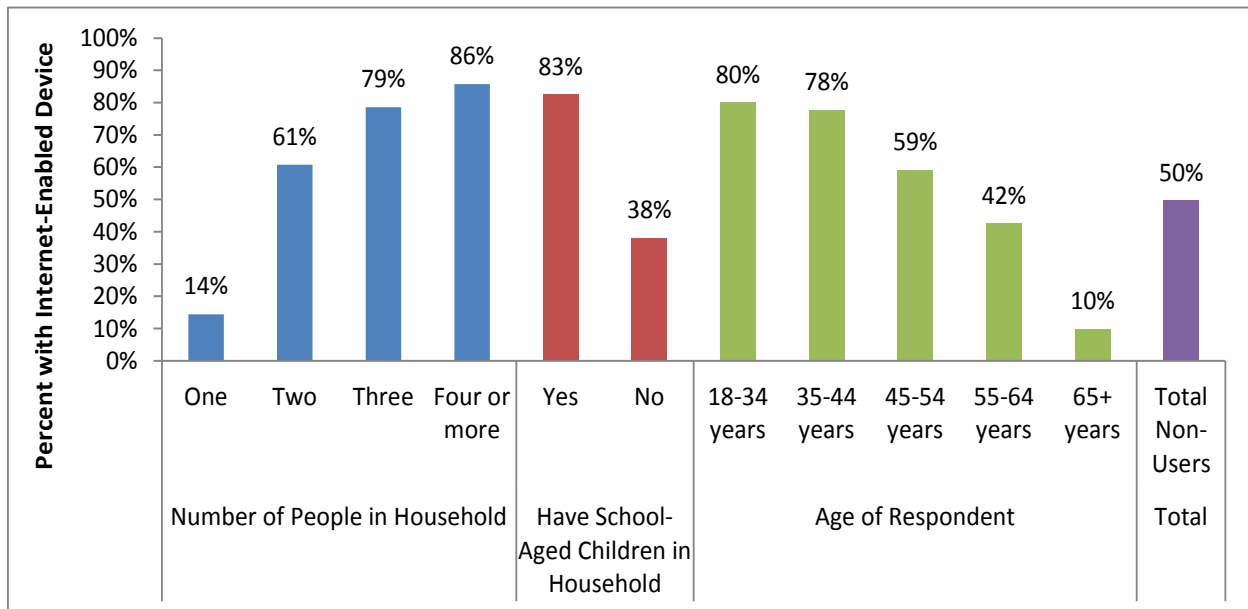
Figure 33: Awareness of Low-Cost Internet Service Providers



5.3.3 Internet-Enabled Devices

One-half of those without home Internet access have an Internet-enabled device in the home. (See Figure 34.) Saturation is higher for those with multiple people in the household, including those with school-aged children, and for those under age 65. Not having an Internet-enabled device was a key reason cited for not having home Internet service.

Figure 34: Have a Computer, Tablet, or Other Internet-Enabled Device at Home



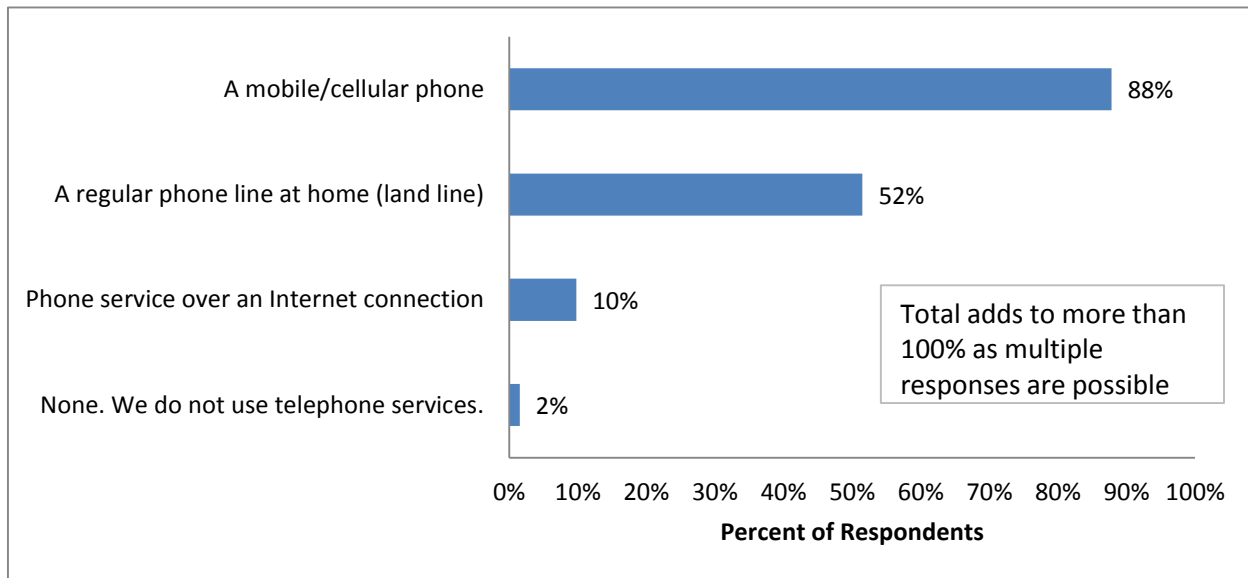
5.4 Mobile Phone Service and Internet Use

Questions were asked related to cellular/mobile telephone and Internet service, use of cellular/mobile Internet connections for various activities, and satisfaction and importance of features related to cellular/mobile Internet service. This information provides valuable insight into residents' need for various Internet and related communications services.

5.4.1 Telephone Service

The majority of respondents (88 percent) use a mobile/cellular phone, and approximately one-half use a traditional phone line at home. (See Figure 35.) About one-half of mobile/cellular phone users also have a landline. (The incidence of landline use does not vary significantly between mobile/cellular phone users and non-users.)

Figure 35: Telephone Services Used



Use of telephone services varies by demographic characteristics. (See Table 16.)

- Those in the 3rd and 4th regions are more likely than those in the 1st and 2nd regions to have telephone service over an Internet connection.
- Those in rural areas tend to be only slightly less likely to have a mobile/cellular telephone service and more likely to have a landline.
- Younger adults ages 18 to 34 are much less likely than older adults to have a land line.
- Those with a high school education or less are somewhat less likely to have mobile/cellular phone.
- Bigger households and those with school-aged children are somewhat more likely to have a mobile/cellular phone.
- Those earning less than \$25,000 per year are somewhat less likely to have a mobile/cellular phone.
- Home owners are more likely than renters to have a landline.

Table 16: Use of Telephone Service by Demographics

		Which phone service(s) do you use?				Total Count
		Land Line	Mobile/ Cellular	Phone Service Over Internet Connection	No Telephone Service	
Region	1 st	51%	86%	5%	1%	308
	2 nd	48%	86%	7%	2%	322
	3 rd	51%	92%	14%	1%	329
	4 th	55%	88%	14%	2%	286
Location	Rural Area	62%	83%	5%	3%	228
	Urban area/city	48%	89%	11%	1%	320
	Suburban area	53%	93%	15%	1%	298
	Medium-sized town	39%	92%	8%	1%	160

		Which phone service(s) do you use?				
		Land Line	Mobile/ Cellular	Phone Service Over Internet Connection	No Telephone Service	Total Count
Gender	Smaller town	57%	86%	8%	1%	209
	Female	52%	90%	8%	1%	722
	Male	53%	89%	12%	2%	498
Age Group	18 to 34 years	22%	96%	7%	1%	278
	35 to 44 years	46%	95%	16%	1%	204
	45 to 54 years	53%	91%	7%	3%	251
	55 to 64 years	69%	89%	14%	1%	216
	65 years and older	75%	77%	8%	2%	268
Education	High school or less	53%	81%	7%	1%	365
	Two-year college associate or technical degree	48%	94%	10%	1%	253
	Four-year college degree	53%	94%	9%	2%	351
	Graduate degree	53%	90%	16%	2%	244
Number of People in Household	One	58%	76%	3%	2%	195
	Two	56%	88%	10%	2%	496
	Three	45%	91%	13%	1%	212
	Four or more	47%	96%	12%	1%	316
School-Aged Children in Home	Yes	46%	96%	11%	0%	346
	No	54%	86%	10%	2%	867
2012 Household Income	Less than \$25,000	45%	75%	7%	1%	147
	\$25,000 to \$49,999	43%	88%	5%	2%	301
	\$50,000 to \$74,999	49%	93%	9%	2%	210
	\$75,000 to \$99,999	53%	93%	14%	3%	191
	\$100,000 or more	59%	92%	14%	1%	277
Own or Rent Home	Own	57%	88%	11%	2%	989
	Rent	28%	92%	7%	1%	223

Percentages are to be read across rows e.g. 51% of respondents in region 1 have a land line phone, 86% have a mobile/cellular phone, 5% have phone service over an Internet connection, and 1% do not have telephone service. Respondents could select more than one type of telephone service, and percentages may add to more than 100.

5.4.2 Cellular/Mobile Internet Service

Nearly two-thirds (63 percent) said their family purchases a cellular/mobile Internet service or data plan for a smartphone, tablet, or mobile hotspot. (See Figure 36.) One-third of mobile/cellular phone users do not have a data plan, and 20 percent without a mobile/cellular phone do purchase a family data plan (presumably for a tablet or similar device). Figure 22 shows a mapped distribution of respondents using mobile data plans.

Figure 36: Purchase Cellular/Mobile Internet Service or Data Plan

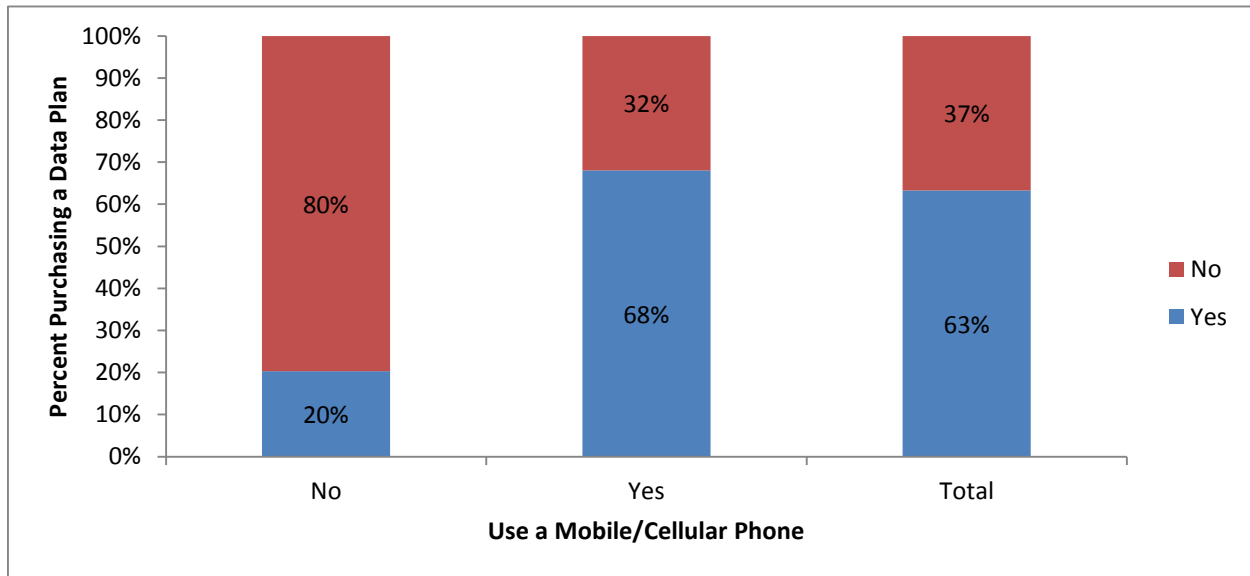
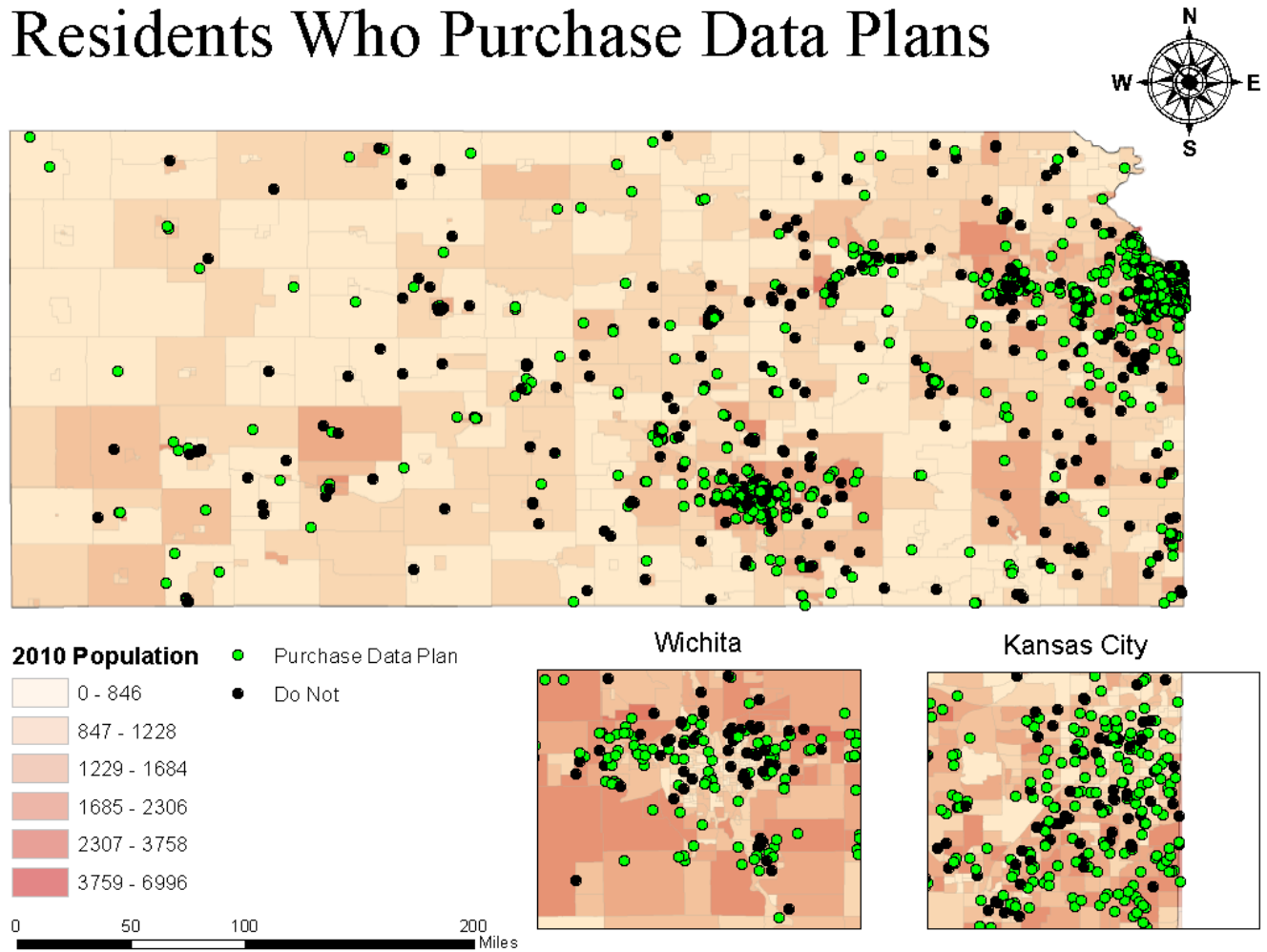


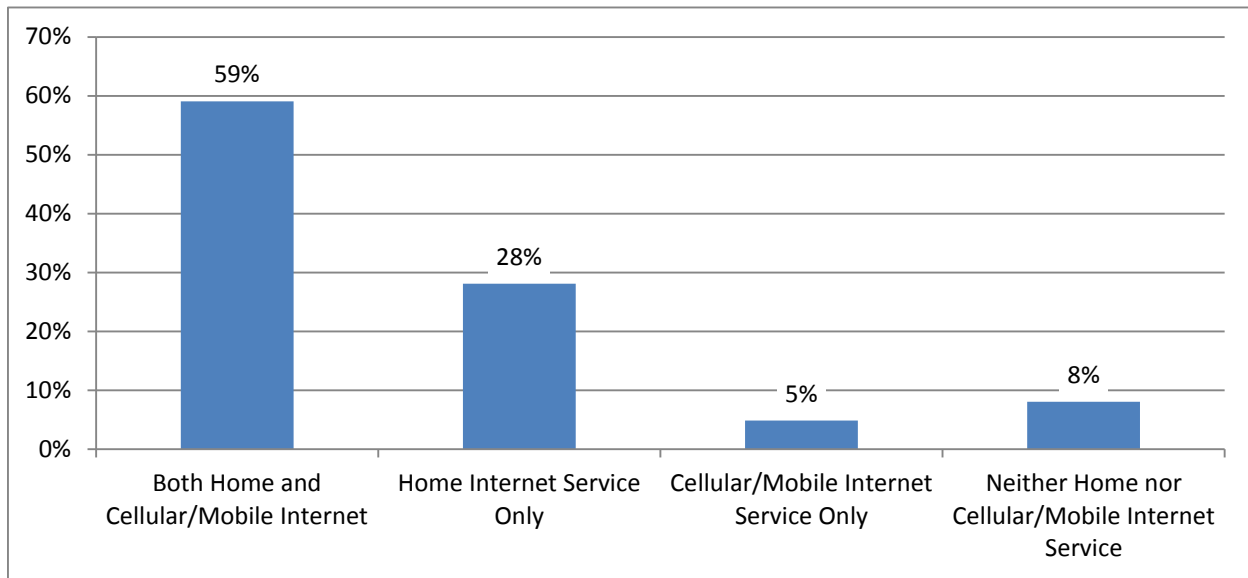
Figure 37: Map of Cellular/Mobile Internet Users

Residents Who Purchase Data Plans



The data show that one-third of households with no home Internet services do have cellular/mobile Internet service. Overall, 59 percent have both home and cellular/mobile Internet, and 8 percent have neither.

Figure 38: Types of Internet Service in the Home



Residents of the 3rd region and those in suburban areas, younger adults, more educated adults, those with more people in the household (including those with school-aged children), and those with higher levels of household income were more likely to report having both home and cellular/mobile Internet service. (See Table 17.)

Table 17: Use of Internet Service by Demographics

		Types of Internet Service Use				Total Count
		Both Home and Mobile Internet	Home Internet Service Only	Mobile Internet Service Only	Neither Home nor Mobile Internet	
Region	1 st	53%	33%	4%	10%	283
	2 nd	54%	29%	8%	9%	294
	3 rd	71%	24%	2%	3%	312
	4 th	57%	27%	5%	10%	272
Location	Rural Area	51%	33%	7%	9%	209
	Urban area/city	58%	29%	7%	7%	303
	Suburban area	74%	22%	2%	2%	286
	Medium-sized town	56%	27%	4%	14%	151
	Smaller town	52%	33%	3%	12%	193
Gender	Female	59%	27%	5%	9%	678
	Male	60%	30%	4%	6%	474
Age Group	18 to 34 years	73%	10%	10%	8%	262
	35 to 44 years	77%	17%	5%	1%	200
	45 to 54 years	69%	22%	4%	5%	246
	55 to 64 years	50%	38%	5%	8%	204
	65 years and older	27%	54%	1%	18%	242
Education	High school or less	43%	33%	7%	17%	340
	Two-year college associate or technical degree	60%	28%	8%	4%	238
	Four-year college degree	69%	26%	3%	3%	335
	Graduate degree	70%	25%	2%	3%	237

		Types of Internet Service Use				Total Count
		Both Home and Mobile Internet	Home Internet Service Only	Mobile Internet Service Only	Neither Home nor Mobile Internet	
Number of People in Household	One	30%	39%	4%	27%	174
	Two	54%	37%	3%	6%	468
	Three	68%	20%	6%	7%	200
	Four or more	78%	14%	7%	2%	303
School-Aged Children in Home	Yes	71%	17%	8%	4%	331
	No	54%	32%	4%	10%	814
2012 Household Income	Less than \$25,000	25%	34%	13%	28%	129
	\$25,000 to \$49,999	45%	37%	8%	10%	279
	\$50,000 to \$74,999	64%	29%	2%	5%	202
	\$75,000 to \$99,999	74%	23%	1%	1%	183
	\$100,000 or more	81%	16%	2%	1%	269
Own or Rent Home	Own	51%	33%	7%	9%	209
	Rent	58%	29%	7%	7%	303

Percentages are to be read across rows e.g. 53% of respondents in region 1 have both home and mobile Internet service, 33% have home Internet service only, 4% have mobile Internet service only, and 10% have neither home nor mobile Internet service.

5.4.3 Cost of Cellular/Mobile Internet Service

Nearly one-half of those with cellular/mobile Internet service pay \$100 or more per month for their service. (See Figure 39.) When comparing cost with that of home Internet service, cellular/mobile Internet service is considerably more expensive. (See Figure 40.)

Figure 39: Average Monthly Cost of Cellular/Mobile Internet Service

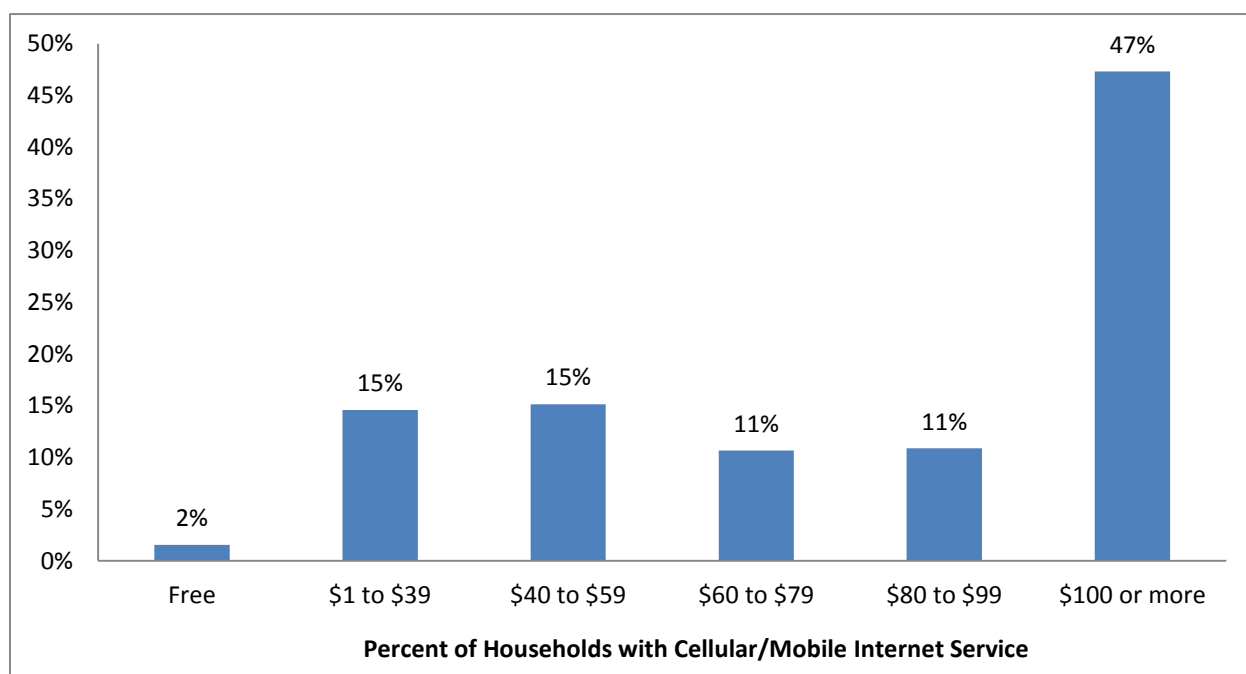
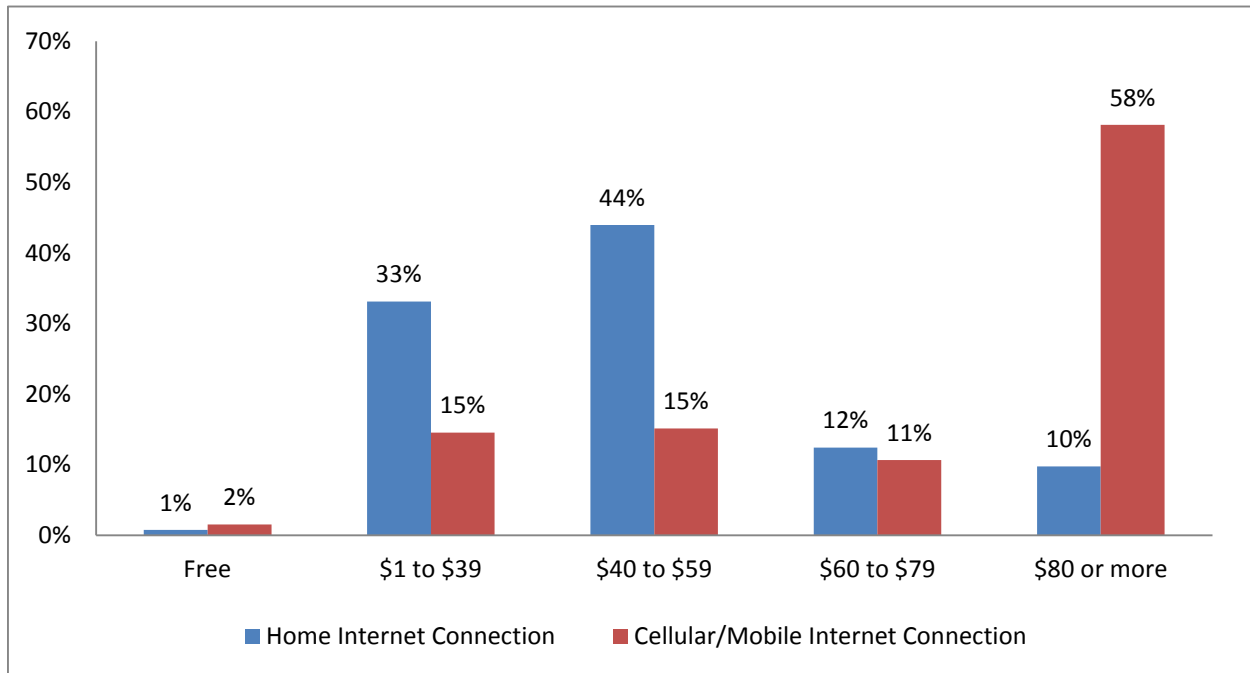


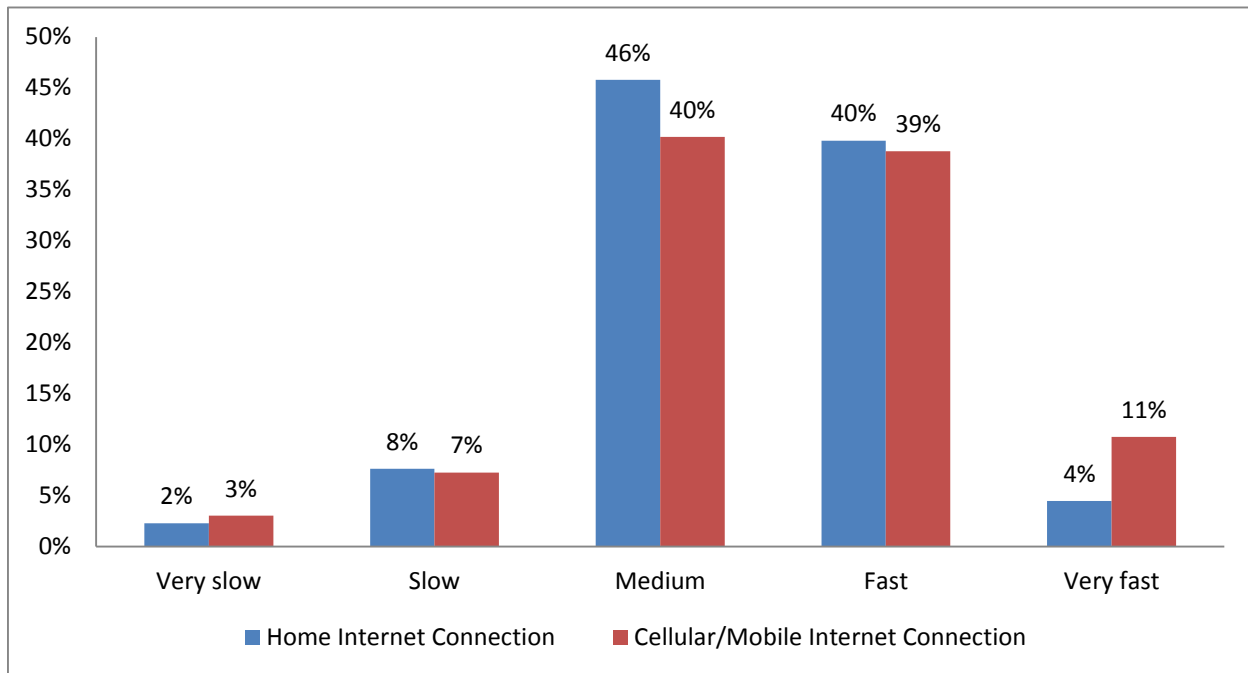
Figure 40: Average Monthly Cost of Home vs. Cellular/Mobile Internet Service



5.4.4 Connection Speed

Just one in 10 respondents with cellular/mobile Internet access reported their connection to be slow or very slow. (See Figure 41.) Another 40 percent said it is medium, 39 percent said it is fast, and 11 percent said it is very fast. Cellular/mobile Internet connections are considered to be somewhat faster than home Internet connections.

Figure 41: Speed of Home vs. Cellular/Mobile Internet Service



5.4.5 Number of Users

Respondents were asked the number of people in the household who use cellular/mobile Internet connection. Most homes have multiple users, with just 20 percent reporting one user in the household. (See Table 18.) This is associated with the number of people in the household. Most of those with one or two people in the household said that all household members use the cellular/mobile Internet connection. However, most of those with three or more members reported a smaller number of people in the household using the cellular/mobile Internet connection, presumably children (presumably, young children are not Internet users).

Table 18: Number of People in Household Using Cellular/Mobile Internet Connection

		Number of People in Household				Total Households
		One	Two	Three	Four or more	
# People Using Home Internet Connection	One	84%	22%	16%	5%	20%
	Two	11%	71%	45%	41%	50%
	Three	5%	4%	34%	20%	16%
	Four or more	0%	3%	6%	34%	14%

Assumes non-permanent household member uses the home's Internet connection.

5.4.6 Uses of Cellular/Mobile Internet

The most common uses of mobile Internet connections are listening to music (streaming), followed by watching movies, videos, or TV; buying products online; and playing online games.

Figure 42: Uses of Cellular/Mobile Internet Connection

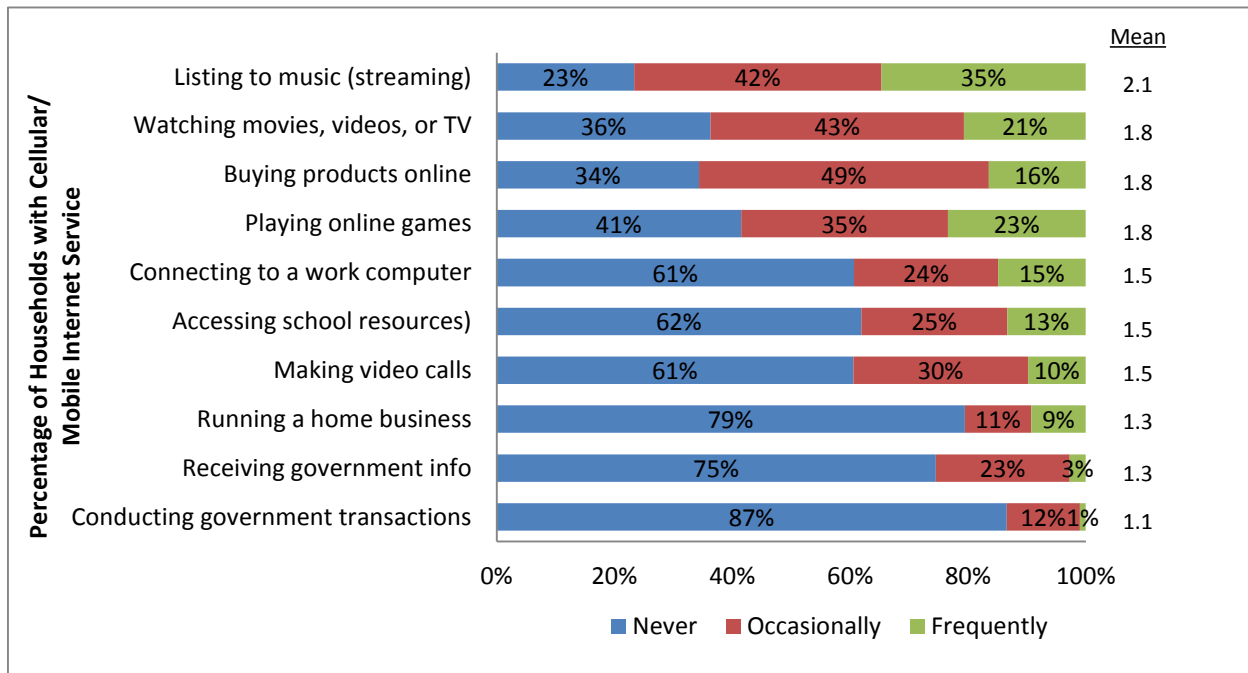
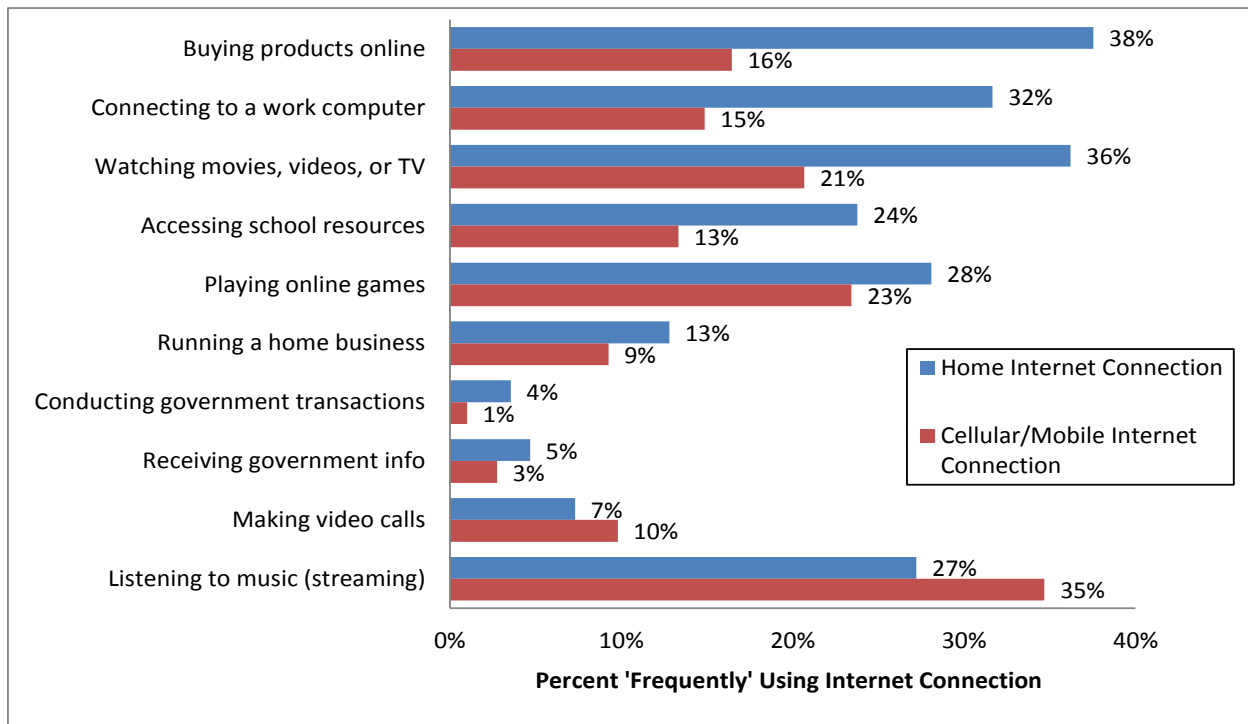


Figure 43: Frequent Use by Connection Type



Internet users are much more likely to frequently use a home connection vs. a cellular/mobile connection for buying products online; connecting to a work computer; watching movies, videos, or TV; or accessing school resources. (See Figure 43.) They are more likely to frequently use a cellular/mobile connection for listening to music (streaming).

Table 19: Uses of Cellular/Mobile Internet Connection by Age of Respondent

		<u>Age of Respondent</u>				
		18 to 34 years	35 to 44 years	45 to 54 years	55 to 64 years	65 years and older
Listening to music (streaming)	Never	11%	19%	19%	43%	57%
	Occasionally	42%	39%	45%	43%	36%
	Frequently	48%	42%	36%	14%	7%
Watching movies, videos, or TV	Never	22%	30%	37%	57%	60%
	Occasionally	50%	43%	44%	34%	33%
	Frequently	28%	28%	19%	8%	7%
Playing online games	Never	41%	29%	38%	52%	65%
	Occasionally	31%	39%	43%	31%	28%
	Frequently	28%	32%	19%	17%	7%
Connecting to a work computer	Never	70%	58%	54%	55%	67%
	Occasionally	21%	23%	27%	29%	20%
	Frequently	9%	19%	19%	16%	13%
Making video calls (Skype, etc.)	Never	54%	53%	65%	69%	72%
	Occasionally	34%	34%	26%	25%	23%
	Frequently	11%	13%	9%	6%	5%
Running a home business	Never	84%	79%	78%	78%	75%
	Occasionally	7%	11%	13%	13%	17%
	Frequently	9%	10%	9%	9%	8%
Receiving government info such as service locations or contact info	Never	81%	72%	74%	67%	72%
	Occasionally	16%	23%	25%	30%	27%
	Frequently	3%	4%	1%	3%	1%
Conducting government transactions such as permit payments	Never	92%	86%	86%	82%	81%
	Occasionally	7%	14%	13%	15%	19%
	Frequently	1%	1%	1%	3%	0%
Buying products online	Never	29%	30%	38%	38%	49%
	Occasionally	49%	53%	48%	50%	41%
	Frequently	22%	17%	14%	13%	10%
Accessing school resources (for parents of school-aged children)	Never	61%	39%	59%	84%	94%
	Occasionally	27%	38%	24%	12%	4%
	Frequently	12%	23%	16%	4%	2%

Percentages are to be read down columns, e.g. 11% of respondents ages 18-34 never use their home Internet for listening to music (streaming), 42% use it occasionally, and 48% use it frequently for this purpose. Read across rows to compare percentages by demographic groups, e.g. 60% of those ages 65+ never use their home Internet for watching movies, videos, or TV, compared with just 22% of those ages 18-34.

Younger respondents were more likely to report someone in the household using their home Internet for a variety of entertainment and other purposes. (See Table 19.) Specifically, the frequency of using the Internet for listening to music (streaming); watching movies, videos, or TV; and playing online games tends to decrease as age increases.

5.4.7 Importance and Satisfaction with Cellular/Mobile Internet Service Aspects

Respondents were asked to rate their level of satisfaction (using a scale where 1=Very Dissatisfied and 5=Very Satisfied) with various aspects of their Internet service, along with the importance (using a scale where 1=Not at All Important and 5=Very Important) of those factors.

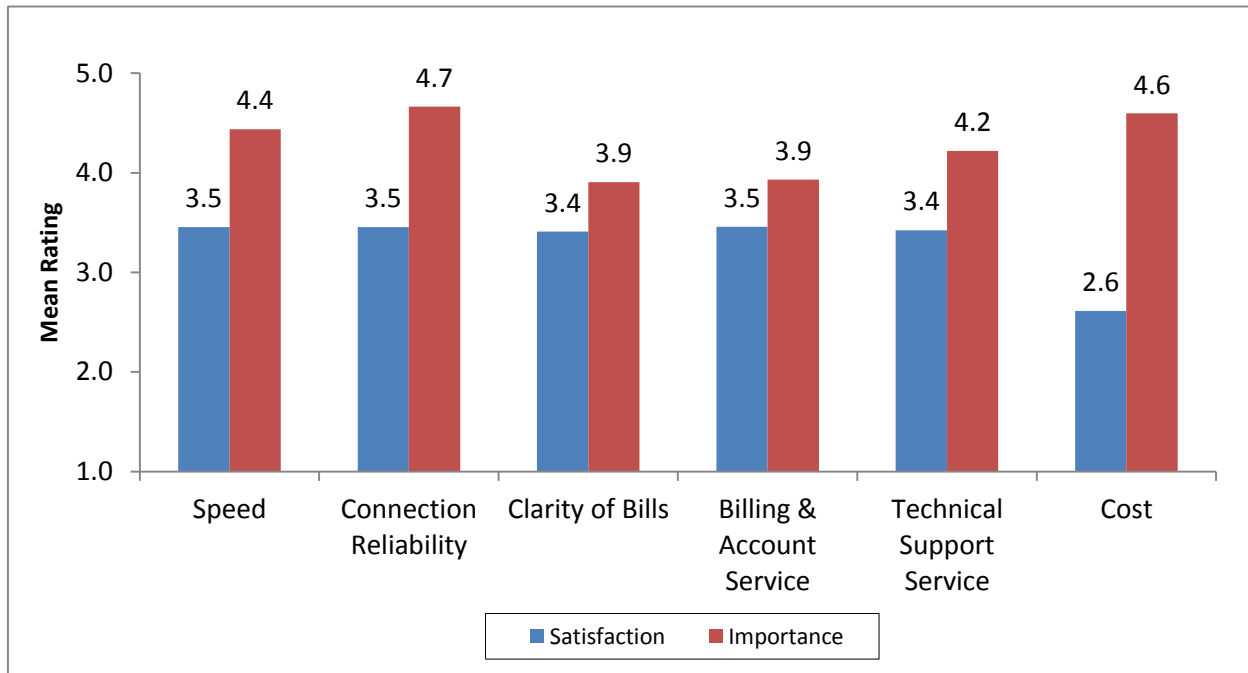
The most **important** service aspects are connection reliability (72 percent Very Important; 4.7 mean) and cost (68 percent Very Important; 4.6 mean), followed by speed, technical support, billing and account service, and clarity of bills. (See Table 20.) Most cellular/mobile Internet users appear to be moderately satisfied with most aspects of their Internet service, although there is some room for improvement. (See Table 20.) Cellular/mobile Internet users appear to be less satisfied with cost of service compared with other aspects, which is a common finding. Importance and satisfaction with Internet service aspects do not vary significantly between home Internet and cellular/mobile Internet service.

Table 20: Importance and Satisfaction with Cellular/Mobile Internet Service Aspects

		Speed	Connection Reliability	Clarity of Bills	Billing & Account Service	Technical Support Service	Cost
Importance	1-Not at All Important	0%	0%	1%	0%	0%	0%
	2	0%	0%	5%	5%	4%	0%
	3	9%	4%	29%	28%	16%	7%
	4	36%	23%	33%	34%	34%	24%
	5-Very Important	54%	72%	32%	33%	46%	68%
	<i>Mean</i>	<i>4.4</i>	<i>4.7</i>	<i>3.9</i>	<i>3.9</i>	<i>4.2</i>	<i>4.6</i>
Satisfaction	1-Very Dissatisfied	4%	5%	5%	4%	4%	18%
	2	11%	11%	11%	9%	12%	28%
	3	34%	32%	33%	36%	36%	33%
	4	38%	40%	38%	38%	34%	13%
	5-Very Satisfied	13%	13%	13%	12%	14%	6%
	<i>Mean</i>	<i>3.5</i>	<i>3.5</i>	<i>3.4</i>	<i>3.5</i>	<i>3.4</i>	<i>2.6</i>

Gap Analysis: Although most Internet users are relatively satisfied, assessing the **gaps** between **importance** and **satisfaction** can help identify what features might need improvement. (See Figure 44.) The results suggest that customers are only moderately satisfied with the most important aspects of service. There is a sizeable “service gap” (difference between importance and satisfaction) with all aspects of their Internet service.

Figure 44: Evaluation of Cellular/Mobile Internet Service



The gaps for these aspects are partially driven by the relatively high importance placed on most of these aspects by respondents. At the same time, these gaps identify aspects where Internet service can be improved in Kansas. In addition to cost for service (it is typical for price to have a large gap compared with other items), the largest gap occurs for connection reliability. (See Table 21.)

Table 21: Gap Between Satisfaction and Importance Ratings

	Mean Satisfaction	Mean Importance	GAP < = >	Significance
Speed	3.5	4.4	-1.0	Expectations not met
Connection Reliability	3.5	4.7	-1.2	Expectations not met
Clarity of Bills	3.4	3.9	-0.5	Expectations not met
Billing & Account Service	3.5	3.9	-0.5	Expectations not met
Technical Support Service	3.4	4.2	-0.8	Expectations not met
Cost	2.6	4.6	-2.0	Expectations not met

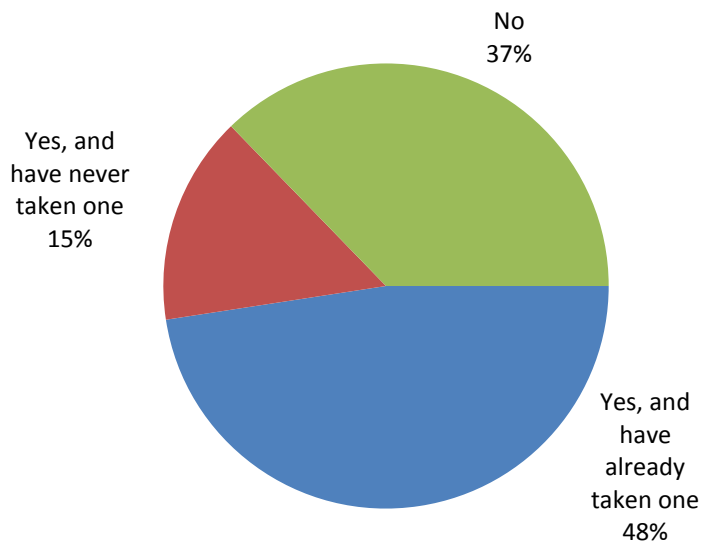
5.5 Internet Use for Education

Questions were asked to assess the use of, and potential need for, Internet services for education or school-related activities. Respondents were asked if a household member has ever taken an online class or class that requires Internet service, or if they would be interested in doing so. Those with school-aged children were asked how those children use the Internet for school-related activities.

5.5.1 Online Classes or Classes that Require Internet

More than one-half (56 percent) said that they or a family member have taken an online class or a class that requires access to some online content. Nearly two-thirds (63 percent) would be interested in doing so. (See Figure 45.)

Figure 45: Interest in Online Classes



Having attended an online course, or interest in doing so, is moderately associated with several key demographic variables. (See Table 22.) Those under age 55, more educated adults, those in households with at least three members, those with a school-aged child in the home, and those with higher levels of income are more likely to have attended (or have a family member who has attended) an online class or a class that required access to some online content, and they (or a family member) are more likely to be interested in taking such a class.

Table 22: Have Taken Online Class and Interest in Taking Online Class by Demographics

		Have Taken Online Class		Interest in Taking Online Class	
		Percentage	Count	Percentage	Count
Region	1 st	51%	299	57%	300
	2 nd	56%	314	63%	314
	3 rd	63%	319	68%	319
	4 th	52%	280	64%	281
Location	Rural Area	54%	224	59%	225
	Urban area/city	51%	315	61%	317
	Suburban area	65%	292	71%	291
	Medium-sized town	53%	158	62%	160
	Smaller town	55%	204	60%	203
Gender	Female	56%	715	60%	714
	Male	56%	487	67%	490
Age Group	18 to 34 years	70%	276	73%	278
	35 to 44 years	69%	203	80%	202
	45 to 54 years	69%	248	75%	248
	55 to 64 years	45%	213	55%	214
	65 years and older	26%	259	34%	260
Education	High school or less	35%	360	48%	359
	Two-year associate or tech degree	59%	250	66%	251
	Four-year college degree	64%	348	71%	348
	Graduate degree	73%	240	71%	241
Number of People in Household	One	33%	188	40%	188
	Two	49%	486	57%	488
	Three	66%	211	76%	211
	Four or more	73%	312	78%	312
School-Aged Children in Home	Yes	71%	346	80%	344
	No	49%	860	56%	865
2012 Household Income	Less than \$25,000	41%	140	49%	142
	\$25,000 to \$49,999	49%	296	59%	298
	\$50,000 to \$74,999	60%	207	67%	208
	\$75,000 to \$99,999	64%	188	69%	188
	\$100,000 or more	69%	273	73%	272
Own or Rent Home	Own	54%	224	59%	225
	Rent	51%	315	61%	317

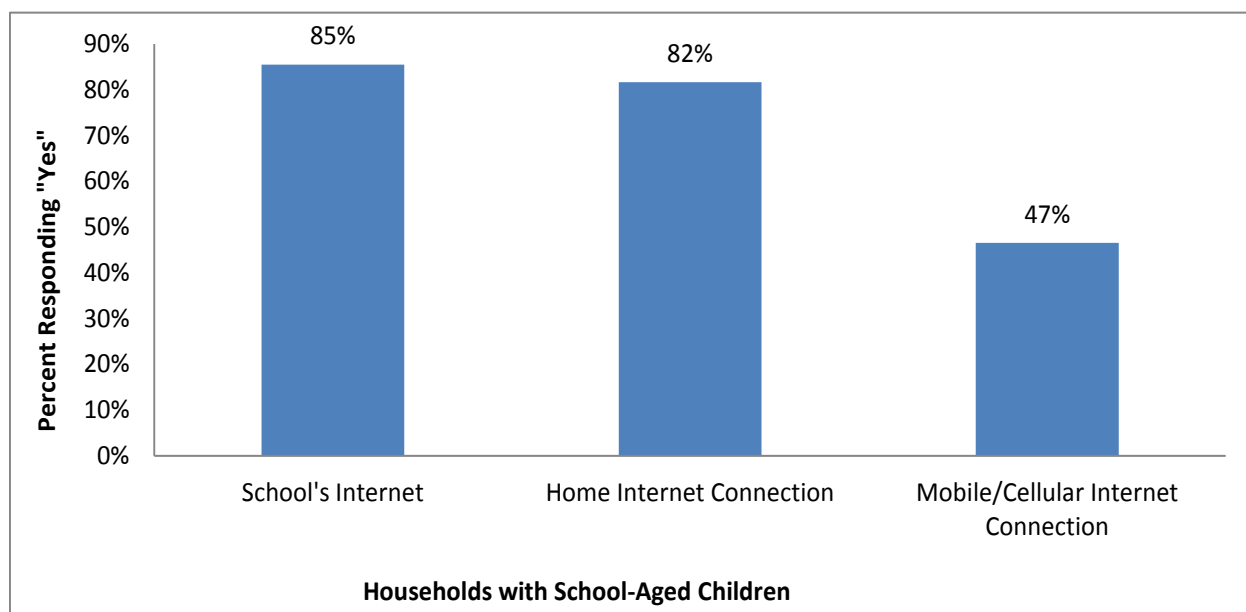
Figures are percentages of respondents who reported a household member taking an online class or those who reported an interest in doing so. Read down columns to compare responses by demographic groups, e.g. 71% of those with school-aged children at home said a member of their family has taken an online class or a class that requires access to some online content, compared with 49% of those without school-aged children at home. Similarly, 80% of those with school-aged children at home said a member of their family would be interested in taking an online class or a class that requires access to some online content, compared with 56% of those without school-aged children at home.

5.5.2 School-Related Activities that Require Internet

Those with school-aged children at home (29 percent of the total sample) were asked if those children use various Internet connections for school-related activities like homework, special projects, or communications with teachers. Most use the school's Internet (85 percent) and a

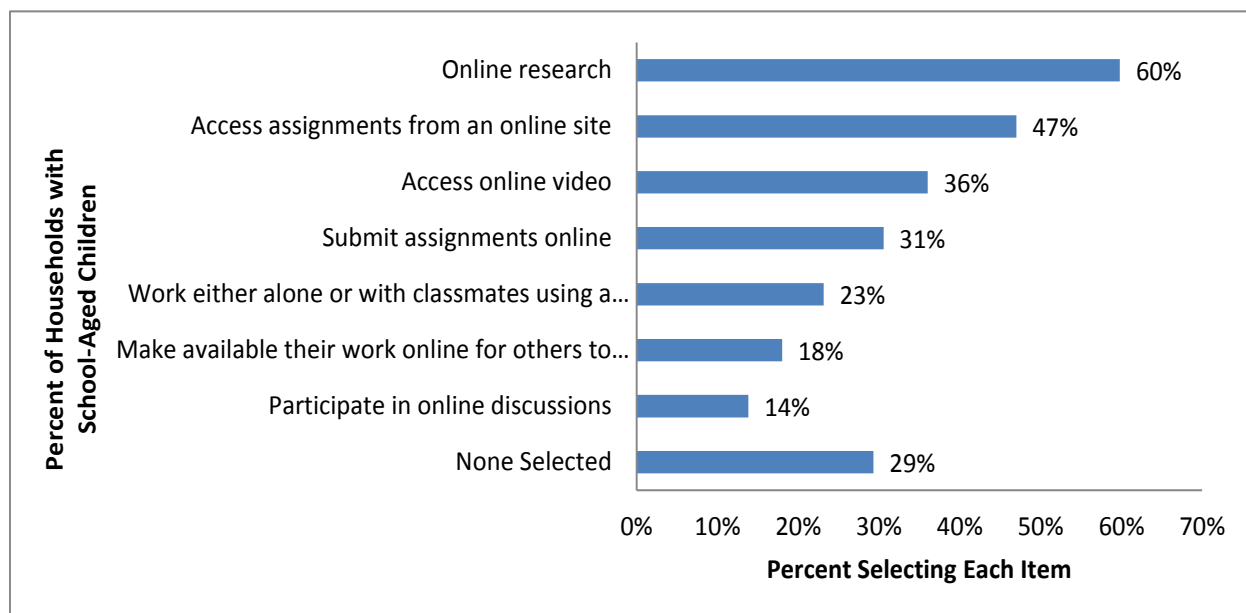
home Internet connection (82 percent) for school-related activities. (See Figure 46.) Nearly one-half (47 percent) use a mobile/cellular Internet connection for school-related activities.

Figure 46: Use Internet Connection for School-Related Activities



Respondents were also asked if their child's school asks students to engage in a variety of activities outside of school. Most indicated that their child's school asks students to engage in some activity that requires an Internet connection (61 percent); just 29 percent did not select one of the activities listed. (See Figure 47.) The most frequently selected activity that schools request students perform is online research (60 percent).

Figure 47: Schools Request Students Engage in Various Activities



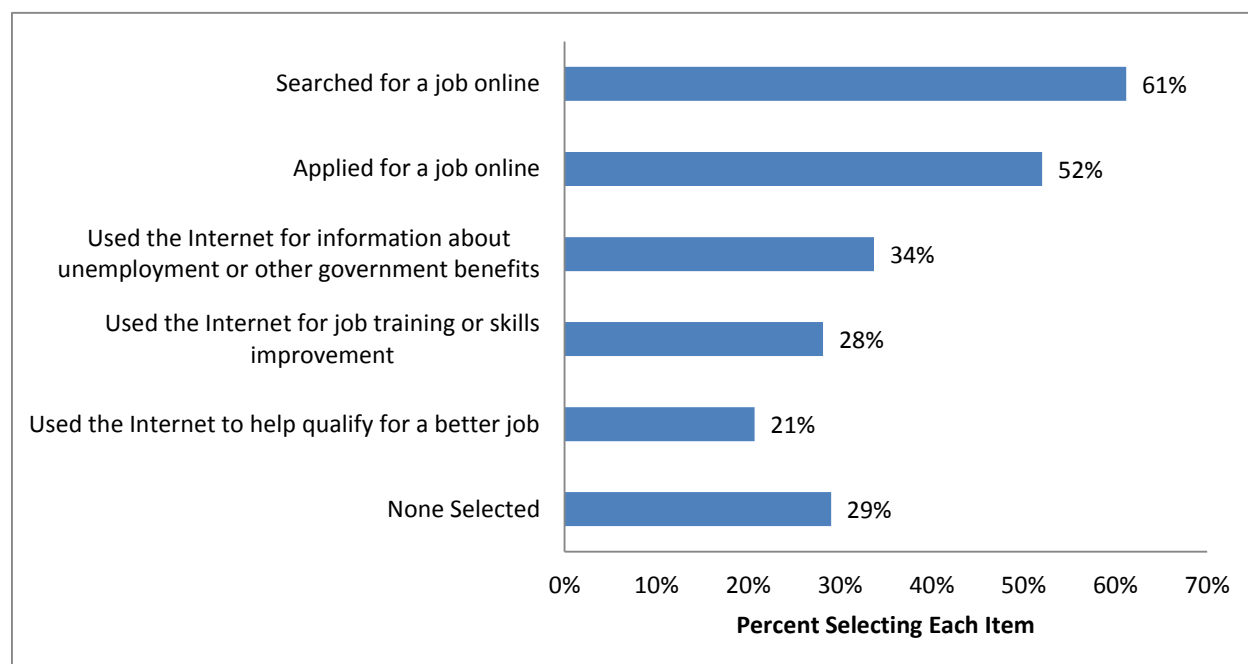
5.6 Internet Use for Jobs/Careers

Questions were asked to assess the potential need for Internet services to support jobs or careers. Respondents were asked if a family member has used the Internet to look for jobs or financial assistance and if anyone in the household teleworks from home. Those with a home-based business were asked the importance of high-speed Internet to their business.

5.6.1 Use of Internet for Job or Financial Assistance

Six in 10 said that they or a family member has searched for a job online, and 52 percent have applied for a job online. (See Figure 48.) Most have engaged in some activity requiring an Internet connection, with just 29 percent having not selecting one of the items listed. Younger adults, those with children in the home, more educated adults, and those with higher incomes are more likely to report using the Internet for job searching and training activities (either themselves or a family member).

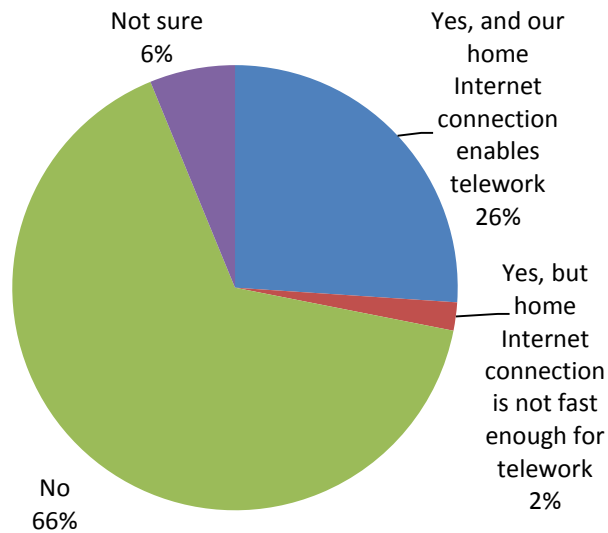
Figure 48: Use of Internet for Job or Financial Assistance



5.6.2 Teleworking

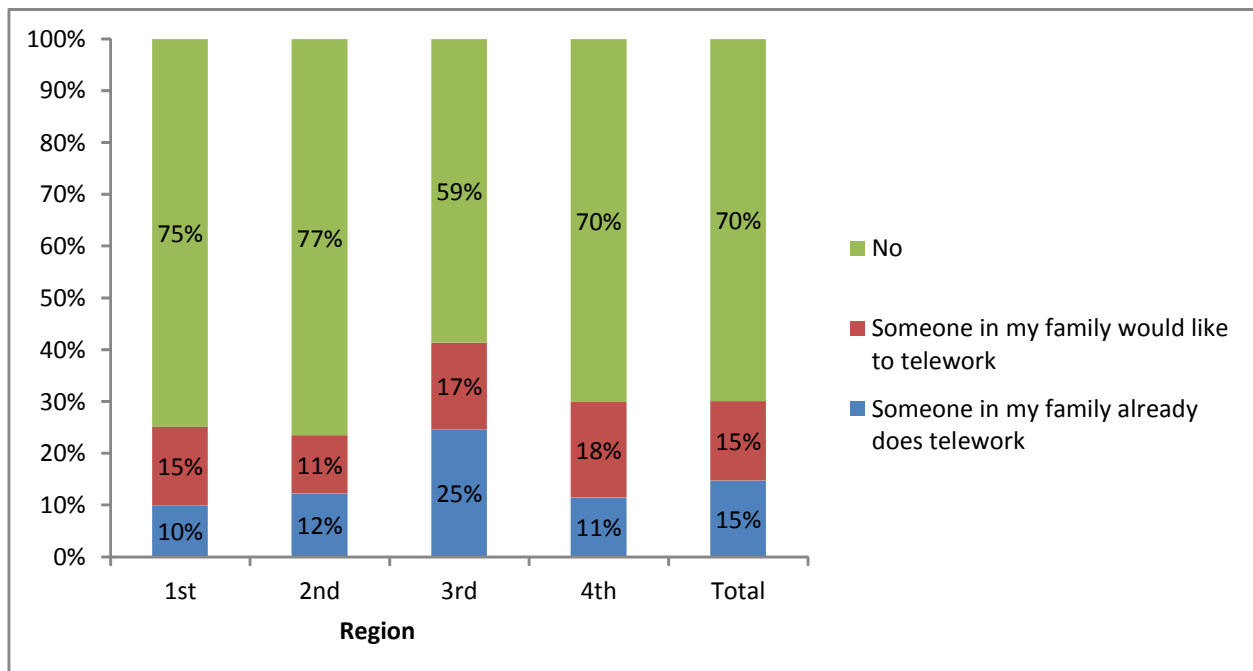
Overall, 28 percent indicated that a family member is allowed to telework from home, with 26 percent reporting that their home Internet connection is fast enough to support teleworking. (See Figure 49.) More educated adults and those with higher incomes are among those more likely to report that teleworking is allowed and that a household member telecommutes.

Figure 49: Family Member Is Allowed to Telework from Home



Fifteen percent reported that someone in the family telecommutes, and another 15 percent reported that a household member would like to telecommute. (See Figure 50.) Those in the 3rd region (which is mainly suburban) were more likely to indicate that teleworking is allowed and that someone already does telecommute.

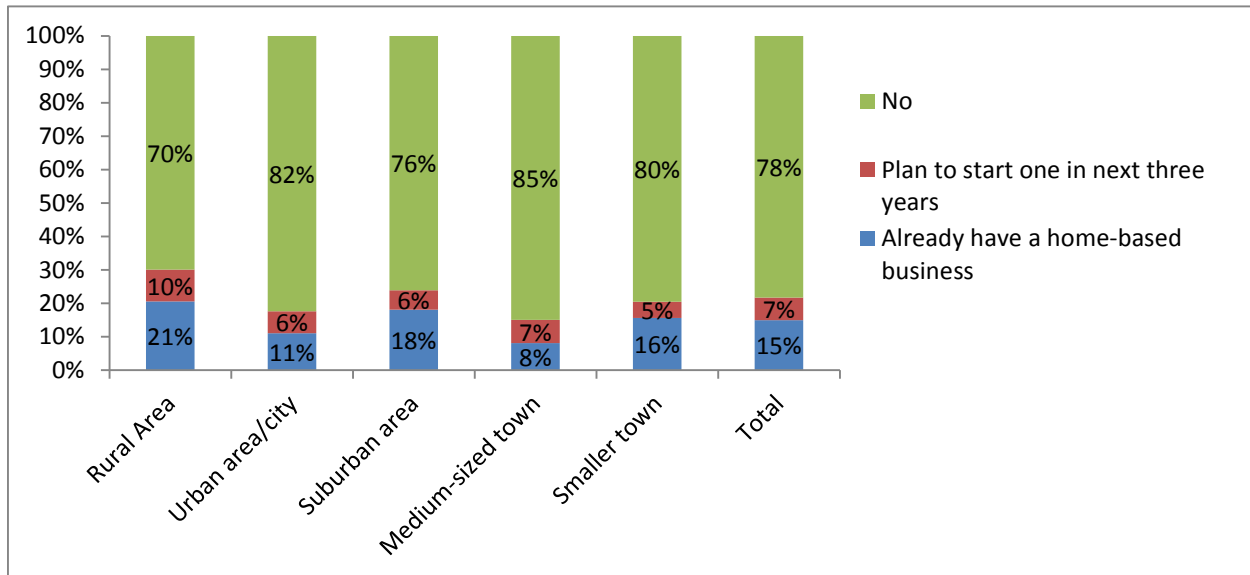
Figure 50: Household Member Currently Telecommutes or Is Interested in Teleworking



5.6.3 Home-Based Business

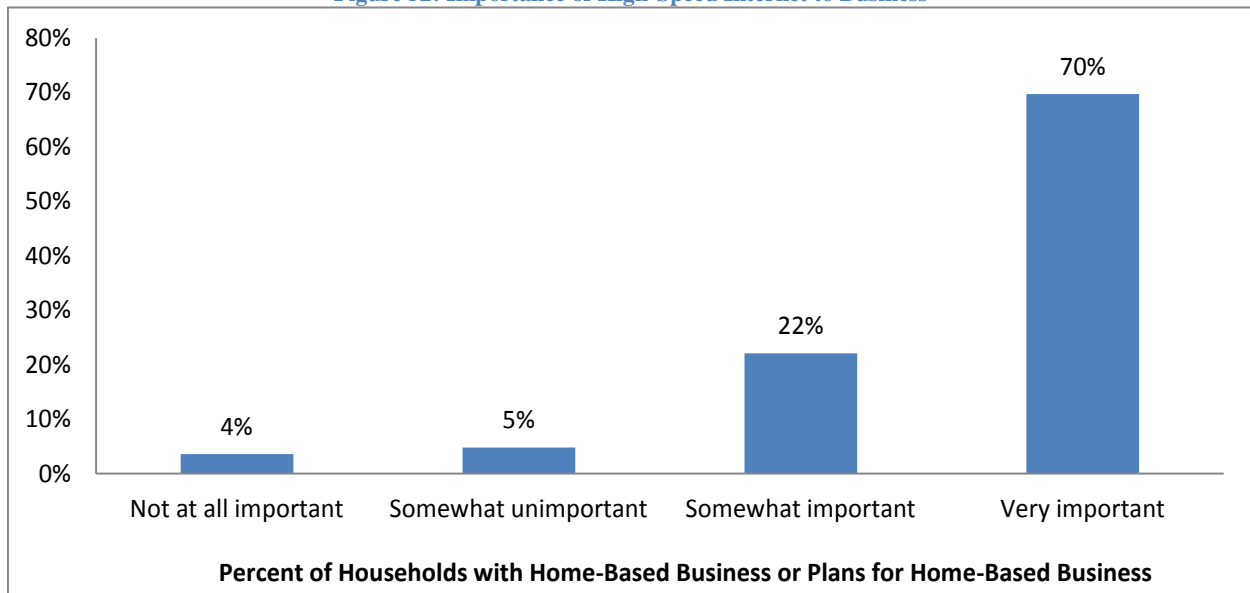
Fifteen percent indicated that they already have a home-based business, and 7 percent have plans to start one in the next three years. (See Figure 51.) Those in rural areas are somewhat more likely to either currently have a home-based business or to plan to start one.

Figure 51: Have Home-Based Business by Location



Most of those with a home-based business or with plans to start one in the next three years said that a high-speed Internet connection is very important to their existing or potential business. (See Figure 52.)

Figure 52: Importance of High-Speed Internet to Business



5.7 Household Information

Respondents were asked a number of demographic questions, including gender, age, race/ethnicity, education, household size, income, location, and whether they own or rent their home. Responses to these questions were aggregated and used to further describe Internet-related questions for key demographic groups.

Table 23: Demographic Profile of Respondents

		Region				Total Sample
		1 st	2 nd	3 rd	4 th	
Location	Rural Area	24%	33%	3%	16%	19%
	Urban area/city	17%	23%	24%	43%	26%
	Suburban area	3%	8%	68%	16%	24%
	Medium-sized town	24%	17%	3%	9%	13%
	Smaller town	32%	19%	2%	17%	17%
Gender	Female	61%	62%	50%	64%	59%
	Male	39%	38%	50%	36%	41%
Age Group	18 to 34 years	27%	19%	22%	23%	23%
	35 to 44 years	12%	15%	19%	20%	17%
	45 to 54 years	18%	23%	20%	21%	21%
	55 to 64 years	21%	17%	17%	16%	18%
	65 years and older	21%	24%	22%	20%	22%
Education	High school or less	33%	37%	18%	34%	30%
	Two-year college associate or technical degree	27%	19%	16%	22%	21%
	Four-year college degree	23%	26%	37%	29%	29%
	Graduate degree	17%	19%	28%	16%	20%
Number of People in Household	One	16%	20%	12%	16%	16%
	Two	42%	39%	39%	43%	41%
	Three	16%	19%	20%	14%	17%
	Four or more	26%	22%	29%	28%	26%
School-Aged Children in Home	Yes	30%	25%	32%	27%	29%
	No	70%	75%	68%	73%	71%
2012 Household Income	Less than \$25,000	14%	13%	7%	18%	13%
	\$25,000 to \$49,999	35%	32%	18%	21%	27%
	\$50,000 to \$74,999	20%	21%	12%	22%	19%
	\$75,000 to \$99,999	14%	16%	23%	15%	17%
	\$100,000 or more	17%	18%	40%	24%	25%
Own or Rent Home	Own	79%	81%	81%	84%	82%
	Rent	21%	19%	19%	16%	18%

Percentages are to be read down columns, e.g. 24% of those in the 1st region are in rural areas, 17% are in urban areas, 3% are in suburban areas, 24% are in medium-sized towns, and 32% are in smaller town. Read across rows to compare responses by demographic groups, e.g. 68% of respondents in the 3rd region reside in a suburban area, compared with 3% in the 1st region, 8% in the 2nd region, and 16% in the 4th region.

5.7.1 Home Internet and Cellular/Mobile Internet Use by Demographics

Figure 53 to Figure 62 highlight saturation of home Internet and cellular/mobile Internet service, as previously discussed in this report. Across demographic groups, respondents were more likely to have a home Internet connection than cellular/mobile Internet service.

Figure 53: Internet Service by Region

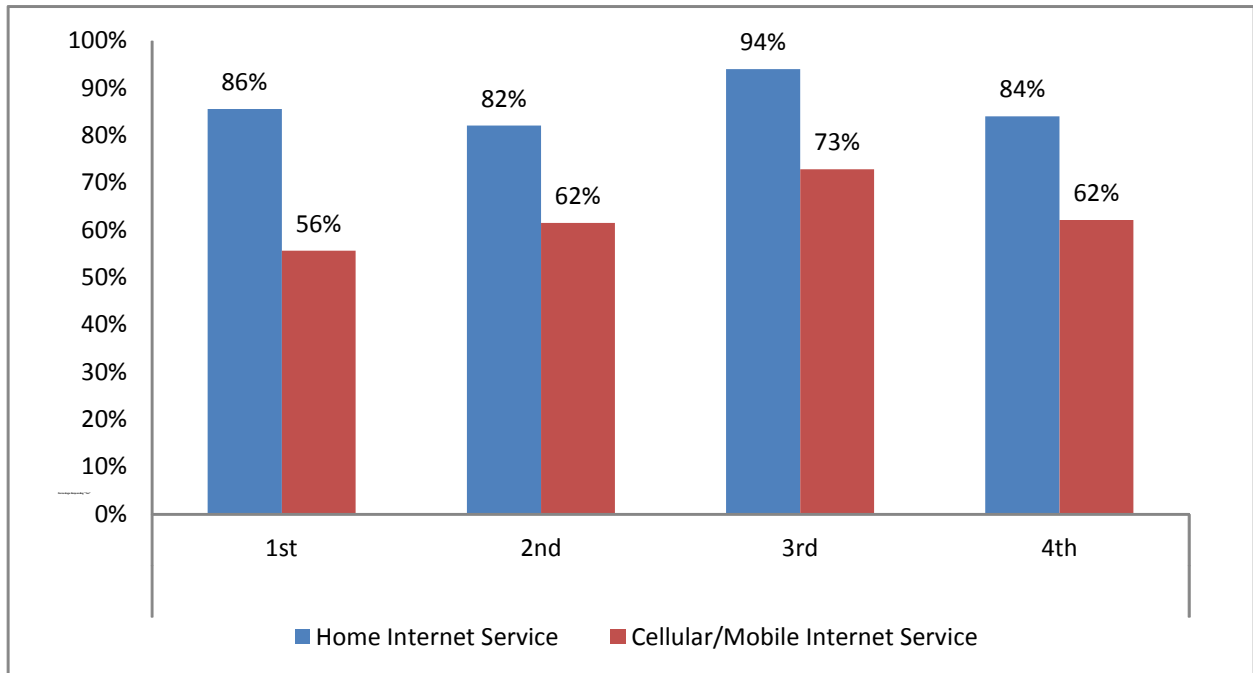


Figure 54: Internet Service by Location

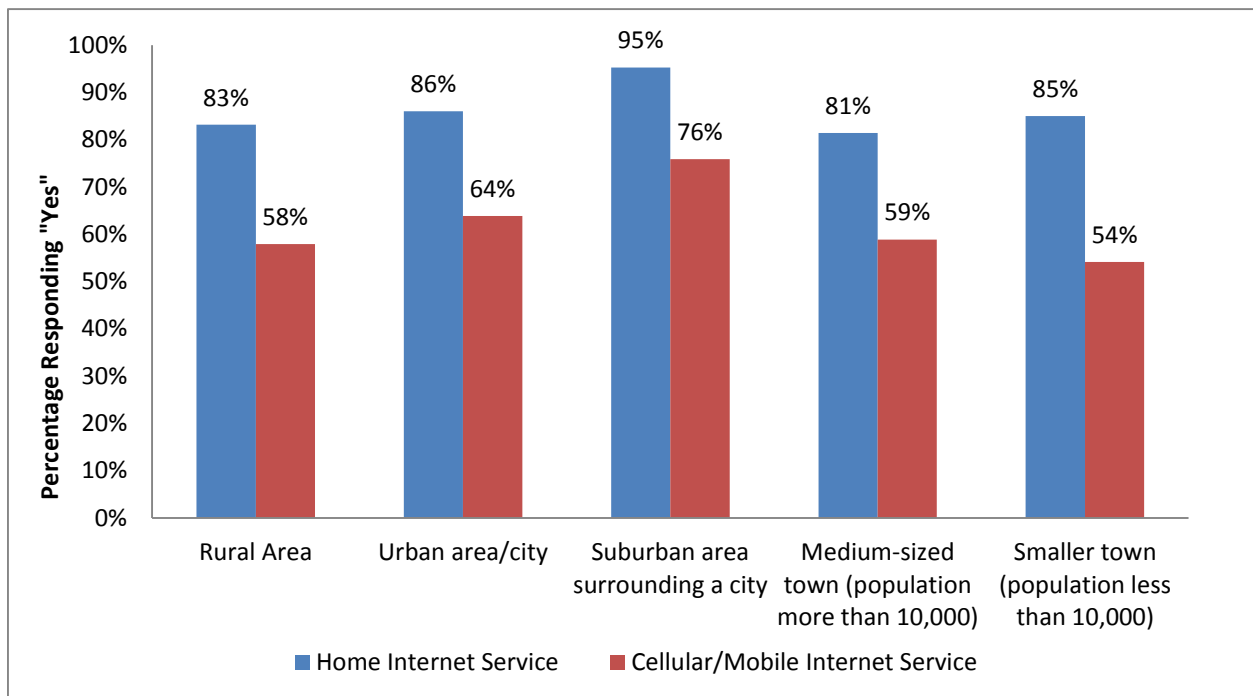


Figure 55: Internet Service by Gender

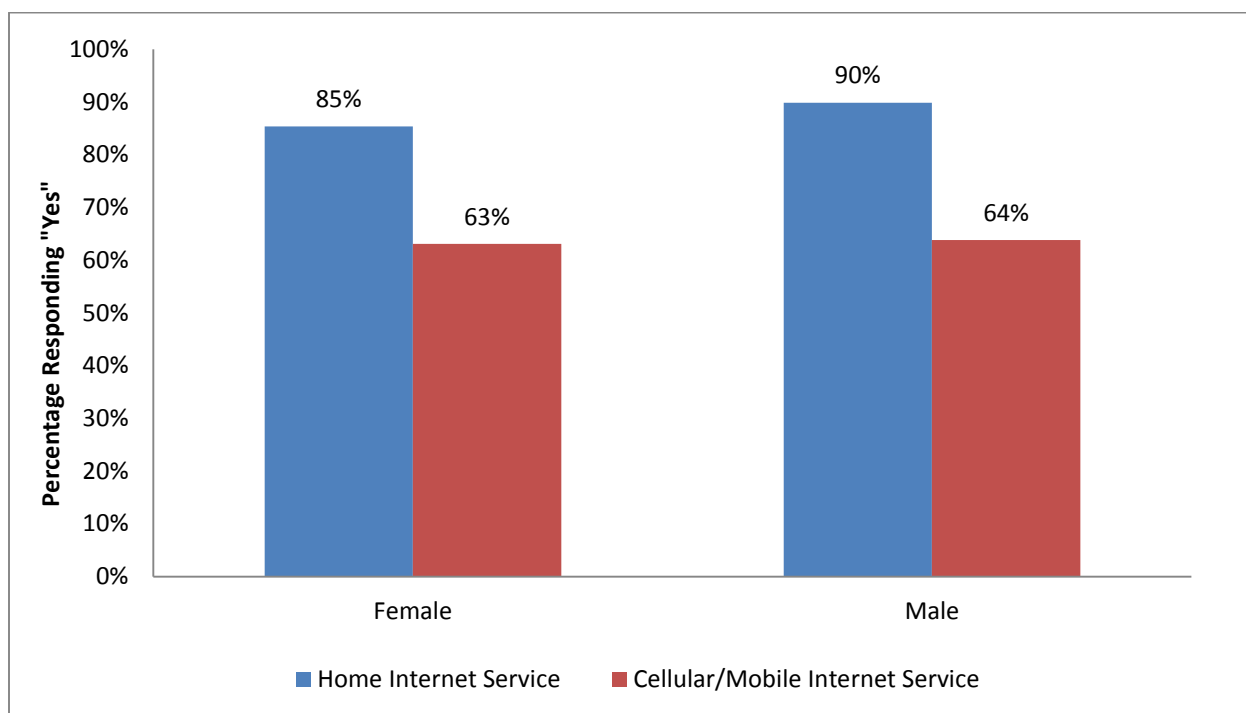


Figure 56: Internet Service by Age Group

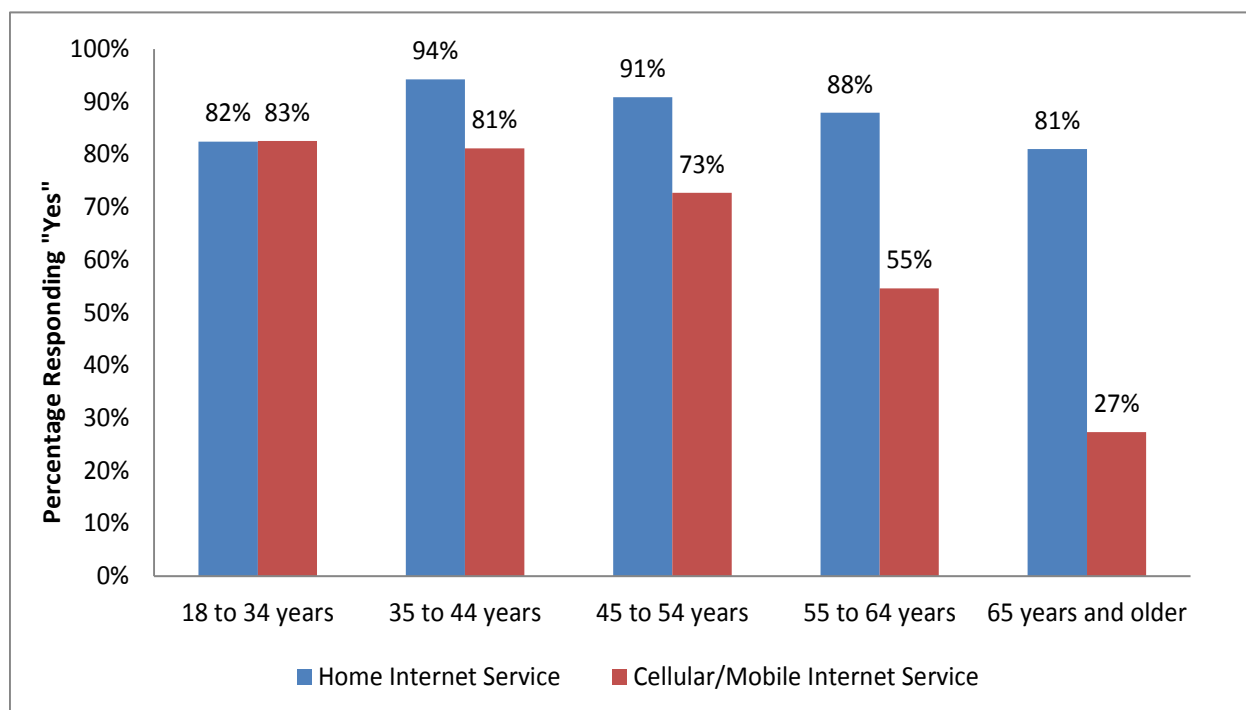


Figure 57: Internet Service by Education

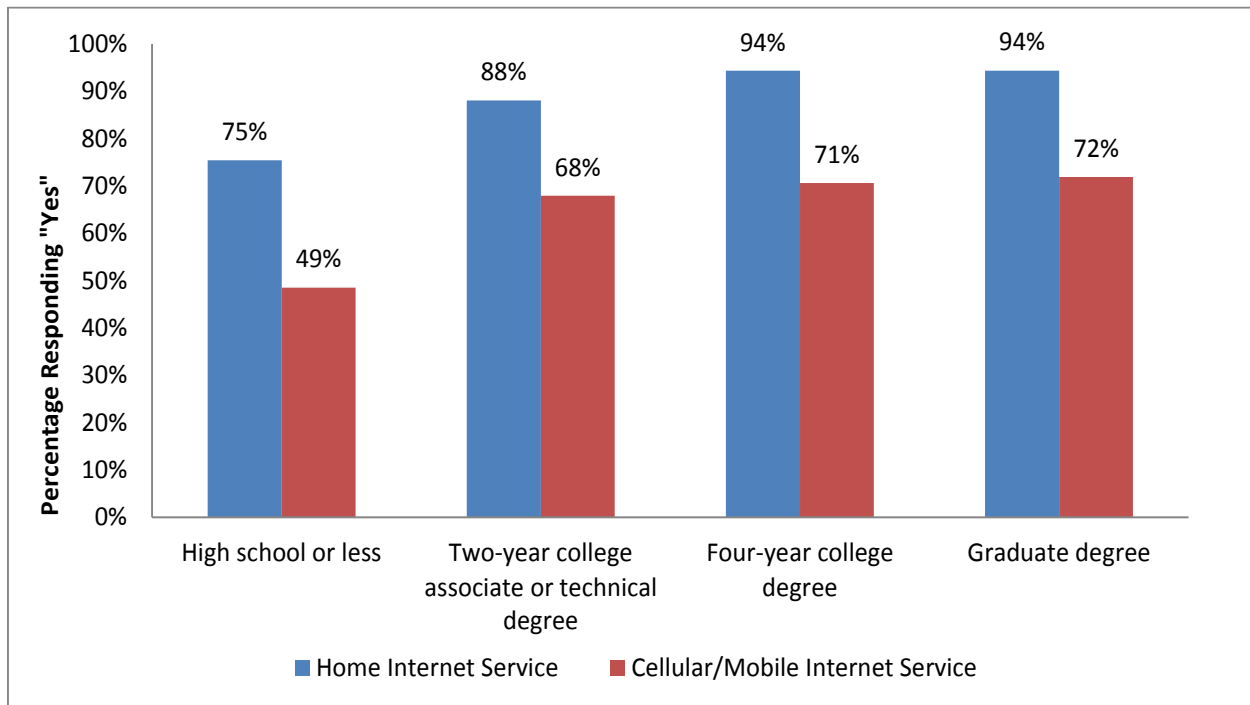


Figure 58: Internet Service by Number of People in Household

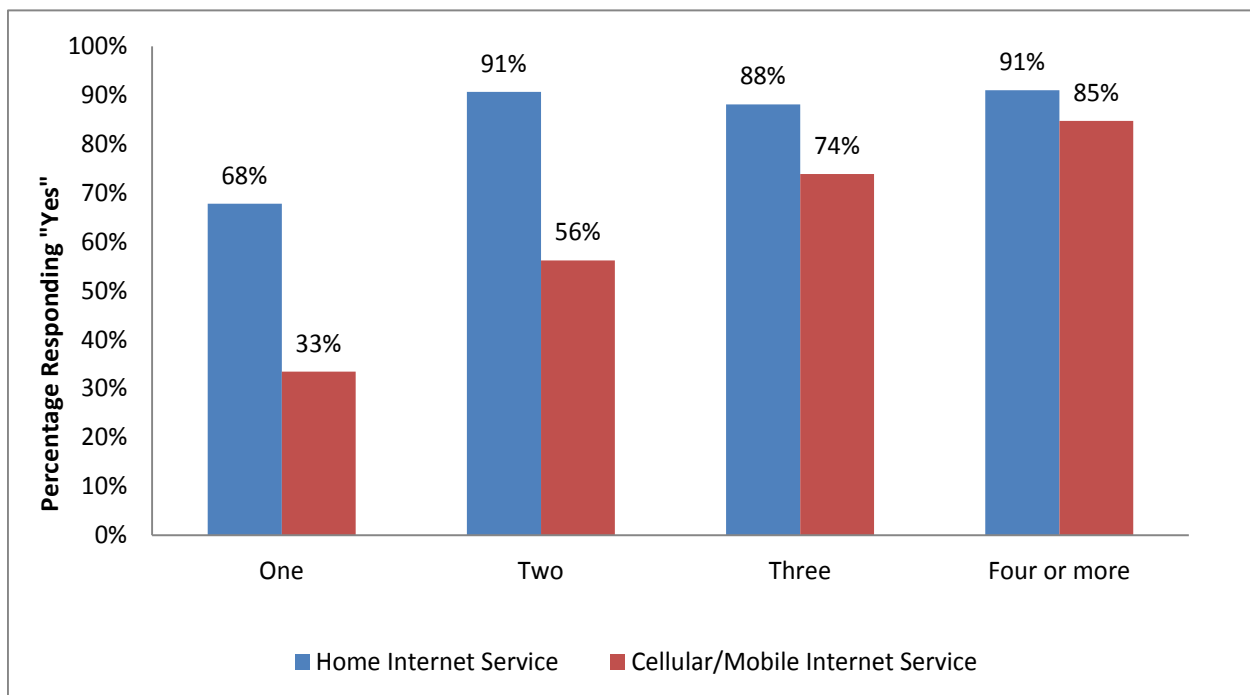
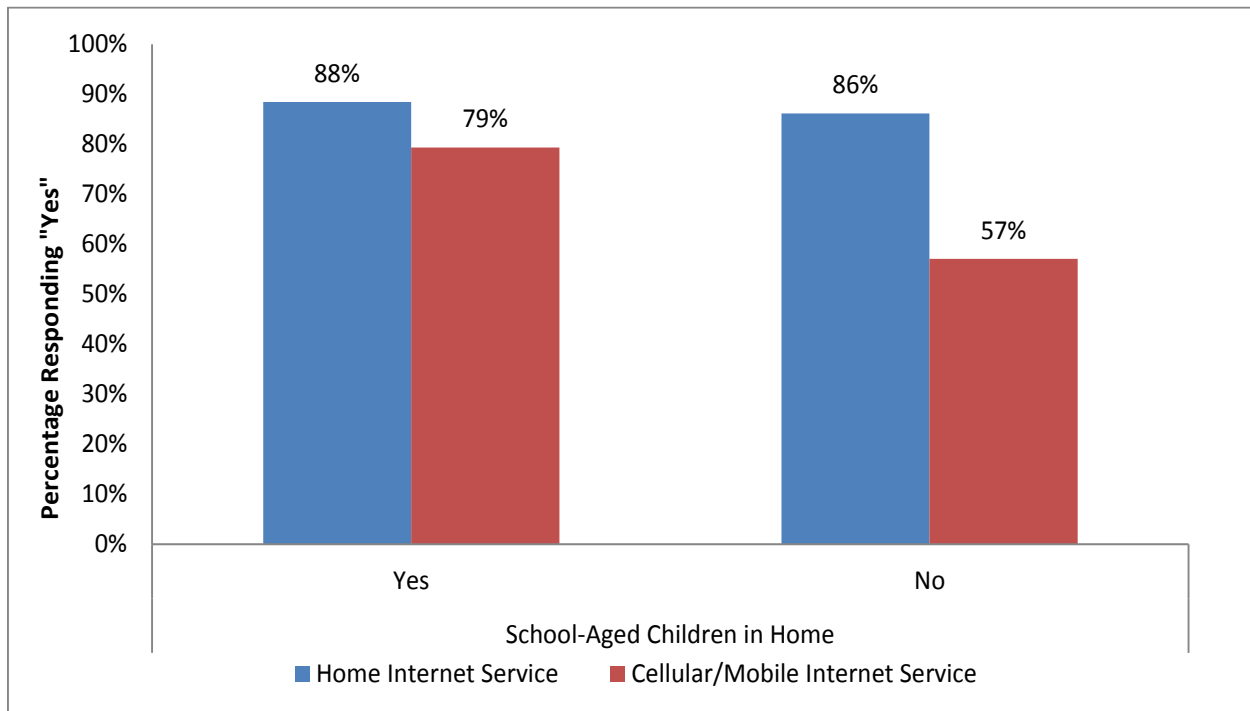


Figure 59: Internet Service by Presence of School-Aged Children in Household



Note that a greater correlation exists between the presence of school-aged children in the household and having mobile/cellular Internet service than having home Internet service. Figure 60 shows a map of respondents with and without children in the household, and whether they purchase a mobile data plan.

Figure 60: Map of Cellular/Mobile Users With and Without School-Aged Children

Residents With School-aged Children

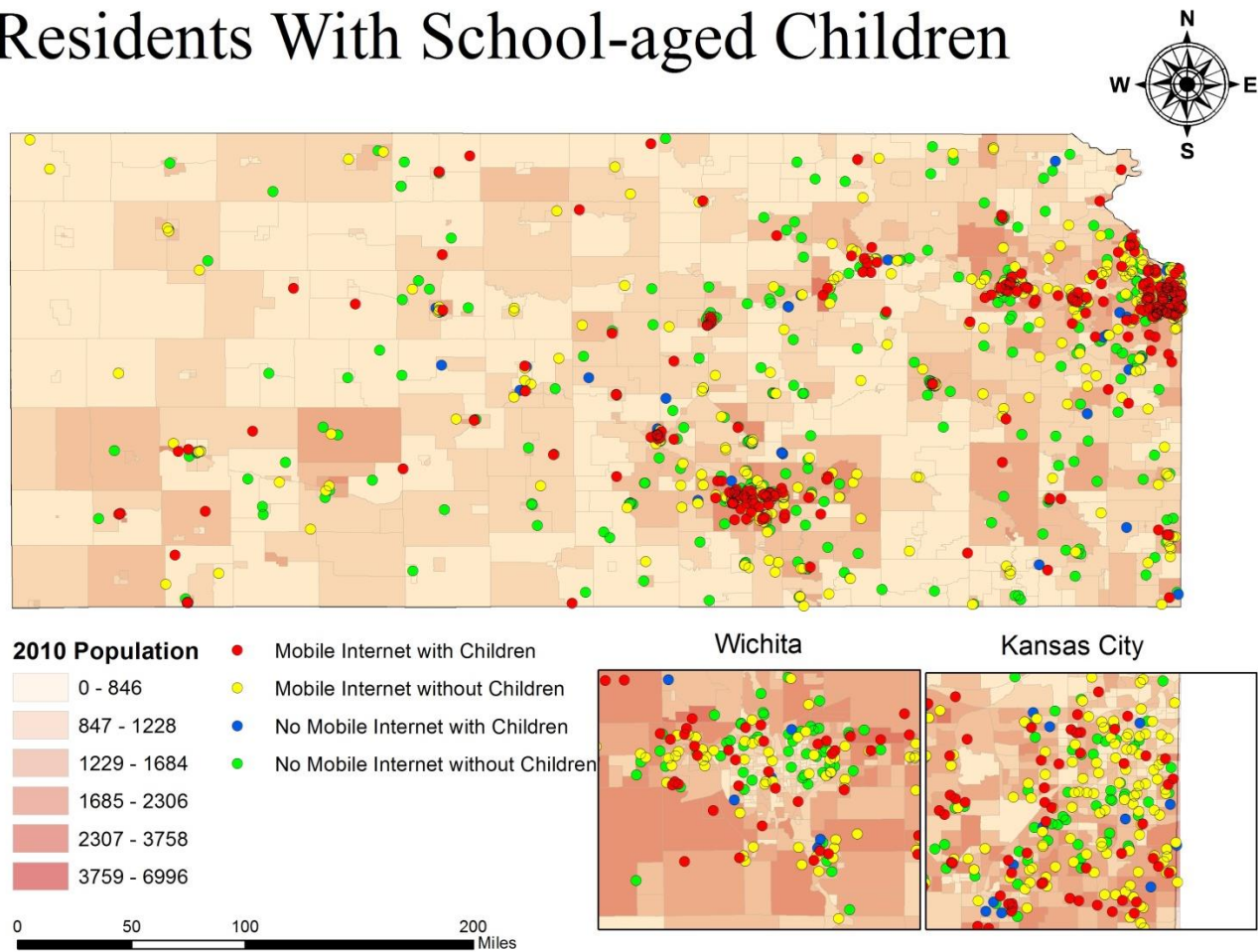


Figure 61: Internet Service by 2012 Household Income Level

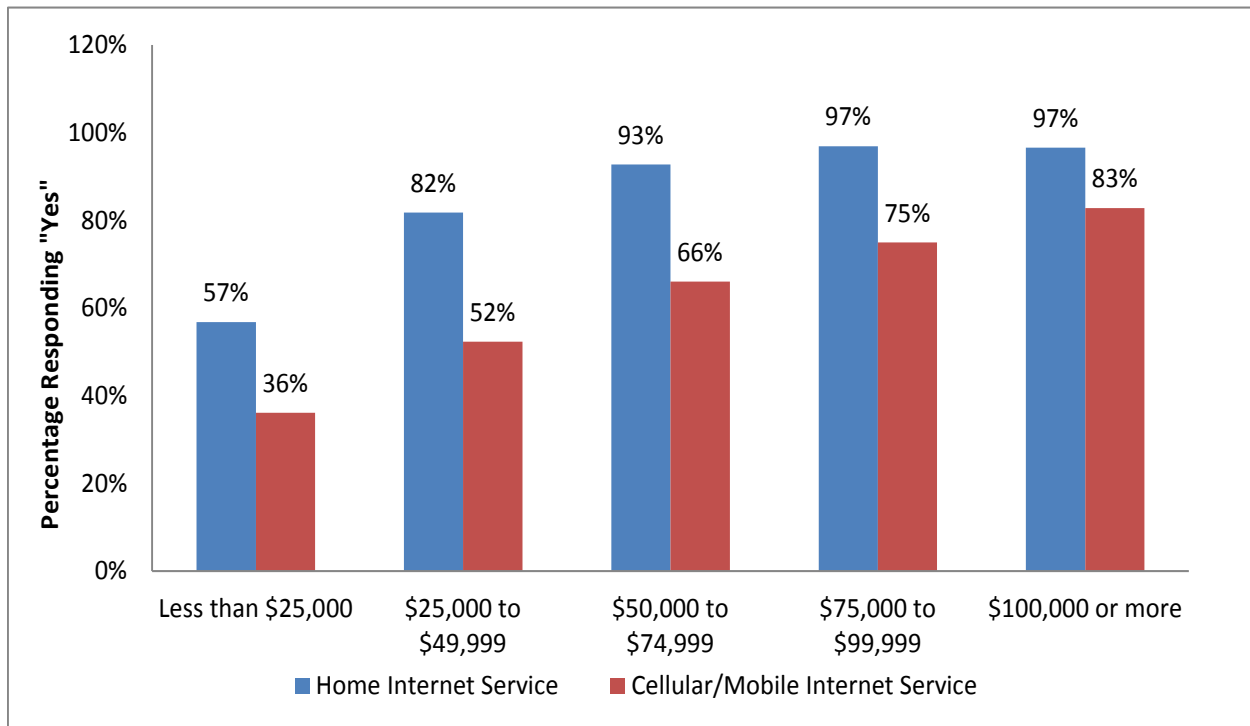


Figure 62: Internet Service by Home Ownership

