

# **Broadband in Allegany County: Status, Opportunities, and Strategies**

**Prepared for:**  
**Allegany County Public Schools, Board of Education**

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**Prepared by:**  
Columbia Telecommunications Corporation  
10613 Concord Street  
Kensington, MD 20895  
301.933.1488  
301.933.3340 fax  
[www.CTCnet.us](http://www.CTCnet.us)

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**ctc technology & energy**  
engineering & business consulting

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## ***1. Executive Summary***

Allegany County, Maryland has long been a leader among local jurisdictions in broadband planning. In that tradition, the Allegany County Public Schools (ACPS) Board of Education's (BOE) is working to understand how broadband is (and can be) used in the County and to develop strategies for use of broadband in the future.

To support that effort, the BOE hired CTC Technology & Energy (CTC) to analyze existing and potential broadband infrastructure and use in the County, and to make strategic recommendations for the future. This process was overseen by the BOE with the input of a wide stakeholder group that included Allegany County, the City of Cumberland, and the Allegany County Chamber of Commerce. The six-month effort was funded by the BOE and a grant from the Appalachian Regional Commission (ARC).

### ***1.1 Project Background and Goals***

Both the public and private sectors in Allegany County have identified broadband as fundamental to government services, government operations, and economic development. That recognition led the County, Board of Education, and City of Cumberland to partner over the past 15 years to build and support the Allegany County Network (Allconet), an innovative and unique project that serves both the public and private sectors. The BOE receives wireless broadband service through Allconet at its schools and facilities.

As the State of Maryland builds fiber optic infrastructure to many schools and other community anchor institutions (CAIs) in the County as part of the One Maryland Broadband Network (OMBN), the BOE seeks to evaluate its options and determine future strategies for building on the tremendous public successes to date with respect to broadband connectivity.

On behalf of the BOE, CTC was charged to investigate and suggest strategies in three general areas of inquiry:

1. Public Sector Broadband: What technologies and service provider(s) can best meet the broadband connectivity needs of the BOE and other public and governmental entities within Allegany County?
2. Economic Development Broadband: How can broadband support economic development efforts in Allegany County?
3. Consumer Broadband: What is the current status of public-facing broadband (products available in the consumer market) in Allegany County as it affects residents, businesses, and school-age children?

To answer these questions, CTC performed the following general tasks over the course of the past eight months:

1. Met with a large number of key public stakeholders, including representatives of the Tri-County Council, the BOE, Allconet, Allegany County government, City of Cumberland government, State of Maryland, and Allegany College.
2. Met with a large number of key private sector stakeholders, including the Maryland Broadband Cooperative, Greater Cumberland Committee, the Allegany County Chamber of Commerce, Lumos, Atlantic Broadband, CONXX, Verizon Wireless, AT&T Wireless, U.S. Cellular, and First Energy.
3. Researched and evaluated the current *demand* for broadband communications products and services in the County through statistically valid surveys of the business and residential sectors, using online (for business) and mail (for residences) methodologies
4. Researched and evaluated the current *supply* of broadband communications products and services in the County through a range of efforts and methodologies, including:
  - a. Discussions with Allconet representatives and other Allconet stakeholders regarding Allconet service speeds, prices, and other service characteristics
  - b. Evaluation of the National Broadband Map data collected and published by the FCC and Department of Commerce
  - c. Evaluation of the Maryland Broadband Map data collected by the State of Maryland
  - d. Research of available broadband products and services in the Allegany County market, and their pricing
  - e. “Drive-outs” of portions of the County to evaluate the presence of wireline facilities and the reach and strength of wireless signals
5. Analyzed options for achieving the BOE’s broadband communications requirements, including:
  - a. Upgrading and enhancing Allconet and maintaining the BOE’s existing wireless broadband service
  - b. Integrating Allconet and OMBN service at BOE facilities
  - c. Connecting all BOE facilities to OMBN fiber, leasing dark fiber from the State, and provisioning service with internal BOE staff resources
  - d. Connecting all BOE facilities to OMBN fiber and purchasing managed services through the State’s network or from another provider



6. Evaluated the value of Allconet services that the BOE has received in the past
7. Researched and evaluated the full range of potential loan and grant opportunities available from the State and federal government agencies for new broadband projects such as upgrading Allconet equipment or building additional fiber optics to schools not yet connected by OMBN

The following is a summary of CTC's findings and recommendations. More detailed analysis is provided in the subsequent sections of the Report.

## **1.2 Allconet's Achievements**

Allconet represents a singular achievement. The network was ahead of its time when it first launched, and even today it stands among the most effective public broadband networks in rural America. Allconet delivers two overarching benefits to the community:

- It enables efficiencies and eliminates public-sector silos. Instead of building multiple networks (e.g., separate networks for fire department, police department, schools, etc.), the Allconet partners have efficiently worked together to share one infrastructure, and have reaped tremendous cost savings and operational benefits over time.
- It stimulates competition in the local broadband market, by removing the high costs of entry to the market by making available the public infrastructure and enabling private sector providers to serve end users over Allconet. The private sector partner that operates the network (CONXX) has the authority of the partnership to sell network capacity to private sector companies (including to itself, in its dual role as a wholesaler and retailer). Those private sector re-sellers then provide retail service to homes and businesses.

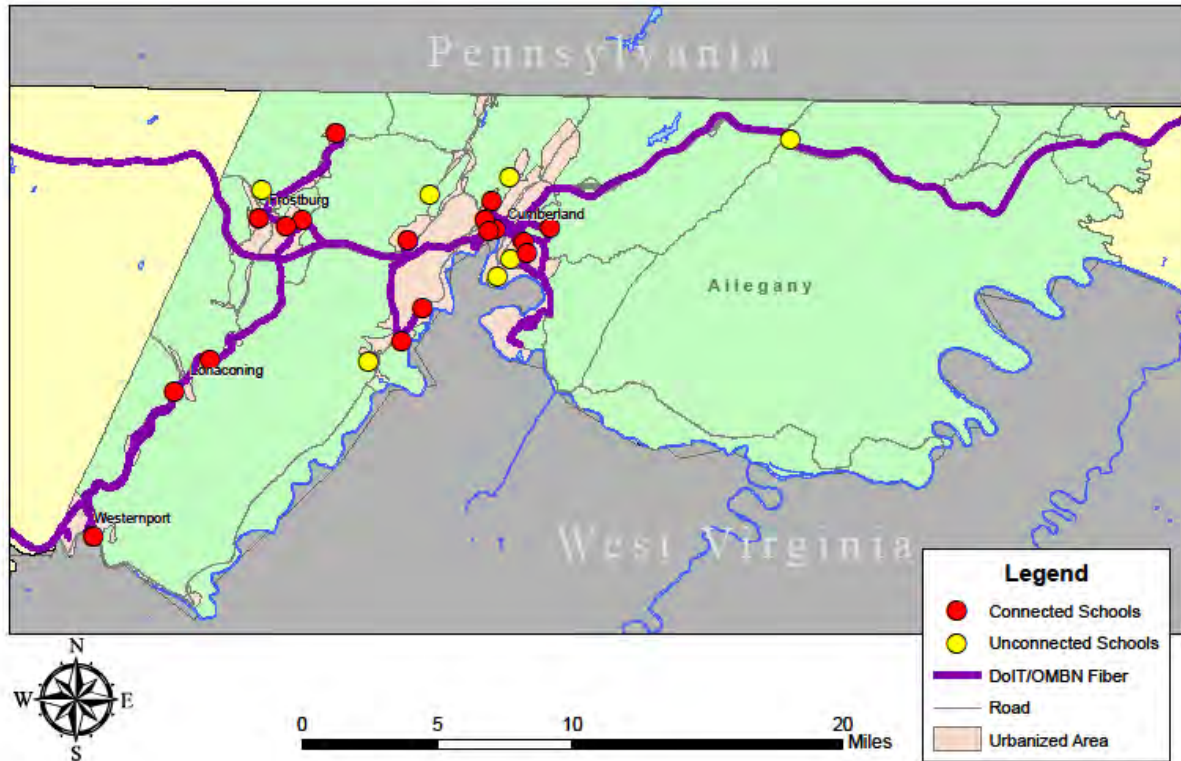
## **1.3 Broadband for the Public Sector**

Allconet supports schools and government well and has saved the public sector money as compared to the cost of buying comparable services from private sector communications providers. Its infrastructure is aging and will need to be replaced—but overall the network has operated under a very good model of serving the public interest while making wholesale capacity available to the private sector.

The competitive environment in the County is not static, however: The State of Maryland's Department of Information Technology (DoIT) is currently building extensive fiber optic infrastructure—both middle-mile backbone and connections to schools and other community anchor institutions (CAIs)—as part of the One Maryland Broadband Network (OMBN). Construction is scheduled to be complete by fall 2013. By enabling new high-capacity services to many schools, this fiber will present the BOE with new options for its broadband service. Figure 1 illustrates the planned routing for OMBN fiber and which schools it will connect.

Figure 1: Schools to Be Connected by OMBN Fiber

## Allegheny County DoIT/OMBN School Connections



The OMBN fiber also represents a shift in the fundamentals behind the Allconet partnership. Once those fiber connections are in place, the BOE will not need Allconet service to the extent that it has in the past – but for the County and City of Cumberland, the need for Allconet is not reduced in a comparable way. While the BOE could conceivably migrate away from Allconet service over time, the other public sector partners need Allconet to support their communications in such areas as traffic signals, utility monitoring, and public safety communications.

In other words, a path that works for the BOE might not work for the full public sector partnership. This is the challenge facing both the BOE, and its partners. The partners' goals and interest may diverge somewhat because of the availability of OMBN fiber.

At a high level, we believe the BOE has three broad strategic options for obtaining broadband connectivity after completion of the OMBN fiber in mid-2013:

### 1.3.1 Option 1: Maintain the Allconet status quo

The BOE could continue to use Allconet service, rather than using the OMBN fiber connections. Pursuing this approach would limit the BOE's capital expenditures to the cost of upgrading and

enhancing the Allconet network equipment—to the extent that such upgrades are desirable, and that funding for new equipment and facilities is available. It would also maintain the public sector synergies that have underpinned the Allconet partnership.

*Financial considerations:* Maintaining all current Allconet involvement would entail paying some or all of the costs related to upgrading Allconet—at a price estimated by The Tanner Group to be \$1.5 million. As with all communications equipment, Allconet’s equipment require replacement at least once a decade, and towers require maintenance and occasional replacement (by way of example, the June 30, 2012 storm destroyed one of the Allconet towers and the equipment on it, eliminating service to one school).

### **1.3.2 Option 2: Use OMBN fiber to connected schools and Allconet elsewhere**

The BOE could obtain broadband service over the State of Maryland fiber (either through managed services from the State or a commercial provider that leases access on OMBN through the Maryland Broadband Cooperative), or it could light its own dark fiber from OMBN. The OMBN fiber would supplement the BOE’s Allconet service at its unconnected schools. Pursuing this approach would enable higher bandwidth and new services at the connected schools, while reducing the load on Allconet (and thus freeing up bandwidth that Allconet could dedicate to new private sector customers).

*Financial considerations:* The BOE can leverage the State’s fiber by purchasing dark fiber and lighting and operating that fiber itself, or by purchasing “lit” managed services from the State’s Department of Information Technology (DoIT). Annual dark fiber cost would be approximately \$82,000, which would pay for fiber on the State’s footprint throughout the County (providing access to all locations where there is OMBN fiber, not only the schools). That cost would include commodity Internet bandwidth and capacity on the State’s secure Intranet and the OMBN network (the State’s extranet).

The managed services option would entail the BOE purchasing services over the fiber from DoIT (thus reducing the need to operate a communications network locally). DoIT’s stated mechanism for determining pricing is to use a volume purchase model to ensure lower costs than a customer would incur if it had to purchase services independently. The State has not yet made public the pricing for the relevant services.

### **1.3.3 Option 3: Expand OMBN to connect remaining schools**

Migrating to a wholly fiber network over time (i.e., building fiber connections to the seven schools that will not be connected by OMBN) will enable the BOE to choose among the same service approaches outlined above for all of its schools—at an estimated construction cost of \$900,000. Pursuing this approach would eliminate the BOE’s need for Allconet services and would potentially reduce the BOE’s connectivity costs in terms of staffing and other areas.

From the standpoint of long-term planning, this option is most future-proof: The fiber has a life of many decades, can scale in capacity to meet BOE needs as they arise (at relatively incremental

cost), is generally acknowledged as the “holy grail” of communications infrastructure.

*Financial considerations:* Building new fiber would entail a range of construction, maintenance, and operations costs. We estimate that construction to the non-OMBN schools would cost about \$900,000. Fiber construction entails significant effort related to pole attachments, procurement, and maintenance, but we believe that the State’s Department of Information Technology would be amenable to partnering with the BOE to undertake some of those efforts.

Because the BTOP program (which funded the OMBN construction) was likely a one-time program, similar federal government funding options for this construction are probably not feasible—but the BOE may be eligible for funding to support fiber construction through the Schools and Libraries program of the Universal Service Fund (known as “e-rate”), Appalachian Regional Commission (ARC), or other sources.

The migration to fiber would require investment in equipment and replacement of that equipment over time. The cost of that equipment is likely to be lower than that required for Allconet, in part because Allconet is a carrier network (enabling ISPs to serve the private sector) as well as an internal government/schools network—the fiber strategy would not include a carrier component and would eliminate those equipment costs.

As in the combined Allconet/fiber model, the BOE could choose to light and operate the fiber itself or to buy managed services.

A more detailed discussion of each of these options is included in Section 2.

## **1.4 Broadband for Economic Development**

Along with local government and the Allegany County Chamber of Commerce, the BOE envisions using broadband to boost the local economy—because more and better jobs will strengthen the community and improve students’ quality of life.

A growing body of research points to the potential economic development benefits of the availability of robust broadband infrastructure in a community or region. According to a 2011 survey of building owners and property managers, broadband access is one of the most important decision factors for commercial real estate siting—after price, parking, and location.<sup>1</sup> Similarly, a national survey found that 77 percent of economic development professionals believe that to attract a new business, a community must have broadband of at least 100 Mbps;<sup>2</sup> in other words, they believe that economic development without broadband is essentially inconceivable.

These benefits may be even greater in rural areas, where high-speed connectivity can ameliorate the effects of physical distance. The City of Cumberland’s Office of Economic Development is

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<sup>1</sup> Joan Engebreston, “Comcast study: Broadband boosts real estate metrics,” Connected Planet, Sept. 26, 2011. <http://blog.connectedplanetonline.com/unfiltered/2011/09/26/comcast-study-broadband-boosts-real-estate-metrics/> (accessed March 12, 2012).

<sup>2</sup> Craig Settles, “After the Stimulus: Broadband and Economic Development,” International Economic Development Council, October 2011. <http://www.cjspeaks.com/msp/IEDC2011.pdf> (accessed March 12, 2012).

working to secure such benefits, noting recently that “the growing trend of rural-sourcing”—companies bringing home to rural U.S. communities the type of jobs that have previously been outsourced to India and other countries.<sup>3</sup>

The One Maryland Broadband Network is a game-changer in this regard. A statewide fiber network to benefit the public interest, OMBN will bring unprecedented potential for cost-effective expansion to strategic economic development targets, and may catalyze further private sector investment.

The U.S. Department of Commerce (which provided the grant for OMBN) and the State hope that OMBN will not only enable fiber-based service at schools, but will also put fiber capacity in the hands of the private sector (through the efforts of the State’s sub-grantee, the Maryland Broadband Cooperative). The construction of the OMBN means that competitive service providers do not have to build the digital highways into Allegany County road to reach pockets of customers—just the local streets and the driveways to the customers’ homes or businesses.

#### **1.4.1 Recommendations Regarding Broadband for Economic Development**

Among the key economic development targets identified by the County, City of Cumberland, and the Allegany County Chamber of Commerce, a number of locations are already scheduled for construction by OMBN.<sup>4</sup> The County, City, and Chamber have also identified a number of additional locations where fiber might have economic impact. These include:

- U.S. 220 backbone
- Industrial parks and untenanted locations within blocks of OMBN fiber
- Downtown Cumberland

CTC engineers assessed these locations to determine potential fiber routes, including placement on existing utility poles and underground routes. Based on this analysis, we estimated the costs to construct each of the fiber segments:

- Constructing fiber down the U.S. 220 corridor would cost an estimated \$2.3 million, including a spur to Rocket Center, West Virginia.
- Constructing fiber to every building in an eight block radius around the courthouse in downtown Cumberland would cost approximately \$500,000.
- Constructing fiber from an OMBN interconnection point to six specific sites identified as economic development priorities would cost approximately \$550,000.

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<sup>3</sup> “Economic Development Strategies: Developing a New Queen City!” Brochure (undated). City of Cumberland, Office of Economic Development.

<sup>4</sup> Riverside Industrial Park, the McMullen Building, North Branch Industrial Park, and 11700 Mexico Farms Rd.

The cost of construction, of course, is only the first part of the many costs that accrue to the public sector when it undertakes communications infrastructure projects—much as with all other infrastructure projects, such as roads, bridges, and government buildings. Public ownership of this fiber would entail, at a minimum, maintenance costs and the costs of securing private partners to light and operate the fiber.

As with the fiber to connect schools, we believe that the State's Department of Information Technology or the Maryland Broadband Cooperative would be interested in partnerships for construction and leasing of the fiber on Route 220 and to the economic development target sites—partnerships that could leverage the State and Coop's strengths, while delivering the economic development benefits of fiber to Allegany County but reducing the need to maintain and operate fiber locally.

The Route 220 fiber build may also be of significant interest to other parties who might share the cost of construction. A range of public and private entities, including the State and private carriers in both Maryland and West Virginia, have expressed interest in fiber connectivity on that route. First Energy, the local power company, may also be interested. CTC understands that the County has already initiated discussions with some of these entities and recommends expanding the discussions to include as many interested parties as possible with the hope that there is enough interest to enable shared construction at low cost for each entity.

Fiber to the Premises (FTTP) in downtown Cumberland presents a more complex picture—at the same time as it holds enormous promise for the City and Chamber's vision of attracting businesses and residents to some of the unused locations and upper floors of Cumberland's historic downtown. FTTP, given its high capital and operating costs, requires high take rates (sales levels) to pay for itself—which can be particularly challenging in a competitive or semi-competitive environment such as Cumberland (where service, albeit at far lower bandwidth) is available from Atlantic Broadband, Skypacket and other Allconet ISPs, Cumberland WiFi, U.S. Cellular, AT&T Wireless, and (in some locations) Verizon DSL.

FTTP in Cumberland would deliver to each connected location a world-class connection to the Internet and the world, but is likely to require significant subsidy, both for capital costs upfront and for long-term maintenance and perhaps operations. Ideally, the Chamber and public sector in Allegany can partner with one or more service providers who are interested in this market and would be willing to incur the capital costs for equipment to connect new customers.

Analysis of the build costs is included in Section 3.

We also recommend that the Chamber and public sector work to ensure that all Allegany County real estate agents, both commercial and residential, understand that broadband is a unique asset—and, frankly, that Allegany County, by rural standards, has an extraordinarily high level of broadband service. This understanding should be part of how they market the County in general, and the particular properties that they represent.

Educating commercial real estate agents in the County about the importance of broadband availability to commercial customers, and ensuring that they are in close coordination with the

Chamber of Commerce and the public sector departments of economic development on this topic, will pay dividends in the long term.

## **1.5 Broadband for Business and Residential Consumers**

To help the BOE understand the state of broadband availability and adoption, and to generate data that might be germane to both economic development efforts and the BOE's future decisions about broadband connectivity, CTC researched the supply and demand of broadband in the County. (Our discussion of broadband technology is in Section 4; our analysis of broadband availability and adoption in Allegany County is in Section 5.)

### **1.5.1 Supply of Consumer Broadband**

We found that the County is well-served, relative to the typical rural community in the United States, with reasonable broadband service (i.e., 2 to 3 Mbps) available to 80 percent to 85 percent of residential addresses. This level of service is not comparable to what is available in many urban and suburban communities, but it is better than what is available to residents of many other rural areas.

It is important to note that we reached this conclusion based on a definition of broadband (2 to 3 Mbps) that would allow speeds that enable a videoconference with a teacher or a streaming video, for example. The National Broadband Map claims 99.5 percent broadband availability in Allegany County, but defines broadband at just 768 Kbps—a much slower speed that would not support the online applications that students need.

The overall availability of consumer broadband owes much to Allconet's *fixed wireless* service across much of the County. By making wholesale capacity available to private sector service providers, Allconet eliminates barriers to private sector competition and enables Internet service providers to market to a range of users.

Most commercial *wireline* investment in the County has ceased, particularly in the residential markets (this trend is national, not local or regional). The focus of the cable and telephone companies is on growth in the institutional and enterprise markets where return on investment is far higher than in the residential and small business markets. Even in those markets, however, incumbent providers are unlikely to build new facilities unless construction is funded by new customers—either with upfront payments or through long-term contracts.

Unlike wireline, commercial *wireless mobile* investment in the County is currently accelerating, with U.S. Cellular claiming that it will activate state-of-the-art mobile broadband services (known as LTE or 4G) during 2012 in its Allegany County footprint. AT&T declines to share its deployment plans or timing, but our observation is that AT&T has recently upgraded its mobile service in the County to 3G, a technology called HSPA+. While not state-of-the-art, this technology does deliver basic wireless broadband service to AT&T customers.

Looking forward, we do not anticipate significant investments by the cable or phone companies in wireline infrastructure. The availability of broadband is likely to improve modestly as a result

of U.S. Cellular's ongoing upgrades. In addition, the State's open access fiber may catalyze new private sector investment. Continued enhancements of Allconet (including through the replacement of aging equipment) may also lead to expanded service availability

### **1.5.2 Demand for Consumer Broadband**

An Internet service's adoption rate is an indication of a population's willingness to pay for services based on what they consider to be important to them. So measuring a community's Internet service adoption rate offers a sense of a population's demand for the services in their community.

To gauge consumer demand, we conducted two surveys in Allegany County—a mail survey of the residential sector and an online survey of businesses. We found that:

- Approximately 80 percent of County residents currently pay for Internet access (including non-broadband dial-up service). This is the total Internet adoption rate for Allegany County—the rate at which Internet service is purchased where available.
- About 72 percent of residents pay for broadband Internet access (i.e., Allconet, cable modem, DSL, or mobile).
- Among respondents with school-age children, 100 percent report paying for Internet access.

Given that broadband users comprise 71.8 percent of total respondents,<sup>5</sup> and the National Broadband Map reports 99.5 percent of Allegany residents have the option of purchasing broadband, the adoption rate for all broadband service in Allegany County, (the rate of usage divided by the rate of availability) is 72.2 percent. This number represents a big-picture estimate of broadband market demand; it indicates that an Allegany County resident has a 72.2 percent likelihood of purchasing broadband Internet service where available. Frankly, we believe this number understates the actual adoption rate because the availability data sourced from the National Broadband Map overstate availability.

A detailed analysis of the survey results is included in Section 6.

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<sup>5</sup> 77.3 percent of respondents said they have home Internet access. However, of total respondents, including those who have not purchased Internet service, those who reported using dial-up account for approximately 1.4 percent. Another 4.1 percent of respondents use a satellite service, another non-broadband technology. If we subtract the dial-up and satellite users from all home Internet users, we are left with 71.8 percent of respondents who have purchased broadband Internet service.



### 1.5.3 Summary of Key Residential Survey Findings

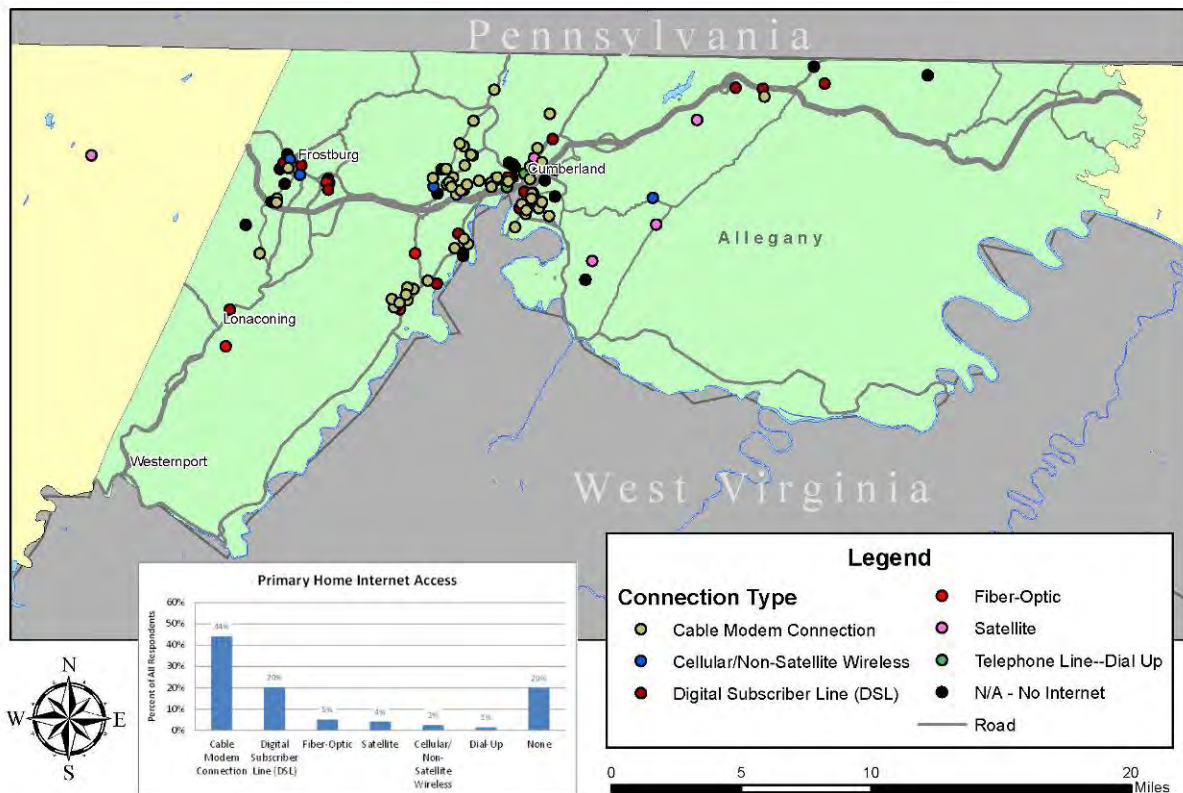
We mailed a questionnaire to 600 randomly selected residences in Allegany County in March 2012. A total of 121 useable residential surveys were received by the cut-off date, providing a “gross” response rate of 20.2 percent.

The survey was designed to obtain information about responding residents’ use of communications services including Internet, television, and telephone. The survey also captured residents’ opinions about communications services within the County and identified ways in which those services may be improved to better meet residents’ needs.

Figure 2 illustrates the locations and service types of residential survey respondents.

Figure 2: Location and Connection Types of Residential Survey Respondents

## Primary Home Internet Access



Key findings from the residential communications survey include:

- Approximately 80 percent of Allegany homes purchase Internet service, almost all with high-speed (non-dial-up) service. Cable modem connection is the leading type of Internet connection, used by 57 percent of home with Internet access (44 percent of all homes), followed by DSL (26 percent of homes with Internet access; 20 percent of all homes).

- Residents are generally satisfied with their Internet services. However, almost all aspects of Internet service “under-perform” when comparing satisfaction ratings with importance ratings. The largest Internet service “gap” (customers’ importance minus their satisfaction) is the price paid for service, followed by reliability, technical support, and connection speed.
- Thirteen percent of employed respondents said their employer allows telecommuting, with the majority having an Internet connection that would enable telecommuting. However, just three respondents (3 percent of employed respondents) telecommute at least one day per week.

#### **1.5.4 Summary of Key Business Survey Findings**

We e-mailed a total of 874 survey invitations to key contacts at businesses located in Allegany County in March 2012. The list of recipients was provided by the Chamber of Commerce. A total of 233 responses were completed by the cut-off date, providing a response rate of 26.7 percent.

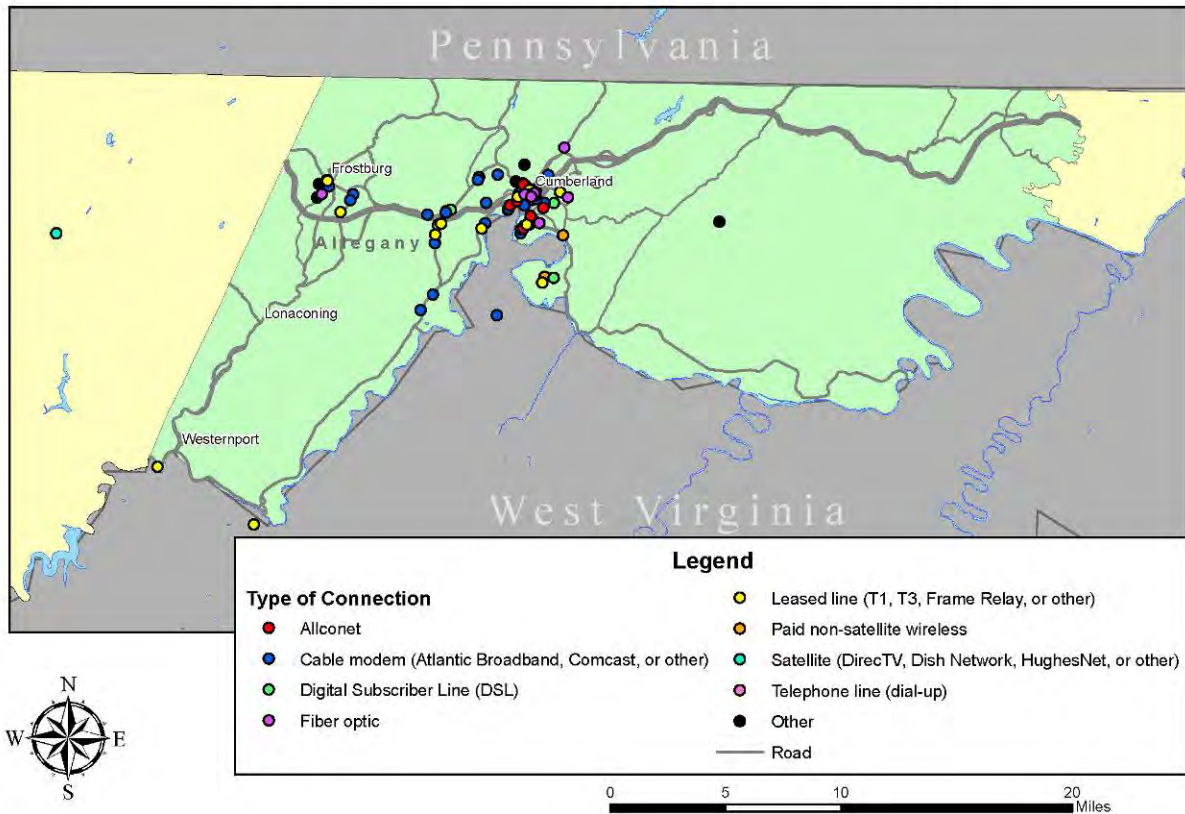
The business Internet services survey was designed to capture information about Internet access and use among businesses in Allegany County. The survey questions also solicited opinions about current Internet service and their future Internet needs.

By its nature, this online survey was a sampling of businesses that are already online, not a sampling of all County businesses. This is in contrast to the residential survey, which was mailed to a random sampling of all residential addresses. Accordingly, the business survey results represent the opinions of businesses that have access to the Internet (broadband or otherwise) and have adopted it.

Figure 3 illustrates the locations and service types of business survey respondents. As the map indicates, business respondents had a far greater concentration along the Route 68 corridor and in the cities of Cumberland, La Vale, and Frostburg.

Figure 3: Location and Connection Types of Business Survey Respondents

## Business Internet Access



Key findings from the business Internet services survey include:

- Among respondents, cable represents the most prevalent connection type, with approximately 40 percent market share. Businesses with less than 20 employees at the location are far more likely to use cable, compared with larger businesses.
- Accessibility of high-speed Internet might have some impact on local businesses and employment in Allegany County. One-fifth (20 percent) said they would be more likely to employ people in Allegany County if they had cost-effective very-high-speed Internet. More than one-fourth (27 percent) would be more likely to locate facilities in the County if they had cost-effective very-high-speed Internet.
- There is only moderate agreement that the local market currently offers affordable and reliable high-speed Internet. Budget/financial considerations and the lack of availability is the largest constraint on businesses' greater use of high-speed Internet.

### **1.5.5 Recommendations Regarding Increasing Local Broadband Use and Awareness**

Many consumers, both residential and small business, do not understand the value of broadband. This is typical in jurisdictions throughout the country, and presents a nationwide problem. Where infrastructure and services do exist, consumers frequently fail to take advantage of existing services; where they do not exist, unfortunately, this lack of consumer demand retards investment in the infrastructure that is necessary to make the services available.

We believe there is an opportunity for the Chamber and public sector in Allegany County to positively impact consumer and small business use of broadband, and we recommend a local community education effort related to broadband adoption.

For many potential broadband users, it is difficult to separate the value of broadband from its cost, because those concepts are so interrelated. Thus, it appears that there are many broadband customers in the County, particularly on the small business side, that are willing and able to pay for first-generation broadband products at lower speeds, but are unwilling or unable to pay for higher-quality broadband products that would enable them to do far more.

All of this suggests that there are many applications that are foundational for small business operations, including for home-based businesses and cottage industries, that many Allegany County business consumers are not using. Cloud-based services such as Google Docs, for example, provide applications at no or low cost, compared to the expense of purchasing software that needs to be located locally on a user's device. Other cloud-based applications might include Web-based bookkeeping, paid on a monthly basis for access to the application rather than paying upfront for the software and maintaining it. For small professional businesses, such as accounting and law firms, Web-based timekeeping programs are also available.

To address this gap, we recommend such simple and inexpensive tactics as occasional public seminars for small businesses to educate them about the kinds of applications that could increase their efficiencies and lower their costs on basic small business functions and applications. The County and City have the in-house expertise to teach these seminars, so this would be a low-cost endeavor. In addition, application and hardware vendors are frequently willing to provide this type of education at no cost; so long as they are cautioned against using the opportunity to present sales pitches, this strategy is a cost effective way to deliver broadband education.

### **1.5.6 Recommendations Regarding Maximizing Affordability of Existing Broadband**

As the residential survey results and national studies indicate, price is a barrier to broadband adoption for many families. As one step to ameliorate this issue, we recommend that the BOE ask Atlantic Broadband to participate in the Connect2Compete program, a national initiative announced by the Federal Communications Commission (FCC) last year.<sup>6</sup> The program, with support from high-speed Internet providers nationwide, aims to “provid[e] \$9.95/month high-

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<sup>6</sup> “Low-Cost Broadband, Computers for Millions of Students, Families,” Official FCC Blog, Dec. 14, 2011. <http://www.fcc.gov/blog/low-cost-broadband-computers-millions-students-families> (accessed June 26, 2012).

speed Internet, low-cost computers and free digital literacy training to families ... with at least one child receiving free school lunches through the National School Lunch Program.”<sup>7</sup>

Participation in this program would cost Atlantic Broadband a nominal amount and could allow many residents to secure the benefits of broadband access for their children. A representative of Atlantic Broadband told us that the company is monitoring the Connect2Compete program, but is not participating; should the company choose to participate, the BOE is in an excellent position to communicate the availability of the service to students’ families.

Similarly, we recommend that the BOE strongly encourage Comcast—which has a small service footprint in the County—to publicize its Internet Essentials program,<sup>8</sup> which was the model for the Connect2Compete program.<sup>9</sup>

## **1.6 Recommendations Regarding Private Use of Allconet**

Allconet brings enormous value and benefits to both the public sector and the private sector—but there are also significant costs related to Allconet’s operations, maintenance, and long-term sustainability, which the public sector has absorbed since the network’s inception. Those costs raise some concerns because, to our knowledge, Allconet’s private sector operator, CONXX, does not report to the BOE on its customer sales or other fundamental business information.

It is our recommendation that the BOE work to ensure that CONXX provide the public sector partners with a clear accounting of how (and to what extent) the network is used by the private sector. In this way, the BOE and its public sector partners can ensure that the relationship is equitable, and that the public (which built, maintains, and operates Allconet at public cost) is fairly compensated for private use of the network.

### **1.6.1 Allconet Wholesaler Relationship**

In its role as Allconet’s wholesaler, CONXX enables Allconet to serve the consumer market. This is an important function, in that it enables service to homes and businesses that might otherwise not be served (or might not have the benefit of competition with incumbent providers) and provides a revenue stream for the public partnership that funds the network.

CONXX serves both as Allconet’s wholesaler (reselling bandwidth to Internet Service Providers) and as a retailer (“buying” bandwidth from itself and selling it in the consumer market in competition with the other ISPs). It appears that this dual role arose at CONXX’s request because the retailers had not been very successful and CONXX represented that if it were itself a

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<sup>7</sup> “FAQs,” Connect2Compete. <http://www.connect2compete.org/faq-page#n91> (accessed June 26, 2012).

<sup>8</sup> “Download speeds of up to 1.5 Mbps and upload speeds of up to 384 Kbps” per “Internet Essentials FAQs.” <http://www.internetessentials.com/faq/index.html> (accessed June 26, 2012).

<sup>9</sup> Comcast created the Internet Essentials program when it hoped to convince the FCC to approve its merger with NBC Universal; it voluntarily made a nationwide commitment to provide low-cost Internet access to low-income residents in its existing service areas. See “FCC Chairman Genachowski Remarks at Comcast Internet Essentials Event,” FCC, Sept. 20, 2011. <http://www.fcc.gov/document/fcc-chairman-genachowski-remarks-comcast-internet-essentials-event>.

retailer, it could increase sales and thus payments to the public sector partners who support Allconet.

CONXX's dual role eliminates the typical separation between wholesale and retail operations—creating the perception, at the very least, of potential conflict of interest. This perception of inequity is exacerbated by two additional matters that, based on the information we were provided, raise concerns:

- Under the current contract, CONXX pays Allconet 50 percent of its wholesale revenues (the price at which it sells Allconet capacity to its own ISP, Skypacket, and other competing ISPs). However, CONXX unilaterally sets its wholesale prices, without input from the public sector partnership.
- CONXX is not obligated to provide detailed disclosure to the public sector partners of how many customers are served, of the types of customers served, of the towers from which they are served, of its total use of Allconet bandwidth, or of its wholesale or retail sales. As a result, the partners have no way to understand the success of the network; no way to track key metrics with respect to financial accountability; no way to gauge to what degree the public sector might be subsidizing private use of the network; and no way to know what percentage of revenues are being returned to the public partners in payment for private use of the network.

Given the apparent lack of information, we do not see how the public partners can fully understand how extensive the private use of Allconet may be. We found in our interviews that public sector stakeholders share a belief that CONXX and other retail ISPs have been unable to sell much service to the private sector market. This widespread understanding is based in part on the extremely modest payments that CONXX makes to the public sector partners for private use of the network—currently about \$1,000 per month.

This understanding may or may not be accurate. One CONXX owner told CTC that the public sector represents one-third of the traffic on Allconet—suggesting that private entities comprise two-thirds of the traffic and that wholesale sales have been very successful (or that many private entities are receiving free service without the knowledge of the Board of Education). We were also told that CONXX sells backhaul capacity to multiple commercial mobile wireless carriers—which, in our experience in the industry, is lucrative.

If this information is correct, it implies that the current payments that CONXX makes to the public sector in payment for its use of Allconet are quite low.

The public sector has no way to be sure of the fairness of the existing business arrangement absent fuller disclosure of information and understanding of private use of Allconet—and absent a role in setting wholesale pricing, given that the wholesaler is also a retailer.

### **1.6.2 Mechanisms for Creating Transparency**

The BOE and its public sector partners could pursue a variety of different mechanisms to achieve

this greater transparency and understanding. For example, renegotiating Allconet's wholesaler contract with CONXX would establish a clearer accounting of revenues and private use of network, and would give the public sector partners confidence that they were being adequately compensated relative to the full private use of Allconet. Alternatively, entering a competitive procurement process to select a wholesaler would secure the best possible financial arrangement for the public partners while continuing to enable private sector use of the network.

To the same end, we recommend that any private role in Allconet be determined through competitive processes. For example, by all accounts, Allconet is overdue for equipment replacement. We have been told that there is likely a backlog of \$1.5 million or so of equipment replacement necessary. Without commenting on the specific equipment or the upgrade strategy, we recommend that the specifications of the equipment should be independently verified rather than determined solely by CONXX, which is an interested party. The equipment replacement contracts should also be put out for bid to ensure that, whether CONXX or some other party is awarded the contract, the BOE and its public partners get all of the benefits of competition with respect to pricing and other attributes of the final contract.

## ***2 Government Use of Broadband***

As a partnership of public entities, Allconet provides broadband service to the BOE, the County, the City of Cumberland, and the Allegany County Library System. The network is operated by internal public sector staff, primarily those employed by the Board of Education. Commodity Internet bandwidth is purchased from CONXX, connecting Allconet to the rest of the world

### ***2.1 Allconet Has Eliminated Silos***

One of the tremendous achievements that Allconet represents is the removal of silos, and the realization of true efficiencies in communications network deployment. This was achieved through the deployment of a network that not only serves multiple public sector partners, but also multiple agencies within the jurisdictions. Unfortunately, that kind of model is uncommon. The dominant model for network use by the public sector, from the federal level down, is frequently that different agencies, jurisdictions, or entities build or lease separate networks. This has the net effect of reducing the business case and financial viability of all of them, because use and buying power are not aggregated and economies of scale are not realized. Allconet stands out with respect to this accomplishment.

Allconet has an additional element of efficiency that is similarly impressive: The innovation to add private sector use for the unused capacity on Allconet, and thereby leverage the public investment already made to enable service to consumers. In this way, Allconet reaches an extraordinary percentage of the public and private sector and users within the County, making various forms of service far more available than is the case in the overwhelming majority of rural areas.

Our comments and recommendations in this Report regarding the details of the relationship between the public and private sector partners in Allconet are not intended in any way to detract from these significant accomplishments.

### ***2.2 BOE Use of Allconet***

Since the inception of Allconet in the mid-1990s, Allegany County Public Schools have had levels of bandwidth at what appear to be very low net cost (taking into account both capital and operating costs) that are frankly unprecedented and almost unheard of in rural communities. The great majority of rural schools in this time period have been served over T1 circuits, which deliver guaranteed symmetrical bandwidth of 1.54 Mbps. These T1 speeds did meet the weak federal definition of broadband, but were not only insufficient to serve an entire school or school district, but could not even support basic applications like full-motion video to a single classroom, let alone multiple classrooms.

Many rural schools have migrated from T1's to higher-bandwidth circuits over the past few years, but at significant cost. Even today, in the majority of rural school districts, T1's (which can range in cost from a few hundred dollars to thousands of dollars per month) are still most common. A very small minority of the most rural schools are still served only by dial-up.



In metropolitan areas, the education sector has been far better served—in part because of the greater availability of infrastructure, and in part because those school districts are better able to afford the high costs that come with high bandwidth. The most innovative of metropolitan-area school districts have built their own communications networks to serve schools, usually over fiber optics.

Allconet stands out as one of the unique examples nationally among a very small minority of jurisdictions that have delivered this significantly higher bandwidth at remarkably low cost to serve the needs, broadly, of the public sector.

### ***2.3 Value of Allconet Services to Public Sector***

Data presented in an Allconet report prepared by The Tanner Group<sup>10</sup> indicate that government use of Allconet is extensive:

- County connections include: 14 buildings, 1 camera, 2 travel kiosks, SCADA monitoring, an emergency command vehicle, video arraignment, Sheriff vehicles
- City connections include: 7 buildings, Cumberland WiFi, AMR project, 13 cameras, SCADA monitoring
- BOE connections include: 26 locations, IP telephone service, cameras at schools

The combined value of this connectivity, according to the report, is a cost avoidance of \$115,000 per month, or more than \$1.3 million annually.

### ***2.4 BOE's Options for Future Connectivity***

By enabling new high-capacity services to many schools, the One Maryland Broadband Network (OMBN) will present the BOE with new options for its broadband service when it is completed in fall 2013. At a high level, we believe the BOE will have three strategic options, which we describe below.

#### ***2.4.1 Maintain the Status Quo***

The BOE could continue to use Allconet service rather than using the OMBN fiber connections. Doing so would enable the BOE to fairly easily anticipate future costs, in that the costs would be similar to the ongoing costs that the BOE has experienced over past years. Maintaining all current Allconet involvement would, however, entail paying some or all of the costs related to upgrading Allconet—at a price estimated by The Tanner Group to be \$1.5 million.

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<sup>10</sup> See: “Allegany County Network / AllCoNet / 1994 to 2011,” The Tanner Group (bound presentation). CTC does not have independent data to validate the data in this presentation, and notes that the presentation does not represent an independent analysis because of The Tanner Group’s financial connection to CONXX; however, even if these connections or other assessments of Allconet’s benefit to public sector users are overstated, there is no doubt that Allconet delivers significant value and savings to the public sector partners.

### 2.4.2 Integrate Allconet and OMBN Service

As a second option, the BOE could integrate its existing Allconet service (i.e., at schools that will not be connected to OMBN) and the new OMBN connections. Under this scenario, the BOE would continue to support the Allconet partnership, possibly at a reduced level, while benefiting from the OMBN.

#### *Operational considerations*

The OMBN fiber is an enormous boon to the BOE, in that the BOE will pay no capital costs for the fiber construction—a scenario that is highly unusual for rural fiber construction, which usually entails the customer paying the provider to build the fiber, either in an upfront payment or over time through a long-term contract.

The OMBN fiber also represents a large step up in terms of its capabilities. The fiber will enable far higher speeds in communications among and between BOE facilities and schools, with almost unlimited ability to scale to far greater speeds over time, as applications require more bandwidth. In addition, connecting to the State’s infrastructure would give the BOE high-bandwidth connectivity to schools and higher education institutions throughout Maryland who are also connected to OMBN. Over time, that feature could well enable significant applications for students and faculty.

#### *Financial considerations*

These benefits do entail costs. There exist at least two general models for how the BOE can leverage the State’s fiber: first, by purchasing dark fiber and lighting and operating that fiber itself; or, second, by purchasing “lit” managed services from the State and reducing the need to operate a communications network locally.

The dark fiber option entails costs both to lease the fiber from DoIT and to light and operate the fiber. DoIT tentatively anticipates an annual dark fiber cost of approximately \$82,000—representing the direct cost to the State of maintenance on the fiber within Allegany County. That cost is for fiber on the State’s footprint throughout the County (providing access to all locations where there is OMBN fiber, not only the schools) based on the fiber miles the State anticipates building as part of OMBN: 45 miles of aerial fiber, and 12 miles of underground fiber.

The State will also provide, as part of that cost:

- 200 Mbps of commodity Internet bandwidth
- 200 Mbps of Statewide Government Intranet (SwGI, the State’s secure Intranet, which will maintain private address space)
- 1 Gbps connection to the OMBN network (the State’s “extranet,” which will use publicly routed addresses)

The managed services option would entail the BOE purchasing services over the fiber from the State, which provides such services to many state agencies, boards of education, libraries, counties, and cities throughout Maryland. DoIT’s stated mechanism for determining pricing is to

use a volume purchase model to ensure lower costs than a customer would incur if it had to purchase services independently.

DoIT has not yet made public its pricing for the relevant services but we anticipate that they would likely be higher than the cost of the fiber leasing but substantially lower than commercial pricing. In addition, in our experience, DoIT's pricing has consistently been reduced each year as a consequence of greater volume and aggregated purchase power, so we anticipate that there may be modest reductions in these costs in future years.

This cost includes 24x7x365 managed services.

Regardless of which approach the BOE takes (or some variant on either), the combined Allconet/fiber option will doubtless represent an increase in annual costs relative to the option of Allconet only—at the same time as it represents an increase in operational capability and scalability. In addition to the leasing and operation costs for the fiber, there will still be operations costs for Allconet, though the BOE's relative share of those costs may be reduced as it reduces its use of Allconet. And Allconet will require a substantial investment to maintain and upgrade the operation over the next few years because of the age of its equipment and infrastructure.

### **2.4.3 Transition to All-Fiber Network (OMBN and New Construction)**

As a third option, the BOE could consider building fiber, over time, to schools that are not slated to be connected to OMBN.

#### ***Operational considerations***

As we have noted multiple times in this report, Allconet ably meets the public sector's existing needs and represents a stunning achievement. Indeed, the Allconet model is a fine one for the many rural areas that do not have this kind of efficiency or service, either to their public or private sectors.

The OMBN fiber, however, represents an exceptional opportunity in that it enables a migration strategy to a fully-fiber network that will then pay dividends, initially and over time, in a number of ways:

- From the very beginning, it will enable both intranet and Internet speeds that far exceed even Allconet's impressive achievements.
- Over time, it will grow with the BOE's needs. Fiber is the holy grail of communications infrastructure and represents a long-term strategy because of its virtually unlimited capacity to scale. This adaptability will enable the BOE to meet future needs by cost-effectively increasing bandwidth and migrating to advanced services over time.
- Fiber has a long life. While fiber is usually depreciated on a 20-year schedule, the usual life of fiber is 30 to 40 or more years if it is routinely maintained. In this way, fiber entails a one-time, rather than recurring, capital cost for the core infrastructure. Network

electronics must, of course, be replaced or refreshed as time passes and as the BOE’s networking needs grow.

It is also notable that this fiber opportunity is very rare in rural areas.

**Financial considerations**

Building new fiber entails a range of different costs: (1) construction; (2) maintenance; and (3) operations.

Construction: We estimate that construction to the non-OMBN schools would cost about \$900,000 (see Table 1).

**Table 1: Estimated Cost to Construct Fiber to Seven Schools**

SCHOOL	AERIAL MILES	U.G. MILES	TOTAL AERIAL COST*	TOTAL U.G. COST**	TOTAL COST
South Penn ES	0.7	0.1	\$50,330	\$20,900	\$71,230
John Humbird ES	1.4	0.1	\$100,660	\$20,900	\$121,560
Northeast ES	1.8	0.1	\$129,420	\$20,900	\$150,320
Frost ES	1.3	0.1	\$93,470	\$20,900	\$114,370
Flintstone ES	0.7	0.1	\$50,330	\$20,900	\$71,230
Cash Valley ES	2.4	0.2	\$172,560	\$41,800	\$214,360
Bel Air ES	1.9	0.1	\$136,610	\$20,900	\$157,510
<b>Total Cost</b>					<b>\$900,580</b>

\*Assumes a cost of \$71,900 per mile \*\* Assumes a cost of \$209,000 per mile

The cost might be eligible for federal subsidy. Because of reforms taken by the FCC in 2011, the Schools and Libraries Universal Service E-Rate program<sup>11</sup> will subsidize construction of fiber laterals to schools and libraries so long as the purchasing entity seeking managed services, not dark fiber.<sup>12</sup> The BOE could thus possibly procure managed services and the construction of fiber to the unconnected schools through the competitive E-rate process at its usual subsidy rate of 70 percent.

Fiber construction entails extensive processes and time related to securing pole attachment rights, procurement of a range of vendors, and related matters. These processes can be time-consuming and highly burdensome for a community that is building a small amount of fiber, as the BOE would be doing in this case. However, we believe that the State’s Department of

<sup>11</sup> “Universal Service for Schools and Libraries,” Federal Communications Commission. [http://transition.fcc.gov/wcb/tapd/universal\\_service/schoolsandlibs.html](http://transition.fcc.gov/wcb/tapd/universal_service/schoolsandlibs.html) (accessed March 21, 2012).

<sup>12</sup> E-rate had previously subsidized services only, not construction. The new support for construction is limited to situations where the school or library seeks managed services, not dark fiber, but we have heard suggestions that the FCC may consider expanding the category to include dark fiber as well. Under the current, new rules, the BOE may be able to secure the subsidy for fiber laterals to additional schools so long as it competitively procures managed services over fiber.

Information Technology would be open to a partnership in which the BOE could leverage and utilize the State's existing pole attachment and vendor agreements—significantly reducing the burden on the BOE and giving the BOE the benefits of the economies of scale the State has realized through the One Maryland Broadband Network.

Maintenance: Maintenance of the fiber represents an additional, ongoing cost to owners of fiber. As with the construction phase, we recommend that the BOE explore with Maryland DoIT the possibility to partner with respect to this fiber and to leverage the State's maintenance contract, which will also maintain the OMBN fiber within Allegany County, to take advantage of economies of scale.

Operations: As in the combined Allconet/fiber model, the BOE could choose to light and operate the fiber itself or to buy managed services. The dark fiber option would entail local costs related to operating a communications network, while the managed services option would enable the BOE to competitively procure services over the fiber from the State network or a private network.

In either case, migration to fiber at all BOE facilities would eventually eliminate the BOE's costs related to Allconet.

### ***3 Broadband and Economic Development***

A significant body of economic literature, dating to the late 1990s, has demonstrated the clear link between the economic well-being of rural communities and even low-speed broadband.<sup>13</sup> Fortunately for Allegany County, where expansion of wireline infrastructure has largely stalled (save for the OMBN project), the link seems valid for both wireline and wireless broadband technologies.

The U.S. Department of Commerce noted in a recent report on competitiveness that wireless broadband—like wired broadband— “has the potential to transform many different areas of the American economy by providing a platform for new innovation.”<sup>14</sup> The same report summarizes the existing scholarship linking broadband and economic development and concludes that, although it is difficult to quantify the economic effects of broadband, such effects “are likely to be substantial.”

#### ***3.1 Rural Sourcing Over Fiber***

The ongoing existence of Allconet and the development of OMBN infrastructure are positive influences on the County’s economy. This is especially true if the expansion of broadband infrastructure will enable the County to benefit from a trend known as rural sourcing — companies locating jobs in more cost-effective rural locations.

Part of this trend involves “in-sourcing” or “reshoring”—the return of jobs to America that had been relocated overseas in the past decade. This is a small but important trend that has escalated over the past year. The non-profit Jobs4America is actively engaged in promoting rural sourcing,<sup>15</sup> and the Obama administration is facilitating various aspects of its development.

The City of Cumberland has been exploring how to use its resources to attract jobs that are uniquely suited to a rural area—and broadband is a key element in its analysis.

Generally, rural sourcing is enabled by a combination of factors. One is the availability of big broadband to particular locations in rural areas. Sometimes this requires broadband to the home, but many rural-sourcing strategies are based on the availability of very big communications pipes to locations where many workers can be located. The other factors include the availability of an educated workforce; the availability of office/call center facilities that do not need extensive retrofitting; and the state and local governments’ approach to incentivizing (or not disincentivizing) the relocation.

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<sup>13</sup> See Gillett, Sharon E., et al., “Measuring the Economic Impact of Broadband Deployment,” National Technical Assistance, Training, Research, and Evaluation Project #99-07-13829, February 28, 2006.

[http://cfp.mit.edu/publications/CFP\\_Papers/Measuring\\_bb\\_econ\\_impact-final.pdf](http://cfp.mit.edu/publications/CFP_Papers/Measuring_bb_econ_impact-final.pdf) (accessed June 26, 2012).

<sup>14</sup> “U.S. Competitiveness and Innovation Capacity,” *Infrastructure for the 21<sup>st</sup> Century*, U.S. Department of Commerce (2011), p. 5-8 to 5-10.

<sup>15</sup> “Broadband Makes U.S. Contact Center Jobs Possible,” Jobs4America: Expanding Contact Center Jobs in the U.S. <http://jobs4america.net/> (accessed June 27, 2012).

With the input of the City of Cumberland’s Economic Development team and the Allegany County Chamber of Commerce, CTC assessed fiber routes throughout the County and estimated the costs to construct fiber optic infrastructure along routes, and to specific locations, that were identified as economic development priorities. These include:

- Multiple industrial parks and untenanted locations
- U.S. 220 to Rocket Center, West Virginia

We estimate that constructing fiber from an OMBN interconnection point to all of these sites would cost approximately \$550,000 (Table 2).

**Table 2: Estimated Cost to Construct Fiber for Economic Development**

SEGMENT	AERIAL MILES	UNDER-GROUND MILES	TOTAL AERIAL COST*	TOTAL UNDER-GROUND COST**	TOTAL COST
Sacred Heart	1.3	0.3	\$93,470	\$62,700	\$156,170
19 Frederick St	0	0.3	\$0	\$62,700	\$62,700
Memorial Hospital	0	0.2	\$0	\$41,800	\$41,800
Frostburg Business Park	0	0.3	\$0	\$62,700	\$62,700
ABC @ FSU	0.35	0.35	\$25,165	\$73,150	\$98,315
7 Commerce Drive	0.4	0.5	\$28,760	\$104,500	\$133,260
<b>Total Cost</b>					<b>\$554,945</b>

\*Assumes a cost of \$71,900 per mile \*\* Assumes a cost of \$209,000 per mile

CTC engineers assessed a backbone fiber route along U.S. 220, including a spur to Rocket Center, West Virginia. We estimate the total backbone fiber construction cost to be approximately \$2.3 million, for approximately 26.5 to 27.5 miles of fiber. We also noted that many potential fiber sites along the proposed fiber route, including the correctional facility on U.S. 220 and the American Woodmark Corporation facility in the Barton Business Park. A map of the route, a detailed cost breakdown, and a list of the assumptions supporting the budget estimate are included in Appendix B.

### **3.2 Fiber to the Premises in Downtown Cumberland**

Very limited data exist about the impact of broadband on communities in the United States, and there has been almost no serious scholarship on the matter. There is little disagreement, however, that broadband has some impact on economic development. In this area, there are data and studies going back about a decade, to the period before broadband was widely adopted nationwide. One of the most significant early studies documented the economic impact of broadband from 1999 to 2002, particularly with respect to jobs related to the information

economy (i.e., white collar jobs), as opposed to manufacturing and “blue collar” jobs.<sup>16</sup> What has not been established, and is still quite controversial, is whether *more* broadband (i.e., high-data-rate fiber to the premises, or FTTP) has a greater impact on economic development than do earlier-generation broadband technologies that deliver lower speeds, such as DSL and cable modem service. There is an ongoing debate in this regard, and what analyses do exist tend to be on a case study or qualitative, rather than a quantitative, basis.

Significantly, though, the debate about the economic impact of FTTP is largely a U.S. debate. The importance of FTTP to future economic development and competitiveness is taken as a given in much of Europe and the developed nations of Asia—most of which have made public investments in FTTP that, on average, are hundreds of times larger than the public broadband investments made by the United States through the 2009 Recovery Act broadband programs (such as the BTOP program that funded OMBN).<sup>17</sup>

Research and national policies aside, municipal economic development efforts are, in many ways, more art than science. Ask business owners why they choose to locate (or relocate) in a given city, for example, and their answers will typically include a list of reasons.<sup>18</sup> So it stands to reason that the availability of “infrastructure” is often one of the factors that can tip a decision in a city’s favor—while lack of infrastructure could conceivably be a deciding factor against a city.

Viewed in this light, the availability of high-speed data services in Cumberland would be a neutral factor (at worst) or a positive force for the City’s economic development efforts.

With the input of the City of Cumberland’s Economic Development team and the Allegany County Chamber of Commerce, CTC also assessed the cost to construct fiber optic infrastructure to the curb of every building in a section of downtown Cumberland surrounding the courthouse (see Figure 4 below).

Assuming that all of the fiber construction will be underground, and staying in the alleyways behind the downtown mall as much as possible to reduce costs, we estimate it would require approximately two miles of construction to get fiber to every building in the core area illustrated below—an area prioritized by the Chamber of Commerce for communications-related development. Using a cost of \$250,000 per mile, which is a conservative benchmark for underground fiber-to-the-premises construction in a city environment, we estimate a total cost of \$500,000. This budget assumes that an Internet service provider will be responsible for the electronics to light the fiber and for the drop, or fiber connection, from the curb into the buildings.

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<sup>16</sup> Lehr, William H.; Osorio, Carlos A.; Gillett, Sharon E.; and Sirbu, Marvin A., “Measuring Broadband’s Economic Impact” (2005). Tepper School of Business. Paper 457. <http://repository.cmu.edu/tepper/457> (accessed May 10, 2011).

<sup>17</sup> Nationwide FTTP construction projects are near completion or underway in Australia, China, Malaysia, New Zealand, Singapore, South Korea, and other Asian nations. More localized investments have been made in significant parts of western Europe. And the European Union and its members have undertaken significant regulatory change designed to spur FTTP investment by the private sector.

<sup>18</sup> Henry Goodfriend, “What Attracts a New Business to a City or State?” NAI Global, <http://ublog.naiglobal.com/blog/2010/08/10/what-attracts-a-new-business-to-a-city-or-state/> (accessed July 3, 2012).



Figure 4: Proposed Cumberland Fiber-to-the-Premises Network Footprint



## ***4 Current State of Residential and Small Business Broadband Technology***

In this section, we summarize the broadband services available to residential and small business customers nationwide. In Section 5, we discuss the current state of broadband technology in Allegany County.

### ***4.1 Wireline***

The wireline component is typically the highest-speed portion of a network. Where it is part of a wireless/mobile network, wireline communications provide the backbone between key network locations and the interface with the wireless network (i.e., the base stations or cell sites). The majority of homes and businesses nationwide are connected via wireline communications, and the role of the wireline connection has evolved to provide users' most intensive needs—high-definition television, telecommuting applications, telemedicine, gaming, data backup, digital media storage and transport, and “cloud” applications.

There are three primary modes of wireline communications:

- Fiber-to-the-premises (FTTP), adopted by Verizon in some markets (but not available in Allegany County),
- Hybrid fiber-coaxial (HFC), used by Atlantic Broadband, Comcast, and other cable operators, and
- Digital subscriber line (DSL) used by Verizon over its copper telephone lines and by companies reselling access over the Verizon copper lines.

#### **4.1.1 Hybrid Fiber–Coaxial (HFC)**

Cable operators, including Comcast, have extended fiber optics progressively closer to their subscribers' premises but have generally stopped about one mile from the premises, using coaxial cable for the last mile. Thus, their networks are a hybrid of fiber and coaxial infrastructure. Cox and Comcast typically only construct fiber optics to the premises of businesses that subscribe to Metro Ethernet and other advanced services (i.e., generally faster than 50 Mbps).

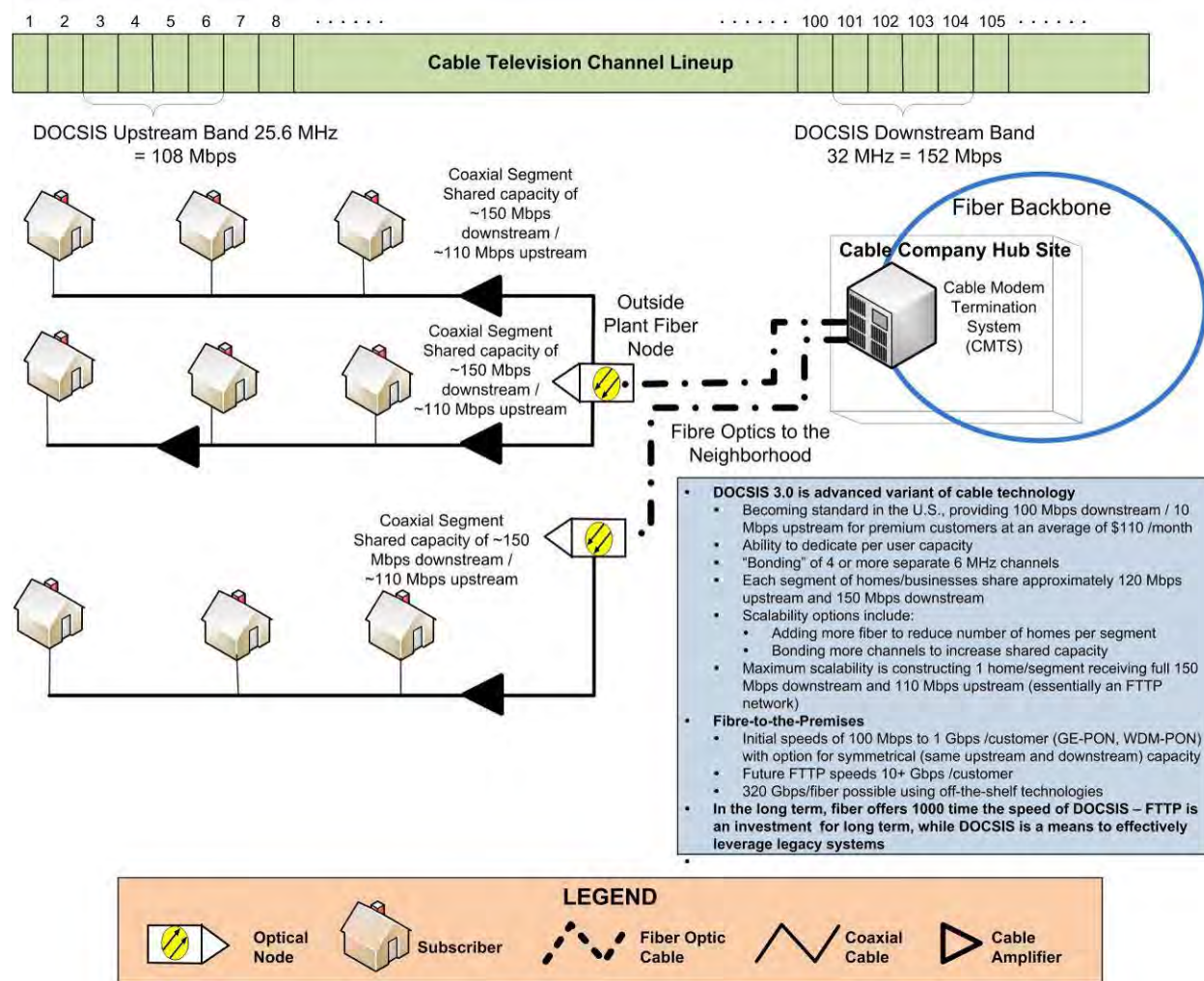
Cable operators have discussed constructing fiber optics to the premises, starting with new greenfield developments, but so far have generally not done so. They have typically opted instead to install new coaxial cables to new users, even though the construction cost to new premises is approximately the same.

In Allegany County, Atlantic Broadband and Comcast offer services using HFC technology. This is the dominant type of wireline broadband service in the County. It appears that both companies are offering or are in the process of upgrading to the current leading cable technology for

broadband, known as Data over Cable System Interface Specification version 3.0 (DOCSIS 3.0). DOCSIS 3.0 makes it possible for cable operators to increase capacity relative to earlier cable technologies by bonding multiple channels together. The DOCSIS 3.0 standard requires that cable modems bond at least four channels, for connection speeds of up to 200 Mbps downstream and 108 Mbps upstream (assuming use of four channels in each direction). A cable operator can carry more capacity by bonding more channels.

Theoretically, there is significant room for upgrading the speeds in a cable system, especially if there is access to high-speed fiber optic backbone. For example, Virgin Mobile is offering 1.5 Gbps service in Britain over a cable network, presumably by bonding more than 30 channels.<sup>19</sup> These are peak speeds, and the capacity is shared by all customers on a particular segment of coaxial cable; this is typically hundreds of homes or businesses. Figure 5 illustrates a sample DOCSIS 3.0 network architecture.

Figure 5: Sample DOCSIS 3.0 Network



<sup>19</sup> Speed is claimed in advertising but no independent verification is available. Also, there is no description of the burst vs. guaranteed speed or the symmetry (upstream/downstream) of the service.

Ultimately, the maximum speed over an HFC network is limited by the physics of the cable plant; although an HFC network has fiber within certain portions of the network, the coaxial connection to the customer is generally limited to less than 1 GHz of usable spectrum in total. By comparison, the capacity of fiber optic cable is orders of magnitude greater and is limited, for all intents and purposes, only by the electronic equipment connected to it—allowing for virtually limitless scalability into the future by simply upgrading the network electronics.

#### 4.1.2 Digital Subscriber Lines (DSL)

Copper “twisted-pair” telephone lines remain the main wireline communications medium globally, and considerable effort has gone into extending the capabilities and capacity of these lines. Digital Subscriber Line (DSL) technology expands the capacity of twisted-pair copper lines to provide higher-speed service.

Retail providers selling DSL services on copper lines deliver a maximum speed that depends on the proximity of the central office or cabinet to the customer premises.<sup>20</sup>

In Allegany County, Verizon operates copper telephone lines that can be used for DSL services. Verizon offers the service directly. The DSL service area is limited by the availability in the Verizon central offices (or remote cabinet), the condition of the copper wires, and the distance from the central office. The available speed varies on a case-by-case basis, depending on the above factors. Usually a DSL customer needs to be within three or four miles of a central office or cabinet.

In the United States, the most advanced widely available DSL platform is the U-verse network deployed by AT&T in its service areas (Allegany County is not an AT&T service area). U-verse constructs fiber to cabinets within approximately one-half mile of the home and uses the copper wires for the subscriber connection.<sup>21</sup> The maximum offered data speed of U-verse is 24 Mbps, with additional capacity for video traffic.<sup>22</sup> Video and voice are provided in Internet Protocol (IP) format, requiring IP set-top converters for all voice and video services. U-Verse is not available in Allegany County.

### 4.2 Wireless

With the improvement of the quality and speed of wireless communications, the public has become accustomed to using Internet services with wireless technologies, either on a communications link managed by a wireless service provider (i.e., a cellular data plan), on local infrastructure typically managed at a home or business (i.e., a WiFi hotspot), or through a mixture of those two approaches, in which an entity such as a service provider, municipality, landlord, or homeowners association operates a hotspot-oriented infrastructure.

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<sup>20</sup> The performance and maximum capacity of DSL on a copper telephone line depends on the frequency response of the individual line, which in turn depends on the condition and length of the line.

<sup>21</sup> AT&T's U-verse dissected, <http://adslm.dohrenburg.net/uverse/> (accessed June 14, 2012).

<sup>22</sup> AT&T U-verse High Speed Internet, <http://www.att.com/u-verse/explore/internet-landing.jsp?fbid=regRwrVqL4d> (accessed June 14, 2012).

It is critical to understand that wireless communications is limited and will always provide less capability and flexibility than the wireline technologies available at a given moment in time. Wireless is limited by over-the-air spectrum (i.e., the “channels” used for the signals), by range, and by line-of-sight. When an individual views images or videos on a device such as an iPad or a wireless Roku set-top converter, the communications link has traveled through a fiber optic backhaul connection to a service provider’s base station (or to a home FTTP optical network terminal, cable modem, or DSL modem). From that point the signal travels either over a service provider network with careful signal and capacity modeling,<sup>23</sup> or from a hotspot located only a short distance from the user (and usually only serving the users in that premises).

That said, wireless technologies continue to improve and provide many of the services that homes and businesses need. Even if it is not, strictly speaking, a “third pipe” of fully competitive broadband to the home (after telephone and cable connections), it provides much of the value of one of those connections, and is currently the only one that follows users away from their homes or businesses.

As the U.S. Department of Commerce noted in a recent report on competitiveness, wireless broadband—like wired broadband—is a platform for innovation and economic growth:

“Broadband also can be provided wirelessly, and the rapid growth of mobile communications clearly shows how important this technology has become to the American way of life. Wireless broadband, like wired broadband, has the potential to transform many different areas of the American economy by providing a platform for new innovation. The spread of wireless broadband will increase the rate of growth in per capita income and will spur economic activity through new business investment. There is the potential for many new high-quality jobs to be created, both directly through investments in wireless infrastructure, and indirectly through as yet unanticipated applications, services and more rapid innovation enabled by advanced wireless platforms. Although these effects are difficult to quantify precisely, evidence from the economics literature suggests that they are likely to be substantial. Areas where innovations using wireless technologies are likely to have significant effects include consumer products and services; products to enhance business productivity, including business process re-engineering; health care, through products like patient-physician video conferencing, personal handheld biosensors to generate diagnostic information, and remote transmission of diagnostic information and images; education; and public safety, where a nationwide interoperable wireless broadband network for public safety will ensure that first-responders have real-time access to critical information in an emergency.”<sup>24</sup>

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<sup>23</sup> Despite the dedicated spectrum (channel capacity), detailed engineering, and continuous upgrades in technology, wireless providers face significant challenges meeting the demand of users with laptop/tablet and smartphone devices, and have implemented bandwidth limits and other measures to control and ration usage.

<sup>24</sup> “U.S. Competitiveness and Innovation Capacity,” *Infrastructure for the 21<sup>st</sup> Century*, U.S. Department of Commerce (2011), p. 5-8 to 5-10.

### 4.2.1 Technology

As noted in the survey results, 2.4 percent of Allegany County residents report that “wireless paid” service is their main form of Internet service. While many of these residents may also receive wireline service to their homes or businesses, their primary contact with the Internet is through their smartphone or wireless-equipped tablet or laptop computer. This indicates that paid wireless service is generally a supplementary and not a primary source of broadband service in Allegany County, either because of the cost or because of the functional limitations of the service.

Nationwide, wireless providers operate a mixture of third-generation (3G) and emerging fourth-generation (4G) technologies. The service providers typically provide devices (telephones, smartphones, air cards, tablet computers) bundled with 3G or 4G services. Typically devices are not portable from carrier to carrier, because they are “locked” into the carrier by software and/or because differences in the technologies used by the carriers limits compatibility of the devices (discussed below). Therefore, the purchase of a device is a de facto commitment to a particular service provider, as long as the user uses the device.

**Table 3: Typical Performance for Advertised 2G/3G/4G Services**

Applications	Technology (Download/Upload Service Speeds) <sup>25</sup>		
	2G/2.5G–EDGE/GPRS, 1xRTT (128 Kbps–300 Kbps/ 70 Kbps–100 Kbps)	3G–EVDO Rev A, HSPA+ (600 Kbps–1.5 Mbps/500 Kbps–1.2 Mbps)	4G – WiMAX/ LTE (1.5 Mbps–6 Mbps/500 Kbps–1.2 Mbps)
Simple text e-mails without attachments (50 KB)	Good (2 seconds)	Good (1 second)	Good (1 second)
Web browsing	Good	Good	Good
E-mail with large attachments or graphics (500 KB)	OK (14 seconds)	Good (3 seconds)	Good (1 second)
Play MP3 music files (5 MB)	Bad (134 seconds)	OK (27 seconds)	Good (7 seconds)
Play video files (100 MB for a typical 10-min. YouTube video)	Bad (45 minutes)	OK (9 minutes)	Good (3 minutes)
Maps and GPS for smartphones	Bad	OK	Good
Internet for home	Bad	OK	Good

<sup>25</sup> This data assumes a single user. For downloading small files up to 50 KB, it assumes that less than 5 seconds is good, 5-10 seconds is OK, and more than 10 seconds is bad. For downloading large files up to 500 KB, it assumes that less than 5 seconds is good, 5-15 seconds is OK, and more than 25 seconds is bad. For playing music, it assumes that less than 30 seconds is good, 30-60 seconds is OK, and more than 100 seconds is bad. For playing videos, it assumes that less than 5 minutes is good, 5-15 minutes is OK, and more than 15 minutes is bad.

The strict definition of 4G from the International Telecommunications Union (ITU) was originally limited to networks capable of peak speeds of 100 Mbps to 1+ Gbps depending on the user environment;<sup>26</sup> according to that definition, 4G technologies<sup>27</sup> are not yet deployed.

In practice, a number of existing technologies (e.g., LTE, WiMAX) are called 4G and represent a speed increase over 3G technologies as well as a difference of architecture—more like a data cloud than a cellular telephone network overlaid with data services. Furthermore, a transition technology called HSPA+, an outgrowth of 3G GSM technology previously considered a 3G or 3.5G technology with less capability than LTE or WiMAX, has been marketed as “4G” by AT&T and T-Mobile, so the definition of 4G is now fairly diluted. The ITU and other expert groups have more or less accepted this.<sup>28</sup>

HSPA is the technology that AT&T currently operates in Allegany County. AT&T has declined to disclose when it plans to upgrade its Allegany County network to LTE. U.S. Cellular, however, has announced publicly that it will be deploying LTE in Western Maryland; though the timing is indefinite, some locations in Allegany County may get the upgrade in 2012.

#### 4.2.2 Limitations

Most businesses and residents will find that wireless broadband has technological limitations relative to wireline. These include:

- 1) *Lower speeds.* At their peaks, today’s newest wireless technologies, WiMAX and LTE, provide only about one-tenth the speed available from FTTP and cable modems. In coming years LTE Advanced may be capable of offering Gbps speeds with optimum spectrum and a dense build-out of antennas—but even this will be shared with the users in a particular geographic area and can be surpassed by more advanced versions of wireline technologies (with Gbps speeds already provided by some FTTP providers today).
- 2) *More asymmetrical capacity, with uploads limited in speed.* As a result it is more difficult to share large files (e.g., video, data backup) over a wireless service, because these will take too long to transfer; it is also less feasible to use video conferencing or any other two-way real-time application that requires high bandwidth.
- 3) *Stricter bandwidth caps.* Most service providers limit usage more strictly than wireline services. Though wireless service providers may be able to increase these caps as their technologies improve, it is not clear whether the providers will keep ahead of demand. A recent *Washington Post* article about Apple’s newly released iPad with 4G connectivity highlights the issue: “Users quickly are discovering the new iPad gobbles data from cellular networks at a monstrous rate. Some find their monthly allotment can be eaten up after

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<sup>26</sup> “Development of IMT-Advanced: The SMaRT approach,” Stephen M. Blust, International Telecommunication Union, <http://www.itu.int/itunews/manager/display.asp?lang=en&year=2008&issue=10&ipage=39&ext=html> (accessed June 14, 2012).

<sup>27</sup> Such as LTE Advanced under development.

<sup>28</sup> “ITU softens on the definition of 4G mobile,” *NetworkWorld*, December 17, 2010, <http://www.networkworld.com/news/2010/121710-itu-softens-on-the-definition.html> (accessed June 14, 2012).

watching a two-hour movie. That has left consumers with a dilemma: Pay up for more data or hold back on using the device's best features."<sup>29</sup>

- 4) *Limitations on applications.* For example, users of smartphones and some tablet computers are limited by service providers or device manufacturers to approved applications. Apple limits the applications that can operate on its iPhone and iPad devices. Although Android is an open platform, Verizon Wireless blocks uploads of video from Android wireless devices on its networks by disabling the feature unless the user is on a private WiFi network. The FCC has reiterated that wireless providers have almost unlimited latitude to manage usage on their networks, in effect applying network neutrality rules only to wired networks; service providers can therefore expand their "management" of applications beyond the devices they provide to blocking or slowing applications from users with aircard-equipped PCs or home networks. The 3GPP protocols underlying LTE and subsequent technologies are designed to enable service providers to manage capacity based on application type (i.e., to prioritize particular types of traffic and make others lower priority).

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<sup>29</sup> Cecilia Kang, "New iPad users slowed by expensive 4G network rates," *Washington Post*, March 22, 2012. [http://www.washingtonpost.com/business/economy/new-ipad-users-slowed-by-expensive-4g-network-rates/2012/03/22/gIQARLXYUS\\_story.html?hpid=z2](http://www.washingtonpost.com/business/economy/new-ipad-users-slowed-by-expensive-4g-network-rates/2012/03/22/gIQARLXYUS_story.html?hpid=z2) (accessed June 14, 2012).



## ***5 Current State of Residential and Small Business Broadband Service Availability in Allegany County***

Broadband deployment to residential and small business customers in Allegany County is strong relative to other rural areas. This current state is the result of three key factors:

- First, DSL and cable modem services are widely available.
- Second, recent upgrades made by the wireless telecommunications industry have dramatically increased the availability of broadband countywide.
- Third, Allconet serves business customers, and leases access to competitive ISPs that serve additional customers countywide.

That said, it is important to understand the County's broadband deployment in light of the economics of broadband deployment in rural areas. Because broadband infrastructure requires high capital expenditures, the private sector favors deployments in densely populated areas that will produce enough revenue to merit an investment. Allegany County, like most rural jurisdictions in the United States, feels the effects of these economics in its relatively low level of deployment: The private sector simply does not see the County as worthy of significant investment, and most private wireline investment in the County has stopped.

This section of the Report provides a discussion of the types and quality of broadband available in the County, as well as an overview of broadband adoption. We begin with an overview of National Broadband Map (NBM) and Maryland Broadband Map (MBM) data pertaining to the County as a whole, and include analysis of the County's incumbent broadband providers, competitive/entrepreneurial broadband providers, and wireless broadband providers. For each broadband technology, we have also included specific NBM data. We include the NBM data here because it is the primary source of statistics regarding broadband availability nationwide—but we include it with the caveat that the NBM data are widely regarded as inflating the actual availability of broadband nationwide.

### ***5.1 Broadband Map Data***

#### ***5.1.1 National Broadband Map***




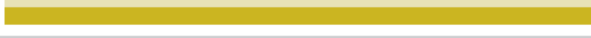
The National Broadband Map (NBM) ranks Allegany County as 18<sup>th</sup> in overall broadband availability out of Maryland's 23 counties and Baltimore City. That said, data from the map show 99.5 percent of Allegany's population has broadband access of some kind.

Figure 6: National Broadband Map Data—Allegany County Connectivity

Rank	Name	Technology	Speed Combo	Speed Combo	Demographics Info.
		All ▼	DL>3 UL>0.7	DL>.7 UL>.2	Popul.
18	Allegany, MD	99.5% ±0.0	82.6% ±0.0	99.5% ±0.0	74,797 <sup>30</sup>

The largest technology available is wireless, which the map reports available to 99 percent of the population. DSL and cable modem technologies follow at 77.9 percent and 72.2 percent respectively. Fiber optic technology is unavailable to most Allegany residents, (available to only 0.1 percent), according to the NBM.

Figure 7: National Broadband Map Data—Allegany County Technologies

Technology	Percent Population	Nationwide
DSL	77.9% 	88.0%
Fiber	0.1% 	17.3%
Cable	72.2% 	83.3%
Wireless	99.0% 	98.5%
Other	0.0%	0.0%

Source: API Call 31

The NBM reports that 99.5 percent of the population (i.e., everyone with broadband) has access to download/upload speeds greater than 0.768 Mbps/0.2 Mbps; almost 82.6 percent of the population is shown as having speeds greater than 3 Mbps/0.768 Mbps.

<sup>30</sup> Source: <http://www.broadbandmap.gov/summarize/state/maryland/county/allegany>, June 22, 2012.

<sup>31</sup> Source: <http://www.broadbandmap.gov/summarize/state/maryland/county/allegany>, June 22, 2012.

Broadband in Allegany County  
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Figure 8: National Broadband Map Data—Allegany County Percent Population Connected at Broadband Speeds

Speed	Percent Population	Nationwide
Unreported	0.0%	0.0%
Download > 0.768 Mbps, Upload > 0.2 Mbps	99.5%	99.5%

Speed	Percent Population	Nationwide
Download > 3 Mbps, Upload > 0.768 Mbps	82.6%	98.3%

Source: API Call <sup>32</sup>

The NBM also shows many of the County’s community anchor institutions have broadband access, though information on service to medical facilities is largely unknown.

Figure 9: National Broadband Map Data—Community Anchor Institutions Connected

Community Anchor Institutions	Total Number of Records	Subscribe to Broadband				Download Speed <input type="button" value="v"/>
		Yes	No	?	*	
Schools K through 12	28	24	0	4	0	
University, College, other post-secondary	3	2	0	1	2	
Libraries	8	6	0	2	0	
Medical / Healthcare	391	3	0	388	0	
Public Safety	49	3	0	46	1	
Community Centers - Government support	58	21	1	36	10	
Community Centers - Non-Government support	26	4	0	22	0	

Source: API Call

Speeds provided \*

<sup>34</sup>

Given that the NBM data rely heavily on self-reporting by the commercial carriers, CTC’s market research in Allegany County offers a means to evaluate the NBM’s claims. Though some elements of CTC’s market research appear to coincide with the NBM data, other measurements raise the concern that the NBM may significantly overstate the broadband coverage in the County.

<sup>32</sup> Source: <http://www.broadbandmap.gov/summarize/state/maryland/county/allegany>, June 22, 2012.

<sup>33</sup> Source: <http://www.broadbandmap.gov/summarize/state/maryland/county/allegany>, June 22, 2012.

<sup>34</sup> Source: <http://www.broadbandmap.gov/summarize/state/maryland/county/allegany>, June 22, 2012.

CTC’s residential communications survey found approximately 80 percent of homes in the County purchase Internet service. Data from both the residential and business surveys show a clear preference for cable modem service (offered primarily by Atlantic Broadband, but also by Comcast) in Allegany County. A majority (57 percent) of home Internet users surveyed reported opting for cable modem service. DSL users also comprise a significant market share, (26 percent), though this is less than half of those with cable modem, and equal to the number of respondents who have no home Internet connection at all.

Figure 10: Residential Survey—Frequency of Home Internet Service Types

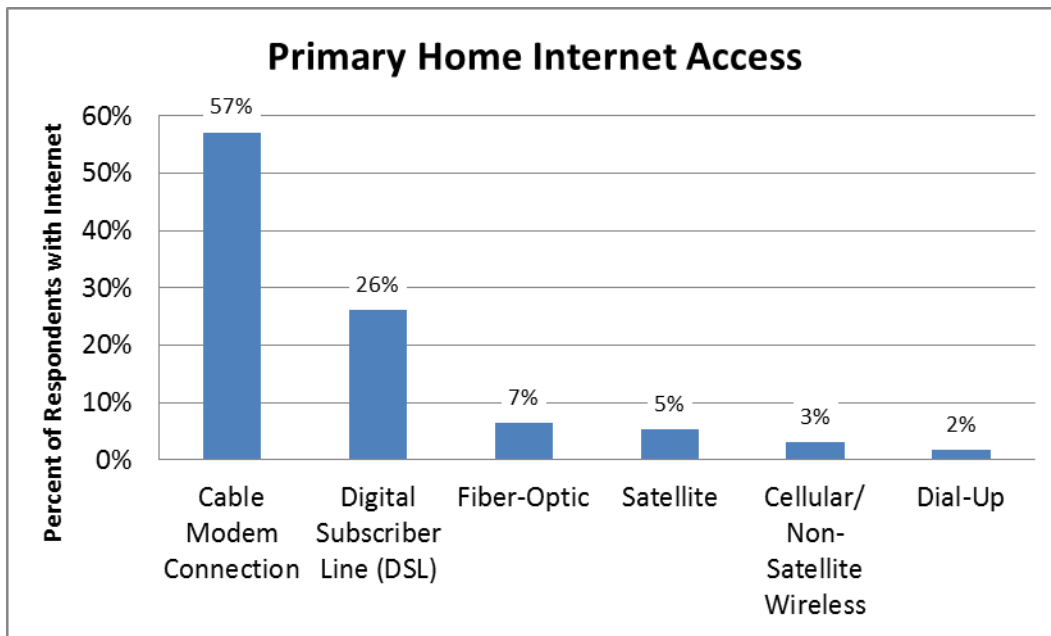
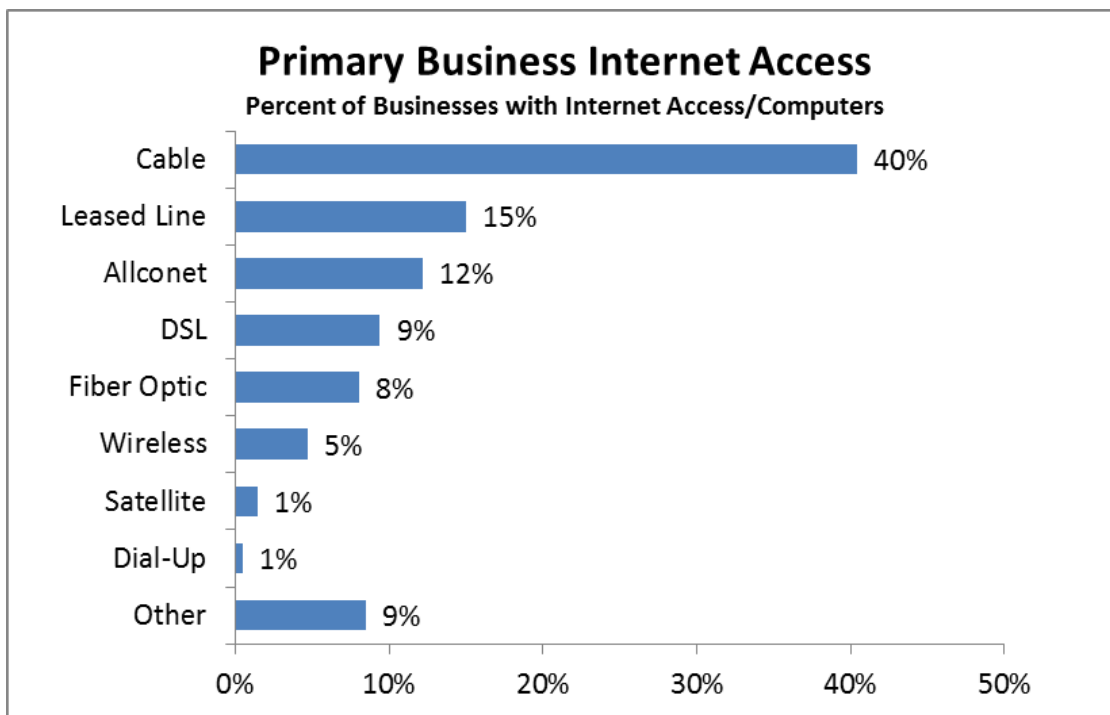


Figure 11: Business Survey—Frequency of Business Internet Service Types



The prevalence of cable modem service adoption among homes and business is, to some extent, consistent with the NBM data; the survey shows a majority of home Internet users adopting cable modem service; and, while less than a majority of businesses use cable, it is by far the most popular type of service, at 40 percent of Internet subscribed businesses. Since cable modem service has a relatively high level of availability, and is a more reliable and fast technology than DSL, it is understandably the Internet option of choice for County residences and businesses.

The other main wireline technology apparently widely available in Allegany is DSL, offered by Verizon. The NBM shows DSL with a slightly greater availability than cable, which is far more popular. It therefore follows that most residents with DSL access either choose to purchase another form of service (or no service), that the NBM overstates the availability of DSL service, or a combination of both.

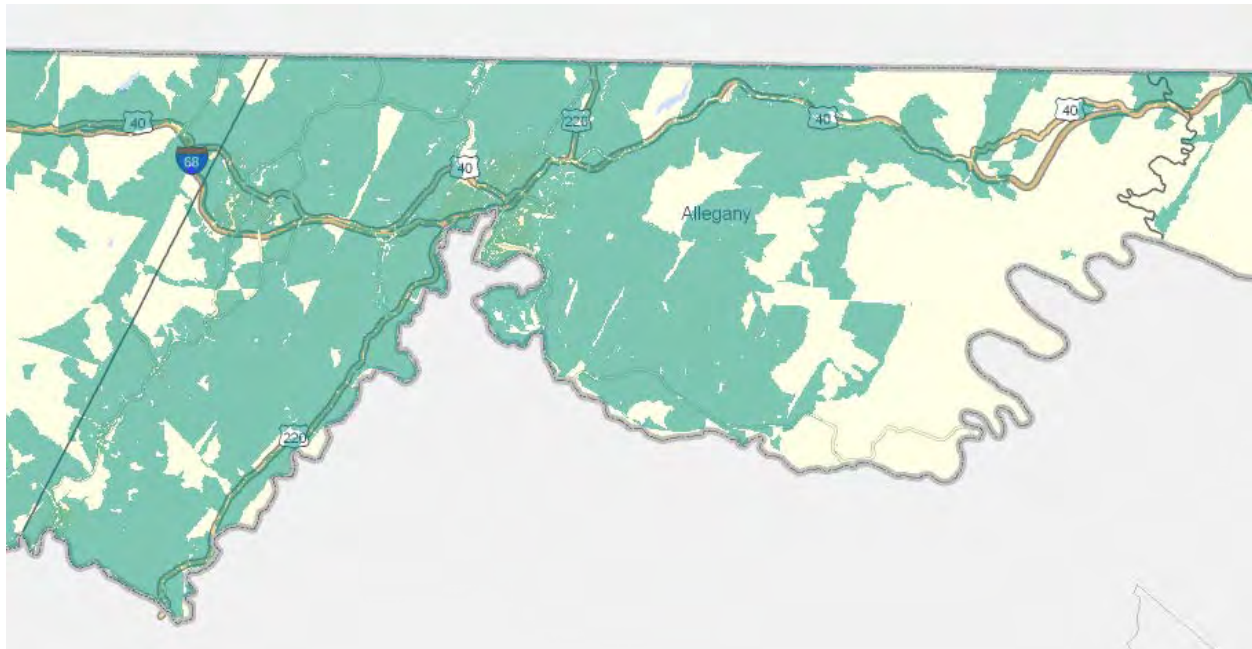
### 5.1.2 Maryland Broadband Map

Although several wireline options exist in Allegany County, the Maryland Broadband Map shows large geographic portions of the County without wireline service.<sup>35</sup> The only Internet options available to residents and businesses in these areas are dial-up, satellite, and in some

<sup>35</sup> The Maryland Broadband Map does not provide the same ability to generate customized reports as the National Broadband Map. It does, however, provide a more granular visual representation of the technologies available throughout the state. Information on specific providers and the types of services they offer appears at the census block level. The MBM also provides residents the ability to take a speed test for their current Internet connection, providing a voluntary reporting method for connection speeds. The results of these tests can be viewed by the census block or ZIP code. The MBM, therefore, offers greater flexibility than the NBM in measuring broadband coverage over a portion of a county rather than the entire county.

areas, fixed and mobile wireless services. DSL service is available from Verizon in the County, but as with other wireline options, its coverage is limited. The Maryland Broadband Map offers visual representations of specific service types throughout the state, which provides an overview of where the technologies discussed above are available.

Figure 12: Maryland Broadband Map Data—Wireline Coverage in Allegany County<sup>36</sup>



This map shows more wireline coverage in and around Cumberland, La Vale, and Frostburg, and along much of I-68/US-40 than other parts of the County. Much of the large unserved portions in the eastern County are state park or other protected land. Mobile wireless, satellite and dial-up are the only Internet services available for a significant portion of the County.

If we separate the visual representations of cable modem availability and DSL availability, we can see that like the NBM, the MBM indicates that DSL is more available than cable modem service.

<sup>36</sup> Source: <http://www.mdbroadbandmap.org/map/>, May 10, 2012.

Figure 13: Maryland Broadband Map Data—Cable Modem Coverage Area<sup>37</sup>

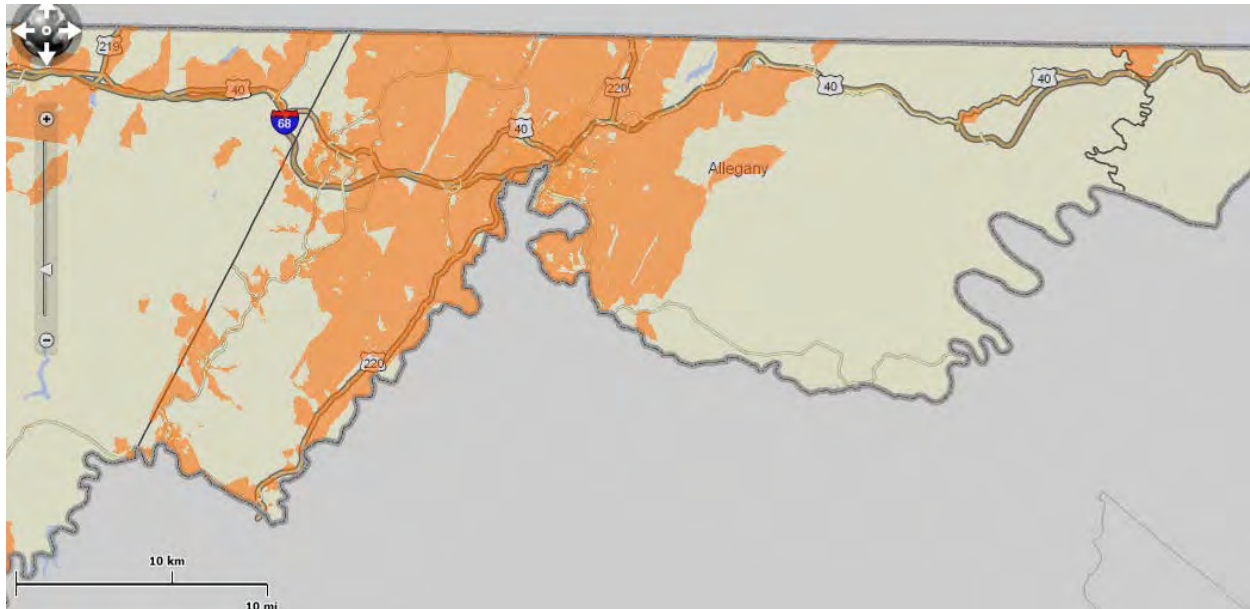
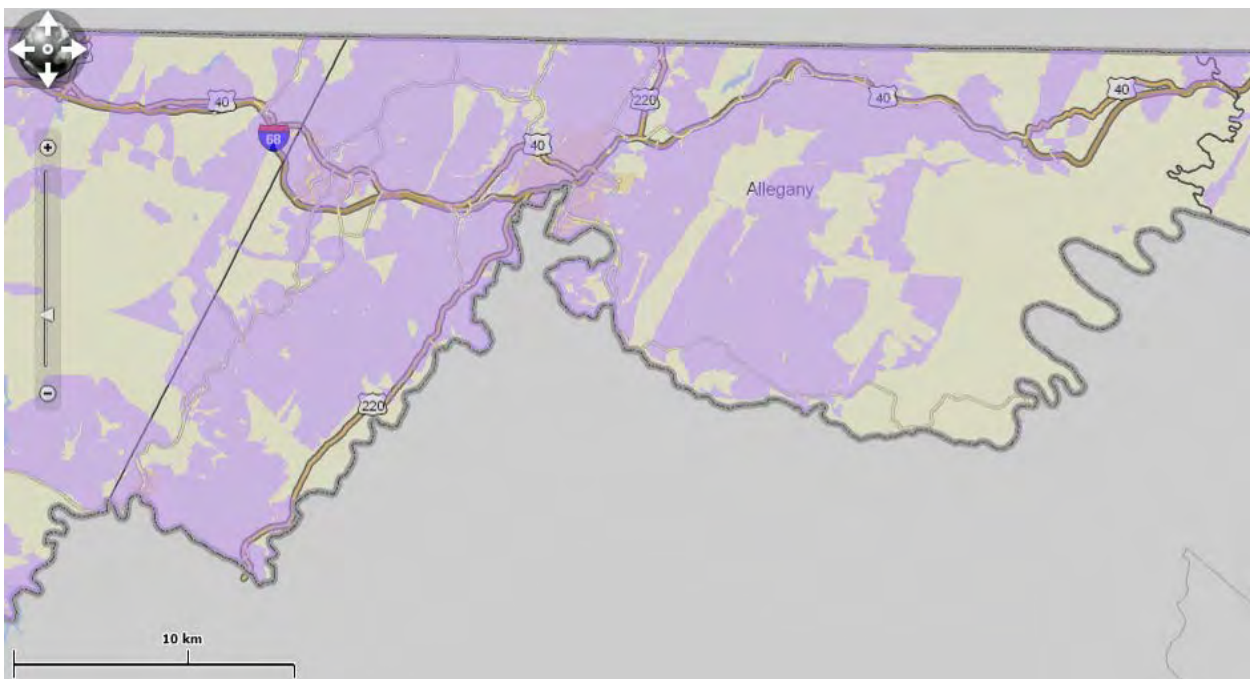


Figure 14: Maryland Broadband Map Data—DSL Coverage Area<sup>38</sup>



The true availability of DSL depends on proximity to a provider's central office; Distance from a central office reduces the quality of a DSL connection. It is therefore possible for a provider to claim it serves a remote area, when in fact the service may be of low enough quality to render it unsatisfactory. Looking at measured connection speeds at various locations throughout Allegany

<sup>37</sup> Source: <http://www.mdbroadbandmap.org/map/>, May 10, 2012.

<sup>38</sup> Source: <http://www.mdbroadbandmap.org/map/>, May 10, 2012.

County can help provide a more accurate picture of the true availability of broadband access.

The MBM displays connection speed data from individuals who have taken a voluntary speed test at the MBM website. The test results are aggregated by census block and by ZIP code. The table below shows the results at the ZIP code level. (Sample sizes at the census block level are too few to have any real significance). These data are gathered from users who choose to use the site to report the connection speeds at their current location; they therefore cannot be considered scientific. They likely overstate connection speeds for the following reasons: It would be less convenient for a person with a slow connection to take the test; persons with greater interest in broadband, who are more likely to take such a test, would probably tend to utilize higher speed technologies where available; and residents or businesses who choose not to have Internet connections because the only technology available to them is too slow to make a subscription worth the investment are entirely unrepresented.

Note that some of these ZIP codes overlap with adjacent counties. The average speed of all of these ZIP codes is listed with due weight given to the number of tests taken, in addition to the MBM’s average for all tests taken within Allegany County. These two averages are very close in number.

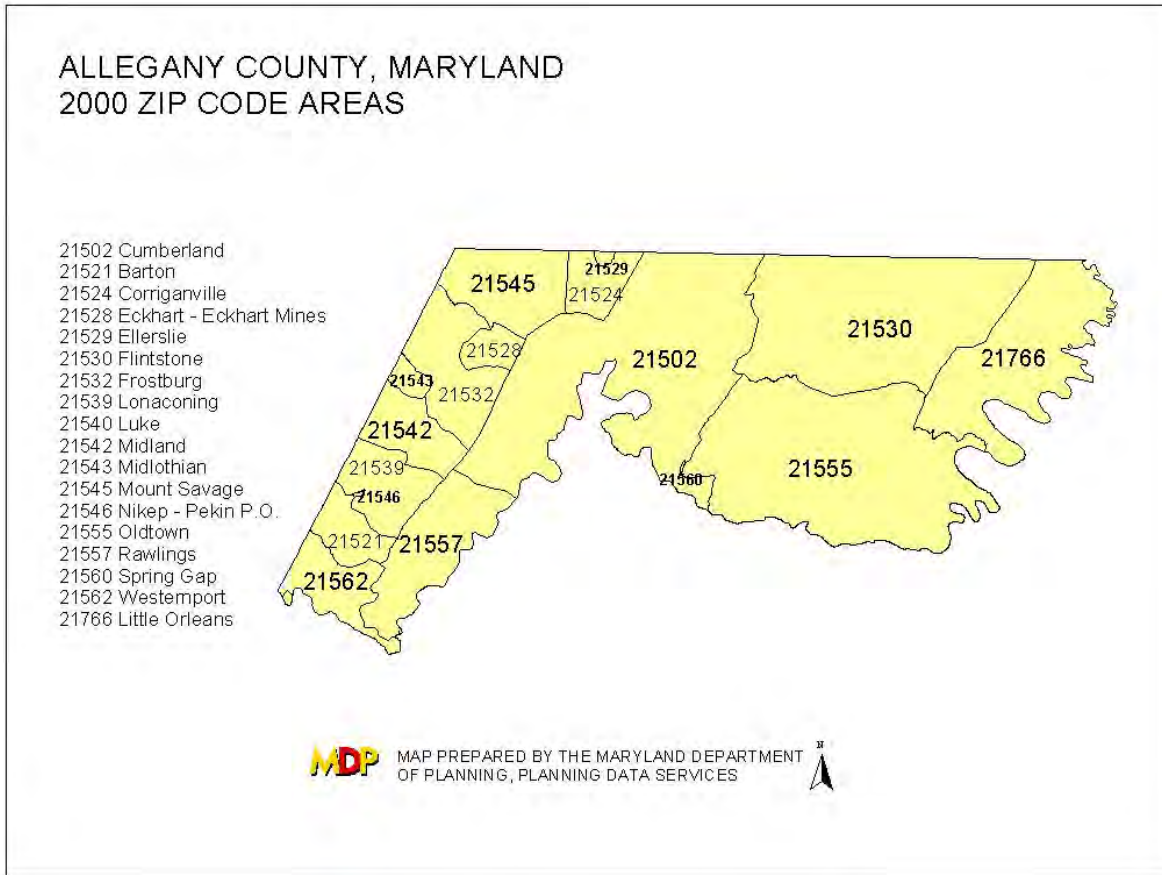
**Table 4: Maryland Broadband Map Data—Allegany County Speed Tests<sup>39</sup>**

<b>ZIP Code</b>	<b>Total Tests (n)</b>	<b>Average Download/Upload Speed</b>
21545	1	6,480 kbps / 483 kbps
21532	179	9,565 kbps / 2,789 kbps
21502	181	7,535 kbps / 2,194 kbps
21555	11	269 kbps / 240 kbps
21766	0	N/A
21557	11	2,269 kbps / 652 kbps
21562	3	271 kbps / 127 kbps
21530	3	2,263 kbps / 734 kbps
21539	9	7,740 kbps / 927 kbps
<b>TOTAL (Weighted Average of above ZIP codes)</b>	<b>398</b>	<b>8,009 kbps / 2,305 kbps</b>
<b>TOTAL (MBM Reported Countywide Average)</b>	<b>374</b>	<b>8,358 kbps / 2,408 kbps</b>

<sup>39</sup> Source: <http://www.mdbroadbandmap.org/map/>, June 4, 2012.



Figure 15: Allegany County ZIP Codes<sup>40</sup>



The range of connection speeds varies significantly across the County. The two ZIP codes with the most tests include the population centers of Cumberland and Frostburg (21532 and 21502). With these data points removed, the remaining ZIP codes' tests average out to 2,938 kbps download by 558 kbps upload. Recall from the survey data discussed earlier that a combined 90 percent of residential respondents with Internet service and a combined 84 percent of business respondents with Internet access reported using wireline broadband (non-dial up, non-satellite, non-wireless). The speed test averages above therefore likely comprise mostly wireline broadband users. If the range of wireline service is as great as both the NBM and the MBM indicates, the speeds available in much of the service areas are clearly in the lower range of the broadband speed spectrum.

## 5.2 Summary of Broadband Competition

This section provides a brief overview of the existing broadband landscape in Allegany County, based on research conducted on the Internet and over the telephone.

<sup>40</sup> Source: [http://www.mdp.state.md.us/MSDC/zipcode\\_map/2000/allezc00.jpg](http://www.mdp.state.md.us/MSDC/zipcode_map/2000/allezc00.jpg), May 28, 2012.

In summary, the broadband Internet services available to residents of Allegany County vary dramatically across the jurisdiction. In some locations residents have a choice among two wireline providers while other locations lack any such providers at all. Residents in the population centers of Cumberland, La Vale, and Frostburg have greater options than those living in sparsely populated areas.

The County's incumbent wireline providers are Atlantic Broadband, Comcast Communications, and Verizon Communications. Cable modem and DSL service is available at a reasonably high rate in the County relative to many rural areas. There is no provider of services to the home over fiber optics. National wireless carriers provide mixed degrees of mobile broadband coverage. 4G LTE service is not available, though HPSA+ service is. By virtue of the technology, national satellite providers operate in all parts of the County. It should be noted that these areas of competitive access are comparable to only average levels of service availability in many large urban markets.

The following tables illustrate the wireline and wireless broadband service options for two sample addresses that were used in this research to account for geographical diversity.<sup>41</sup> These addresses were chosen after reviewing the Maryland Broadband Map<sup>42</sup> and the National Broadband Map to investigate existing provider footprints while also acknowledging geographical differences.

Unless otherwise stated each price represents the monthly service cost. Connection speed represents the advertised maximum ("up to") download speed; actual download speeds will vary, and actual upload speeds will be slower for each service listed. For wireless service, 4G speed normally equates to a "burstable" (not guaranteed) download speed up to 10 Mbps and 3G tends to have up to four different advertised download speeds: 1 Mbps, 3 Mbps, 5 Mbps, and 7 Mbps. (3G and 4G speeds are "up to" and may not be consistently available.)

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<sup>41</sup> Addresses used: 207 Washington St., Cumberland, MD 21502, and 52 Aspinall St., Frostburg, MD 21532

<sup>42</sup> Source: <http://www.mdbroadbandmap.org/map/>, June 4, 2012.

**Table 5: Summary of Wireline Services Available at Sample Allegany County Addresses**

<b>Provider</b>	<b>Broadband Type</b>	<b>Residential Service Packages (monthly)</b>	<b>Small Business Service Packages (monthly)</b>
Atlantic Broadband	Cable modem	<p>Starter Service 1 Mbps/512 Kbps \$28.95-\$35.95</p> <p>Preferred Service 8 Mbps/1 Mbps \$40.95 – \$51.95</p> <p>Express Service 20 Mbps/2 Mbps \$54.99</p> <p>Unleashed Service 40 Mbps/3 Mbps \$69.99</p> <p>Double Play and Triple Play bundles available</p>	<p>Performance 8 Mbps Prioritized Upstream \$89.99</p> <p>Premier 20 Mbps Prioritized Upstream \$119.99</p> <p>Ultra 30 Mbps Prioritized Upstream \$159.99<sup>43</sup></p>
Comcast	Cable modem	<p>Performance 12 Mbps/2 Mbps \$42.95 – \$62.95</p> <p>Blast! 16 Mbps/2 Mbps \$52.95 – \$72.95</p> <p>Extreme 50 50 Mbps/10 Mbps \$99.95 – \$116.95</p> <p>Extreme 105 105 Mbps/20Mbps \$199.95</p> <p>Double Play and Triple Play bundles available<sup>44</sup></p>	None

<sup>43</sup>Source: <http://www.atlanticbb.com/pa/wfbusinessbundle.asp>, Zip Code 21502, June 7, 2012

<sup>44</sup> Source: <https://www.comcast.com>, Zip Code 21532, June 7, 2012

<b>Provider</b>	<b>Broadband Type</b>	<b>Residential Service Packages (monthly)</b>	<b>Small Business Service Packages (monthly)</b>
Verizon	DSL	0.5 to 1 Mbps \$19.99 for 1 year, no contract  1.1 to 15 Mbps 29.99 for one year, no contract <sup>45</sup>  Prices change after 1 year	Business phone only
Lumos	DSL	6 Mbps/1 Mbps \$34.95 <sup>46</sup>  6 Mbps/1Mbps \$29.95 <sup>47</sup>	6 Mbps / 1 Mbps \$39.95 <sup>48</sup>  3 Mbps / 768 Kbps \$29.95 with business bundle <sup>49</sup>

Of the major national mobile carriers, only AT&T and U.S. Cellular offer mobile broadband coverage. AT&T does not offer LTE service in the County yet; it does claim to provide substantial “mobile broadband” coverage, which is subsequently defined as 3G technologies.

U.S. Cellular offers 3G EVDO service, and may be the largest single provider in the County. It is beginning to offer 4G LTE services in other areas, and estimates that it will have LTE service available in Allegany County in 2012.

T-Mobile provides service in the County. However, the coverage map they provide does not differentiate between their coverage area and roaming coverage. Nor do they make distinctions between 3G and 4G levels of service.

Verizon Wireless’ coverage map indicates that no 3G or 4G services are offered anywhere in Allegany County. Additional searching reveals that Verizon claims to offer only 2G coverage, obtained through roaming on the U.S. Cellular network.

Satellite Internet access providers, by virtue of the characteristics of the technology, are able to offer services across the nation. The three major providers have similar speeds and pricing plans, with only HughesNet offering separate business services.

<sup>45</sup>Source: <http://www22.verizon.com/>, Zip Code 21502, June 7, 2012

<sup>46</sup> Free email accounts (up to 6), modem use, 20 MB personal Web space, and 24/7 local technical support.

<sup>47</sup> Free email accounts (up to 6), modem use, 20 MB personal Web space, and 24/7 local technical support.

<sup>48</sup> When bundled with Lumos Networks business voice services. Free use of a DSL modem. Up to 50 e-mail addresses with junk email and virus filtering are included at no additional charge. Includes up to 1 Gig of e-mail storage space; and up to 1 Gig of Web space. Virtual domain hosting is included at no charge. Static IPs are available, if requested, at an additional \$10 per IP per month.

<sup>49</sup>With Lumos Networks business bundle. Free use of a DSL modem, up to 10 email addresses. Includes up to 1 Gig of email storage space and up to 1 Gig of Web space. Domain hosting and extra emails are available at additional charges. Static IPs are available, if requested, at an additional \$10 per IP per month.

**Table 6: Summary of Wireless and Satellite Services Available in Allegany County**

<b>Provider</b>	<b>Broadband Type</b>	<b>Residential Service Packages (monthly)</b>	<b>Small Business Service Packages</b>
AT&T	Mobile Wireless	Before overage charges:  300 MB <sup>50</sup> \$20  3 GB \$30  5 GB \$50  Plans require 1 or 2 year contracts. <sup>51</sup>  Speed estimates: <sup>52</sup> 700 Kbps – 1.7 Mbps Download for HSPA  2 Mbps – 6 Mbps Download for HSPA+  4G LTE not available. Speeds.  Upload speeds not available	None

<sup>50</sup> Data limits measured in bytes.

<sup>51</sup>Source: <http://www.att.com/shop/wireless/plans>, Zip Code 21502, June 7, 2012

<sup>52</sup> “AT&T does not offer mass market mobile broadband Internet access service in different speed tiers. Instead, our mobile broadband Internet access service is designed to provide customers with the highest speed available from the network on a given device at any given point in time, subject to the many different factors discussed above that can impact wireless network performance. For our High Speed Packet Access (HSPA) services, typical download speeds range from approximately 700 Kbps up to 1.7 Mbps, and for HSPA+ typical download speeds range from approximately 2 Mbps up to 6 Mbps where AT&T has enhanced backhaul connections in place. For our Long Term Evolution (LTE) services, typical download speeds range from approximately 5 Mbps up to 12 Mbps in most markets. For more information about the capabilities and performance of our mobile broadband Internet access services, please click here.” Source: <http://www.att.com/gen/public-affairs?pid=20879>, June 11, 2012

Broadband in Allegany County  
July 10, 2012

Provider	Broadband Type	Residential Service Packages (monthly)	Small Business Service Packages
HughesNet	Satellite	<p>Basic 1.0 Mbps/200 Kbps \$39.99</p> <p>Power 150 1.5 Mbps/250 Kbps \$79.99</p> <p>Power 200 2.0 Mbps/300 Kbps</p> <p>Equipment: \$9.99 per month lease, or \$199.99 to purchase</p>	<p>Express 200: \$109.99 2 Mbps/300 Kbps (400 MB daily limit)</p> <p>Express 300: \$199.99 3 Mbps/512 Kbps (800 MB daily limit)</p> <p>Express 500: \$349.99 5 Mbps/1024 Kbps (800 MB daily limit)</p> <p>Each plan requires a two-year contract and one-time installation cost of \$699 or \$899 (\$150 mail-in rebate available)</p>
Starband <sup>53</sup>	Satellite	<p>Nova500 512 Kbps/100 Kbps \$49.99</p> <p>Nova1000 1 Mbps/128 Kbps \$69.99</p> <p>Nova1500 1.5 Mbps/256 Kbps \$99.99</p> <p>Each requires a two-year contract and \$150 install fee (waived with mail-in rebate)</p>	None.

<sup>53</sup> <http://www.starband.com/services/index.html>, June 7, 2012

Broadband in Allegany County  
 July 10, 2012

Provider	Broadband Type	Residential Service Packages (monthly)	Small Business Service Packages
T-Mobile <sup>54</sup>	Mobile Wireless	<p>HSPA+ (Advertised as 4G. Specific speeds not available).</p> <p>2-year contract:</p> <p>2 GB Overage Free<sup>55</sup> \$39.99</p> <p>5 GB Overage-Free \$49.99</p> <p>10 GB Overage-Free \$79.99</p> <p>\$10 discount when bundled with voice service.</p> <p>No yearly agreement:</p> <p>Week Pass 300 MB, 7 days \$15.00</p> <p>Month Pass 1.5 GB, 30 days \$25.00</p> <p>Month Pass 3.5 GB, 30 days \$35.00</p> <p>Month Pass 5 GB, 30 days \$50.00</p>	<p>Small Business Classic Unlimited (unlimited data, talk, text) \$69.99 per line</p> <p>Unlimited Data + Unlimited Messages \$24.99 when adding onto a small business voice plan.</p>

<sup>54</sup> Source: <http://www.t-mobile.com/shop/plans/mobile-broadband-plans.aspx>, Zip Code 21502, June 11, 2012

<sup>55</sup> After limit reached, speeds are reduced. Data limits measured in gigabytes.

<b>Provider</b>	<b>Broadband Type</b>	<b>Residential Service Packages (monthly)</b>	<b>Small Business Service Packages</b>
U.S. Cellular <sup>56</sup>	Mobile Wireless	3G Typical speeds: 600 Kbps – 1.2 Mbps Download/400 Kbps – 600 Kbps Upload  Data bundled with voice and messaging at the following rates:  100 MB: \$10 300 MB: \$20 2 GB: \$25 5 GB: \$50 10 GB: \$90	Added onto phone line:  100 MB \$10  300 MB \$20  2 GB \$25  5 GB \$50  10 GB \$90
Wild Blue <sup>57</sup>	Satellite	Exede12 12 Mbps/3 Mbps  7.5 Gb: \$49.99 15 Gb: \$79.99 25 Gb: \$129.99  \$149.99 Setup fee \$9.99/month lease fee	None.

### 5.2.1 Wireless

Allconet provides wireless broadband service to four primary public sector partners: the BOE, the County, the City of Cumberland, and the Allegany County Library System. Through CONXX (wholesale and retail) and other retail providers that purchase capacity from CONXX, the network also provides service to private sector businesses throughout the County.

Figure 16 illustrates Allconet’s estimated service area, based on the known locations of Allconet’s backbone sites (i.e., towers). The map likely overstates Allconet’s coverage, because it assumes that each tower would create a perfect circle of coverage; mountainous terrain and other geographic features would limit the actual coverage.

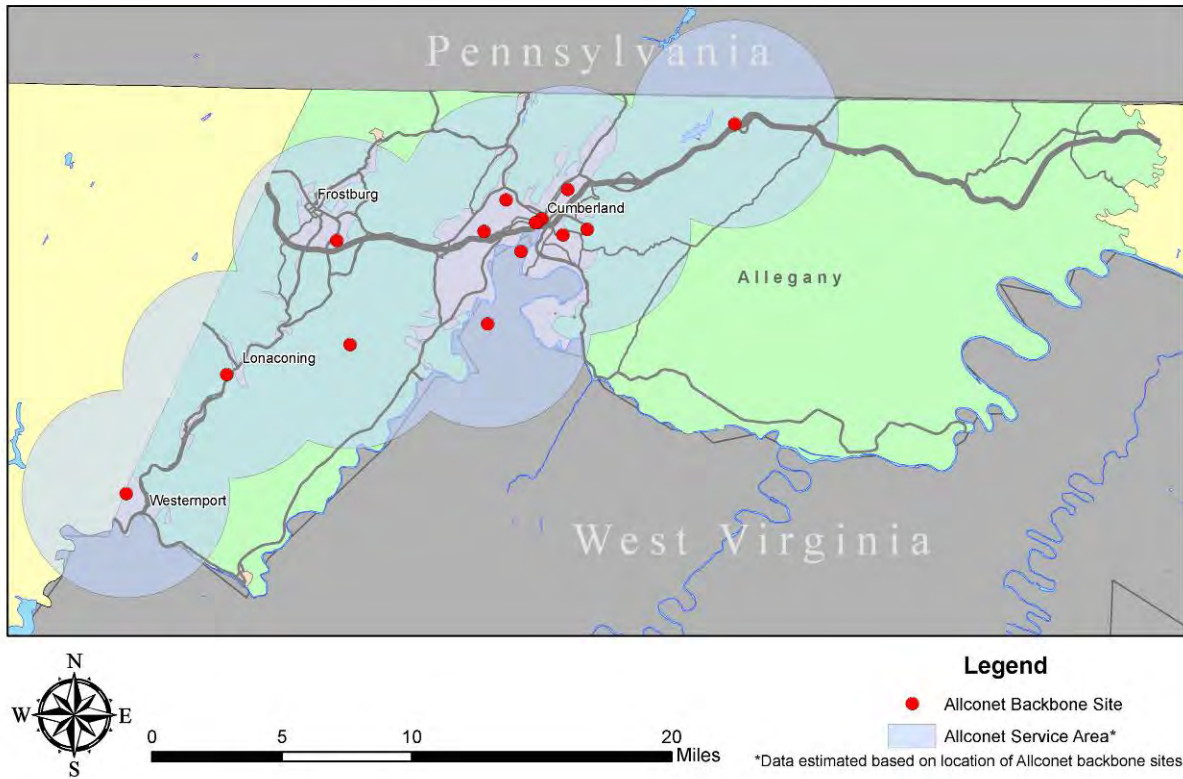
<sup>56</sup>Source: <http://www.uscellular.com/uscellular/plans/>, ZIP Code 21502, June 7, 2012

<sup>57</sup>Source: <http://www.wildblue.com>, ZIP Code 21502, June 7, 2012



Figure 16: Allconet Service Availability (Estimated)

## Allconet Service



### 5.2.2 Fiber

Fiber service in Allegany County is essentially limited to the One Maryland Broadband Network (OMBN), which is being constructed by the State of Maryland to selected community anchor institutions. When it is complete, portions of that fiber will be operated by both the State and the Maryland Broadband Cooperative.

The MBM also shows a small pocket of fiber services offered by Level 3 Communications in the City of Cumberland.

Figure 17: Fiber Availability (Maryland Broadband Map Data)<sup>58</sup>



Level 3 indicates the existence of a fiber backbone through the County on its own network map (see Figure 18), but does not advertise the availability of any services.<sup>59</sup>

Figure 18: Level 3 Network Map for Allegany County



### 5.2.2.1 One Maryland Broadband Network (OMBN)

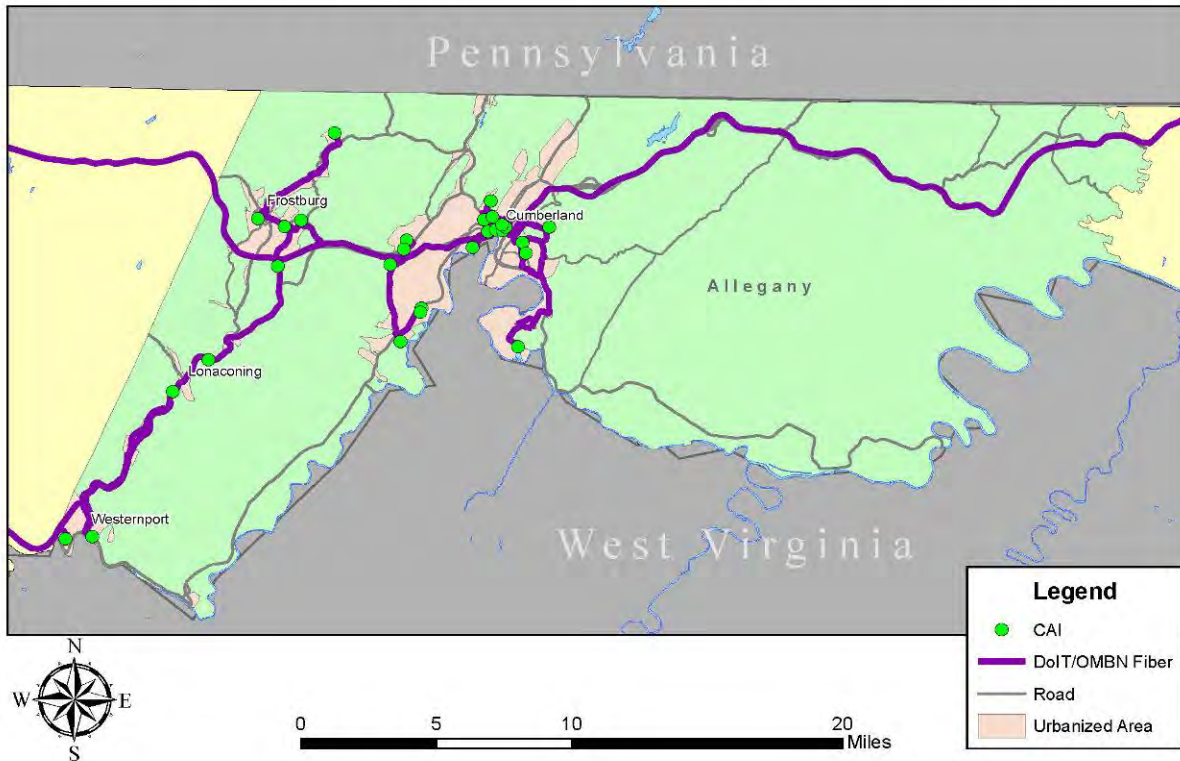
OMBN will connect 32 community anchor institutions (CAIs) in Allegany County, including 15 schools, the BOE building, and more than a dozen public safety and government facilities in Cumberland.

<sup>58</sup> Source: <http://www.mdbroadbandmap.org/map/>, June 4, 2012.

<sup>59</sup> Level 3 Network Map, <http://maps.level3.com/default/> (accessed June 21, 2012)

Figure 19: OMBN Service to Community Anchor Institutions

## Allegany County DoIT/OMBN Fiber and CAIs



The State of Maryland’s Department of Information Technology (DoIT) will offer dark fiber leases or managed services to these connected CAIs.

### 5.2.2.2 *Maryland Broadband Cooperative*

The Maryland Broadband Cooperative (Mdbc)<sup>60</sup> is the State’s sub-recipient under the Broadband Technology Opportunities Program (BTOP) grant that is funding OMBN. Mdbc’s charge and mission is to open up the middle-mile markets and bring cost-effective transport and commodity bandwidth to the rural western, southern, and eastern portions of the State. As such, Mdbc is likely to provide services to its members in Allegany County by September 2013.

Mdbc has obtained Resource Share Fiber from the State, as well as significant funding under the OMBN BTOP grant. Its huts (which will serve as local Points of Presence) are currently being manufactured to its specifications, and the backbone equipment purchased as part of the BTOP grant is awaiting installation once the huts are in place.

Mdbc will place the huts (POPs) in Cumberland, the Keyser’s Ridge area of Garrett County,

<sup>60</sup> <http://www.mdbc.us/>

Hagerstown, Frederick, and Rockville/College Park. This will allow MdBC to serve Western Maryland out of McLean, Virginia and Equinix in Ashburn, Virginia. Once the entire network is in place, MdBC will also be able to provide service out of other locations such as the carrier hotels at 300 Lexington and 111 Market in Baltimore.

MdBC's primary mission is to provide broadband to the rural areas by providing transport for last mile providers. To that end, MdBC pricing for transport (between any two points on its network) are as follows (note that an additional installation fee of \$1,500 applies on a non-recurring basis):

10 Mbps:	\$340 monthly recurring cost (MRC)
100 Mbps:	\$1,275 MRC
1 Gbps:	\$5,950 MRC
10 Gbps:	\$12,900 MRC

Commodity Internet bandwidth is priced on a case-by-case basis; prices vary widely, depending on the scale of bandwidth purchased (the unit cost per megabit decreases as the total number of megabits increases). MdBC is hoping to be able to offer commodity bandwidth in Allegany County (on top of the cost of transport) at a rate of \$4 to \$5 per megabit for its members.

MdBC members have the option of purchasing transport from MdBC and negotiating for commodity bandwidth at a major point of presence, or of buying bandwidth through MdBC to leverage its scale.

### 5.2.3 DSL

Verizon and its predecessors have operated a telephone network in much of the County for many decades. In recent years, Verizon upgraded some portions of that network to provide broadband DSL service. As is discussed in the technical section above, however, DSL has significant technical and distance limitations, and has never provided a solution for more than a significant fraction of County residents and businesses. In addition, Verizon has stopped investing in its rural wireline services in many parts of the country, and we believe that is the case in Allegany County.

#### 5.2.3.1 Verizon

Verizon's own materials and the NBM purport to show that Verizon DSL is widely available in the County. The NBM, for example, indicates that 71.5 percent of residents have access to DSL service from Verizon. However, it is the experience of many County residents and businesses that when they call Verizon to purchase services, they are denied; in other words, Verizon is refusing to add any additional customers. Most likely this is because of the limitations of its system to support additional customers, although it may also be purely a business decision not to focus on or market rural DSL services. Recent news about Verizon reducing its wireline service workforce in the region provides further evidence that the company is seeking to contract rather than expand its rural wireline coverage. The company is reportedly offering buyouts to an

estimated 1,700 employees in Maryland and several other states.<sup>61</sup>

Based on all of these factors, the results of our survey work, and the County's own extensive observations and efforts, we therefore conclude that less than 25 percent of County residents and businesses could be served by Verizon DSL services.

#### **5.2.3.2 Lumos Networks**

Lumos sells DSL service to the residential and small business markets. Lumos recently upgraded its local DSL offering to a 6 Mbps down / 1 Mbps up product, which is available to locations within a three-mile radius of the central office (a typical limitation of DSL service). The company's 6/1 product is competitively priced at \$39.95 per month. A phone line is an additional \$28 per month, and unlimited long distance and local telephone service adds \$20 more.

#### **5.2.4 Hybrid Fiber-Coaxial (HFC) / Cable Modem**

There are two incumbent cable providers in Allegany County: Atlantic Broadband and Comcast. According to the NBM, Atlantic Broadband provides broadband via cable modem to 62.2 percent of County residents. Comcast provides broadband via cable modem to 12.4 percent of County residents.

The Comcast system is state of the art or close to it for a cable modem network. Both in Allegany County and elsewhere, Comcast is known for investing in and supporting its facilities and maintaining them well. To our knowledge, most of the Comcast facilities in Allegany County have been upgraded to DOCSIS 3.0, the state of the art for cable modem technologies. And Comcast is offering services both to the residential and the business markets in Allegany County that are comparable to the services it offers in any metro area.

In addition, Comcast is open to investing extensively in Allegany County to provide business-class and enterprise-level services to Allegany County businesses and anchor institutions where the financial case supports that type of investment. Thus, assuming that there are interested customers, we anticipate that Comcast may invest further in Allegany County for purposes of serving the institutional market. On the other hand, however, while Comcast is supporting and upgrading its existing network to the business community, it is our impression that Comcast does not plan to expand its residential footprint other than perhaps in marginal ways if it is building to an institutional customer, and reaching a potential residential customer along that route entails only marginal additional investment.

We thus conclude that for purposes of the areas of Allegany County served by Comcast, the company's service areas is unlikely to grow for the residential market, and may grow if the business case develops in the institutional market.

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<sup>61</sup> Spangler, Todd. "Verizon Aims to Cut Wireline Workforce By 1.9%." *Multichannel News*. June 4, 2012. [http://www.multichannel.com/article/485469-Verizon\\_Aims\\_To\\_Cut\\_Wireline\\_Workforce\\_By\\_1\\_9\\_.php](http://www.multichannel.com/article/485469-Verizon_Aims_To_Cut_Wireline_Workforce_By_1_9_.php) (accessed June 21, 2012).

### 5.2.5 Mobile Wireless

We conducted drive-out tests to document the availability of cellular broadband services in representative portions of the County. Using an AT&T mobile hot spot and a standard Web-based speed test, we checked for service availability at 11 points (see Table 7). We found that cellular broadband service is available in most of the denser parts of the County. Areas that are not served by cellular voice service are also not served by these services—including parts of Mt. Savage and along Route 36 between Mt. Savage and Barrelville.

**Table 7: Availability of Mobile Wireless Service**

Location	Speed Test Results		Comparison to Other Broadband Technologies				Video Streaming Test	
	Speed Test 1 (Mbps Down/Up)	Speed Test 2 (Mbps Down/Up)	Dial-up	DSL	Cable Modem	Fiber	With Downstream Data	With Upstream Data
<b>Cumberland</b>								
Exit 43C, Cumberland	1.502/950	1.247/820	OK	OK	OK (Low)	OK (Low)	OK (Low)	OK (Low)
<b>Westernport</b>								
250 Route 36, Westernport (Victory Post Rd)	1.295/1.018	1.534/1.031	OK	OK	OK (Low)	OK (Low)	OK	OK
78 Main St., Westernport	1.257/1.374	1.569/1.065	OK	OK	OK (Low)	OK (Low)	OK	OK
Lane St., Westernport	1.257/540	1.199/570	OK	OK	OK (Low)	OK (Very Low)	OK (Low)	OK (Low)
<b>Route 36</b>								
Route 36 Parallel to Skyline Drive	860/1.014	788/932	OK	OK	OK (Low)	OK (Very Low)	Very Low (No)	Very Low (No)
<b>Mt. Savage</b>								
21545 Mt. Savage Rd., Mt. Savage	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
<b>Route 36</b>								
Route 36, Barrelville	No Service*	No Service*	No Service*	No Service*	No Service*	No Service*	No Service*	No Service*
10218 Route 36	2.894/860	1.951/720	OK	OK	OK (Low)	OK (Low)	OK	OK
<b>Flintstone</b>								
Bluegrass Dr., Flintstone	2.127/2.050	2.023/1.967	OK	OK	OK (Low)	OK (Low)	OK	OK
Snow Hill Ln., Flintstone	2.451/2.075	2.019/1.046	OK	OK	OK (Low)	OK (Low)	OK	OK
Town Creek Rd., Flintstone	1.874/1.562	1.341/1.082	OK	OK	OK (Low)	OK (Low)	OK	OK

\* Slow/unstable connection

Notes:

Speed tests conducted through dsreports.com, <http://www.dsreports.com/stest>

Speed test 1 pinged a Comcast server in Washington, D.C.

Speed test 2 pinged a Net Access server in New Jersey

Comparable speeds are: Dial-up (4.4 Kbps - 56 Kbps); DSL (32 Kbps - 7 Mbps); Cable modem (32 Kbps - 15 Mbps); Fiber (1 Mbps - 50 Mbps)

Where cellular broadband service does exist in the County, download speeds can reach almost 3 Mbps, although 1.5 Mbps is more typical. Upload speeds vary but are typically lower (and often significantly so). In addition, the performance is often not as consistent as with a wired connection for a range of technical reasons. (Asymmetrical speed measurements are due to many factors such as connection type, signal-to-noise ratio, and TX/RX power.)

Mobile wireless providers typically prevent mobile devices from sharing video and using other more bandwidth-intensive applications. Cost is also a limiting factor for cellular broadband users, with basic service costing a set amount per month (usually requiring a multi-year service commitment), and additional charges if users exceed their monthly bandwidth cap.

Considering the cost and performance of the best mobile wireless services in Allegany County, those services currently are a step down from higher-quality cable modem and DSL services, sharply limiting the user's ability to do many things that are taken for granted on a wireline service. Customers cannot rely on the current mobile wireless service in the County to share large files (such as images, blueprints, video), operate two-way video, view on-demand video from Netflix and other sources, play interactive games, or use anything beyond the most rudimentary educational and telemedicine applications.

#### *5.2.5.1 AT&T and U.S. Cellular*

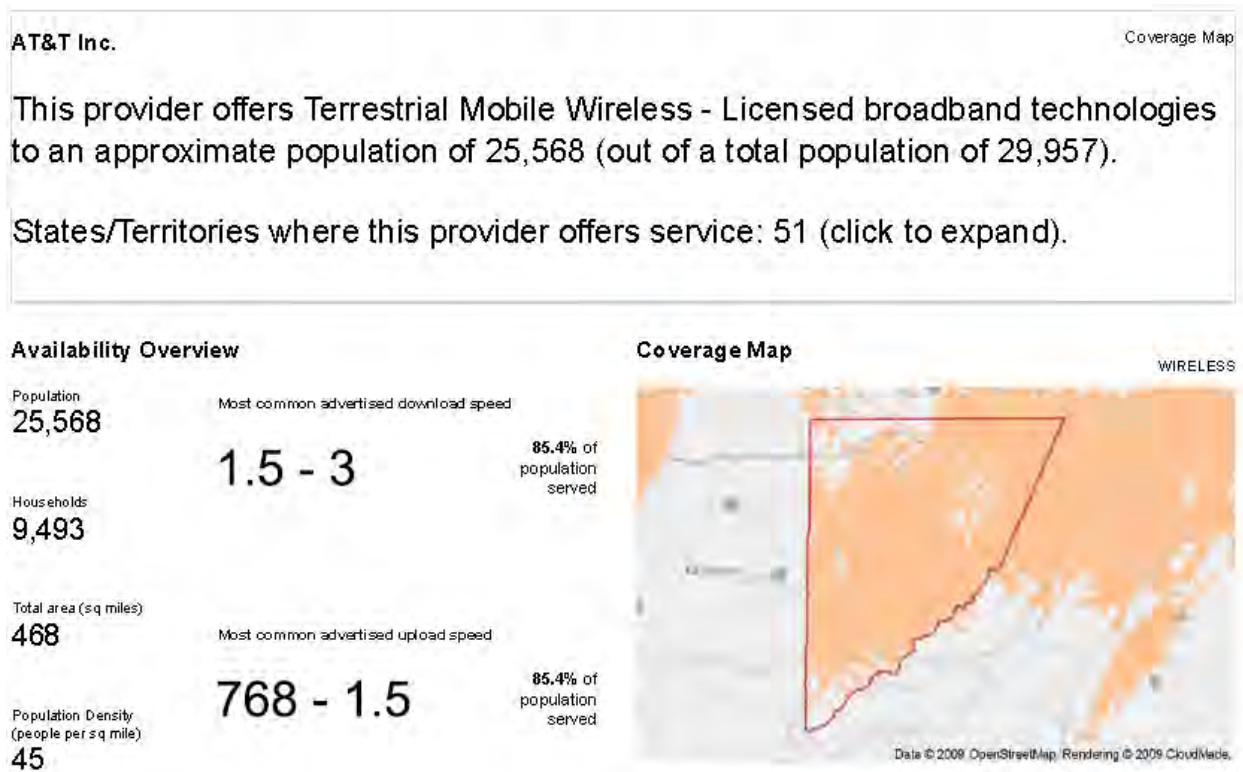
AT&T is offering HSPA+ (generally considered to be a 3G or 3.5G) and U.S. Cellular is offering EVDO (3G) mobile wireless services within the County. These services have been upgraded in recent years and can be expected to improve further, as newer technologies are developed and network performance improves nationwide.

AT&T has upgraded from HSPA to more capable LTE in many metropolitan areas, including the Washington, D.C. region, but has not yet deployed that technology in Allegany County. When we inquired about their timeline, they responded that under no circumstances do they disclose upgrade paths or timelines. We note, however, that even without LTE deployment, the AT&T product currently deployed in the County will reliably deliver more than the 768 Kbps in remote areas that the County had targeted—although it is unlikely to deliver 4 Mbps down as the County had targeted for its population centers.

In the case of U.S. Cellular, the company has been very public about its plans to upgrade western Maryland to LTE from EVDO over the next year or so. While we have no specifics as to their build-out plans or timeline, we do hear that they are planning to build multiple new towers (to be served over fiber) in Western Maryland. This is a very strong and encouraging sign that they are investing in higher quality mobile broadband in the region. The LTE product will deliver higher, more reliable speeds than the existing EVDO network, though we note that (as U.S. Cellular itself has explicitly stated) this mobile product is not an exact substitute for a wireline or point-to-point service—in part because commercial mobile products are capped as to total bandwidth available per month.

AT&T offers only mobile wireless access in Allegany County. The NBM shows that this wireless service covers most of the County, both in terms of geography and population:

Figure 20: National Broadband Map Data—AT&T Mobile Wireless Coverage



The NBM does not list U.S. Cellular as a broadband provider in Allegany County, so no benchmark data are available.

It should also be noted that Sprint and Verizon Wireless do not have infrastructure in Allegany County and do not have plans to serve the County; customers of those companies roam to U.S. Cellular’s network. In the case of Verizon Wireless, subscribers are only allowed to connect to U.S. Cellular’s 2G 1xRTT service with significantly lower reliability and typical download speeds in the 100 Kbps range (and slower uploads)—comparable to dial-up services.

T-Mobile operates in the County under a roaming agreement with AT&T.

#### 5.2.5.2 Clear

Clear does not offer services in Allegany County even though it holds a license for a large block of spectrum. Its closest active area is near Baltimore<sup>62</sup> and it has not announced plans to activate service in Allegany County.

### 5.3 Broadband Adoption in the County

The Allegany County residential survey asked respondents whether they had a purchased an Internet connection in their home. A total of 80 percent replied “yes.” This is the total Internet

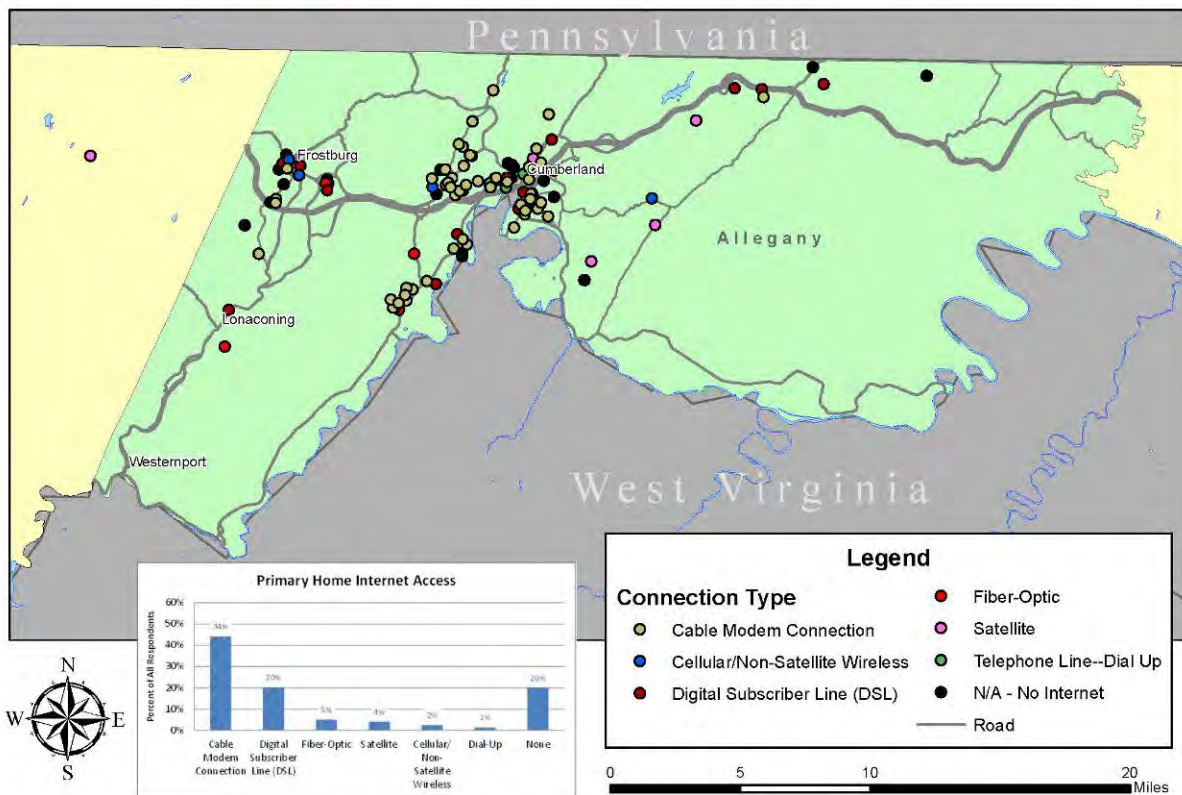
<sup>62</sup> Clear, “Check Coverage,” <http://www.clear.com/coverage> (accessed March 19, 2012).



adoption rate for Allegany County—the rate at which Internet service is purchased where available. Most of this group reported using a broadband connection, but others reported using dial-up or satellite services. Respondents assessed their choice of home Internet service based on several considerations; they rated various components of service that are important to them, and indicated that reliability, speed and cost are all significant considerations. An Internet service’s adoption rate is an indication of a population’s willingness to pay for services based on what they consider to be important to them. If we can measure Internet service adoption, we can get a sense of a population’s demand for the services in their community.

Figure 21: Survey Results—Map of Primary Home Internet Access

## Primary Home Internet Access



The adoption rate of a broadband service is the percentage of residents who purchase the service where it is available. The Adoption Rate measures market demand as a proportion of supply, and is calculated using the formula:  $a = d/s$  where “a” is the Adoption Rate, “d” is the rate at which the service is purchased (the demand metric), and “s” is the rate of a service’s availability (the supply metric). For the supply metric, we rely on availability data from the National Broadband Map.<sup>63</sup> For the demand metric, we use the results of the Allegany County residential survey,

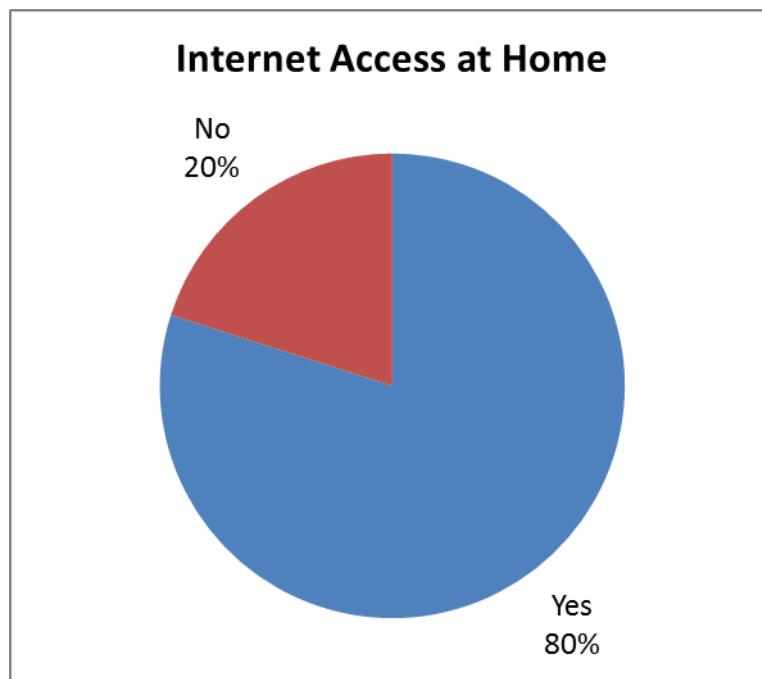
<sup>63</sup> The National Broadband Map relies heavily on self-reporting from Internet service providers. Depending on the company and the technology, the map’s coverage numbers are likely overstated. Since we use these metrics as the denominator in calculating adoption rates, it is likely that true adoption rates are higher than those calculated in this report. This suggests that consumer demand for the broadband services predicted in this section are on the

which asked respondents whether they have Internet access in their homes, and if so what type. Further qualitative analysis is based on survey questions that assess the level of importance to consumers of components of Internet service, and their level of satisfaction with these components.

The survey began by asking respondents if they have purchased Internet access in their homes, to which 80 percent responded yes. This number is also the total Internet adoption rate, since availability of Internet access is 100 percent; anyone with a phone line can purchase dial-up Internet, and satellite services are widely available. Broadband users comprise 71.8 percent of total respondents.<sup>64</sup> The National Broadband Map reports 99.5 percent of Allegany residents have the option of purchasing broadband. **Therefore, the adoption rate for all broadband service in Allegany County, (the rate of usage divided by the rate of availability) is 72.2 percent ( $0.718 / 0.995 = 0.722$ ).** This number represents a big-picture estimate of broadband market demand; it indicates that an Allegany County resident has a 72.2 percent likelihood of purchasing broadband Internet service where available. Frankly, we believe this number understates the actual adoption rate because the availability data sourced from the National Broadband Map overstate availability.

Below is a breakdown of the adoption of various types of Internet service in Allegany County.

Figure 22: Survey Results—Internet Access at Home



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conservative side, and that true demand is likely higher.

<sup>64</sup> 77.3 percent of respondents said they have home Internet access. However, of total respondents, including those who have not purchased Internet service, those who reported using dial-up account for approximately 1.4 percent. Another 4.1 percent of respondents use a satellite service, another non-broadband technology. If we subtract the dial-up and satellite users from all home Internet users, we are left with 71.8 percent of respondents who have purchased broadband Internet service.

Figure 23: Survey Results—Primary Home Internet Access (Respondents with Internet)

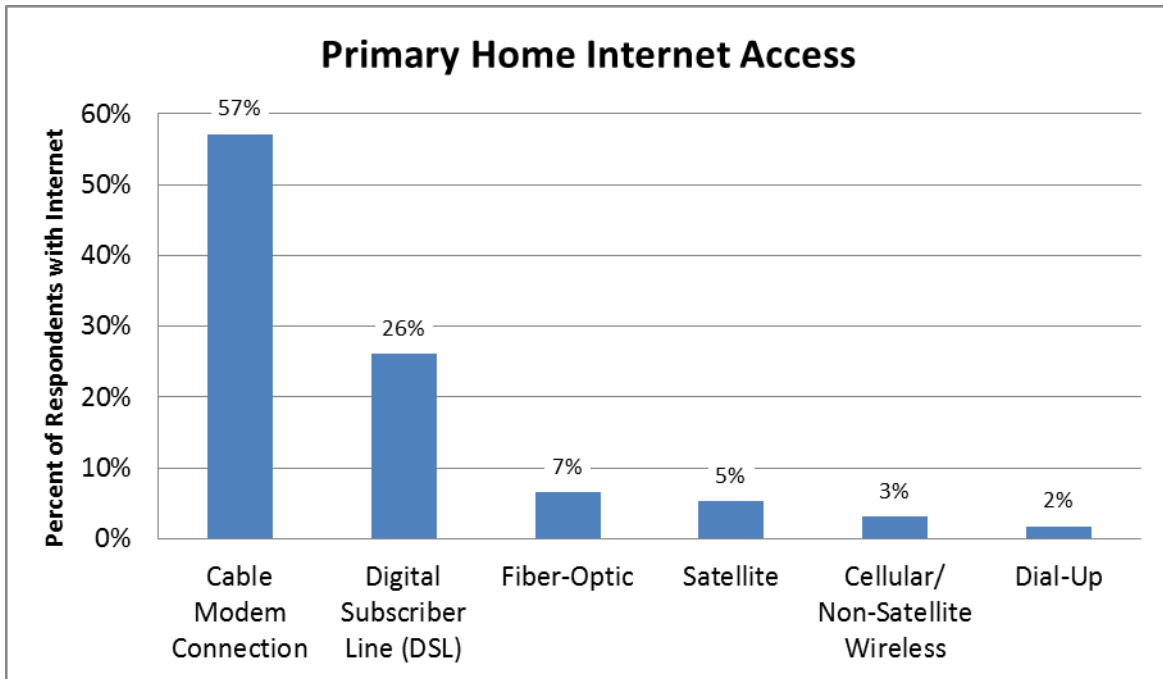
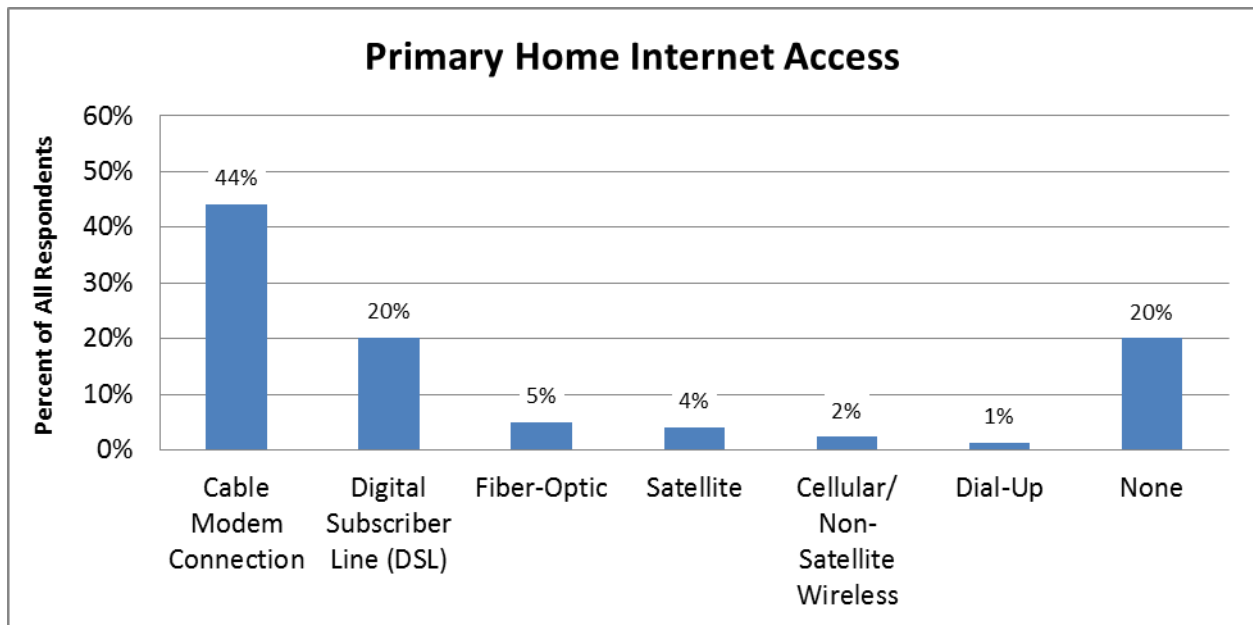


Figure 24: Survey Results—Primary Home Internet Access (All Respondents)



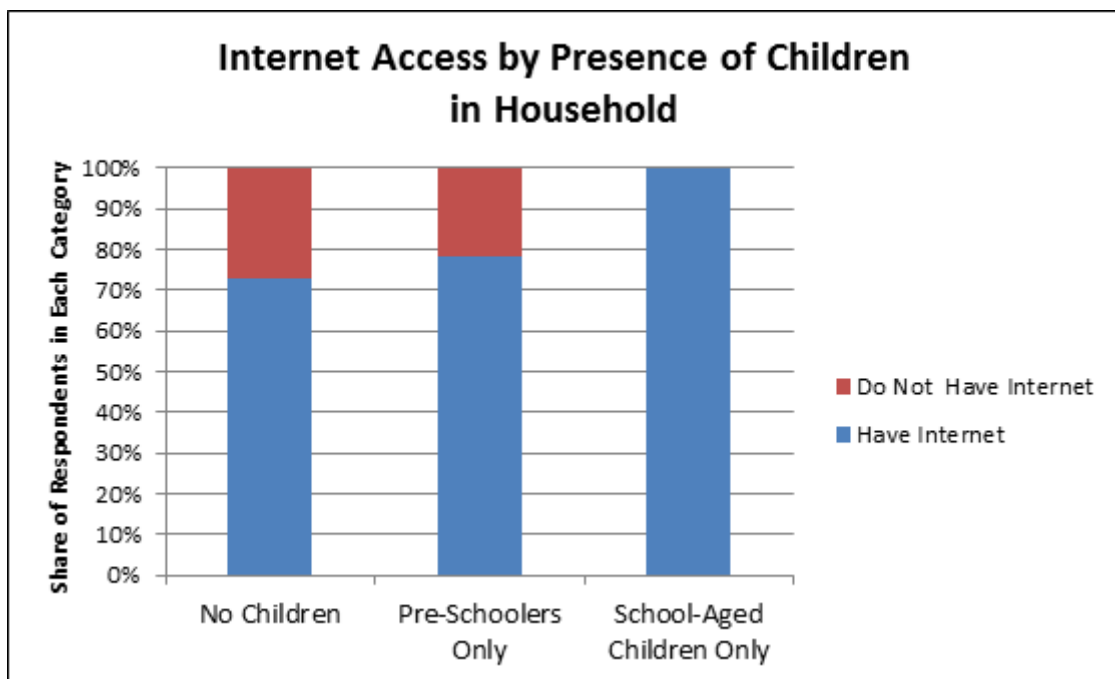
According to the residential survey, the most common Internet connection type in Allegany County is cable modem, providing service to 44 percent of all homes, followed by DSL with service to 20 percent of all homes, and fiber optic, with service to 5 percent of all homes.

We can estimate the adoption rate for each type of service by using the above data on what

technologies respondents have purchased and comparing them with data on what is available to them. Additionally, the survey asked respondents to evaluate which aspects of Internet service are important to them, and to what extent their expectations are met with their existing service. These responses help provide a picture of why respondents adopt (or do not adopt) services at the current rates.

Other survey metrics based on household information also provide insight into Internet adoption behavior. One notable adoption result is the prevalence of home Internet use among people with children in the household. A household with no children had a 72.8 percent likelihood of having Internet service. For a household with pre-schoolers, the likelihood grew to 78.4 percent. And among households with school-aged children, 100 percent had Internet access. This finding shows a clear correlation between demand for Internet service and the presence of children.

Figure 25: Survey Results—Internet Access by Presence of Children in Household

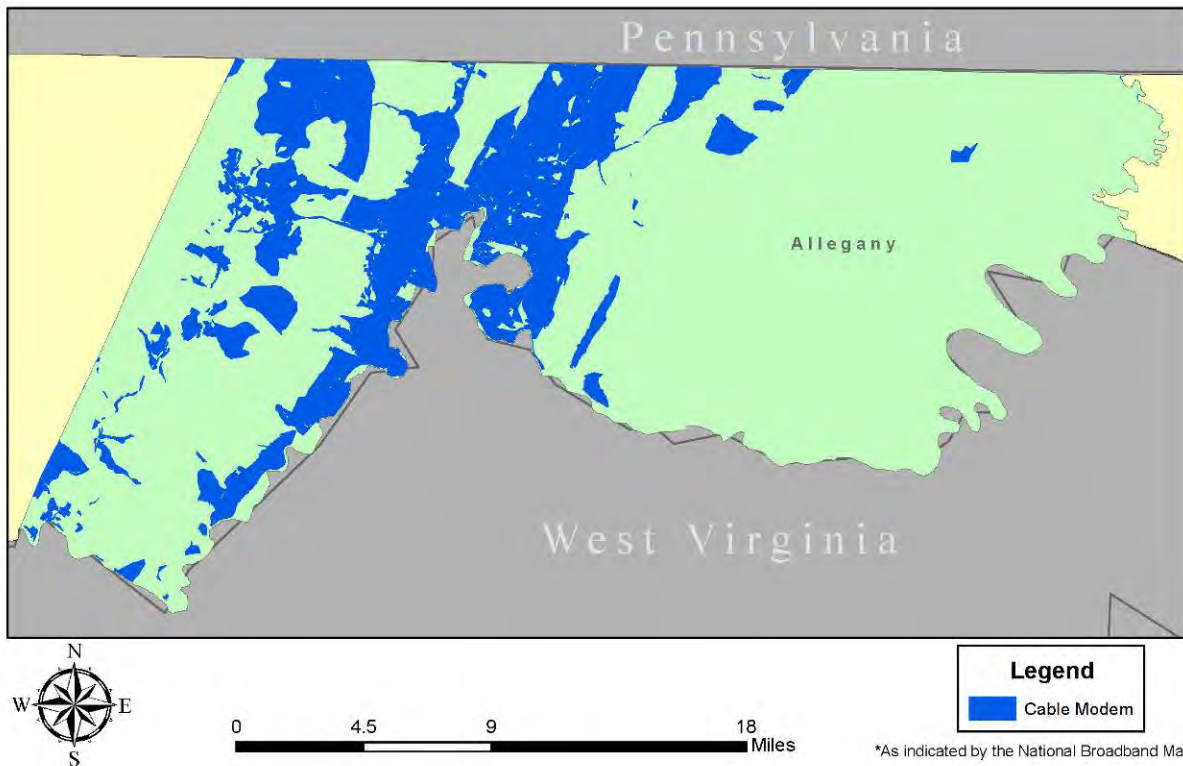


### 5.3.1 Cable Modem

Data from the National Broadband Map show 72.2 percent of the population has access to cable modem service in Allegany County.

Figure 26: Cable Modem Availability (National Broadband Map Data)

## Cable Modem Availability



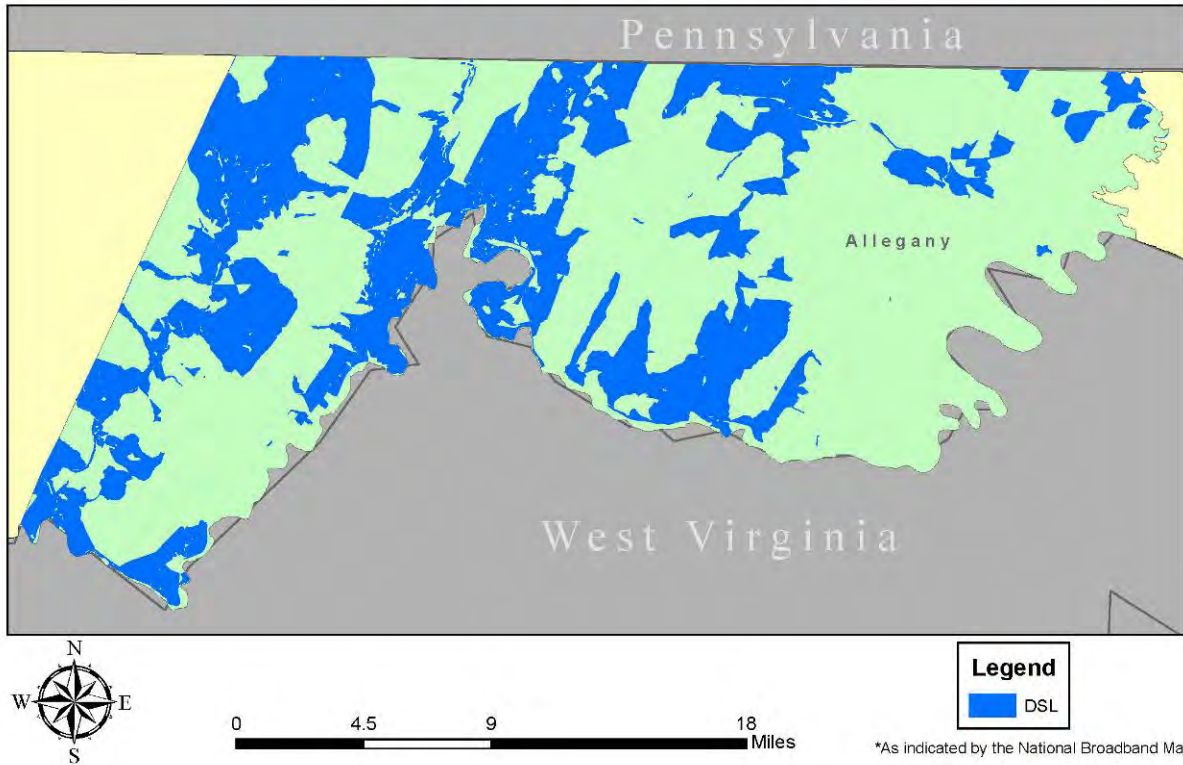
By comparison, only 44.2 percent of all residential survey respondents adopted cable modem service. If correct, this indicates a large portion of the population chooses not to purchase this service despite its availability. According to these numbers, **the adoption rate of cable modem service in Allegany County (percentage of those with access to cable modem who have purchased it) is 61.2 percent.** This is a relatively high take rate, as it indicates a resident is more likely to purchase cable modem service than not; still, a significant minority opt out of this service. On ratings of various aspects of Internet service, respondents were notably dissatisfied the cost of cable modem. Respondents rated the importance of price paid for service at a mean of 4.8 out of 5; cable modem subscribers gave a satisfaction mean of 2.8 out of five. This differential of -2.0 is the largest gap between importance and satisfaction of any aspect of any type of service in the survey. Respondents on the business survey showed a smaller satisfaction gap on cost, (a satisfaction rating of 3.5 against an importance of 4.1), but cost also ranked as the second least important aspect of service among business respondents. (Only provider choice was less satisfactory). The level of dissatisfaction with the cost of cable modem service might explain the low adoption rate of this service relative to its availability.

### 5.3.2 DSL

The National Broadband Map shows 77.9 percent of the population of Allegany County has access to DSL—the highest of any service type.

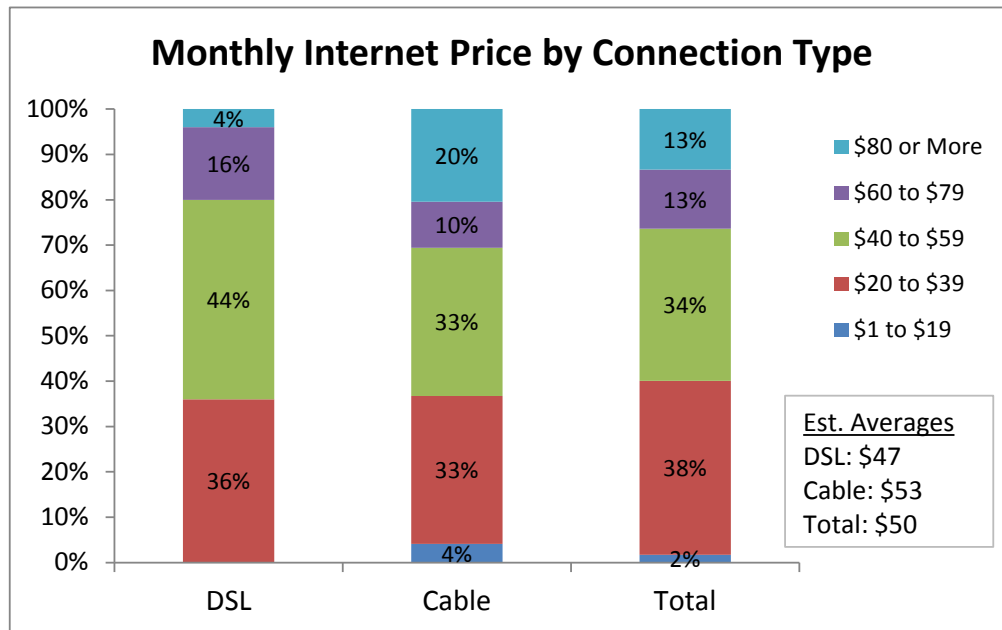
Figure 27: DSL Availability (National Broadband Map Data)

## DSL Availability



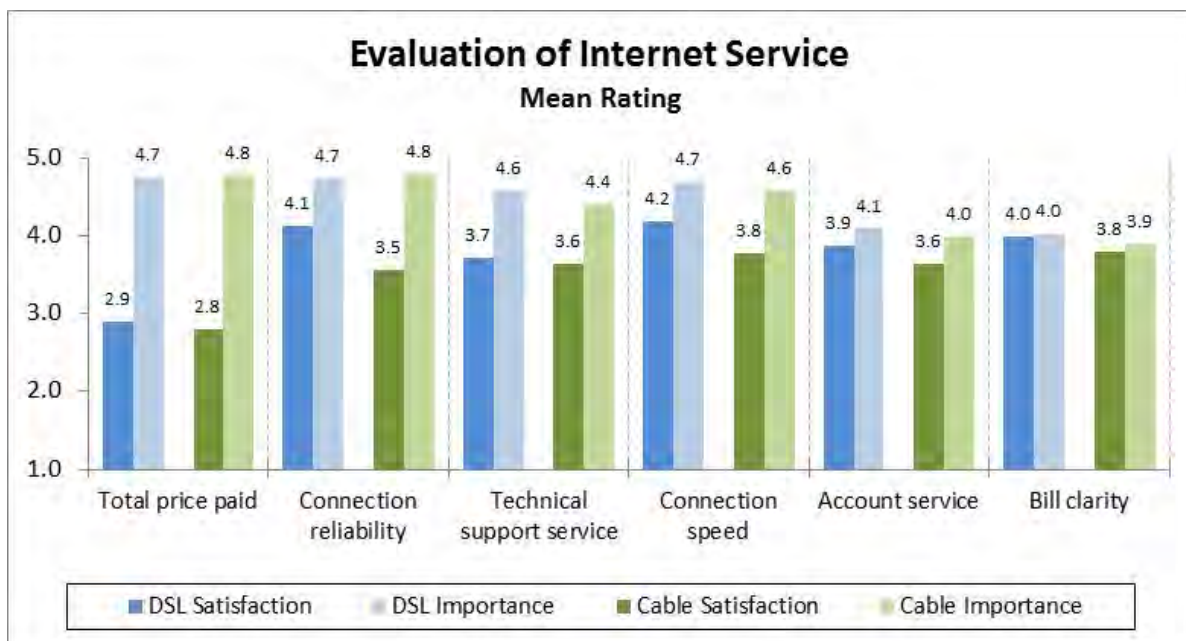
However, for the reasons stated above, this number is likely inflated. If correct, however, **the adoption rate for DSL is 25.9 percent**, because 20.2 percent of all residential survey respondents adopted DSL service. This shows a far lower demand for DSL service than for cable. DSL is an inferior service to with respect to speed and reliability; its only clear advantage is cost. However, the residential survey shows that a DSL user's monthly cost is only slightly less than that of a cable user.

Figure 28: Allegany Residential Survey—Monthly Internet Price by Connection Type



The gap between importance and satisfaction on cost was also very close to the gap for cable modem service. Overall, DSL users reported slightly better satisfaction than cable users on both reliability and connection speed. However, it remains the case the cable is far more popular, so despite receiving higher satisfaction scores on several metrics, DSL’s adoption rate remains relatively low. The following chart summarizes satisfaction and importance of DSL and cable services by the residential respondents.

Figure 29: Allegany Residential Survey—Evaluation of Internet Service



### 5.3.3 Fiber-Optic

Fiber-optic service to the home or small business is essentially unavailable in Allegany County. The NBM reports only 0.1 percent availability of this high-speed service type.

### 5.3.4 Satellite

By the nature of its technology, satellite service is available to approximately 100 percent of the population. Satellite Internet speeds are significantly slower than those of broadband service. (Note: the MBM includes satellite technology under the nomenclature of “broadband,” but the NBM does not include satellite in its list of technologies). Satellite only makes sense for customers who have no broadband options, and want a dedicated connection with speeds greater than dial-up. **4.1 percent of residential respondents reported purchasing satellite service, making this the adoption rate.** Mean satisfaction levels of speed, reliability and cost were the lowest levels of any technology in the survey. We can view this technology as an option for customers with no access to broadband, but not as a technology with demand beyond current supply.

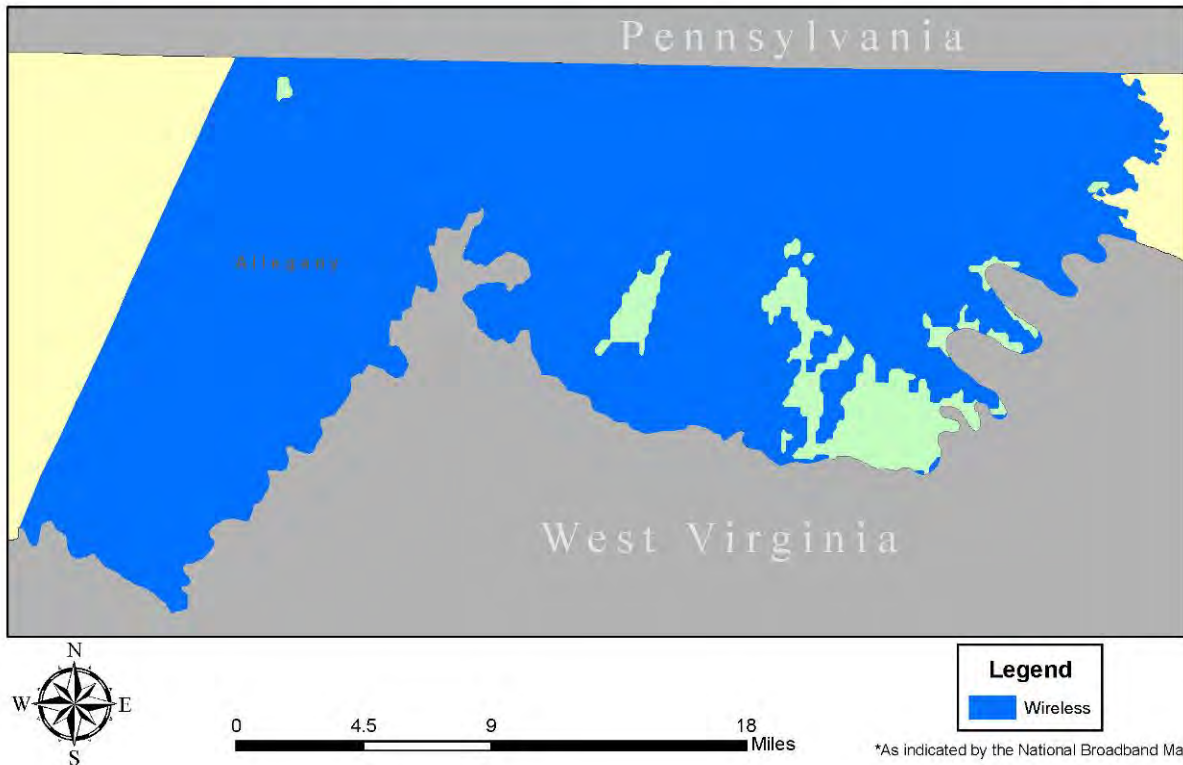
### 5.3.5 Cellular/Non-Satellite Wireless

2.4 percent of respondents indicated using a wireless broadband service as their primary home connection. Essentially, these households use the equivalent of mobile phone service to connect their homes. The NBM indicates 99 percent availability for mobile Internet service, for an **adoption rate of 2.4 percent.**



Figure 30: Wireless Availability (National Broadband Map Data)

## Wireless Broadband Availability



This small group gives ratings in the average to favorable range on all aspects of service, though like the other service types discussed, there is a gap between satisfaction and importance. Since these subscribers are not significantly less satisfied than those respondents using faster technologies, they are unlikely to be a source of demand for new services.

### 5.3.6 Dial-Up

The oldest home Internet technology is dial-up service, and is used by 1.4 percent of residential respondents. **The service is available to anyone with a phone line, so the adoption rate is also 1.4 percent.** Since dial-up service is widely available, like satellite, it is unlikely there is additional market demand for this mode of connection. Though dial-up users rated their services favorably, they indicated an importance/satisfaction gap of 2.0 for price paid, (5.0 on the importance scale, and 3.0 on the satisfaction scale). In other words, dial-up users are no more satisfied with their monthly costs as their counterparts using faster and more reliable services.

## ***6 Residential and Small Business Survey Data and Analysis***

On the County's behalf, we conducted surveys of residents and businesses in Allegany County. The surveys aimed to collect data that would allow the County to understand both the potential unmet broadband needs in the community and ways in which improved communications services could benefit residents.<sup>65</sup>

### ***6.1 Residential Survey Summary***

The residential survey, which was designed to obtain information about residents' use of Internet and telephone services, also captured residents' opinions about communications services within Allegany County and identified ways in which those services could be improved to better meet residents' needs. Key findings from the residential communications survey include:

- Eighty percent of Allegany homes have Internet service, almost all with high-speed (non-dial-up) service. Cable modem connection is the leading type of Internet connection, used by 57 percent of home with Internet access (44 percent of all homes), followed by DSL (26 percent of homes with Internet access; 20 percent of all homes).
- Nearly one-half of those with Internet access use it to watch movies or television shows on the computer. One-fourth use the Internet to watch movies or television shows on a tablet or smart phone. Additionally, 42 percent of those with Internet access own a video gaming console that is connected to the Internet.
- Residents are generally satisfied with their Internet services. However, almost all aspects of Internet service "under-perform" when comparing satisfaction ratings with importance ratings. The largest Internet service "gap" (customers' importance minus their satisfaction) is the price paid for service, followed by reliability, technical support, and connection speed.
- The strongest reason for residents to purchase very high-speed Internet is to download large data files, including photos and videos.
- Twenty-two percent would be likely to switch to very fast Internet for 20 percent more per month. Very few would switch for an additional 40 percent or more per month.
- More than three-fourths of Allegany homes have a landline phone (traditional or cable), and 65 percent use it as their primary service. One-third use a cell phone as their primary service. Four percent of homes use Internet-based phone services, but only 1 percent use it as their primary phone.

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<sup>65</sup> CTC was responsible for all project communications, coordination, methodologies, and reporting of results. CTC also managed the work of contractors involved in survey printing, mailing, and processing. County staff and stakeholders provided feedback on the draft survey instruments and reviewed preliminary study findings.

- Eight-eight percent of working respondents commute alone in their cars. Telecommuting could provide substantial savings of gas and time.
- Thirteen percent of employed respondents said their employer allows telecommuting, with the majority having an Internet connection that would enable telecommuting. However, just three respondents (three percent of employed respondents) telecommute at least one day per week.

The following sections discuss the survey objectives, process, and results.

### **6.1.1 Background and Objectives**

The residential communications services survey was designed to capture substantial information about residents' use of Internet and telephone services, their opinions about those services, and information about their communications service needs. To meet those objectives, residents were asked about their:

- Internet use, satisfaction, and opinions about their service
- Television and video services, satisfaction, and opinions about their service
- Telephone services and satisfaction levels
- Internet-based telephone use
- General household information

### **6.1.2 Survey Mailing and Response**

A total of 600 questionnaires were mailed to randomly-selected Allegany County residents in March 2012. The survey forms were mailed first-class and included a postage-paid envelope to return the completed survey. Completed forms were returned to the survey processor for verification and data entry.

A total of 121 useable residential surveys were received by the cut-off date, providing a “gross” response rate of 20.2 percent<sup>66</sup>. Based on approximately 29,177 households<sup>67</sup> in Allegany County, the results are available with a precision level of  $\pm 8.9$  percent at the 95 percent probability level for aggregate responses. That is, 19 times out of 20, one would expect the survey results to be within  $\pm 8.9$  percent of the actual value across the entire population.

The data from completed surveys were entered into a database format for analysis.

### **6.1.3 Data Analysis**

Survey data were transferred to SPSS<sup>68</sup> software where the data were coded, labeled, cleaned, and verified. Survey data were evaluated using techniques in SPSS including frequency tables,

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<sup>66</sup> Excluding 22 undeliverable surveys, the “net” response rate was 20.9%.

<sup>67</sup> Source: U.S. Census Bureau, 2010 Census, <http://factfinder2.census.gov>

<sup>68</sup> Statistical Package for the Social Scientist, [www.spss.com](http://www.spss.com)

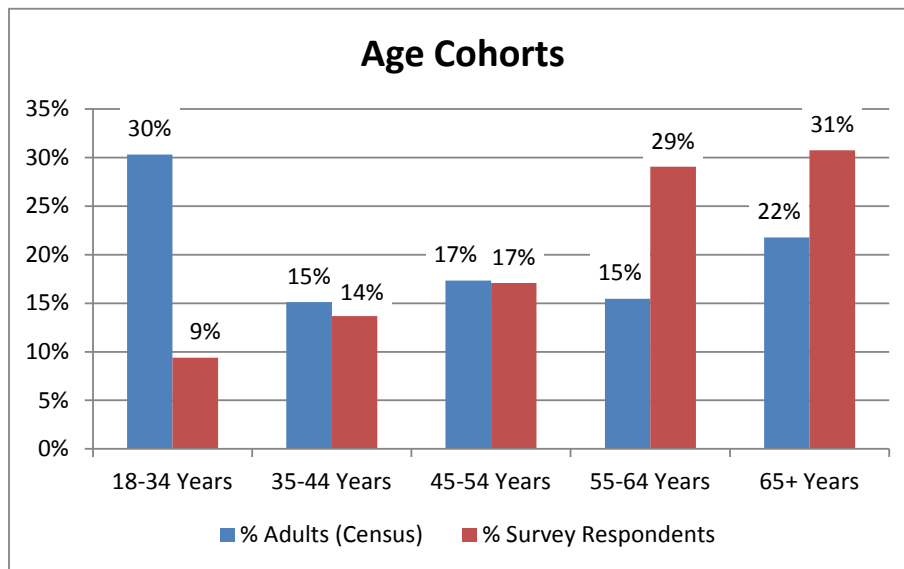
cross-tabulations, and means functions. Survey results were weighted based on the age of the survey respondent to help adjust for the fact that younger residents are much less likely to respond to a survey than older residents. To the extent that younger residents use different technologies, subscribe to different services, or have different opinions, the survey results would be biased and would misrepresent the population as a whole if weighting were not performed. Weighting survey data by the age of the respondent helps correct for any inherent biases in survey response rates by age. The weighting calculation uses population data from the U.S. Census Bureau 2010 Census and is calculated in the following manner:

**Figure 31: Survey Results—Residential Survey Weighting**

Residential Survey Weighting			
	% Adults (Census)	% Survey Respondents	Weight
18-34 Years	30.3%	9.4%	3.224
35-44 Years	15.1%	13.7%	1.105
45-54 Years	17.3%	17.1%	1.014
55-64 Years	15.5%	29.1%	0.532
65+ Years	21.8%	30.8%	0.707
Total	100.0%	100.0%	

In this manner, the weighted results are more representative of the Allegany County population as a whole.

**Figure 32: Survey Results—Age Cohorts**



The following sections of this report summarize the survey results and highlight key findings.

#### 6.1.4 Residential Survey Results

The residential survey results are presented and discussed in the following sections. In addition,

comparisons or cross-tabulations of responses based on demographics or services types are included to evaluate key correlations or distinctions among major subgroups of service types or other characteristics.

It should be noted that statements referring to “Allegany County” households refer to the 121 respondents to the survey, which are representative of the larger population within the statistical parameters discussed previously. All of the results discussed in subsequent sections represent “age-weighted” data unless otherwise specified.

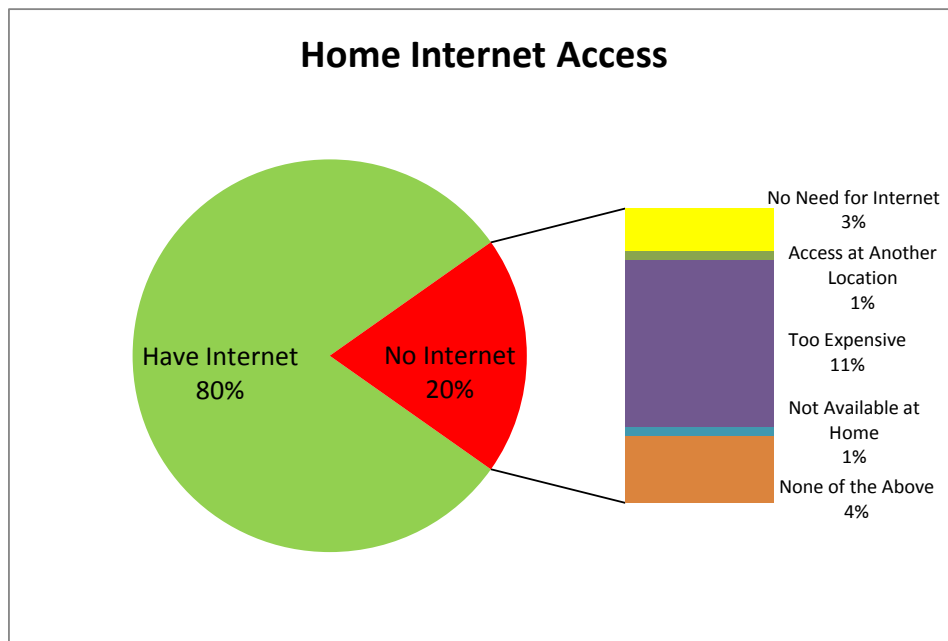
#### 6.1.4.1 Internet Service

Questions were asked related to Internet service (to compare usage by types of service providers), usage of the Internet for various activities, and satisfaction and importance of features related to Internet service. This information provides valuable insight into residents’ need for various communications services.

##### Internet Access

Eight in 10 respondents have Internet access at their home, most with high-speed (non-dial-up) service. The main reason cited for not having Internet service is the expense, cited by 13 of 24 respondents.

Figure 33: Survey Results—Home Internet Access



##### Internet Connection

Cable modem connection is the leading type of Internet connection, used by 57 percent of home with Internet access (44 percent of all homes), followed by DSL (26 percent of homes with Internet access; 20 percent of all homes). Market share for fiber-optic (seven percent), satellite (5 percent), cellular/non-satellite (three percent), and dial-up (two percent) is considerably lower.

Figure 34: Survey Results—Primary Home Internet Access (Respondents with Internet)

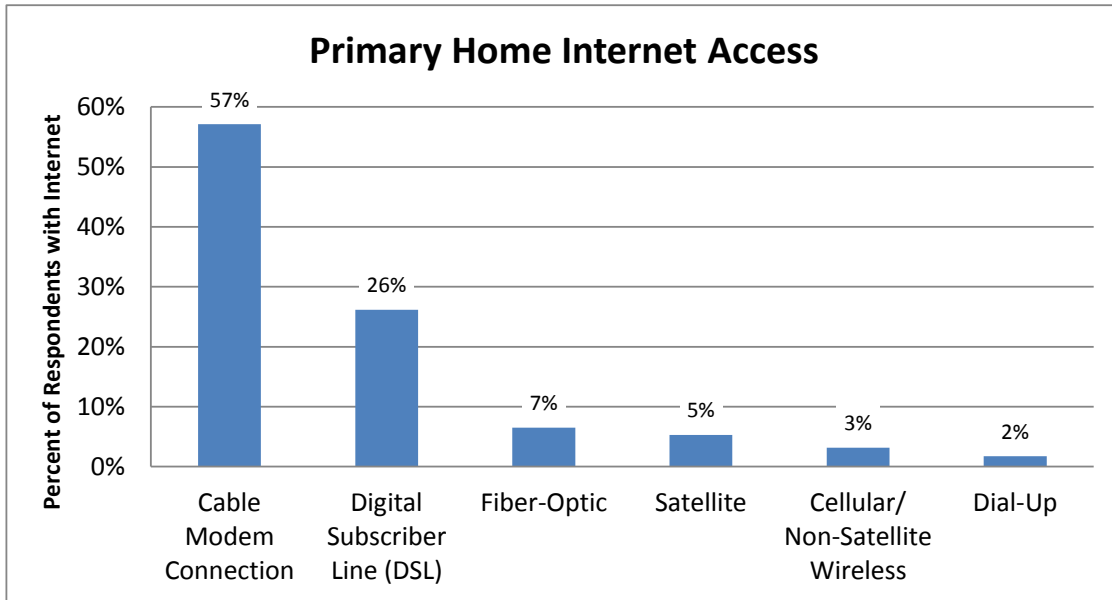
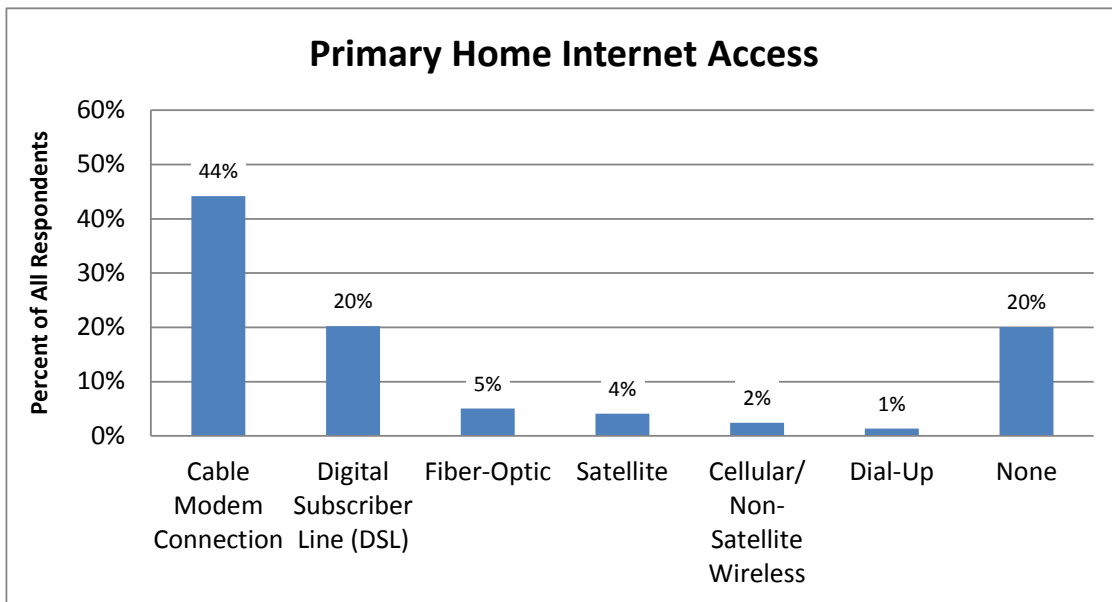


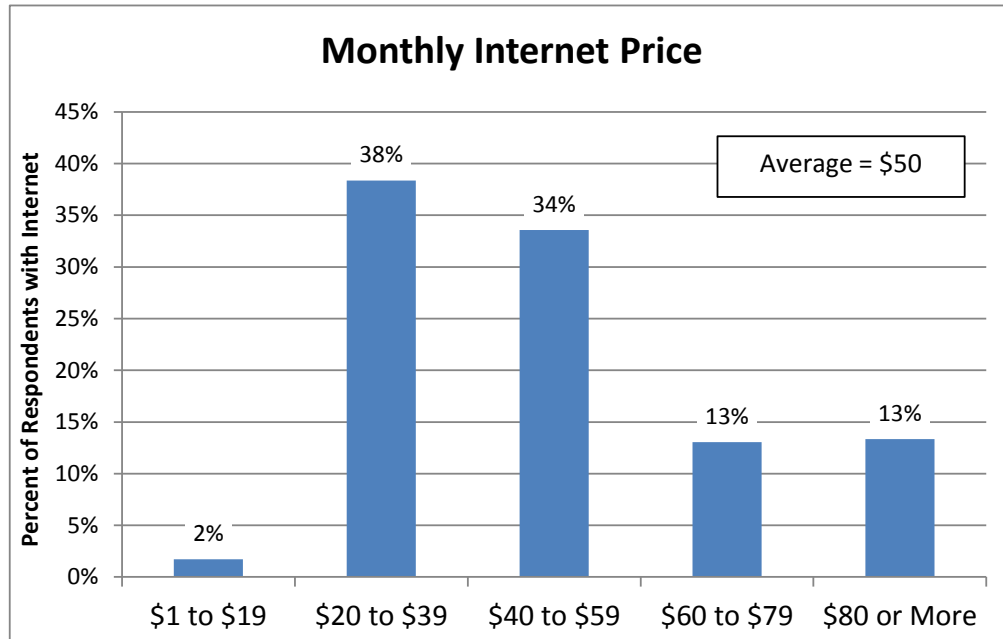
Figure 35: Survey Results—Primary Home Internet Access (All Respondents)



**Monthly Cost**

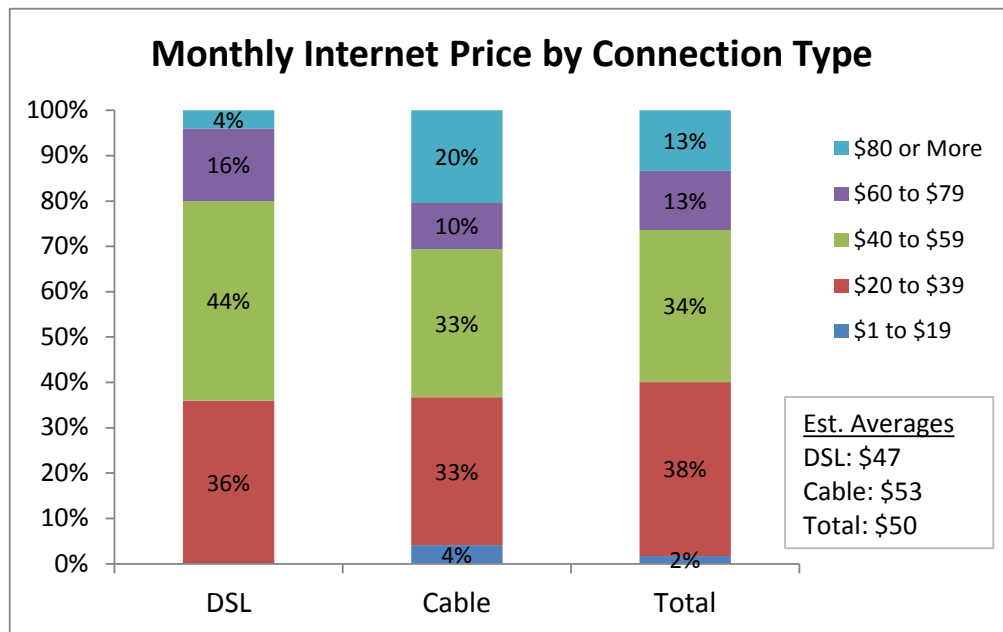
The average subscriber pays an estimated \$50 per month for Internet service. Thirty-eight percent pay \$20 to \$39 per month, and 34 percent pay \$40 to \$59 per month. Another 26 percent pay \$60 or more per month, and 2 percent pay less than \$20.

Figure 36: Survey Results—Monthly Internet Price



The estimated average monthly cost for cable modem connection is slightly higher than the estimated average monthly cost for DSL.

Figure 37: Survey Results—Monthly Internet Price by Connection Type



### Uses of Internet

Allegany County residents use their home Internet connection for a variety of purposes. Nearly all use it for general Internet browsing (94 percent) and for e-mail (92 percent). At least one-half use the Internet for downloading music or videos (56 percent), streaming audio and/or video (54

percent), or online games (52 percent). Nearly one-fourth also use the Internet to connect to work computers, indicating the potential for increased telecommuting if connection speeds are sufficient.

Figure 38: Survey Results—Internet Activities

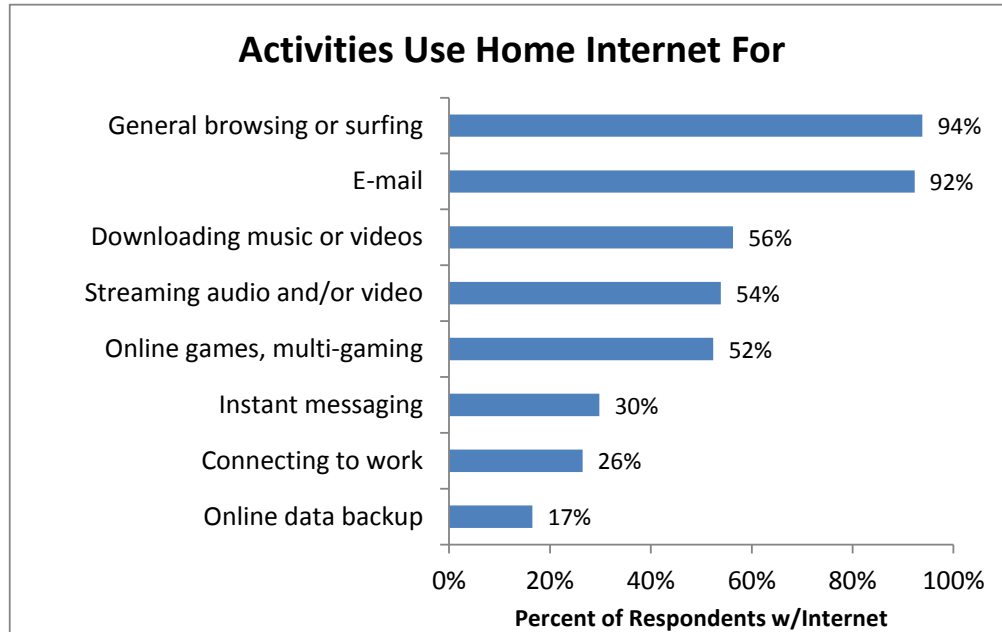
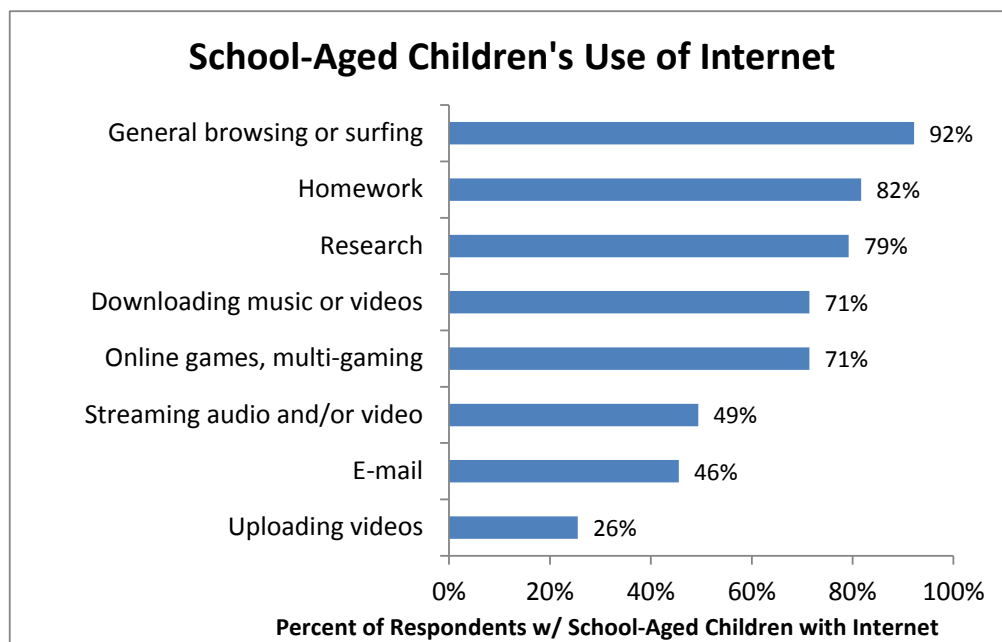


Figure 39: Survey Results—School-Age Children's Internet Activities



School-age children are most likely to use the Internet for information purposes, including general browsing, homework, and research. A sizeable percentage also uses the Internet for downloading music or videos and for games.



Although based on a relatively small number of respondents, it appears that use of the Internet varies by age, as well as presence of children in the household for some activities. In general, older adults are less likely to use the Internet for various purposes. Those with school-age children at home are more likely than those without children to use the Internet for instant messaging, downloading music or videos, streaming audio and/or video, and online games.

**Table 8: Survey Results—Uses of Internet by Age of Respondent**

<b>Uses of Internet by Age of Respondent</b>					
	<b>18 to 34 Years</b>	<b>35 to 44 Years</b>	<b>45 to 54 Years</b>	<b>55 to 64 Years</b>	<b>65 Years and Older</b>
General Browsing	100%	100%	100%	100%	72%
E-mail	100%	86%	100%	100%	76%
Instant Messaging	25%	50%	37%	35%	4%
Online Data Backup	13%	21%	26%	16%	4%
Downloading Music or Videos	63%	79%	74%	45%	20%
Streaming Audio and/or Video	75%	71%	58%	45%	12%
Online Games	63%	71%	58%	52%	16%
Connecting to Work	25%	29%	32%	42%	4%
None	0%	0%	0%	0%	16%
<i>Total Number of Respondents</i>	<i>26</i>	<i>15</i>	<i>19</i>	<i>17</i>	<i>18</i>

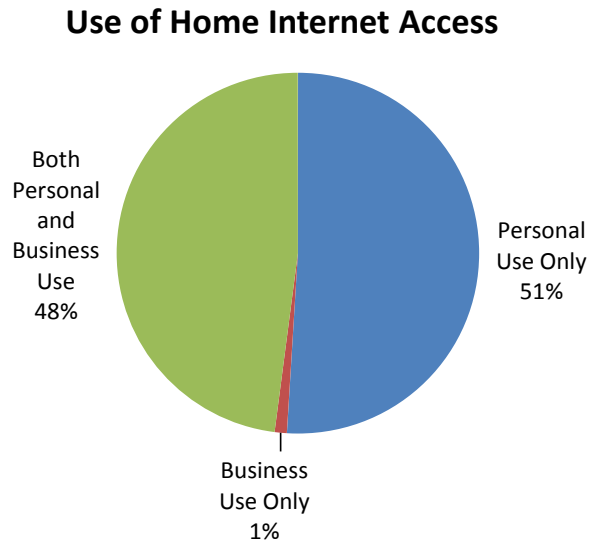
**Table 9: Survey Results—Uses of Internet by Children in Household**

<b>Uses of Internet by Children in Household</b>			
	<b>No Children</b>	<b>Pre-Schoolers Only</b>	<b>School-Age Children Only</b>
General Browsing	88%	100%	100%
E-mail	87%	100%	97%
Instant Messaging	19%	28%	48%
Online Data Backup	11%	36%	19%
Downloading Music or Videos	47%	45%	69%
Streaming Audio and/or Video	34%	100%	61%
Online Games	29%	72%	73%
Connecting to Work	25%	36%	28%
None	8%	0%	0%
<i>Total Number of Respondents</i>	<i>48</i>	<i>12</i>	<i>34</i>

About one-half of respondents use their home Internet connection at least partly for work-related purposes. This may include connecting to work computers, information gathering for work-related activities, checking work e-mail, or for other work-related purposes. (This may also indicate the potential for increased telecommuting if Internet speeds are sufficient to support

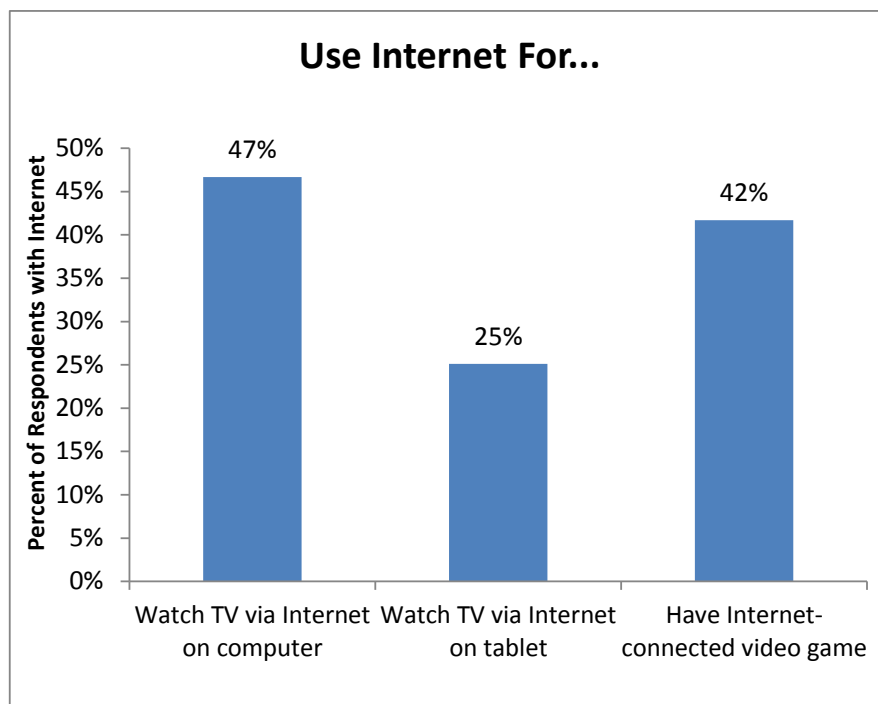
work-related functions; telecommuting is discussed in more detail later in this report.)

Figure 40: Survey Results—Use of Home Internet Access for Business



Nearly one-half of those with Internet access use it to watch movies or television shows on the computer. One-fourth use the Internet to watch movies or television shows on a tablet or smart phone. Additionally, 42 percent of those with Internet access own a video gaming console that is connected to the Internet. (Forty-three percent do not own a game console, and 15 percent own one that is not connected to the Internet.)

Figure 41: Survey Results—Use of Internet for Watching TV



Use of the Internet for watching movies or television shows or for connecting a video gaming console varies by age of respondent, with older adults being far less likely to use the Internet for these purposes. Additionally, those with children in the household are much more likely to have a video gaming console that is connected to the Internet.

Figure 42: Survey Results—Internet Use by Age

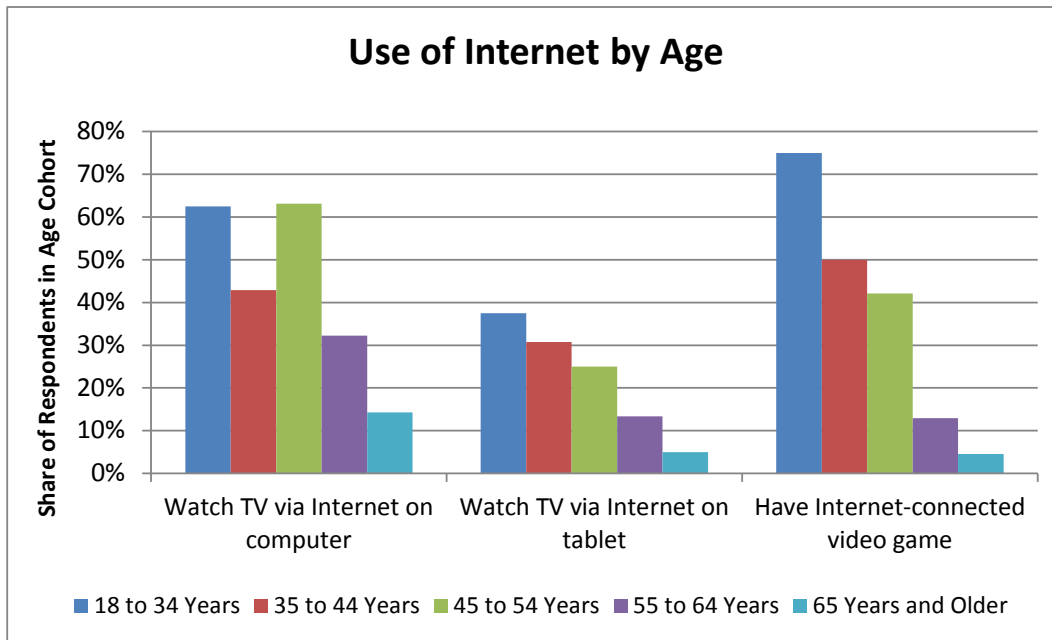
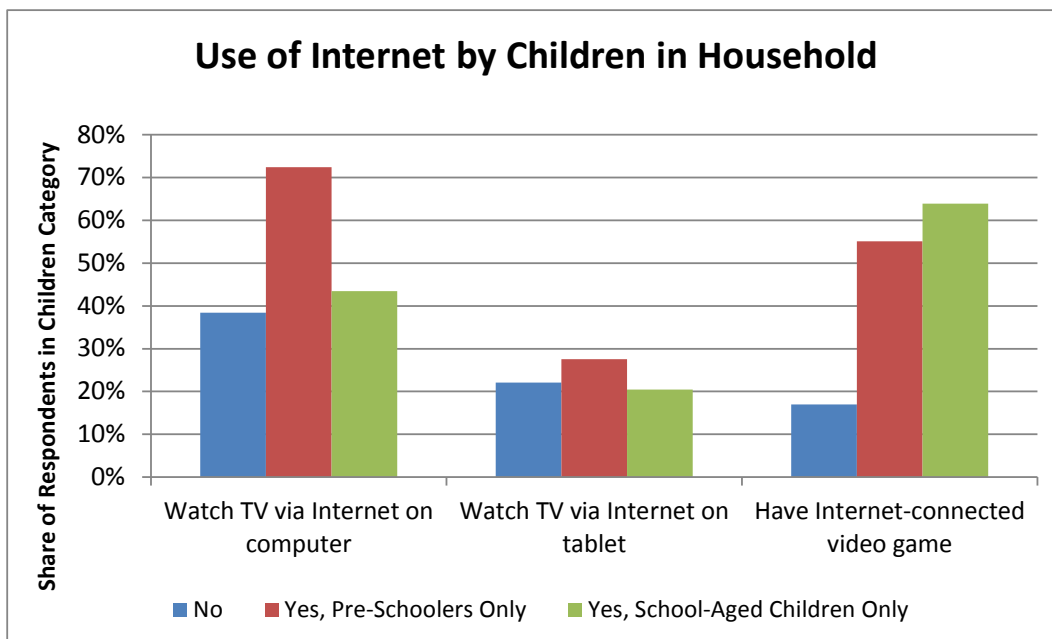


Figure 43: Survey Results—Internet Use by Children

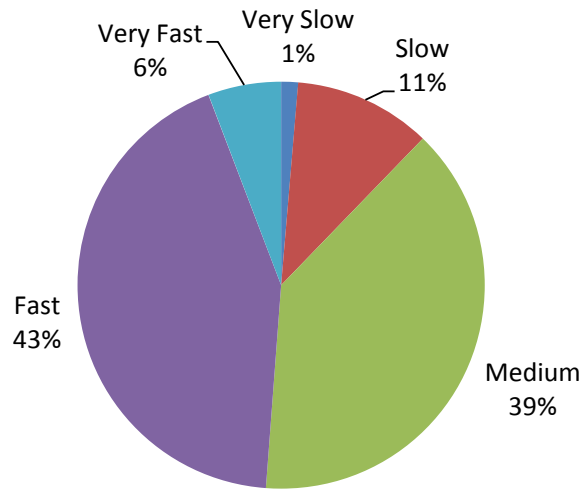


**Connection Speed**

Respondents were asked to describe the speed of their home Internet connection. Nearly one-half of respondents indicated that their connection speed was “fast” or “very fast”, while only 12 percent described their speed as “slow” or “very slow”. Another 39 percent described their connection speed as “medium.”

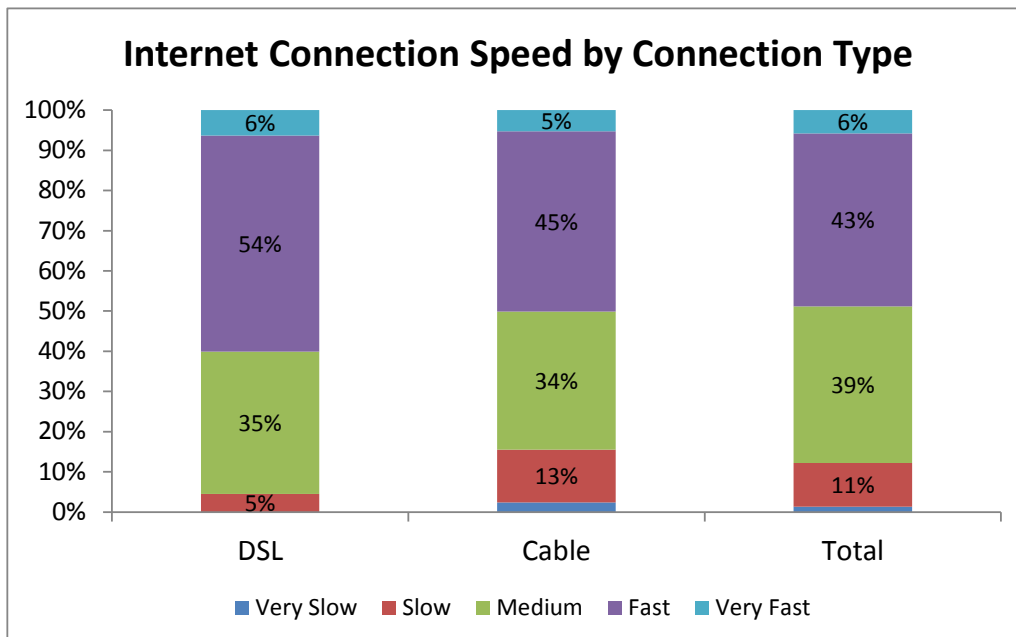
Figure 44: Survey Results—Internet Connection Speed

**Internet Connection Speed**



Connection speed reported by cable and DSL users did not vary significantly by connection type. Both DSL and cable users reported moderate to fast rates of speed.

Figure 45: Survey Results—Internet Connection Speed by Connection Type



### 6.1.4.2 Internet Satisfaction and Importance Levels

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

Table 10: Survey Results—Importance of and Satisfaction with Aspects of Internet Service

Importance of and Satisfaction with Internet Service Aspects							
		Connection Speed	Connection Reliability	Bill Clarity	Billing & Account Service	Technical Support Service	Total Price Paid
Importance	1-Not at All Important	0%	0%	0%	0%	0%	0%
	2	1%	0%	6%	1%	2%	1%
	3	3%	3%	26%	27%	9%	2%
	4	29%	18%	32%	35%	30%	18%
	5-Very Important	67%	79%	36%	36%	59%	79%
	<b>Mean</b>	<b>4.6</b>	<b>4.8</b>	<b>4.0</b>	<b>4.1</b>	<b>4.5</b>	<b>4.8</b>
Satisfaction	1-Very Dissatisfied	1%	5%	1%	6%	3%	11%
	2	7%	9%	8%	4%	7%	27%
	3	29%	25%	25%	27%	40%	38%
	4	39%	34%	37%	36%	28%	14%
	5-Very Satisfied	25%	27%	29%	27%	22%	10%
	<b>Mean</b>	<b>3.8</b>	<b>3.7</b>	<b>3.9</b>	<b>3.7</b>	<b>3.6</b>	<b>2.9</b>

Overall, the most **important** service aspects are Connection reliability (79 percent Very Important; 4.8 mean) and Price paid (79 percent Very Important, 4.8 mean), followed by: Connection speed (67 percent Very Important; 4.6 mean), Technical support service (59 percent Very Important; 4.5 mean), Billing and account service (36 percent Very Important; 4.1 mean), and Bill clarity (36 percent Very Important, 4.0 mean).

Overall, most Internet users appear to be moderately satisfied with aspects of their Internet service, although there is some room for improvement. Bill clarity was the highest-rated aspect (29 percent Very Satisfied, 3.9 mean), followed by: Connection speed (25 percent Very Satisfied, 3.8 mean), Billing and account service (27 percent Very Satisfied; 3.7 mean), Connection reliability (27 percent Very Satisfied; 3.7 mean), Technical support service (22 percent Very Satisfied; 3.6 mean), and Price paid (10 percent Very Satisfied; 2.9 mean).

The charts in this section highlight the **gaps** between **importance** of services provided and **satisfaction** with those aspects. Although most Internet users were relatively satisfied overall, assessing the gaps can help providers identify what features might need improvement.

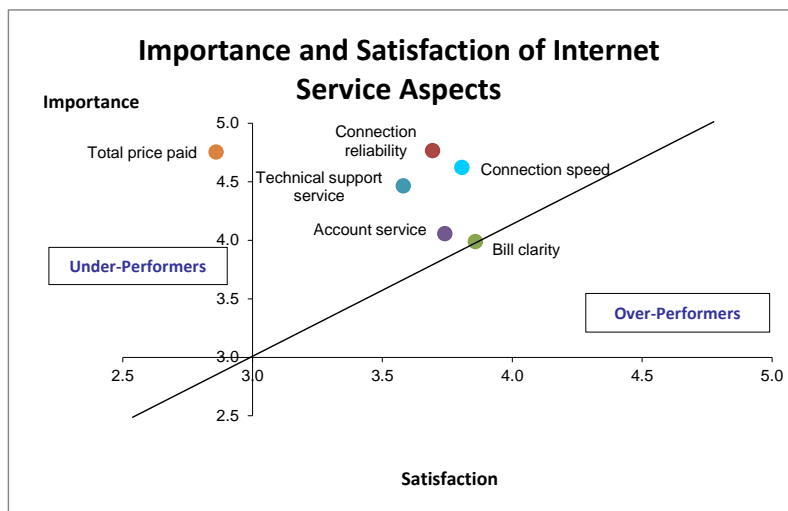
The results suggest that customers are generally satisfied with the most important aspects of service, but there is a sizeable “service gap” (difference between importance and satisfaction) with all aspects of their Internet service, except bill clarity.

Table 11: Survey Results—Gap Between Satisfaction and Importance Ratings

	<u>Mean</u> <u>Satisfaction</u>	<u>Mean</u> <u>Importance</u>	<u>GAP</u> <u>&lt; = &gt;</u>	<u>Significance</u>
■ Connection speed	3.8	4.6	-0.8	Expectations not met
■ Connection reliability	3.7	4.8	-1.1	Expectations not met
■ Bill clarity	3.9	4.0	-0.1	Not significant
■ Account service	3.7	4.1	-0.3	Expectations not met
■ Technical support service	3.6	4.5	-0.9	Expectations not met
■ Total price paid	2.9	4.8	-1.9	Expectations not met

The largest gap occurs for price paid, followed by connection reliability, technical support service, and connection speed. There is a small, but significant, gap between satisfaction and importance for billing and account service. The gaps for these aspects are partially driven by the relatively high importance place on these aspects by respondents. At the same time, these gaps identify aspects where Internet service can be improved in Allegany County.

Figure 46: Survey Results—Graph of Gap Between Satisfaction and Importance Ratings

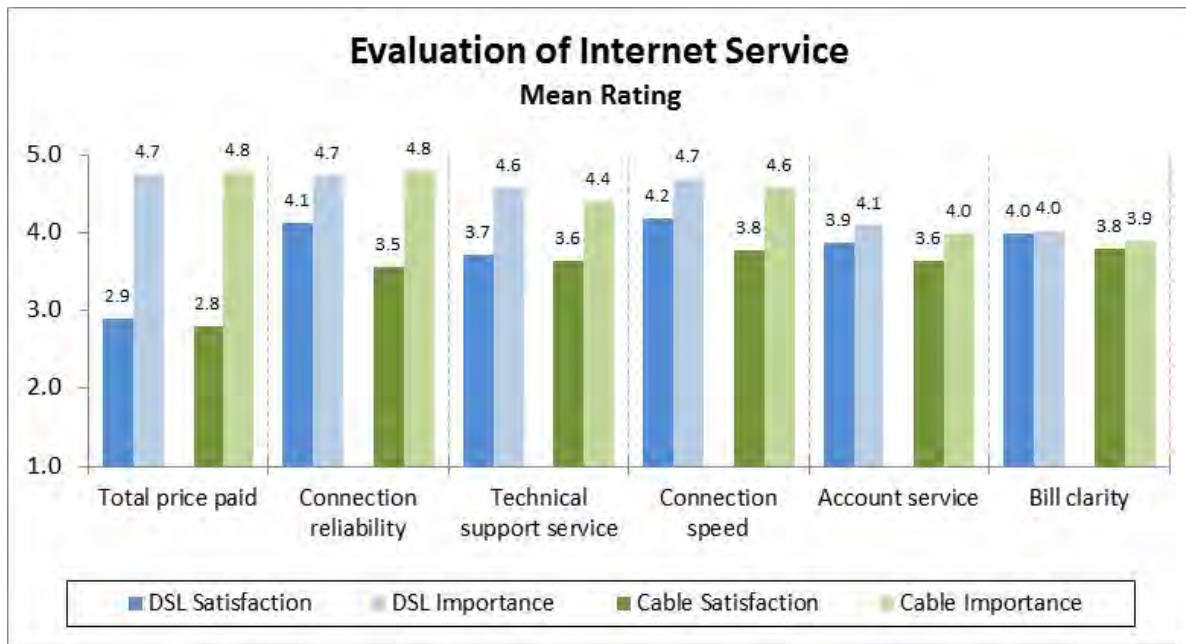


Although respondents are relatively satisfied with their Internet service, all aspects but bill clarity are considered “under-performers” in the regard that satisfaction scores are lower than importance scores.

Cable users have a larger gap between satisfaction and importance of connection reliability, compared with DSL users. In general, cable users are less satisfied with this aspect of their

service. Similarly, they are somewhat less satisfied with connection speed.

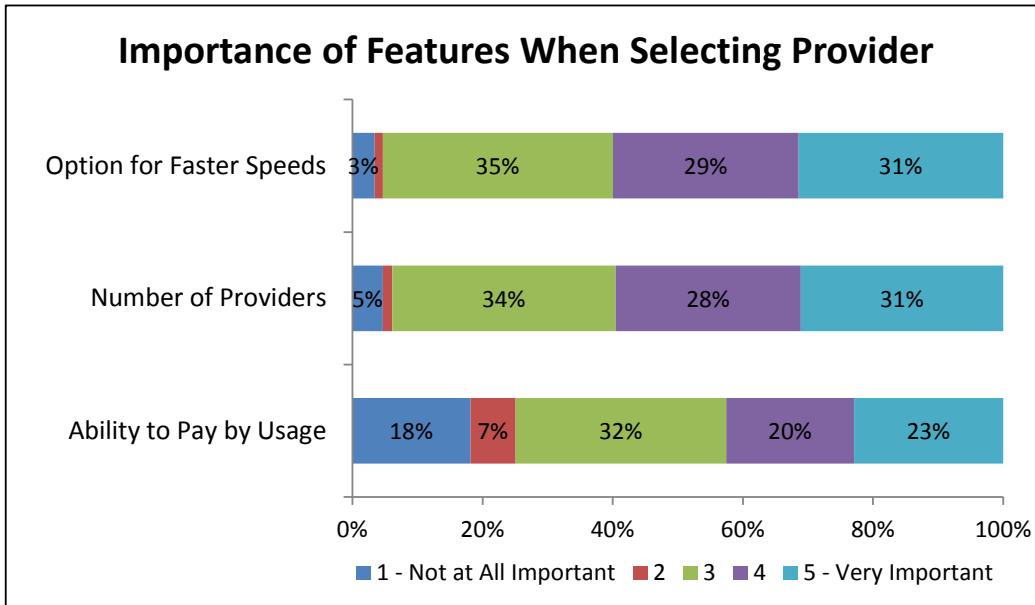
Figure 47: Survey Results—Evaluation of Internet Service (Mean Ratings)



**Importance of Features in Selecting Provider**

Respondents were asked to evaluate the importance of features when selecting an Internet service provider, using a scale where 1=Not at All Important and 5=Very Important. The option to purchase very fast Internet bandwidth (31 percent Very Important, 3.8 mean) and choice of a greater number of Internet providers (31 percent Very Important, 3.8 mean) are relatively important features. Ability to pay for Internet based on usage (23 percent Very Important, 3.2 mean) is somewhat less important.

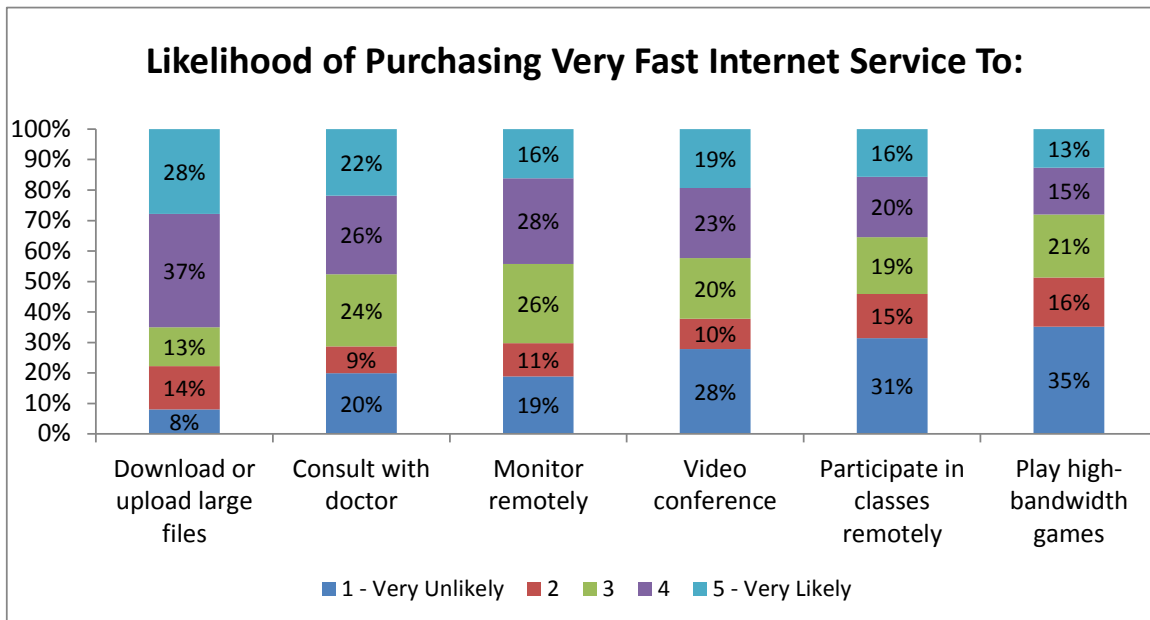
Figure 48: Survey Results—Importance of Features When Selecting Provider



**Likelihood of Purchasing Very Fast Internet Service**

Respondents were asked how likely or unlikely they would be to purchase very fast Internet service that allowed them to perform various activities, using a scale where 1=Very Unlikely and 5=Very Likely. Among the activities listed, download or upload large data files or photos/videos ranks as the top reasons for purchasing very fast Internet service (28% Very Likely, 3.6 mean).

Figure 49: Survey Results—Likelihood of Purchasing Very Fast Internet Service



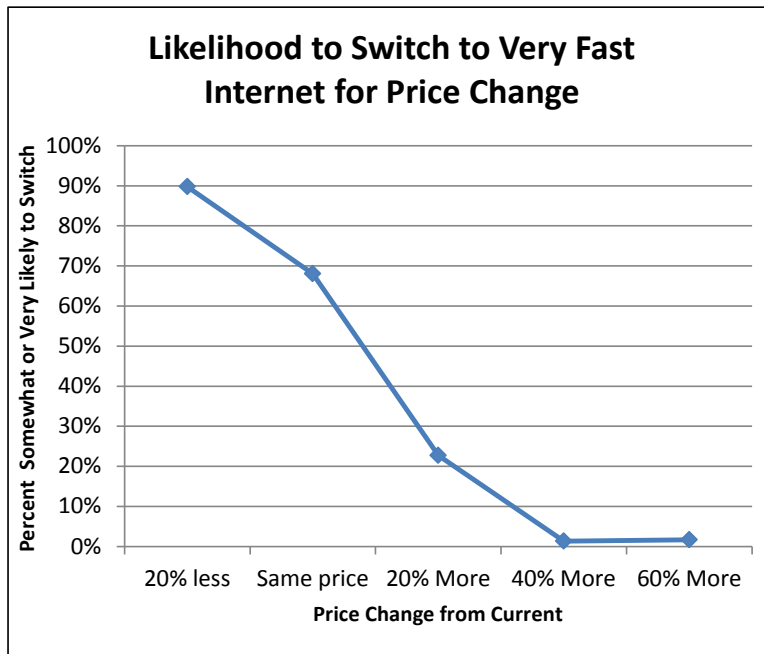
**Likelihood of Switching to Very Fast Internet Service**

Using the same scale, respondents were also asked how likely or unlikely they would be to



switch to Internet service that is much faster than DSL or cable modem for various price increases. Almost all (90 percent) would be likely to switch if it cost 20 percent less per month, and 68 percent would be likely to switch for the same price. Twenty-two percent would be likely to switch for 20 percent more per month. Very few would switch for an additional 40 percent or more per month.

Figure 50: Survey Results—Likelihood of Switching to Very Fast Internet Service



#### 6.1.4.3 Telephone Service

Survey respondents were also asked a few questions about their telephone service, including migration toward increasing use of Internet phone and cell phone services.

##### *Type of Telephone Service*

About three-fourths have land-line telephone service, either from their local provider (e.g. Verizon) or their cable company, and 79 percent have cell phone service. However, only 33 percent said cell phone is their primary type of telephone service. Nearly two-thirds use a land-line as their primary telephone.

Figure 51: Survey Results—Type of Telephone Service

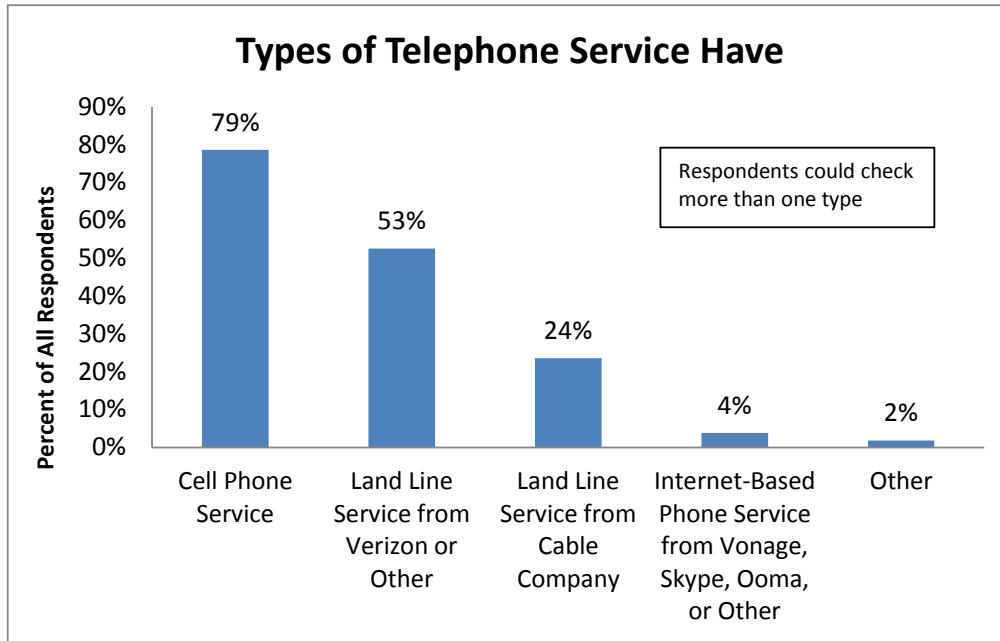
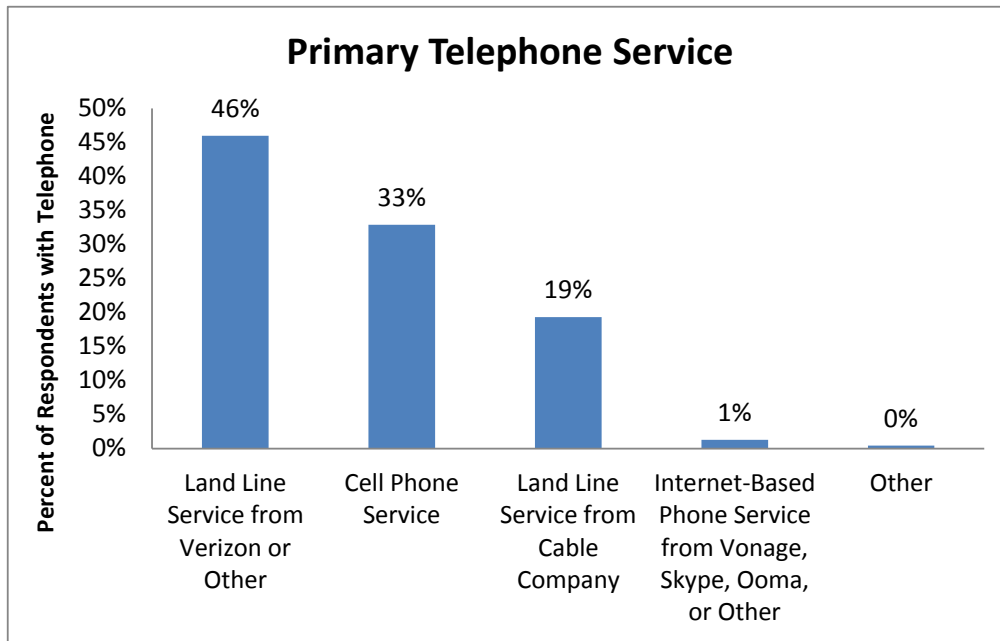


Figure 52: Survey Results—Primary Telephone Service



**Consider Switching Providers**

Respondents were asked if they would consider switching their primary telephone service in the next year. Twelve percent reported using an Internet-based telephone service, another 10 percent said they are considering the switch. Nearly three in 10 are unfamiliar with the technology, and 21 percent are unsure whether or not they would switch.

Figure 53: Survey Results—Consider Switching to Internet-Based Telephone Service

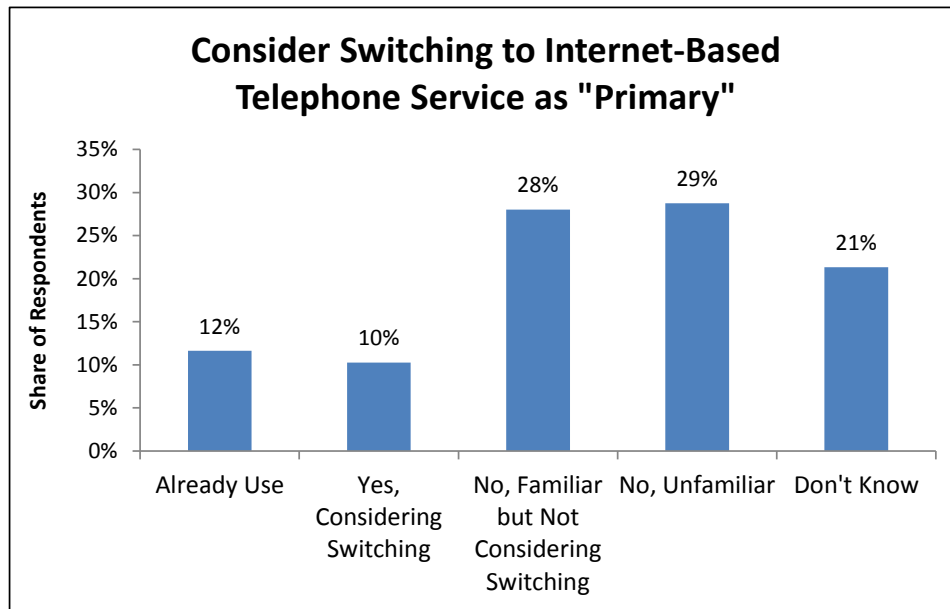
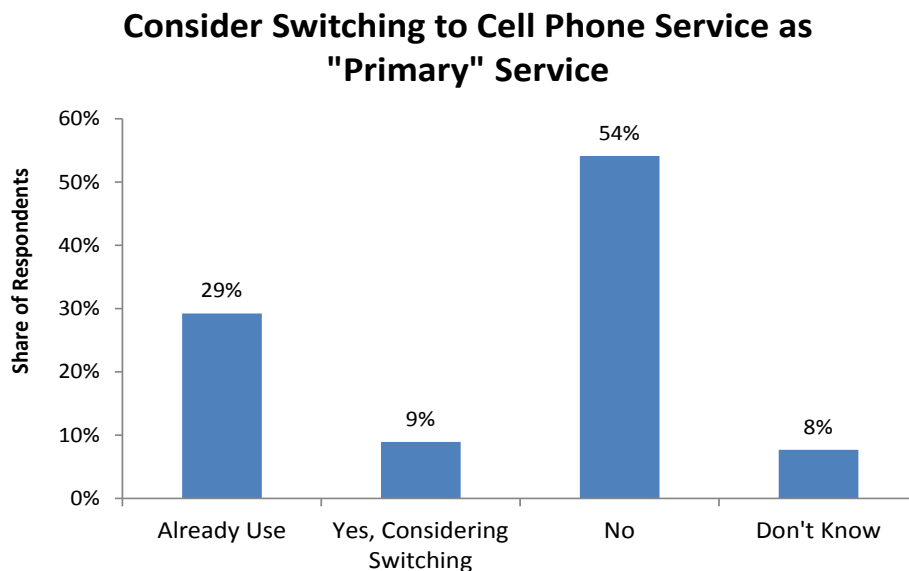


Figure 54: Survey Results—Consider Switching to Cell Phone as Primary Phone Service



About one in 10 would consider switching to a cell phone service as their primary number in the next year, while 29 percent said they already use this service primarily. This reflects the nationwide trend toward more cell phone-only homes, and shows the potential for a continuation of that trend.

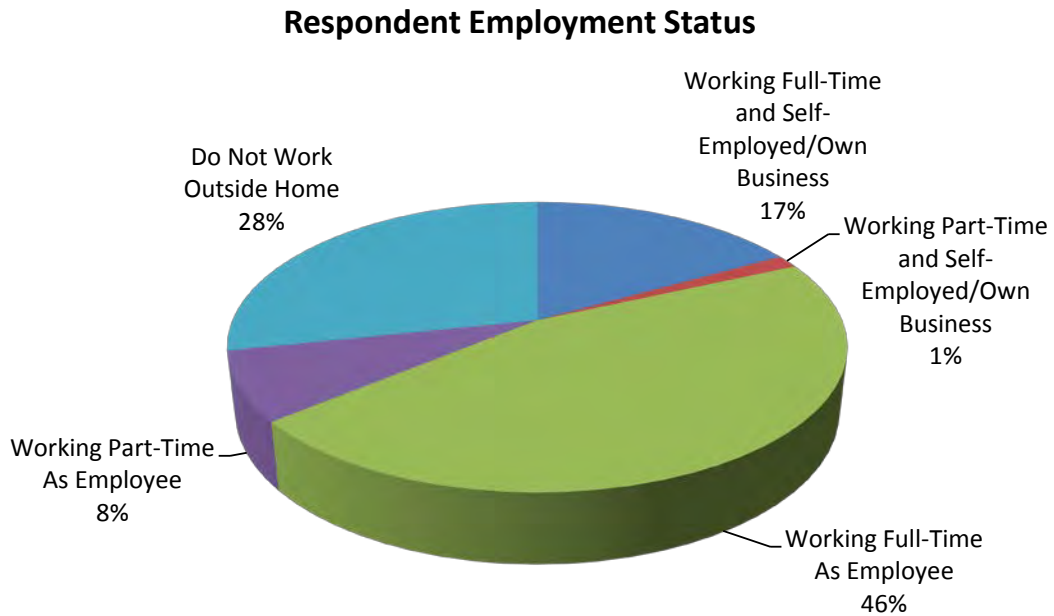
#### 6.1.4.4 Telecommuting

In addition to questions about their use of communications services, respondents were asked about their employment status, commuting patterns, and their use of the Internet for telecommuting.

**Employment Status**

Nearly three-fourths of survey respondents are employed, with 9 percent working part-time and 63 percent working full-time. Over one-fourth of respondents indicated that they do not work outside the home.

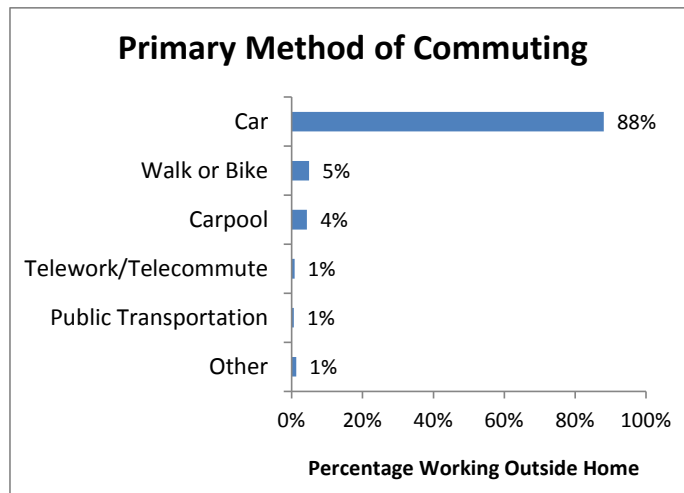
Figure 55: Survey Results—Respondent Employment Status



**Method of Commuting**

The majority of employed respondents commute by car (88 percent). Few walk or bike (five percent), carpool (four percent), or use another mode of transportation primarily.

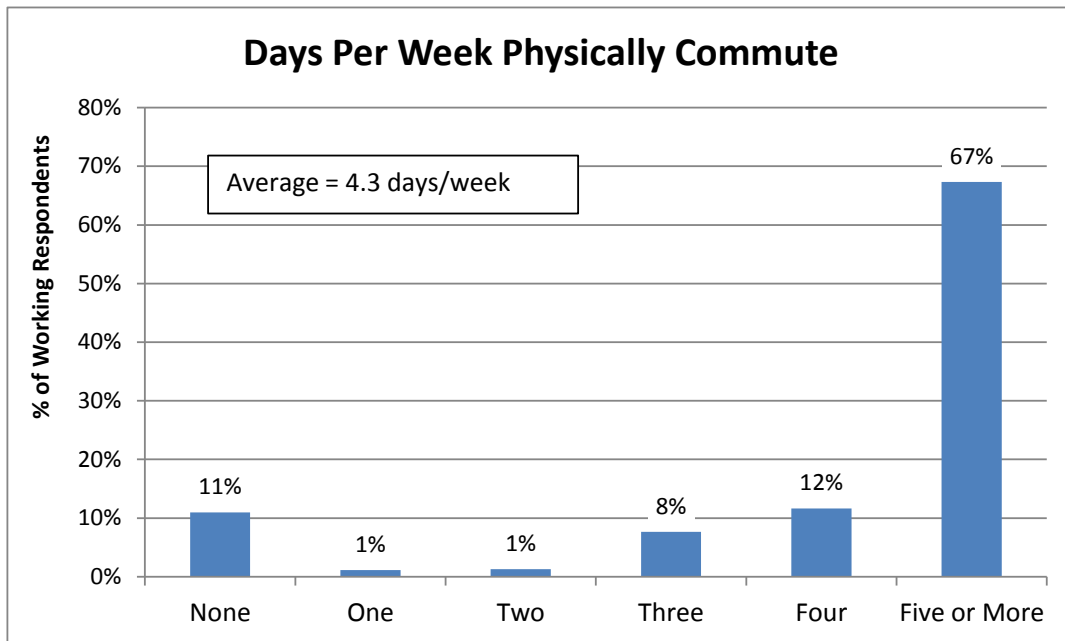
Figure 56: Survey Results—Primary Method of Commuting



**Commute**

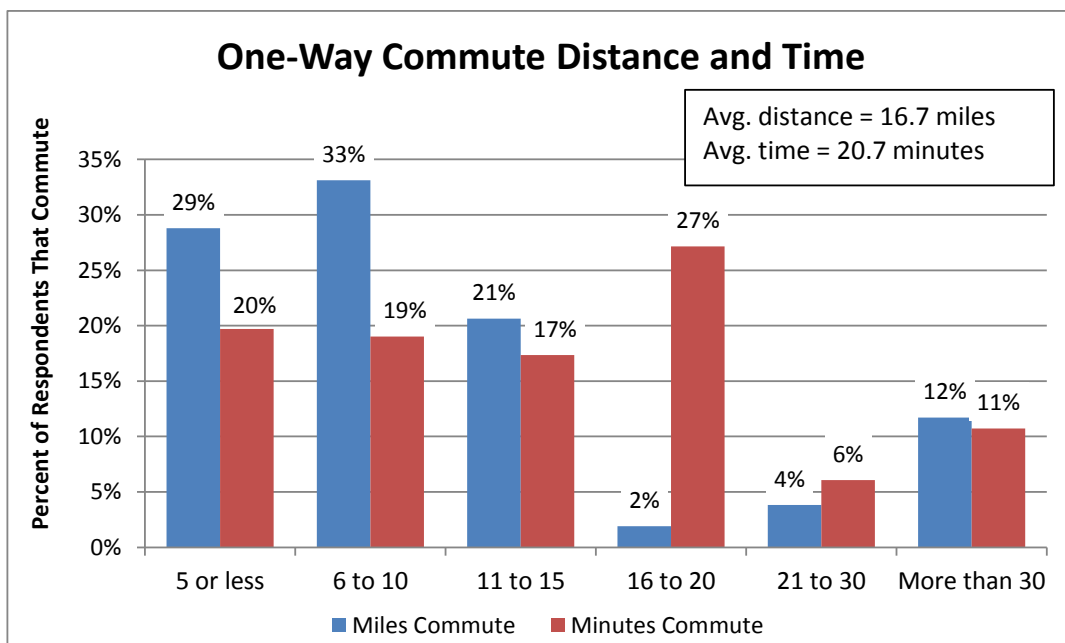
Approximately two-thirds of employed persons commute five or more days per week. The average employed respondent physically commutes to work 4.3 days per week.

**Figure 57: Survey Results—Days per Week Commuting**



On average, employed respondents commute 16.7 miles and 20.7 minutes to work each way.

**Figure 58: Survey Results—One-Way Commuting Distance and Time**

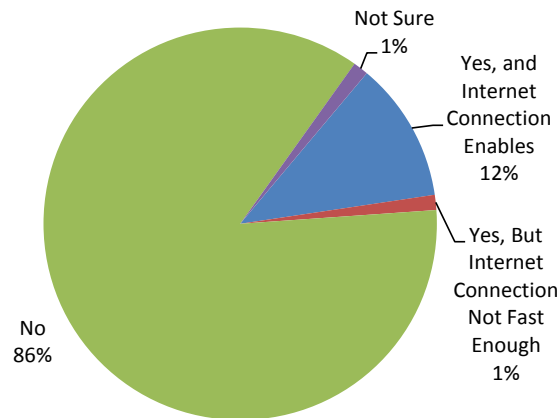


### *Telecommuting*

Thirteen percent of employed respondents said their employer allows telecommuting, with the majority having an Internet connection that would enable telecommuting. However, just three respondents (three percent of employed respondents) telecommute at least one day per week.

Figure 59: Survey Results—Employer Allows Telecommuting

#### **Employer Allows Telecommuting**



Among the 10 whose employer allows telecommuting, two said they would need very high speed Internet to enable working from home. Another four would need high speed Internet, and four would need DSL or cable modem speed. For this question, “very high speed” was defined as 100 Mbps or faster, and “high speed” was defined as 10 to 100 Mbps.

Six of 10 whose employer allows telecommuting said they would not telecommute, even if their Internet connection had sufficient speed and capacity to enable work at home. Four of 10 would telecommute at least one day per week.

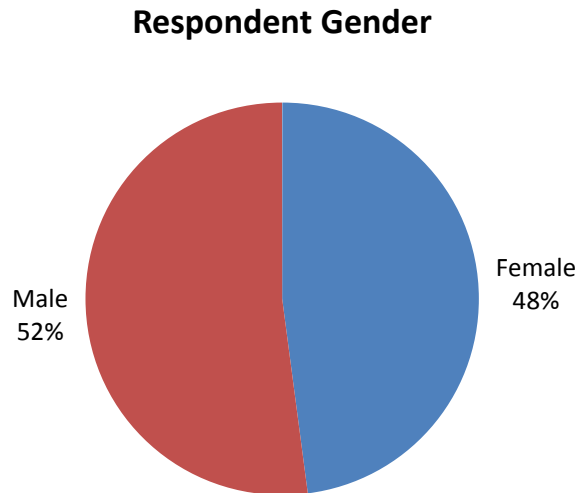
#### **6.1.4.5 Household Characteristics**

Information about each respondent’s home, age, education, income, and other characteristics was also gathered to help define the respondent group and to investigate correlations between these characteristics and responses to other questions.

#### **Gender**

The sample is split almost evenly between men and women.

Figure 60: Survey Results—Gender of Respondents



### *Children in Household*

Approximately 45 percent of respondents had children living in the home, with 29 percent having school-age children. Homes with school-age children are more likely to have home Internet service than are homes with no children.

Figure 61: Survey Results—Children Under Age 18 in Household

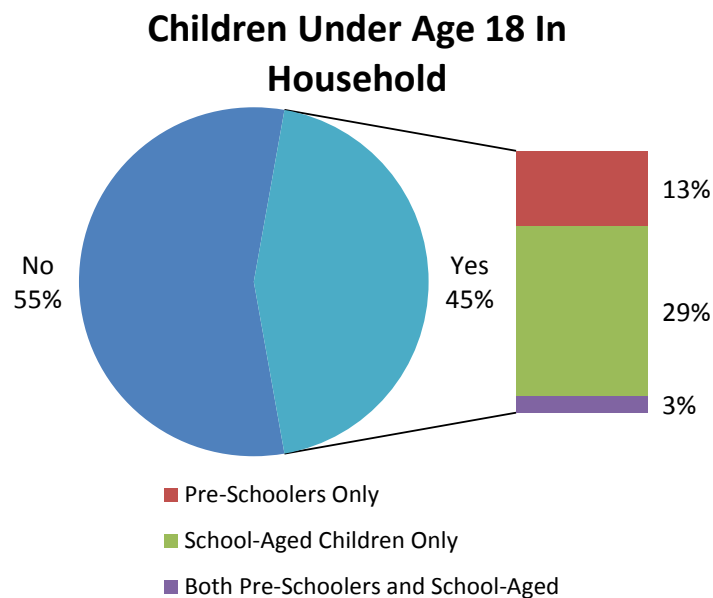
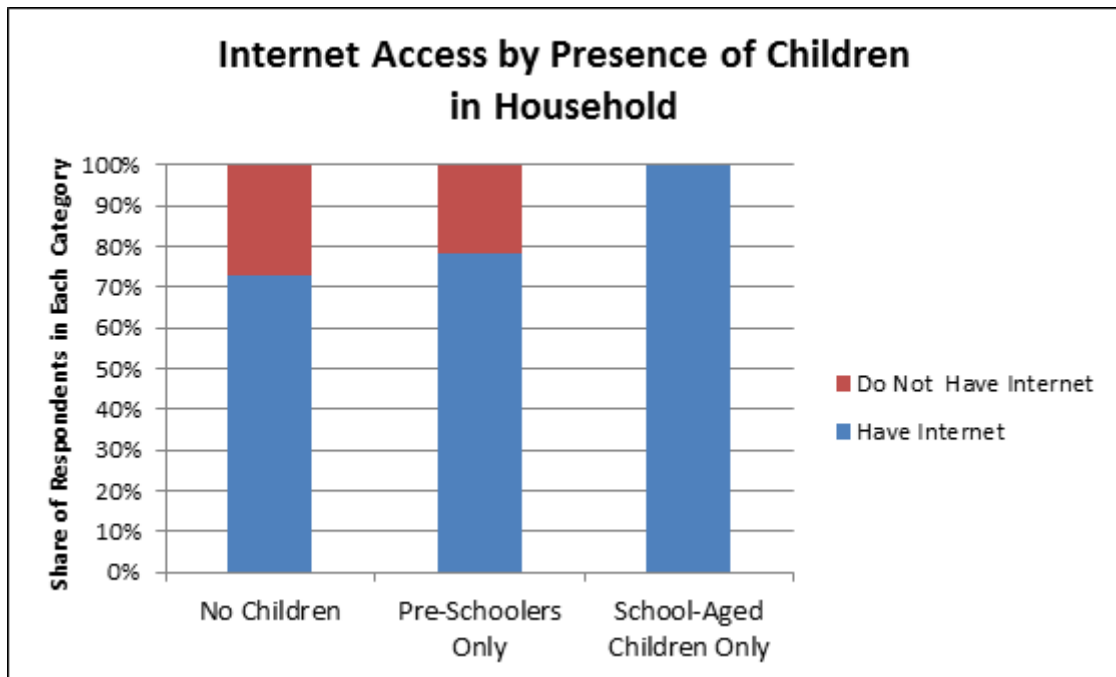
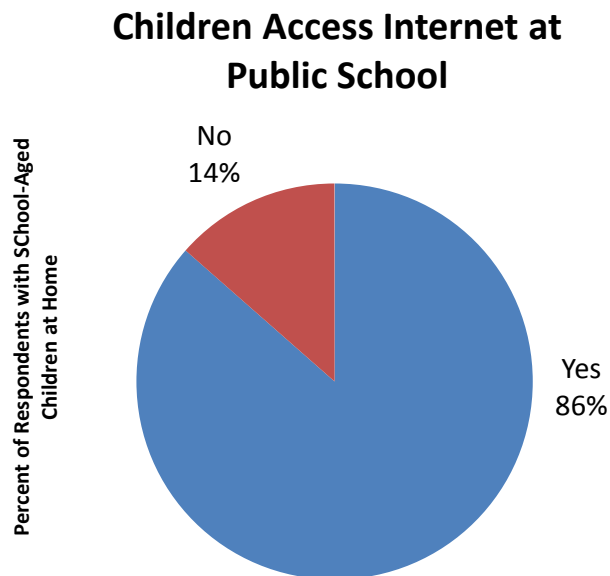


Figure 62: Survey Results—Internet and Children



Overall, 55 percent reported their children having Internet access at public schools, while 34 percent said “no” and 11 percent said they do not know. However, when selecting just those with school-age children *living in the household*, this figure jumps to 86 percent.

Figure 63: Survey Results—Children With Internet Access at Public School



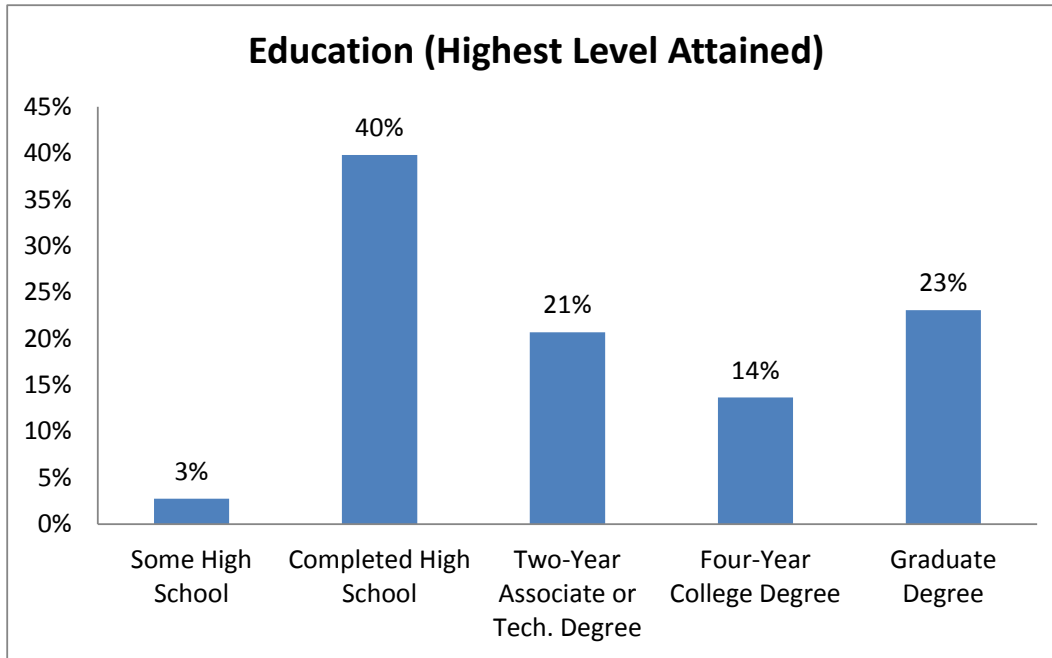
No significant correlations were observed between presence of children in the household and the type of Internet connection used or the type of primary phone service.



**Education**

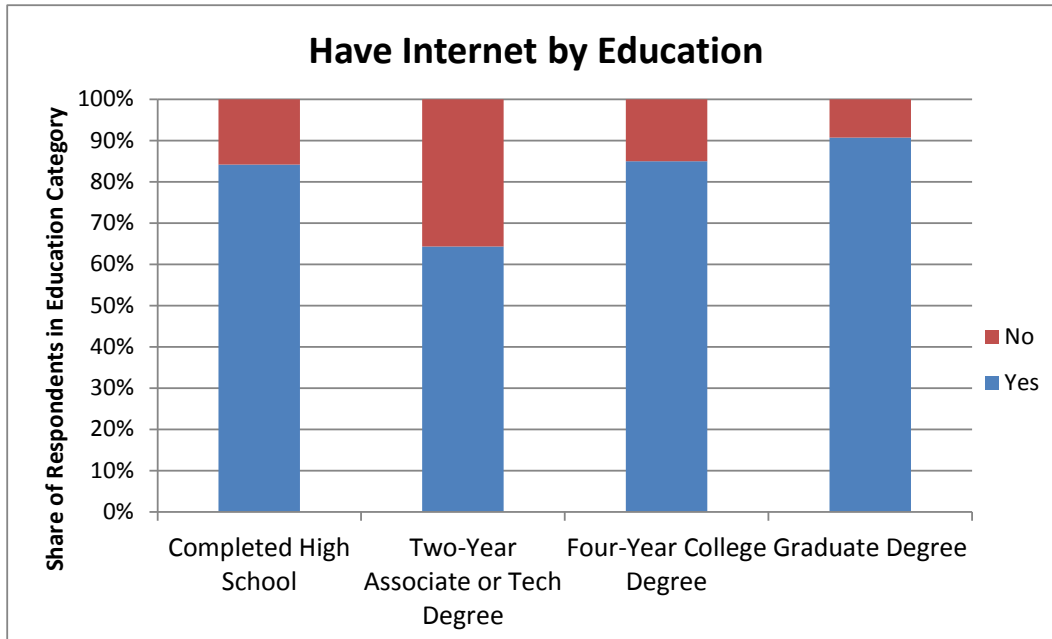
Respondents were also asked about the highest level of education attained. Over one-third of respondents have completed either a four-year college degree or a graduate degree. Four in 10 have a high school education.

**Figure 64: Survey Results—Respondents' Education Level**



Those respondents with a two-year college associate or technical degree are less likely to have home Internet service. However, it is unclear whether this is directly due to education level or whether it is more related to income, age, or other factors.

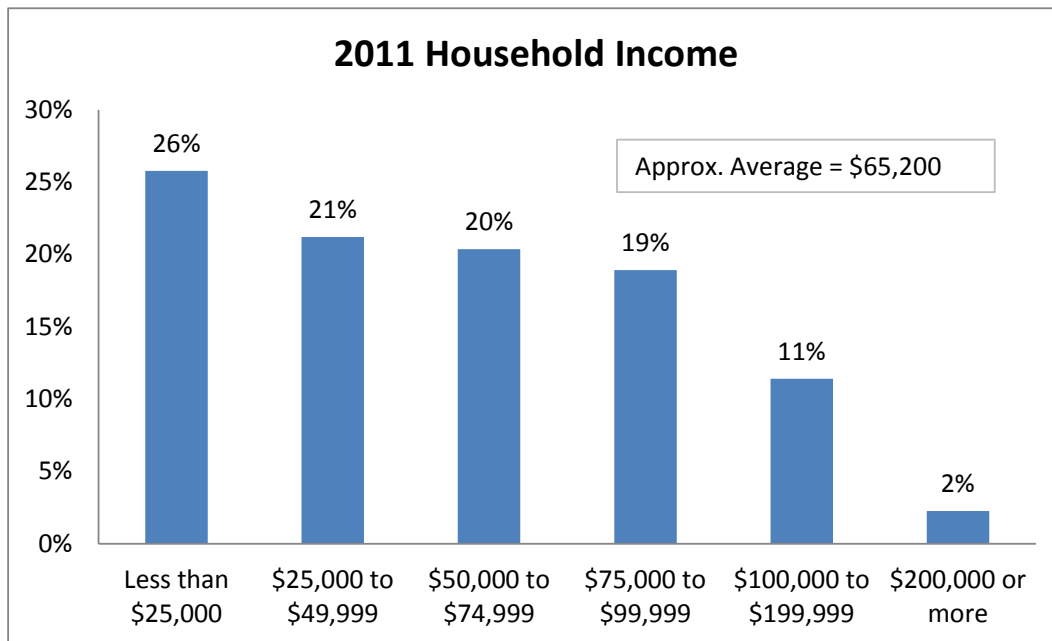
Figure 65: Survey Results—Respondents with Internet Access by Education Level



**Income**

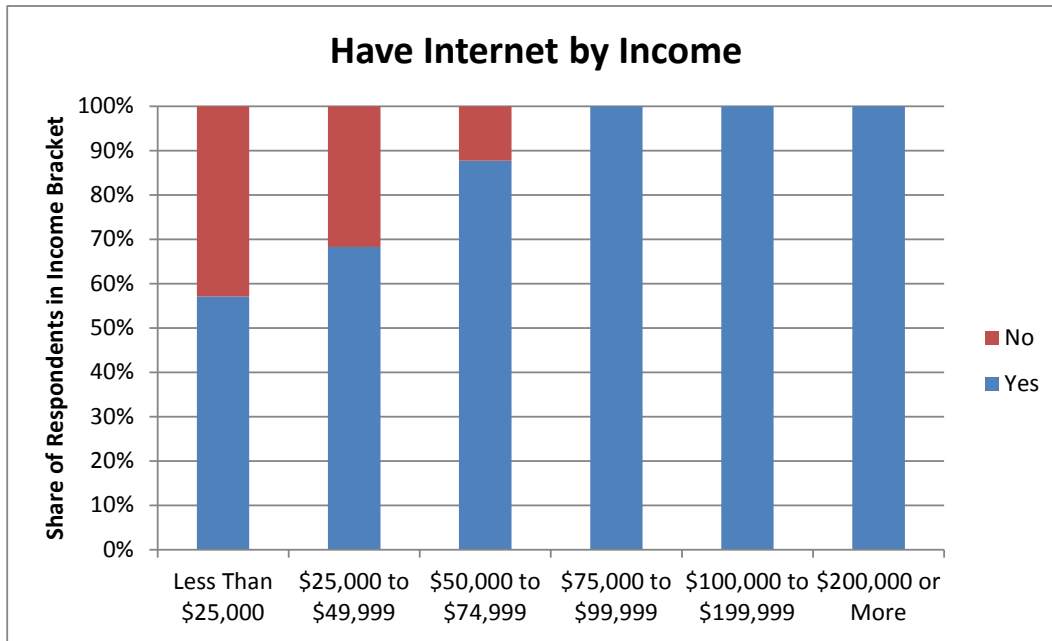
The average household income of survey respondents was approximately \$65,000. About one-fourth of respondents had a household income of less than \$25,000 in 2011. Just two percent had a household income of \$200,000 or more.

Figure 66: Survey Results—Respondents' Household Income



Income plays a significant role in purchasing power for goods and services. Homes with lower income levels are less likely to have home Internet service than other homes.

Figure 67: Survey Results—Respondents with Internet Access by Income

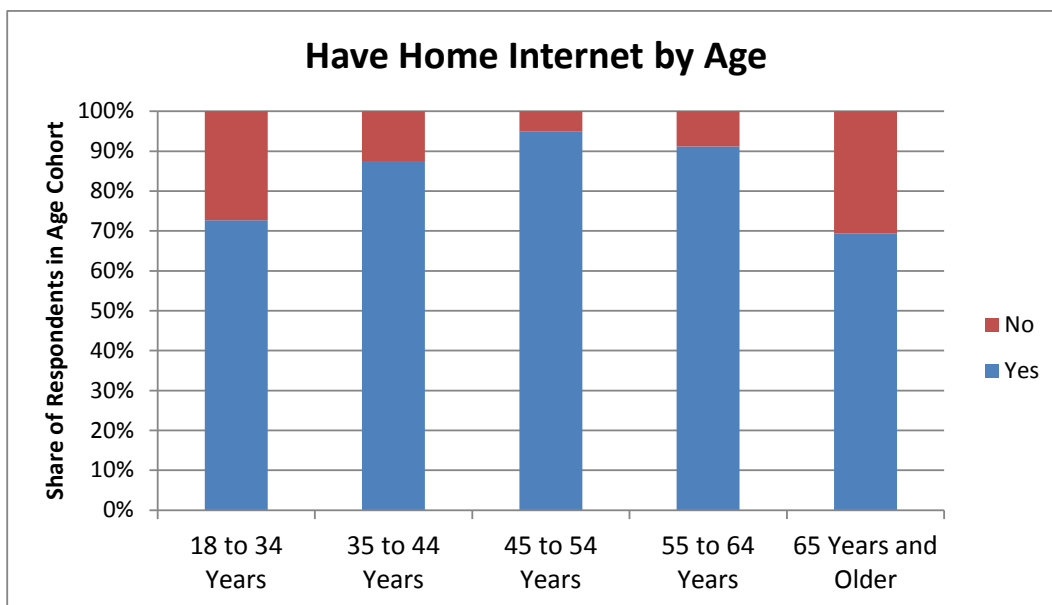


*Age*

The ages of survey respondents, Census data, and the data weighting calculation were discussed earlier in this section. There were a number of correlations observed between age and the types of communications services used.

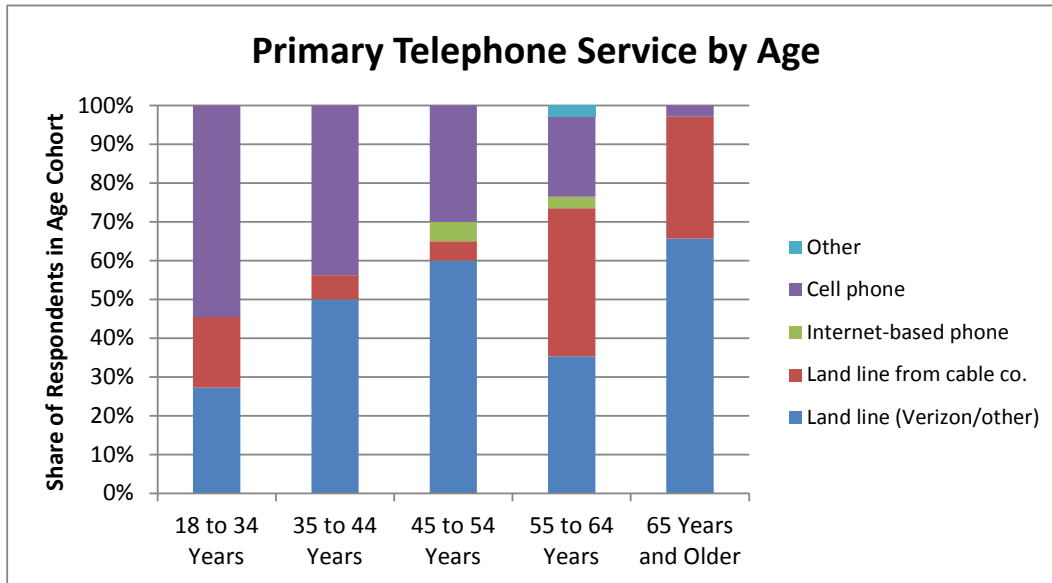
Older and younger respondents are less likely to have home Internet service than are other age groups.

Figure 68: Survey Results—Respondents with Internet Access by Age



The type of primary telephone service is also correlated with the age of the respondent. Younger respondents are more likely to use their cell phone as their primary service, while the share with traditional land lines increases with the respondent's age.

Figure 69: Survey Results—Respondents Primary Telephone Service by Age



### *Home-Based Business*

Approximately five percent of respondents indicated that they already have a home-based business, and another 11 percent intend to start one in the next one to three years. Four in 10 of those with a home-based business or planning to start one said that high-speed Internet service is “very important” to that business.

Figure 70: Survey Results—Respondents with Home-Based Businesses

### Have or Plan to Start Home-Based Business

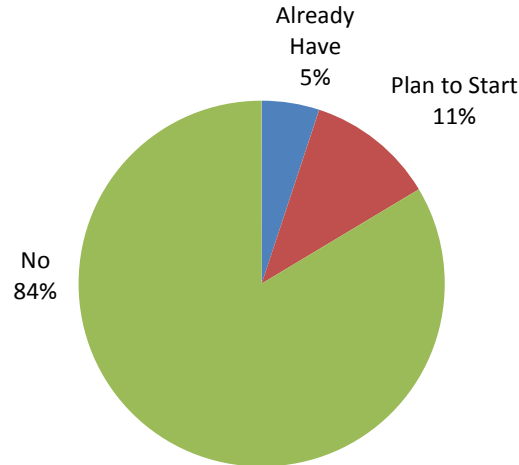
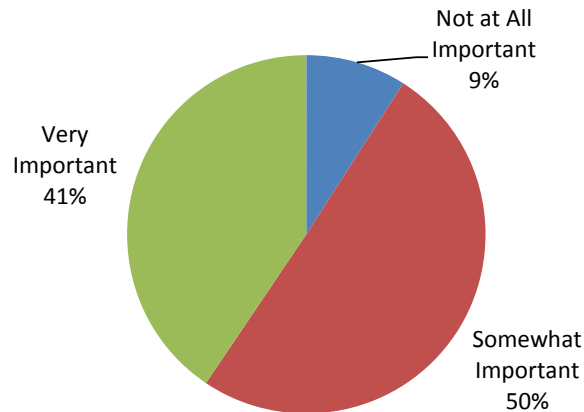


Figure 71: Survey Results—Importance of Internet Connection to Home-Based Business

### Importance of High-Speed Data or Internet Connection to Home-Based Business



## 6.2 Business Survey Summary

In March 2012, 874 invitations were e-mailed to businesses in Allegany County, soliciting their response to an on-line survey about their Internet service and use. The survey questions were designed to obtain information about business' access to the Internet, services purchased, and their use of the Internet for their business activities. It also captured opinions about Internet

services within Allegany County and identified ways in which those services may be improved to better meet the needs of the County's business community.

Key findings from the business Internet Services Survey include:

- Almost all responding businesses have Internet access. Cable is the most prevalent connection type, with approximately 40 percent market share. Businesses with less than 20 employees at the location are far more likely to use cable, compared with larger businesses.
- Most responding businesses infrequently experience downtime or lost connection, but most know whom to contact should they experience technical difficulties. More than one-third (36 percent) have contacted their Internet service provider because of technical difficulties, billing, or other issues, with the majority (94 percent) saying their issue was resolved in a satisfactory manner.
- Sharing images or photos was the most common business Internet activity. Sharing photos or images and large data/file transfers were rated as the most important of the various Internet uses evaluated.
- The majority (67 percent) indicated that their Internet service is fast enough to meet their needs. Another 28 percent said their service speed is marginal, and five percent said it is slow to very slow.
- Accessibility of high-speed Internet might have some impact on local businesses and employment in Allegany County. One-fifth (20 percent) said they would be more likely to employ people in Allegany County if they had cost-effective very-high-speed Internet. More than one-fourth (27 percent) would be more likely to locate facilities in the County if they had cost-effective very-high-speed Internet.
- There is a fairly sizeable "service gap" (difference between importance and satisfaction) with all aspects of business Internet service. The largest gap occurred for reliability, and the smallest gap for total price paid for service. This is atypical, because price usually has a large gap and other aspects have much smaller gaps.
- Respondents would be somewhat willing to pay 20 percent more for Internet service that allowed them to more quickly and efficiently perform key activities. The majority would be unwilling to pay an additional 40 percent or more. This shows little price "headroom," even for higher-speed or higher-quality service.
- There is only moderate agreement that the local market currently offers affordable and reliable high-speed Internet. Budget/financial considerations and the lack of availability is the largest constraint on businesses' greater use of high-speed Internet.
- Most businesses believe that mobile access to the Internet will become more important for their business over the next five years.

### **6.2.1 Background and Objectives**

The business Internet Services Survey was designed to capture information about Internet access and use among businesses in Allegany County. The survey questions also solicited opinions about current Internet service and their future Internet needs. To meet those objectives, survey recipients were asked about their:

- Internet connections and availability
- Internet use for a variety of business-related activities
- Satisfaction with, and importance of, Internet service aspects
- Opinions about Internet services available to businesses
- General business-related information

This information is being used to assess the current state of Internet services in Allegany County's business community and to identify ways in which the County could support improvements in those services to better meet the needs of its businesses.

### **6.2.2 Survey Process**

The survey process requires coordination among several different parties. This section describes the processes for project coordination, survey development and implementation, data analysis, and presentation of results.

#### **6.2.2.1 Survey Solicitation and Response**

A total of 874 invitations were e-mailed to key contacts at businesses located in Allegany County on March 7, 2012. The list of recipients' names and addresses were provided by County staff from the Chamber of Commerce databases. Two reminders were e-mailed to survey recipients on March 21 and March 29. Respondents completed the electronic questionnaire online through the Survey Monkey website.

A total of 233 completed responses were gathered by the cut-off date, providing a response rate of 26.7 percent. Given the total number of businesses in the target community (874 to which the survey was sent), the results are available with a precision level of  $\pm 5.5$  percent at the 95 percent probability level for aggregate responses. That is, 19 times out of 20, one would expect the survey results to be within  $\pm 5.5$  percent of the actual value across the entire population.

#### **6.2.2.2 Data Analysis**

Survey data were entered transferred to SPSS<sup>69</sup> software, and were evaluated using techniques in SPSS including frequency tables, cross-tabulations, and means functions. Survey results were exported to Microsoft Excel software for additional analysis, summary, and graphing purposes. The illustrations in this report were created in Excel.

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<sup>69</sup> Statistical Package for the Social Scientist [www.spss.com](http://www.spss.com)

### **6.2.3 Business Survey Results**

The following sections present and discuss the business survey results. It should be noted that there were 233 total respondents to the survey and the confidence interval is  $\pm 5.5$  percent for aggregate results. Analyses of sub-sections of the responses will have broader confidence intervals.

#### **6.2.3.1 *Computers and Internet Access***

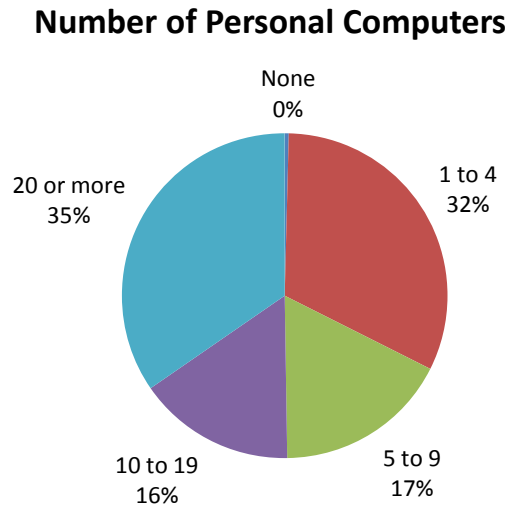
Questions were asked related to computers, Internet service, and related technology to compare usage by types of service providers. This provides insights into how businesses use communication services.

##### ***Computers***

One-third (32 percent) responding businesses have one to four computers or terminals at the location surveyed. Another 17 percent have five to nine computers, and 16 percent have 10 to 19 computers. Another 35 percent have 20 or more computers. Just one responding business (less than one percent) does not have any computers or terminals at that location.



Figure 72: Survey Results—Number of Personal Computers at Business



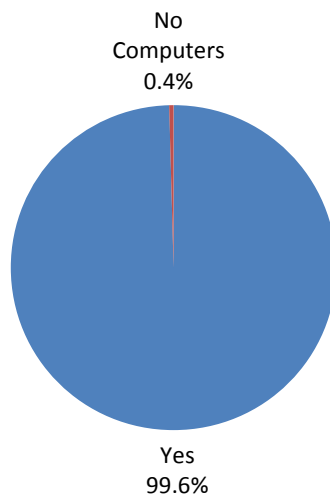
### Internet Access

Almost all responding businesses have Internet access. (This is expected of surveys using an online methodology.) One business does not have computers and was not asked about Internet access.

Figure 73: Survey Results—Businesses with Internet Access

### Internet Access at Location

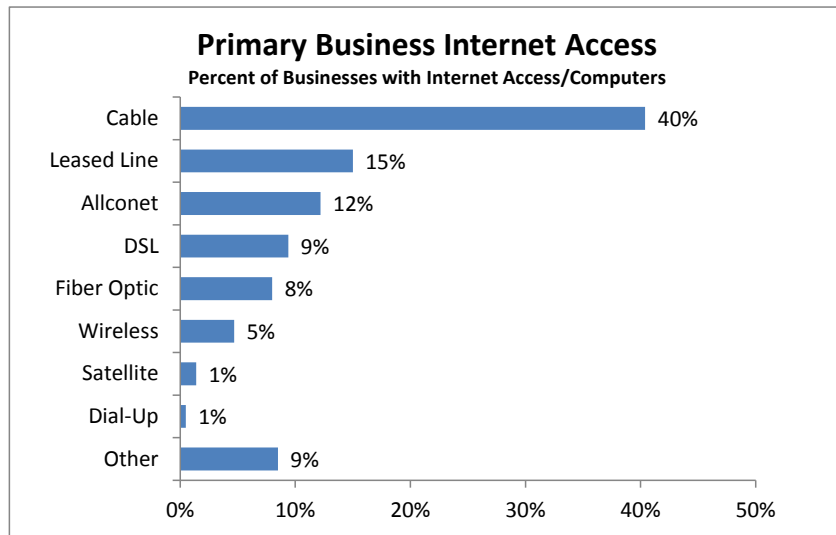
Percent of All Businesses



### Internet Connection

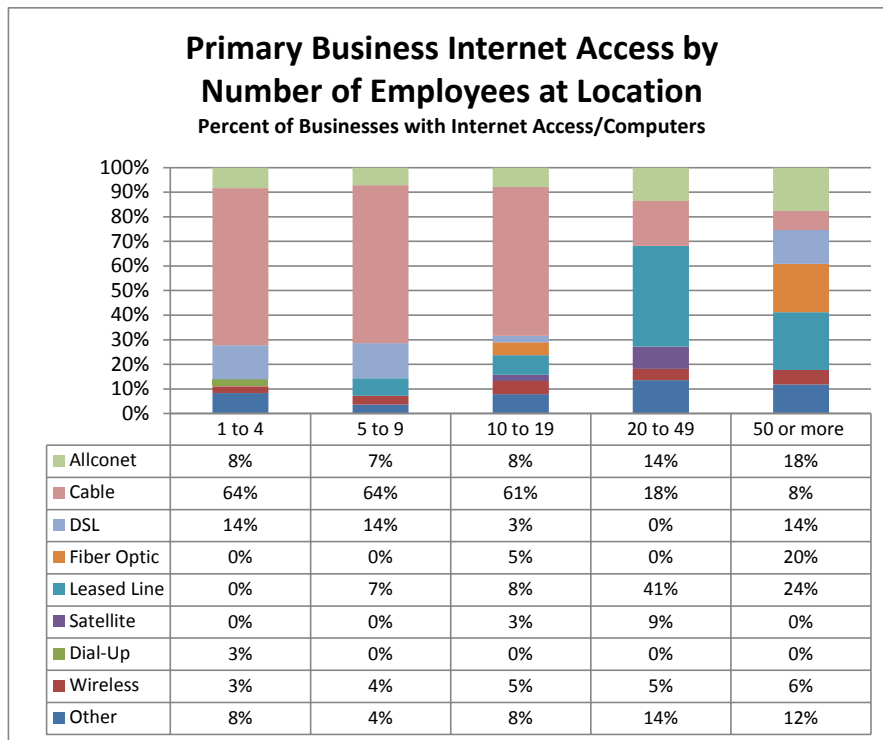
Cable is the leading Internet connection type among businesses with computers and Internet access (40 percent). Market share for leased line (15 percent), Allconet (12 percent), DSL (9 percent), fiber optic (8 percent), and wireless (5 percent) is considerably lower. Just 1 percent of businesses have satellite, and less than 1 percent (one responding business) has dial-up.

Figure 74: Survey Results—Primary Business Internet Access



Internet connection type varies significantly by size of the business. Businesses with less than 20 employees at the location are far more likely to use cable, compared with larger businesses.

Figure 75: Survey Results—Primary Business Internet Access by Number of Employees



### Monthly Cost

The estimated average monthly cost for Internet service is \$274. Although the majority pays less than \$250 per month, a sizeable segment pays more than \$250 per month, including 12 percent that pays \$1,000 or more (the majority being leased line). The average monthly cost for cable is

\$137. Keep in mind that the estimated average monthly costs are based on a relatively small sample for most service types.

Figure 76: Survey Results—Monthly Cost for Business Internet Service

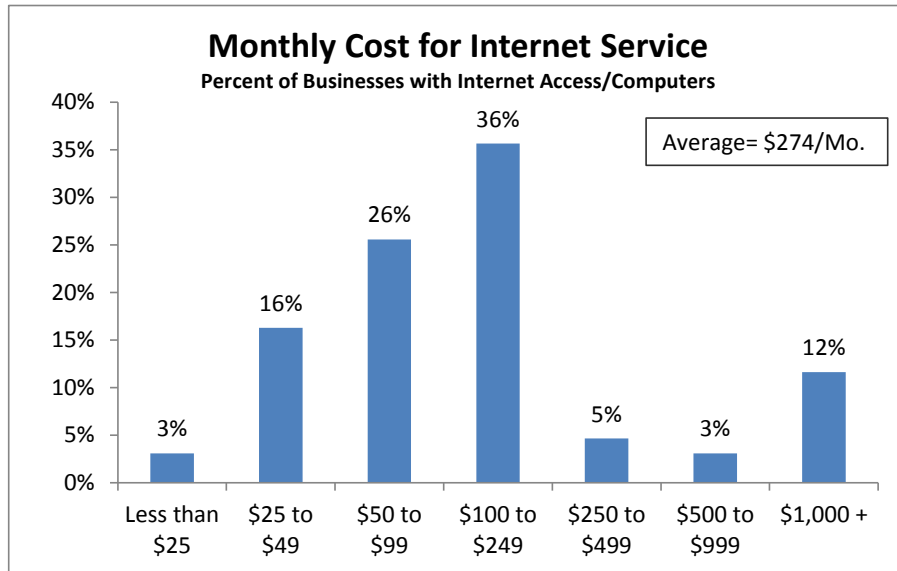
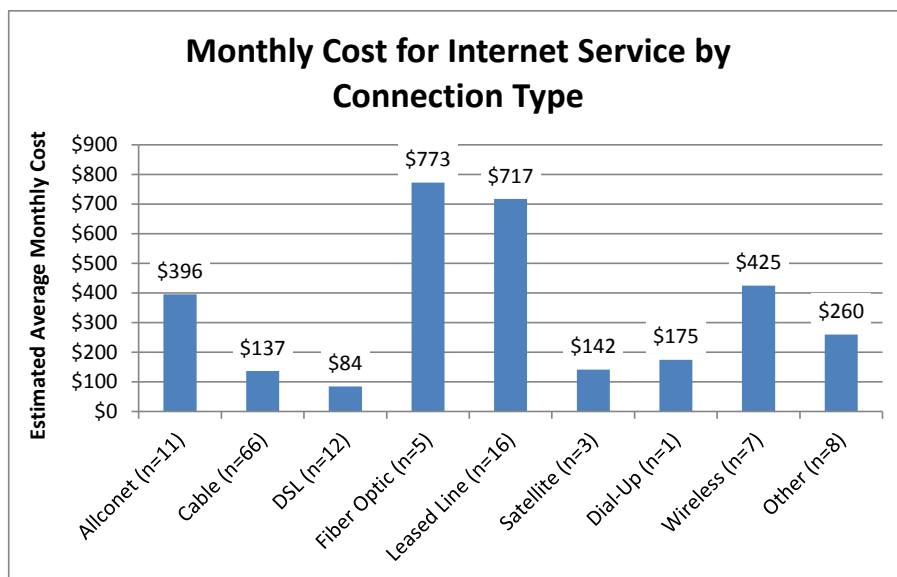


Figure 77: Survey Results—Monthly Cost for Business Internet Service by Connection Type



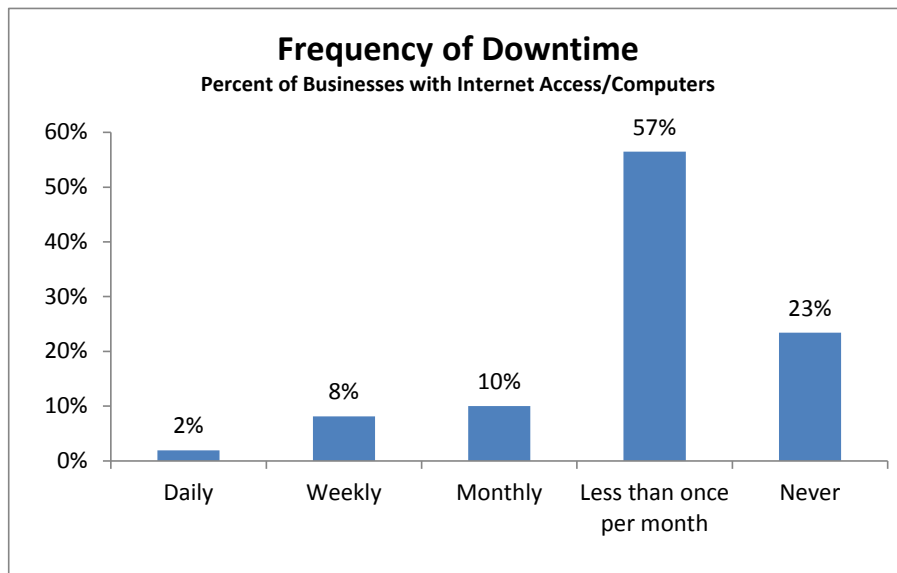
### 6.2.3.2 Internet Use and Connectivity

Respondents were asked how their business uses the Internet and to assess the potential impact of connectivity issues. This information provides valuable insight into businesses' need for improved communications services.

#### *Frequency of Downtime*

Most responding businesses infrequently experience downtime or lost connection. Fifty-seven percent experiences downtime less than once per month on average, and another 23 percent said they never experience downtime. Still, 20 percent experience downtime at least monthly, and 10 percent at least weekly, suggesting connectivity might be an issue for a fairly sizeable segment of businesses.

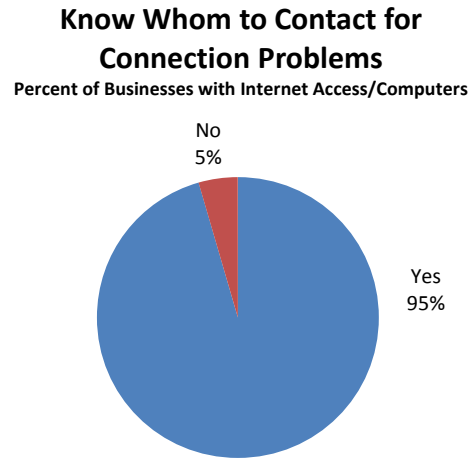
Figure 78: Survey Results—Frequency of Downtime for Business Internet Service



#### *Contact for Connection and Other Problems*

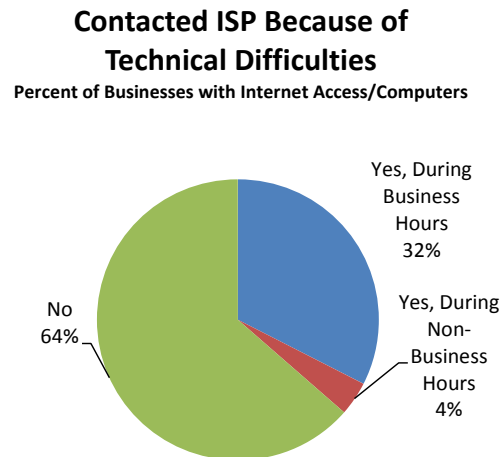
The majority (95 percent) of responding businesses with Internet access/computers know whom to contact if they were to experience connection problems.

Figure 79: Survey Results—Businesses Contacts for Internet Service Disruptions



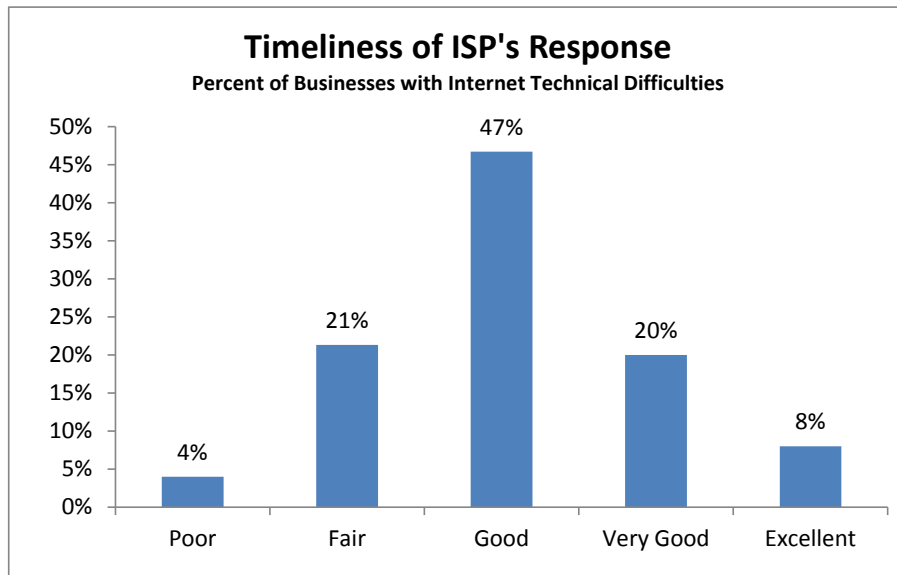
More than one-third (36 percent) have contacted their Internet service provider because of technical difficulties, billing, or other issues. The majority of those who contacted their provider did so during business hours.

Figure 80: Survey Results—Businesses Contacted ISP for Technical Difficulties



On average, the timeliness of the ISP's response was good but could be targeted for improvement, given the relative importance businesses place on customer service. (See next section.) On a scale where 1=Poor and 5=Excellent, responding businesses gave a mean rating of 3.1, and a median of 3.0. Nearly one-half (47 percent) rated the timeliness as Good, while about one-fifth each said Fair and Very Good. Another eight percent said it was Excellent, and four percent said it was Poor.

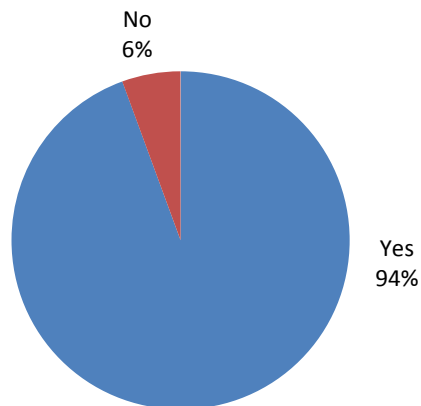
Figure 81: Survey Results—Timeliness of ISP's Response



Almost all respondents with technical difficulties said their issue was resolved in a satisfactory manner.

Figure 82: Survey Results—ISP Resolved Issue

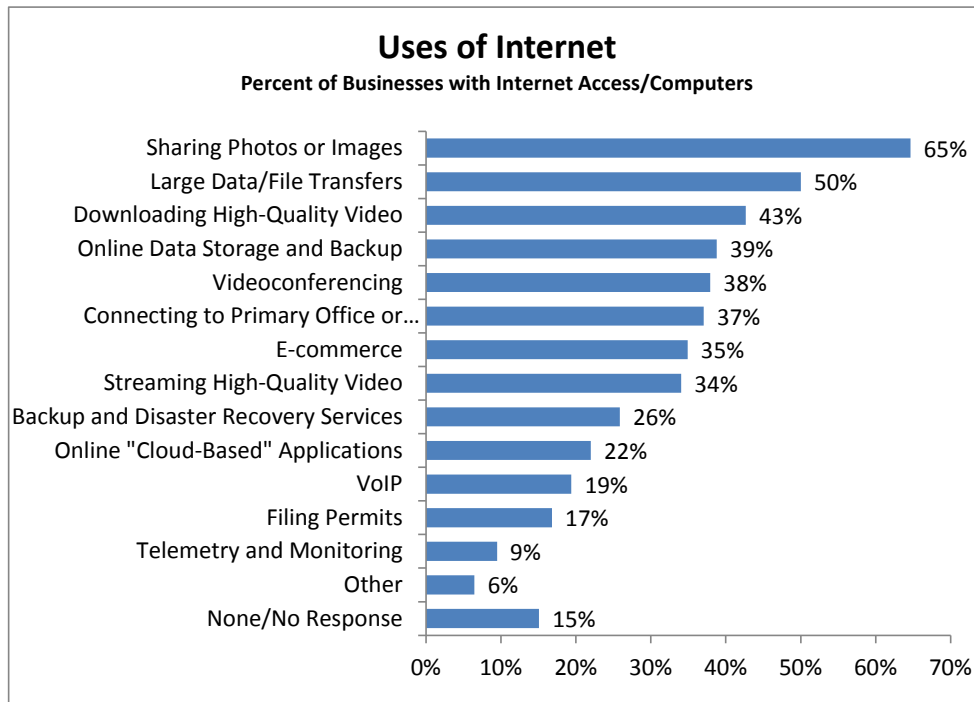
**Issue Resolved Satisfactorily**  
Percent of Businesses with Internet Technical Difficulties



### *Uses of Internet*

The top use of the Internet among businesses with Internet access/computers is sharing photos or images, reported by 65 percent. Fifty percent use the Internet for Large data/file transfers. Other uses were cited by less than one-half of responding businesses; still, a sizeable segment uses the Internet for: downloading high-quality video (43 percent), online data storage and backup (39 percent), videoconferencing (38 percent), connecting to primary office or manufacturing facility (37 percent), e-commerce (35 percent), and streaming high-quality video (34 percent).

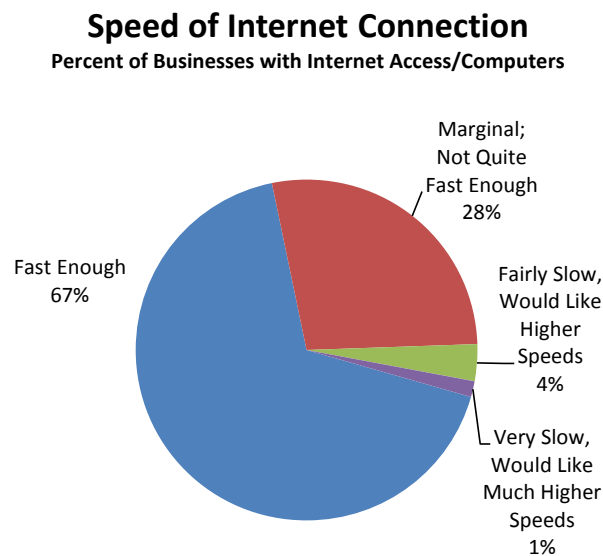
Figure 83: Survey Results—Business Uses of Internet



### Connection Speed

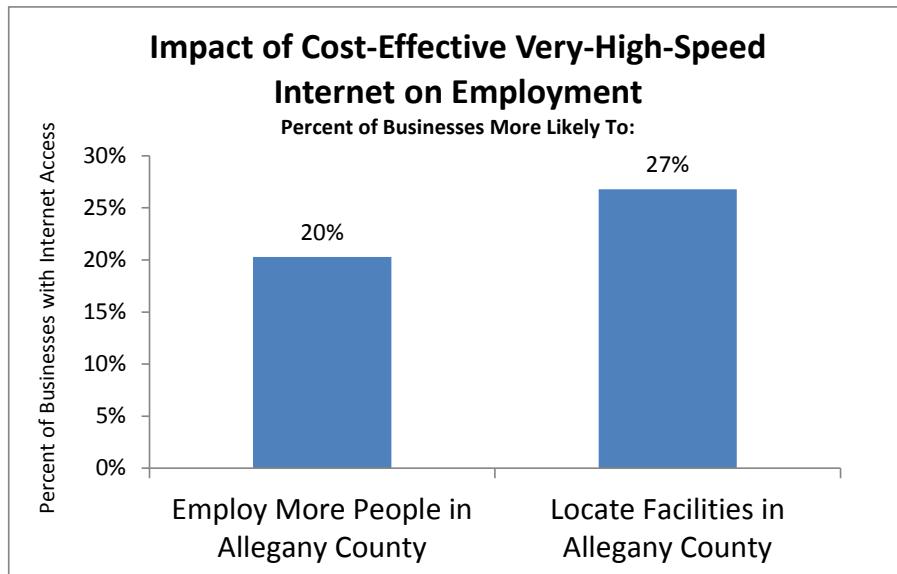
Internet service providers appear to be meeting the needs of most businesses in terms of connection speed, regardless of connection type. Overall, two-thirds said their connection is fast enough to meet their needs. However, 28 percent said their connection speed is marginal, and five percent said it is slow to very slow.

Figure 84: Survey Results—Speed of Business' Internet Connections



Accessibility of high-speed Internet might have some impact on local businesses and employment in Allegany County. One-fifth (20 percent) said they would be more likely to employ people in Allegany County if they had cost-effective very-high-speed Internet. More than one-fourth (27 percent) would be more likely to locate facilities in the County if they had cost-effective very-high-speed Internet.

Figure 85: Survey Results—Impact of Availability of Internet on Business Hiring



### 6.2.3.3 Satisfaction with and Importance of Internet Services

Respondents were asked to evaluate the Internet service they receive. This information provides valuable insight into businesses' need for various communications services.

#### *Importance and Satisfaction with Service Aspects*

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



**Table 12: Survey Results—Importance of and Satisfaction with Internet Service Aspects**

		<b>Price paid for service</b>	<b>Download speed</b>	<b>Upload speed</b>	<b>Reliability (uptime)</b>	<b>Provider choice</b>	<b>Customer service</b>
Importance	1-Not at All Important	4%	2%	2%	2%	7%	3%
	2	3%	0%	1%	0%	3%	1%
	3	16%	7%	8%	1%	25%	5%
	4	31%	27%	30%	11%	31%	27%
	5-Very Important	46%	65%	59%	86%	34%	65%
	<b>Mean</b>	<b>4.1</b>	<b>4.5</b>	<b>4.4</b>	<b>4.8</b>	<b>3.8</b>	<b>4.5</b>
Satisfaction	1-Very Dissatisfied	1%	4%	4%	3%	10%	3%
	2	7%	10%	13%	8%	14%	3%
	3	47%	22%	25%	14%	46%	33%
	4	28%	37%	32%	39%	21%	37%
	5-Very Satisfied	17%	27%	27%	36%	9%	24%
	<b>Mean</b>	<b>3.5</b>	<b>3.7</b>	<b>3.7</b>	<b>4.0</b>	<b>3.0</b>	<b>3.8</b>

Overall, the most **important** service aspect is reliability (86 percent Very Important, 4.8 mean), followed by: Download speed (65 percent Very Important, 4.5 mean), customer service (65 percent Very Important, 4.5 mean), upload speed (59 percent Very Important, 4.4 mean), total price paid for service (46 percent Very Important, 4.1 mean), and ability to choose among competing providers (34 percent Very Important, 3.8 mean).

Overall, most Internet users appear to be moderately **satisfied** with aspects of their Internet service, although there is some room for improvement. Reliability was the highest rated service aspect (36 percent Very Satisfied, 4.0 mean), but it is also the most important item to customers. Ability to choose among competing providers was the lowest rated item (9 percent Very Satisfied, 3.0 mean), although it is less important compared with other service aspects.

Although most Internet users were relatively satisfied overall, assessing the **gaps** between **importance** and **satisfaction** can help providers identify what features might need improvement. The charts in this section highlight these gaps.

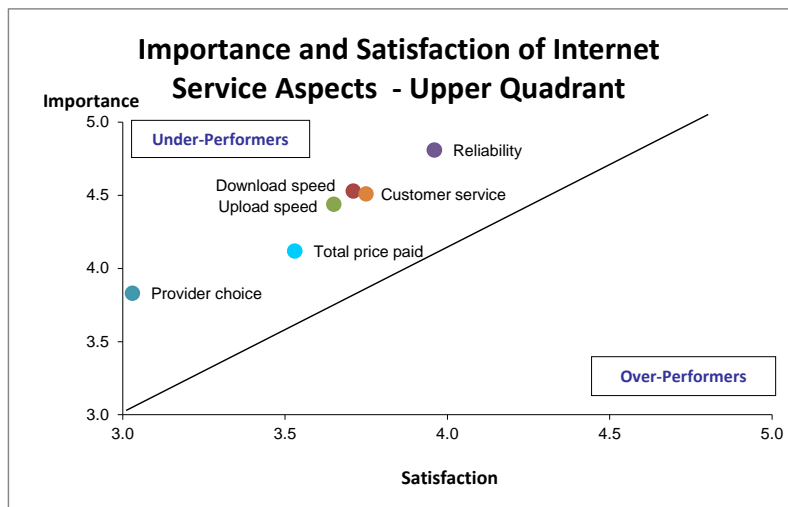
The results suggest that customers are generally satisfied with the most important aspects of service, but there is a sizeable “service gap” (difference between importance and satisfaction) with all aspects of their Internet service.

Table 13: Survey Results—Gap Between Importance and Satisfaction

Gap Between Satisfaction and Importance Ratings				
	Mean Satisfaction	Mean Importance	GAP < = >	Significance
Total price paid	3.5	4.1	-0.6	Expectations not met
Download speed	3.7	4.5	-0.8	Expectations not met
Upload speed	3.7	4.4	-0.8	Expectations not met
Reliability	4.0	4.8	-0.9	Expectations not met
Provider choice	3.0	3.8	-0.8	Expectations not met
Customer service	3.8	4.5	-0.8	Expectations not met

The gaps for these aspects are partially driven by the relatively high importance place on these aspects by respondents. At the same time, these gaps identify aspects where Internet service can be improved in Allegany County. The largest gap occurs for reliability, which was the highest-rated service aspect in terms of importance. The smallest gap occurs for total price paid for service. This is atypical; price usually has a larger gap compared with other items.

Figure 86: Survey Results—Importance and Satisfaction (Graph)



Although respondents are relatively satisfied with their Internet service, all aspects are considered “under-performers” in the regard that satisfaction scores are lower than importance scores.

Compared with Allconet and leased-line subscribers, cable users experience larger service gaps for some key aspects. On average, cable users are less satisfied with Total price paid for service, as well as Download and Upload speeds. The larger service gap for Provider choice can be explained by the greater importance placed on this item by cable users.

Figure 87: Survey Results—Importance and Satisfaction (Mean Rating)

	Importance			Satisfaction		
	Allconet	Cable	Leased	Allconet	Cable	Leased
			Line			Line
Total price paid	4.1	4.1	3.8	3.9	3.4	3.6
Download speed	4.6	4.4	4.6	4.0	3.5	4.0
Upload speed	4.5	4.3	4.6	4.0	3.4	4.0
Reliability	4.9	4.7	4.9	4.1	3.9	4.0
Provider choice	3.3	4.0	3.5	3.1	2.9	3.2
Customer service	4.2	4.5	4.6	3.8	3.7	3.8



 Significantly higher mean rating (more importance placed on aspect of service)  
 Significantly lower mean rating (less satisfied with aspect of service)

Figure 88: Survey Results—Service Gap by Connection Type

	Gap (Satisfaction - Importance)		
	Allconet	Cable	Leased Line
Total price paid	-0.2	-0.7	-0.2
Download speed	-0.6	-0.9	-0.6
Upload speed	-0.5	-0.9	-0.6
Reliability	-0.8	-0.8	-0.9
Provider choice	-0.2	-1.1	-0.3
Customer service	-0.4	-0.8	-0.8

In general, Allconet is performing quite well compared with cable, albeit ratings are based on relatively few responses. At the same time, there is indication that Allconet might not be meeting customer expectations for some service aspects, particularly Reliability. This is true of other connection types as well.

#### *Importance of Internet Services or Activities to Business*

Using a scale where 1=Not at All Important and 5=Very Important, respondents were asked to assess the level of importance of various uses of the Internet (requiring high-speed Internet). Overall, the two most important services appear to be: Sharing photos or images (38 percent Very Important, 4.0 mean) and Large data/file transfers (47 percent Very Important, 4.0 mean). Telemetry and monitoring, VoIP, and Filing permits are less important to responding businesses.

Figure 89: Survey Results—Importance of Services Requiring High-Speed Internet (Mean)

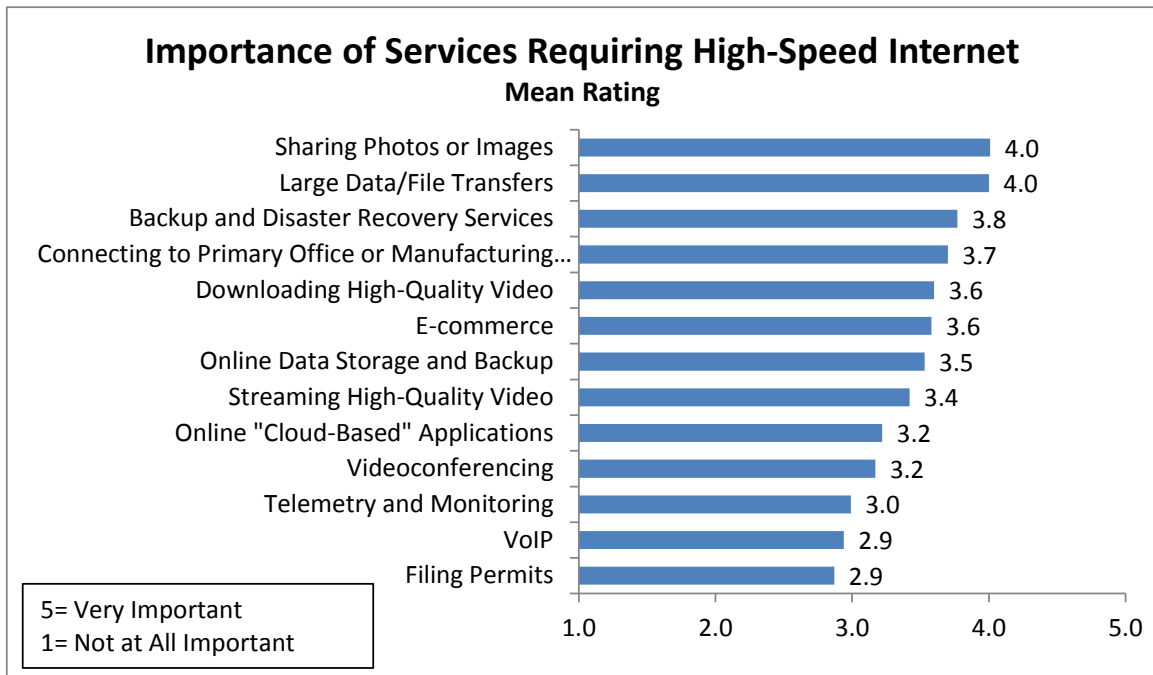
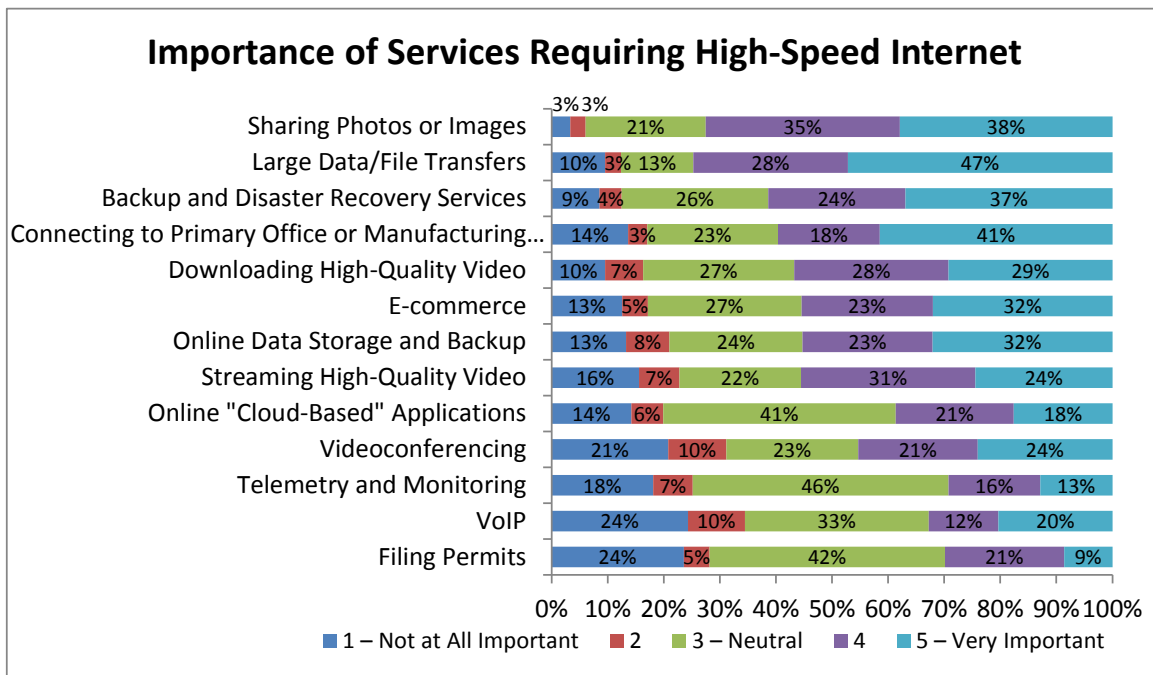


Figure 90: Survey Results—Importance of Services Requiring High-Speed Internet



**Willingness to Pay More for Faster Internet Access**

Respondents were asked how willing they would be to pay more for Internet service that allowed them to more quickly and efficiently perform the activities listed in the previous question. The majority of respondents would be unwilling to pay more at the various price increases listed, but there is a segment who might consider paying 20 percent more per month if the Internet service

improved the performance of key services or activities. More than one-third (36 percent) would be Somewhat or Very Willing to switch for 20 percent more per month, but this figure drops to 10 percent of respondents for 40 percent or more per month. Very few would be willing to switch for a greater price increase. This suggests the potential for a relatively small commercial market for high-bandwidth Internet service at a 20 percent price increase.

Figure 91: Survey Results—Willingness to Switch to Faster Internet Service (Mean Rating)

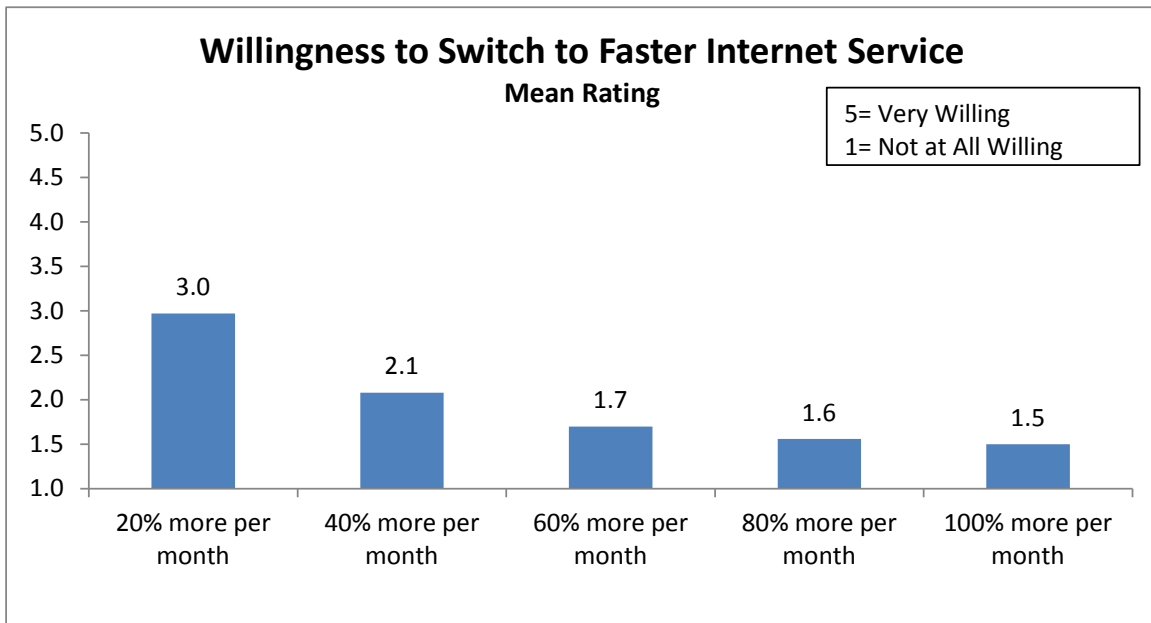
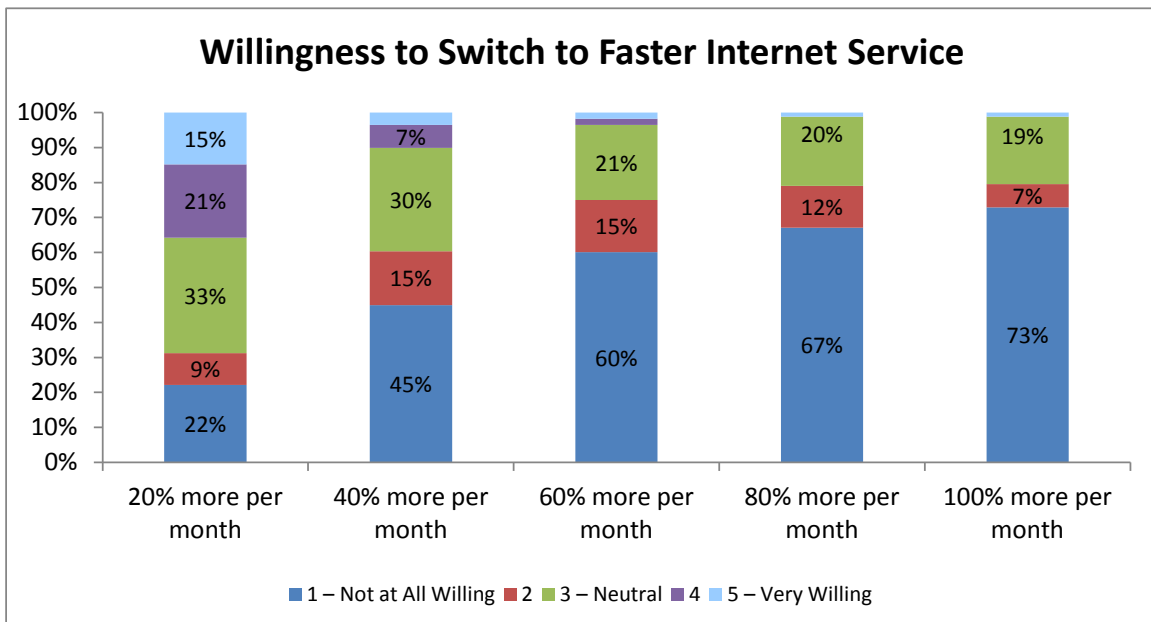


Figure 92: Survey Results—Willingness to Switch to Faster Internet Service



*Importance of Internet Service to Business*

Respondents were asked to evaluate the impact of Internet service on aspects of their business, using a scale where 1=Not at All Important and 5=Very Important. Improving operational efficiency was rated as the most important benefit (64 percent Very Important, 4.5 mean), although Internet service appears to be relatively important for all aspects of business evaluated.

Figure 93: Survey Results—Importance of Internet Service to Business (Mean Rating)

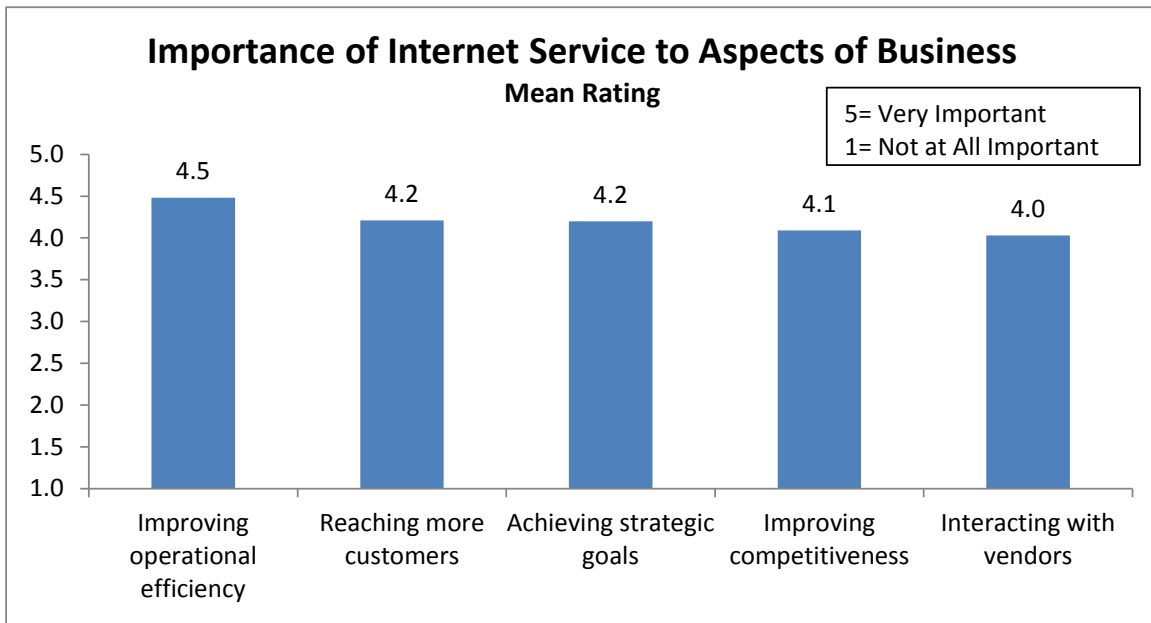
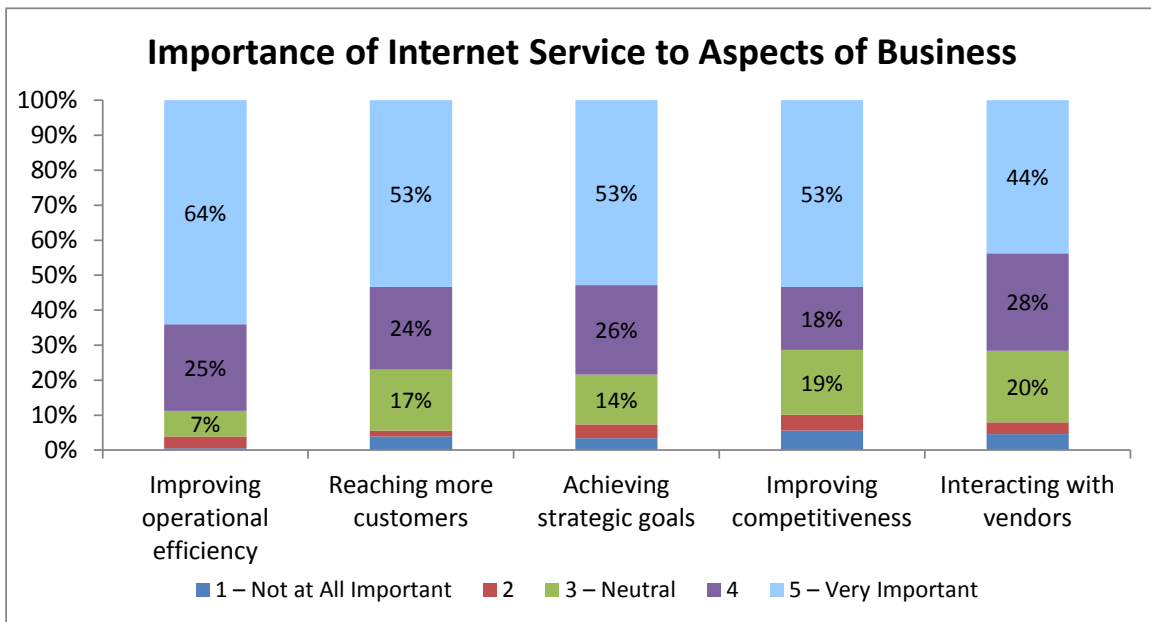


Figure 94: Survey Results—Importance of Internet Service to Business



*Attitudes About High-Speed Internet Access*

Respondents were asked to rate their level of agreement with statements about high-speed Internet access. Overall, most respondents agreed with most of the statements listed, including that high-speed Internet helps the business function more efficiently (58 percent Strongly Agree, 4.4 mean). They were least likely to agree with the statement that the availability of affordable Internet access is a factor in deciding where to locate their business and that the local market offers affordable high-speed Internet. There is considerable variation in responses, suggesting different segments of users who place more or less value on high-speed Internet access.

Figure 95: Survey Results—Agreement with Statements About Internet Access (Mean)

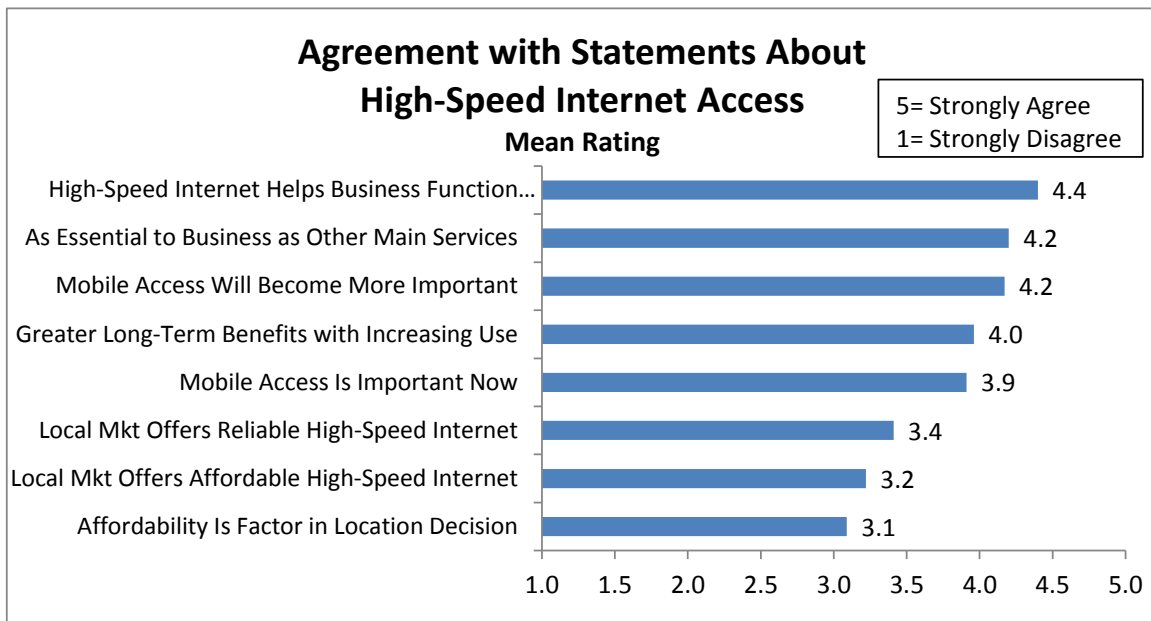
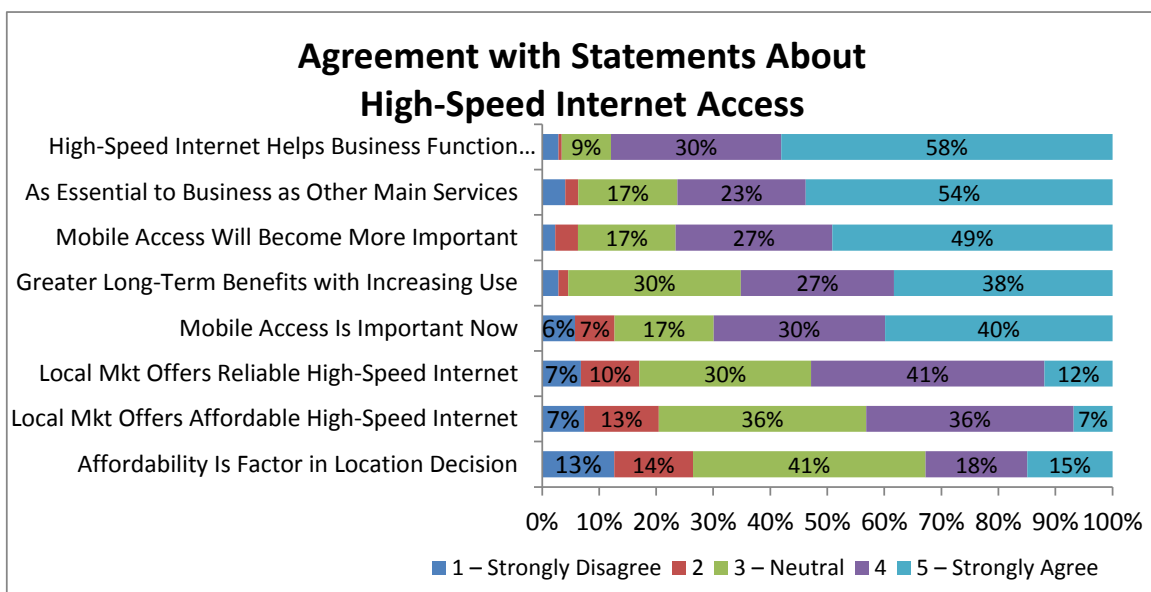


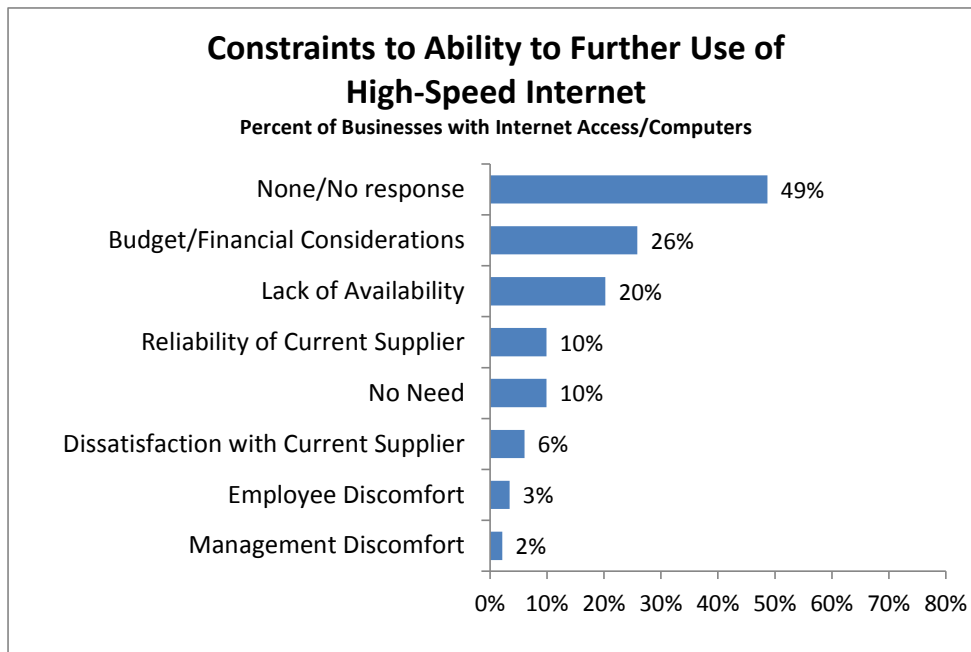
Figure 96: Survey Results—Agreement with Statements About Internet Access



*Constraints to Internet Usage*

One-half of responding businesses with Internet access/computers indicated there was some constraint to their further use of high-speed Internet. The leading constraints are: Budget or finance considerations (26 percent) and Lack of availability (20 percent). Keep in mind that respondents could check more than one response, and percentages might add up to more than 100.

Figure 97: Survey Results—Constraints to Use of High-Speed Internet





### *Company Information*

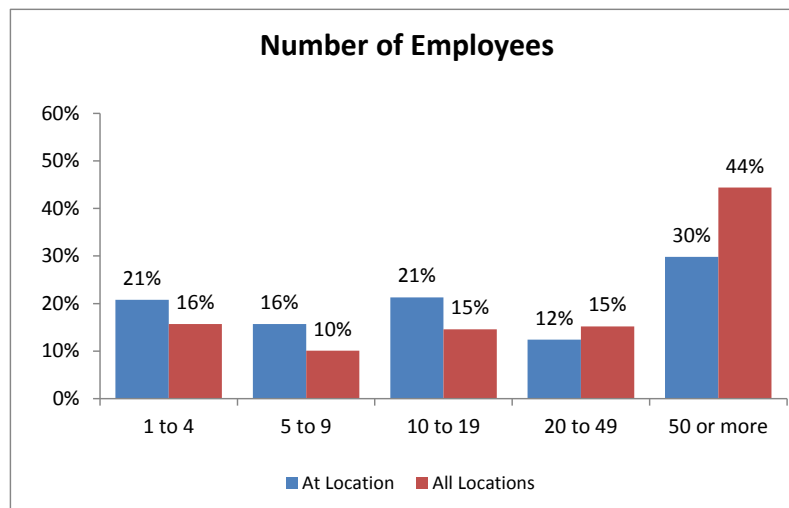
In addition to information about Internet services, the survey asked a number of questions about the characteristics of responding businesses. A general summary of the company information for respondents is provided in this section. The general profile of respondents includes:

- The majority are small- to mid-sized locations.
- Businesses represent a variety of industries, including professional services.
- Almost all responding businesses have a Web site.
- Four in 10 are required to support industry-specific Internet security requirements.
- Most Internet or phone decisions are made locally.
- Most respondents are managers, including some who are both owners/managers.

### *Number of Employees*

The majority of locations are small- to mid-sized, including one-fifth with just one to four employees. However, 30 percent have 50 or more employees at the location. Forty-four percent have 50 or more employees across all locations.

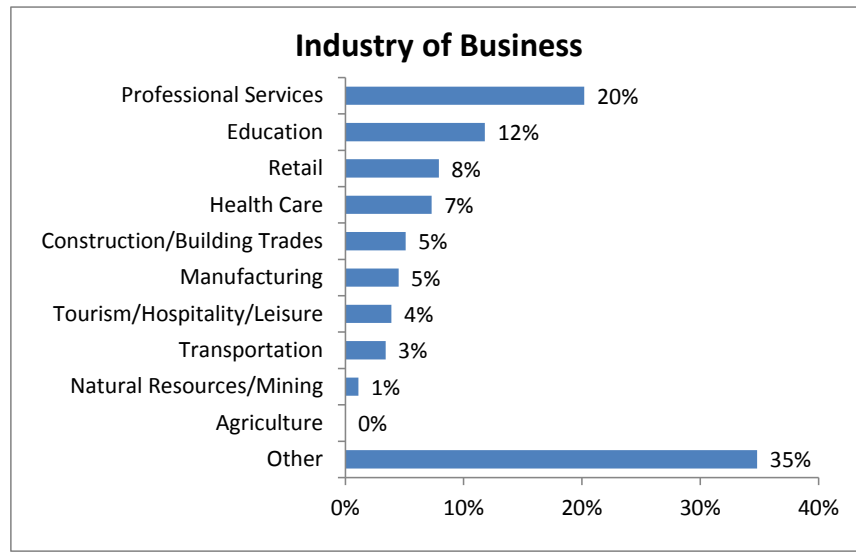
Figure 98: Survey Results—Number of Employees



### *Industry*

The largest industry segment responding to the survey was professional services, comprising 20 percent of respondents. In addition, 35 percent of respondents classified their business in another category outside the options provided in the survey question.

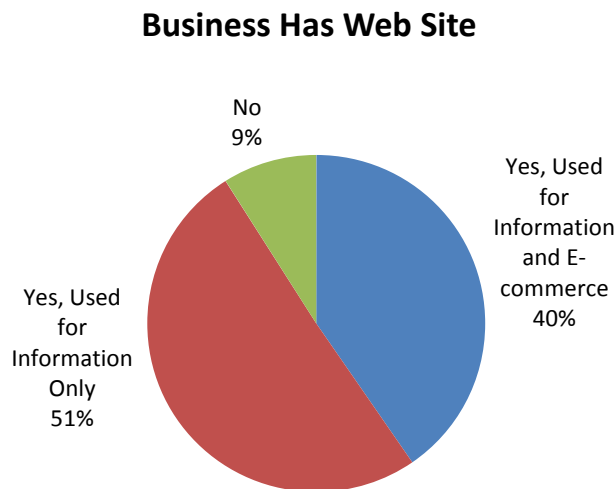
Figure 99: Survey Results—Business Respondents' Industry Classifications



### Website

Almost all responding businesses have a website. One-half (51 percent) have a website used for information only, while 40 percent use their website for both information and e-commerce.

Figure 100: Survey Results—Business Respondents' Websites

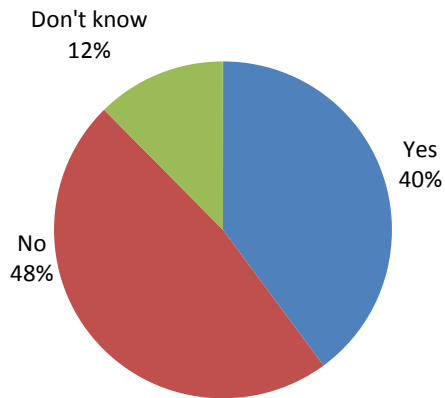


### Internet Security

Four in 10 respondents (40 percent) said they are required to support industry-specific Internet security requirements.

Figure 101: Survey Results—Businesses Required to Support Internet Security Requirements

### Required to Support Internet Security Requirements

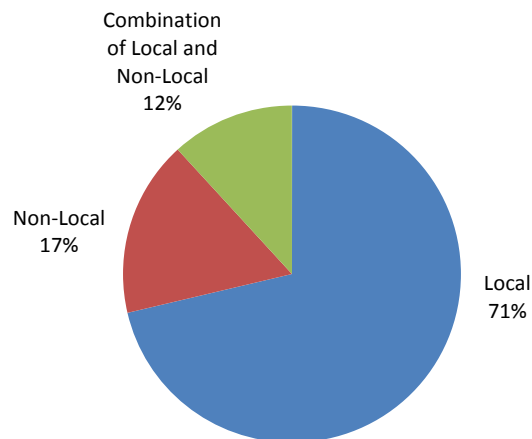


### Decision Location

Most businesses (71 percent) make Internet and phone decisions locally (within the Allegany County area). In contrast, just 17 percent make decisions non-locally, and 12 percent said it is a combination of local and non-local.

Figure 102: Survey Results—Location of Business Internet and Phone Decisions

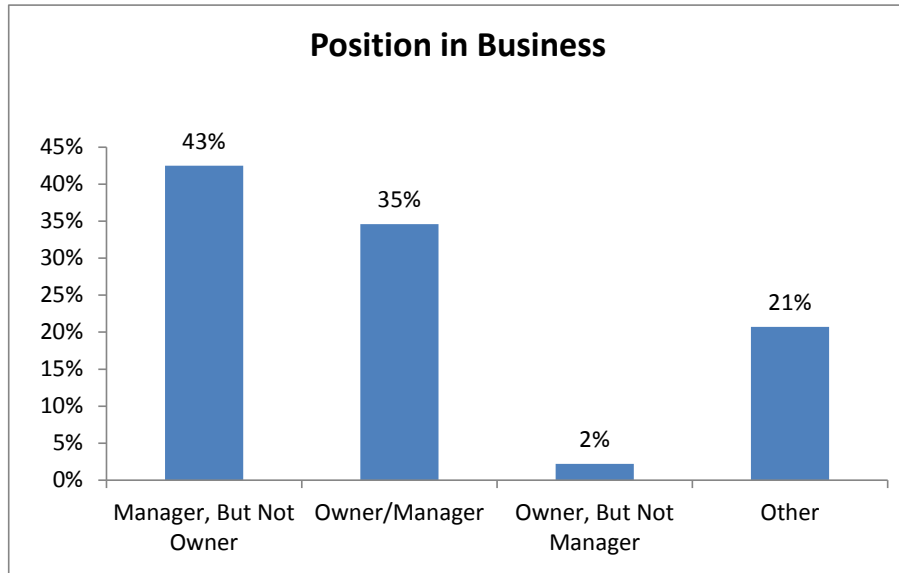
### Where Internet and Phone Decisions Are Made



*Position*

More than four in 10 (43 percent) respondents are managers (but not owners), and 35 percent are owners/managers. Just two percent are an owner but not a manager, and 21 percent indicated they hold another position.

Figure 103: Survey Results—Respondents' Position in Business



## ***Appendix A: Broadband Funding Opportunities***

While America's Recovery and Reinvestment Act (ARRA) provided a remarkable boost to broadband funding and deployment, these grants have been allocated and many expire in the near term. The ARRA-funded Broadband Technology Opportunities Program (BTOP) and the Broadband Initiatives Program (BIP) were very much one-time programs, and Congress does not seem inclined to reauthorize comparable programs in the foreseeable future. While there are a number of alternative federal telecommunications programs, appropriations are limited given the partisan political atmosphere in Washington and the upcoming election. At the same time, foundations are tightening their budgets due to the ongoing economic crisis and shrinking foundation endowments. For these reasons, we see no immediate significant grant opportunities to support broadband deployment in Allegany County.

While immediate opportunities are limited, we recommend that the appropriate County staff subscribe to alerts of upcoming funding deadlines through [www.grants.gov](http://www.grants.gov). Dependent on the grant-writing capacity at the County, we also recommend that the County apply whenever opportunities arise. Such "longshots" may pay off, as it did in the case of the One Maryland Broadband Network (OMBN).

We also recommend that the County closely monitor progress on the reauthorization of the Farm Bill (i.e., the Agriculture Reform, Food, and Jobs Act of 2012, S. 3240).<sup>70</sup> The bill passed out of the Senate on June 21, 2012 and was awaiting consideration by the House as of this writing. The Farm Bill has traditionally been a critical source of rural broadband funding and is likely to continue to be so going forward, particularly as ARRA resources disappear. Of particular note, the Senate bill (Sec. 6104, "Access to broadband telecommunications services in rural areas") expands the loan program to provide broadband grants (with a 25 percent cost share under certain circumstances), doubles annual appropriations (from \$25 million to \$50 million), increases standards for broadband in rural areas (mandating that broadband providers deliver minimum download speeds of 4 Mbps and upload speeds of 1 Mbps), and establish new metrics for determining eligibility for funding. The Senate bill further establishes a competitive grant program for the distribution of broadband grants as a substitute for the historic case-by-case eligibility determinations for funding. These collective changes will greatly enhance resources for broadband deployment in rural areas. We recommend that the BOE and its public sector partners closely monitor the bill's progress in the House. If successful, the Farm Bill will provide an essential source of continued broadband funding, particularly in light of the expiration of ARRA resources.

We researched federal funding opportunities to support broadband deployment in Allegany County. These opportunities are described briefly below. The nature of support varies widely, ranging from low-interest loans and tax credits to more generous grants. In many instances, support has declined significantly in recent years, as the federal budget has tightened. Some programs are narrowly tailored to specific types of investments (e.g., educational or healthcare),

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<sup>70</sup> S 3240, "Agriculture Reform, Food, and Jobs Act of 2012" (passed in Senate on June 21, 2012 by a vote of 64-35).

while other programs have broad mandates that can be used to support virtually any broadband improvements. We provide background on some of the potential broadband funding opportunities below:

### **Department of Agriculture – Rural Utilities Service**<sup>71</sup>

The Rural Utilities Service (RUS) is an agency of the United States Department of Agriculture charged with providing public utilities (electricity, telephone, water, sewer) to rural areas in the United States. In this capacity, RUS administers a number of broadband grant and loan programs.<sup>72</sup>

#### **1. Community-Oriented Connectivity Broadband Grant Program (“Community Connect”)**

The Community Connect Grant Program is a modest-sized grant program for local governments and tribes that focuses on targeted deployment to completely unserved, very low-income areas. The application window for the 2012 program recently concluded (June 18, 2012); however, the 2013 funding window is likely to be announced in the first half of next year.

Community Connect grants are not a perfect fit for broadband deployment throughout Allegany County, as priority is given to areas demonstrating “economic necessity.” The application process is rigorous and competitive (with awards given to only 10 percent of applicants) and once awarded, program requirements are demanding (e.g., requiring last-mile service for all households in the service area). Awards are fairly modest (ranging from \$50,000 to \$1-million), and would be limited to a discrete community within the County. Grants also carry a modest (15 percent) match requirement, which can be met with in-kind contributions.

Awards can be given to both public and private entities and eligible applicants include incorporated organizations, Indian tribes or tribal organizations, state or local units of government, or cooperatives, private corporations, and limited liability companies organized on a for profit or not-for-profit basis. Individuals or partnerships are not eligible.

The grant process is highly competitive. Community Connect funds approximately 15 projects annually (from an application pool of 150). While Community Connect has a fairly broad mission, funding is geographically limited to a single community with a population less than 20,000 that does not currently have Broadband Transmission Service (as determined by the FCC National Broadband Map). By these standards, portions of Allegany County should be eligible for funding, as the National Broadband Map indicates that there is only a single service provider (AT&T) providing advertised service at speeds between 1.5 and 3 Mbps.<sup>73</sup> As noted above, Community Connect prioritizes areas of economic necessity. Notably, median household income in Allegany County is nearly half the Maryland median income and 27 percent lower than the

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<sup>71</sup> For additional information regarding any of USDA’s RUS programs, contact Kenrick (“Rick”) Gordon ([Kenrick.gordon@wdc.usda.gov](mailto:Kenrick.gordon@wdc.usda.gov); 717-761-3280), RUS Field Representative for the region encompassing Allegany County.

<sup>72</sup> See Congressional Research Service, Lennard Kruger, RL33816, Mar. 7, 2012, “Broadband Loan and Grant Programs in the USDA’s Rural Utilities Service” (providing a survey and evaluation of the full suite of RUS broadband grants and loans).

<sup>73</sup> National Broadband Map data available for 21555 at <http://www.broadbandmap.gov/internet-service-providers/21555/lat=39.59837/long=-78.5433701/#> (visited June 23, 2012).

median household income nationwide. Moreover, a substantially higher percentage of individuals are living below the poverty rate in Allegany County than in the rest of the state.

Table 14: Allegany County Economic Data<sup>74</sup>

Jurisdiction	Population	Median Household Income	Percent Below Poverty
United States	308,745,538	\$51,914	13.80%
Maryland	5,773,552.00	\$70,647	8.60%
Allegany County	75,087	\$37,747	14.50%

Grants cannot duplicate any existing broadband services, nor can applicants charge for services to any critical community facilities for at least two years from the grant award.

Once awarded, grant requirements are rigorous. Eligible projects must offer basic broadband transmission service to both residential and business customers within the proposed service area. Examples of eligible projects include deploying broadband transmission service to critical community facilities, rural residents, and rural businesses; constructing, acquiring or expanding a community center (but only 5 percent of the grant or \$100,000 can be used for this purpose); or building broadband infrastructure and establishing a community center with at least 10 computer access points, which offer free public access to broadband for two years.

The grant window is fairly brief and is typically announced in early spring. Applications are accepted during a 60-day period.

We recommend that the County map an area within its unserved footprint and then target the lowest income portions of those areas to develop the most competitive grant application possible.

## 2. *Distance Learning and Telemedicine (DLT)*<sup>75</sup>

The Distance Learning and Telemedicine (“DLT”) program offers modest grants of \$50,000 to \$500,000 for projects that “meet the educational and health care needs of rural America.” This program offers a promising—albeit limited—opportunity to support the use of broadband by the BOE.

Eligible grant recipients include entities that directly operate a rural community facility or deliver distance learning or telemedicine services to entities that operate a rural community facility or to residents of rural areas. Grants can be awarded to any entity that provides the requisite services and may include both public and private institutions (i.e., corporations or partnerships, tribes, state or local units of government, consortia, and private for-profit or not-for-profit corporations). Individuals are not eligible.

DLT grants are intended to enhance education and medical care provided through

<sup>74</sup> U. S. Census Bureau, American Community Survey, 5-Year Estimates (<http://factfinder2.census.gov>).

<sup>75</sup> See USDA, “About the DLT Program” ([http://www.rurdev.usda.gov/UTP\\_DLT.html](http://www.rurdev.usda.gov/UTP_DLT.html)) (accessed June 23, 2012).

telecommunications. Such grants can be used for equipment, but not broadband service. Eligible projects vary and can include capital assets (e.g., interactive video equipment, data terminal equipment, inside wiring, etc.), instructional programming that is a capital asset, technical assistance and instruction. Loans have historically been awarded for projects that establish links between teachers and students or medical professionals in the same facility, site development of buildings, construction or purchase of land, acquisition of telecommunications transmission facilities, or distance learning broadcasting. Grants can provide operating costs for the first two years of a program; however, demonstration projects are not eligible for DLT funds. Grants are made for projects where the benefit is primarily delivered to end users that are not at the same location as the source of the education or health-care service.

Projects must be in a rural area as defined by the program's authorizing regulations.<sup>76</sup> Of note, nearly one-half of the census tracts in Allegany County are deemed rural according to a representative of the U.S. census.

Funding for the Distance Learning and Telemedicine (DLT) program has declined in recent years. While the program historically provided both grants and loans (and the loan program continues to exist "on the books"), appropriations have been limited to grants in recent years. The DLT program provided \$30 million in FY2010, declining to \$25 million in FY2011, and is expected to decline further in FY2012. Grant recipients must provide a 15 percent match. Such matches may be made through "in kind" contributions, but cannot be made with federal funds. Applications that provide a greater contribution may be scored more favorably.

Despite its limitations, it is worth monitoring the DLT program as it is less competitive than other funding options, with awards granted to roughly 50 percent of all applicants. While DLT grants are limited to equipment, rather than deployment, they may provide a means for the BOE to leverage a new broadband network (e.g., by helping finance videoconferencing systems). As such, DLT could be a good supplement to other funding options.

### **3. Public Television Digital Transition Grants**

The Public Television Digital Transition program provides full (100 percent) grants to public television stations that serve rural areas. Such grants are intended to "[a]ssist Public Television Stations serving substantial rural populations in transitioning to digital broadcast television transmission." Funds can be used to acquire, lease, and/ or install facilities and software needed for the digital transition, including digital transmitters and power upgrades of existing Digital Television ("DTV") equipment. Grants are nonrenewable and cannot cover a station's ongoing operational expenses.

In FY2011, \$4.5 million was available for Public Television Digital Transition Grants, with individual awards up to \$750,000. Applications are accepted during a six-week window in early summer. (As with all federal funding opportunities, grant deadlines can be tracked via [www.grants.gov](http://www.grants.gov).)

Grants are limited to stations serving rural areas, defined as any area of the U.S. not included

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<sup>76</sup> 7 CFR 1703.126(a)(2) (criteria for scoring grant applications) (available online at <http://cfr.vlex.com/vid/1703-126-criteria-scoring-grant-applications-19918213>) (accessed June 23, 2012).



within the boundaries of any incorporated or unincorporated city, village, or borough having a population in excess of 20,000. According to the U.S. Census, 40 percent of the census tracts in Allegany County are rural and thus theoretically eligible for funding through this program. Notably, however, grants cannot be extended to areas with public television. There is at least one public television station in Allegany County (channel 97).<sup>77</sup> As such, the County is likely not eligible for funding under this program.

#### **4. Expansion of 911 Access; Telecommunications Loan Program**

The Expansion of 911 Access, Telecommunications Loan Program was finalized in March 2012,<sup>78</sup> and is intended to provide loans for 911 service in rural areas. We do not believe this represents a viable funding option for the County as loans are restricted to rural areas without existing 911 capabilities.

The program is intended to “provide[ ] rural first responders with the tools they need to maintain mission-critical voice and broadband service during times of emergency or during natural disasters.” The new rule explicitly codifies the Secretary of Agriculture’s authority to make loans in five areas of eligibility to expand or improve 911 access and integrated emergency-communications systems in rural areas for the Telecommunications Loan Program.

The program appears to have broad application to emergency-communication improvements. For instance, it could provide support for projects that help responders precisely locate rural wireless 911 calls, contact 911 via text message, or send emergency responders photos or videos of crime scenes or accidents. The Program would also give the Rural Utility Service the ability to finance wireless upgrades for public safety and security. USDA staff, however, report that the program is restricted to 911 and could not extend to construction of a broadband system, despite arguable benefits for emergency communications.

As with other RUS programs, the 911 Access program is limited to “rural areas,” defined as areas that are not located within a city with a population greater than 20,000 or urban areas contiguous to a city with a population greater than 50,000.<sup>79</sup> Roughly 45 percent of Allegany County is classified as rural by the U.S. Census, so could be eligible if it lacked adequate 911 services. Awards are made based on existing emergency communications capability.<sup>80</sup>

Any entity eligible to borrow from the Rural Utility Service, including state or local governments, tribes and emergency communications equipment providers (if the state is prohibited from acquiring debt) could receive a loan through this program. Agency staff indicate, however, that awards are typically given to telephone companies (which may provide broadband service), though the County could theoretically receive an award to distribute to the appropriate

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<sup>77</sup> See Allegany County Public Schools, Mar. 1, 2012, “News Release: ACCTV Now Live: Information Can Be Viewed by Atlantic Broadband Subscribers on Channel 97” ([http://acps.allconet.org/news\\_details.php?NewsID=654](http://acps.allconet.org/news_details.php?NewsID=654)) (accessed June 23, 2012) (announcing February 29, 2012 launch of Allegany County Public School System local Public, Education, and Government access channel).

<sup>78</sup> U.S. Dep’t of Agriculture, March 16, 2012, 77 Fed. Reg. 15564, “Expansion of 911 Access Loans and Loan Guarantees.”

<sup>79</sup> 7 CFR §1735(2) (General Policies, Types of Loans, Loan Requirements – Telecommunications Program, “definitions”).

<sup>80</sup> 7 CFR §1735(12) (“nonduplication”).

private-sector entities.

As the program was just finalized, “typical” award size is unknown, though awards will be in the form of either a cost of money (3.75 percent) or 4 percent loan.

##### ***5. Broadband Loan Program***

The Broadband Loan Program is one of the most extensive, long-term funding options for rural broadband and telecommunications facilities.<sup>81</sup> The program is administered by the Rural Utilities Service, with funding provided through the Farm Bill. The application process itself is not onerous and there is some flexibility in what loans can cover; however, once awarded, the administrative requirements are notoriously intensive.

The Broadband Loan Program provides loans (ranging from \$100,000 to \$1 million) to a wide array of stakeholders, including corporations, limited liability companies, cooperative or mutual organizations, Indian tribes, and state or local government. Individuals or partnerships are not eligible.

Interest rates are very competitive, with awards given in the form of Treasury-rate loans, 4 percent loans, and loan guarantees. Loans are for the term of the life of the facility (18 to 20 years for standard-wire broadband). Money is dispersed as construction is completed, with monthly advances against the following month’s contract. Once awarded, funding covers capitol costs and can retroactively cover pre-application expenses (e.g., project design); however, applicants must take a “leap of faith” in preparing these details during the application process.

The Rural Broadband Loan Program has a broad mission. It is designed “[t]o provide loans for funding, on a technology neutral basis, for the costs of construction, improvement, and acquisition of facilities and equipment to provide broadband service to eligible rural communities.”

Loans are limited to eligible rural communities (i.e., an area with fewer than 20,000 inhabitants and not adjacent to an urbanized area with more than 50,000 inhabitants). An eligible service area must be completely contained within a rural area, at least 25 percent of the households in the area must be underserved, no part of the service area can have more than three incumbent service providers (note that an area may have two competing broadband service providers), and no part of the funded service area can overlap with the service area of current RUS borrowers and grantees or be included in a pending application before RUS. Given the rural nature, economic status, and non-competitive broadband market in large portions of Allegany County, it is likely that portions of the County would qualify. Incumbent service providers are broadband providers that RUS identifies as directly providing broadband service to at least five percent of the households within a service area.

Applicants must complete build-out within three years, demonstrate ability to provide the service at the Agency’s “broadband lending speed” (5 Mbps up and down), and demonstrate an equity

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<sup>81</sup> U.S. Department of Agriculture, “About the Farm Bill Loan Program,” ([http://www.rurdev.usda.gov/utp\\_farmbill.html](http://www.rurdev.usda.gov/utp_farmbill.html)) (accessed June 20, 2012).

position of at least 10 percent of the loan amount.<sup>82</sup> Note that awards are only partially based on project design, but pay particular attention to the business plan and *pro forma*. Thus, applicants must invest resources preparing these supporting documents before securing funding. Loans are given to those projects that demonstrate the greatest likelihood of repayment (as demonstrated by the business plan). Priority is given to applicants that propose to offer broadband to the greatest proportion of households that have no incumbent service provider.

#### **6. Telecommunications Infrastructure Loans**

The Rural Utilities Service also offers Telecommunications Infrastructure Loans to support broadband in rural communities.<sup>83</sup> It is not clear, however, that this option is a good fit for Allegany County. Loans are limited to telephone companies serving rural areas within cities of fewer than 5,000 inhabitants. While a significant portion of Allegany County is rural, it may not qualify under this standard.

All awards are in the form of low-interest loans (starting at \$50,000) and include: cost-of-money loans (interest rate fluctuated between 2.9 percent and 5 percent for a 20-year term in 2005-2008), guaranteed loans (interest rates are Treasury rate plus 1/8 percent; historically between .15 and 4.2 percent), and hardship loans (5 percent interest). Such loans are intended to provide advanced telecommunications networks for rural areas, especially broadband networks designed to accommodate distance learning, telework and telemedicine.

#### **Universal Service Fund**

The Universal Service Fund,<sup>84</sup> a creation of the Telecommunications Act of 1996, has traditionally been, along with RUS loans, the most significant source of telecommunications funding for rural America. There are four key programs within Universal Service as summarized below. Some pending reforms within the FCC may make these programs more promising going forward:

##### **1. Lifeline Program**

The Lifeline program for low-income citizens<sup>85</sup> has traditionally included two key programs: Lifeline and Link Up, which subsidize the telephone service and initial connection charges, respectively, for low-income Americans.

Lifeline has historically provided low-income households with a \$9.25 per month subsidy on phone service from participating telecommunications carriers. The FCC recently reformed the Lifeline program. Of particular note, the \$9.25 subsidy can now be applied to bundled phone and

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<sup>82</sup> U.S. Department of Agriculture, Rural Utilities Service, 76 Fed Reg 13770, 13779, Mar. 14, 2011, "Rural Broadband Access Loans and Loan Guarantees" (<http://www.gpo.gov/fdsys/pkg/FR-2011-03-14/pdf/2011-5615.pdf#page=10>) (accessed June 23, 2012).

<sup>83</sup> U.S. Department of Agriculture, "About Telecommunications Infrastructure Loans" ([http://www.rurdev.usda.gov/utp\\_infrastructure.html](http://www.rurdev.usda.gov/utp_infrastructure.html)) (accessed June 23, 2012).

<sup>84</sup> Federal Communications Commission, "Universal Service" ([http://transition.fcc.gov/wcb/tapd/universal\\_service/](http://transition.fcc.gov/wcb/tapd/universal_service/)) (accessed June 20, 2012). *See also*: Universal Service Administrative Company, [www.usac.org](http://www.usac.org) (accessed June 20, 2012).

<sup>85</sup> Federal Communications Commission, "Lifeline Program for Low-Income Consumers" (<http://www.fcc.gov/lifeline>) (accessed June 20, 2012).

Internet service, and is no longer limited to stand-alone phone service. This could be a fairly significant change as the enabling legislation has historically been a barrier to using the subsidy for stand-alone Internet service.

The Lifeline program would not help facilitate build-out of broadband facilities in Allegany County; however, it could benefit the County's low-income residents. As such, we urge the County to highlight this resource in its educational outreach to area residents.

A second significant reform opportunity is pending in a proceeding at the FCC. This process may result in the reallocation of Lifeline funding to libraries and other public and nonprofit entities. Specifically, in a recent Further Notice of Proposed Rulemaking,<sup>86</sup> the Commission requested comments (to be filed by May 1, 2012) on the prospects of allocating some of the Lifeline reform savings to funding digital literacy efforts. Allocating funding in this manner would enable those entities to undertake digital literacy training. The Commission has suggested using the E-rate mechanism to enable libraries to purchase digital literacy-training services. This rulemaking may lead the FCC to restructure the program so that public entities—such as local government or non-profits — may be eligible for funding. Such a change could have significant implications for low-income and less-connected sectors of the Allegany County economy. We recommend monitoring the final rule to assess implications for services in the County.

## ***2. High Cost and Connect America Funds<sup>87</sup>***

The Universal Service High-Cost program has historically been the largest component of the Universal Service Fund (with annual appropriations exceeding \$4-billion). The High-Cost program has traditionally provided funding for eligible telecommunications carriers (ETCs) to build and operate telecommunications (telephone) facilities in rural, unserved areas. Following sustained criticism of the High-Cost program, the FCC initiated a major reform, leading to the recent launch of the Connect America Fund, to mixed reviews.

Of particular interest, as part of this reform, a portion of the High-Cost fund is being gradually transitioned into a new program (the Connect America Fund, or “CAF”), which will subsidize the construction of broadband (data) facilities. This transition will expand the scope of the program beyond the historic focus on telephone service. Over time, this shift from telephone to data service will accelerate.

The CAF is limited to unserved areas,<sup>88</sup> which would not benefit from broadband deployment absent federal support. It is not intended to improve broadband competition and grants are therefore not available in areas where any unsubsidized competitors are already providing broadband at the defined speeds.

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<sup>86</sup> U.S. Federal Communications Commission, 77 Fed. Reg. 12784, Mar. 2, 2012, “Further Notice of Proposed Rulemaking: Lifeline and Link Up Reform and Modernization, Advancing Broadband Availability Through Digital Literacy Training”

(<http://www.gpo.gov/fdsys/pkg/FR-2012-03-02/html/2012-5142.htm>) (accessed June 20, 2012).

<sup>87</sup> For additional information about the Connect America Fund, contact Patrick Halley, Legal Advisor at the FCC ([Patrick.Halley@fcc.gov](mailto:Patrick.Halley@fcc.gov) or 202-418-7550).

<sup>88</sup> An area is considered served if at least one provider offers broadband at speeds of 3-megabits per second down and upload speeds of 768 kilobits per second.

While funding is not necessarily limited to rural areas; FCC staff anticipates that most eligible unserved areas are likely to be rural. Notably, the National Broadband Map identifies all of Allegany County as receiving service (by AT&T) at the requisite speed. As such, Allegany County is unlikely to benefit from the expansion and restructuring of the High-Cost fund.

Funding within unserved areas will be provided to “Eligible Telecommunications Carriers” (ETCs), which in turn can include price-cap carriers and rate-of-return companies. Thus, the Connect America Fund represents a private-sector funding opportunity, whereby incumbent carriers will be given the right of first refusal. ETCs will be offered up to \$3,000 per line in a single area (with actual amounts determined based on a “cost model” of service). If the incumbent carrier declines to extend coverage, the FCC will hold a reverse auction to determine an alternative carrier who can serve the area at the lowest cost. At this time, Verizon is the only eligible price-cap carrier in Maryland. As such, the Connect America Fund essentially provides an opportunity for Verizon to build subsidized broadband to the unserved parts of the County.

The CAF has been the subject of extensive litigation by existing high-cost telecommunications carriers who view the subsidy as a financial threat to their business models. Regardless of the outcome of the litigation, Allegany County is already better served than many of the communities that will apply to the CAF. As such, we do not believe that the CAF provides a significant funding vehicle for the County; however, we recommend that the County monitor the litigation and continued reform of the CAF, as such changes could eventually allow awards to facilitate broadband competition.

### ***3. E-Rate Program***<sup>89</sup>

The Schools and Libraries Universal Service program (“E-Rate”),<sup>90</sup> offers funding to public entities (states and counties) that provide Internet connectivity to low-income schools, libraries and rural healthcare institutions where such service may otherwise be cost-prohibitive. Subsidies are provided for telecommunication services, Internet access, and internal connections. In this way, the program is intended to reduce the disparity between rural and urban broadband services. This program appears to be one of the most promising funding opportunities for Allegany County.

The E-Rate Program allows a range of providers to compete to deliver services to public institutions, such as schools and libraries. Eligible entities solicit proposals (RFPs) through a structured program administered by the Universal Service Administrative Company (USAC). The winning service provider and the school or library then apply to the USAC for the appropriate subsidy. Actual subsidies are based on poverty levels in the relevant school district.

The size of the subsidy (ranging from 20 percent to 90 percent) depends on the level of poverty and the urban/rural status of the population that will be served. The funding level can be

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<sup>89</sup> For additional information regarding the E-Rate program, contact the FCC helpline (1-888-203-8100) or Gina Spade, Deputy Chief, Telecommunications Access Policy Division, at the FCC ([gina.spade@fcc.gov](mailto:gina.spade@fcc.gov)).

<sup>90</sup> Federal Communications Commission, “Universal Service for Schools and Libraries” ([http://transition.fcc.gov/wcb/tapd/universal\\_service/schoolsandlibs.html](http://transition.fcc.gov/wcb/tapd/universal_service/schoolsandlibs.html)) (application and orders) (accessed June 20, 2012).

determined from the matrix available on the E-Rate website.<sup>91</sup> Poverty rates are determined by the percentage of students at the individual school that are eligible for free and reduced lunches under the National School Lunch Program (“NSLP”). For instance, if 70 percent of the students at the relevant school are eligible for NSLP, E-Rate will reimburse 80 percent of the eligible service costs.

Notably, there are pockets of poverty in Allegany County. In fact, as depicted in Table 14 (above), the median household income in Allegany County is 27 percent lower than the U.S. median income, with a substantially higher percentage (70 percent more) of the County population living below the poverty rate than elsewhere in Maryland.<sup>92</sup> Public institutions in these portions of the County may therefore be eligible for E-Rate subsidies.

Several recent reforms to the E-rate program may benefit Allegany County. In particular, as of 2011, public and non-profit entities now qualify as eligible providers. As the operator of a public-sector anchor institution fiber network, Allegany County may serve schools and libraries that are eligible for the subsidy. Alternatively, the County may compete to provide the most cost-effective services to eligible entities. The program also subsidizes construction of fiber to schools and libraries, which could present an opportunity to expand the reach of public-interest fiber in the County.

Despite this potential eligibility, it does not appear that Allegany County has filed a Form 470 to initiate the application process.<sup>93</sup> The application process begins in October and continues throughout the year. A flowchart depicting the general process (without dates) is available on the USAC website.<sup>94</sup>

#### **4. Rural Health Care Pilot Program (now transitioning to Health Infrastructure Program)<sup>95</sup>**

The Universal Service Fund also includes a Rural Health Care program,<sup>96</sup> which partially funds telecommunications services for rural health care providers. This program is designed to offset a significant portion (85 percent) of the construction costs of new regional or statewide networks to serve public and non-profit health care providers in areas of the country where broadband is unavailable or insufficient. It is not a viable short-term funding option for Allegany County, however, because the Health Infrastructure Program has not yet been launched and grantees were selected for its predecessor (the “Pilot Program”) in 2007. The Pilot Program has been widely criticized for failing to deliver money to eligible recipients in a timely manner. Recognizing

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<sup>91</sup> Universal Service Administrative Company, Discount Matrix

(<http://www.sl.universalservice.org/reference/dmatrix.asp>) (accessed June 23, 2012).

<sup>92</sup> U.S. Census Bureau, American Community Survey, 5-Year Estimates (<http://factfinder2.census.gov>).

<sup>93</sup> Submitted forms can be searched by year and zip code at:

[http://www.slforms.universalservice.org/Form470Expert/Search\\_FundYear\\_Select.aspx](http://www.slforms.universalservice.org/Form470Expert/Search_FundYear_Select.aspx) (accessed June 23, 2012).

<sup>94</sup> U.S. Department of Health and Human Services, “E-Rate Application Process Flowchart”

([http://eclkc.ohs.acf.hhs.gov/hslc/ta-system/operations/Fiscal/erate-toolkit/manage\\_fts\\_00519\\_042407.html](http://eclkc.ohs.acf.hhs.gov/hslc/ta-system/operations/Fiscal/erate-toolkit/manage_fts_00519_042407.html)) (accessed June 23, 2012).

<sup>95</sup> Federal Communications Commission, Rural Health Care Pilot Program (orders, news releases, and responses to frequently asked questions) (<http://www.fcc.gov/encyclopedia/rural-health-care-pilot-program#faqsNPRM>) (accessed June 23, 2012).

<sup>96</sup> Federal Communications Commission, “Rural Health Care Program” (background and news releases) (<http://transition.fcc.gov/wcb/tapd/ruralhealth/welcome.html>) (accessed June 20, 2012).

these concerns, the FCC published a Notice of Proposed Rulemaking in July 2010 to restructure the program; however, the rule has not yet been finalized.

The Pilot Program was limited to traditional telecommunications and did not extend to broadband. Once finalized, the new program will be more expansive and should provide support for the construction of state or regional broadband health care networks that can, for example, connect rural and urban health-care providers; facilitate the transmission of real-time video, pictures, and graphics; and make communications resources more robust and resilient. Funding would be limited to rural areas and portions of Allegany County may therefore be eligible. As such, we suggest monitoring this program to see if it presents an opportunity going forward.

### **FEMA – Homeland Security Grant Program (HSGP)**<sup>97</sup>

The Homeland Security Grant Program supports five interconnected grants (totaling \$1.3-billion in FY2011) that are intended to enhance national preparedness capabilities.<sup>98</sup> Of these, the State Homeland Security Program (“SHSP”) holds the greatest promise for Allegany County, though it is not likely to be a substantial funding source (as grants are allocated to counties based on population and appropriations have declined dramatically in recent years). As elaborated below, Allegany County is unlikely to benefit significantly from other FEMA telecommunications funding programs.<sup>99</sup>

The State Homeland Security Program is intended to support the implementation of State Homeland Security Strategies to address the identified planning, organization, equipment, training and exercise needs at the state and local levels to prevent, protect against, respond to, and recover from acts of terrorism and other catastrophic events. Awards were granted to three priority funding areas in FY2011: (1) Advancing “whole community” security and emergency management, (2) building prevention and protection capabilities (e.g., “If you See Something Say Something”), and (3) maturation and enhancement of state and major urban areas fusion centers. Broadband deployment could be supported under the first of these funding priorities.

The SHSP provides funding to all 50 states; however, funding levels have declined significantly in recent years and are expected to fall by an additional 340 percent in 2012. Moreover, while resources are available for every state, grants are allocated to individual counties using a population-driven formula. With about one percent of the state population, Allegany County is unlikely to receive substantial funding under this approach.

The Urban Areas Security Initiative is limited to 31 designated “high-threat, high-density urban

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<sup>97</sup> For additional background on FEMA’s Homeland Security Grant Programs, contact: Gary Harrity, Agency Grants Coordinator, Maryland Emergency Management Agency ([gharrity@mema.state.md.us](mailto:gharrity@mema.state.md.us)).

<sup>98</sup> The five grant programs include: the State Homeland Security Program (SHSP), Urban Areas Security Initiative (UASI), Operation Stonegarden (OPSG), Metropolitan Medical Response Grants (MMRS), and the Citizen Corps Program (CCP). Only the first two are described herein, as the others do not have any potential application to Allegany County. For a summary of all HSGP programs, visit <http://www.fema.gov/government/grant/hsgp/> (“Fiscal Year 2012: Homeland Security Grant Program”) (accessed June 23, 2012).

<sup>99</sup> See U.S. Dep’t of Homeland Security, May 2011, “Fiscal Year 2011: Homeland Security Grant Program, Guidance and Application Kit” ([http://www.fema.gov/pdf/government/grant/2011/fy11\\_hsgp\\_kit.pdf](http://www.fema.gov/pdf/government/grant/2011/fy11_hsgp_kit.pdf)) (accessed June 23, 2012).

areas” throughout the United States. As such, it does not provide funding for western Maryland (with the exception of Frederick County).

The Interoperable Emergency Communications Grant Program (IECGP) appears to support broadband deployment; however, the program is no longer funded.

Emergency Management Performance Grants,<sup>100</sup> can be used to support broadband deployment. The state Emergency Management Agency (EMA) is responsible for preparing a single state application on behalf of local emergency management agencies. Because allocations are population-based, this is also unlikely to be a substantial funding source for Allegany County. Nonetheless, this may be an option worth exploring, since the guidance and application kit identifies broadband as an eligible project.

### **Appalachian Regional Commission<sup>101</sup>**

The Appalachian Regional Commission (ARC) awards grants to projects that address one or more of the four goals identified by ARC in its strategic plan. While broadband may satisfy one of these stated goals, there are no live requests for proposals at this time.<sup>102</sup> Broadband deployment clearly advances ARC’s mission, however, so Allegany County should monitor the website for potential opportunities. Updates on ARC application deadlines are also available through [www.grants.gov](http://www.grants.gov).

Funds are given to projects that advance one of four strategic goals: (1) Job growth, (2) Strengthening the capacity of the people of Appalachia, (3) Infrastructure, and (4) Highways. Broadband would be eligible for funding under the third category. To receive funding, infrastructure projects must:

1. Develop leaders and strengthen community capacity;
2. Build and enhance basic infrastructure;
3. Increase access to and use of telecommunications technology
  - a. Make strategic investments in high-speed telecommunications infrastructure to increase local and regional connectivity and affordability;
  - b. Encourage the use of telecommunications applications in education, health care, business, and government initiatives;
  - c. Provide assistance for telecommunications development that coincides with other public infrastructure development;
4. Preserve and enhance environmental assets;
5. Promote the development of an Intermodal Transportation Network;
6. Foster the Development and Use of Innovative Technologies
  - a. Assist in the creation of telecommunications and computing enterprises;
  - b. Provide assistance for expanding existing high-technology operations in the Region;

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<sup>100</sup> U.S. Dep’t of Homeland Security, “FEMA Fact Sheet: 2010 Emergency Management Performance Grants Program” (<http://www.fema.gov/pdf/government/grant/empg.pdf>) (accessed June 23, 2012).

<sup>101</sup> For additional information regarding the Appalachian Regional Commission, contact Al Feldstein ([afeldstein@mdp.state.md.us](mailto:afeldstein@mdp.state.md.us) or 301.777.2161), Maryland ARC Program Manager.

<sup>102</sup> For a list of current funding opportunities, visit the Appalachian Regional Commission website: <http://www.arc.gov/funding/RequestsforProposalsforProjectGrants.asp> (none listed as of June 23, 2012).



- c. Promote partnerships with, and leverage research opportunities generated by, government-sponsored and private-sector research labs;
- d. Expand and create technology research initiatives in the Region's colleges and universities; and
- e. Increase support for public-sector science and technology programs.

ARC targets special assistance to economically distressed communities in the Appalachian Region, allowing 50 percent grant participation throughout the region and up to 80 percent participation in distressed areas. Allegany County is identified as a "transitional" community with a single economically distressed area, so a portion of the County would be eligible for this higher level of assistance.<sup>103</sup>

Typically, ARC project grants are awarded to state and local agencies and governmental entities (such as economic development authorities), local governing boards (such as county councils), and nonprofit organizations (such as schools and organizations that build low-cost housing).

### **US Treasury– New Markets Tax Credit**<sup>104</sup>

New Markets Tax Credits (NMTC) encourage investments in low-income communities by providing a 39 percent tax credit over a seven-year period to qualifying projects.<sup>105</sup> While traditionally used to help finance real-estate development,<sup>106</sup> we are aware of two instances where the NMTC Program was used to support telecommunications infrastructure in low-income communities.<sup>107</sup> Nonetheless, this is a very competitive process and awards are limited to nonprofit entities. As such, we are not confident that this is the best opportunity for Allegany County.

The NMTC Program attracts investment capital to low-income communities by permitting individual and corporate investors to receive a tax credit against their Federal income tax return in exchange for making equity investments in specialized financial institutions called Community Development Entities (CDEs). The NMTC Program is governed by the Internal Revenue Service (IRS) and the Community Development Financial Institutions Fund (CDFI), a division of the US Treasury. The IRS oversees the implementation of the Program and ensures

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<sup>103</sup> County Economic Status and Number of Distressed Areas in Appalachian Maryland, Fiscal Year 2013. [http://www.arc.gov/images/appregion/economic\\_statusFY2012/CountyEconomicStatusandDistressAreasFY2012Maryland.pdf](http://www.arc.gov/images/appregion/economic_statusFY2012/CountyEconomicStatusandDistressAreasFY2012Maryland.pdf) (accessed June 20, 2012).

<sup>104</sup> To learn more about the New Markets Tax Credit program, contact Radhika Reddy, founding partner at Ariel Ventures ([rr@arielventures.com](mailto:rr@arielventures.com)).

<sup>105</sup> See U.S. Dep't of the Treasury, LMSB-04-0510-016, May 2010, "New Markets Tax Credit" (guidance manual New Markets Tax Credit program) (<http://www.irs.gov/pub/irs-utl/atgnmtc.pdf>) (accessed June 23, 2012).

<sup>106</sup> See U.S. Dep't of the Treasury, Community Development Financial Institutions Fund, "Allocatee Profiles" (providing a collection of 2010 credit recipient profiles) (<http://www.cdfifund.gov/docs/2010/nmtc/2010NMTCProgramAllocateeProfiles.pdf>) (accessed June 23, 2012).

<sup>107</sup> See, e.g., Impact Matters, "16 Rural, Nonprofit, Medically Underserved Hospitals in Ohio to Get Telemedicine and High-speed Internet: Fiber Optic Network Made Possible with \$8 Million in New Markets Tax Credits Financing" (providing background on OneCommunity Ohio) (<http://www.ncbcapitalimpact.org/default.aspx?id=1905>) (accessed June 23, 2012); Jennifer Dockery, Journal of Tax Credits, Dec. 2011, Vol. 2, "New Broadband Connection Brings Medicine, Education to Alaska Natives" (providing remote medicine through broadband in Northwest Alaska) ([http://www.wavelandventures.com/pdfs/novogradac\\_article\\_1326902714.pdf](http://www.wavelandventures.com/pdfs/novogradac_article_1326902714.pdf)) (June 23, 2012).

that tax credits are appropriately applied. The CDFI awards NMTC authority – dubbed “allocations” – to CDEs, or “allocates.” These allocations enable CDEs to raise the stated amount of capital, or Qualified Equity Investments, from investors. Thus, by receiving allocation authority from the CDFI, CDEs are given resources to seek investment opportunities in Qualified Active Low Income Community Businesses (QALICB). Investors, in turn, are attracted to CDEs because the tax credit allows them to reduce their federal tax liability on their investment by 39 percent over the funding period.

CDEs are certified organizations with a primary mission of serving low-income communities and are accountable to the populations they are intended to serve (e.g., through membership on their board). Once a NMTC award is granted to the CDE, the CDE must secure an investor to provide capital in exchange for the tax credit. The CDE then has one year to invest substantially all (i.e., at least 85 percent) of the Qualified Equity Investment in Qualified Active Low-Income Community Businesses located within Low-Income Communities (LICs). In other words, while the project need not be constructed in its entirety within one year, the value of the tax credit needs to be spent down during that time.

Low-income communities are defined as census tracts:<sup>108</sup>

1. With at least 20 percent poverty rate; or
2. Where the median family income does not exceed 80 percent of the area median family income; or
3. That have a population of less than 2,000, are contained within a Federally designated Empowerment Zone, and are contiguous to at least one other LIC; or
4. Where the median family income does not exceed 85 percent of the area median family income, provided the census tract is located in a high-migration rural county.

It is possible that portions of the County satisfy these criteria.

Qualifying investments in eligible low-income communities must benefit Qualified Active Low-Income Community Businesses (QALICB), which are defined as:

1. An operating business located in a LIC, where:
2. At least 50 percent of the total gross income is earned within the LIC; and
  - a. At least 40 percent of the use of tangible property of the business is within LICs;
  - b. At least 40 percent of the services performed by the business’ employees are performed in LICs;
  - c. Or either the use of tangible property or the use of services performed is met at 50 percent or higher.

The application process for NMTC allocations is extremely competitive. CDEs typically solicit resources that far exceed the available funding. Even if allocated, it is not guaranteed that the CDE will be able to identify a suitable investor. Given the competitive nature of the award, the requirement for local resources to supplement the tax credit, the limited portion of the County that would be eligible, and the substantial monitoring requirements once awarded, we do not think that NMTC represent a top funding option for the County.

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<sup>108</sup> See Reznick Group, “New Markets Tax Credit Interactive Map” (<http://www.reznickgroup.com/NMTC-mapping-tool>) (interactive tool to determine NMTC eligibility based on address or census tract).

## ***Appendix B: Cost Estimate to Build U.S. 220 Fiber***

On May 7, 2012, CTC engineers drove out fiber backbone routes in the County. The purpose of the drive out was to initially assess a backbone fiber route proposed for U.S. 220, including determining potential fiber placement on existing utility poles and underground routes. Additionally, we estimated budgetary costs for construction of the fiber segments.

Based on our ride out, we found that approximately 70 percent of the aerial route had two potential pole line routes. The majority of the routes contained Verizon telephone poles along one side of the highways and Allegany Power poles with CATV attachments on the opposite side of the highway. Therefore, the make-ready costs necessary to make space for the new fiber should be able to be minimized by using the least expensive routes.

The fiber construction routes followed the highway rights-of-ways (ROW) in the majority of the route. However, in some locations, the pole lines diverge from the highway to service locations or cross over hills, and then rejoin the highway. In these cases, pole lines were not always visible from the roads. Obtaining more accurate make-ready costs and plant mileage would require a complete pole survey, consisting of fiber attachment height, collection of utility pole numbers, pole ownership, potential fiber users, and meetings with utilities to determine any unique pole attachment requirements.

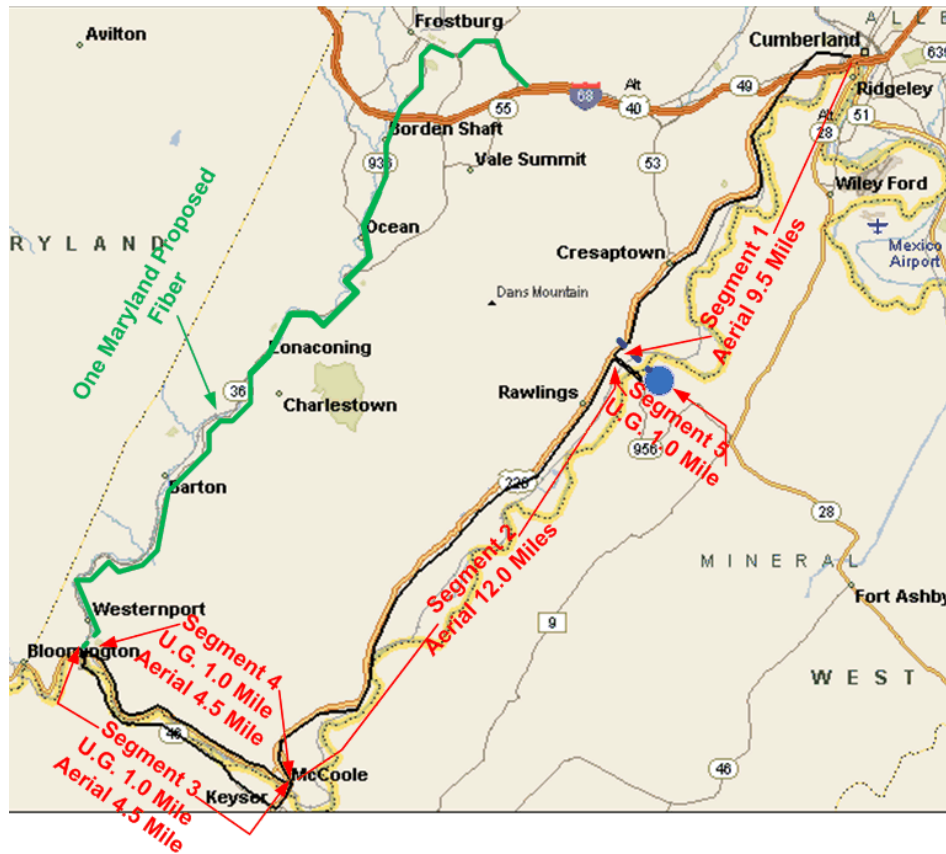
As part of the proposed fiber route, we included Rocket Center, West Virginia. We also noted that future potential fiber sites were along the proposed fiber route. These included the Cumberland, Crespatown, and Black Oak Allegany Power Substations as well as the correctional facility on U.S. 220 and the American Woodmark Corporation facility in the Barton Business Park.

We estimate the total backbone fiber construction cost to be approximately \$2.3 million, for approximately 26.5 to 27.5 miles of fiber. The Rocket Center spur is estimated to be an additional mile of construction. We divided the fiber construction into five segments:

- Segment 1 (estimated at 9.5 miles) is from Cumberland to Route 956 along U.S. 220.
- Segment 2 (estimated at 12.0 miles) is from Route 956 to Keyser along U.S. 220.
- Segment 3 (estimated at 5.5 miles) is from Keyser to Bloomington along Route 46; Segment 4 (estimated at 4.5 miles) extends from Keyser to Bloomington along Route 135. Only one of these two segments would be constructed. Either segment could also be connected with the One Maryland Broadband Network (OMBN) fiber to complete a redundant fiber route.
- Segment 5 (estimated at one mile) consists of a spur from the backbone to Rocket Center.

Figure 104 illustrates the proposed fiber routings and distances.

Figure 104: Potential Fiber Routes and Distances



Notes: Blue circle is Rocket Factory; only Segment 3 or Segment 4 would be constructed.

The tables below detail the cost breakdown, and are based on the following assumptions:

- Preliminary costs are based upon the use of all dielectric self-supporting (ADSS) ribbon fiber.
- The drop fiber to the Rocket Center facility is based upon the use of 48-count fiber and does not include wiring inside the building.
- Slack fiber is based upon fiber storage approximately every 500 to 600 feet. This slack fiber is to be placed at future possible splice locations or for fiber storage if a fiber cut or fiber damage occurs.
- All new underground fiber is placed in new two-inch conduit with inner duct for future use.
- Make-ready costs are based upon our best estimates. Make-ready costs are estimated and actual costs may vary substantially based upon the utility company. Actual costs can be determined after a complete walk out has been completed.

**Table 15: Preliminary Estimated Total Cost for U.S. 220 Fiber**

SEGMENT	AERIAL MILES	U.G. MILES	COST/AERIAL MILE	COST/U.G. MILE	TOTAL AERIAL COST	TOTAL U.G. COST	TOTAL COST
1	9.50	0.00	\$71,900	\$209,000	\$683,050	\$0	\$683,050
2	12.00	0.00	\$71,900	\$209,000	\$862,800	\$0	\$862,800
3 or 4	4.50	1.00	\$71,900	\$209,000	\$323,550	\$209,000	\$532,550
5	0.00	1.00	\$71,900	\$196,600	\$0	\$196,600	\$196,600
<b>TOTAL ESTIMATED COST</b>							<b>\$2,275,000</b>

**Table 16: Preliminary U.S. 220 Backbone Aerial Cost Per Mile**

<b>MATERIAL</b>					
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	144 Count ADSS Fiber	6,072	FT.	\$1.50	\$9,108
2	Dead End Fiber Mount	56	EACH	\$50.00	\$2,800
3	Tangent Fiber Mount	84	EACH	\$43.00	\$3,612
4	ADSS Slack Storage	9	EACH	\$70.00	\$630
5	Splice Cases	0.33	EACH	\$600.00	\$198
6	Cable Markers	140	EACH	\$0.50	\$70
SUB TOTAL MATERIAL					\$16,418
TAX and FREIGHT (10%)					\$1,642
<b>TOTAL MATERIAL PER MILE</b>					<b>\$18,100</b>
<b>LABOR</b>					
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Base Maps	6,072	FT.	\$0.01	\$61
2	Walk-Out	1	Lot	\$2,500.00	\$2,500
3	Design	5,280	FT.	\$0.08	\$423
4	Pole Application	140	EACH	\$25.00	\$3,500
5	Make-Ready	140	EACH	\$250.00	\$35,000
6	Permits (RR )	0.08	EACH	\$10,000.00	\$770
7	Place Fiber	5,280	FT.	\$1.75	\$9,240
8	Place Fiber Splice Case	0.33	EACH	\$275.00	\$91
9	Place Slack Fiber	9	EACH	\$125.00	\$1,125
10	Splice Fiber	48.00	EACH	\$20.00	\$960
11	Place Cable Markers	140	EACH	\$0.25	\$35
<b>TOTAL LABOR PER MILE</b>					<b>\$53,800</b>
<b>TOTAL MATERIAL AND LABOR</b>					<b>\$71,900</b>

**Table 17: Preliminary U.S. 220 Backbone Underground Costs Per Mile**

<b>MATERIAL</b>					
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	144 Count ADSS Fiber	6,072	FT.	\$1.50	\$9,108
2	2" Rolled Duct	5,280	EACH	\$3.00	\$15,840
3	Pedestals	9	EACH	\$225.00	\$2,025
4	Place Fiber	5,280	EACH	\$2.50	\$13,200
5	Riser	2	EACH	\$30.00	\$60
5	Splice Cases	0.33	EACH	\$600.00	\$198
7	Cable Markers	11	EACH	\$35.00	\$370
<b>SUB-TOTAL MATERIAL</b>					<b>\$40,801</b>
<b>TAX and FREIGHT (10%)</b>					<b>\$4,081</b>
<b>TOTAL MATERIAL PER MILE</b>					<b>\$44,900</b>
<b>LABOR</b>					
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Base Maps	6,072	FT.	\$0.01	\$61
2	Walk-Out	1	Lot	\$2,500.00	\$2,500
3	Design	5,280	FT.	\$0.08	\$423
4	Permits	1	Lot	\$350.00	\$350
5	Bore Cable	5,280	EACH	\$28.00	\$147,840
6	Place Pedestals	9	EACH	\$200.00	\$1,800
7	Place Fiber	5,280	FT.	\$1.75	\$9,240
8	Place Fiber Splice Case	0.33	EACH	\$275.00	\$91
9	Construct Riser	2	EACH	\$250.00	\$500
10	Splice Fiber	48.00	EACH	\$20.00	\$960
11	Place Cable Markers	11	EACH	\$30.00	\$317
<b>TOTAL LABOR PER MILE</b>					<b>\$164,100</b>
<b>TOTAL MATERIAL AND LABOR</b>					<b>\$209,000</b>

**Table 18: Preliminary Rocket Center Underground Cost Per Mile**

<b>MATERIAL</b>					
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	48 Count Fiber	6,072	FT.	\$0.69	\$4,190
2	2" Rolled Duct	5,280	EACH	\$3.00	\$15,840
3	Pedestals	9	EACH	\$225.00	\$2,025
4	Place Fiber	5,280	EACH	\$2.50	\$13,200
5	Riser	1	EACH	\$30.00	\$30
5	Splice Cases	0.33	EACH	\$400.00	\$132
7	Cable Markers	11	EACH	\$35.00	\$370
<b>SUB TOTAL MATERIAL</b>					<b>\$35,787</b>
<b>TAX and FREIGHT (10%)</b>					<b>\$3,579</b>
<b>TOTAL MATERIAL PER MILE</b>					<b>\$39,400</b>
<b>LABOR</b>					
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Base Maps	6,072	FT.	\$0.01	\$61
2	Walk-Out	1	Lot	\$2,500.00	\$2,500
3	Design	5,280	FT.	\$0.08	\$423
4	Permits (RR)	1	Lot	\$10,350.00	\$10,350
5	Bore Cable	5,280	EACH	\$25.00	\$132,000
6	Place Pedestals	11	EACH	\$200.00	\$2,200
7	Place Fiber	5,280	FT.	\$1.50	\$7,920
8	Place Fiber Splice Case	1.00	EACH	\$150.00	\$150
9	Construct Riser	1	EACH	\$250.00	\$250
10	Splice Fiber	48.00	EACH	\$20.00	\$960
11	Place Cable Markers	11	EACH	\$30.00	\$317
<b>TOTAL LABOR PER MILE</b>					<b>\$157,200</b>
<b>TOTAL MATERIAL AND LABOR</b>					<b>\$196,600</b>