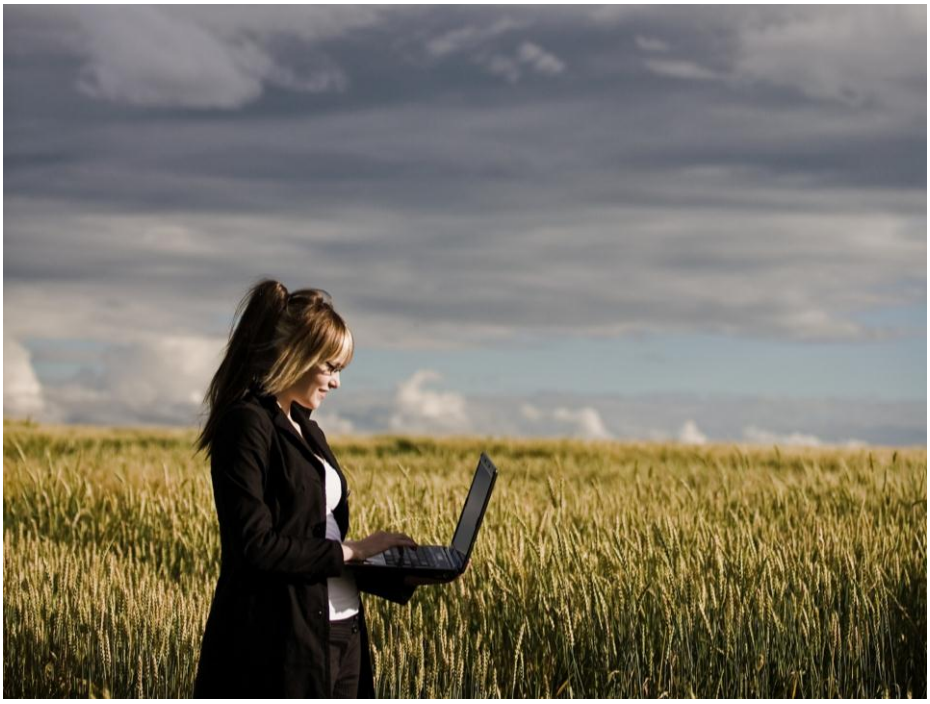
Broadband *KY*

e-Solutions Benchmarking Technical Report

Utilizations and Impacts of Broadband for Businesses, Organizations and Households



This report was prepared by Strategic Networks Group in partnership with Michael Baker Jr., Inc.

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Commonwealth of Kentucky Office of Broadband Outreach and Development

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This report is one of several deliverables that are part of the Kentucky Broadband Project, by the Commonwealth Office of Broadband Outreach and Development (OBOD), and managed by Michael Baker Jr., Inc. (Baker). Ongoing project reporting, outreach, field work, surveys, data analysis and development and map production incorporate information relating to the Commonwealth's Broadband availability, utilization and adoption in specific regions, including characteristics such as service provider data and coverage areas, industry and business data, and household demographics. The project derives from the American Recovery and Reinvestment Act (ARRA) of 2009; funded from the State Broadband Initiative (SBI), and administered by the National Telecommunications and Information Association (NTIA) for a five-year period from 01/01/2010 to 12/31/2014.

For certain project components, Baker contracted with Strategic Networks Group (SNG) to administer user surveys, and to tabulate, analyze and develop reports based on the collected survey data. The **Broadband KY e-Solutions Benchmarking Technical Report** on the following pages was prepared by Strategic Networks Group under contract and in partnership with Michael Baker Jr. Inc.

1 Introduction

This report presents the results of survey-based research carried out for the Commonwealth of Kentucky. The surveys collected information from businesses, organizations and households on the availability of broadband (high-speed Internet access) and its uses, benefits, drivers and barriers. The survey results provide insight into gaps and opportunities for increasing broadband utilization by organizations and households. The report focuses on key findings and data that will be useful in planning for broadband infrastructure and adoption initiatives in Kentucky.

The survey was deployed as a state-wide online process to document broadband utilization and connectivity among both organizations (commercial and non-commercial) and households. The survey explored these issues at a very detailed level, generating a large quantity of data, only the highlights of which are covered in this report.

This Broadband KY e-Solutions Benchmarking Technical Report (eSB Report) will be followed by a separate report on Broadband KY e-Strategies that includes recommendations for how Kentucky and its regions[1] can improve the utilization of broadband, thereby improving their economies and quality of life. The Broadband KY e-Strategies Report is for broader circulation, while this eSB Technical Report serves as a reference document for the client. In addition it should be noted that a large amount of the data collected through this initiative is available through an online platform (*Broadband KY* Digital Economy Analytics Platform - DEAP) which is accessible by the Office of Broadband Outreach and Development and designated stakeholders. An outline of the data and reports available through DEAP is included in Appendix 2.

The report is organized in the following sections:

[1] With guidance from the Kentucky Council of Area Development Districts, this report organizes the Commonwealth into five distinct regions: East (Big Sandy, Cumberland Valley, Kentucky River) , West (Green River, Pennyrile, Purchase), Central (Barren River, Lincoln Trail, Lake Cumberland), North (KIPDA, Northern Kentucky), and Northeast (Bluegrass, Buffalo Trace, Gateway, FIVCO).

Introduction and Methodology Overview – A brief description of e-Solutions Benchmarking initiative, together with a brief overview of the key methods used and scope of research and analysis.

Key Findings – Businesses and Organizations – Summary and highlights of information provided by businesses and organizations.

Key Findings – Households – Summary and highlights of information provided by households. Detailed appendices are included to provide supplemental reference information on survey deployment statistics and additional detailed charts and tables.

Kentucky Benchmarks for Analysis of Utilization of the Internet – Use of a benchmarking process (Digital Economy index -DEi) to compare Internet use between groups and regions by various characteristics, such as industry, business size, and household demographics. Benchmarks create reference points against which the performance of any individual or group can be compared.

Key Findings for Specific Sectors - Summary and highlights of sector specific uses of the Internet based on information provided by respondents belonging to one of the following sectors: farming, public Internet access sites, K – 12 Schools, public safety organizations, and local governments.

Methodology Overview

The core methodology is founded on primary research consisting of data collection through online surveys of businesses, organizations and households. Due to the distinct nature of the uses and benefits of different categories of Internet users, separate and distinct surveys are used for businesses and organizations (Business Survey) and for households (Household Survey). Information is collected directly from Internet users in the following categories: user profile, Internet utilization, Internet benefits and barriers to Internet use.

The surveys are made available for online access through one of two means:

- Individual organizations and households were invited to participate via direct email invitations sent from a large, state-wide contact list.
- In addition, organizations and households were encouraged through a variety of other communications channels to access a link to the survey through the website of the Office of Broadband Outreach and Development (OBOD).

An active public outreach and awareness campaign was carried out by OBOD and the Kentucky Council of Area Development Districts. This campaign included press releases from the governor and OBOD, media interviews, and engagement of stakeholder organizations (requesting that they endorse and promote the survey through their networks.

E-mail invitations were sent directly to 80,000 households and 19,000 organizations in Kentucky. Two contact lists were purchased from a national list provider. Surveys were deployed using direct email invitation to households and organizations providing access to online surveys. The initial email invitations were sent initial on February 8th, 2012, followed by four reminder emails. The surveys were closed on March 27th.

A total of 2,231 organizations and 4,122 households contributed to the broadband benchmarking effort.

2 Key Findings – Businesses and Organizations

The analysis of responses identifies key findings related to Internet usage, benefits and barriers, with selected results broken down by key respondent characteristics such as industry sector, employment size and connectivity type.

2.1 RESPONDENT PROFILE

The sample set outlined in this report includes data from businesses and organizations across the state. In addition, the sample includes survey responses from businesses and organizations across all 20 industries classified by NAICS.[2] This profile includes commercial businesses and non-commercial organizations, such as government entities, educational institutions and non-profit organizations.

Figure 1 shows the distribution of organizational responses by region, compared to each region's share of the state population. The North region is somewhat under-represented, while the West is over-represented. This is in part a reflection on the survey emphasis on less urban regions. To achieve response rates more representative of the state's actual population distribution, a simply weighting process can be carried out. This report does not include any weighting.

Figure 1 – Organization Survey Responses by Region

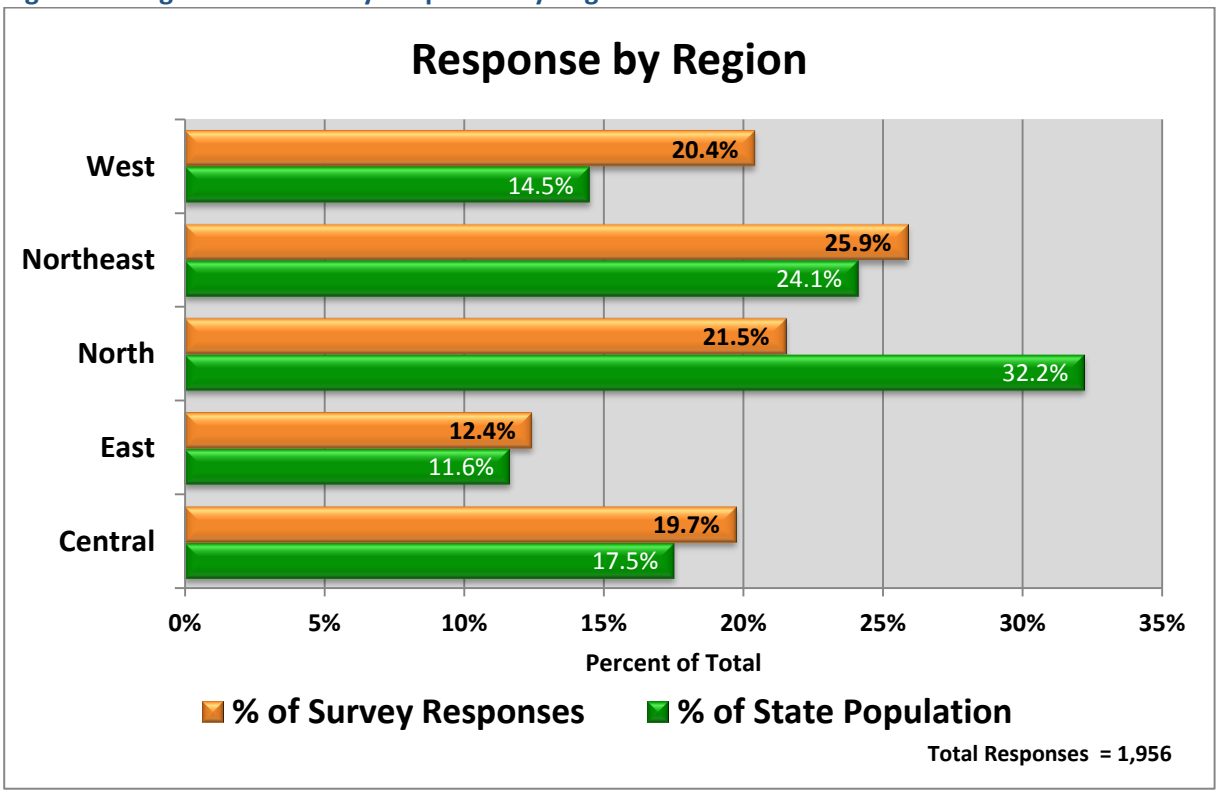
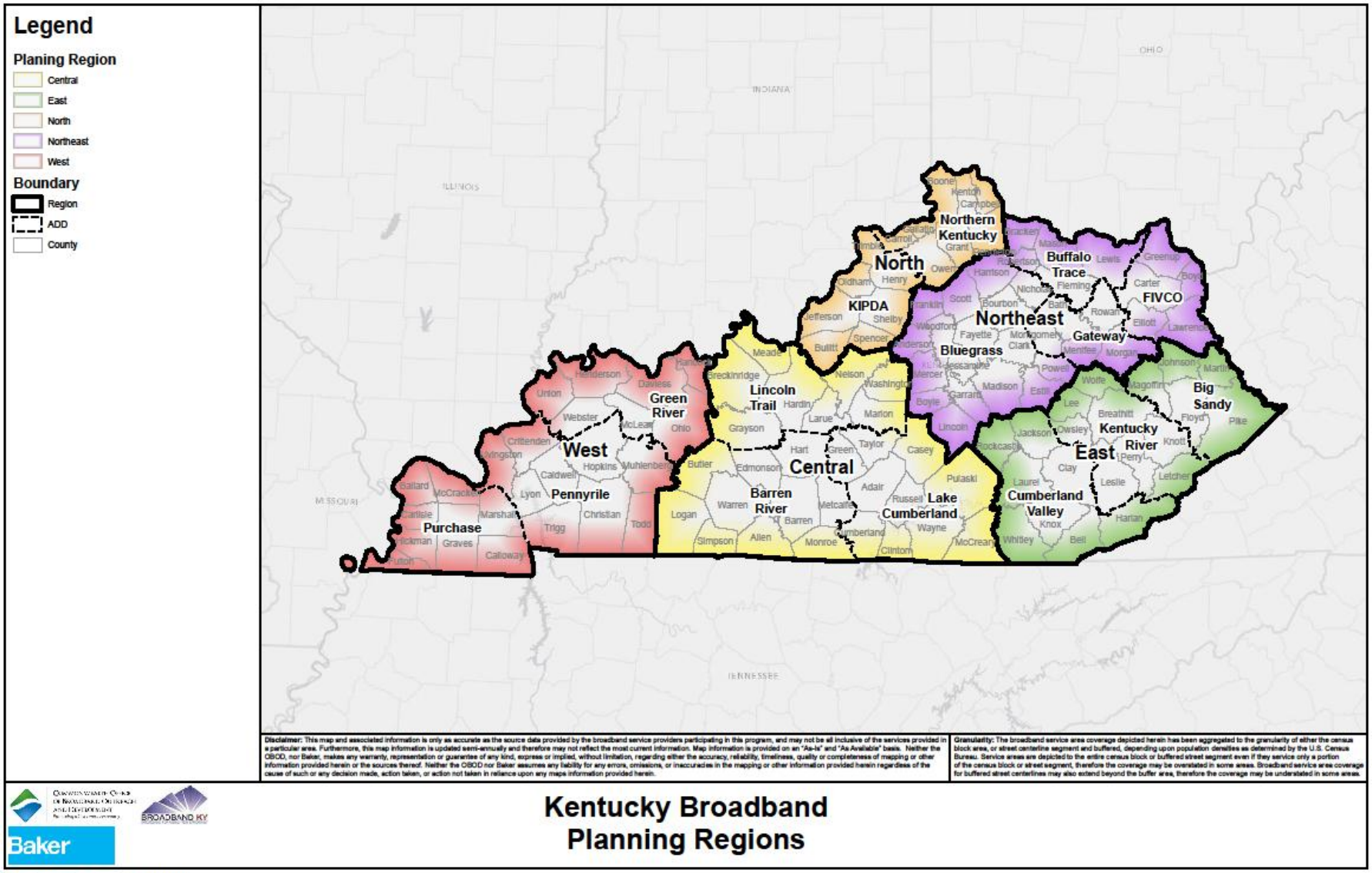


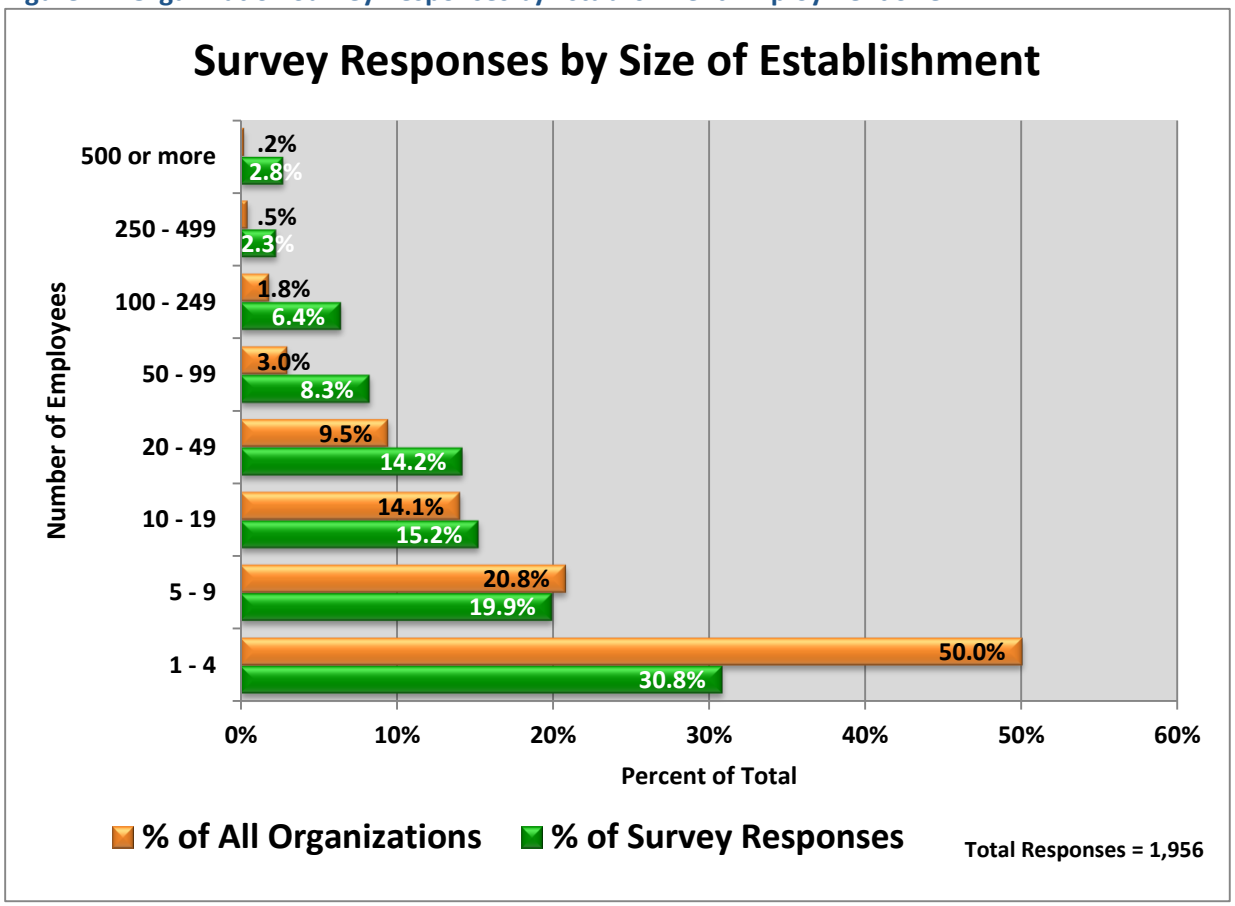
Figure 2 shows the breakdown of survey responses by size of establishment, as measured by number of employees. The chart provides a comparison to the state profile of establishments.

[2] North American Industry Classification System. Industry breakdowns are at the 2-digit NAICS code level. Some survey responses did not have an industry classification.



Map data current as of December 31, 2011

Figure 2 – Organization Survey Responses by Establishment Employment Size



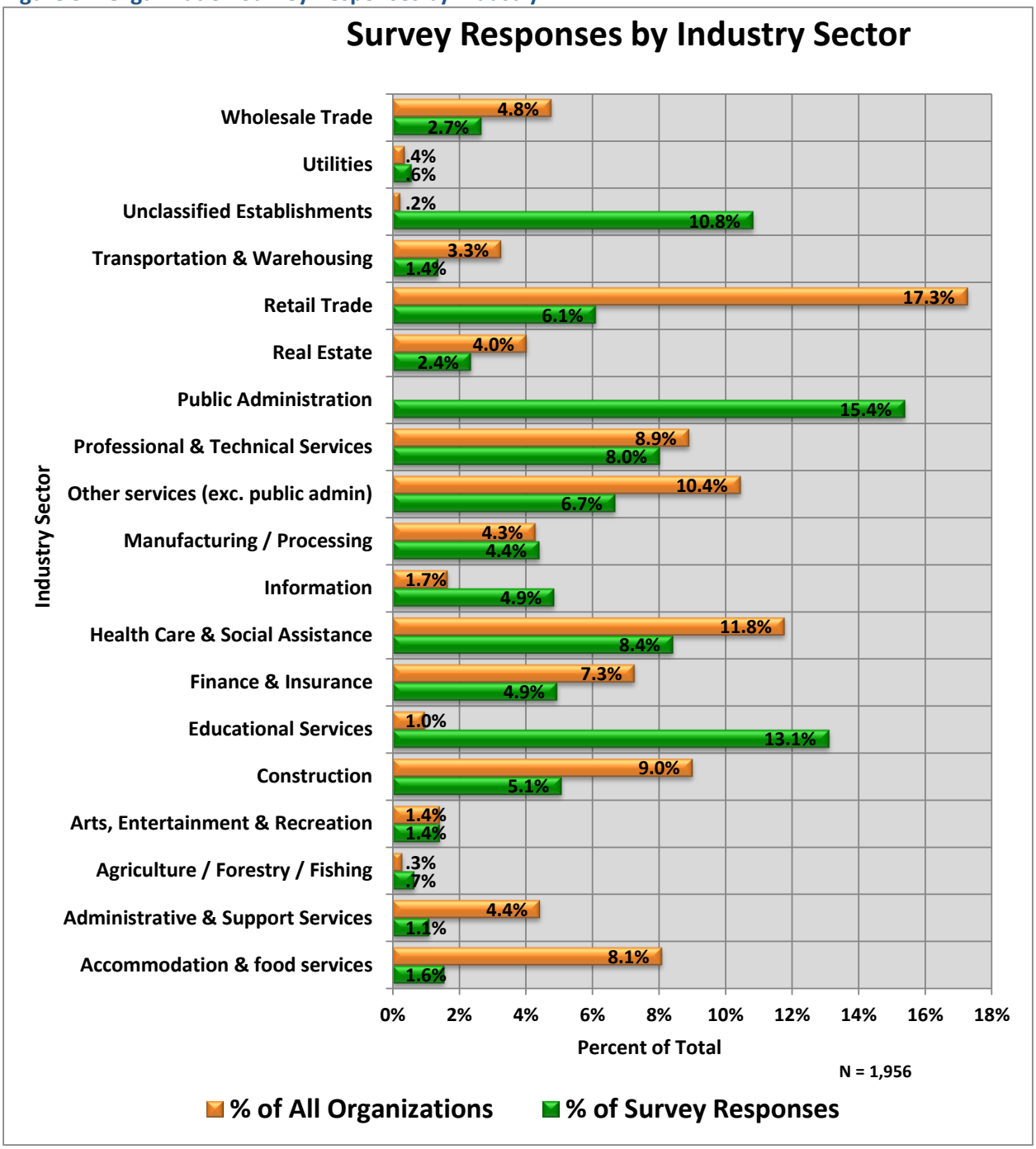
Medium to large organizations are over-represented. Micro enterprises (those with 4 or less employees, are under-represented, though they still make up over 30% of the entire sample.

Figure 3 provides a comparison of survey responses to the industrial profile of Kentucky. The sample resulting from the survey is under-represented in retail trade, construction, accommodation and food services, and administration and support services. Survey respondents were over-represented in Information, Education, and Unclassified establishment. State profile data does not include data for Public Administration. [3]

The survey also collected information from organizations that are often referred to as Community Anchor Institutions. These include: K – 12 schools (196 responses); local government bodies (159), health services (139), state and federal entities (139), postsecondary institutions (134), economic development agencies (71), libraries (66), public safety organizations (65).

[3] State data source: US Census Bureau County Business Patterns 2009 – Number of establishments. percentages shown for sample do not include Public Administration in the totals for comparative purposes.

Figure 3 – Organization Survey Responses by Industry



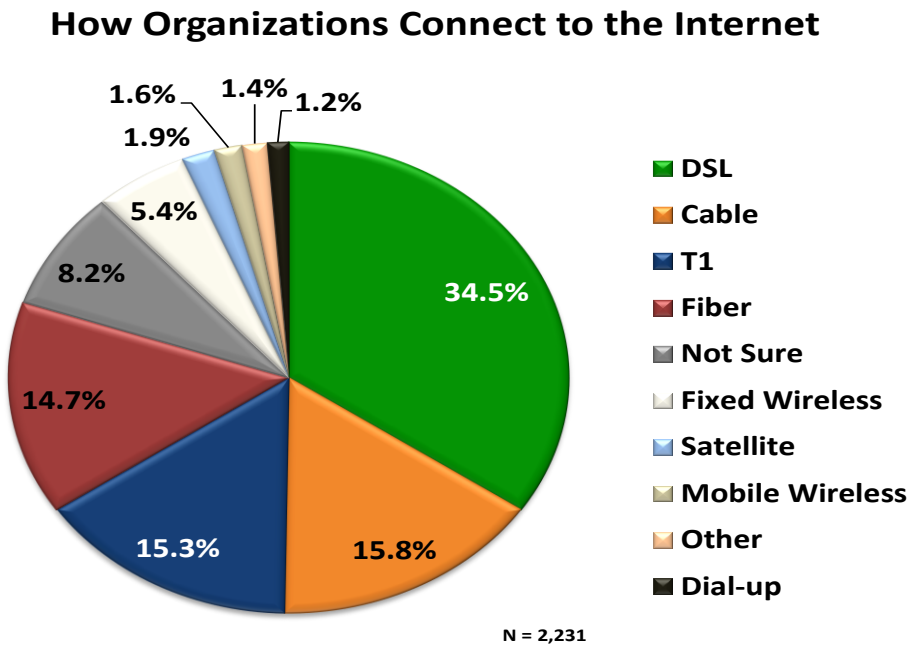
2.2 CONNECTIVITY CHARACTERISTICS

The survey sample includes a broad mix of Internet connectivity technologies, including a small number of organizations using dial-up Internet connections. Use of broadband services is very high across all types and locations of businesses and organizations. Over 98.8 percent of responding businesses and organizations have connectivity other than dial-up, but many still lack broadband level connections in at least one direction (broadband speeds as defined by the Federal Government - 768kbps in at least one direction).

Access Technology

1. A small percentage of organizations use dial-up (1.2 percent) and satellite (1.9 percent) connections as their primary connect.
2. Internet services using DSL (43%) and cable (19.7%) are the predominant technologies used by small enterprises (less than 20 employees). Only 20.4 percent of medium-sized (100–499) enterprises use either DSL or cable services.
3. The use of fiber Internet technologies increases steadily with business size and is the predominant technology for organizations with more than 500 employees.

Figure 4 – How Organizations Connect to the Internet

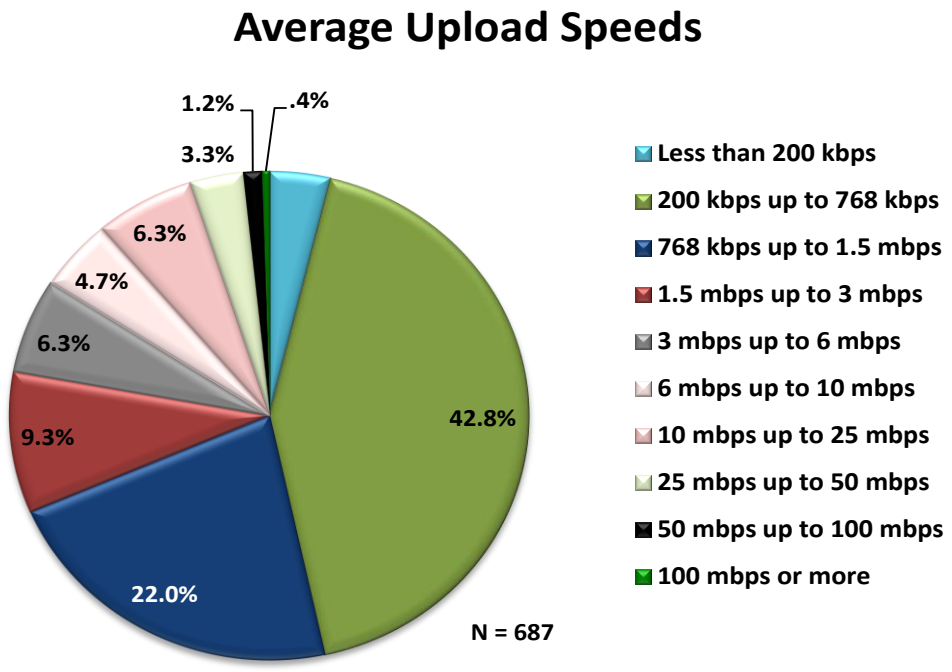


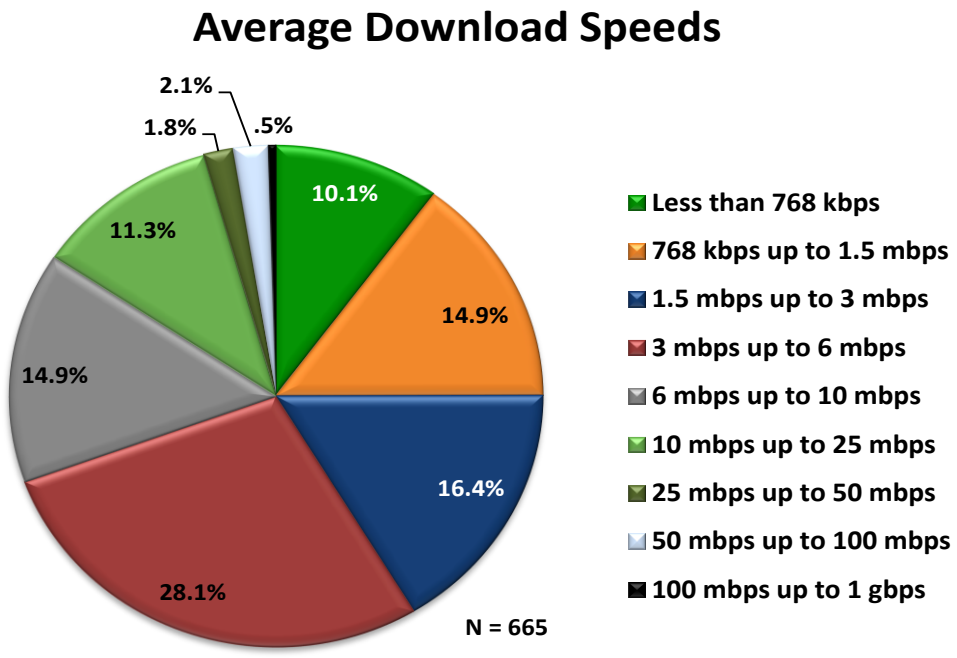
The survey included an opportunity for respondents to take a live speed test that assessed their actual up-load and down-load speeds. The speed test utilized is one also used by the FCC. Over 655 organizations took the speed test, results of which were automatically entered into the survey.

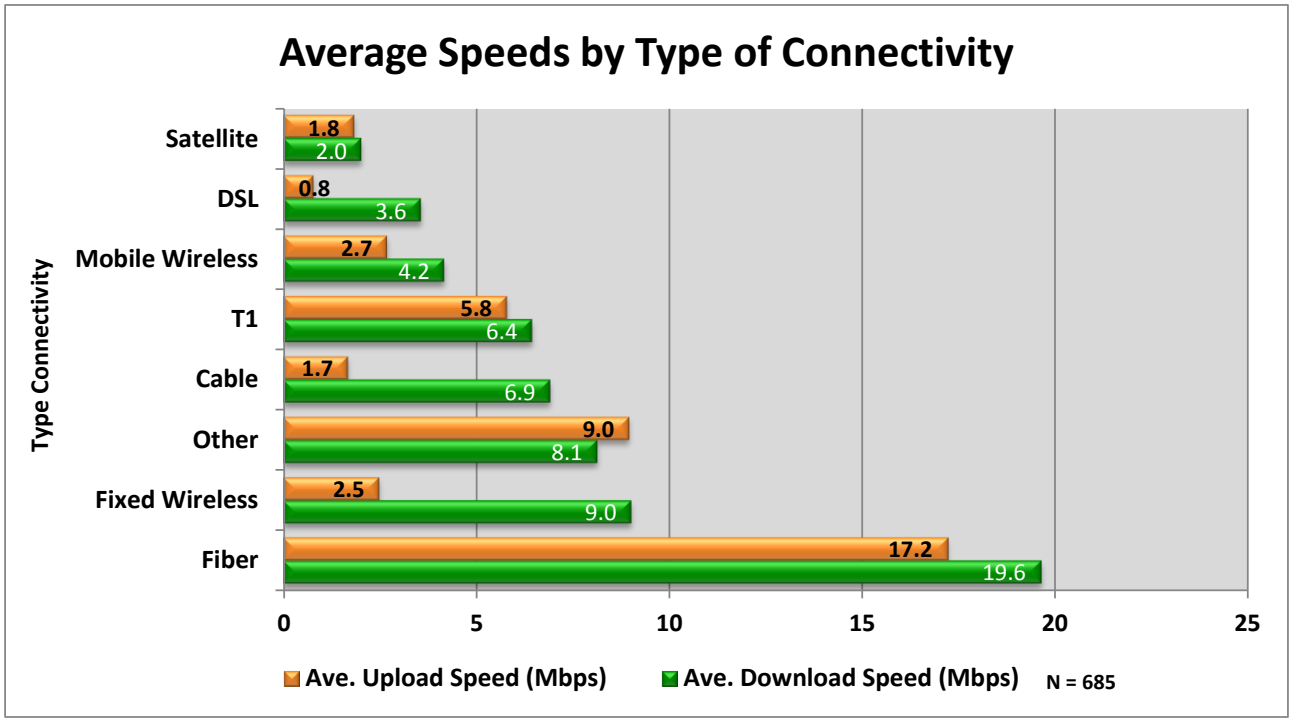
4. While connectivity speeds failed to meet the FCC definition of broadband (768kbps or more in at least one direction) for only 10.1 percent of respondents, a full 46.6 percent of those taking the speed test had upload speeds of less than 768 kbps.

5. There were significant differences in speed test results between different technologies, with fiber the winner by a wide margin. Fixed wireless, cable and T1 connections formed the second fastest tier of services, while DSL and satellite recorded the slowest speeds.

Figure 5 – Speed-Test Results – Organizations







Cost

6. The monthly expenditures of Internet connectivity increase with organization size. Over 76 percent of very small establishments (1 – 4 employees) spend less than $100 per month, while 50 percent of establishments with 100 or more employees spend $1,000 or more per month.
7. Between 60 and 70 percent of DSL, cable, fixed wireless and satellite users spend less than $100 per month. At the opposite end of the scale, over 25 percent of fiber users pay $2,000 or more per month.

Satisfaction

8. Of the non-dial-up technologies, fiber is considered the most reliable and satellite the least reliable with 32 percent of establishments with satellite service reporting frequent problems.
9. While 26 percent of respondents felt that the value of their Internet service was poor or below expectations, this number increased to 82.4 percent of satellite users.
10. Cable, fixed wireless and DSL were closely rated in terms of reliability and value.
11. Fiber is considered the best value of all technologies despite its higher average monthly cost.

2.3 BROADBAND UTILIZATION AND BENEFITS

2.3.1 Utilization Patterns

The extent to which organizations use e-solutions[4] provides an indication of their engagement in the digital economy and their leveraging of broadband capacity. The following findings summarize the uses of broadband by businesses and organizations with breakdowns by organizational characteristics.

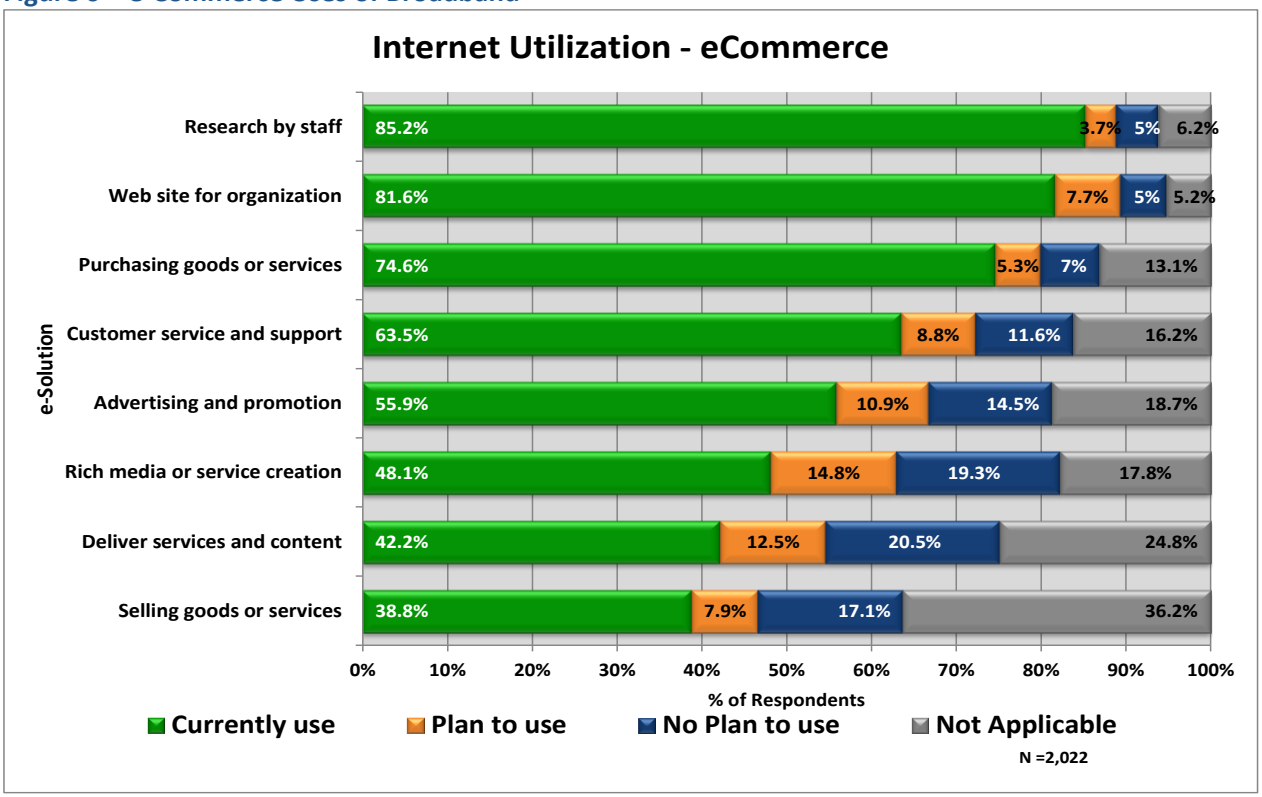
Utilization of Internet-enabled applications and operations is still very much an evolving process. Simpler processes that have been available for a long time are heavily accessed across all types of users – e.g. email. Differentiation in utilization patterns emerges as more complex business and transactional processes come "online", and more current technologies spawn enhanced or new process capabilities – e.g. social networking and social sites. The two most significant factors in utilization levels are size of organization and industrial classification to which an organization belongs.

The survey of businesses and organizations explores the uses of the Internet in two major categories:

e-Commerce uses, which include activities related to the sales, marketing and delivery of products and services; and,

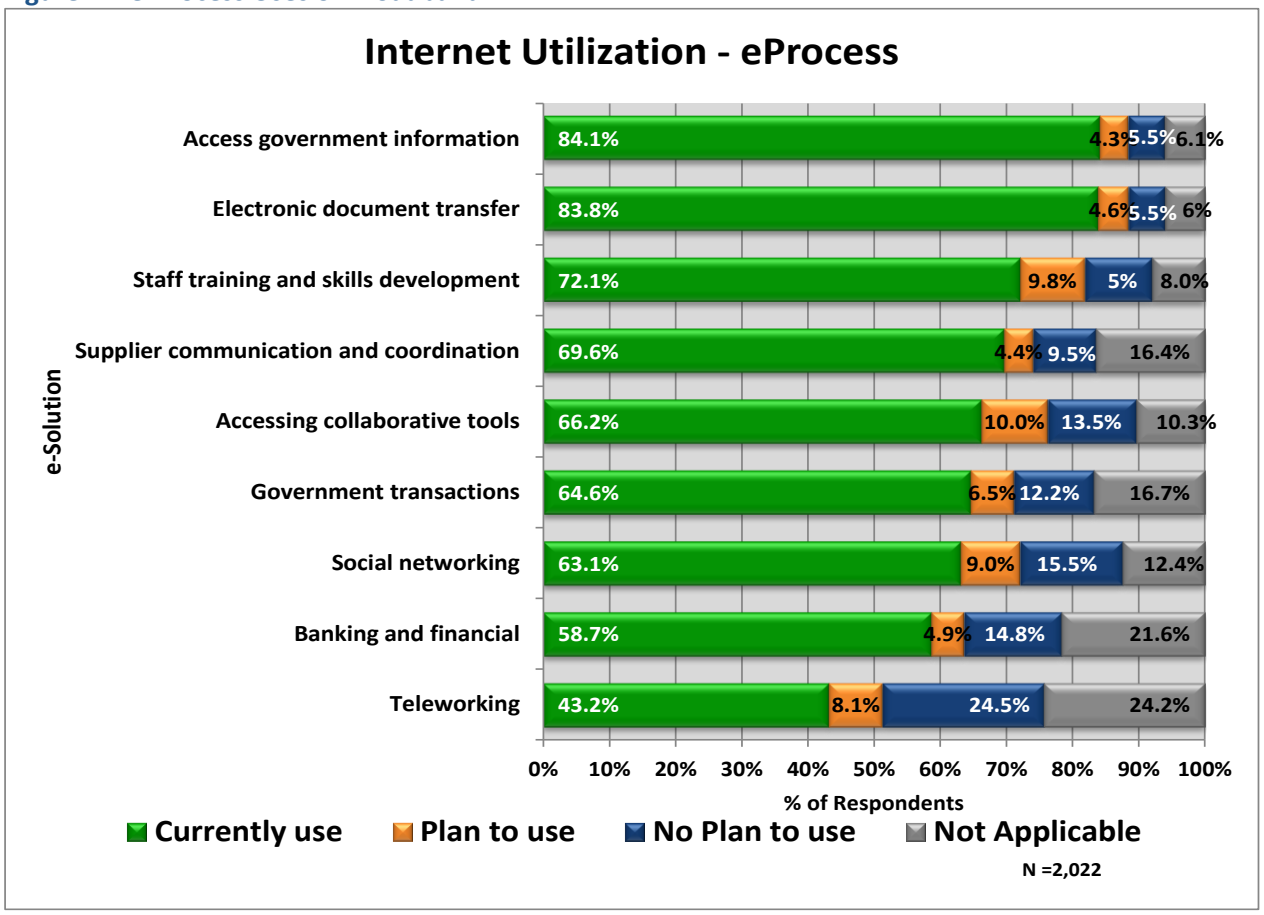
e-Process uses, which include internal operational uses, such as supplier coordination, training and teleworking.

Figure 6 – e-Commerce Uses of Broadband



[4] **e-Solutions** refers to the integration of Internet technologies with the internal computer-based systems and applications within or among organizations for a variety of operational processes. Please see Glossary in the appendix for an explanation of other terms used in this report.

Figure 7 – e-Process Uses of Broadband



Uses: Current

1. Almost 75% percent of organizations use the Internet to purchase goods and services online. In contrast, only 38.8 percent of organizations sell goods and services online.
2. Commercial businesses use the Internet to a higher degree for selling products online (54.8 percent). However, nonprofit (30.3 percent) and government organizations (15.2 percent) also use the Internet to sell their services.
3. Broadband offers uses that can transform how organizations conduct their operations. Almost 70 percent of organizations use broadband for coordination with suppliers, while over 72 percent use broadband for employee training and another 63.5 percent for improving customer service.
4. Broadband utilization increases with employment size.

Uses: Future

1. Where smaller organizations lag in current utilization, they often show higher levels of planning for utilization, indicating a tendency for smaller organizations to try and catch up with larger organizations over time. Experience from earlier surveys is that these intentions do in fact translate into a shrinking gap in utilization between smaller and larger organizations.
2. These breakdowns uncover variation in utilization by organizational characteristics. Where there are large gaps in utilization between organizations grouped by industry, size or length of broadband experience, there are opportunities to target adoption effort to increase utilization.

3. Some e-solutions such as research, document transfer, and accessing government information online, show immediate high levels of use with little change over time. Other e-solutions show a distinct upward trend over time, either as a result of increasing familiarity with broadband capabilities or due to certain e-solutions being more complex and sophisticated.
4. The two areas with lowest current utilization (service delivery and rich media content) also have the highest level of planned use.

2.3.1.1 Broadband Utilization by Length of Broadband Use

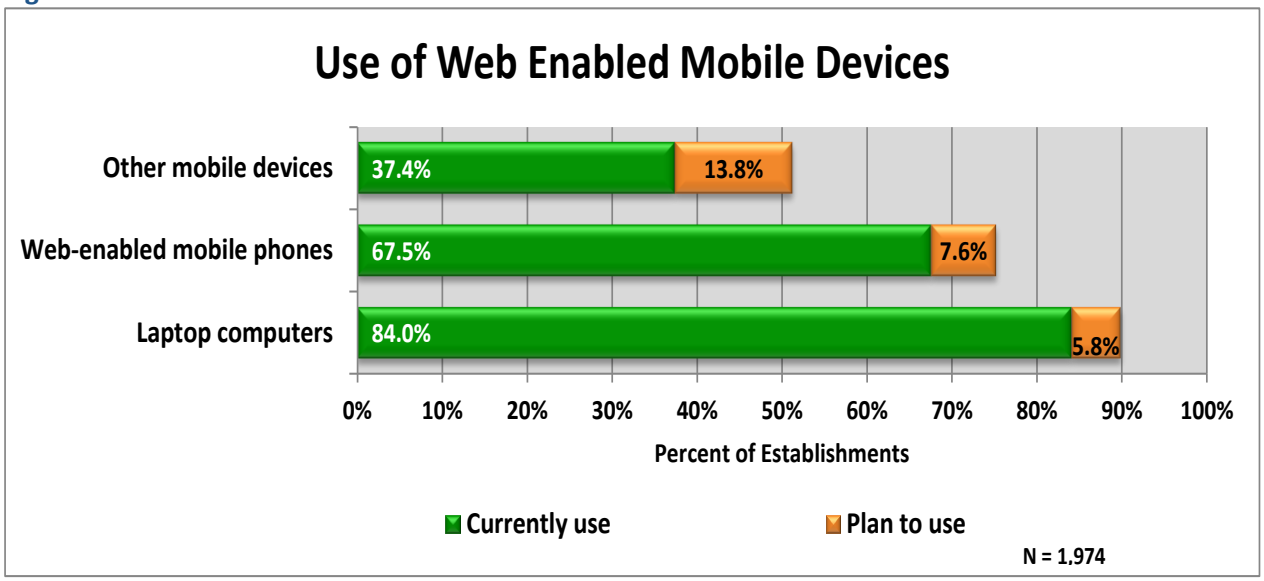
The majority of organizations have been using some form of broadband connectivity for more than five years. Some e-solutions show immediate high levels of use with little change over time, such as research, document transfer and access to government information online. Other e-solutions show a distinct upward trend over time, either as a result of increasing familiarity with broadband capabilities or due to certain e-solutions being more complex and sophisticated. E-solutions such as teleworking, collaboration, and online service delivery may take organizations more time to evaluate their benefits and to determine the most appropriate solutions to implement. In addition, some e-solutions have greater implications on internal business processes than others, such as staff training, supplier coordination and customer service.

These trends have strong implications for broadband planning and adoption strategies as they demonstrate that the impacts of broadband deployments are not always immediate and need time to develop.

2.3.1.2 Utilization of Mobility Services

Organizations provided the following information on the utilization of mobility devices for Internet access and the importance of mobility functions to their organizations.

Figure 8 – Use of Web-enabled Mobile Devices



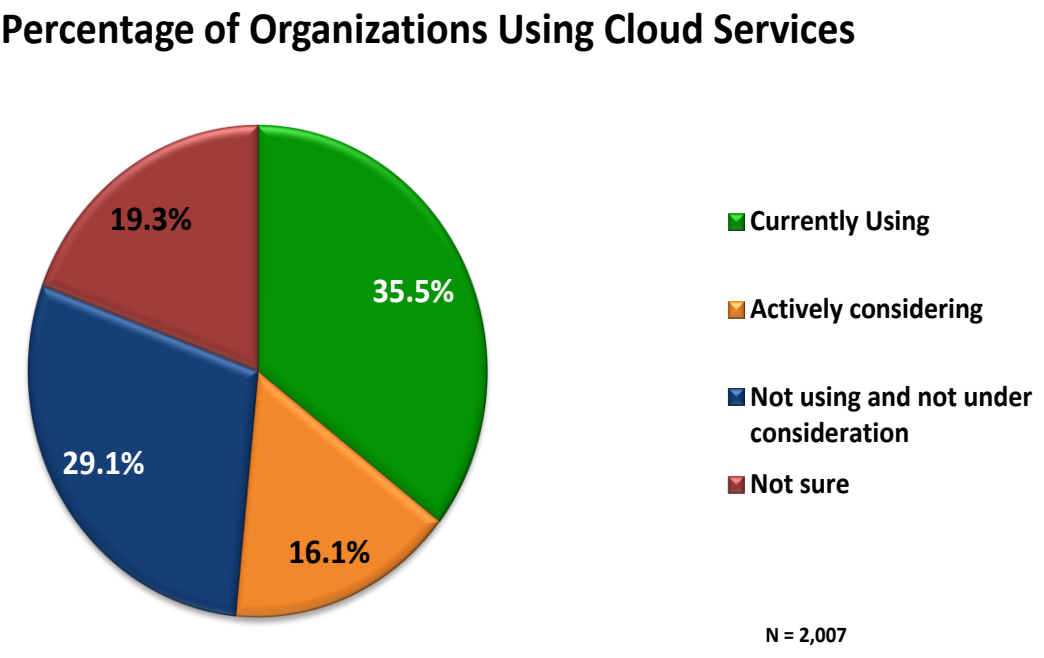
Over 84 percent of organizations use some form of web-enabled mobile device, with 84 percent using a web-enabled laptop computer, closely followed by web-enabled mobile phones (67.5 percent). There are significant differences in use of mobile web access across industry sectors. The most frequent mobile

use of the web can be found in the Education, Manufacturing, Professional and Technical, and Real Estate. Accommodation and Food, and Public Administration tend to have lower than average use of mobile web access. The highest use of mobile web access is for research, closely followed by communication.

2.3.1.3 Cloud Services

With the rapid recent growth in cloud based services, the survey probed how many organizations were using these services and for what purposes. Over one third of respondents indicated that they were already using cloud based services, with another 16 percent actively considering them. The larger the organization, the more likely it uses cloud application. Organizations with 100 or more employees are twice as likely to use cloud applications

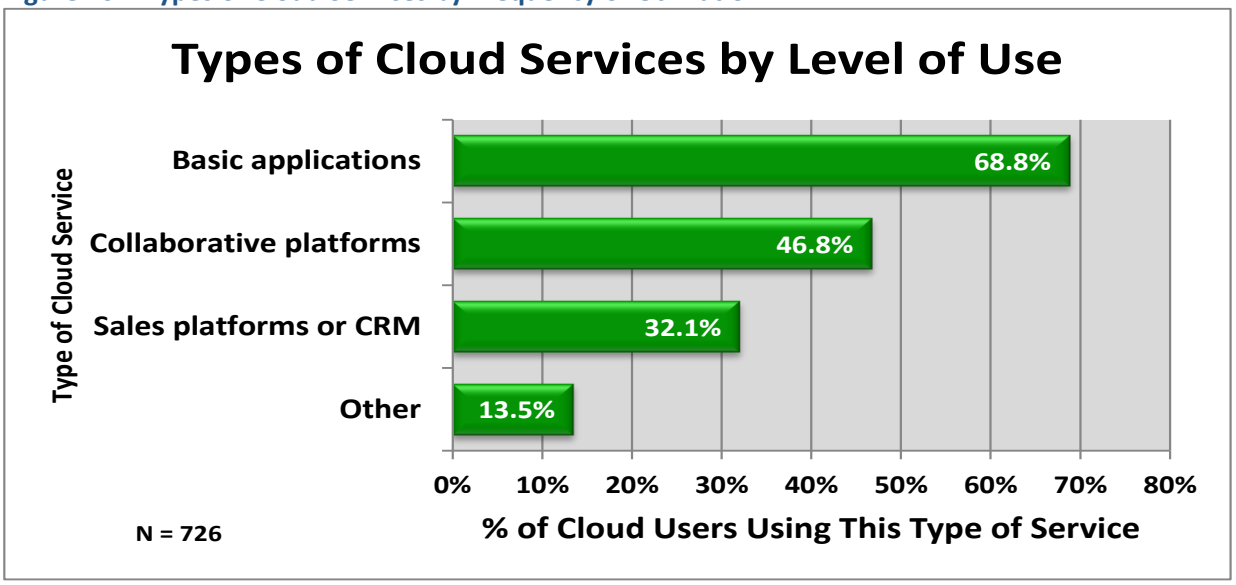
Figure 9 – Percentage of Organizations Using Cloud Based Services



Cloud based services are most frequently used for basic applications (e-mail, word processing, etc.), with 68.8 percent of cloud service users. Collaborative platforms[5] that provide for were the second most used cloud based type of service, at 46.8%.

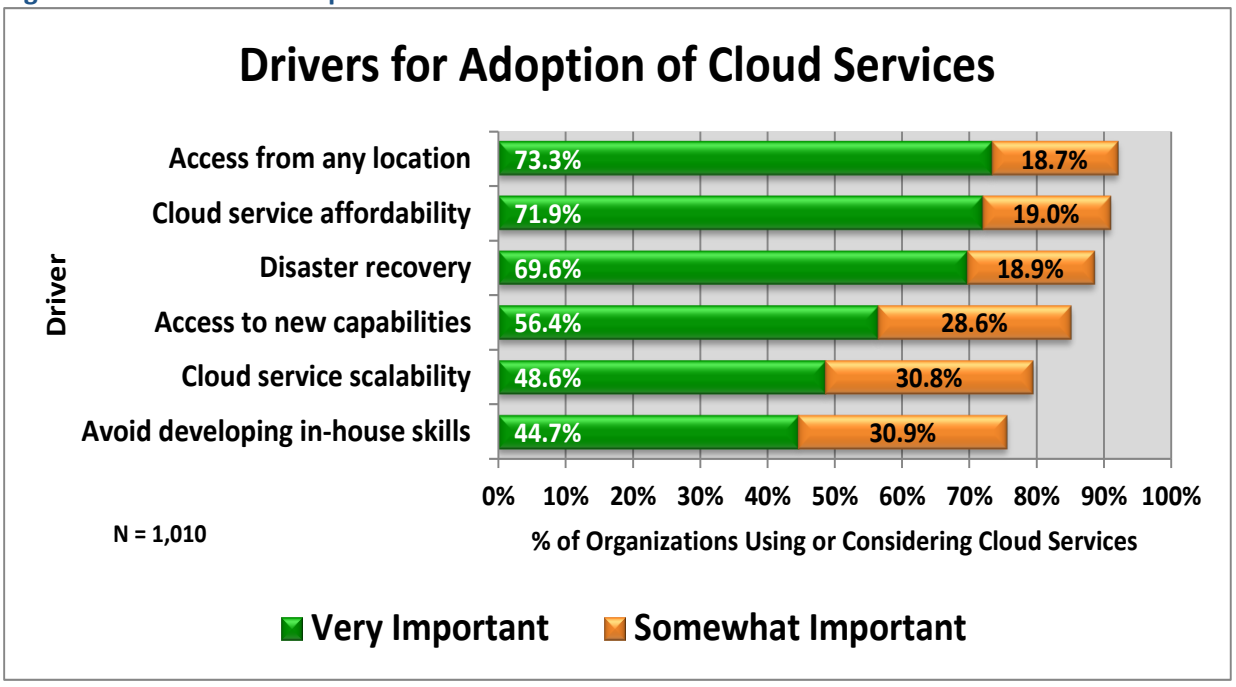
[5] "Collaboration platforms integrate a range of software components that enable groups of individuals and organizations to work together on common tasks or projects. Typical components are messaging (email, calendars and scheduling), file sharing with version control, and real-time communication (e.g., instant messaging and Internet conferencing).

Figure 10 – Types of Cloud Services by Frequency of Utilization



There are a broad mix of motivations for utilizing cloud based services, with all six possible motivating factors offered being identified as very important or somewhat important by over 75% of cloud services users (see Figure 11). The two most frequently cited drivers were mobile access to the Internet and affordability.

Figure 11 – Drivers for Adoption of Cloud Services

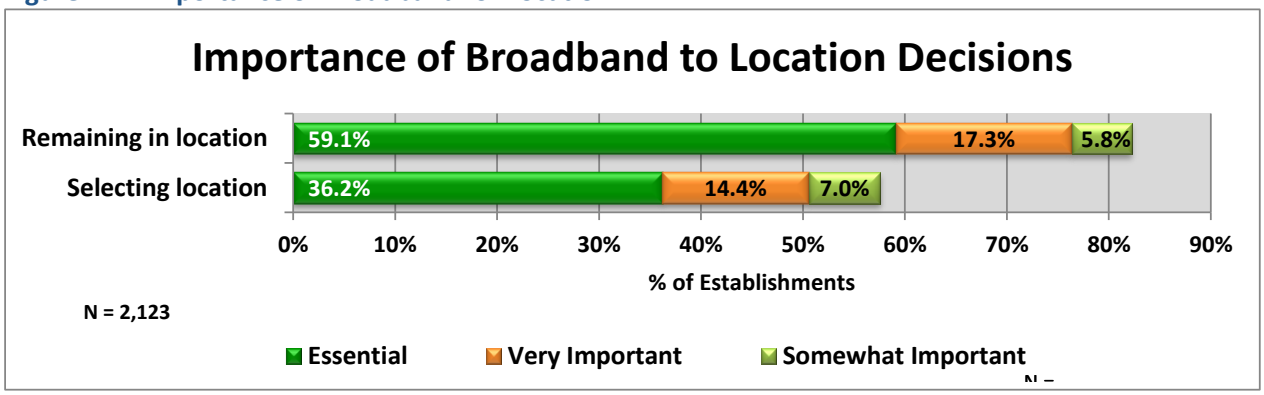


2.3.2 Broadband and Deciding Where to Locate

To provide a perspective on the impact of broadband, organizations were asked about the importance of broadband for both selecting their location and for remaining in their current location. Responses to the survey clearly indicate that availability and suitability of broadband play an important role in corporate decisions to remain in a community, and if an organization is moving, which areas it is willing to consider.

Over 36 percent of organizations say that the availability of broadband services was "essential" for selecting their business location, and over 59 percent say broadband is "essential" for remaining in their current location. These statistics are relatively unaffected by the size of organization.

Figure 12 – Importance of Broadband for Location



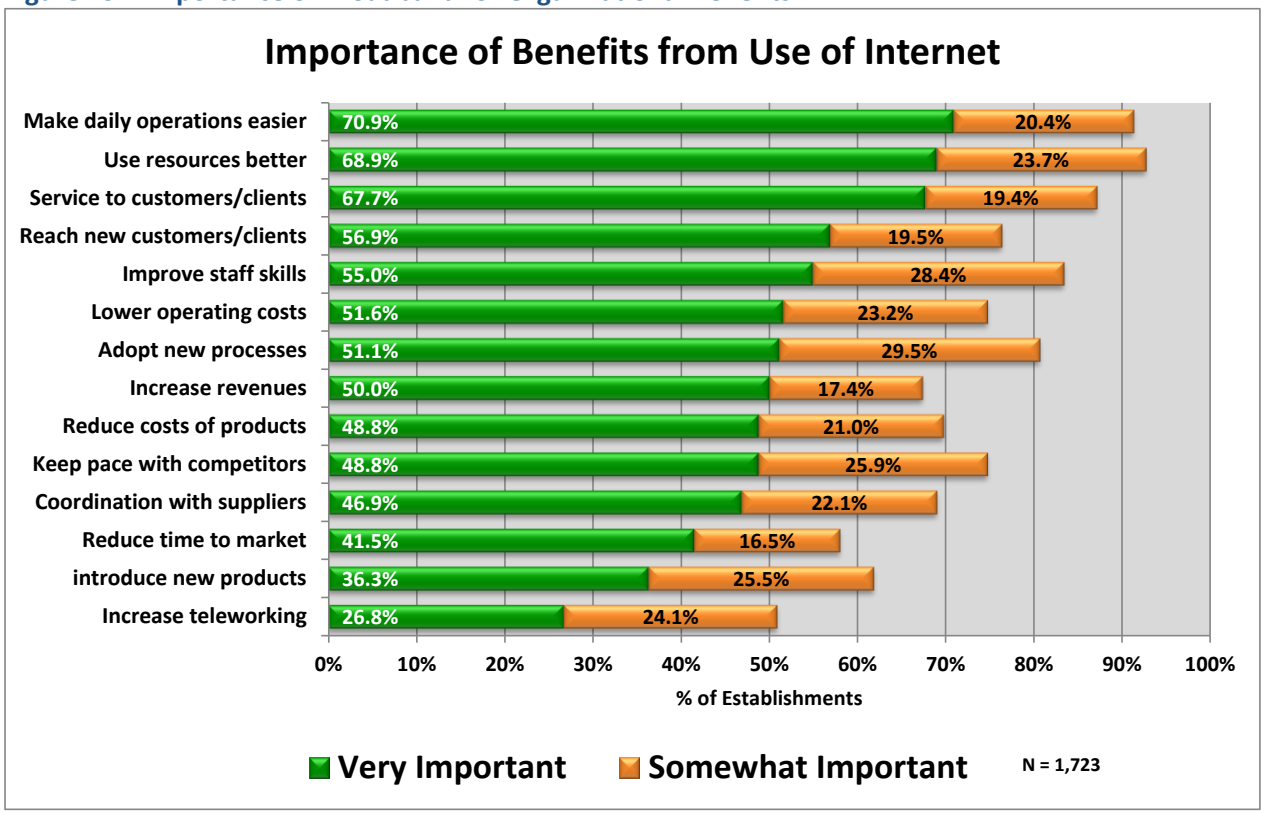
2.3.3 Broadband Benefits and Impacts

While understanding patterns of utilization of broadband helps to identify gaps and opportunities for increased adoption of e-solutions, it is equally important to understand the benefits and impacts of broadband utilization on businesses and organizations.

Overall, the majority of organizations recognize broadband as "very important" or "somewhat important" across all benefits dimensions (see Figure 13). The most generally recognized benefits are related to improved efficiency and productivity. The most recognized external-facing benefit of broadband is improving service to customers. Productivity-related benefits are recognized by more organizations than the revenue-related benefits, such as market reach, competitiveness, increasing revenues, and introducing new products.

The net effect of these benefits is to increase competitiveness and productivity and, where applicable, increase organizational revenues, reduce costs and improve profitability. Understanding the perceived importance of broadband in contributing to these benefits provides an indication of its impact.

Figure 13 – Importance of Broadband for Organizational Benefits



In comparing the importance of broadband by the three major sectors (business, nonprofit and local government), the difference in how broadband delivers benefits between commercial business and less-commercial organizations becomes apparent. The top three benefits remain the same for all three sectors. However, market reach, revenue, and competitiveness take on more significance for commercial businesses, as may be expected; while staff training becomes a higher priority for nonprofit and government sectors.

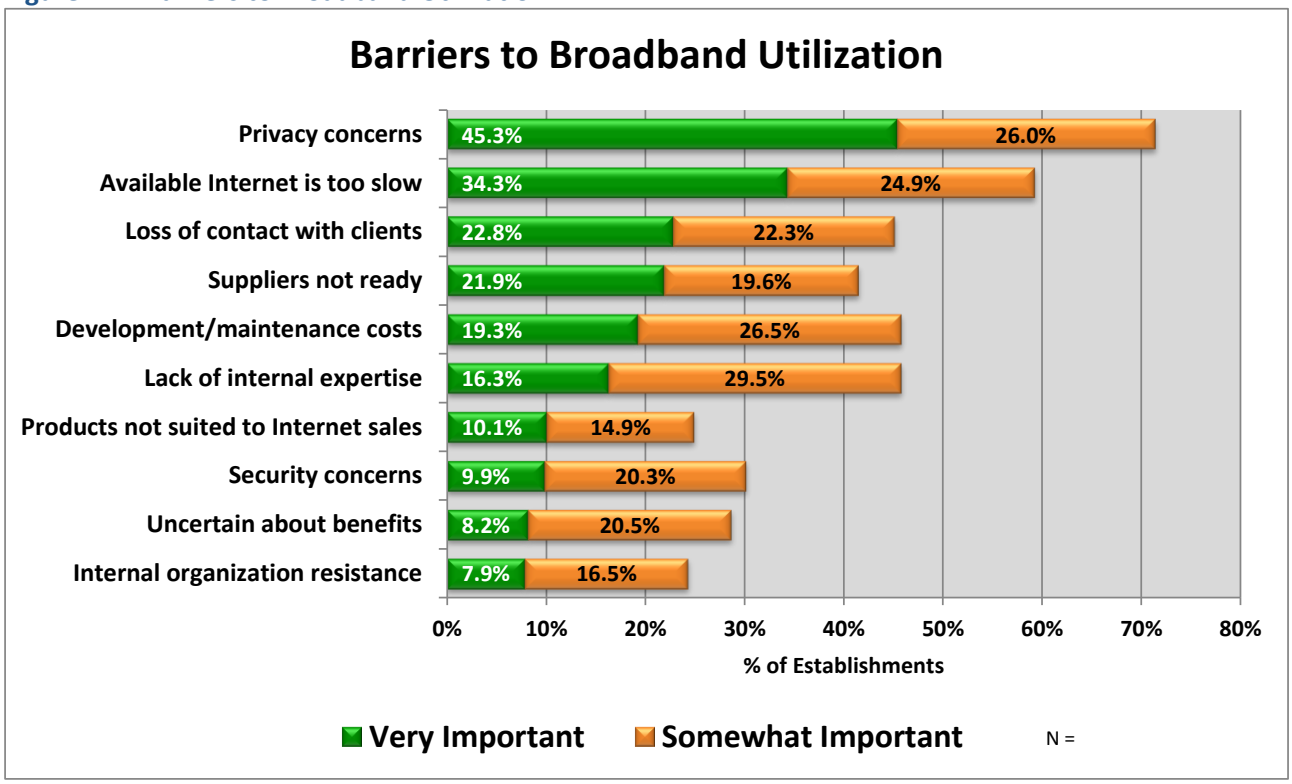
2.4 BARRIERS AND ADOPTION ISSUES

2.4.1 Barriers to Adoption

Organizations were asked to rate the significance of a number of barriers to effectively using broadband Internet in their operations. These barriers tend to inhibit the adoption of e-solutions that need to be recognized and overcome to increase broadband utilization.

Two barriers that rate the highest in importance are privacy concerns and slow Internet connectivity, considered very important by more than 45 percent and 34 percent of organizations respectively.

Figure 14 – Barriers to Broadband Utilization



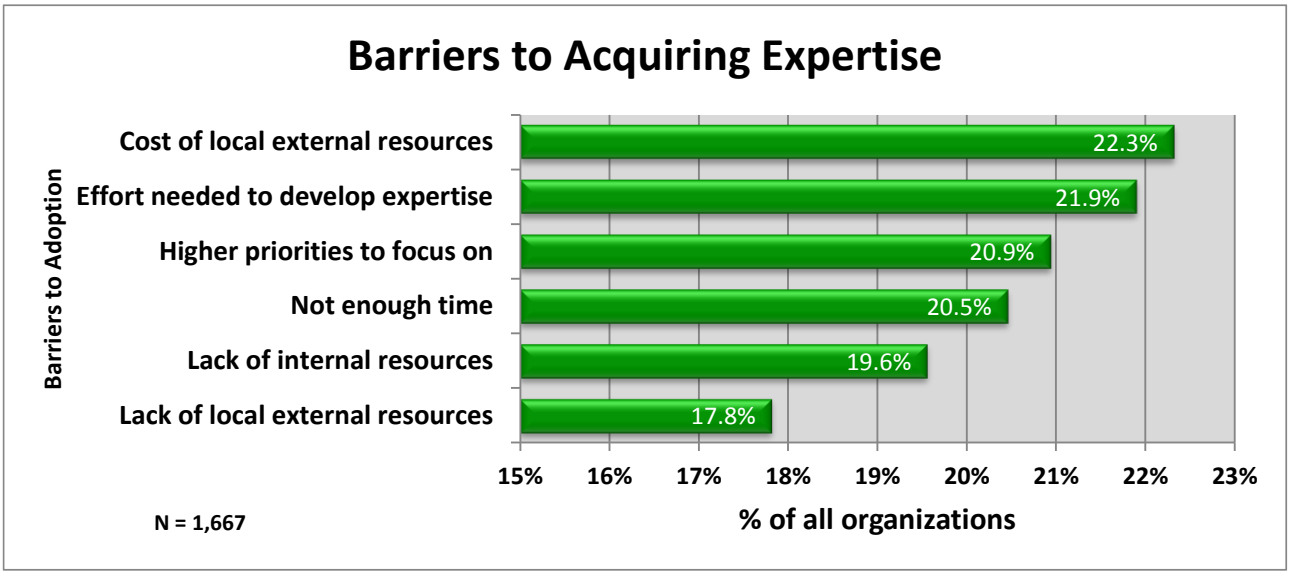
2.4.2 Expertise and Knowledge Issues

The knowledge and expertise needed to implement and use e-solutions are key factors in the level of broadband utilization achieved. There are several inter-related issues that organizations may encounter in moving forward with e-solutions:

- Lack of internal resource with necessary skills
- Time and effort required to develop expertise
- Lack of local external support resources
- Affordability of local external support resources
- Too much information – not enough time to research options
- Higher priorities to focus on

Organizations were asked to identify which of these issues are: critical barriers to progress; challenging but manageable; or not an issue for them. Overall, the lack of internal resources is a critical barrier for over 19 percent of organizations, and the cost of acquiring external resources is critical for 22.3 percent.

Figure 15 – Barriers to Acquiring Expertise

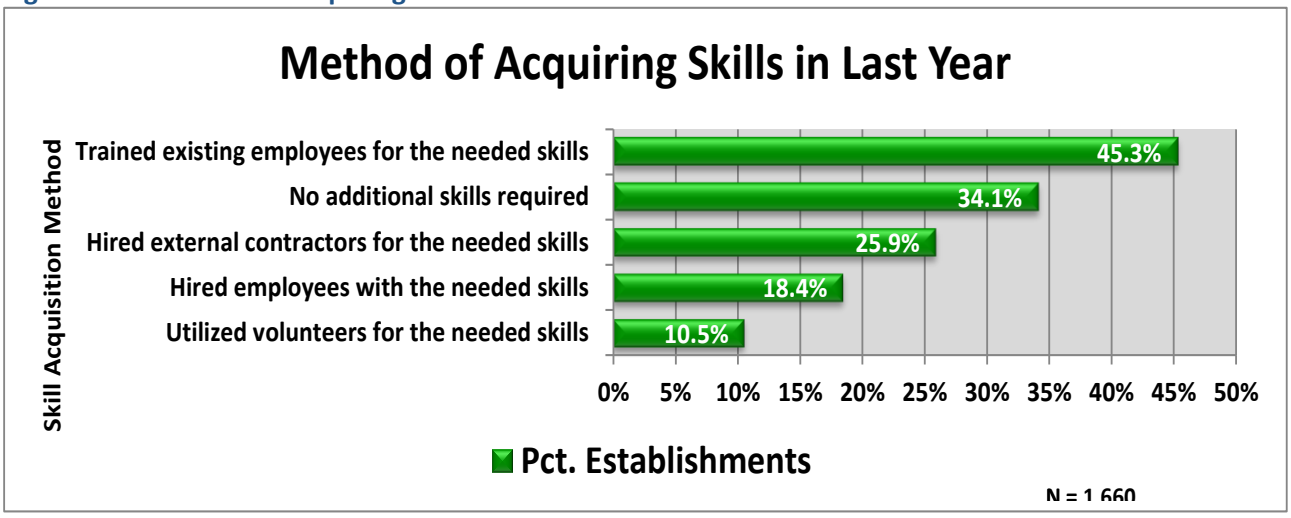


Given that expertise and knowledge within an organization is intimately tied to its human resources, a key question is to what extent these issues change with the size of organization. In fact, while the lack of appropriately skilled resources, both internal and external, is more often a critical issue for small businesses, these issues continue to exist for organizations with over 100 employees.

2.4.3 Skills Acquisition

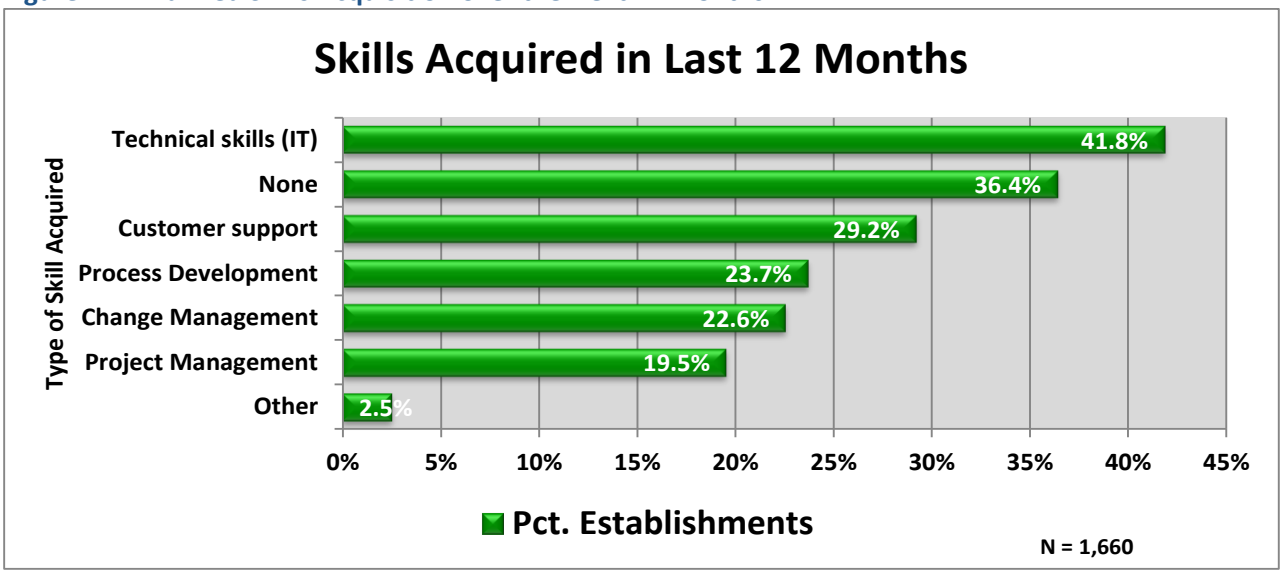
The survey examined how organizations did in fact address their expertise needs related to use of the Internet in the preceding 12 months. Organizations indicated a clear preference for training existing employees (45.3 percent). Generally, larger organizations (more than 50 employees) indicate a higher preference for hiring new staff with expertise compared to smaller organizations. To understand the extent to which organizations acquire or train resources, they were asked how they had acquired expertise and knowledge for e-solutions within the past 12 months. Organizations may have used one or more of the following methods as shown below.

Figure 16 – Method for Acquiring Skills In Past Year



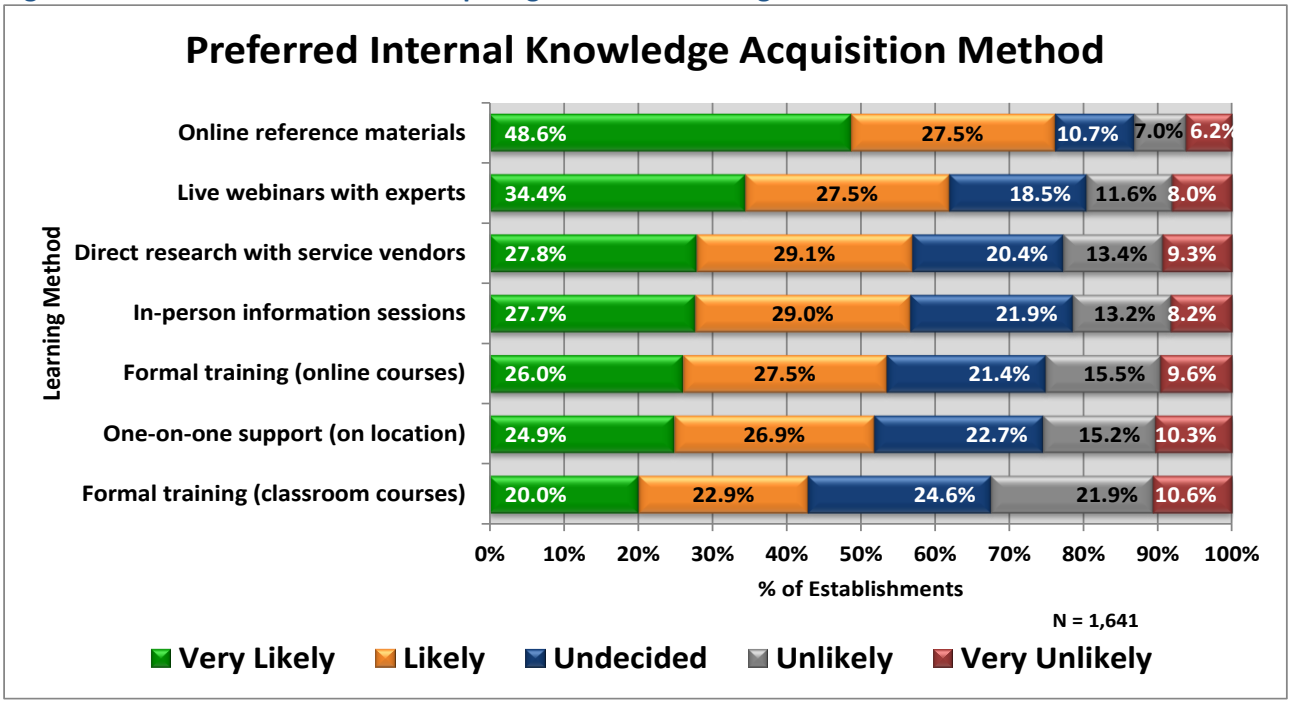
Organizations were also asked skills they had actually acquired in the preceding 12 months. The most frequently cited areas of skill acquisition were in technical support (41.8 percent). However, organizations recognize the need to acquire customer support skills (29 percent) and process management skills (23.7 percent) to support the development and use of e-solutions.

Figure 17 – Planned Skills Acquisition over the Next 12 Months



There are essentially two methods for organization to acquire the needed skills, either through training of internal resources or through hiring of resources with the required skills (internal hiring or contracting external resources). From a training perspective, organizations were asked about which methods they are most likely to use for the internal development of knowledge and expertise for researching, planning or implementing e-solutions.

Figure 18 – Preferred Methods for Acquiring Internal Knowledge

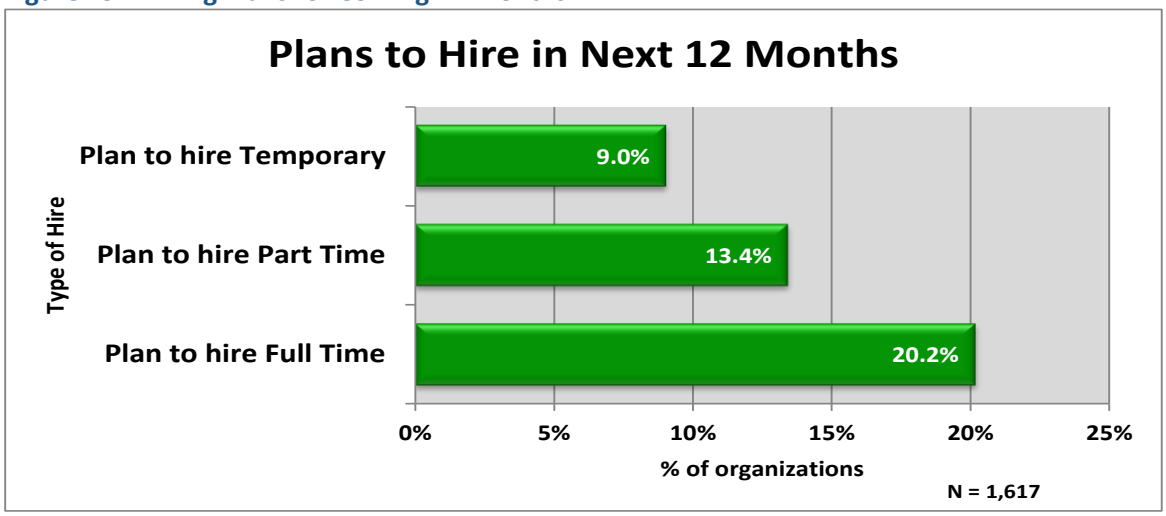


Self-directed methods of knowledge development, such as online research and webinars, are most likely to be used by the majority of organizations. Notably, formal training methods are less likely to be used, with in-person classroom training the least likely method and unlikely to be used by over 32.5 percent of organizations. This information is useful in determining the most appropriate methods to support organizations in developing the expertise they require for e-solutions adoption skills.

While 28 percent did not require or actively acquire skills, 45 percent of organizations undertook some level of training of existing employees. To acquire the needed skills, 34 percent hired external contractors and 20 percent hired new employees. Forty one percent used more than one method to acquire skills, demonstrating that a combination of methods may be used. While past action is not necessarily a predictor of future action, these statistics do provide a base to assess the propensity of organizations to actually hire and train their employees.

When asked about hiring plans for the next 12 months, over 20 percent of organizations stated that they planned to hire full-time employees. While these hiring plans are not solely for acquiring e-solutions skills, such skills will likely be a driver for some of the planned hiring.

Figure 19 – Hiring Plans for Coming 12 Months



2.5 FINANCIAL AND EMPLOYMENT IMPACTS FROM INTERNET USE

In order to gauge the impacts of Internet use on the operations, organizations were asked to quantify how using the Internet has affected the generation of revenues, operating cost savings and employment. Due to the proprietary and sensitive nature of this information, these questions were optional for survey respondents. As a result, the sample sizes for usable data in these areas is significantly less than for the total survey response set. The largest amount of data collected was in relation to employment and the impacts of the Internet, on which 720 establishments reported data. However, only 207 and 132 organizations reported data for revenues and operating cost savings related to the Internet respectively,

Organizations were asked to provide their total annual[6] revenues, operating costs, and current employment to provide a baseline for assessment of impacts. They were also asked to provide the changes as a result of using the Internet, specifically:

> **Total Annual Revenue** from the Internet over the past 12 month period.
> *Example: This may include direct Internet sales (online) and income enabled by using the Internet to interact with customers.*
>
> **Total Annual Cost Savings** from using the Internet over the same period.
> *Example: This may include direct labor costs and other operating cost savings through efficiencies in purchasing and new operating processes.*
>
> **Number of new jobs created** in the past 12 month period and the number of new jobs created that can be attributed to using the Internet.
> *Consider the difference to job creation if your organization did not use the Internet.*

As seen in Figure 20, while over 3,498 new positions were created, reporting organizations also experienced sizeable job reductions over the preceding 12 months, resulting in a net job increase of 1,686 positions. The net job increase attributed to using the Internet was 1,062 positions. The Internet facilitated the creation of over 33 percent of all new jobs created and constituted 63 percent of net jobs created.

Figure 20 – Summary of Employment Impacts (part and full time combined)

Size of Employer	# of Organizations	Current Employees	New Jobs Created	Lost Jobs	Net Jobs
0 - 19	377	2,981	467	280	187
20 - 49	141	4,495	395	259	136
50 - 99	88	5,996	424	186	238
100 - 499	85	18,899	1,088	498	590
500 or more	29	33,205	1,124	589	535
	720	65,576	3,498	1,812	1,686

Size of Employer	New Jobs from Internet Use	Lost Jobs from Internet Use	Net Jobs from Internet Use	New Jobs from Internet Use as % of all New Jobs
0 - 19	133	16	117	28.5%
20 - 49	62	7	55	15.7%
50 - 99	111	13	98	26.2%
100 - 499	307	14	293	28.2%
500 or more	549	50	499	48.8%
	1,162	100	1,062	33.2%

In terms of the impact of the Internet on generating both revenues and cost savings, 11.4 percent of revenues from 207 establishments were generated through the Internet. Cost savings were also notable at 7 percent.

[6] Annual figures were requested for the past 12 month reporting period.

Figure 21 – Revenues and Cost Savings from Internet Utilization

Annual Revenue Impacts			
# Establishments	Total Annual Revenue ($M)	Annual Revenue from Internet ($M)	Pct. Internet Revenue
207.	$3,881.0	$441.0	11.4%
Annual Operating Cost Impacts			
# Establishments	Total Annual Operating Cost ($M)	Cost Saving from Internet ($M)	Pct. Cost Saving
132.	$664.9	$46.8	7.0%

3 Key Findings – Households

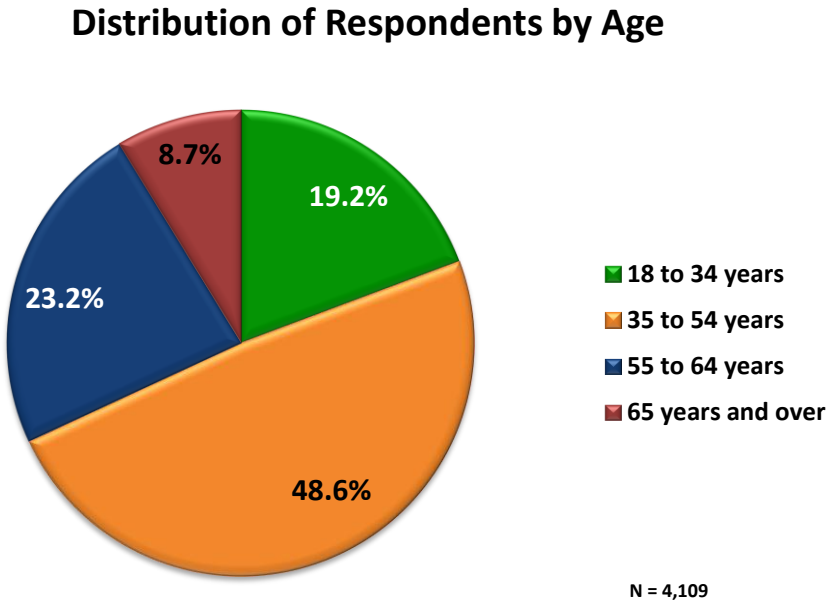
The following analysis is based on survey responses from 4,122 households from across the Commonwealth of Kentucky. The results focus on key findings related to Internet usage, benefits and barriers, with selected results broken down by key respondent characteristics, such as household income, connectivity type and rural versus non-rural regions.

3.1 HOUSEHOLD PROFILES AND CONNECTIVITY

3.1.1 Respondent Characteristics

The household sample includes data from 120 counties across the state. The household sample represents a good mix of demographics based on age, household income, and employment status, as well as a mix of communities from urban/metropolitan, micropolitan, small town and isolated small towns[7]. Figures 64 to 66 provide an overview of the demographic characteristics of the respondents. These characteristics can be used in analysis of survey data and are available as filters in the Digital Economy Analysis Platform. Having good sample sizes from each demographic group, region or type of community allows planners to conduct comparative analysis of how that group, region or type of community utilized the Internet, relative to its peers.

Figure 22 – Household Demographics

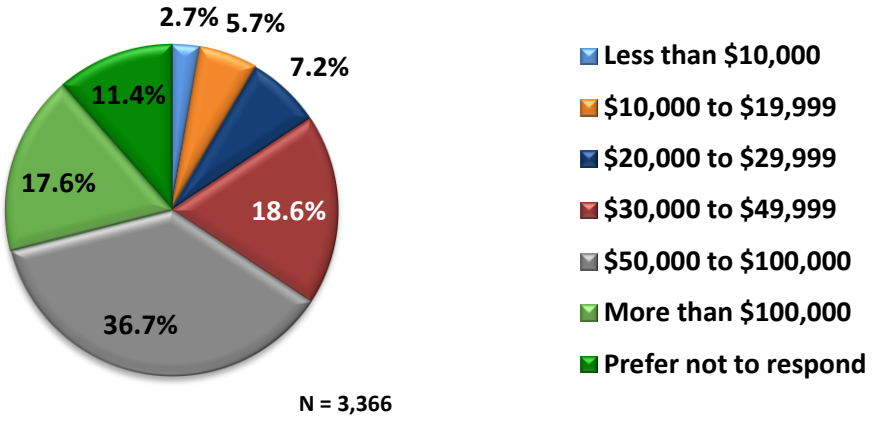


Compared to the US Census profile of Kentucky, the sample collected is overweight in the 35 to 54 age category and slightly underweight in the three other age groups. In terms of education, the sample is

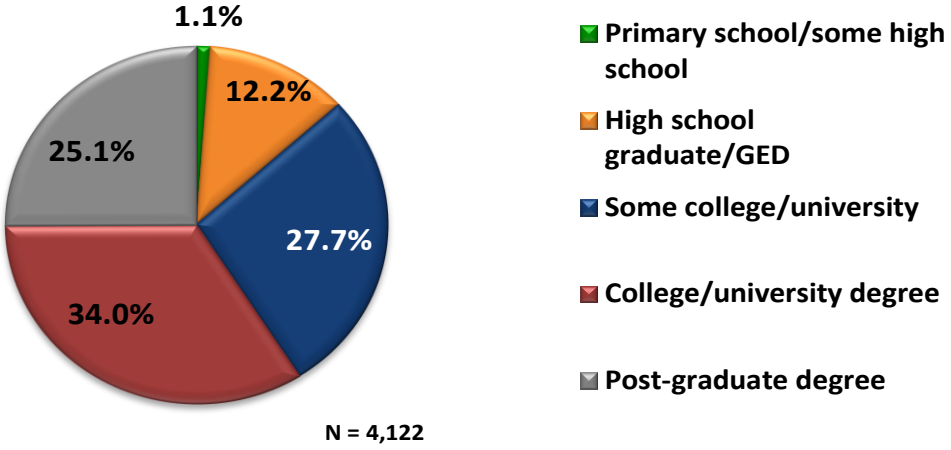
[7] A metropolitan area is defined by the Census Bureau as having a core urban area of over 50,000 with a population density greater than 1,000 people per square mile. A micropolitan area has a population of 10,000 to 49,999. A small town has a population of 2,500 to 9,999. The category of "isolated small town" includes the remainder.

overweight in those with post-graduate degrees while being underweight in those with only a high school degree or less. In terms of income, the sample is overweight in households over the median state income.

Distribution of Respondents by Income

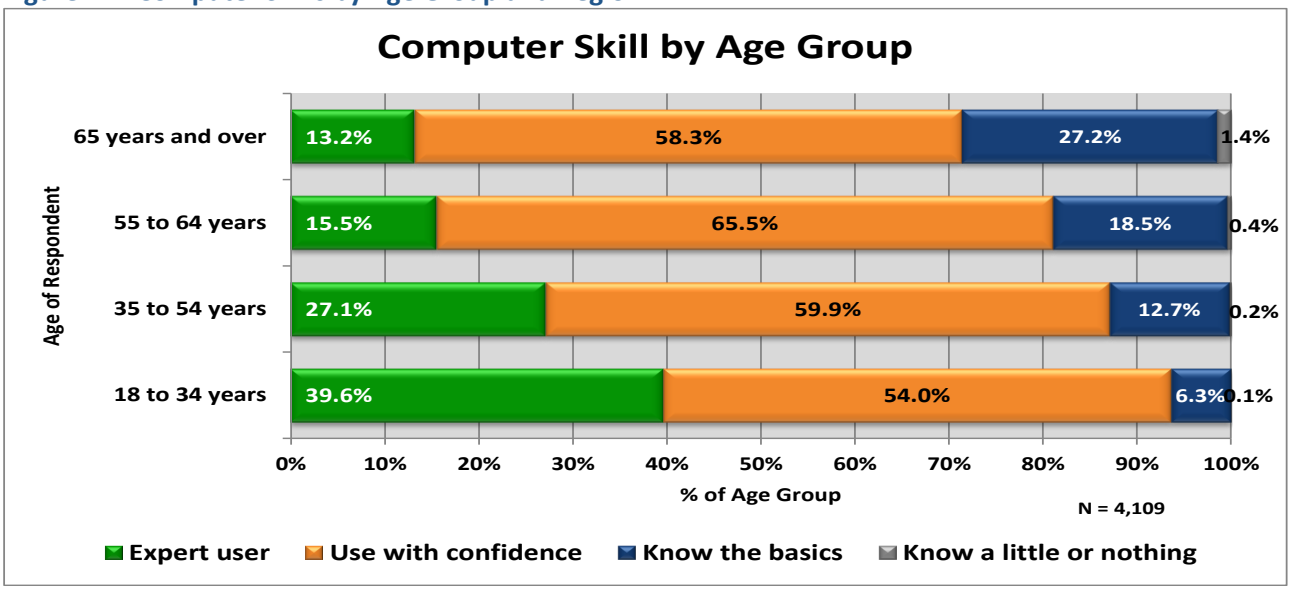


Distribution of Respondents by Education



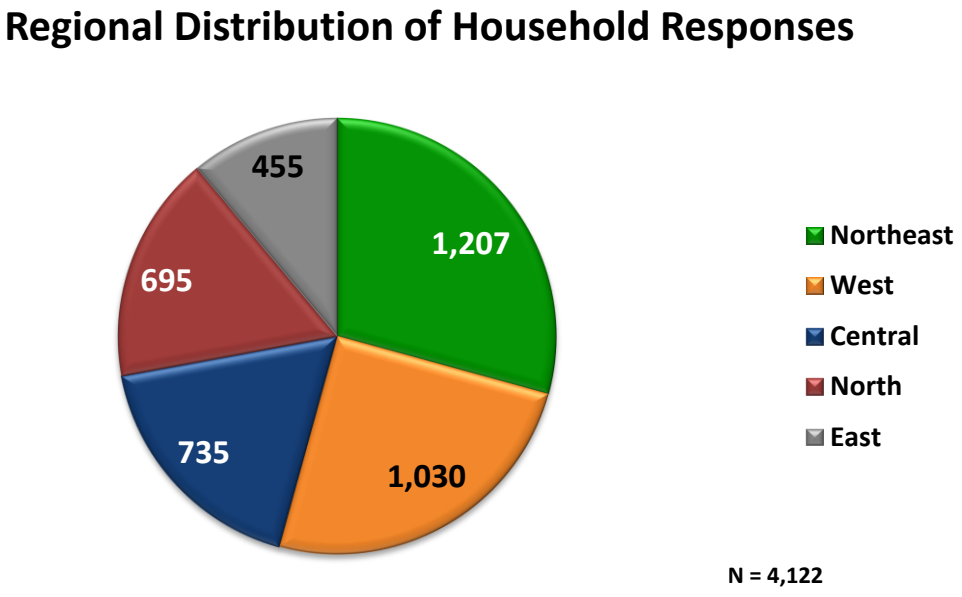
Computer-skill levels and their implications for using the Internet provide an important frame of reference when evaluating and utilizing broadband services. As one might expect, the level of computer expertise increases for younger age groups. For Kentucky, 27.2 percent of those over the age of 65 “know the basics”, compared to just 6.3 percent of 18–34 year-olds. In contrast, 39.6 percent of respondents under age 34 consider themselves “expert users”, compared to 13.2 percent of those aged 65 and more.

Figure 21 –Computer Skills by Age Group and Region

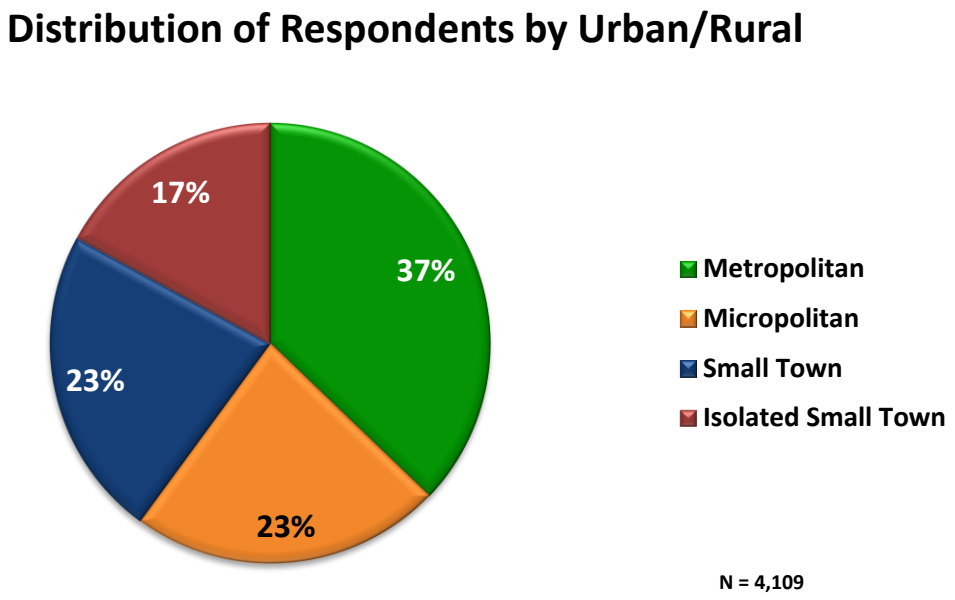


Data is available for a good cross section of the state, whether defined as regions[8] or degree of urban concentration. This reflects the focus on maximizing participation by non-metropolitan areas of the state.

Figure 24 – Responses by Geography



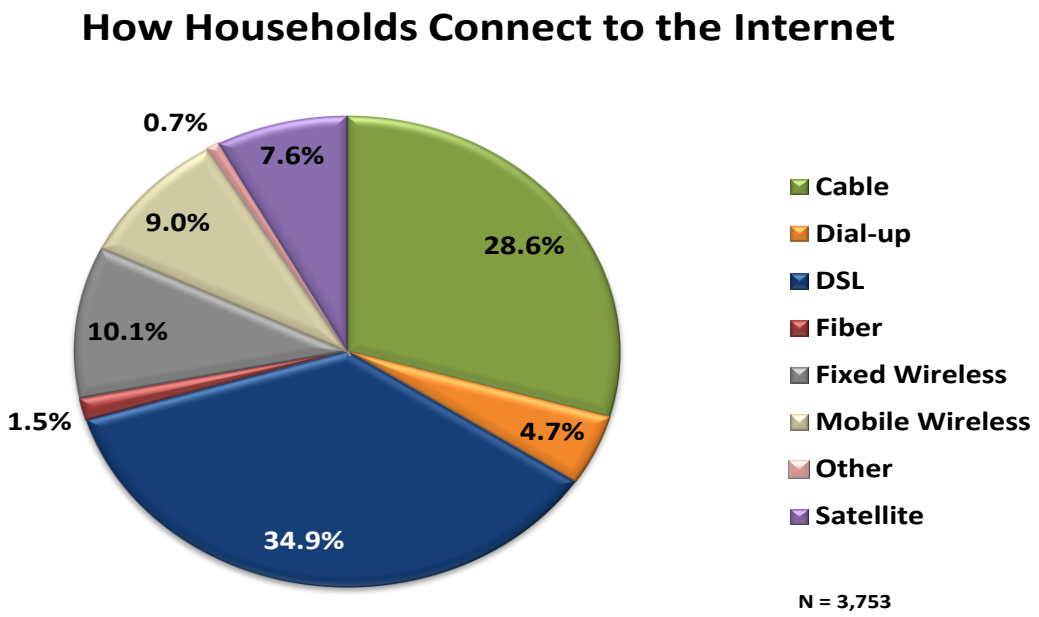
[8] East (Big Sandy, Cumberland Valley, Kentucky River) , West (Green River, Pennyrile, Purchase), Central (Barren River, Lincoln Trail, Lake Cumberland), North (KIPDA, Northern Kentucky), and Northeast (Bluegrass, Buffalo Trace, Gateway, FIVCO).



3.1.2 Connectivity Characteristics

The survey sample includes a broad mix of Internet connectivity technologies. Only 4.7 percent of households surveyed use dial-up Internet access, with another 7.6 percent using satellite. The following figures summarize the Internet technologies used.

Figure 25 – How Households Connect to the Internet



The predominant technologies used are DSL used by 34.9 percent, cable at 28.6 percent of households, fixed wireless at 10.1 percent, mobile wireless at 9 percent and fiber at only 1.5 percent. For non-metro

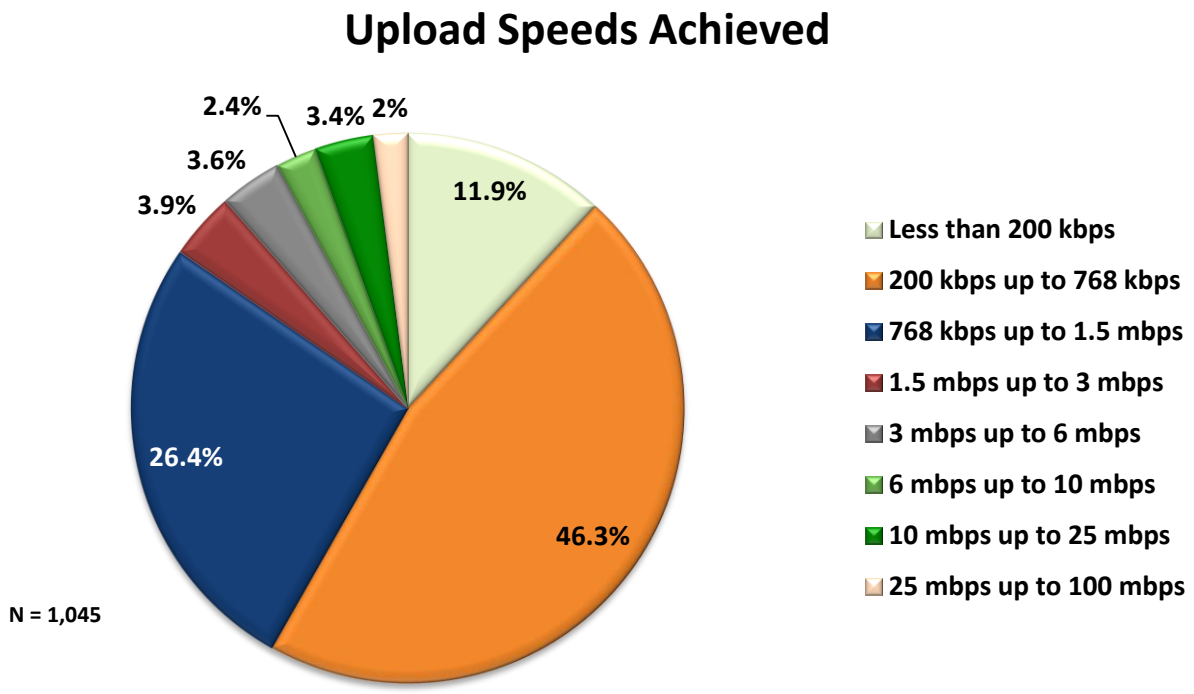
areas, DSL remains the dominant technology used by over 39 percent of households, with cable at 20 percent. However, in metro areas, the roles reverse, with cable serving 41 percent of households, compared to DSL at 27 percent. Use of cable Internet is much lower in rural counties, which may also be an indication of more limited availability of this technology for households in rural counties. When comparing the 2010 and 2012 data, the two fastest growing technologies were wireless (both fixed and mobile).

Significantly higher percentages of households in rural counties use satellite and dial-up Internet services, most likely because other forms of high-speed Internet access are not available. Dial-up users were asked why they did not have broadband. Out of 24 responses, 20 said that they couldn't get broadband in their location, three said broadband was too expensive, and only one said that dial-up meet their needs.

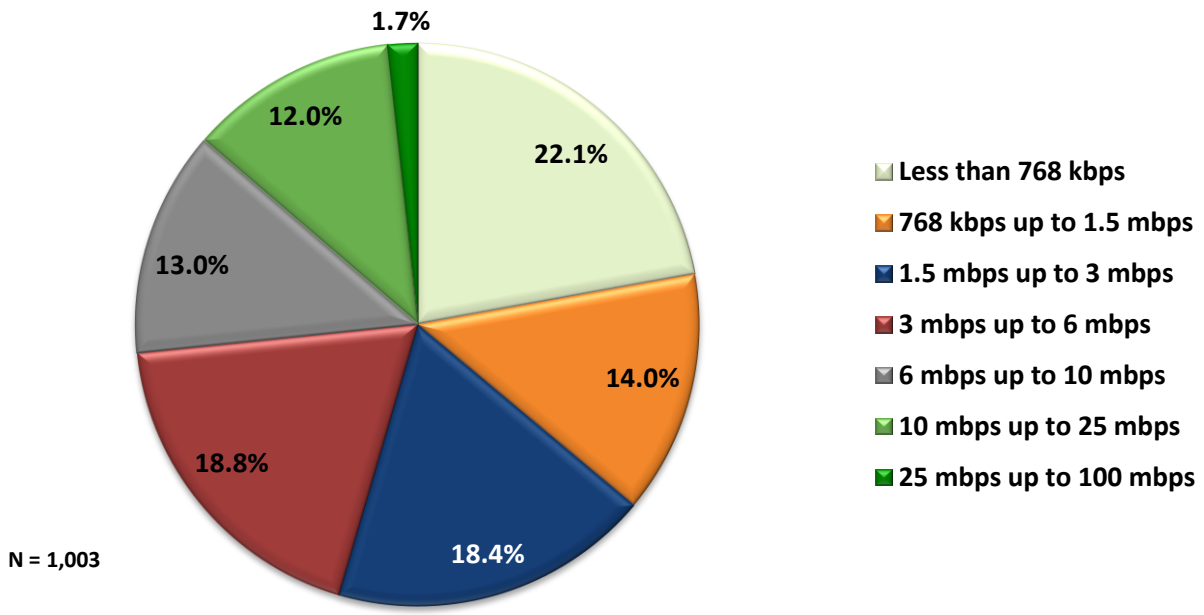
Internet Access Speeds

Households were provided the option of taking a speed test to measure the upload and download speeds of their connections. While 58.2 percent of households recorded less than 768kbps on the upload speed test, 36.1 percent failed to record 768kbps or higher on the download speed test. The following charts provide a summary of the speed-test results for upload and download speed ranges and average upload and download speed by connectivity type.

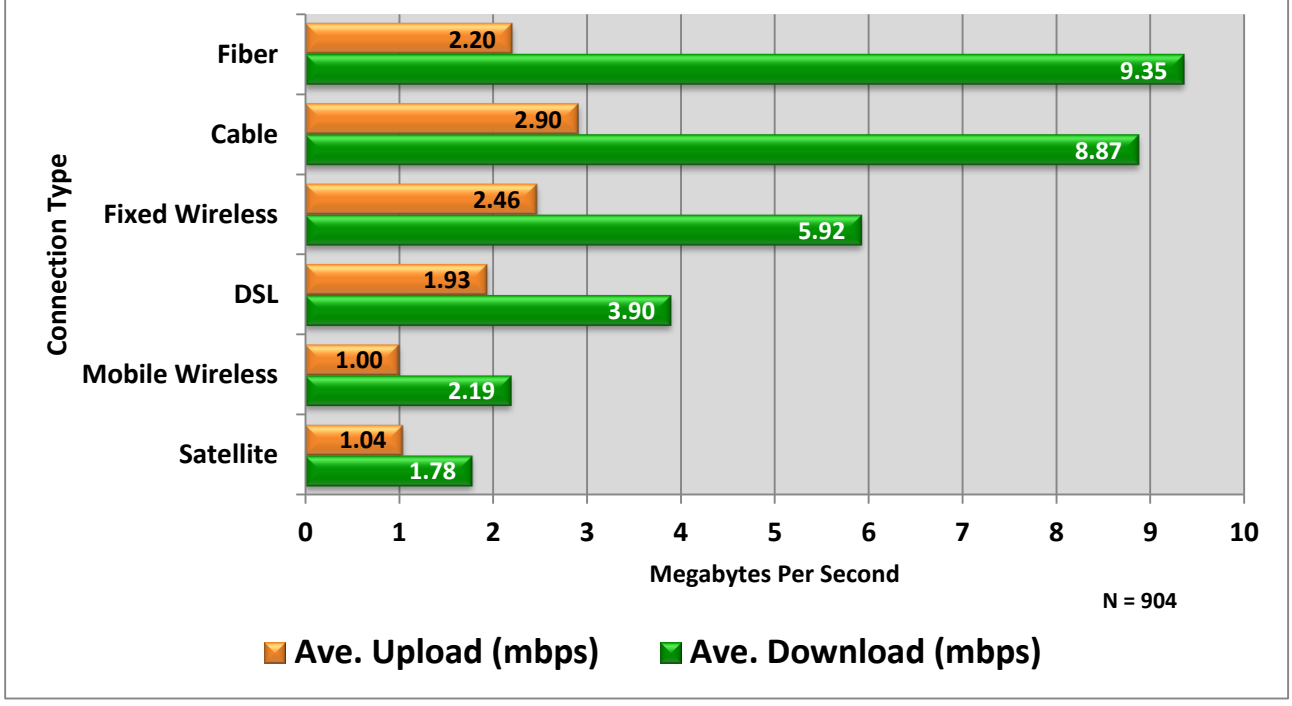
Figure 26 – Speed-Test Results for Households



Download Speeds Achieved



Speed by Connection Type



Internet Costs

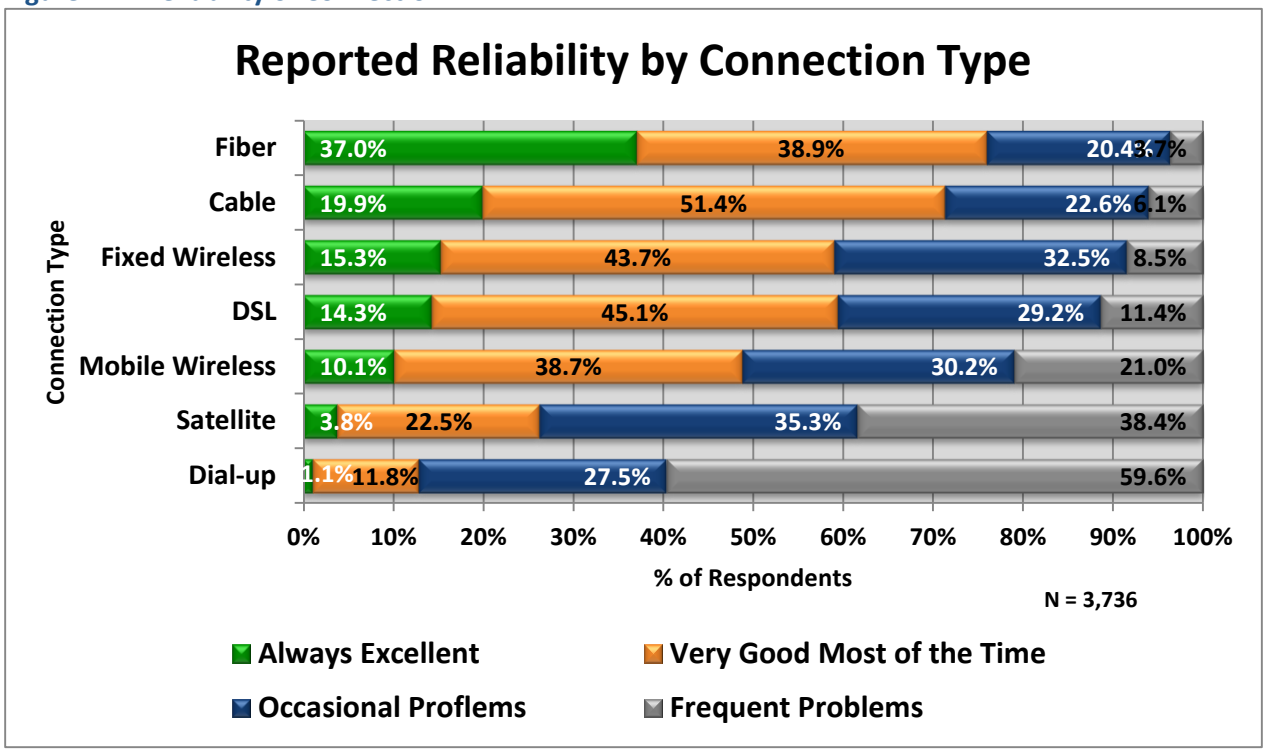
The most common forms of broadband access – DSL, cable, mobile and fixed wireless – have very similar median cost ranges which, for the majority of households, fall in the range of $30 to $50 per month. Satellite and mobile wireless Internet services tend to fall in the $50 to $80 per month range, while dial-up service is the lowest cost option.

The monthly costs for Internet service tends to be higher in rural versus non-rural counties, with 34 percent of rural households spending more than $50 per month compared to 25 percent of non-rural households, despite the higher proportion of low-cost dial-up service used by rural households. For broadband households the difference increases to 45% of rural households versus 26% of non-rural households spending more than $50 per month.

Internet Reliability and Satisfaction Levels

Households were asked to rate how well their current Internet service meets their needs in terms of speed, reliability and value. Fiber rates the best of the broadband options. Cable, DSL and fixed wireless are comparable in terms of meeting household needs and expectations for speed, reliability and price/value. Reliability is generally poor for both dial-up and satellite Internet, contributing to poor ratings on price/value expectations.

Figure 27 – Reliability of Connection



Fiber is rated best for reliability by users. Cable was a distant second, followed closely in order by fixed wireless, DSL and mobile wireless. Satellite service shows occasional or frequent problems by 73.7 percent of households, only slightly better than dial-up Internet at 87.1 percent.

Only 3.4 percent of dial-up users and 21.2 percent of satellite users considered their service fast enough, compared to 73.5 percent for cable, 63 percent for fixed wireless and 57.7 percent for DSL. As a result, 79.3 percent of satellite users state that their service is of poor value or below expectations, compared to 47 percent of users overall.

3.2 BROADBAND UTILIZATION AND BENEFITS

3.2.1 Broadband Utilization

Households were asked about their current uses of the Internet as well as their planned use over the next 12 months. Results are included for both dial-up users and households with broadband. Household utilization is examined in five major categories:

- Communication
- Research and information
- Online transactions
- Entertainment and recreation
- Personal productivity

The results of utilization in these five categories can be found in the online Digital Economy Analytics Platform (DEAP), which is described in detail in Appendix 2. This eSB Technical Report focuses primarily on household utilization in the productivity category.

1. The use of email for communication is very high for both dial-up and broadband households (96.8 and 82 percent respectively).
2. The Internet is used for voice communication by 25.6 percent of broadband households.
3. 81.8 percent of broadband households use the Internet to search for government information and services, providing a large base for increasing citizen engagement for all levels of government through delivery of online information and services. However, only 52 percent of dial-up households used the Internet to access government information.
4. Over 90 percent of broadband households, use the Internet for researching consumer goods and services (e.g. product information and comparison, etc.) and buying goods and services. In addition, more than 59 percent of households either currently sell or plan to sell items online.

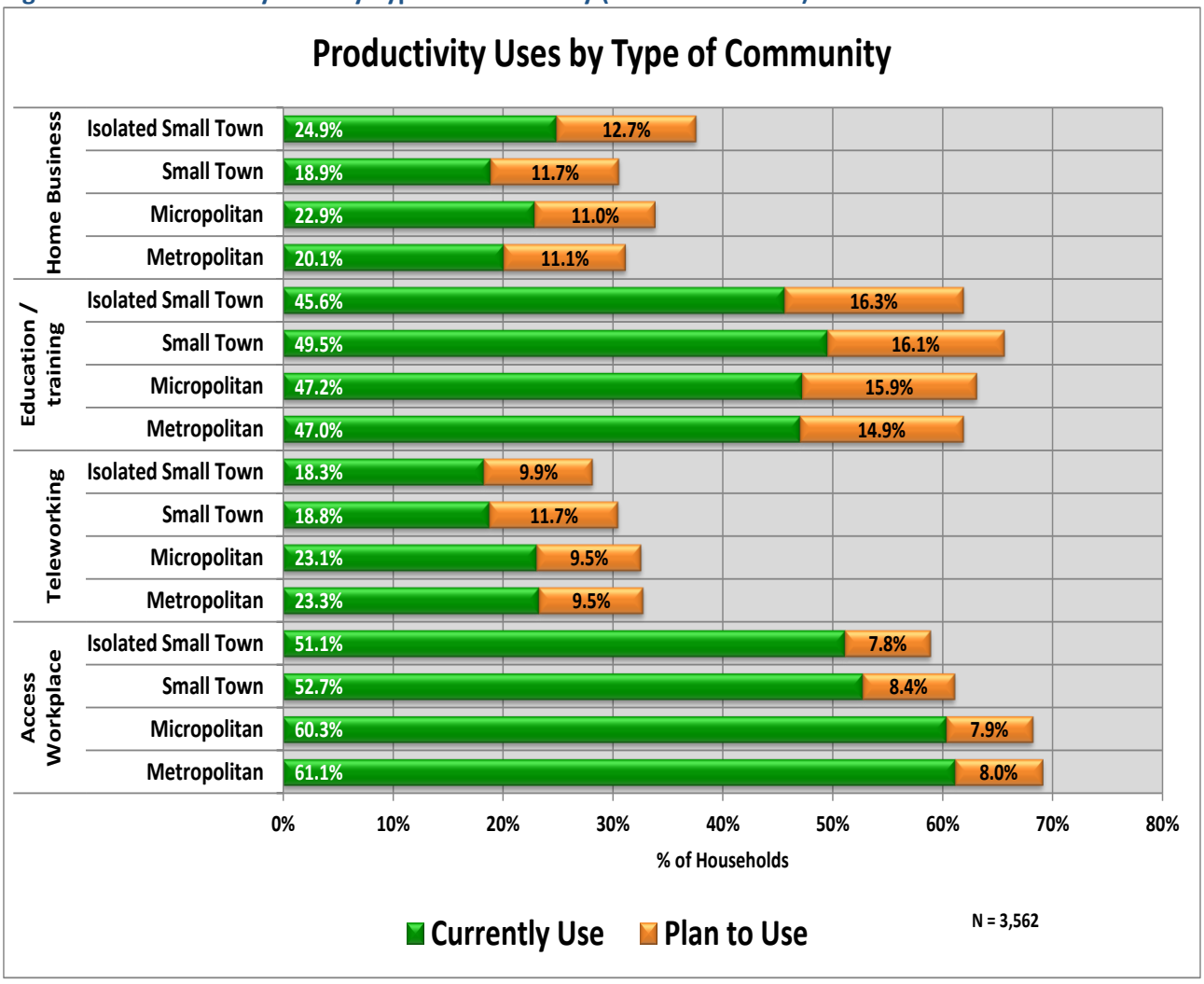
Households were asked about how they use the Internet for personal productivity for:

- Educational or training courses (remote learning or supplemental courses from home)
- Accessing workplace from home (occasional use)
- Teleworking (formal workplace all or part of normal work hours)
- Home-based business (full-time or part-time)

Utilization of the Internet for personal productivity is generally lower than the other usage categories. This can be attributed to a number of reasons, primarily in that the uses will not be applicable to all households or may not be an option available to them. For example, accessing the workplace would not be applicable to those who are retired, self-employed, students or unemployed. Only a certain portion of the population will be motivated to have a home-based business, and teleworking is not always an option depending on one's occupation or an employer's willingness to allow teleworking. However, the levels of usage in these personal productivity areas are significant, as are their implications.

The most frequent productivity use for households is for accessing their work place, with over 57 percent of households currently using the Internet for this purpose and another 8 percent planning to do so. Education and training was the next most frequent productivity use, with 47% currently using and another 15.6 percent planning to do so. Households using the Internet for a home-based business or for teleworking were a significantly smaller group at just over 21 percent each. However, this still represents a significant segment of the population. Moreover, planned use for both these categories exceeded 10 percent.

Figure 28 – Productivity Uses by Type of Community (Broadband users)



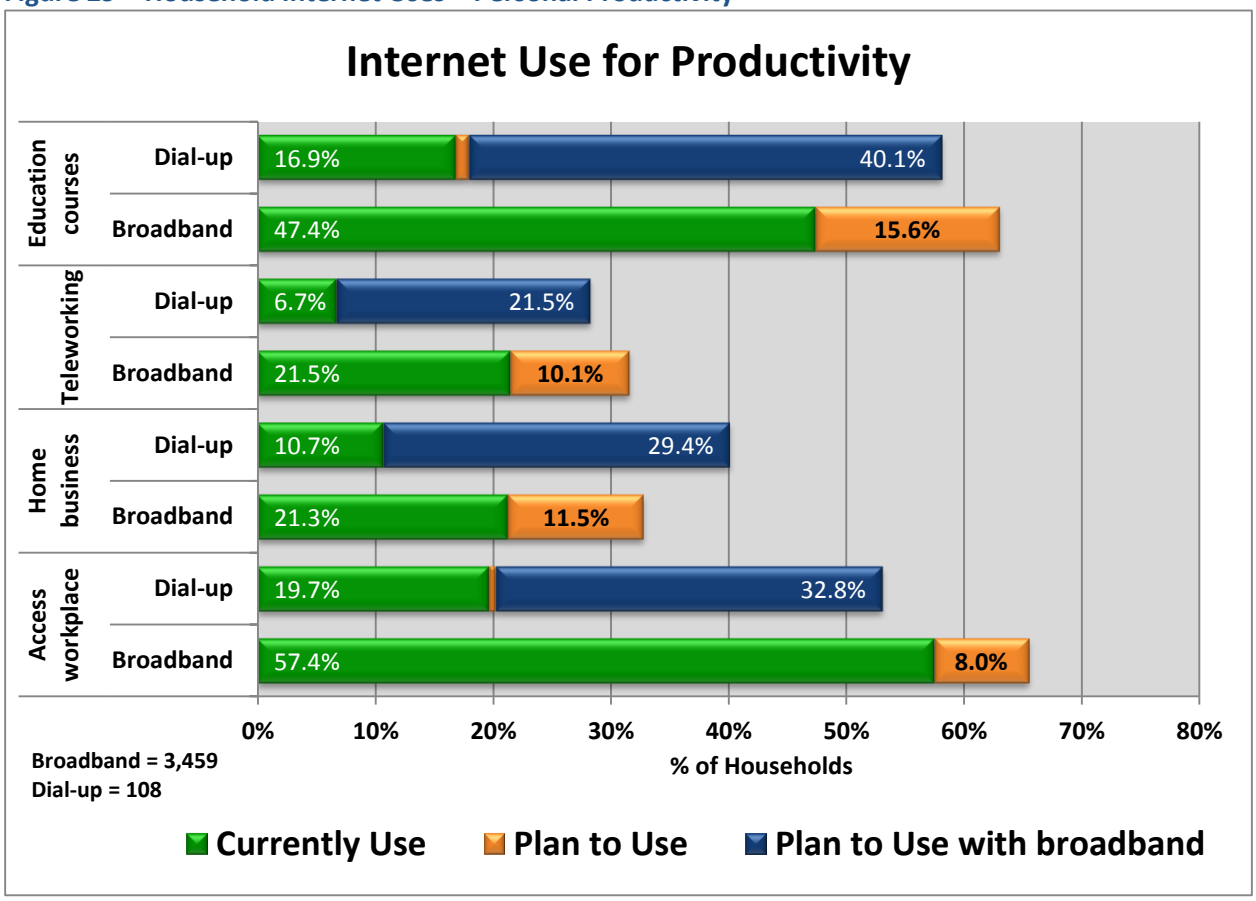
As seen in Figure 28, the impact of population density on these productive uses of the Internet by broadband users is noticeable though relatively minor. Higher population density increases use of the Internet to telecommute and access the workplace, while isolated small towns show a higher use of the Internet for home-based businesses.

However, Figure 28 deals exclusively with users of broadband, and not dial-up users. It is important to note that households in communities with a population less than 50,000 are three times as likely to be on dial-up compared to those in communities larger than 50,000. Households in isolated small towns are

almost four times as likely to be on dial-up. As seen in Figure 29, having lower quality connectivity (.e. dial-up) has a major negative impact on a household's Internet uses in the area of productivity.

As with other Internet uses there is a significant difference in utilization between dial-up and broadband users. This is more than simply a matter of convenience of higher speeds and bandwidth. For these uses the lack of broadband becomes a practical and meaningful impediment. Participation in online training that may include real-time interactions, presentations and video, is impractical if not impossible with dial-up access. Home-based businesses that are "Internet intensive" or that require continual online access without tying up the telephone line cannot operate effectively with dial-up. Similarly, teleworking requires home-based employees to be able to operate with the same effectiveness and efficiency as they would at their normal workplace.

Figure 29 – Household Internet Uses – Personal Productivity



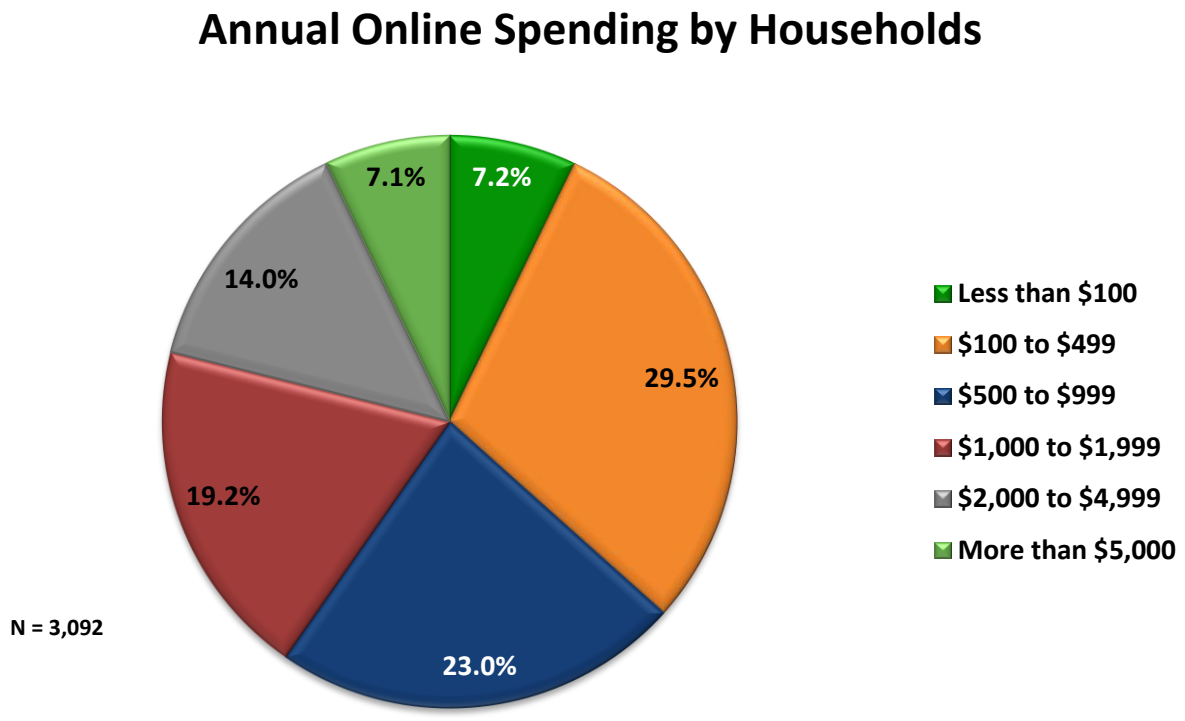
Also evident in the figure above is the desire of many dial-up households to obtain broadband so that they can engage in specific and productive activities. Over 40 percent of dial-up households want to obtain broadband so they can take educational courses. Another 29.4 percent want broadband for a home based business.

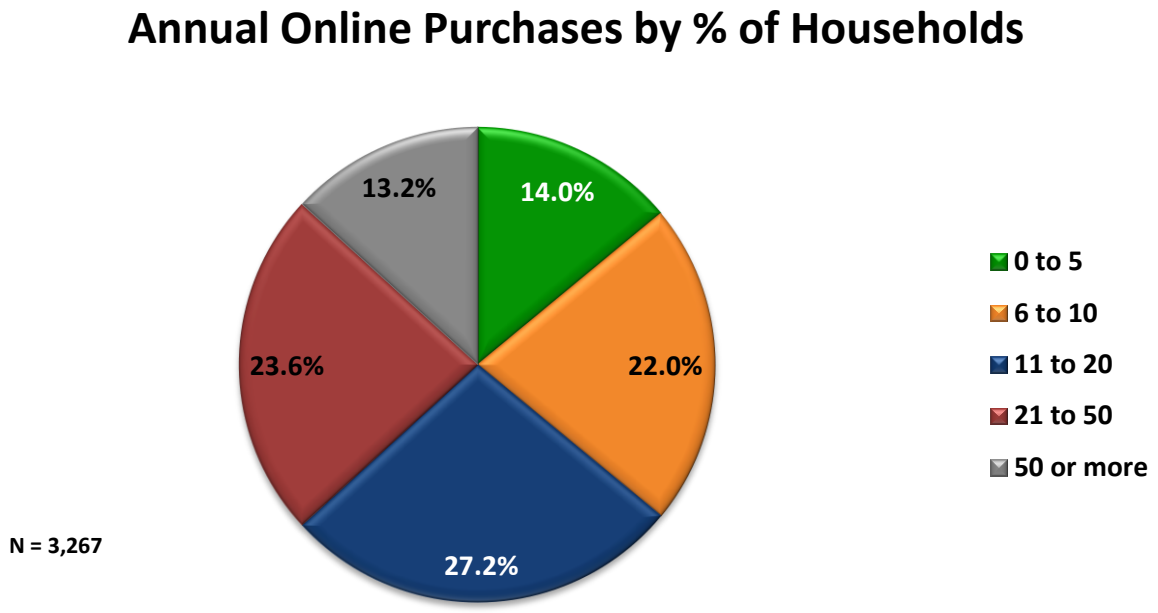
3.2.1.1 Online Transactions and Spending

The survey reveals that 92.9 percent of households use the Internet to purchase goods and services online, 64 percent of households conduct more than 10 purchase transactions per year, and

63.3 percent of households spend more than $500 per year online. Broadband users conduct more transactions and spend more online than dial-up users.

Figure 30 – Annual Online Spending by Households





3.2.1.2 Home-based Business

One somewhat surprising finding was the number of households that generated income over the Internet, particularly through a home-based business. Over 21 percent of broadband households stated that they currently operate a home-based business. These households were further asked if they operate a home-based business under the following definition:

"A home-based business may be part-time or full-time activity by one or more household members that operate their business exclusively from home. This may include self-employed professionals and many other types of entrepreneurial business activities."

Results indicated that 69 percent of respondents confirmed operating a home-based business under this definition. Based on this more-precise definition, over 14 percent of total households currently operate a home-based business.

1. Of all home-based businesses, 97.3 percent use a form of broadband, while the remainder uses dial-up service.
2. Only 55.1 percent of home businesses have a business web site, compared to 72.3 percent of other small businesses with 0 to 4 employees. On the other hand, home-based businesses are more likely to sell online (58.7 percent) compared to other small businesses.
3. Over 70 percent of home businesses see using the Internet as very important for making day-to-day operations easier making more effective use of their resources (productivity). and improve service to their customers. Over 60 percent consider the Internet very important for reaching new customers, lowering operating costs, and increasing sales.
4. As well, 73.1 percent of home-based businesses stated that broadband is essential for their business to function. Taking this broad statement one step further, 39.2 percent of home businesses strongly agree that they would not be in business without broadband, and 31.8 percent would need to relocate to get broadband if it was not available.
5. Home-based businesses were asked to identify[9] in which industries they operate. The largest industry component is Retail Trade, followed by the broad categories of "Other Services"[10] and "Professional & Technical Services"[11].

[9] Respondent were asked to self-identify based on a list of industry categories. The results provide an indication of industry breakdowns, but must be viewed with caution as individuals may not accurately identify their industry based on standard NAICS definitions.

[10] Other Services (excl. Public Administration) includes a wide range of business categories, such as auto repair, personal care services, pet care services, and a variety of repair and maintenance services. Please refer to NAICS 81 industry definitions for details.

[11] Professional, Scientific and Technical Services includes a wide range of business categories, including legal services, accounting and tax preparation, architectural, landscaping, interior design, graphic design, etc. Please refer to NAICS 54 industry definitions for details.

Figure 31 – Home Business Uses of the Internet

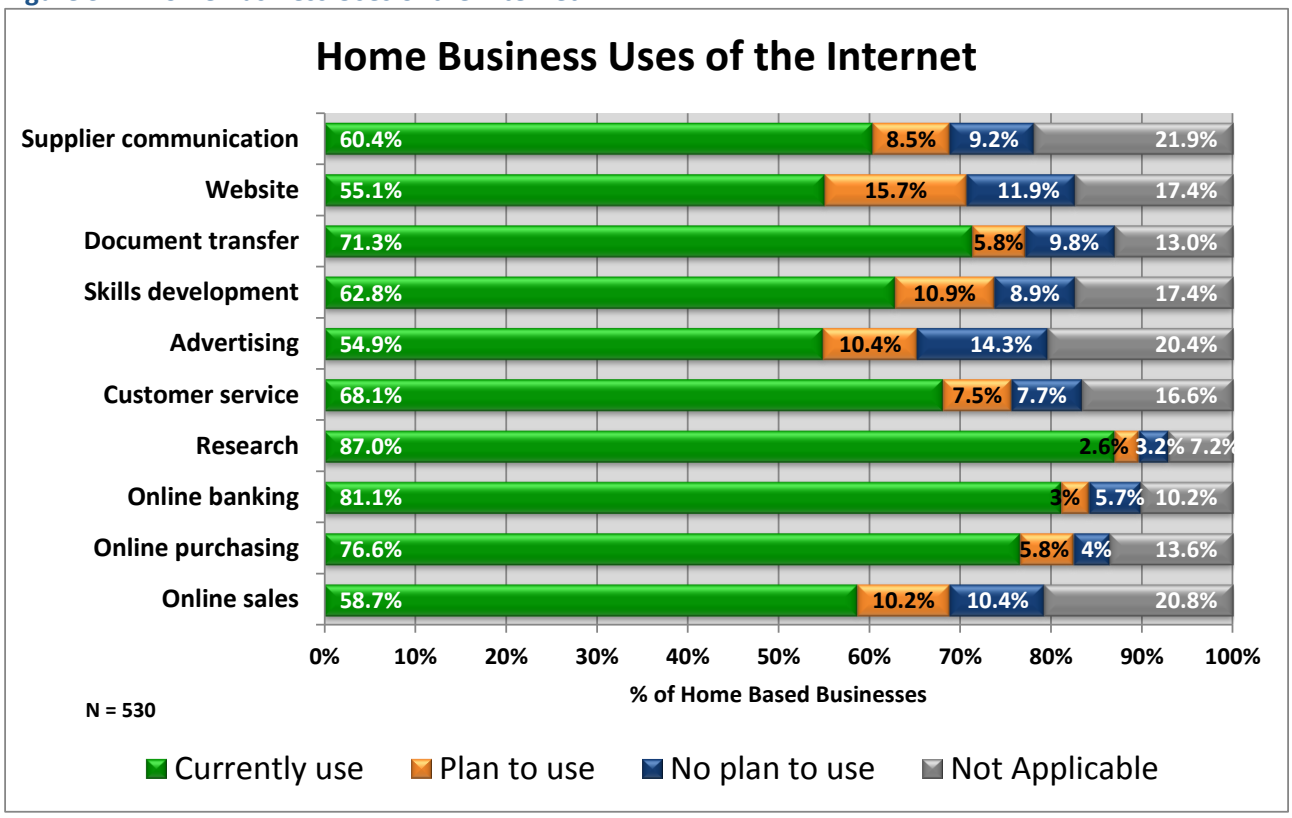
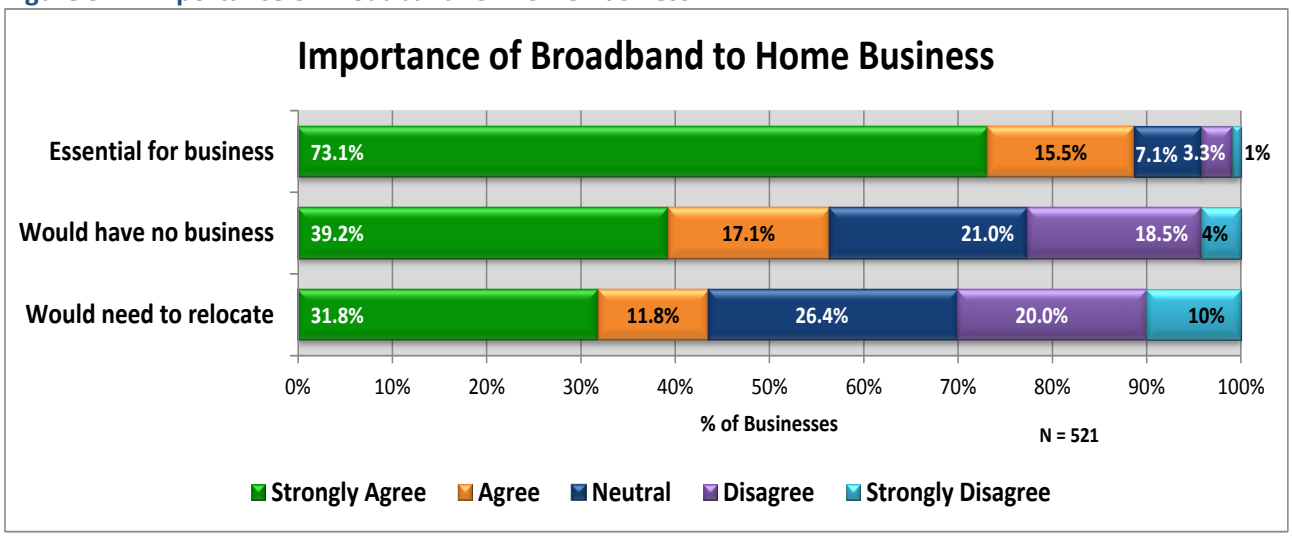


Figure 32 – Importance of Broadband for Home Business



3.2.1.3 Teleworking

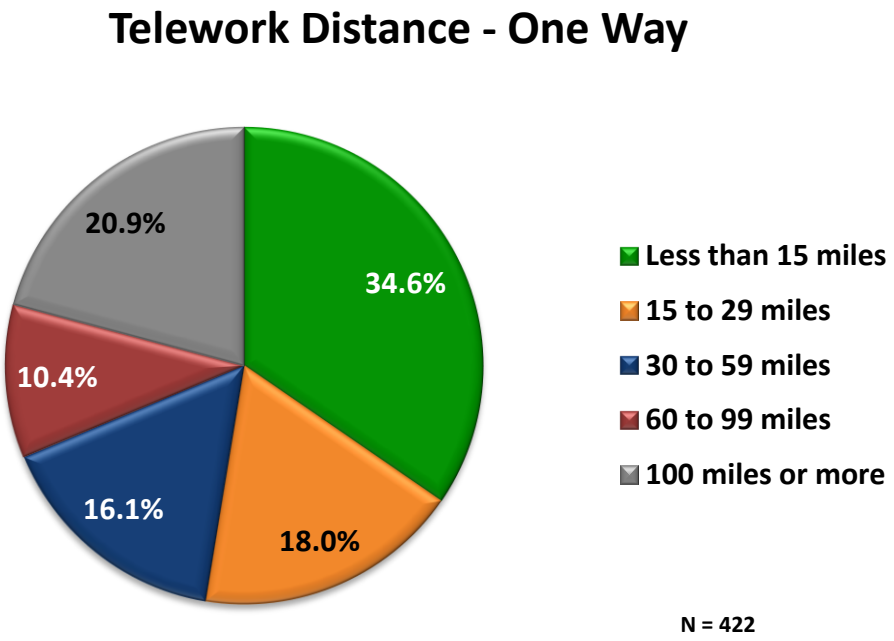
In response to questions concerning use of the Internet for personal productivity 21 percent of households stated that teleworking is currently practiced. These households were further asked if one or more household members telework under the following definition:

"Teleworking is considered to be working from home during normal working hours as part of an ongoing arrangement with your employer. Teleworking may be part of the time (one or more days per week) or all of the time. Teleworkers typically have access to company resources online (e.g., company Intranet) with the ability to work from home in the same manner that they would in their company location. Occasional access to work or doing work from home after normal working hours is not considered teleworking."

Of the original 21 percent of households that identified themselves as teleworking, 54 percent confirmed that they telework using this definition. This more-precise definition provides a more conservative estimate of teleworking. It is likely that additional households work at home on an occasional basis, but not as a formal ongoing working arrangement with their employer.

1. 11.8 percent of total households currently telework. An additional 11.1 percent of households are planning to do so in the next 12 months.
2. Over 47 percent of teleworkers are employed by organizations more than 30 miles (one-way distance) from their residence. Over 30 percent would need to travel over 60 miles to their normal workplace.
3. The most important motivation factors for teleworking households are life-work balance (cited by 71.8 percent of teleworkers), followed by productivity (69.6 percent), more family time (67.7 percent) and reduced commute time (67.5 percent).
4. Thirty four percent strongly agree that they would not be able to work in their present position if it were not for the ability to telework, i.e. teleworking is a dependency for their current job.
5. Relocating to another community would be necessary for 25 percent of teleworkers if they could not telework.
6. The largest industry category for teleworking is "Educational Services" at 23.9 percent, followed by "Professional and Technical Services" at 14.9 percent. However, teleworkers can be found in a broad range of other industries, including government, health care and social assistance, finance and information services.

Figure 33 – Teleworking Characteristics – Days and Distance



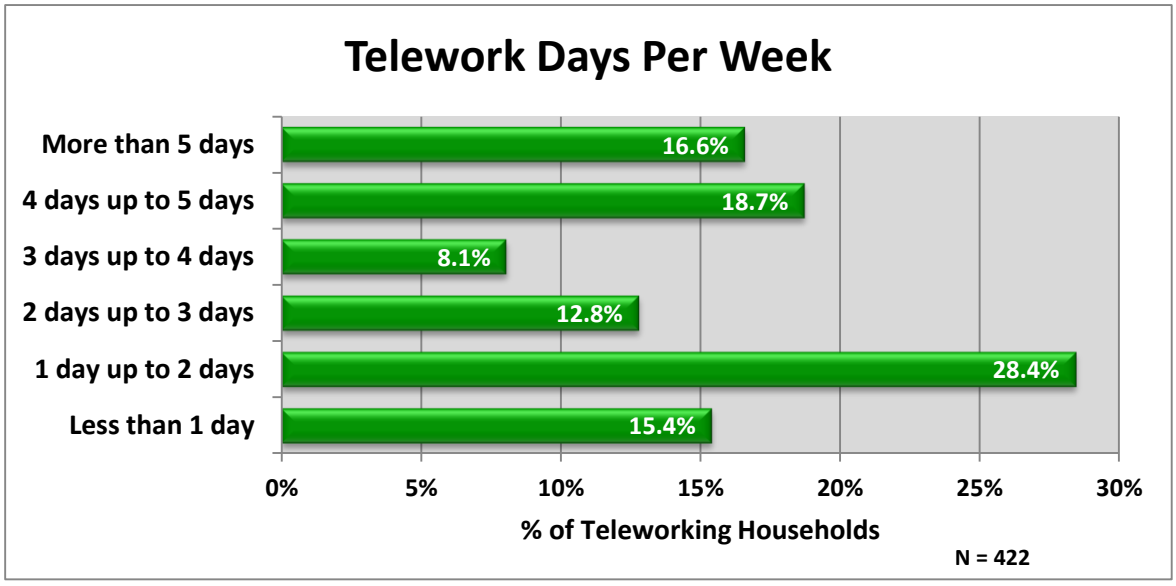
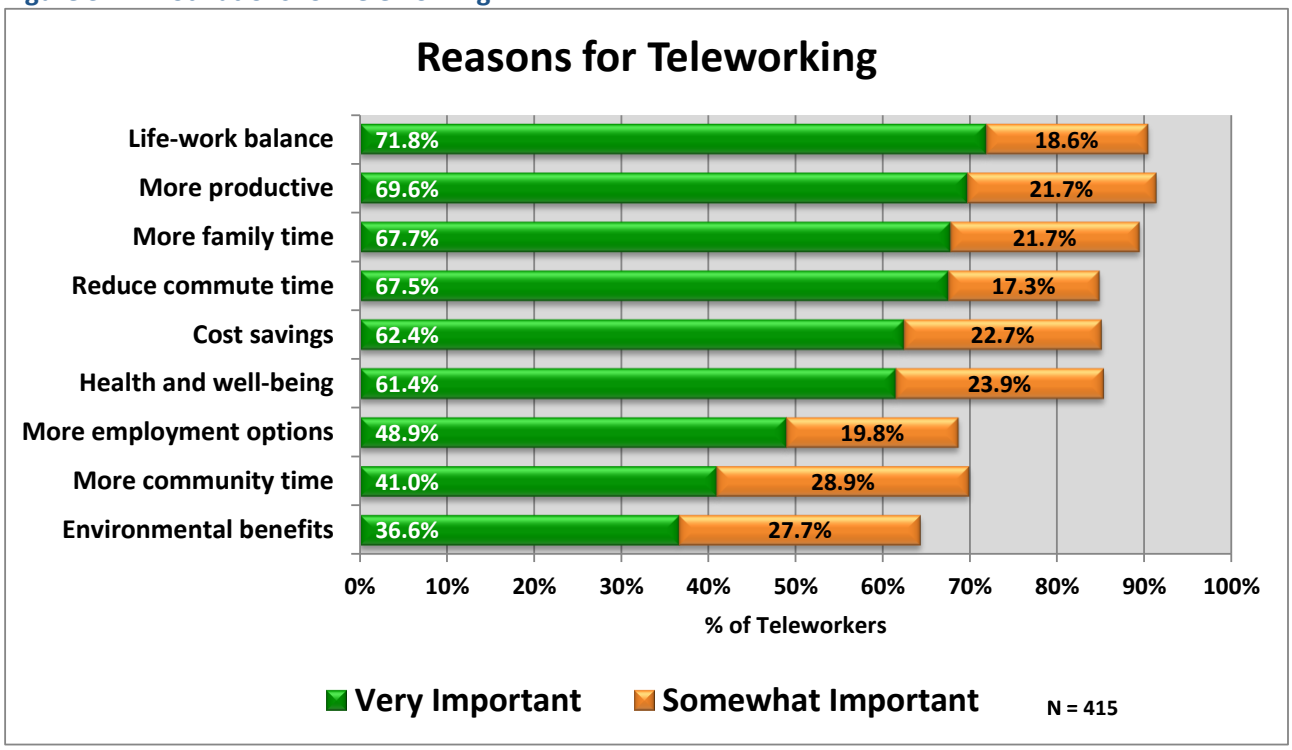


Figure 34 – Motivations for Teleworking



3.2.2 Household and Community Benefits

While it is important to understand patterns of Internet use to identify gaps and opportunities for increased utilization, it is equally important to understand the benefits and impacts of broadband utilization for households and their communities.

To provide a perspective on the overall importance of broadband, households were asked: ***"Assuming you could never get broadband service, how likely is it that you would leave to relocate to a community that offers broadband?"*** At least 19 percent of households would definitely relocate to another community in order to access to broadband services. An additional 20 percent would consider relocation very likely.

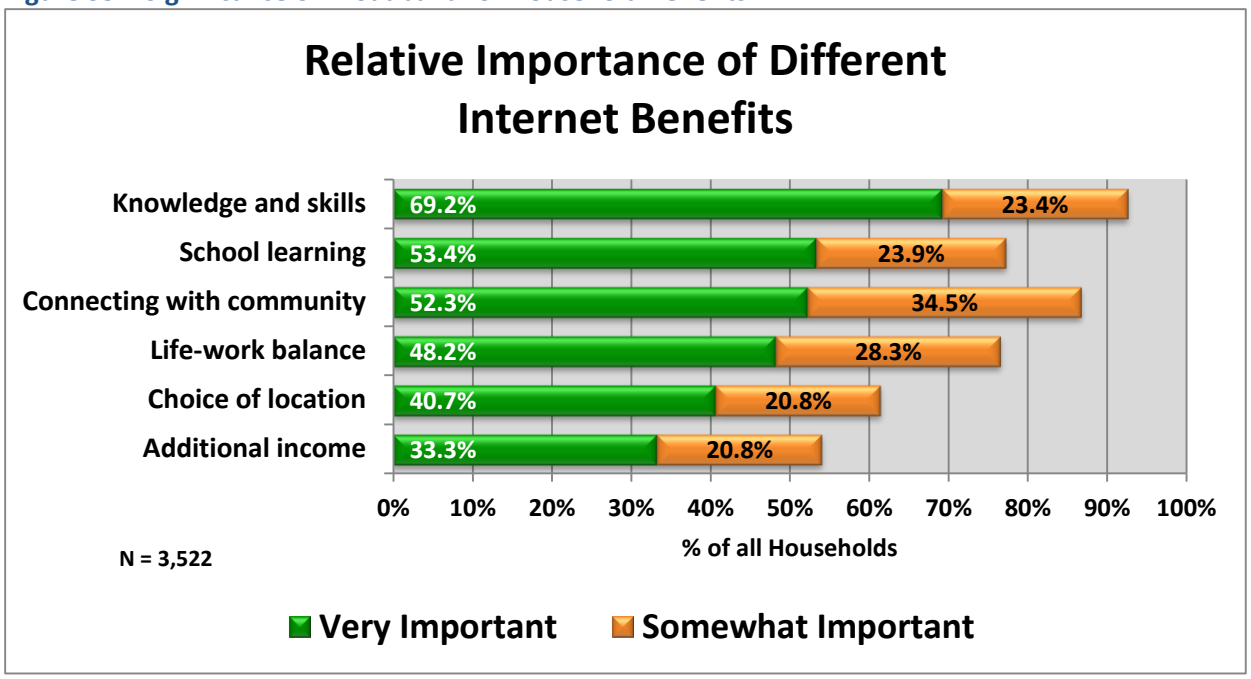
The fact that **overall between 19 percent and 39 percent of households would seriously consider relocation for broadband service** is an important factor with significant implications for communities, both in retaining and attracting residents.

Households were asked to rate the significance of the Internet for achieving the following household benefits:

- Improves knowledge and skills (through online education and/or research)
- Enhances ability to earn additional income
- Enhances school learning (through research and study)
- Enhances awareness of what is happening in the community
- Supports better balance of personal and work time
- Supports choice of living location (e.g. for selecting or remaining in your community)

The following figure shows the benefits of using the Internet for households using broadband connectivity.

Figure 35 – Significance of Broadband for Household Benefits



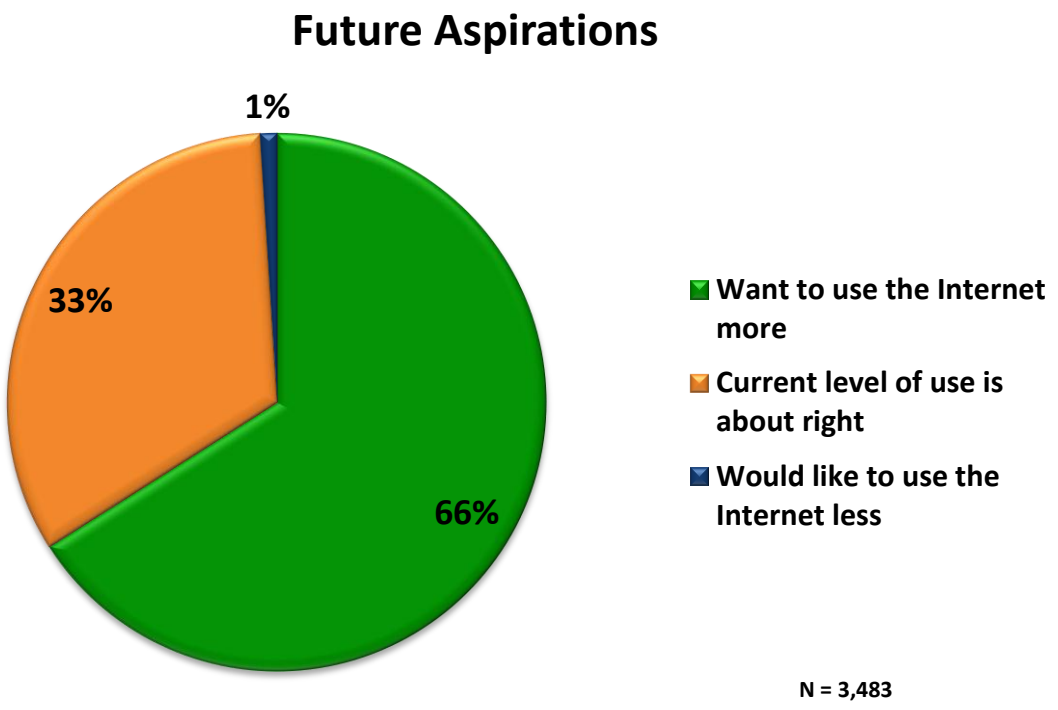
One of the benefits for which broadband is most frequently cited as "very significant" is **improving knowledge and skills** (69.2 percent) through online education or research. Being **more connected with the community** is seen as very significant by over 52.3 percent of households. Broadband is considered very important for the **ability to earn additional income by over 26 percent of households**. This is a level similar to that of those households that currently either telework or have a home-based business.

3.3 BARRIERS AND ADOPTION ISSUES

Data collected addresses how households can get the most out of broadband by looking at their aspirations, barriers to achieving those aspirations, and how they can acquire the skills to overcome those barriers.

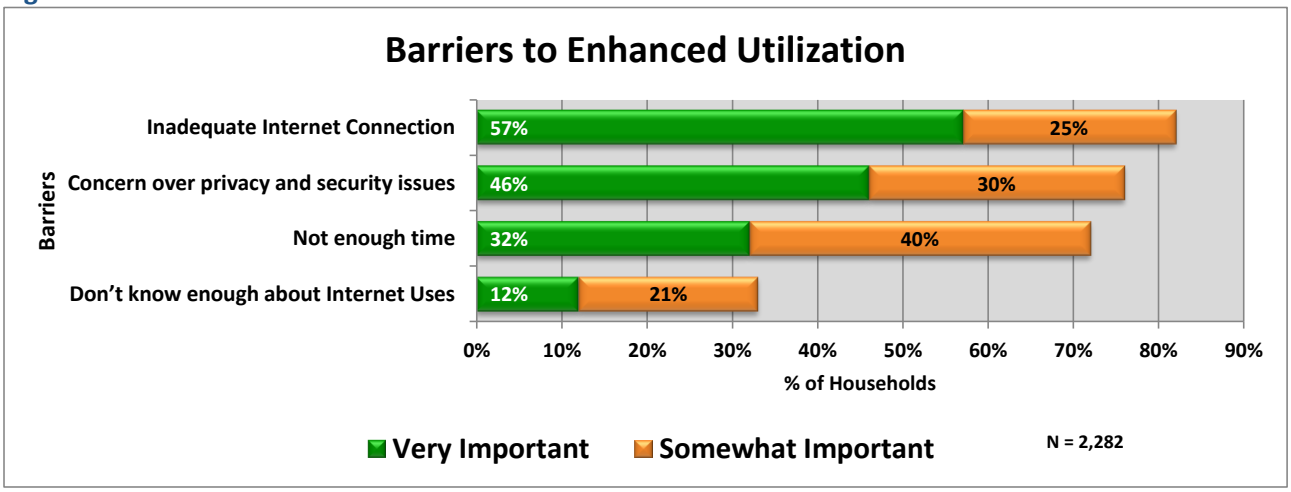
The first question is whether households are satisfied with their current level of Internet use, including the level of befits they derive from using the Internet. As seen in Figure 35, two thirds of household respondents want to increase their level of Internet use or derive greater benefit from their use. One third feel their current level of use if about right, while only 1 percent would like to reduce their use. For those 65 and older the percent wanting to increase their use is over 70 percent.

Figure 36 – Household Aspirations Regarding Level of Internet Use



With 66 percent of households wishing to increases or improve their use of the Internet, the next question is what barriers do they see in achieving that objective. As seen in Figure 36, the two main barriers are an inadequate Internet connection (57 percent of households say this is a very important barrier), followed by concerns over privacy and security (46 percent). Lack of skills or knowledge impacts a far smaller group.

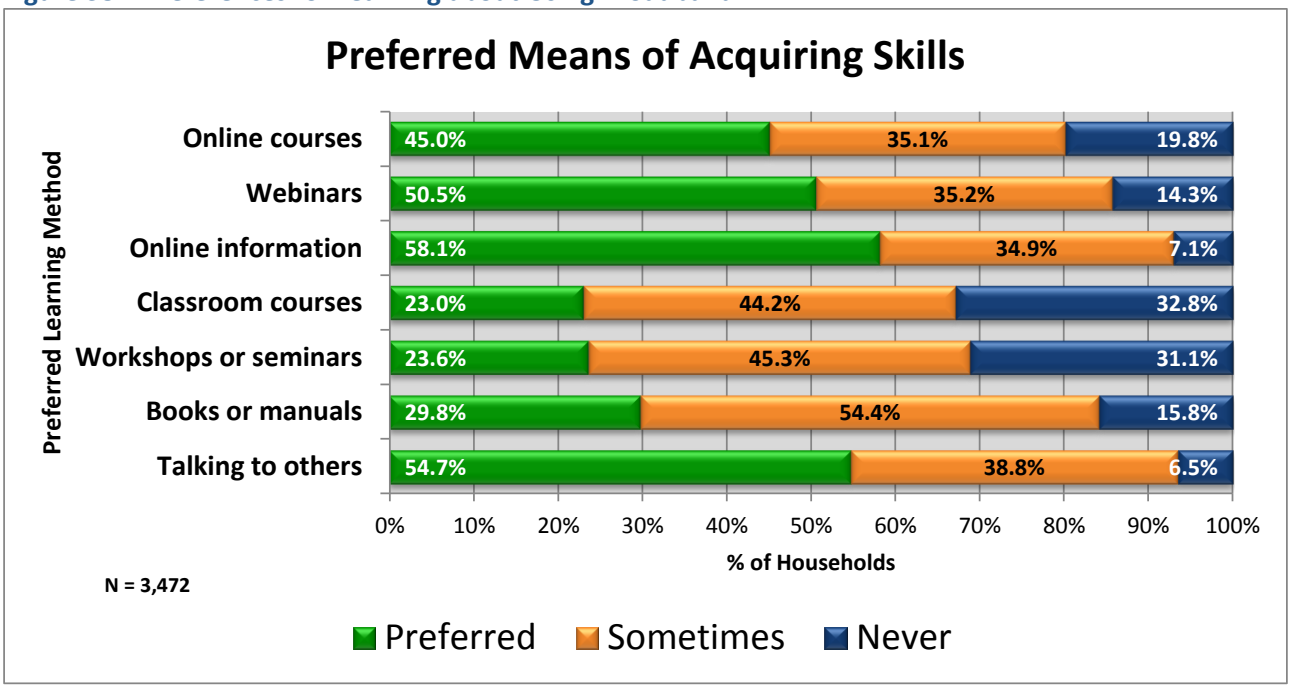
Figure 37 – Barriers to Enhanced Use of the Internet



A critical question those households wishing to learn more about using the Internet is their preferences for different learning methods. As seen in Figure 37, the preferred methods are self-directed, either by accessing online resources or talking with other people who have experience. The least favoured methods are formal classroom training or workshops and seminars. These statistics should be

considered in any initiatives designed to deliver training and support to households for increasing broadband utilization. In particular, providing access to online information, webinars, and training courses would be favoured by over 80% of households, while also being a cost-effective method for delivering information and support for using broadband services.

Figure 38 – Preferences for Learning about Using Broadband



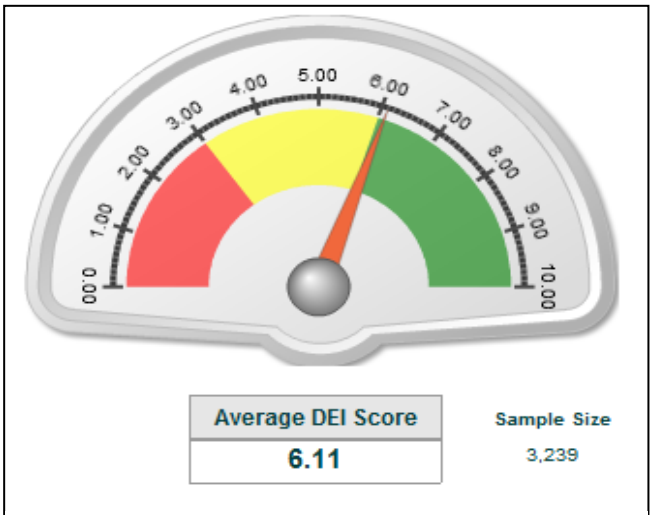
4 Benchmarks and Regional Overview

This report includes comparisons of Internet use between regions by various characteristics, such as industry, business size, and household demographics. To assist in the process of making comparisons, a mechanism was developed for establishing benchmarks. Benchmarks are useful in creating reference points against which the performance of any individual or group can be compared. Strategic Networks Group has developed a benchmarking process based on its Digital Economy index (DEi).

4.1 INTRODUCING THE DIGITAL ECONOMY INDEX (DEI)

The Digital Economy index (DEi) reflects an organization's or household's utilization of a range of Internet applications and process – 17 for organizations and 30 for households. These applications and processes (e-solutions) are listed on the following page. Based on the number of applications currently being used by an organization or household, a composite score is calculated that summarizes how comprehensively each organization or household uses Internet-enabled e-solutions. The DEi can be used to compare organizations, regions, or industry sectors. A separate DEi is used to compare how different types of households use the Internet.

An organization's or household's DEi score (from 0 to 10) captures that their utilization of e-solutions, with 10 being the highest possible use. DEi scores are averaged across groups of users by various categories: e.g. a sector's DEi is the average for all organizations in that sector. The DEi is used as a basis for comparison of utilization levels across various dimensions.



DEi Meter from dashboard of the Digital Economy Analytics Platform.

Identifying variations in DEi assists in focusing on areas where a deeper assessment is warranted. In areas where DEi is lower than average, indicating lower utilization, there is an opportunity to increase utilization and benefits to organizations and households. On the next page is a list of the utilization categories (e-Solutions) used to track how organizations and households use their Internet and broadband connections.

The Color Coding for DEi Scores: To better show how industry sectors perform, the DEi tables in this report are color coded from the highest (**green**) to lowest (**red**) to highlight how DEi scores compare. **The color coding** (**green to red**) allows one to quickly compare groups based on how utilization varies.

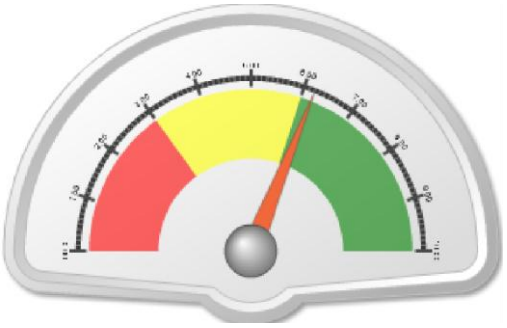
Highest
2
3
4
5
6
Lowest
Insufficient Data

e-Solutions refer to the integration of Internet technologies with the internal computer-based systems and applications within or among organizations for a variety of operational processes. e-Solutions encompass not only product delivery and payment transactions (e-commerce) but also all processes that may be facilitated by computer-mediated communications over the Internet.

e-Solutions Categories for Organizations	
e-Commerce Related	***e-Process Related***
Selling goods or services	Purchasing goods or services
Deliver services and content	Supplier communication and coordination
Rich media or service creation	Electronic document transfer
Customer service and support	Staff training and skills development
Advertising and promotion	Teleworking
Social networking	Accessing collaborative tools
Web site for organization	Banking and financial
Research by staff	Government transactions
	Access government information

e-Solutions Categories for Households	
Communication	***Transactions***
E-mail	Buying goods or services
Voice over IP	Selling items
Online chat	Investments / trading
Sharing information	Online banking
Personal website	Paying bills
Productivity	Government services
Education or training courses	Music or video download
Accessing workplace	Software download
Teleworking	Booking travel
Home business	***Research***
Recreation	Product information
News and sports	Investments
Listen to radio	Government information
Watch TV programs	Community events
Watch movies	Education and training
Online gaming	Health information
	Travel information

4.2 ORGANIZATIONAL BENCHMARKS AND REGIONAL BREAKDOWN



Average DEi Score	Sample Size	Median DEi Score
6.22	2244	6.41

This report uses both mean average and median as benchmarks. For organizations in Kentucky, the mean average was 6.22 while the median average was 6.41.[12] As can be seen in Figure 38, the North and Central Regions have significantly higher than average median DEi scores than the Northeast, West and East. Figure 39 shows how different sized organizations in the different regions perform relative to the state benchmarks. The benchmarking shows that smaller organizations consistently perform at lower levels than larger organizations.

Figure 39 – Utilization Benchmarks (DEi) for Organizations by Region

Utilization (DEi) by Region			
Region	Ave. DEI Score	Median DEi	# Establishments
North	**6.51**	**6.70**	**483.**
Central	**6.09**	**6.60**	**443.**
Northeast	**6.22**	**6.31**	**581.**
West	**6.16**	**6.31**	**458.**
East	**6.00**	**6.21**	**279.**
			2,244.

Figure 40 – Utilization Benchmarks (DEi) for Organizations By Region and Size of Firm

DEI by Region and Size of Firm					
Employment Range	Central	East	North	Northeast	West
0 - 19	**5.85**	**5.60**	**6.31**	**5.83**	**5.70**
20 - 49	**6.86**	**5.57**	**6.92**	**6.53**	**6.59**
50 - 99	**6.79**	**6.01**	**6.83**	**6.88**	**7.05**
100 - 499	**6.62**	**7.10**	**6.80**	**7.04**	**7.18**
500 or more	**7.62**	**8.23**	**7.33**	**7.52**	**7.57**

In comparing the government, commercial and non-profit sectors, it is apparent that the commercial sector (with a DEi of 6.6) utilizes a broader range of e-solutions than either the non-profit sector (6.31)

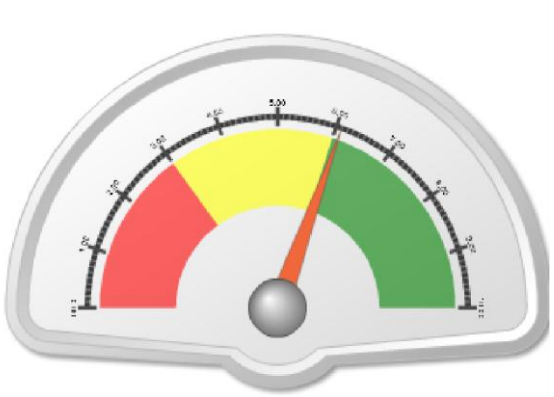
[12] The terms **mean** and **average** refer to the sum of all values divided by the total number of values. The **median** is the central point of a data set. To find the median, you would list all data points in ascending order and simply pick the entry in the middle of that list.

or government sector (6.12). This is only partly explained by the less frequent use of such commercial e-solutions as selling on line. Benchmarking with the DEi also allows comparisons between different industry sectors, as outlined in Figure 40.

Figure 41 – Utilization Benchmarks (DEi) by Industry Sector

DEi by Industry Sector			
Major Industry	Ave. DEI Score	Median DEi Score	# of Establishments
Finance & Insurance	**7.47**	**7.96**	**100**
Information	**6.90**	**7.38**	**95**
Real Estate	**6.82**	**7.09**	**43**
Unclassified Establishments	**6.73**	**6.99**	**223**
Educational Services	**6.67**	**6.80**	**247**
Manufacturing / Processing	**6.56**	**6.51**	**94**
Retail Trade	**6.36**	**6.70**	**126**
Other services (exc. public admin)	**6.30**	**6.70**	**133**
Utilities	**6.30**	**5.97**	**12**
Accommodation & food services	**6.29**	**6.56**	**30**
Professional & Technical Services	**6.24**	**6.41**	**169**
Wholesale Trade	**6.22**	**6.31**	**54**
Agriculture / Forestry / Fishing	**5.96**	**6.12**	**15**
Arts, Entertainment & Recreation	**5.93**	**6.31**	**31**
Construction	**5.84**	**5.88**	**102**
Health Care & Social Assistance	**5.74**	**5.73**	**167**
Administrative & Support Services	**5.62**	**6.12**	**25**
Transportation & Warehousing	**5.34**	**5.44**	**28**
Public Administration	**5.17**	**5.24**	**321**
Mining	**5.03**	**5.63**	**6**

4.3 HOUSEHOLD BENCHMARKS AND REGIONAL BREAKDOWN



Average DEi Score	Sample Size	Median DEi Score
6.1	4122	6.35

For households in Kentucky, the mean average was 6.1 while the median average was 6.35. As can be seen in Figure 41, the North and Northeast Regions have significantly higher than average median DEi scores than the Central, West and East.

Figure 42 – Utilization Benchmarks (DEi) for Households

Region	Median DEi	Difference from Median	Ave. DEi Score	Difference from Average	# Households	Sample Error Margin
Northeast	6.60	0.25	6.29	0.19	1,207	+2.8%
North	6.54	0.19	6.31	0.21	695	+3.7%
Central	6.22	-0.13	5.95	-0.15	735	+3.6%
West	6.22	-0.13	5.93	-0.17	1,030	+3.1%
East	6.15	-0.20	5.92	-0.18	455	+4.6%
Kentucky	6.35		6.10		4,122	

The DEi scores indicate that residents of the North and Northeast regions utilize the Internet more effectively (on average) than residents of other regions. The reasons for this variance between the regions can be explained to a significant extent by the age, income and educational make-up of each region. The younger, wealthier and better educated a person or household, the more effectively they use the Internet. The older, poorer and less well educated, the less effectively (on average) they are likely to use the Internet.

In addition, residents of rural areas also tend to have lower utilization (DEi score) than metropolitan residents. A more complete of household benchmarks is included in the Broadband KY e-Strategies Report, as well as on the Digital Economy Analysis Platform.

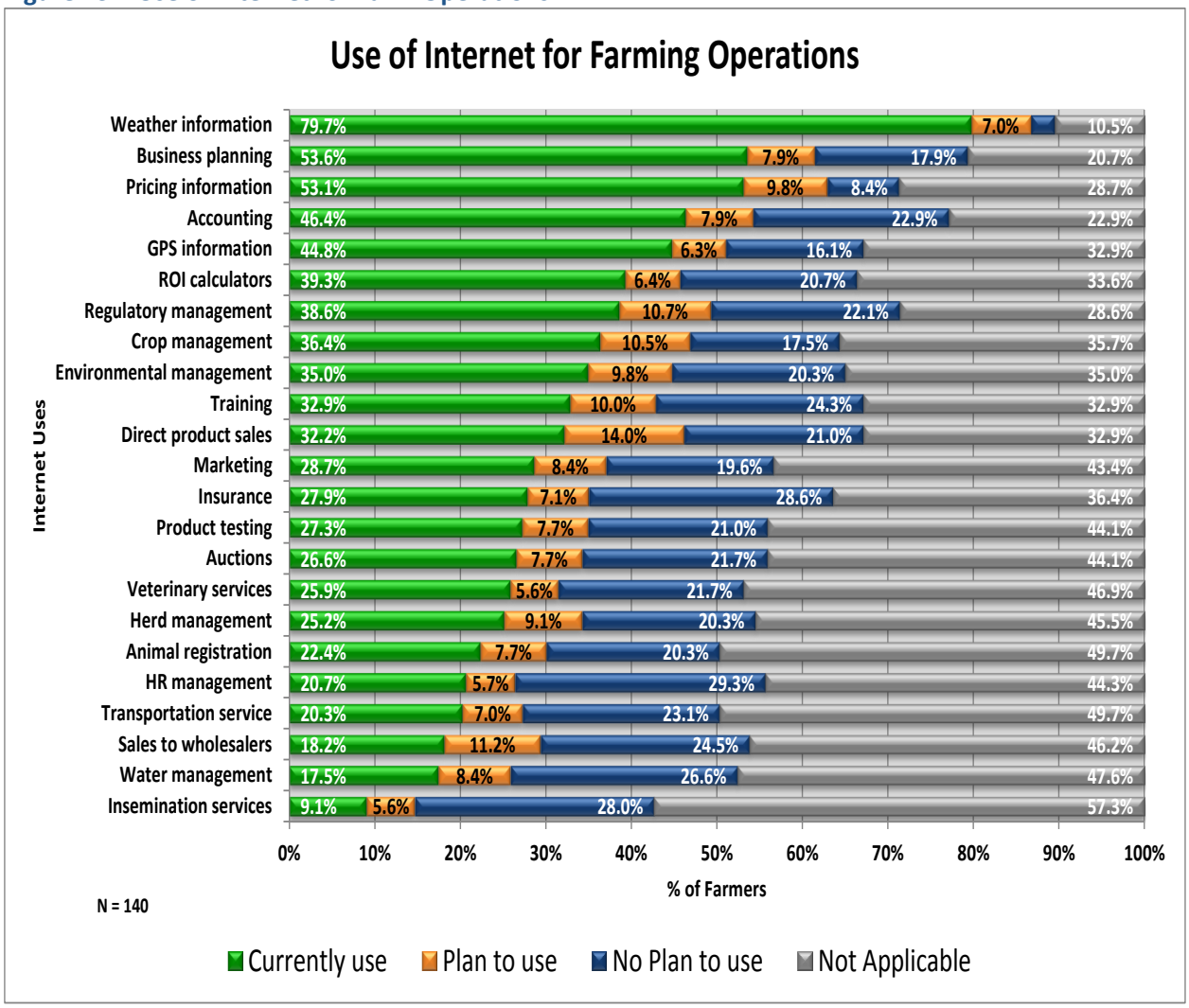
5 Sector Analysis

The data collection effort for Kentucky included specific questions for respondents who identified themselves as belonging to a group that was of special interest to broadband planning. These included farms and five types of community anchor institutions (CAIs): public Internet access sites, health, education, local government and economic development agencies. CAIs were asked if they provided public access to the Internet, and if so in what manner. CAIs in the five categories noted above were each asked as small number of questions regarding Internets uses specific to their area. This section summarizes the responses of this sub-set of respondents to their area specific questions.

5.1 FARMS

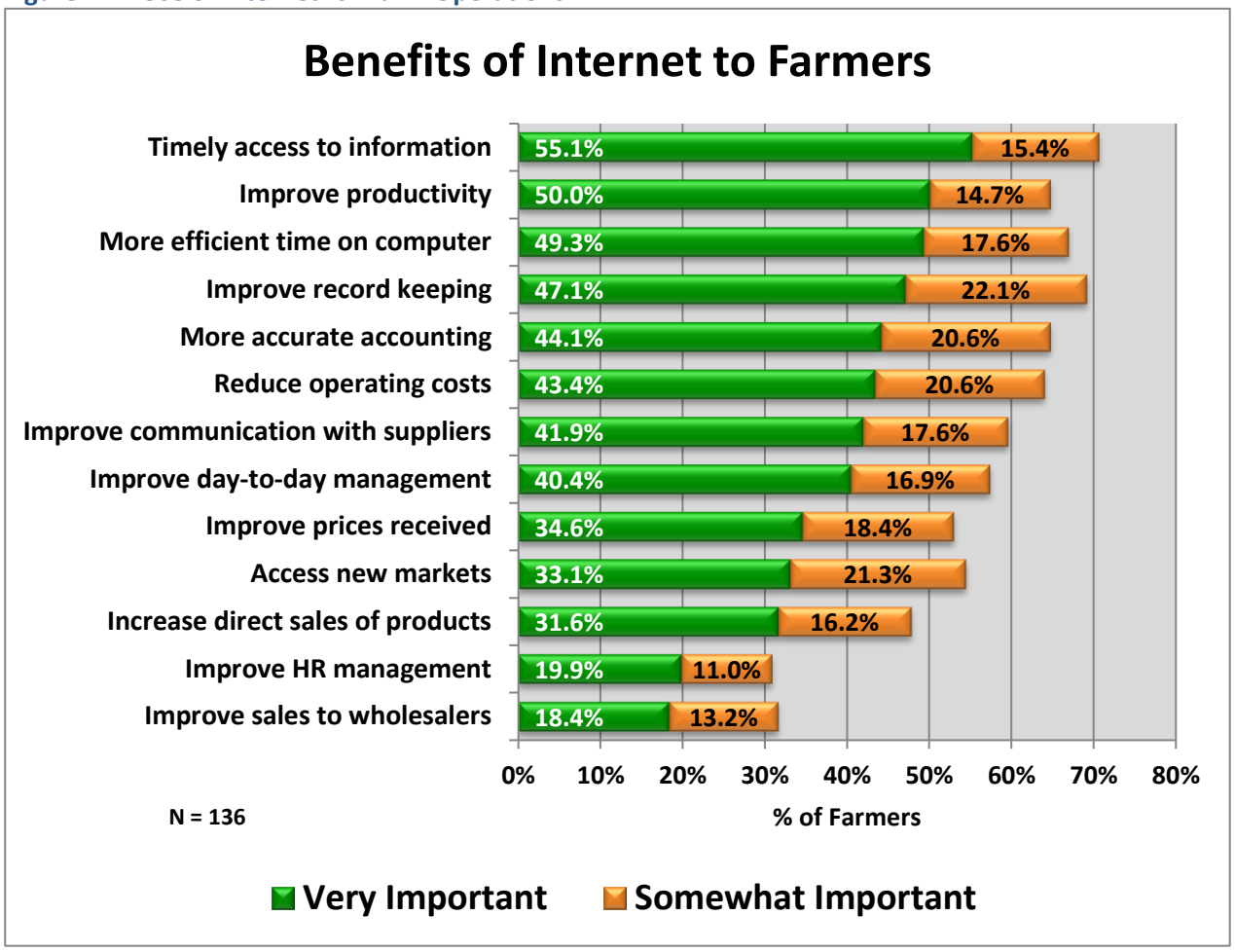
144 self-identified respondents identified themselves as belong to the farm sector. Their use of the core Internet solutions, as measured by DEi, was almost identical to the state average (DE- = 6.21, versus 6.22 for the state). As seen in Figure 42, the leading farm specific uses of the Internet focus on background information (weather, GIS, prices) and business management. Direct market sales through the Internet falls roughly in the middle of e-solutions currently being used by farmers, but was the highest rated for future growth.

Figure 43 – Use of Internet for Farm Operations



The main benefits of the Internet reported by farmers related to operational factors, with increased sales and revenues less frequently cited.

Figure 44 – Use of Internet for Farm Operations



5.2 PUBLIC INTERNET ACCESS AT COMMUNITY ANCHOR INSTITUTIONS

Eight hundred and sixty two (862) respondents identified themselves as a public or non-profit entity that could be considered to be a Community Anchor Institution. Of these, 249 (28.9 percent) reported that they provided some form of public Internet access. The most common types of access included public Internet terminals (99 percent) and public access Wi-Fi (57.9 percent). Over 40 percent of these organizations also provided Internet training.

The availability of public access Internet is greatest during the work day, with the majority of public Internet facilities closed during evenings and weekends. Libraries represent the most consistent public service during evenings and weekends, though a surprising number of other organizations, such as schools and local governments, provide access outside of work hours. Just under a quarter of public access facilities indicate that they plan to expand the number of public terminals.

Figure 45 – Public Internet Access Services

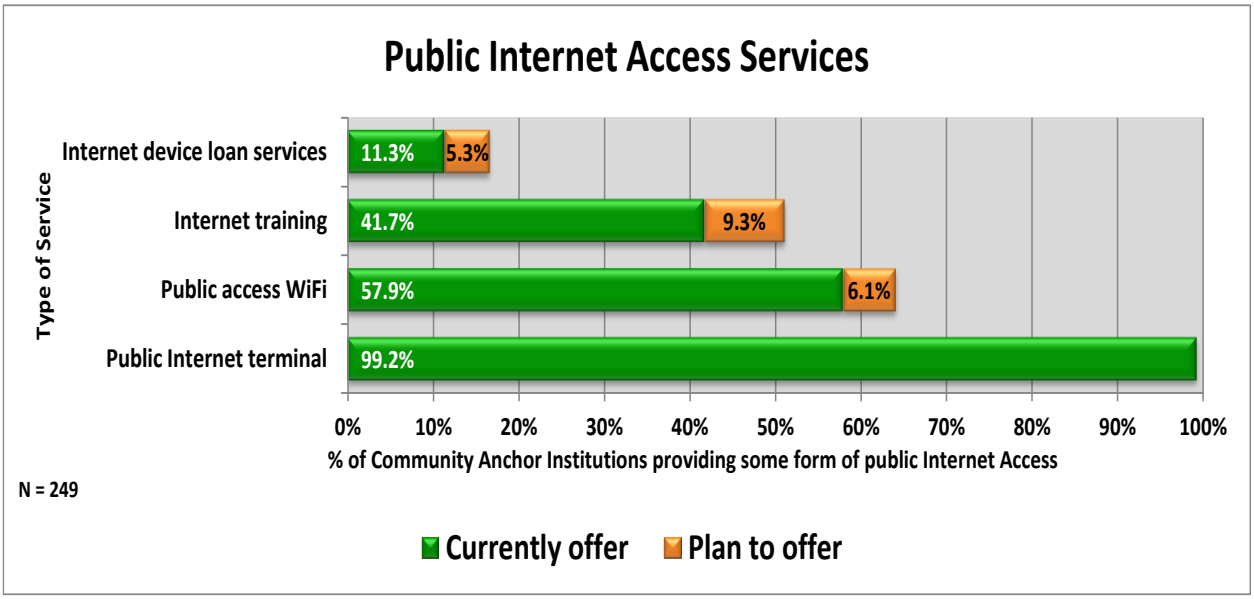


Figure 46 – When Public Internet Access is Available

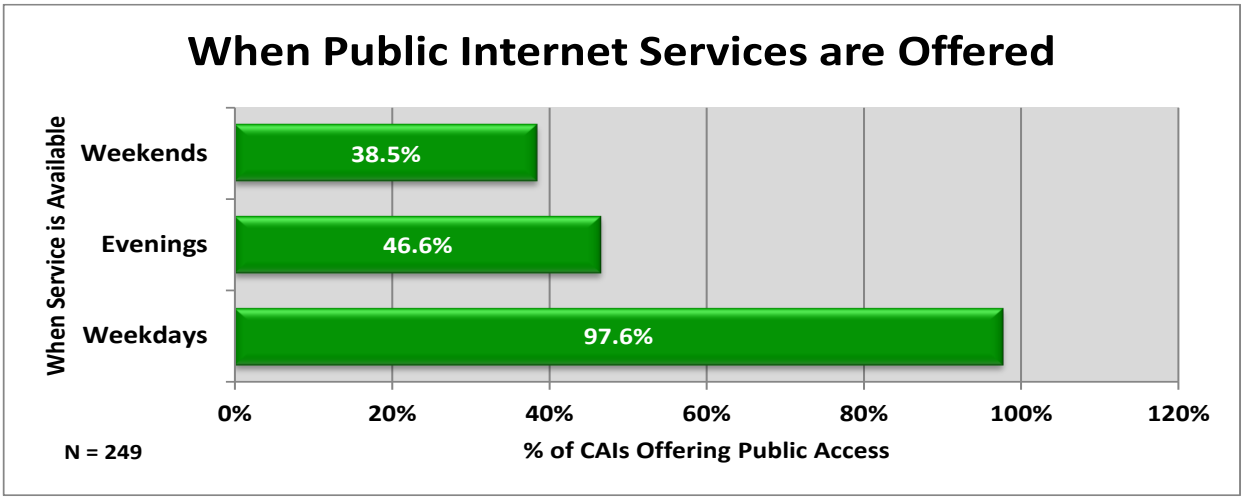


Figure 47 – Peak Occupancy versus Spare Capacity of Public Access Terminals

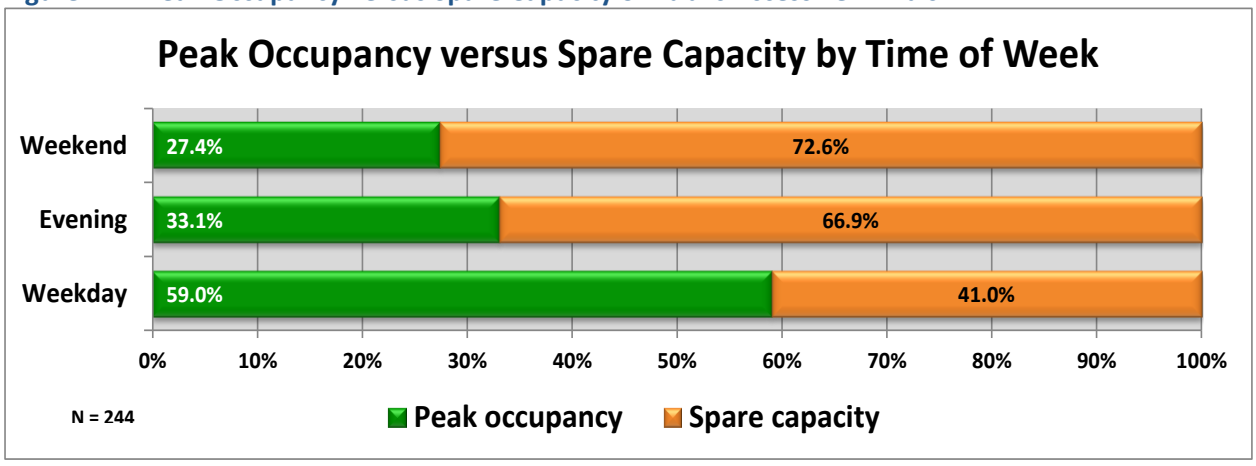
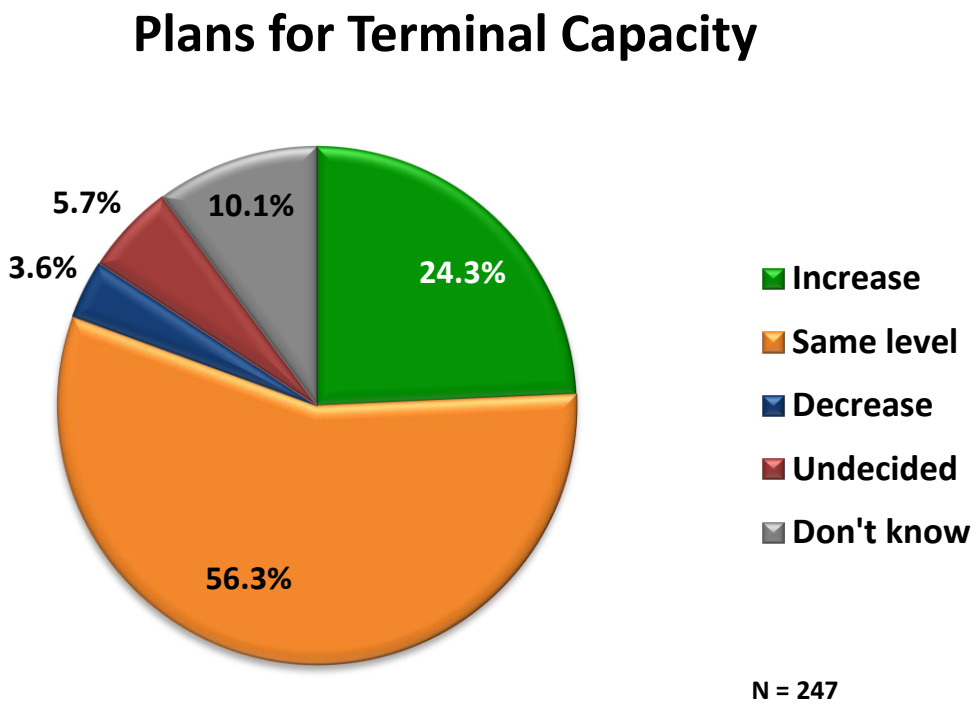


Figure 48 – Plans for Terminal Capacity



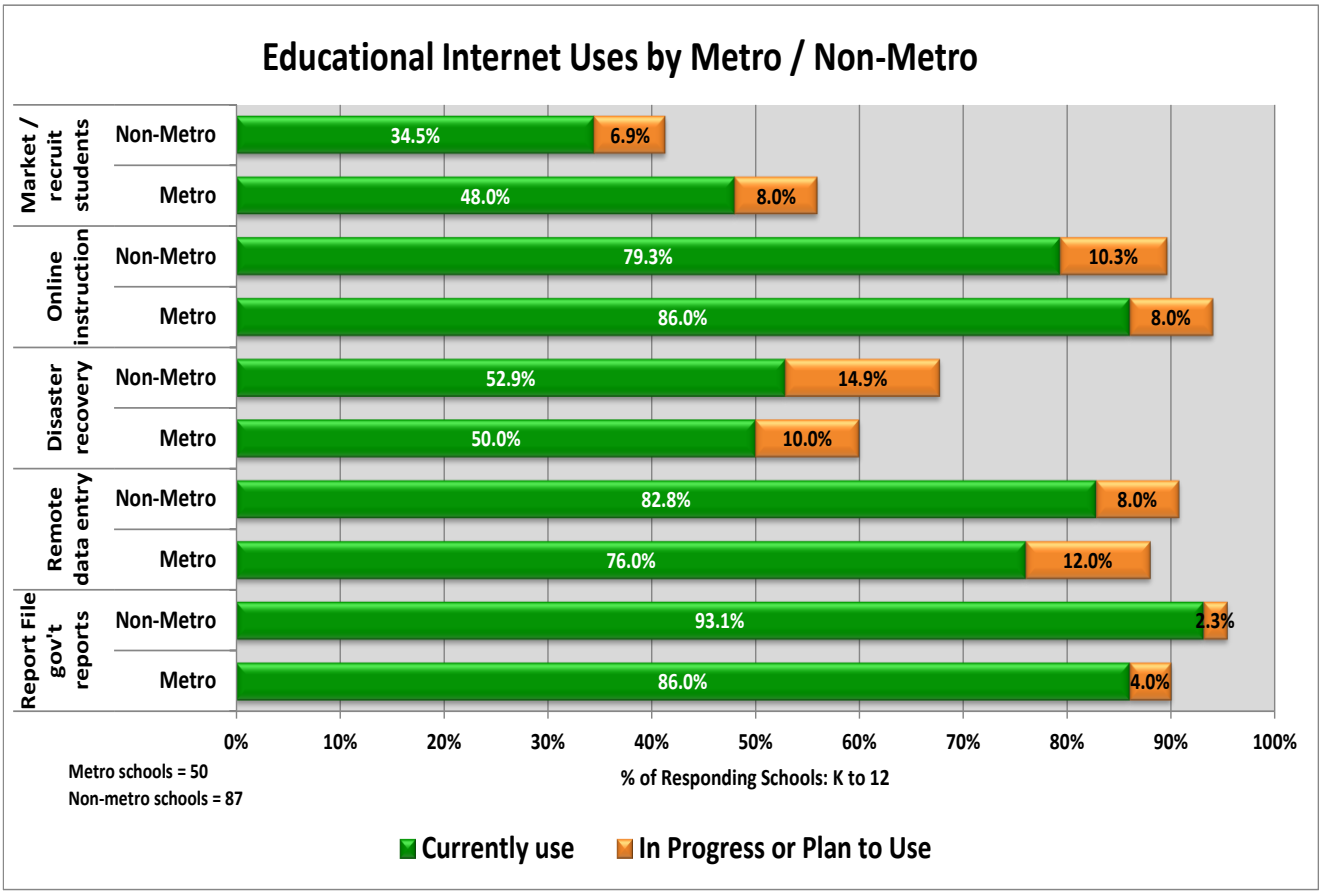
5.3 K – 12 SCHOOLS

Metro and non-metro schools have similar utilization of generic Internet applications and processes, with DEis of 6.47 and 6.4 respectively (above the state average for all types of organizations). However, when looking at Internet uses specific to the educational sector, a noticeable difference between metro and non-metro schools appears. Using a DEi focusing just on educational applications (DEi-E), metro schools scored 7.46, while non-metro schools scored 7.07.

As can be seen in Figure 47, the main difference between the metro and non-metro schools occurs in the areas of online delivery of instruction and marketing and recruiting of students through the Internet. On closer examination, while these differences exist to a small extent at the high school level, the main difference is at the elementary and middle school levels where metro schools are far more likely to currently provide instruction online (87 percent), as well as market and recruit (43.5 percent)[13], compared to their non-metro peers (63.2 and 10.5 percent respectively).

[13] The survey asked schools if they use the Internet to recruit or market their school to students. This area of utilization is a relatively fast growing use, based on the percent of schools that said they were currently in the process of adopting or planning to adopt this use of the Internet (see Figure 49).

Figure 49 – Educational Uses of the Internet by K – 12 Schools (metropolitan and non-metropolitan)



5.4 PUBLIC SAFETY ORGANIZATIONS

Fifty seven responding organizations identified themselves as public safety organizations (see break down by type in Figure 48. These organizations were asked three supplementary questions related their use of the Internet. One question related to the quality and capability of their Internet connectivity. Approximately half of respondents indicated that their broadband connectivity was sufficient. The majority of organizations reporting inadequate connectivity were non-police services (911 – Dispatch, ambulance and fire). However, the number of respondents is too small to draw any conclusions.

Figure 50 – Breakdown of Public Safety Organizations by Type of Service

Public Safety Role	# Establishments	Share of Public Safety Organizations
Police	**25**	**43.9%**
Fire	**20**	**35.1%**
911 dispatch	**8**	**14.0%**
Ambulance	**4**	**7.0%**
	57	**100.0%**

Public safety organizations were asked to rate the level of compatibility of their communication systems, both within their jurisdiction, as well as with agencies outside their jurisdiction. Figure 49 shows that within a given jurisdiction, compatibility tends to be moderate to high, with only 9.3 percent reporting low compatibility. However, when asked to assess the level of compatibility of communications with agencies outside their jurisdiction, 29.6 percent reported low levels of compatibility.

Figure 51 –Compatibility of Public Safety Communications within their Area of Jurisdiction

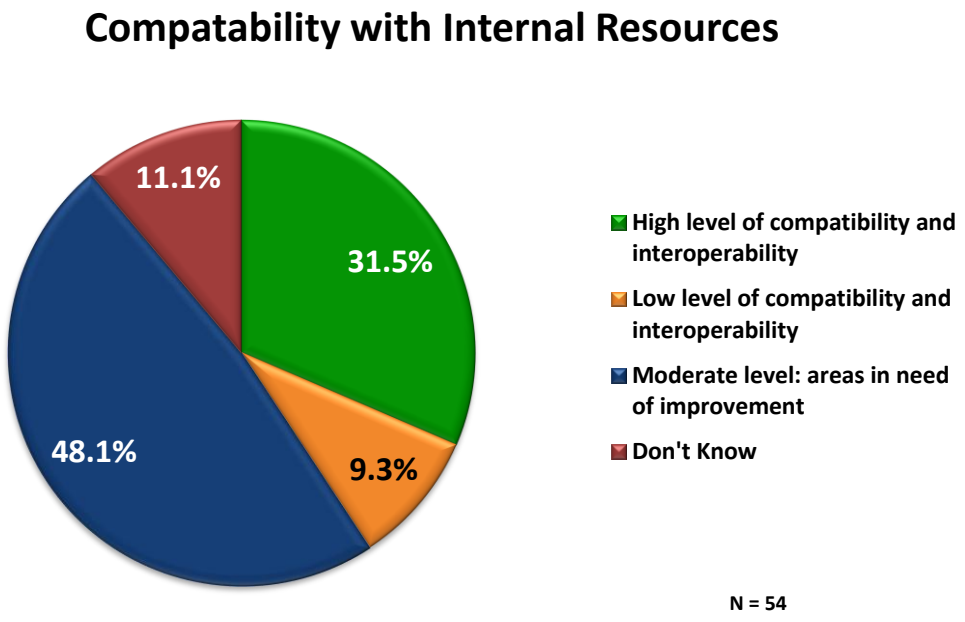
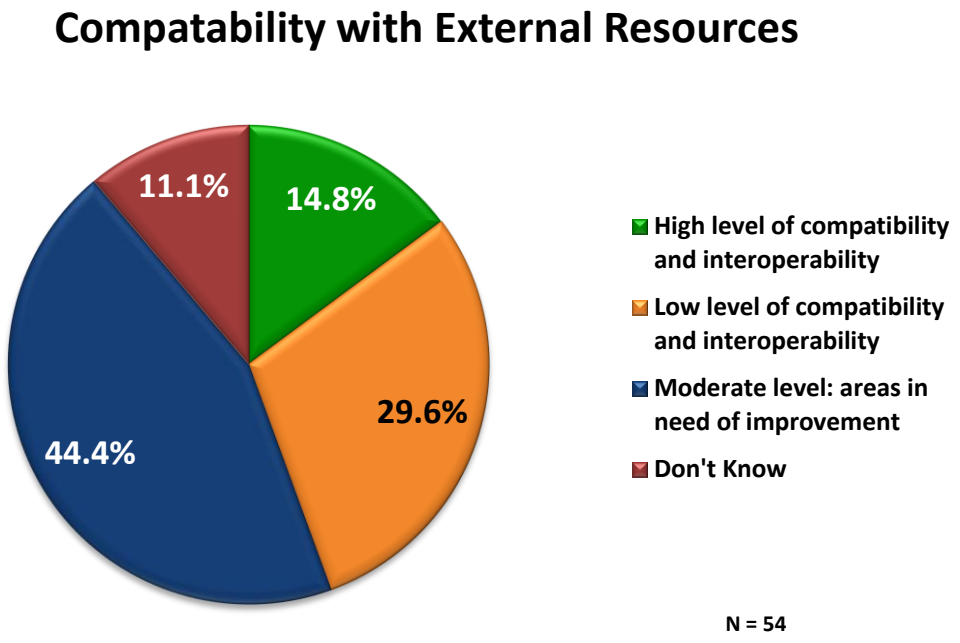


Figure 52 –Compatibility of Public Safety Communications Outside their Area of Jurisdiction



5.5 LOCAL GOVERNMENT

One hundred and fifty nine local government organizations responded to the survey, providing information on Internet utilization, including uses specific to local governments (Figure 51). Generally local governments have low levels of utilization of generic Internet applications and processes, with an average DEi of 5.32 compared to 6.42 for K-12 schools and 6.22 for organizations in Kentucky overall. Local governments in metropolitan areas (populations in excess of 50,000) have noticeably higher utilization than those outside metropolitan areas.

Local governments were also asked about the degree to which they collaborate or have considered collaborating on e-solutions. Collaborating on e-solutions can be a means for addressing both cost issues and lack of internal expertise. Current levels of collaboration are very low at under 10 percent. This could indicate an opportunity that many governments could pursue to improve their use of Internet applications and processes.

Figure 53 –Local Government Uses of the Internet

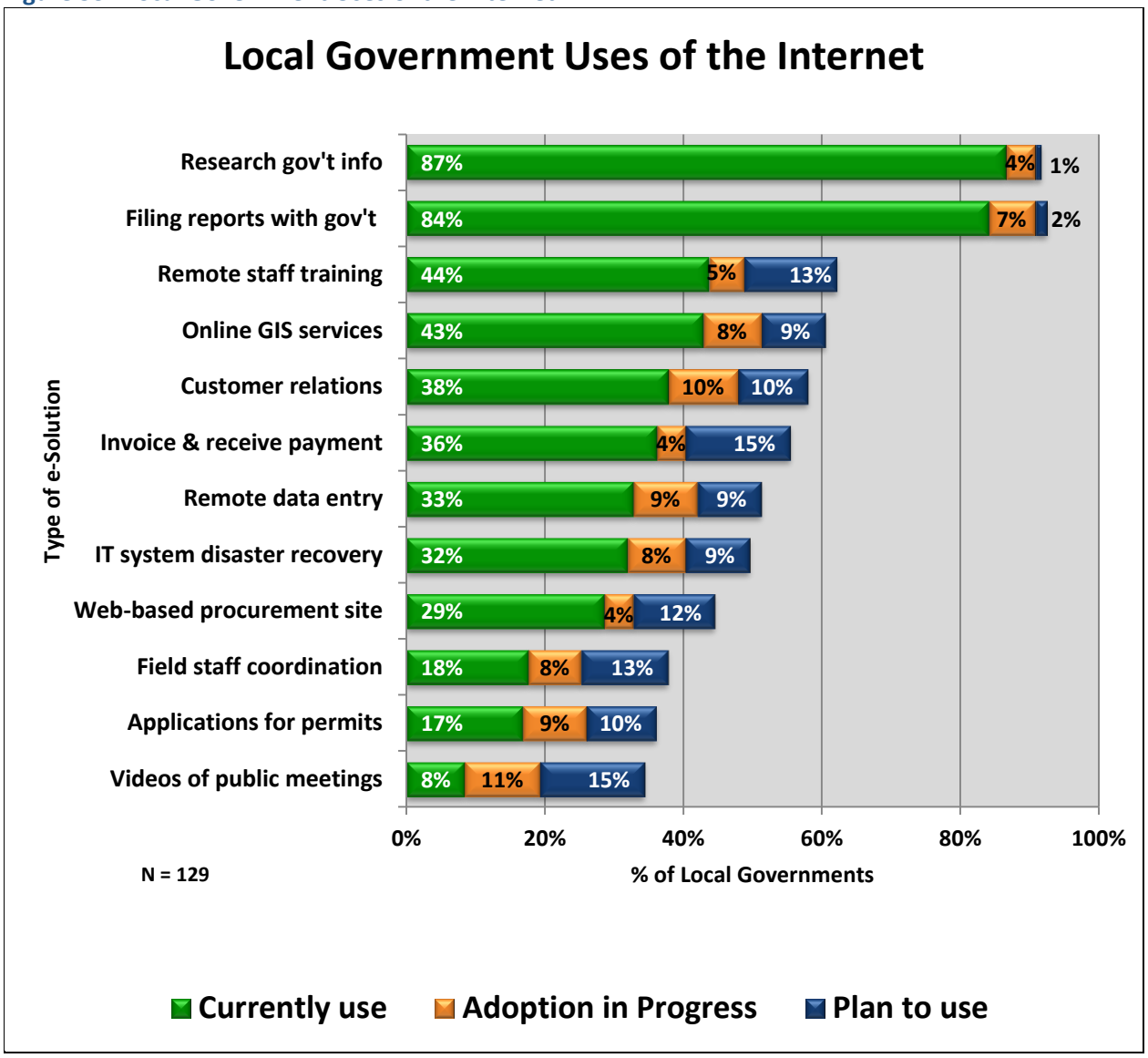
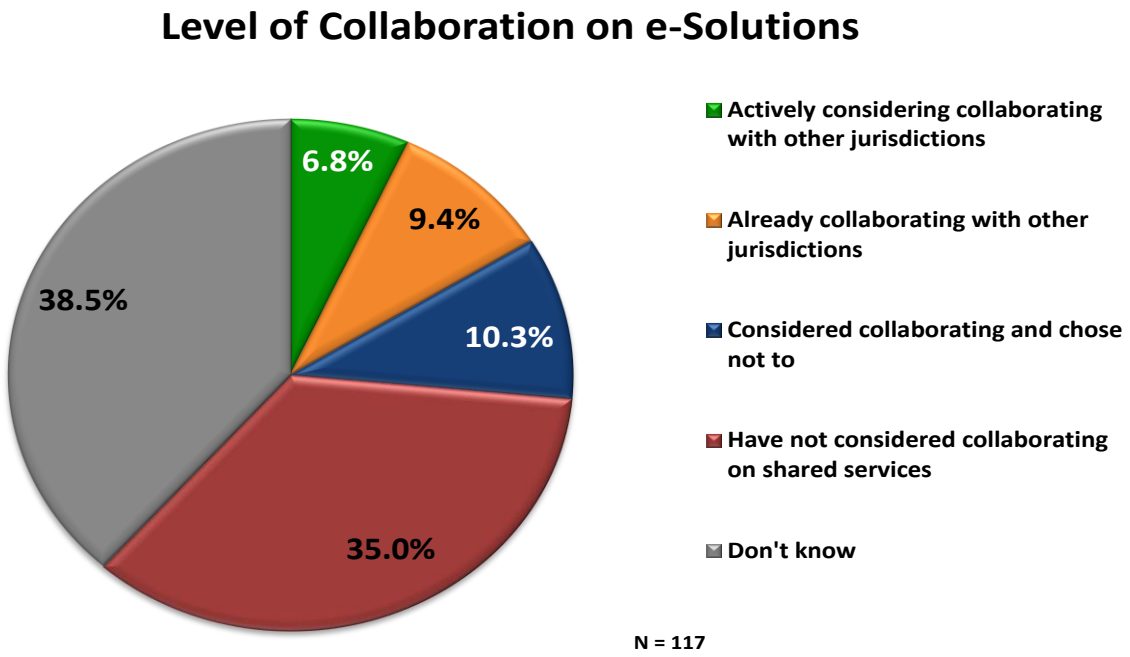


Figure 54 –Local Government Use of Collaboration on e-Solutions



5.6 ECONOMIC DEVELOPMENT AGENCIES

Fifty three respondents identified themselves as economic development agencies. These respondents provided information on Internet issues related to their mandate.

One issue on which these respondents were asked to comment related to how often they encountered businesses that either left the area or chose not to locate there because of the type of Internet services available. The actual questions asked were:

- In the past 12 months, how often have businesses chosen not to locate in your community because of the broadband services available?
- In the past 12 months, how often have businesses relocated away from your jurisdiction due to the type of broadband services available?)

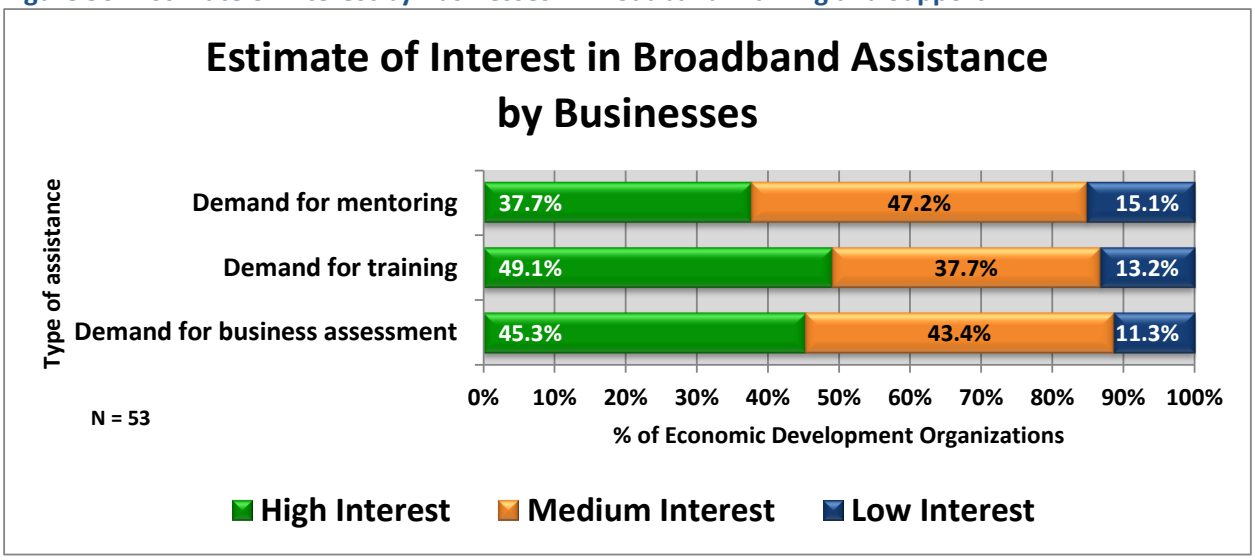
While not a common occurrence, one third of economic development agencies said that businesses not locating in their area due to the type of broadband was either a frequent or occasional occurrence. Economic development agencies in non-metro areas reported a higher frequency, but the small sample makes any inference risky.

Figure 55 –Locational Decisions by Businesses in Relation to Quality of Broadband

Impact of Broadband on Location Decisions	Frequently	Occasionally	Rarely	Never
Businesses choosing not to locate due to available broadband	5.6%	27.8%	13.0%	53.7%
Businesses leaving area due to available broadband	3.7%	13.0%	29.6%	53.7%

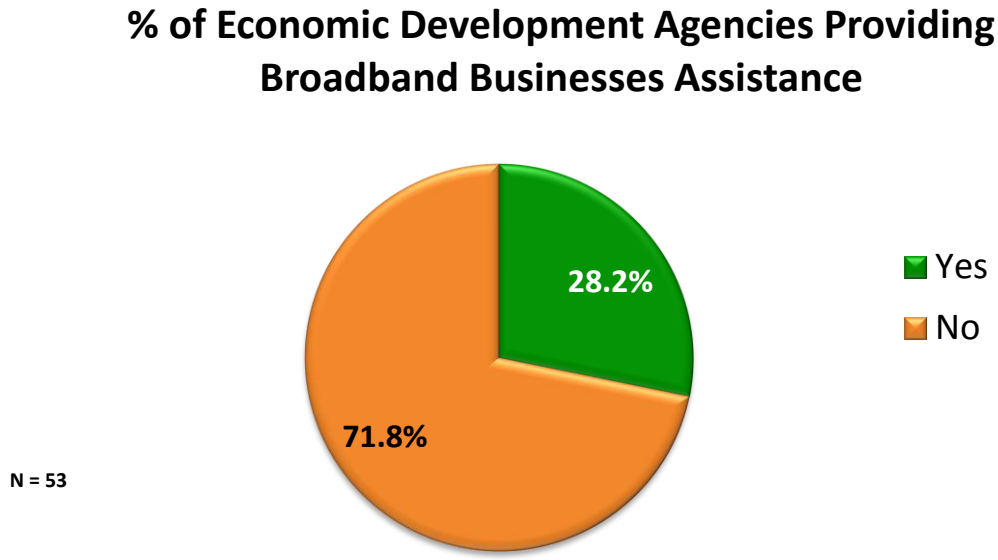
Economic development agencies were also asked to identify the level of interest by businesses in training and support services related to broadband.

Figure 56 –Estimate of Interest by Businesses in Broadband Training and Support



There is a high estimated level of interest in training and assessment in relation to use of the Internet by businesses. Nonetheless, only 15 out of 53 respondents stated that they provided such services.

Figure 57 –Percent of Economic Development Agencies with Broadband Training and Support Services



Concluding Comments

The findings in this eSB Technical Report provide a solid foundation for evidence-based planning and decision-making. These findings and their implications must be filtered through the values and priorities of the region and its communities.

Appendix A - Data Collection Methods and Results

The core methodology is founded on primary research via data collection through online surveys of businesses, organizations and households. Due to the distinct nature of the uses and benefits of different categories of Internet users, separate and distinct surveys are used for organizations and for households. While the nature and purpose of the question sets are parallel for each survey, the questions are formulated in contexts specific and relevant to each of these basic user categories.

In addition to the main set of questions that all organizations were asked, a number of small "modules" (consisting of four to 10 questions) were added to those respondents identifying themselves as belong to one the following key sectors: farming, K-12 schools, colleges, health care, public safety, and local government.

Both the business survey and the household survey are designed to collect information directly from Internet users in the following categories:

User Profile – information that characterize each respondent for purposes of statistical analysis based on user characteristics, e.g. organization size by employment, household income, time of Internet use, etc.

Internet Utilization – the current and planned uses of the Internet across multiple categories relevant to how organizations and households may use the Internet. The primary type of Internet connection used is also identified for selected cross tabulations with other response data.

Internet Benefits – information on how organizations and households assess the benefits of using the Internet.

Barriers - information on the importance of factors that prevent or inhibit organizations and households from taking full advantage of the Internet.

The surveys are made available for online access through one of two means:

- Individual organizations and households were invited to participate via direct email invitations sent from a large, state-wide contact list.
- In addition, organizations and households were encouraged through a variety of other communications channels to access a link to the survey through the website of the Office of Broadband Outreach and Development (OBOD).

An active public outreach and awareness campaign was carried out by OBOD and the Kentucky Council of Area Development Districts. This campaign included press releases from the governor and OBOD, media interviews, and engagement of stakeholder organizations (requesting that they endorse and promote the survey through their networks.

E-mail invitations were sent directly to 80,000 households and 19,000 organizations in Kentucky. Strategic Networks Group purchased two contact lists from a national list provider. Surveys were deployed using direct email invitation to households and organizations providing access to online surveys. The initial email invitations were sent initial on February 8th, 2012, followed by four reminder emails. The surveys were closed on March 27th.

Survey responses were received from **2,252 businesses and organization**s, and from **4,122 households**. For these survey sample sizes the overall error margin for statistical analysis are +/- 2.1 percent for organizations and +/- 1.5 percent for households (with a 95 percent Confidence Interval)[14]. The sample error margin indicates the accuracy of the statistics derived in relation to how they represent the larger population. Using a 95 percent Confidence Interval, a statistic should fall within the error margin for any random sample of the population 95 percent of the time. The sample error margin is calculated based on the sample size, the population size, and the confidence interval. For 95 percent confidence interval and for populations much larger than the sample, the sampling error is 0.98 divided by the square root of N, where N is the sample size. For this report all population sizes are much larger than the sample sizes.

The following is an example for interpretation of statistics provided in this report:

- 38.8 percent of organizations use the Internet for selling goods or services online.
- The sample size for organizations reporting Internet utilization is 2,022, providing a sample error margin of +/- 2.2 percent with a 95 percent confidence interval.

This means that any similar sample of the population of organizations across the state will result in a statistic for selling goods or services one between 36.4 percent and 41.0 percent (38.8 percent +/- 2.2 percent) 95 percent of the time. The statistic would fall outside this range 5 percent of the time for other random samples of the population. In practical terms the sampling error can be taken as the accuracy of the statistic as it applies to the entire population.

Smaller sample sizes result in larger sampling errors. When comparing statistics between two independent samples, e.g. the same statistic for broadband users vs. dial-up users, the sample errors for each sample must be considered to determine if the difference is significant.

Example – Households paying bills online:

- Dial-up household sample size = 174, with a sample error of +/- 7.4 percent
- Broadband household sample size = 3,544 with a sample error of +/-1.6 percent
- Dial-up statistic is 45.4 percent +/- 7.4 percent, or between 38.0 percent and 52.8 percent, 95 percent of the time.
- Broadband statistic is 81.6 percent +/- 1.6 percent, or between 80.0 percent and 83.2 percent, 95 percent of the time.

While the error margin for the dial-up sample is relatively large, the ranges of the statistics do not overlap, i.e. the higher end of the dial-up statistic (52.8 percent) is less than the lower end of the broadband statistic (80.0 percent), the difference can be considered statistically significant. The difference between the statistics can be taken as given, i.e. 81.6 percent – 45.4 percent = 36.2 percent, or more conservatively as 80.0 percent – 52.8 percent = 27.2 percent. Where the difference between statistics is within the sampling error margin ranges, then such differences may not be real or significant for other random samples of the same sizes. For simplicity of reporting the statistics are stated as given with sample sizes and sampling error margins provided for interpretation.

[14] The error margin at 95% Confidence Interval is often referred to as +/- X% accuracy, 19 times out of 20. Error margins increase for detailed analysis that uses subsets of the overall sample. Where applicable, sample sizes and sample error margins are indicated – example: N= 1,428 [2.6%].

Appendix B - *Broadband KY* Digital Economy Analytics Platform (DEAP) Overview

The survey collected data on the utilization of the Internet by businesses, organizations, and households through e-Solutions Benchmarking and Impact Tracking services. Data is collected through an online survey that provides information on Internet utilization and impacts directly from those using the Internet. This approach sources data that provides direct attribution of the benefits and impacts of Internet use from the user perspective, as well as barriers and drivers for using the Internet. The primary goal of this data collection is to inform clients on the level of utilization of broadband and the benefits and impacts that are derived from broadband utilization.

The DEAP has been developed as an online resource that provides clients with access to the data collection results and the ability to customize their analysis based on their own priorities, sector or geographic region. Application of the DEAP for new and deeper data analysis has value to the following groups:

- **Businesses and organizations** seeking to improve their understanding of how to use e- solutions and seeking to optimize the productivity and efficiencies gains from applying e-solutions;
- **Economic development agencies** seeking to improve the competitiveness and health of local and regional industry sectors.
- **Industry associations** seeking to improve the competitiveness and health of industry sectors;
- **Universities and research institutes** using the DEAP as a support for research and analysis. Digital Economy Analytics Platform Content

The DEAP is an online capability that provides the power of a Business Intelligence engine to analyze datasets based on specific topics of interest, enabling users to develop insights and statistics in answer to specific questions as needed. The following sections provide an overview of the categories of data available for analysis and how the results are organized and presented within the DEAP.

Digital Economy Database Overview

Data is collected for separate datasets for businesses / organizations and households through two distinct questionnaires. While individual questions are tailored to each of these distinct user segments the data collected in both cases consist of the following categories.

- **Utilization** – How users are currently using or plan to use broadband in their business operations or household. This information informs on current state of utilization for identification of gaps and opportunities for increasing e-solutions adoption.
- **Drivers** – The importance of factors that motivate users to utilize broadband and to implement e-solutions. This information aids in focusing the value of broadband and e-solutions.
- **Barriers** – The importance of factors that inhibit or prevent users from adopting e-solutions. This information can be used to develop strategies and initiatives to overcome barriers leading to increased broadband utilization and e-solutions adoption.
- **Benefits** – The importance of broadband for creating positive impacts realized by users. Understanding of benefits achieved reinforces the value of broadband and e-solutions utilization.
- **Impacts** – The quantification of benefits in terms of employment, organization revenues, and cost efficiencies for businesses/organizations, and online spending by households. Translating the benefits from broadband and e-solutions utilization into tangible numbers that demonstrate value and provide measurement of broadband impact.

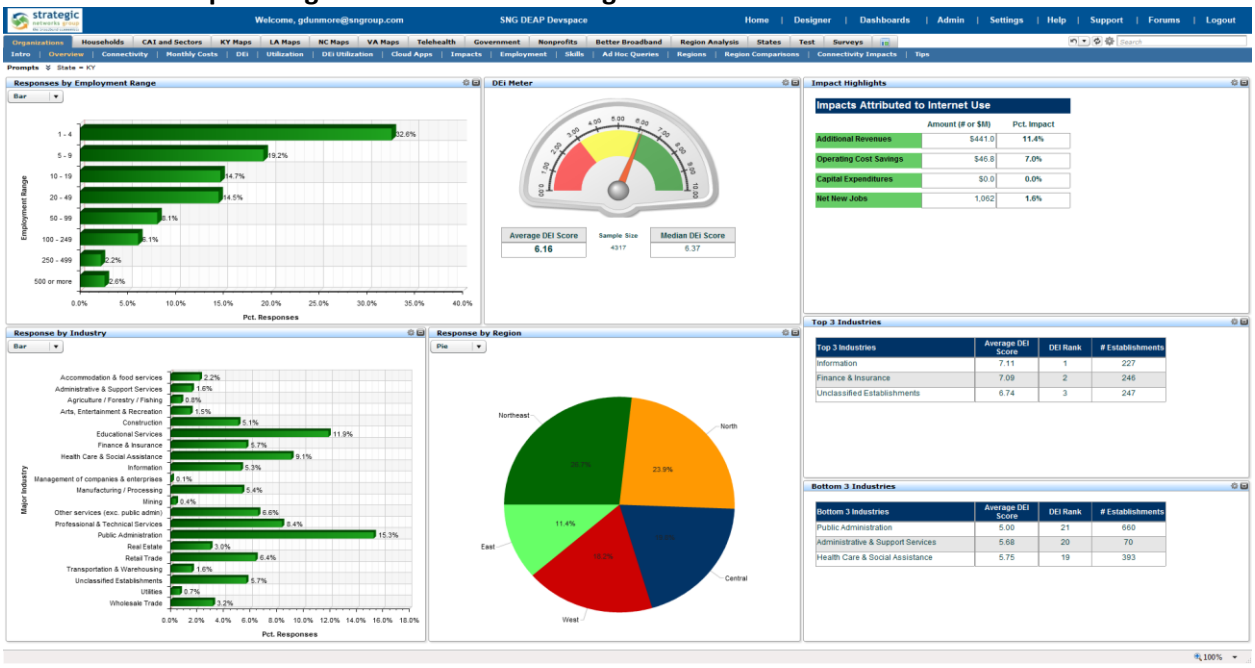
- **Profile Data** – Information about user characteristics and their Internet connectivity for analysis by various dimensions. Organizations are characterized by sector, industry, and employment size. Households are characterized by income, employment status, and age groups. Connectivity method, time of broadband use, and Internet costs are also available both as results and dimensions for analysis. All data contains location based information for geographical analysis, including long/lat. coordinates, state/province, county, and region as well as rural and non-rural designations. When combined with the e-solutions datasets this information enables focus on different market segments to increase utilization and benefits from e-solutions.
- **Digital Economy index (DEi)** - digital economy participation of individual businesses, organizations, and households is assessed using a Digital Economy index (DEi). The DEi is used to measure how e-solutions are being utilized, the benefits derived, and value that could be realized with further utilization. By providing organizations with benchmarking against other businesses and organizations within their own industry, they see the effect utilization gaps are having on their business. This has a significant impact on driving e-solutions usage.

Within these categories additional data is collected in specific focus areas and user segments. Data subsets may include information specific to organizations in Community Anchor Institution sectors, government, non-profit, and health sectors. Household datasets include information specific to teleworking and home business uses.

Digital Economy Analytics Platform Organization

The DEAP is accessed online by authorized users. Users are presented with **dashboards** for businesses and for households. Each dashboard is organized around a series of **pages** focused on specific topics, e.g. Connectivity, Utilization, DEi, Impacts, etc. Within each page is a set of predefined **reports** that present a chart and/or table of processed results from the datasets. The reports display results based on the full set of data being made available to the user.

Dashboard Example – Organizations Overview Page



See "**Digital Economy Analytics Platform Reports**" later in this section for details on each of the reports in the above DEAP Overview Dashboard.

Each dashboard page includes a set of prompts used for filtering the reports in various dimensions, used individually or in combination. Prompts allow users to drill into the data results for exploring specific areas of interest, for example seeking results for organizations in specific industries, employment size, and regions. All reports on the selected page are automatically filtered based on applying the prompt settings selected by the user.

Users may examine reports using combinations of various dimensions as per some of the following examples (of many):

- Type of Internet connectivity by establishment employment size
- Digital Economy Index (DEi) by region
- Household utilizations of the Internet by income
- Revenue impacts by DEi
- Employment impacts by establishment size and region

The wide variety of reports and dimensions available for filtering the data provides users with the means to answer virtually any question regarding Internet use and impacts.

Any report may be expanded to fill the web page view when desired. Individual data point information is presented by moving the cursor over the data point. Chart reports may be switched to table view by the user to view the dataset results upon which the chart is based. In addition, some charts may be switched to a different format, e.g. column, bar, pie, depending on the user preference. All reports may be exported to Excel, PowerPoint, or PDF. Prompt settings may be bookmarked for later use by the user to quickly go back the views of particular interest.

Prompt Set Example – Organization Connectivity Page

Over 60 predefined reports are available for each dashboard (Organizations and Households) focusing on the most meaningful and useful results for providing insights on utilization and impacts and to provide sufficient flexibility for user to query the dataset along the most important dimensions. An

additional page/report is provided in each dashboard called “Ad Hoc Queries” to enable users to view all of the information collected based on category and topic that may not be included in individual reports. For descriptions of the dashboard reports and user prompts currently available in the DEAP please refer to the section below.

Digital Economy Analytics Platform Reports

The following tables provide brief descriptions of each DEAP report contained within the **dashboards** and **pages**. The notes describe the primary purpose of each report and its interpretation. All reports may be filtered using combinations of filter prompts provided on each page. A list of available prompt filters follows the table of reports. Reports are grouped by the dashboard pages.

Organization Dashboard

Dashboard Report	Purpose	Interpretation and Use
Overview		
Responses by Employment Range	Shows the employment size profile of responses for the selected response set. This is useful to understand the employment size base of the response set, e.g. for a selected geography.	May be used for comparison to an employment size profile for the business population if known.
DEi Meter	Provides the DEi score for the selected response set and the number of business responses included (sample size).	Allows for comparison of DEi for different user segments and/or geographies.
Impact Highlights	Provides a quick summary of key impact metrics, such as revenues, cost savings, and employment attributed to Internet use.	Metrics are actual totals for the information reported by the selected response set. Results are not extrapolated to the larger population.
Response by Industry	Shows the industry profile of responses for the selected response set. This is useful to understand the industry base of the response set, e.g. for a selected geography.	May be used for comparison to an industry profile for the business population if known.
Response by region	Provides a breakdown of response by region for a selected response set	Allows quick comparison across regions of the number of respondent that meet the selected criteria.
Top 3 Industries	Shows the top 3 industries based on the industry average DEi scores. This can be useful when drilling down into specific geographic areas.	Filtered response sets that generate very small samples may not produce meaningful results if few industries are represented in the sample.
Bottom 3 Industries	Shows the bottom 3 industries based on the industry average DEi scores. This can be useful when drilling down into specific geographic areas.	Filtered response sets that generate very small samples may not produce meaningful results if few industries are represented in the sample.
Connectivity		
Business Internet Connections	Summary of the number of users of each major type of Internet connection for the selected response set.	Connectivity data is based on the primary type of Internet connection used. Organizations may have multiple types of connection in use. Caution should be used when interpreting the results as the availability or use of technologies in geographies that may have few data points.

Dashboard Report	Purpose	Interpretation and Use
Connectivity by Establishment Size	Compare levels of use of different Internet access technologies by establishments of different employment size	Provides insights into how technology selection varies by establishment size and gives a context for utilization relative to connection type.
Connectivity by Sector	Compare levels of use of different Internet access technologies by different sectors - Commercial, Government, and Nonprofit.	Provides insights into how technology selection varies by sector. Internet technology selection is more likely to be influenced by organization size and budget rather than sectoral influences.
Download Speed Ranges	Shows the distribution of measured download speeds in standard speed ranges.	Data is based on actual measured speeds using a speed test site provided for the research. Measured speeds can be variable based on network and time of day factors.
Upload Speed Ranges	Shows the distribution of measured upload speeds in standard speed ranges.	Data is based on actual measured speeds using a speed test site provided for the research. Measured speeds can be variable based on network and time of day factors.
Average Connection Speeds	Shows the average measured download and upload speeds (mbps) by major connection technology types.	Data is based on actual measured speeds using a speed test site provided for the research. Measured speeds can be variable based on network and time of day factors.
Monthly Costs		
Monthly Internet Costs	Shows the distribution of monthly Internet costs in cost range bands for all connection types. Useful for quickly seeing the cost ranges for selected response sets, e.g. connectivity type, regions, establishment size, etc.	Data is based on actual monthly costs provided by organizations and grouped into cost range bands for reporting. Note - this does not necessarily reflect monthly subscription rates for single connections, especially where additional services and multiple connections may be included in an organization's monthly costs.
Internet Cost by Access Type	Shows the percentage of organizations within each monthly cost band for each type of connection technology.	Indicates the relationship of monthly cost to connectivity type.
Average Internet Cost by Access Type	Shows the average monthly cost of Internet by major connection technology.	Allows for insights into average cost variations for selected response sets, such as geographies.
Satisfaction with Current Connection	Provides a qualitative assessment from the users' perspective on their levels of satisfaction related to their connectivity for: - Speed of connection - Reliability of connection - Price/value of connection	Provides insights into satisfaction levels of the current connections in use. This may be of particular interest when filtered by connection type and geographic area to understand where satisfaction issues may exist.
Internet Cost by Size	Shows the percentage of organizations within each monthly cost band for each range of employment size.	Indicates the relationship of monthly cost to establishment employment size.

Dashboard Report	Purpose	Interpretation and Use
Average Internet Cost by Size	Shows the average monthly cost of Internet by establishment employment size.	Allows for insights into the relationship between Internet cost and establishment size. Larger establishments may have multiple connections and additional services bundled in their monthly costs.
DEi		
DEi Distribution	Provides the distribution of DEi scores within DEi score ranges from 0 to 10. This complements the average DEi score by showing the distribution of lower and higher scores around the average.	Organizations below the average DEi are potential targets for increased utilization initiatives. Viewing DEi distribution for selected response sets (e.g. industry, employment size) can provide insights into which segments to target for increasing utilization levels.
DEi Meter	Provides the DEi score for the selected response set and the number of business responses included (sample size).	Allows for comparison of DEi for different user segments and/or geographies using the prompt filters.
Average DEi by Industry	Provides a summary of the average DEi scores for each industry in the selected response set, sorted from highest to lowest DEi score.	Allows for a quick view of which industries are making the greatest use of the Internet based on DEi score.
Revenue Impact by DEi	Shows the percentage of annual revenue attributed to using the Internet by establishments within each DEi score band from 0 to 10. The number of establishments reporting revenue is also shown for context.	Indicates the relationship between revenue impacts (past 12 months) and Internet utilization as represented by the DEi score. The number of establishments for each DEi range indicates the sample size for consideration in interpreting how representative the results are. Note - Revenue impacts can be greatly influence by larger organizations with high revenues. Careful use of prompt filters is recommended to gain meaningful insights.
Cost Impact by DEi	Shows the percentage of annual cost savings attributed to using the Internet by establishments within each DEi score band from 0 to 10. The number of establishments reporting revenue is also shown for context.	Indicates the relationship between cost savings (past 12 months) and Internet utilization as represented by the DEi score. The number of establishments for each DEi range indicates the sample size for consideration in interpreting how representative the results are. Note - Cost impacts can be greatly influence by larger organizations with high operating costs. Careful use of prompt filters is recommended to gain meaningful insights.
FT Employment Impact by DEi	Shows the percentage of new full-time (FT) jobs and the percentage of new FT attributed to using the Internet for the past 12 months. The number of establishments reporting revenue is also shown for context.	New full-time jobs is used as a metric to indicate the relationship between Internet utilization and job creation. Interpretation should also consider the creation of part-time jobs and that job losses may also exist.

Dashboard Report	Purpose	Interpretation and Use
Average DEi by Employment Size	Provides a summary of the average DEi scores for each employment size range in the selected response set.	Allows for a quick view of how Internet utilization varies by employment size based on DEi score.
Impacts		
Impacts Summary	Summary totals for annual revenue impacts, annual operating cost impacts, and net employment impacts.	Useful for quick view of overall impacts, especially when filtered using prompts to focus on specific segments.
New Jobs from Internet Use	Provides a summary of new jobs created in the past 12 months for full-time, part-time, and full and part-time combined. Provides metrics for job creation.	Pct. New Internet is the ratio of New Jobs Internet to total New Jobs and indicates the percentage of new jobs attributed to the establishment's use of the Internet. New Jobs Internet does not only mean "internet-related jobs", but any new employment driven from using the Internet.
Internet Revenue Impacts	Shows the percentage of annual revenue attributed to using the Internet for each employment size range. The number of establishments reporting revenue is also shown for context.	Revenues attributed to using the Internet include attribution from all sales activities, not exclusively online sales. The number of establishments (sample size) must be considered in the degree of confidence in interpreting the revenue impacts.
Internet Cost Impacts	Shows the percentage of annual cost savings attributed to using the Internet for each employment size range. The number of establishments reporting cost savings is also shown for context.	Cost savings attributed to using the Internet includes attribution from all operational activities, not exclusively from IT savings. The number of establishments (sample size) must be considered in the degree of confidence in interpreting the cost saving impacts.
New Full-time Employment	Shows the percentage of new full-time jobs and the percentage of new full-time jobs attributed to using the Internet for each employment size range. The total number of full-time employees is also shown for context.	Provides an indication of where new full-time employment is created by size of business, and how much of that job creation is attributed to using the Internet.
New Part-time Employment	Shows the percentage of new part-time jobs and the percentage of new part-time jobs attributed to using the Internet for each employment size range. The total number of part-time employees is also shown for context.	Provides an indication of where new part-time employment is created by size of business, and how much of that job creation is attributed to using the Internet.
New Total Employment (FT+PT)	Shows the percentage of new full-time and part-time jobs and the percentage of new full-time and part-time jobs attributed to using the Internet for each employment size range. The total number of full-time and part-time employees is also shown for context.	Provides an indication of where new full-time and part-time employment is created by size of business, and how much of that job creation is attributed to using the Internet.

Dashboard Report	Purpose	Interpretation and Use
Broadband Importance to Location	Shows the importance of broadband for organizations in both selecting and remaining in their location.	This indicates the importance of broadband overall for business location and provides insights into the importance of broadband for both attracting and retaining businesses. It can be useful to filter this report by time in location to see how importance varies for establishments that have made more recent location decisions.
Utilization		
Internet Uses for e-Commerce	Provides the percentage of establishments utilizing each of the 8 Internet utilization categories that form the group of e-Commerce categories. The e-Commerce uses are those that relate most to interacting with external entities for commercial purposes. The utilizations are included in the 17 total categories that comprise the Digital Economy Index (DEi).	Allows for understanding of how the Internet is used to a greater or lesser extent for e-Commerce for the selected response set. This information provides additional detail behind the DEi scores for the selected sample. Low utilization levels provide opportunities to increase utilization and their resulting benefits for organizations.
Internet Uses for e-Commerce	Provides the percentage of establishments utilizing each of the 9 Internet utilization categories that form the group of e-Process categories. The e-Process uses are those that relate most to interacting with internal and external entities for internal business process purposes. The utilizations are included in the 17 total categories that comprise the Digital Economy Index (DEi).	Allows for understanding of how the Internet is used to a greater or lesser extent for e-process for the selected response set. This information provides additional detail behind the DEi scores for the selected sample. Low utilization levels provide opportunities to increase utilization and their resulting benefits for organizations.
Internet Benefits	Provides the percentage of establishments rating the importance levels of benefits received from using the Internet.	Interpreted as "How important is the Internet for delivering the following benefits?" Provides insights into how different segments perceive and receive benefits from Internet use.
Internet Barriers	Provides the percentage of establishments rating the importance levels of barriers that inhibit their effective use of the Internet.	Interpreted as "How important are the barriers in inhibiting the effective use of e-solutions?" Overcoming barriers is an important consideration for increasing utilization.
Use of Web-enabled Devices	Shows how many organizations are using or planning to use different types of web-enabled mobile devices.	Web-enabled mobile devices and increasing in their variety and capabilities and becoming increasingly important for many businesses. Major categories are laptop computers, wen-enabled phones, and other mobile devices.
Applications of Mobile Devices	Shows the percentages of organizations that use web-enabled mobile devices for a variety of purposes.	Provides insights into how and why organizations are using web-enabled mobile devices and how these devices may enhance productivity.

Dashboard Report	Purpose	Interpretation and Use
DEi Utilization		
Current Utilization vs. Dei Range	Affectionately known as "the football chart", this shows the relationships between different utilizations and DEi scores. Specifically, each line plots the percentage of organizations that currently use the type of Internet utilization within each DEi score range.	Looking vertically within each DEi range one can see the relative composition of utilizations within that range, i.e. for each range which utilizations are used most to least. Following the curves of each utilization one can see which are adopted more quickly by users (fast rising curves) and which tend to be adopted more slowly (slow rising curves). Given that lower DEi scores, by definition, mean fewer utilizations, the curves indicate which utilizations are adopted more quickly and easily compared with those that are adopted later and require greater sophistication in use. This provides insights into which utilizations can be a focus for increasing DEi scores.
Internet revenue vs. DEi Range	Shows the percentage of annual revenue attributed to using the Internet by establishments within each DEi score band from 0 to 10. The number of establishments reporting revenue is also shown for context.	Indicates the relationship between revenue impacts (past 12 months) and Internet utilization as represented by the DEi score. The number of establishments for each DEi range indicates the sample size for consideration in interpreting how representative the results are. Note - Revenue impacts can be greatly influence by larger organizations with high revenues. Careful use of prompt filters is recommended to gain meaningful insights.
Cost savings vs. DEi Range	Shows the percentage of annual cost savings attributed to using the Internet by establishments within each DEi score band from 0 to 10. The number of establishments reporting revenue is also shown for context.	Indicates the relationship between cost savings (past 12 months) and Internet utilization as represented by the DEi score. The number of establishments for each DEi range indicates the sample size for consideration in interpreting how representative the results are. Note - Cost impacts can be greatly influence by larger organizations with high operating costs. Careful use of prompt filters is recommended to gain meaningful insights.

Dashboard Report	Purpose	Interpretation and Use
Cloud Apps		
Cloud Service Use	Shows how many organizations are currently using cloud-based services or are considering their use.	Cloud services is a growing segment that enables cost effective solutions, especially important to smaller enterprises, and drives greater use of and dependency on the Internet connection.
Cloud Service Drivers	Shows the relative importance of various motivating factors in the decisions to adopt cloud-based services.	Understanding business motivations provides insight into opportunities to promote greater utilization.
Cloud-based Applications	Shows the proportion of cloud service users that utilize major categories of common cloud-based applications	Three major categories shown are; basic applications such as spreadsheet and word processing tools, collaborative platforms, and sales and customer relationship management tools.
Collaboration Tool Uses	Provides the percentage of establishments that use collaborative tools for various different collaboration purposes.	Provides for additional insights into what types of collaboration are used by organizations.
Employment		
Net Industry Employment Impacts	Shows the number of net full-time and part-time employees added (lost) in the past 12 months and the number of net employees attributed to using the Internet for each major industry. Refer to the table for the total industry employment for the selected response set.	Net jobs = New Jobs - Lost Jobs over the preceding 12 months for full-time and part-time combined.
Percent Net Industry Employment Impacts	Shows the percentage of net full-time and part-time employment added (lost) in the past 12 months and the percentage of net employees attributed to using the Internet for each major industry. Refer to the table for the total industry employment for the selected response set.	Both percentages are calculated relative to the total full-time and part-time employment. Calculating net Internet jobs as a percentage of net jobs does not make sense where net jobs is negative and net Internet jobs is positive.
Net Employment Impacts by Size	Shows the number of net full-time and part-time employees added (lost) in the past 12 months and the number of net employees attributed to using the Internet for each employment size range. Refer to the table for the total employment for the selected response set.	Net jobs = New Jobs - Lost Jobs over the preceding 12 months for full-time and part-time combined.
Percent Net Employment Impacts by Size	Shows the percentage of net full-time and part-time employment added (lost) in the past 12 months and the percentage of net employees attributed to using the Internet for each employment size range. Refer to the table for the total employment for the selected response set.	Both percentages are calculated relative to the total full-time and part-time employment. Calculating net Internet jobs as a percentage of net jobs does not make sense where net jobs is negative and net Internet jobs is positive.

Dashboard Report	Purpose	Interpretation and Use
Employment Impact Summary	Provides a summary of employment impacts for all organizations reporting either full-time or part-time employment in the previous 12 months. The report shows reported combined full-time and part-time employment for: total employment; new, lost, and net jobs; and new, lost, and net jobs attributed to using the Internet.	The total number of organizations includes those that report full-time and/or part-time employment. This includes those that report full-time only, part-time only, or both. The results show the new and lost jobs as well as the net jobs by size of organization. Percentages show the changes in jobs relative to total employment as well as new or lost lobs attributed to using the Internet as a percentage of total new or lost jobs. Note - The total employment includes both FT and PT employees for establishment that have either or both FT and PT. Other reports may show the number of establishments and employment for subsets of establishments that have either FT or PT.
Skills		
e-Solutions Expertise Issues	Identifies how critical knowledge and expertise issues are for organizations.	Lack of sufficient internal knowledge and expertise can inhibit e-solutions adoption and utilization. Provides insights into which issues needs attention for selected response sets.
Types of Skills Acquired (past 12 months)	Identifies which types of skills organizations have actively acquired through various methods as a result of their Internet uses or in order to support its use.	Provides insights into the past and future potential demands for skills which can become a key factor in the successful adoption and sustainability of new e-solutions.
Preferred Learning Methods	Provides indications of how preferred methods of learning for development of e-solutions skills	Provides insights for targeting skills development and delivery methods.
Skills Acquisition Methods (past 12 months)	Provides indications of how skills are acquired based on methods used in the past 12 months.	provides insights for targeting skills development and acquisition methods, e.g. training and hiring.
Ad Hoc Queries		
Query All Questions	Provides access to query all topics in the data set. Note - Some questions may not provide results if the question was not part of the data collection for the region selected.	Allows for any question to be queried with a chart and table, some of which may not be presented in other dashboard reports.
Regions		
Average DEi	Comparison of average DEi scores for each region. Note - Regions are defined using generally accepted definitions of economic development regions within the larger geographic area (e.g. a State).	Allows for a quick comparison of utilization performance across the selected regions.

Dashboard Report	Purpose	Interpretation and Use
Employment Impacts	Shows the percentage of new full-time and part-time jobs and the percentage of new full-time and part-time jobs attributed to using the Internet for each region. The total number of full-time and part-time employees is also shown for context.	Provides an indication of where new full-time and part-time employment is created by region, and how much of that job creation is attributed to using the Internet. Note- The focus of this report is on job creation for regional comparison. It must be recognized that job losses may also exist, which may be viewed in the Employment reports.
Revenue Impact	Shows the percentage of annual revenue attributed to using the Internet for each region. The number of establishments reporting revenue is also shown for context.	Revenues attributed to using the Internet includes attribution from all sales activities, not exclusively online sales. The number of establishments (sample size) must be considered in the degree of confidence in interpreting the revenue impacts. This report shows how regions compare based on the information reported by organizations (small samples may exist).
Importance of Broadband to Location	Shows the importance of broadband for organizations in both selecting and remaining in their location for each region.	This indicates the importance of broadband overall for business location and provides insights into the importance of broadband for both attracting and retaining businesses. This report allows for comparing location importance results for each region.
Region Comparisons		
Region Comparisons of Selected Topics	Provides access to query all topics in the data set with a breakdown by region.	Provides the ability to compare results between regions. Allows for any question to be queried with a chart and table, some of which may not be presented in other dashboard reports.
Connectivity Impacts		
Utilization and Impact Results by Connectivity Type	Provides access to query selected topics in the data set with a breakdown by type of Internet connection. Reports show the percentage of establishments for each response category.	Provides the ability to compare results across the different types of Internet technologies to uncover potential relationships between the results and connectivity type. Allows for any question to be queried with a chart and table.
Utilization and Impact Results by Download Speed	Provides access to query selected topics in the data set with a breakdown by download speed ranges. Reports show the percentage of establishments for each response category.	Provides the ability to compare results based on download speeds to uncover potential relationships between the results and connection speed. Allows for any question to be queried with a chart and table.
DEi vs. Connectivity	Shows the average DEi scores for each major type of connectivity. The number of reporting establishments is show for reference.	Provides insights into relative utilization, based on DEi scores, of each type of connectivity.

Dashboard Report	Purpose	Interpretation and Use
DEi vs. Connectivity	Shows the average DEi scores for each download speed range. The number of reporting establishments is show for reference.	Provides insights into utilization, based on DEi scores, relative to connection speeds.

Organization Dashboard Prompts

Prompts	Purpose	Interpretation and Use
Geography		
Year	Selection of year data was collected	
State	Selection of State for data source	
Region	Selection of regions for the State	
County Name	Selection of counties for the state or region	If region(s) selected, only those counties are presented for selection
RUCA	Selection of rural/urban groupings based on RUCA codes	Rural-Urban Commuting Areas (defined by USDA) are grouped into four categories and specified at the Zip Code level.
Characteristics		
Major Industry	Selection of major industries as defined by the North American Industry Classification System (NAICS)	
Sector	Selection of sectors of interest - Commercial, Government, Nonprofit	
CAI Type	Selection of major categories of Community Anchor Institutions	
Gov Level	Selection of County and/or Municipal level	Available for selected dashboard pages
Health Orgs	Allows for selection of organizations that provide health services	
Health Type	Selection of type of health organization	Available for selected dashboard pages
NFP Type	Selection of type of nonprofit organization	Available for selected dashboard pages
Employment	Selection of response based on organization employment size ranges	Standard industry employment size ranges are used.
Ethnicity		
Ethnic Group	Ethnicity of business ownership	Available for selected dashboard pages
Hispanic	Selection of Hispanic-owned businesses	Available for selected dashboard pages
Gender	Selection of woman-owned businesses	Available for selected dashboard pages

Prompts	Purpose	Interpretation and Use
Connectivity		
Access Group	Broadband or Dial-up	Allows for quick filtering when interested in users of broadband only or dial-up only
Access Type	Selection of major Internet access technologies	
Upload Speeds	Selection of upload speed ranges based on NTIA ranges	Selects data where speed test results are available
Download Speeds	Selection of download speed ranges based on NTIA ranges	Selects data where speed test results are available
Broadband Time	Length of time using broadband in yearly ranges	
Monthly Internet Cost	Selection of monthly Internet cost ranges	Available for selected dashboard pages
Results		
Category	Category of interest - Utilization, Impacts, Skills	Available for selected dashboard pages
Question	Question topic of interest based on category	Available for selected dashboard pages
Response Element	Selection of response element of the selected question	Available for selected dashboard pages
Response Data	Selection of responses for selected response elements	Available for selected dashboard pages

Household Dashboard

Dashboard Report	Purpose	Interpretation and Use
Overview		
Household DEi	Provides the DEi score for the selected response set and the number of business responses included (sample size).	Allows for comparison of DEi for different user segments and/or geographies.
Home Businesses	Percentage of households that operate a home business meeting the home business definition	The home business definition is "A home-based business may be part-time or full-time activity by one or more household members that operate their business exclusively from home."
Teleworking Households	Percentage of households who have one or more teleworkers meeting the telework definition	Teleworking is defined as "working from home during normal working hours as part of an ongoing arrangement with your employer. Tele-working may be part of the time (one or more days per week) or all of the time. "
Household Respondent Age	Percentage of household respondents in different age ranges.	Provides context for the age profile of the selected response set.
Household Income	Percentage of household respondents in different ranges of household income.	Provides context for the household income profile of the selected response set.
Responses by Region	Provides a breakdown of response by region for a selected response set	Allows quick comparison across regions of the number of respondent that meet the selected criteria.

Dashboard Report	Purpose	Interpretation and Use
Education Attainment	Percentage of household respondents at various levels of current education attainment.	Provides context for the household education profile of the selected response set.
Employments Status	Percentage of household respondents by employment status.	Provides context for the employment profile of the selected response set.
Computer and Internet Skill by Age	Level of computer skill by respondent age range.	Provide context for computer skill level variations which may influence Internet utilization.
Connectivity		
Household Connection Types	Summary of the number of users of each major type of Internet connection for the selected response set.	Caution should be used when interpreting the results as the availability or use of technologies in geographies that may have few data points.
Connectivity by Income	Compare levels of use of different Internet access technologies by household income	Provides insights into how technology selection varies by household income and gives a context for utilization relative to connection type.
Connectivity by Skill Level	Compare connectivity selection based on user computer skill level.	Provides insights into how technology selection varies by computer skill level.
Download Speeds	Shows the distribution of measured download speeds in standard speed ranges.	Data is based on actual measured speeds using a speed test site provided for the research. Measured speeds can be variable based on network and time of day factors.
Upload Speeds	Shows the distribution of measured upload speeds in standard speed ranges.	Data is based on actual measured speeds using a speed test site provided for the research. Measured speeds can be variable based on network and time of day factors.
Average Connection Speeds	Shows the average measured download and upload speeds by major connection technology types.	Data is based on actual measured speeds using a speed test site provided for the research. Measured speeds can be variable based on network and time of day factors.
Internet Costs		
Monthly Internet Costs	Shows the distribution of monthly Internet costs in cost range bands for all connection types. Useful for quickly seeing the cost ranges for selected response sets, e.g. connectivity type, regions, household characteristics, etc.	Data is based on monthly costs ranges selected by households.
Broadband Cost by Download Speed Range	Shows the relationship of monthly Internet cost to measured download speeds.	Provides insights into the relationship between cost and speeds especially when selecting response sets for geographies and access types.

Dashboard Report	Purpose	Interpretation and Use
Satisfaction with Current Connection	Provides a qualitative assessment from the users' perspective on their levels of satisfaction related to their connectivity for: - Speed of connection - Reliability of connection - Price/value of connection	Provides insights into satisfaction levels of the current connections in use. This may be of particular interest when filtered by connection type and geographic area to understand where satisfaction issues may exist.
Monthly Internet Costs by Access Type	Shows the percentage of households within each monthly cost band for each type of connection technology.	Indicates the relationship of monthly cost to connectivity type.
Average Speed by Monthly Cost Range (under $150 per month)	Shows the average upload and download speeds by monthly cost ranges under $150 per month, for all connectivity types.	Provides insights into the relationship between cost and speeds especially when selecting response sets for geographies and access types.
Monthly Internet Costs by Rurality	Shows the percentage of households within each monthly cost band by RUCA categories	Provides insights into variations in monthly Internet cost for rural households and non-rural households. Rural-Urban Commuting Areas (defined by USDA) are defined at the Zip Code level.
DEi		
DEi Distribution by Access Group	Provides the distribution of DEi scores within DEi score ranges from 0 to 10. This complements the average DEi score by showing the distribution of lower and higher scores around the average. The distribution for dial-up households and broadband households are shown for comparison.	Households below the average DEi are potential targets for increased utilization initiatives. Viewing DEi distribution for selected response sets (e.g. income, ethnicity) can provide insights into which segments to target.
Household DEi	Provides the DEi score for the selected response set and the number of household responses included (sample size).	Allows for comparison of DEi for different user segments and/or geographies.
DEi by Rurality	Provides a summary of the average DEi scores by RUCA category.	Allows for a quick view of how Internet utilization varies by RUCA categories based on DEi score.
DEi by Household Income	Provides a summary of the average DEi scores for each household income range in the selected response set. The number of household in each range is provided for reference.	Allows for a quick view of how Internet utilization varies by household income based on DEi score. The number of households (sample size) should be considered when interpreting the results.
DEi by Connection Type	Provides a summary of the average DEi scores for each connection type in the selected response set. The number of household in each range is provided for reference.	Allows for a quick view of how Internet utilization varies by connection type based on DEi score. The number of households (sample size) should be considered when interpreting the results.

Dashboard Report	Purpose	Interpretation and Use
DEi by Respondent Age	Provides a summary of the average DEi scores for each respondent age range in the selected response set. The number of household in each range is provided for reference.	Allows for a quick view of how Internet utilization varies by respondent age based on DEi score. The number of households (sample size) should be considered when interpreting the results.
DEi by Region	Provides a summary of the average DEi scores for each region in the selected response set. The number of household in each region is provided for reference.	Allows for a quick view of how Internet utilization varies by region based on DEi score. The number of households (sample size) should be considered when interpreting the results.
Region Comparisons		
Monthly Broadband Costs by Region	Shows the distribution of monthly Internet costs in cost range bands for broadband connection types. Useful for quickly seeing the cost ranges for selected response sets to compare by region.	Data is based on monthly costs ranges selected by households. Only broadband connection types are included for purposes of comparing broadband costs by region.
Household DEi	Provides the DEi score for the selected response set and the number of household responses included (sample size).	Allows for comparison of DEi for different user segments and/or geographies.
DEi by Region	Provides a summary of the average and median DEi scores for each region.	Allows for a quick view of how Internet utilization varies by region based on DEi score.
Connectivity Used by Region	Summary of the number of users of each major type of Internet connection for each region in the state.	Allows comparisons of uses of different technologies across regions. Caution should be used when interpreting the results as the availability or use of technologies in geographies that may have few data points.
Likelihood of Relocation for Broadband by Region	Shows the likelihood of relocating to a community that has broadband services by percentage of households for the selected response set, broken down by regions designated for the state.	Data is for all households including those currently using broadband. Interpretation is that if the household did not currently have broadband how likely is it that they would relocate to get broadband. Provides insights into the importance of broadband for attracting and retaining households in a community and how this may vary by region.
Utilization		
Household Productivity	Provides the percentage of households utilizing each of the productivity utilization categories that form a component of the DEi scores.	Allows for understanding of how the Internet is used to a greater or lesser extent for household productivity across the selected response set.
Household Research	Provides the percentage of households utilizing each of the productivity information research categories that form a component of the DEi scores.	Allows for understanding of how the Internet is used to a greater or lesser extent for household research across the selected response set.

Dashboard Report	Purpose	Interpretation and Use
Household Communication	Provides the percentage of households utilizing each of the Internet communication categories that form a component of the DEi scores.	Allows for understanding of how the Internet is used to a greater or lesser extent for household communication across the selected response set.
Household Recreation	Provides the percentage of households utilizing each of the entertainment and recreation categories that form a component of the DEi scores.	Allows for understanding of how the Internet is used to a greater or lesser extent for household recreation across the selected response set.
Household Transactions	Provides the percentage of households utilizing each of the Internet transaction categories that form a component of the DEi scores.	Allows for understanding of how the Internet is used to a greater or lesser extent for household transactions across the selected response set.
Web Presence Uses	Provides the percentage of households utilizing web presence, e.g. a personal website or other hosted service, for different purposes; personal relationships, professional networks, and generating income.	Allows for understanding of how individuals use their web presence. Individuals may use web presence for one or more of the categories.
Dei Utilization		
Current Utilization by DEi Range	Shows the percentage of households using each of the 30 utilization categories for each range of DEi score. The percentages are based on the number of households that fall within each DEi range.	This report, nicknamed the "football", shows the adoption trends by DEi range for each type of utilization. Given that lower DEi scores, by definition, mean fewer utilizations, the curves indicate which utilizations are adopted more quickly and easily compared with those that are adopted later and require greater sophistication in use.
DEi Distribution by Access Group	Provides the distribution of DEi scores within DEi score ranges from 0 to 10. This complements the average DEi score by showing the distribution of lower and higher scores around the average. The distribution for dial-up households and broadband households are shown for comparison.	Households below the average DEi are potential targets for increased utilization initiatives. Viewing DEi distribution for selected response sets (e.g. income, ethnicity) can provide insights into which segments to target. Note - This report is repeated from the DEi page to provide additional context when using filters on the utilization vs. DEi report.
Current Utilization vs. Average DEi	Shows the percentage of households using each utilization category and the average DEi for households using each utilization category.	Indicates the relationship household utilization level for each category and the average Dei for those households. The results provide an indication of which utilizations are associated with higher or lower DEi scores.
Impacts		
Household Benefits	Shows the level of agreement by households with a series of statement related to the benefits of using the Internet for the household.	Provides insights into how households perceive the benefits of Internet use.

Dashboard Report	Purpose	Interpretation and Use
Likelihood of relocating for Broadband	Shows the likelihood of relocating to a community that has broadband services by percentage of households for the selected response set.	Data is for all households including those currently using broadband. Interpretation is that if the household did not currently have broadband how likely is it that they would relocate to get broadband. Provides insights into the importance of broadband for attracting and retaining households in a community.
Lifestyle benefits	Shows the importance of the Internet for achieving household lifestyle benefits (e.g. improved life-work balance)	Provides insights into how households perceive the benefits of Internet use.
Annual Online Orders	Summary of annual online transactions with the percentage of households within each range of annual transactions.	Provides insights into how frequently households use the internet for online transactions on an annual basis. Greater use of online transactions indicates greater engagement with the digital economy.
Annual Online Spending	Summary of annual online household spending through online transactions with the percentage of households within each range of annual spending	Provides insights into how much households spend online on an annual basis. Greater online spending indicates greater engagement with the digital economy.
Preference for Future Internet Use	Shows preferences for individuals to use the Internet more effectively, the same amount, or use it less.	Provides insights into future demand for Internet use.
Barriers to Increasing use of Internet	Shows the importance of different factors that may inhibit individuals from being able to increase their effective use of the Internet.	Provides insights into barriers that may need to be overcome to increase Internet use.
Online Purchases from Mobile Devices	Shows the extent to which mobile devices are used for online purchases as a percentage of total online purchases.	Provides insights into how mobile devices are used for Internet activities based on purchase transactions.
Ad Hoc Queries		
HH All Questions	Provides access to query all topics in the data set	Allows for any question to be queried with a chart and table, some of which may not be presented in other dashboard reports.
Telework		
Teleworker Industries	Percentage of teleworkers by major industry.	Provides insights into which industries are employing teleworkers. This is particularly useful for assessing how teleworking augments existing industry employment within a region and increasing industry diversity.
Teleworking Households by Region	Shows the percentage of teleworking households by region.	Allows regional comparison of teleworking penetration by region.
Importance of Teleworking	Shows the level of agreement by teleworking households with key benefits of teleworking, such as the ability to achieve career goals, avoid relocation, etc.	Provides additional insights into the importance of teleworking in achieving household benefits.

Dashboard Report	Purpose	Interpretation and Use
Average teleworking Days per Week	Shows the average teleworking days per week by percentage of households.	Useful for assessing the extent to which teleworking is used all the time vs. part of the time with implications for other teleworking benefits, such as employer cost savings and environmental benefits.
Distance to Telework Employer	Shows the average distance to teleworker employer locations by percentage of households.	Useful for assessing the potential environmental benefits of and household time and cost benefits of reduced commuting.
Reasons for Teleworking	Shows the percentage of teleworking households rating the importance of different motivations for teleworking.	Provides insights into motivations and expected benefits of teleworking.
Teleworking by Rurality	Compares the percentage of teleworking households by RUCA categories.	Provides insights into differences between areas of different ruralities. Rural-Urban Commuting Areas (defined by USDA) are defined at the Zip Code level.
Home Business		
Home Business Industries	Percentage of home businesses by major industry.	Provides insights into which industries home businesses are engaged. This is particularly useful for assessing how home businesses augment existing industries within a region and increasing industry diversity.
Home Business Households by Region	Shows the percentage of home businesses by region.	Allows regional comparison of home business penetration by region.
Importance of Broadband for Home Business	Shows the level of agreement by home business households on the importance of broadband for the success of their business, e.g. broadband is essential for the business, would need to relocate to get broadband, etc.	Provides additional insights into the importance of broadband to the success of home businesses.
Home Business Uses of Internet	Shows how home businesses are currently using the Internet for business purposes.	Similar to business utilizations, this information provides insights into the additional uses of the Internet for home business households.
Importance of Internet for Home Business Benefits	Shows the importance of the Internet for achieving business benefits (e.g. reaching new customers)	Interpreted as "How important is the Internet for delivering the following benefits?" Provides insights into how home businesses perceive and receive benefits from Internet use.
Home Businesses by Rurality	Compares the percentage of home business households by RUCA categories	Provides insights into differences between areas of different ruralities. Rural-Urban Commuting Areas (defined by USDA) are defined at the Zip Code level.
Region Utilizations		
Region Comparisons of Internet utilizations	Provides access to query all Internet utilization topics in the data set with a breakdown by region.	Provides the ability to compare results between regions. Allows for any question in the Utilization category to be queried with a chart and table, some of which may not be presented in other dashboard reports.

Dashboard Report	Purpose	Interpretation and Use
Region Impacts		
Region Comparisons of Impacts and Skills	Provides access to query all Internet impacts and skills topics in the data set with a breakdown by region.	Provides the ability to compare results between regions. Allows for any question in the Impacts and Skills categories to be queried with a chart and table, some of which may not be presented in other dashboard reports.
Skills		
Preference of Learning Methods	Provides indications of how preferred methods of learning for development of e-solutions skills	Provides insights for targeting skills development and delivery methods
Availability of Learning Methods	Shows the availability of different learning methods.	Provides insights into the extent of availability of learning methods that may influence the development and delivery of training programs.
Learning Preference by Age Group	Provides a comparative breakdown of learning methods preferences by age group.	Provides insights for targeting skills development and delivery methods based on age group segments.
Learning Preference by Income	Provides a comparative breakdown of learning methods preferences by age group.	Provides insights for targeting skills development and delivery methods based on income group segments.
Availability of Local Learning Resources	Identifies if resources are available in the community for learning how to get the most from the Internet	Provides insights into where learning resources may be lacking and where awareness of available resources may be weak.
Learning Resource Availability by Region	Shows the availability of different learning methods by region.	Provides insights into the extent of availability of learning resources, which may influence the development and delivery of training programs.

Household Dashboard Prompts

Prompts	Purpose	Interpretation and Use
Geography		
Year	Selection of year data was collected	
State	Selection of State for data source	
Region	Selection of regions for the State	
County Name	Selection of counties for the state or region	If region(s) selected, only those counties are presented for selection
Rural	Selection of rural vs. non-rural counties	Rural and non-rural designations are at the county level (whole counties)

Prompts	Purpose	Interpretation and Use
RUCA	Selection of rural/urban groupings based on RUCA codes	Rural-Urban Commuting Areas (defined by USDA) are grouped into four categories and specified at the Zip Code level.
Characteristics		
Household Income	Selection of household income ranges	
Respondent Age	Selection of respondent age groups	
Education	Selection of respondent education attainment level	
Computer Skill	Selection of respondent computer skill level	
Employment Status	Selection of respondent employment status	
Ethnicity	Selection of household ethnicity (if single group) or mixed	Available for selected dashboard pages
Minorities	Allows selection of households with at least one minority ethnic group	Available for selected dashboard pages
Telework	Allows selection of teleworking households	Available for selected dashboard pages
Home Business	Allows selection of home business households	Available for selected dashboard pages
School Age	Allows selection of households with school age children (5-17 years)	Available for selected dashboard pages
Seniors	Allows selection of households with seniors (65 years or more)	Available for selected dashboard pages
Connectivity		
Access Group	Broadband or Dial-up	Allows for quick filtering when interested in users of broadband only or dial-up only
Access Type	Selection of major Internet access technologies	
Upload Speeds	Selection of upload speed ranges based on NTIA ranges	Selects data where speed test results are available
Download Speeds	Selection of download speed ranges based on NTIA ranges	Selects data where speed test results are available
Internet Time	Length of time using Internet of any type in yearly ranges	
Broadband Time	Length of time using broadband in yearly ranges	

CAI and Sectors Dashboard

Dashboard Report	Purpose	Interpretation and Use
Farms		
Farm DEi-F Distribution	Provides the distribution of DEi-F scores within DEi-F score ranges from 0 to 10. This complements the average DEi-F score by showing the distribution of lower and higher scores around the average. The DEi-F score is based on the farm-specific uses of the Internet, over and above the core Internet uses that are the basis for the DEi.	Farms below the average DEi-F are potential targets for increased utilization initiatives. Viewing DEi-F distribution for selected response sets filters can provide insights into which segments to target for increasing utilization levels.
Farm Average DEi-F and DEi	Provides the average DEi-F and DEi scores for the selected response set and the number of farm responses included (sample size).	Allows for comparison of DEi-F and DEi for farms for different user segments and/or geographies.
Farm Types	Shows the number and percentage of farms by farm type based on standard agriculture industry categories.	Provides information for reference on the farm type composition of the farm data set. Also available as a prompt filter for this page.
Farm-specific Uses of the Internet	Shows the current and planned use of farm-specific utilizations of the Internet. These uses are more detailed and relevant to farm operations than the core set of utilization categories.	Aids in understanding how farms use the Internet for applications specific to their industry and forms the basis for the DEi-F score. Note that certain utilization categories may not be applicable to certain farm types, e.g. herd management may not be applicable to crop farms.
Farm Benefits of using the Internet	identifies the importance of the Internet for achieving the listed benefits specific to farm operations.	Provides insight into how important the Internet is to farms in specific benefits categories. Higher importance implies greater dependency on the Internet.
Public Access		
CAI Responses by Category	Provides the percentage and number of Community Anchor Institutions (CAI) in the selected response set by standard CAI categories. Certain categories have dedicated pages and reports in this dashboard.	Provided for reference on the breakdown of the CAI sector and the available sample sizes for analysis.
Public Access Facilities Available	Identifies if CAI provide access to computer terminals and the Internet to the public.	Provides insights into the extent to which CAI enable public access to the Internet, particularly useful when filtered by CAI type.
Public Services Offered	Identifies what additional Internet-related services are offered to the public, such as equipment loan services, training, and public WiFi access.	Provides insights into the extent that additional support service are provided to enable public use of the Internet.

Dashboard Report	Purpose	Interpretation and Use
Availability of Public Access Facilities	Identifies the percentage of CAI providing public access that make their facilities available at different time periods - weekdays (daytime), evenings, and weekends.	One or more time periods may be applicable to any CAI offering public access facilities.
Public Access Terminals Capacity	Shows the percentage of public access CAI in ranges of public access terminal capacity.	Provides insights on the available capacity of public access CAI to meet public demand.
Public Access Occupancy Levels	Identifies the occupancy level of current public access facilities by time period, showing percentages of when facilities are at full occupancy or have spare capacity.	Aids in identifying when and where public access capacity may be stressed or unused.
Plans for Public Access Capacity	Identifies plans for changing the capacity of public access facilities	Aids in understanding potential trends in increasing or decreasing public access to the Internet.
Education		
K12 DEi-K Distribution	Provides the distribution of DEi-K scores within DEi-K score ranges from 0 to 10. This complements the average DEi-K score by showing the distribution of lower and higher scores around the average. The DEi-K score is based on the school-specific uses of the Internet, over and above the core Internet uses that are the basis for the DEi.	Schools below the average DEi-K are potential targets for increased utilization initiatives. Viewing DEi-K distribution for selected response sets filters can provide insights into which segments to target for increasing utilization levels.
K12 Average DEi-K and DEi	Provides the average DEi-K and DEi scores for the selected response set and the number of school responses included (sample size).	Allows for comparison of DEi-K and DEi for schools for different user segments and/or geographies.
K12 Status	Shows the proportion of K-12 schools that are public vs. private in the sample.	Allows for segmentation by school status.
K12 School Internet Utilization	Shows the current and planned use of school-specific utilizations of the Internet. These uses are more detailed and relevant to school operations than the core set of utilization categories.	Aids in understanding how schools use the Internet for applications specific to their sector and forms the basis for the DEi-K score.
College Internet Utilization	Shows the current and planned use of college-specific utilizations of the Internet. These uses are more detailed and relevant to college operations than the core set of utilization categories.	Aids in understanding how colleges use the Internet for applications specific to their sector.

Dashboard Report	Purpose	Interpretation and Use
Local Government		
Local Government DEi-G Distribution	Provides the distribution of DEi-G scores within DEi-G score ranges from 0 to 10. This complements the average DEi-G score by showing the distribution of lower and higher scores around the average. The DEi-G score is based on the local government-specific uses of the Internet, over and above the core Internet uses that are the basis for the DEi.	Local governments below the average DEi-G are potential targets for increased utilization initiatives. Viewing DEi-G distribution for selected response sets filters can provide insights into which segments to target for increasing utilization levels.
Average DEi-G and DEi	Provides the average DEi-G and DEi scores for the selected response set and the number of local government responses included (sample size).	Allows for comparison of DEi-G and DEi for local governments for different user segments and/or geographies.
Local Government Utilizations	Shows the current and planned use of local government-specific utilizations of the Internet. These uses are more detailed and relevant to local government operations than the core set of utilization categories.	Aids in understanding how local governments use the Internet for applications specific to their sector and forms the basis for the DEi-G score.
Local Government Motivations for e-Solutions	Shows the importance of different factors that motivate local governments to adopt e-solutions, i.e. internet-enabled applications.	Aids in understanding the drivers for adoption of Internet solutions and factors that influence increased adoption.
Local Government Collaboration on Shared Services	Shows the proportions of local governments who are participating in collaboration with other jurisdictions on the development or delivery of online services, i.e. shared services.	Collaboration with other jurisdictions on the development of shared services provides an opportunity for local governments to increase the range of online services offered and benefit from reduced costs of development and delivery.
Local Government Motivations for Collaboration	Shows the importance of different factors that motivate local governments to collaborate on shared service.	Aids in understanding the drivers for collaboration on shared services and factors that influence decisions.
Public Safety		
Public Safety Organizations by Role	Shows the proportion of responses by public safety role within the sample.	Provided for reference on the breakdown of the Public Safety sector and the available sample sizes for analysis.
Sufficiency of Connections for Emergency Services Systems	Provides the public safety organizations' views on how sufficient their existing broadband connections for achieving a high level of emergency service system interoperability.	Provides insights into the extent to which broadband connections meet the needs and expectations of public safety organizations for emergency services systems.
Emergency service system compatibility - within jurisdiction	Provides the public safety organizations' views on the current levels of compatibility of emergency services systems within their jurisdiction.	Provides insights into the current levels of interoperability that may impact the effective delivery of emergency services.
Emergency service system compatibility - outside jurisdiction	Provides the public safety organizations' views on the current levels of compatibility of emergency services systems with other emergency services outside their jurisdiction.	Provides insights into the current levels of interoperability with emergency services in other jurisdiction that may impact the effective delivery of emergency services.

Dashboard Report	Purpose	Interpretation and Use
EcDev		
Businesses asking about broadband services	Identifies the frequency with which economic development organizations are asked by prospective businesses about the availability and affordability of broadband services in their community.	The scale of frequency is qualitative in the context of each responding economic development organization, i.e. frequently, occasionally, rarely, never. This indicates the relative importance of the quality and availability of local broadband services to local businesses.
Businesses not locating due to broadband services	Identifies the frequency with which businesses have chosen not to locate in the community because of the broadband services available.	The scale of frequency is qualitative in the context of each responding economic development organization, i.e. frequently, occasionally, rarely, never. This indicates the relative importance of the quality and availability of local broadband services decisions of businesses to locate within the jurisdiction, i.e. impact on attracting businesses.
Businesses leaving due to broadband services	Identifies the frequency with which businesses have relocated away from the jurisdiction due to the type of broadband services available.	The scale of frequency is qualitative in the context of each responding economic development organization, i.e. frequently, occasionally, rarely, never. This indicates the relative importance of the quality and availability of local broadband services decisions of businesses to remain within the jurisdiction, i.e. impact on retaining businesses.
Business assistance services offered	Shows the proportion of economic development organizations that offer business assessment assistance or training to businesses on the use of the Internet.	In the context of the importance of broadband services to businesses, this provides insights into the availability of services to support businesses in the adoption and use of broadband services.
Demand for broadband training or assistance for businesses	Shows the level of interest or demand seen by economic development organizations for assessments, training or support services for small businesses in relation to better utilization of the Internet for their business.	Provides the perspective of economic development organizations on demand for support and assistance services that can be compared to statistics from businesses on expertise issues and need for skills and training.
Use of Internet to promote community	Shows the proportion of economic development organizations that use the Internet to promote their community or region to attract households or businesses from outside to their area.	Provides insights into the level of use of the Internet to promote local economic development through attracting populations.

CAI and Sectors Dashboard – Additional Prompts

Prompts	Purpose	Interpretation and Use
Characteristics		
CAI Type	Selection of major categories of Community Anchor Institutions	
Farm Type	Selection of type of farm operation based on standard industry classifications.	Available for Farms dashboard page
Elementary	Selection of schools that have elementary level education	Available for Education dashboard page
Middle School	Selection of schools that have middle school level education	Available for Education dashboard page
High School	Selection of schools that have high school level education	Available for Education dashboard page
K12 Status	Selection of K-12 schools based on public/private status	Available for Education dashboard page
Gov Level	Selection of County and/or Municipal level	Available for selected dashboard pages
Public Safety Org	Selection of type of public safety organization	Available for Public Safety dashboard page

Telehealth Dashboard

Dashboard Report	Purpose	Interpretation and Use
Health		
Health DEi-H Distribution	Provides the distribution of DEi-H scores within DEi-H score ranges from 0 to 10. This complements the average DEi-H score by showing the distribution of lower and higher scores around the average. The DEi-H score is based on the health provider-specific uses of the Internet, over and above the core Internet uses that are the basis for the DEi.	health providers below the average DEi-H are potential targets for increased utilization initiatives. Viewing DEi-H distribution for selected response sets filters can provide insights into which segments to target for increasing utilization levels.
Health DEi-H and DEi	Provides the average DEi-H and DEi scores for the selected response set and the number of health provider responses included (sample size).	Allows for comparison of DEi-H and DEi for health providers for different user segments and/or geographies.
Health Application Use	Shows current utilizations of health-related applications (e.g. Electronic Health Records) for organizations that provide health products and services.	Data based on responses from organizations that provide health services only. Useful for examining the use of health applications by different types of health providers.
Health-specific Drivers	Shows the importance of different motivations for providing Internet-enable health applications.	Data based on responses from organizations that provide health services only. Useful for examining the importance of drivers for delivery of health services for different types of health providers.

Dashboard Report	Purpose	Interpretation and Use
Health-specific Barriers	Shows the importance of different barriers to providing Internet-enable health applications.	Data based on responses from organizations that provide health services only. Useful for examining the importance of barriers to the delivery of health services for different types of health providers.
Telehealth		
Telehealth Utilization	Shows the use of different categories of telehealth services by households.	Since the use of health services in general, including telehealth services, impacts only a portion of the population, the levels of current and planned use tend to be low. This report also includes statistic on households "willing to explore" the use of telehealth services, which is an indicator of acceptance and potential future use.
Telehealth satisfaction	Shows the satisfaction levels from those households currently using telehealth services.	Provides insights into the levels of satisfaction with telehealth services currently being used. Be aware that sample sizes may be small for those currently using telehealth services.
Motivations to use Telehealth services	Shows the importance of different factors on household decisions to use telehealth services.	Provides insights into what will motivate households to use telehealth services, information that can influence service delivery by health providers.
Barriers to using Telehealth services	Shows the importance of different factors that inhibit household decisions to use telehealth services.	Provides insights into what may inhibit households from using telehealth services, information that can influence service delivery by health providers.

The details of these reports are for internal use and are provided to selected recipients under Non-Disclosure Agreements.

Appendix C - Glossary

***Broadband KY* e-Strategy Report:** This report examines how organizations and households in Kentucky differ in their utilization of broadband and where they can look to make improvements. The report shows in detail how different industry sectors and household types compare to each other, especially between and within regions. The report provides insights and hard evidence that allows regions, businesses, and households to assess where they stand. The report provides recommendations on strategies for improving their Internet performance and benefits.

***Broadband KY* e-Solutions Benchmarking Technical Report:** This report presents the results of survey-based research carried out for the Commonwealth of Kentucky. The surveys collected information from businesses, organizations and households on the availability of broadband (high speed Internet access) and its uses, benefits, drivers and barriers. This largely descriptive report results provide insight into gaps and opportunities for increasing broadband utilization by organizations and households. The policy, planning and program implications for Kentucky and its regions are dealt with in a separate report: the *Broadband KY* e-Strategy Report.

Digital Economy Analysis Platform (KY- DEAP): The DEAP has been developed as an online resource that provides clients with access to the data collection results and the ability to customize their analysis across a range of variables, including industry sector or geographic region. The DEAP is accessed online by authorized users. Users are presented with **dashboards** for businesses and for households. Each dashboard is organized around a series of **pages** focused on specific topics, e.g. Connectivity, Utilization, DEi, Impacts, etc. Within each page is a set of predefined **reports** that present a chart and/or table of processed results from the datasets.

e-Strategies: e-Strategies are high level plans for achieving one or more goals related to improved access to and utilization of broadband Internet. e-Strategies define a course of action that is most likely to successful address opportunities, challenges or barriers related. Strategies are usually seen as distinct from detailed action plans which deal with specific issues of "who, what, when and how".

e-Solutions: refers to the integration of Internet technologies with the internal computer-based systems and applications within or among organizations for a variety of operational processes. e-Solutions encompass not only product delivery and payment transactions (e-commerce) but also all processes that may be facilitated by computer-mediated communications over the Internet.

e-Process: uses of the Internet which include internal operational uses, such as supplier coordination, training and teleworking.

e-Commerce: uses of the Internet which include activities related to the sales, marketing and delivery of products and services; and,

Kentucky Digital Economy Index (KY-DEi): The Digital Economy index (DEi) is part of the benchmarking process and provides reference points against which the performance of any individual or group can be compared. The DEi summarizes an organization's or household's utilization of a range of Internet applications and process – 17 for organizations and 30 for households. Based on the number of applications currently being used by an organization or household, a composite score is calculated that summarizes how comprehensively each organization or household uses Internet-enabled e-solutions. The DEi can be used to compare organizations, regions, or industry sectors.

Utilization refers to the third stage in the broadband development process. The first stage is providing a community, household or organization with access (availability) to the Internet. The second stage is adoption or the process whereby a person or organization starts to actually use the Internet. The third stage is utilization whereby a person or organization uses their Internet connection to create value. Many people and organizations have access and have adopted the Internet, but are relatively ineffective in how they use and derive benefits from the Internet. The field of analysis labeled "utilization" explores patterns of Internet use and how these patterns can be enhanced.

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