



Community Broadband Planning Strategies

***Access, Adoption and
Utilization in Virginia***

March 2013

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Cover Letter

Ubiquitous affordable broadband remains a priority for the Commonwealth of Virginia. Access to broadband provides communities with the foundation necessary for economic growth and an improved quality of life. The Commonwealth continues to provide support to communities in their efforts to expand broadband access and increase adoption and utilization through the Center for Innovative Technology. Continuing their efforts to create resources and tools to assist communities, the Center for Innovative Technology (CIT) is releasing this Community Broadband Planning Strategies (CBPS) guide.

It is our hope that this guide will serve as a roadmap for communities planning broadband initiatives. All too often local governments are overburdened and understaffed which is why the CBPS guide was designed to alleviate the often overwhelming task of broadband technology and models research.

We encourage community leaders to take advantage of not only this resource but all of the broadband resources CIT has developed to assist local governments and communities. CIT and the Commonwealth view the pursuit of broadband technologies as a partnership with Virginia communities and as such I ask that you feel free to provide feedback so we can keep this guide relevant.

The Commonwealth's Broadband Team

1. Executive Summary

The Commonwealth of Virginia has for over a decade pro-actively promoted broadband access, adoption and utilization. It has done so with a strategic approach that positions the Commonwealth’s government as a leader by example and as an enabler of local and regional efforts. Virginia’s strategic approach is outlined in Sections 2 and 3 and forms the starting point for this document. This approach has resulted in significant successes, including the recent and ongoing build-out of a number of strategic “middle-mile” Internet access projects.

Virginia’s commitment to supporting communities and regions with broadband access, adoption and utilization is based on an understanding of the impacts that broadband does have and can have on the wellbeing of Virginia’s citizens, its economy and its governments. As noted in Section 4, these impacts include the creation of jobs, organizational cost savings, business revenues, access to educational and health services, and active participation in community life.

However, a close look at how Virginia is performing across the three dimensions of broadband access, adoption and utilization uncovers a pattern of uneven performance. Some regions, notably the Southside and Southwest, are struggling to achieve the high levels of performance found in others parts of Virginia. Section 5 examines the characteristics of the “digital divide” in Virginia. Key characteristics of households on the wrong side of the digital divide include low income, age (65 +), location (living in a non-metropolitan area), presence of a mental or physical disability, and lower levels of education and skills related to computers and the Internet. Probably the most frequently mentioned aspect of the digital divide is the number of rural residential areas that are still without access to broadband.

For Virginia to make meaningful progress in bridging the ever-widening digital divide, an assessment of the current situation was undertaken, as summarized in the table below (taken from Section 6).

<p style="text-align: center;"><u>Strengths</u></p> <p>Interest from many local stakeholders Support from Commonwealth Resources (regulatory, technical) Improved potential from wireless (fixed and mobile)</p>	<p style="text-align: center;"><u>Weaknesses</u></p> <p>Low density population in unserved rural areas Weak uptake and revenues in some areas Poor business case for conventional solutions Grant and loan constraints Lack of interest among some incumbent ISPs Inertia and limited organizational resources in many rural communities</p>
<p style="text-align: center;"><u>Opportunities</u></p> <p>New middle mile infrastructure Fixed wireless as a low cost, agile option</p>	<p style="text-align: center;"><u>Threats</u></p> <p>Weak and uncertain economy Global competition eroding local economic base Fiscal constraints on local government Past harvesting of “low hanging fruit” makes remaining areas less economic for last mile investments</p>

Section 7 lays out strategies and actions that communities can undertake to bridge the digital divide. The Section provides recommendations across four key dimensions, with the issue of leadership and local capacity being added to the three more familiar broadband issues of access, adoption and utilization.

The issue of leadership is critical in *overcoming the inertia that exists in many communities*, especially those with limited resources and a small population base (see Section 7.2). This strategic planning document recommends ***that communities and regions develop a structured broadband leadership development and support program within their area.*** Looking beyond the local and regional level, it is also recommended ***that organizations with a state-wide or larger region consider providing assistance to local communities by establishing a collaborative leadership development program for rural areas that are willing to make a commitment to improving broadband services.***

“One common characteristic of all Virginia’s current broadband projects is the presence of strong, dedicated leadership (individual and/or committee) who understand the broadband imperative and are willing to commit time, energy and scarce resources to insure that their community is not left behind.”

Virginia’s Broadband Toolkit

Section 7.3 lays out in some detail the various steps, strategies, options and considerations that communities should take into account as they undertake efforts to improve ***broadband availability***. The four key steps in this process are: preparation; engagement of Internet Services Providers; refining of objectives and relationships; and, making commitments. Addressing a broadband infrastructure deficit in a community will vary greatly according to its circumstances, values and ambitions. Consequently this section makes few recommendations, but does provide numerous strategies and options, as well as identifying issues that will need to be addressed.

Section 7.4 examines strategies for addressing broadband adoption challenges. Noting the very distinct groups that have low levels of Internet adoption, it is recommended ***that communities or regions target Internet adoption efforts at one or more of the following groups: low income households with children; unemployed individuals; individuals over 65 years old; and individuals with disabilities.*** Each of these groups tends to face a different set of barriers, as low income families with children are challenged by costs while non-adopting seniors often fail to see the relevance of the Internet and lack the skills to explore it. Section 7 identifies strategies appropriate to the distinct barriers that these different groups face.

For households, the challenge of more productive use of the Internet has similar dimensions as non-adoption. Those that struggle tend to be older, lower income, more likely to live in a non-metropolitan area or have a disability. Most of the strategies noted in a previous section on non-adoption apply to low utilization by households and need not be re-stated. Instead, the primary focus for improving utilization of the Internet is on organizations (Section 7.5). While organizations (both commercial and non-commercial) have very high levels of adoption (over 95%), their utilization of the Internet varies significantly depending on their size, sector and location. Communities outside the influence of larger metropolitan areas often lack the natural networks needed to enable effective adoption of complex

Internet applications and uses. This report recommends ***that non-metropolitan communities and marginalized urban areas take a pro-active approach to maximizing the benefits of the existing broadband infrastructure.*** Given that smaller organizations have, on average, a demonstrated lower level of utilization than their larger peers and in recognition of the unrealized potential of small businesses to more effectively utilize the Internet, it is recommended ***that local and regional efforts focus on the small-medium enterprise segment, especially those with 1-19 employees, to increase Internet utilization.***

Throughout the document, links are provided to online documents and resources that can assist the reader in pursuing areas of particular interest. Many of these resources have been developed or coordinated by the Commonwealth. In addition, the appendix provides a more systematic listing of additional resources for the reader's consideration.

2. Purpose And Focus

This document is designed to assist community and regional efforts in achieving better access, adoption and effective use of broadband services. Through efforts to improve broadband, the people, businesses and government bodies in Virginia can open up new opportunities, promote a dynamic economy, and develop healthy and resilient communities.

The foundation of this Community Broadband Planning Strategies document is its Strategic Framework that consists of the following elements:

- A core set of principles that reflects the Commonwealth's values and strategies regarding broadband.
- A clear understanding of why broadband matters.
- Emphasis on the economic health of regions and communities that are currently lagging behind their counterparts in other parts of the Commonwealth.
- A clear rationale for Government policies and programs;
- High level goals for broadband initiatives that establish purpose and expectations for local community-based broadband initiatives.
- Development of a community broadband planning strategies document as a resource for regions and communities.

It is well known that gaps currently exist in the availability and usage of broadband services; that there are areas with low adoption levels; and that sectors of the economy are struggling to adapt to the increasingly knowledge-based economy. This planning document identifies how these aspects of the digital divide can be addressed at the local and regional level. While the Commonwealth of Virginia can be an advocate and enabler (documenting best practices and developing tools and assistance programs), the most effective change agents are often at the local level, driving action and implementation on the frontline of broadband initiatives.

This Community Broadband Planning Strategies document builds on previous work carried out in the Commonwealth. The document consolidates existing resources for use by a variety of local and regional stakeholders, including local governments, community leadership, private businesses, and not-for-profits. The Community Broadband Planning Strategies document includes recommendations for supplementing existing resources, so that the overall goals and strategies of the Commonwealth can be achieved. The strategies in this document focus on the digital divide, which can be seen in areas that are unserved and underserved by broadband services, as well as in populations that are not adopting or underutilizing the Internet. This document does not address geographic areas or groups where market forces are effective at addressing the goal of ubiquitous and meaningful access, adoption and utilization.

The Community Broadband Planning Strategies document includes the following components:

- Defining the Strategic Framework
 - Core principles
 - Why broadband matters

- Goals for broadband access, adoption and awareness
- Rationale for government policies and programs
- Assessing the current state of broadband access, adoption and awareness in Virginia
- Strategic directions / recommendations
- Identification of resources for implementing strategies

3. Core Principles

This community broadband planning resource takes its direction from the Governor’s Broadband Round Table Report to the Governor (2008) which states that: *“There is no single policy change or initiative that will solve these broadband deployment problems overnight. Therefore, governments and regulatory agencies at all levels must act as enablers, not impediments, to community-led deployments and private investment. In fact, broadband deployments in unserved areas must become a top public policy priority with government acting in a leadership role to make ubiquitous affordable broadband a reality.”* Page 15.

The core principles that guide community broadband planning in Virginia build on this sentiment:

- The Commonwealth will play the role as enabler of local and regional efforts to address the digital divide.
- Broadband initiatives should recognize the complementary roles of market (consumers and providers), communities and local governments.
- Broadband initiatives should be undertaken in light of evidence that provides benchmarks and comparative assessment of communities, regions and sectors.
- Priority should be given to areas where the digital divide is evident in terms of access, adoption and use of the Internet. More specifically, priority should be given to areas identified as “Unserved” and “Underserved” in terms of Internet access.¹
- The Commonwealth will endeavor to provide a menu of options and resources to support local and regional broadband initiatives that address the digital divide.

¹ NTIA definition of **unserved** and **underserved**: **“Unserved**: An area, composed of one or more contiguous census blocks where at least 90% of households in the proposed funded service area lack access to facilities-based, terrestrial broadband service, either fixed or mobile, at the minimum-broadband speed.” The rules defined **underserved** for Last Mile Projects as “an area composed of one or more contiguous census blocks where at least one of the following is met: 1) no more than 50% of households in the proposed funded service area have access to facilities-based, terrestrial broadband service at greater than the minimum broadband speed; 2) no fixed or mobile broadband service provider advertises broadband speeds of at least 3 Mbps downstream in the proposed funded service area; or 3) the rate of broadband subscribership for the proposed service area is 40% of households or less.

4. Why Broadband Matters: Implications for Strategic Planning

In the twenty-first century, the Internet is an essential part of a region's infrastructure, a business's internal and external operations, and a household's participation in their community life. Availability and meaningful use of the Internet speaks directly to a community's viability, competitiveness and quality of life. The shift to the knowledge economy manifests itself at a variety of levels, from the private sector to public services to the private household. At each of these levels, Internet based activities have become integrated in the daily functioning of businesses, governments and individuals. The Internet facilitates communications, productivity, innovation, recreation, and healthcare.

For government organizations, the impact of the Internet can be felt in terms of cost efficiency, accountability and the ability to put services into the hands of local residents. With all levels of governments moving services to the Internet, those who don't use the Internet find themselves with increasingly restricted access to government information and services.

Another area that broadband can add tremendous value is in the delivery of health care services. Broadband enables the development of cutting-edge approaches to healthcare that can reduce cost, increase availability and improve outcomes. One way that broadband enabled healthcare reduces healthcare costs is by facilitating the widespread use of electronic medical records. Broadband enabled health care can also help to reduce costly medical errors by implementing solutions like e-prescribing, and facilitate more timely and relevant diagnoses and treatments of chronic diseases. Moreover, broadband-enabled telemedicine services such as remote patient monitoring are shifting the point of care to the home.

Broadband enabled health care also leads to increased employment. A new generation of skilled and professional workers is required to support the roll-out and delivery of broadband enabled health care. Perhaps more important to many areas of the Commonwealth, broadband enabled telehealth can level the playing field between urban and rural medical capabilities, ensuring more uniform and enhanced healthcare for all Americans.

From an economic perspective, broadband (high-speed Internet) impacts local and regional economies by facilitating internal business growth and retention, while attracting new businesses. In a similar manner, broadband facilitates development of a skilled labor force and allows a community to compete for skilled labor that will not move to an area without broadband. The implication is that those areas that don't have broadband will lose existing skilled labor and businesses, while failing to attract new residents and businesses.

Two recent reports by Strategic Networks Group (SNG)² and the Thomas Jefferson Institute for Public Policy³ have provided evidence of the impacts of Broadband on the economy of Virginia and its regions.

² *An e-Strategy for Broadband Utilization in the Commonwealth of Virginia*: Strategic Networks Group, January 2012.

³ <http://www.thomasjeffersoninst.org/files/3/Connecting%20Virginia%20Policy.pdf>

The findings of these reports underscore the large and critical role that the Internet plays in the shift to a knowledge economy.

First and foremost, job creation is a vital aspect of the impact of broadband. The SNG report found that jobs whose creation was enabled by the Internet represented twenty percent of all new jobs created in a sample group of 1,084 commercial and non-commercial organizations in the Commonwealth. The Thomas Jefferson Institute report in November 2011 on the economic impact of broadband estimated that “Virginia could gain close to 13,000 jobs and retain 50,000 jobs due to broadband expansion in the next five years.” The impact of broadband expansion on job creation and business retention and expansion was estimated to generate additional tax revenue in the range of \$73 to \$110 million over the same five year period.

Evidence of the pronounced impact of broadband on the health of a local and regional economy is growing and virtually indisputable. However, for many, the mechanisms of these impacts are unclear. To better understand why broadband produces the impacts attributed to it, it helps to identify some of the specific ways in which broadband benefits the operations of businesses. Drawing on 2010 broadband utilization benchmarking data from Virginia, the benefits most valued by businesses fell into three categories:

- Productivity: the Internet makes operations easier and allows organizations more effective use of their resources.
- Customer support and reach: the Internet allows businesses to improve customer support, while also helping them to reach new customers, often on a global scale.
- Profitability: Increased use of the Internet results in a growing percentage of revenues from the Internet, which is one of the fastest areas of growth. Use of the Internet also helps in reducing costs.

However, broadband availability and effective utilization is not equally present across Virginia, as explored in the next section of this report. The relatively low levels of broadband availability, adoption and use in some regions of Virginia have a negative impact on job creation and attraction of new businesses in those regions. Consequently, the lack of competitive broadband strongly impacts the ability of a region to retain its existing businesses and population.⁴

Local and regional leaders face the challenge of assessing how their community or region is performing on broadband issues. To the extent that their region or community has relatively low broadband access and/or utilization, they face the challenge of finding the means to improve their situation, whether it be in terms of access to the Internet, adoption of the Internet or productive use of the Internet. The following sections provide information and strategies to help local and regional leaders in addressing these challenges.

⁴ The 2010 SNG report that benchmarked broadband utilization across Virginia found that over 16% of households would “definitely” relocate to another community for broadband service if it was not available in their current location. Another 19% would consider relocation “very likely”. Broadband was also considered “essential” for selecting location by 32% of businesses and other organizations, as well as “essential” for remaining in a location by 54% of organizations (e-Solutions Benchmarking Report for Virginia, November 2010).

5. Assessment of Current Status: How is Virginia Doing?

Given the importance of broadband to the current and future health of Virginia, its communities, residents and businesses, it is important to assess Virginia’s situation regarding the three dimensions of broadband availability, adoption, and utilization. The conclusion arising from the evidence is that the digital divide in Virginia is real and impactful. Some regions, households and businesses continue to face barriers to participating fully in the digital age.

The following pages examine Virginia’s broadband wellbeing across these three dimensions. While broad measures of Virginia’s broadband performance are presented, an effort has been made to identify the specific factors that lead to the digital divide. The data and perspectives presented reflect this document’s focus on local and regional broadband planning. Broadband issues that relate more to the state-level are being addressed through a separate process that includes the Broadband Advisory Council’s review of barriers related to state-level policies .

5.1 Broadband Access

Access to the Internet has evolved at a tremendous rate over the last twenty years. The rate of change in the infrastructure that provides access to the Internet will continue to evolve rapidly. Moreover, the directions of this ongoing evolution will not necessarily follow a predictable path. This section looks at where Virginia currently stands in relation to access to the Internet. This assessment will need to be adjusted periodically to reflect the rapidly changing face of Internet access.

What is Broadband?: The following definition of "Broadband" comes from National Broadband Map of the National Telecommunication and Information Administration. “Broadband refers to a high-speed, always-on connection to the Internet. The primary factors that people consider when deciding what type of broadband Internet service to subscribe to include service availability, connection speed, technology and price. Organizations define broadband in different ways. For information to be included on the National Broadband Map, the technology must provide a two-way data transmission (to and from the Internet) with advertised speeds of at least .768 megabits per second (mbps) downstream and at least .2 mbps upstream to end users.” More recently, ***the FCC has set a goal of affordable broadband with a minimum download speed of 4 megabits per second*** (<http://www.broadband.gov/plan/>). For the sake of consistent use of terminology, the FCC has defined the following “Internet speed tiers” .

FCC Speed Tier Download Speeds Broadband		
	From	To
1st Generation	200 Kbps	768 Kbps
Tier 1 Broadband	768 Kbps	1.5 Mbps
Tier 2 Broadband	1.5 Mbps	3 Mbps
Tier 3 Broadband	3 Mbps	6 Mbps
Tier 4 Broadband	6 Mbps	10 Mbps
Tier 5 Broadband	10 Mbps	25 Mbps
Tier 6 Broadband	25 Mbps	100 Mbps
Tier 7 Broadband	Greater than 100 Mbps	

FCC Activity Minimum Recommended Download Speeds(Mbps)	
Application	Minimum Speed Recommended (megabits per second)
Email	0.5
Web browsing	0.5
Job searching, navigating government websites	0.5
Interactive pages and short educational videos	1
Streaming radio	Less than 0.5
Phone calls (VoIP)	Less than 0.5
Standard streaming videos	0.7
Streaming feature movies	1.5
Basic video conferencing	1
HD-quality streaming movie or university lecture	4
HD video conference and telelearning	4
Game console connecting to the Internet	1
Two-way online gaming in HD	4 symmetrical
Lower definition telemedicine	0.6-1 symmetrical
HD Telemedicine (diagnostic imaging)	5-10+ symmetrical

The National Broadband Map web site (<http://www.broadbandmap.gov/>) provides data on each state's performance in terms of the percentage of population covered by broadband. The site looks at broadband coverage at two levels: basic broadband (0.768 mbps down/0.2 up) and better broadband (3 mbps down/0.768 up). Virginia's performance is assessed at: 99% basic broadband; 93.8% better broadband. In national comparisons, Virginia ranks 43rd in terms of access to better broadband and 43rd for basic broadband. The figures on the National Broadband Map site are periodically updated. The figures provided here reflect the situation in January 1st 2012.

However, state-wide broadband availability is not the primary focus of this broadband planning document. Instead, the issue in question is the level of broadband availability in the different communities and regions of Virginia. It is at this level that a very different picture emerges. Using 2011 data, the Virginia Performs website notes that "There are stark regional differences in broadband access within Virginia. While over 98 percent of the Northern (98.4%) and Hampton Roads (98.5%) regions have reliable access to broadband (the only regions above the state average), rates in Southside and Southwest for 2011 are 61.8 percent



and 71.4 percent, respectively.”⁵ Looking at the broadband coverage maps, it is quickly apparent that the areas with poor or no coverage are predominantly rural, which is consistent across the nation.

The broadband coverage situation is becoming more complex with the rapid growth of mobile wireless coverage and rapidly increasing use of smart phones capable of accessing the Internet. Assessing the impact of 4G wireless networks on broadband availability, adoption and utilization are still in its early stages. For the most part, smart phones, tablets and other mobile devices are valuable adjuncts to a business’ or household’s broadband access. However, mobile wireless is rarely attractive as the primary means of broadband access, especially for organizations. With lower levels of reliability, higher costs, and usage caps, mobile broadband has not been a good option as the primary Internet connection for businesses. For households, mobile wireless may be more attractive as a vehicle for accessing the Internet, though the situation depends greatly on usage patterns of each individual. For a community, having mobile broadband wireless coverage may be seen as necessary to remain a viable place for its businesses and residents. However, most communities will not see mobile wireless as acceptable as the primary means of broadband connectivity.⁶

Before concluding this review of broadband availability, it is important to note that there are considerations beyond simply availability of basic broadband, especially for businesses and community anchor institutions. As the Internet becomes a more integral part of the operations and critical systems of an organization, reliability usually becomes as important as or more important than speed. Moreover, for businesses with truly critical operations that are dependent on the Internet, the ability to have more than one means of access (redundancy) to the Internet becomes a major consideration in locational decisions. Lastly, there are many organizations (and households) whose demands on their Internet access require more speed than “basic broadband”.

Whether a community’s motivation is acquiring basic broadband or upgrading beyond basic broadband, a similar challenge presents itself. If there is sufficient demand for broadband services as well as competition among local Internet Service Providers (ISPs), the market place will probably address the needs of that community. Where there is limited demand or competition, communities may decide to undertake initiatives to address the lack of (adequate) broadband service. The options available to communities in this latter situation will be explored in Section 8.

5.2 Internet Adoption

Providing access to Internet services is only the first step in achieving a digitally active and engaged community. In 2010, 73.3 percent of the population in Virginia used the Internet, either from work, home or elsewhere. ***This means that over a quarter of Virginia residents do not use the Internet from any location.*** Looking at availability of broadband in the home, “69.5% of Virginia households have adopted broadband, which is slightly higher than the national average of 68%. 72.9% of households in

⁵ <http://vaperforms.virginia.gov/indicators/govtCitizens/internetAccess.php>

⁶ The Office of Telework Promotion and Broadband Assistance (OTPBA) publishes [a broadband access map of Virginia](#), detailing where such service is available and by what method.

urban areas use broadband compared to only 48.5% of households in rural areas of the Commonwealth.”⁷ Whether by choice or economic circumstance, these residents do not access opportunities and services that provide a broad range of benefits to most residents of Virginia.

Looking at businesses, the issue of adoption is less clear. A FCC study in 2010 found that 95 percent of businesses with five or more employees had a *broadband connection* and consequently can be considered adopters of the Internet. For businesses with four or less employees, the situation is less clear, with mixed estimates from different studies.

For the purposes of this plan, the priority for Internet adoption efforts is on individuals and households. To the extent that low adoption is an issue among micro businesses, adoption efforts targeted at individuals and households will have a secondary benefit as these people will also be the owners of many of Virginia’s micro businesses.

Recognizing the benefits of increasing levels of Internet adoption is just the first step on the road to developing a coherent adoption strategy. A key consideration in designing that strategy is understanding who are the “non-adopters” and what are the barriers or motivations that keep them from using the Internet. Results across different national and state studies are very consistent in their findings. Non-adopting individuals have disproportionately one or more of the following characteristics: lower income, over 65 years old, residents of non-metropolitan areas, physical or mental disability and less than a college education.⁸

Numerous research efforts have been carried out to determine the main barriers to Internet adoption. The results have shown that non-adoption is usually a result of a combination of factors, rather than any one factor. The three most critical factors include: costs of broadband service and owning a computer; digital literacy; and, lack of interest or perceived relevance of the Internet to the non-adopting individual or household. Other relevant but less frequently cited factors include concern over privacy and security issues and lack of broadband availability.

In the last few years, the growing popularity and capabilities of “smartphones” has added a new wrinkle to the Internet adoption dynamic. With people increasingly using smartphones to access the Internet, it is important that policy and decision-makers understand the implications of smartphones and mobile wireless connectivity. In a 2012 survey carried out by the Pew Internet & American Life Project, 45 percent of American adults own smartphones. In a Pew survey in 2011, “87 percent of smartphone owners access the Internet or email from their handheld, including two-thirds (68%) who do so on a

⁷ **Digital Nation: Expanding Internet Usage: U.S. Department of Commerce:** National Telecommunications and Information Administration; 2011; <http://www.ntia.doc.gov/report/2011/exploring-digital-nation-computer-and-internet-use-home>. (“43 percent of households headed by someone with a disability used broadband, compared to 72 percent of households headed by someone with no disability, implying a 29 percentage point gap in broadband Internet access. Once we control for income, education, age, and other key attributes, the gap in broadband Internet access declines to six percentage points or about one-fifth of the original gap.”)

⁸ **An e-Strategy for Broadband Utilization in the Commonwealth of Virginia:** Strategic Networks Group, January 2012.

typical day”.⁹ The Pew survey found that smartphones were the primary means for accessing the Internet for 25 percent of smartphone users, especially for Black and Latino smartphone owners (38%) and households with incomes under \$30,000¹⁰. An implication of the research is that is that smartphones play an important role in addressing the digital divide across racial and ethnic categories.

Based on the above evidence, the following conclusions can be derived for Virginia:

- Virginia’s broadband adoption rates are consistent with national trends.
- Over a quarter of the population does not use the Internet and a slightly larger number does not have Internet access in their homes.
- Non-adopters come disproportionately from the following groups: lower income, elderly, rural, and persons with disabilities.
- The major barriers consist of a combination of cost, interest, relevance and digital literacy.
- The type of household has a major impact on the relative importance of the main barriers, with cost and availability being the greatest barrier for younger households and “usability” and relevance being most important for older households.¹¹

5.3 Internet Utilization

It is natural that organizations will differ in their utilization of broadband and Internet infrastructure. Research shows that productive use of the Internet and e-solutions is related to the size and density of a community or region, the types of industry sectors that make up its economy, the level of diversification of its economy, and the income, age and education of its citizens. Turning potential into reality requires skills, training, and both formal and informal support, in addition to access to broadband connectivity. It is natural that organizations will differ in their utilization of broadband and Internet infrastructure.

There are no national data sets that allow for cross-state comparisons of Internet utilization. However, several in-state research efforts have been carried out, including one in 2010 in Virginia. Results from these various state level surveys show a consistent picture of how the digital divide continues to manifest itself once adoption has happened. The benchmarking of Internet utilization in 2010 identified where the digital divide manifested itself in Virginia. The key findings were:

- There is a significantly lower level of Internet utilization and sophistication among organizations (commercial and non-commercial) in the Southside and Southwest regions. Not surprisingly, the highest utilization levels were in the Northern region.
- Organizations outside of metropolitan areas¹² have, on average, significantly lower utilization levels than those in a metro region. Organizations outside of a metropolitan area usually do not benefit from a large network of supports and a large skilled labor pool.

⁹ http://www.pewinternet.org/~media/Files/Reports/2011/PIP_Smartphones.pdf and http://www.pewinternet.org/~media/Files/Reports/2012/PIP_Smartphones_Sept12%209%2010%2012.pdf

¹⁰ http://www.pewinternet.org/~media/Files/Reports/2011/PIP_Smartphones.pdf (page 15).

¹¹ Pew Research Center Survey: *Home Broadband Adoption 2009* - <http://www.pewinternet.org/~media/Files/Reports/2009/Home-Broadband-Adoption-2009.pdf> (page 43)

¹² A metropolitan area is defined by the Census Bureau as having a core urban area of over 50,000 with a population density greater than 1,000 people per square mile. A Micropolitan area has a population of 10,000 to

- On average, utilization increases as establishments increase in size. The greatest variation exists at the two ends of the spectrum: small organizations with 1 to 4 employees have utilization 10% below the overall average; and large organizations with 250 or more employees have utilization levels 28% higher than average.
- For households, the dynamics of the digital divide in Internet utilization are very similar to those with Internet adoption. Lower Internet utilization is typically associated with households that are lower income, older, less well educated and non-metropolitan. While there is a consistent increase in utilization that tracks increased income, the most dramatic drop in utilization occurs among the oldest age group (those over 65), especially seniors with household incomes under \$30,000. In this context it is worth noting that those 65 and older make up over 12% of Virginia's population.

Lower utilization levels have been shown to have important impacts on the benefits from Internet access received by the users (household or business) and their communities. Households with higher utilization levels produce higher levels of household income through both teleworking and home-based businesses. Businesses with high levels of utilization report noticeably higher levels of revenue generation from the Internet.

49,999. A small town has a population of 2,500 to 9,999. The category of "isolated small town" includes the remainder.

6. Strengths, Weaknesses, Opportunities and Threats

The planning document sets forward the following as goals of all regions of Virginia:

- Ubiquitous Internet access for all citizens;
- High levels of participation by citizens and businesses in the digital dimensions of the economy and society;
- A globally competitive and sustainable economy;
- Community anchor institutions have Internet connectivity that supports high end Internet applications.

The preceding section has shown that the current situation falls short of meeting these goals. This is most noticeable in the non-metropolitan areas of Virginia. If Virginia is to make meaningful progress towards these goals, it is important to assess the current situation. This planning document uses the SWOT process that identifies current **S**trengths and **W**eaknesses, as well as future **O**pportunities and **T**hreats. The table below provides a snapshot assessment using SWOT. Section 7 will draw on this SWOT assessment to develop strategies that address the weaknesses and threats, while building on current strengths and future opportunities.

<p style="text-align: center;"><u>Strengths</u></p> <p>Interest from many local stakeholders Support from the Commonwealth Resources (regulatory, technical) Improved potential from wireless (fixed and mobile)</p>	<p style="text-align: center;"><u>Weaknesses</u></p> <p>Low density population in unserved rural areas Weak uptake and revenues in some areas Poor business case for conventional solutions Grant and loan constraints Lack of interest among some incumbent ISPs Inertia and limited organizational resources in many rural communities</p>
<p style="text-align: center;"><u>Opportunities</u></p> <p>New middle mile infrastructure Fixed wireless as a low cost, agile option</p>	<p style="text-align: center;"><u>Threats</u></p> <p>Weak and uncertain economy Global competition eroding local economic base Fiscal constraints on local government Previous harvesting of “low hanging fruit” makes remaining areas less economic for last mile investments</p>

Strengths

- There is a broad appreciation among non-metro communities of the importance of broadband. Understanding of the benefits of broadband is significantly greater than three or four years ago.
- The Commonwealth has been very supportive of local and regional efforts to expand middle-mile and last mile broadband infrastructure. Through CIT, the Commonwealth has also been supportive of initiatives on Internet issues related to health and economic development.

- There are a number of resources that have been put in place by both the Commonwealth and national governments to support broadband initiatives. These resources range include regulatory and technical support. These are outlined in Appendix A.
- The increased technical capacity of both fixed and mobile wireless have provided some unserved or underserved areas with cost effective Internet access. There is legislation in place that supports local government involvement in developing Internet access.

Weaknesses

- Many unserved rural areas in Virginia have low population densities and challenging topography.
- Financial support for broadband infrastructure will likely be more constrained than in the recent past. While some grant and loan programs will continue to exist, the funding available is likely to be smaller and harder to access.
- Unserved or underserved areas with low populations and challenging topography make for a poor business case, especially for conventional wired Internet services. These areas may be difficult to serve without public financial support. These areas are also less likely to have the **resources** and leadership needed to take advantage of the resources and opportunities available.
- In some non-metro areas that have developed broadband infrastructure, there has been low adoption of broadband services or primarily adoption of lower end and lower cost services. This has resulted in lower than anticipated revenues for providers, while also indicating that local businesses and households are not realizing the potential benefits of many broadband services.
- The dynamics described in the preceding points have meant that many incumbent ISPs have little motivation for expanding their services in unserved and underserved areas.
- There is limited capacity in most non-metro communities. In addition to their small size and limited staffing and resources, these communities are facing challenging fiscal circumstances that constrain their ability to respond to low levels of broadband availability, adoption and utilization.
- There is limited momentum on broadband issues in many rural and non-metropolitan communities.

Opportunities

- New middle mile infrastructure that reaches out to areas that previously had poor connections to the global Internet.
- Across the US, fixed wireless is increasingly seen as an attractive and viable infrastructure technology for providing last mile (and occasionally middle mile) Internet access in non-metro areas. With low capital costs, relatively short installation schedules, and an ability to use existing “vertical assets”, fixed wireless offers an opportunity to extend Internet access to many rural residential areas currently unserved or underserved. Fixed wireless has demonstrated the ability to increase both its quality of service (which has been weak in some areas) and connection speeds.

Threats

- Residents in unserved communities may lose physical access to public and private services that increasingly will be available only online. This will negatively impact both households and businesses.

- Ongoing regional, national and global competition will erode the economic base of those communities lacking competitive broadband.
- The weak and uncertain national and global economies make investment decisions more difficult, as future revenue streams become more uncertain.
- Fiscal constraints on local government are anticipated to last for an extended period, limiting their capacity to initiate and support broadband initiatives.
- Providing Internet infrastructure to those areas with the best business case will make the remaining areas increasingly less economic for last mile investments.

Note: The availability of financial resources for broadband is uncertain. There continue to be a number of financial resources potentially available to both public and private sector stakeholders. However, past programs such as BIP and BTOP are drawing to a close. Other funding sources such as the national RUS and Connect 2 Compete programs and regional sources such as the Tobacco Commission, ARC, and Virginia Resources have continually shifting priorities and eligibility requirements. Some of the funders may have requirements that are too onerous for small communities. Nonetheless, these funding sources represent a possibility that needs to be tracked and taken advantage of wherever possible.

7. Strategies and Recommendations

7.1 Establishing Goals

Building on its core principles outlined in Section 3, the Commonwealth of Virginia has established the following high level goals in relation to broadband:

- a) Through development, adoption and use of broadband, Virginia will be a national leader in the preservation and enhancement of its economy.
- b) All regions within the Commonwealth will achieve a healthy and sustainable local economy.
- c) Work force productivity will be increased through use of technology to enhance work force skills, mobility, and telecommuting.
- d) Ubiquitous access and digital inclusion will be achieved for all citizens.

In pursuit of these goals, the Commonwealth has developed specific objectives and strategies for achieving these goals within its own governmental operations. This has included:

- Creating a 2011 Technology Business plan for its own internal and external services.
- Establishing Broadband mapping to identify unserved and underserved areas.
<http://www.wired.virginia.gov/broadband.shtml>
- Developing a range of resources to assist local and regional communities in addressing the digital divide, with particular focus on regions with significant incidence of unserved and underserved areas. <http://www.wired.virginia.gov/broadband.shtml>

This planning document is designed to assist in implementation of the 3rd of the above listed goals.

Bringing about deliberate and planned change is usually easier in theory than in practice. When important public issues motivate a government or group of citizens to act, it is important that they base their efforts on a sound understanding of their objectives and how they can best bring about the desired changes. This document sets out a process that can inform community and regional leaders about broadband access, adoption and improved utilization. This process seeks the following outcomes:

- Individuals and households that can participate fully in civil life, enjoy opportunities to earn a livelihood, and access both government and non-government services.
- Businesses that are productive, competitive, profitable and sustainable.
- Communities that are dynamic, resilient, and offer a high quality of life.
- Governments that have the ability to provide online services that are effective and efficient, and that also encourage civic participation in governmental affairs.

In pursuing this vision, this planning resource sets out strategies and recommendations that build on the principles set out in Section 3. Two key strategic directions that emerge from these principles are:

- A. Broadband initiatives should recognize the complementary roles of the market (consumers and providers), communities, community anchor institutions and local governments; and,

- B. Priority should be given to areas where the digital divide is evident in terms of access, adoption and use of the Internet. More specifically, priority should be given to areas identified as “Unserved” and “Underserved”.

The outcomes and vision described above serve as the fundamental rationale behind the broadband initiatives that are recommended for consideration by regions and communities. In this section, strategies, options and recommendations are provided for initiatives that address the four main challenges that communities and regions face in their effort to bridge the digital divide.

- 1) Development of the **leadership and capacity** needed to initiate and sustain broadband local or regional efforts;
- 2) **Availability** of broadband that is ubiquitous and suitable to the needs of the community;
- 3) **Adoption** of broadband by an increasing portion of residents;
- 4) **Utilization** of the Internet that maximizes the benefits to residents, businesses and community anchor institutions.

“What has become apparent through the work of the roundtable is that those communities who have successfully navigated the maze of broadband deployments, do so in large part to strong (and tenacious) leadership.”

Broadband Toolkit

7.2 Building Local and Regional Leadership

The strategic framework presented in the document relies on communities and regional entities to provide initiative in addressing the digital divide in their area. In some areas of Virginia, this approach has produced substantial results (see case study in Appendices). However, in many rural areas, lack of resources and leadership has limited the effectiveness of this approach. Consequently, ***a strategic objective for rural areas lacking in broadband services is development of motivated leadership and resources for broadband initiatives.***

It is increasingly rare for local government leaders to be unaware or uninterested in the desirability of having good Internet access throughout their jurisdiction. Evidence of this interest is seen in high levels of participation at meetings on the topic held by the Virginia Municipal League and Virginia Association of Counties. However, interest and awareness has frequently not translated into action in communities where financial resources are constrained, technical knowledge is missing and leadership is in short supply. Nonetheless, there is an improving climate for local leadership to emerge and develop.

In discussions with regional stakeholders from both the public and private sectors, there is broad agreement that “local champions” are critical for the success of broadband initiatives. This plan recommends that ***communities and regions develop a structured broadband leadership development and support program within their area.***

Important elements of leadership development include:

- a) *Recruitment of individuals with the interest, energy and time needed to provide leadership.* Recruitment can come from within local government institutions or from the broader community.
- b) *Empowerment of leaders by providing official sanction and support from elected and other key community organizations.* Leadership without support from key stakeholders greatly reduces the chances of success. *Official support may take the form of an official committee or management team.*
- c) *A mechanism for accountability of leaders back to the organizations that provide support.*
- d) *Educational and learning opportunities for leadership so they can acquire the knowledge and skills required for developing goals and proposals related to the digital divide.* Much of this material already exists. However, an effective approach is to encourage participation in formal opportunities (participation in state-wide or regional workshops) while also supporting participation in networks that provide peer-to-peer support and technical advice.
- e) *Institutional support from organizations with the capacity for organizing meetings, ensuring effective communications, and providing logistical support.*

Development of local leadership is not necessarily limited to key individuals. Leadership may also come from a local stakeholder organization that is willing to take on some or most of the responsibility of initiating and maintaining local broadband efforts. *In practice, a mix of key individuals and local institutions is often the most effective form of leadership.*

Given that many rural communities face the shared challenge of developing and supporting local leadership, it is **recommended that organizations with a state-wide or larger region mandate consider providing assistance to local communities by establishing a collaborative broadband leadership development program for rural areas that are willing to make a commitment to improving broadband services.**

Checklist for developing community leadership

Individual leadership

- Community leaders and elected officials understand benefits and impacts of broadband
- At least three leaders are committed to follow through of broadband initiative
- Leaders have the influence needed to enlist community support
- Leaders are committed to obtaining the resources required for implementation.

Organizational leadership and capacity

- One or more lead organizations have been identified
- The lead organization(s) is willing and able to develop partnerships for broadband implementation and operation (where applicable)
- Personnel within the lead organization have been identified and are available to provide leadership and support.

Shared Vision: The leadership (individual and organizational) has a shared vision of the goals, drivers and parameters of the broadband initiative;

Community support:

- Benefits of broadband are understood and supported by local businesses and key organizations
- There has been community engagement on the benefits of broadband and in the level of support for a broadband initiative.

7.3 Broadband Availability

Communities with less than adequate Internet services face significant barriers in overcoming the digital divide. However, more than a few non-metropolitan communities have developed the leadership and commitment necessary to achieve the broadband they need for their residents, businesses and community anchor institutions. Communities starting a new broadband initiative face a challenging fiscal environment, but may have the opportunity to partner with recent middle-mile projects.

Each community faces different challenges, constraints and opportunities. Usually non-metropolitan communities face one or more of the following four broadband access issues:

- a) Lack of Internet availability in rural residential areas: This is the most frequently cited challenge.
- b) Lack of very high speed broadband (Tier 3 and higher – see page 11 for description of broadband tiers) for commercial areas and community anchor institutions: Broadband Internet services exist in almost all town centers, neighborhoods and community anchor institutions (libraries, schools, health facilities, and public safety services). Nonetheless, some communities may feel that a higher level of broadband services is required to address their community and economic development objectives.
- c) Lack of physical public access sites that include Wi-Fi access, computer terminals, and assistance in accessing e-government services (including filling out government forms and applications). These sites usually consist of libraries, community centers and schools and may simply not be present in some areas or have very restricted hours.
- d) Lack of hot spots in strategic locations in a community. Hot spots consist of areas of a community that are covered by free Wi-Fi. These hot spots are usually not associated with any computer terminals or personal support. People bring their own Internet device. Hot spots provide locals and visitors with convenient access to the Internet. Hot spots can be used by students after school, tourists, and a broad range of residents.

Strategies and Solutions: There is no one or two quick solutions that will address the needs of most communities. Improving broadband availability usually requires persistence and the ability to work over a one to three year period. This does not imply huge amounts of resources. However, it does require patience and commitment. This strategy document sets out a process whereby each community or region can develop solutions that fits its own needs. The outline below identifies key tasks and options. It is expected that communities will adapt this process to fit their own circumstances and culture. The result should be a process where the values and priorities of a community determine subsequent tasks and choices. As communities move down the road to implementing specific strategies and solutions, they may find that initial choices need to be re-assessed.

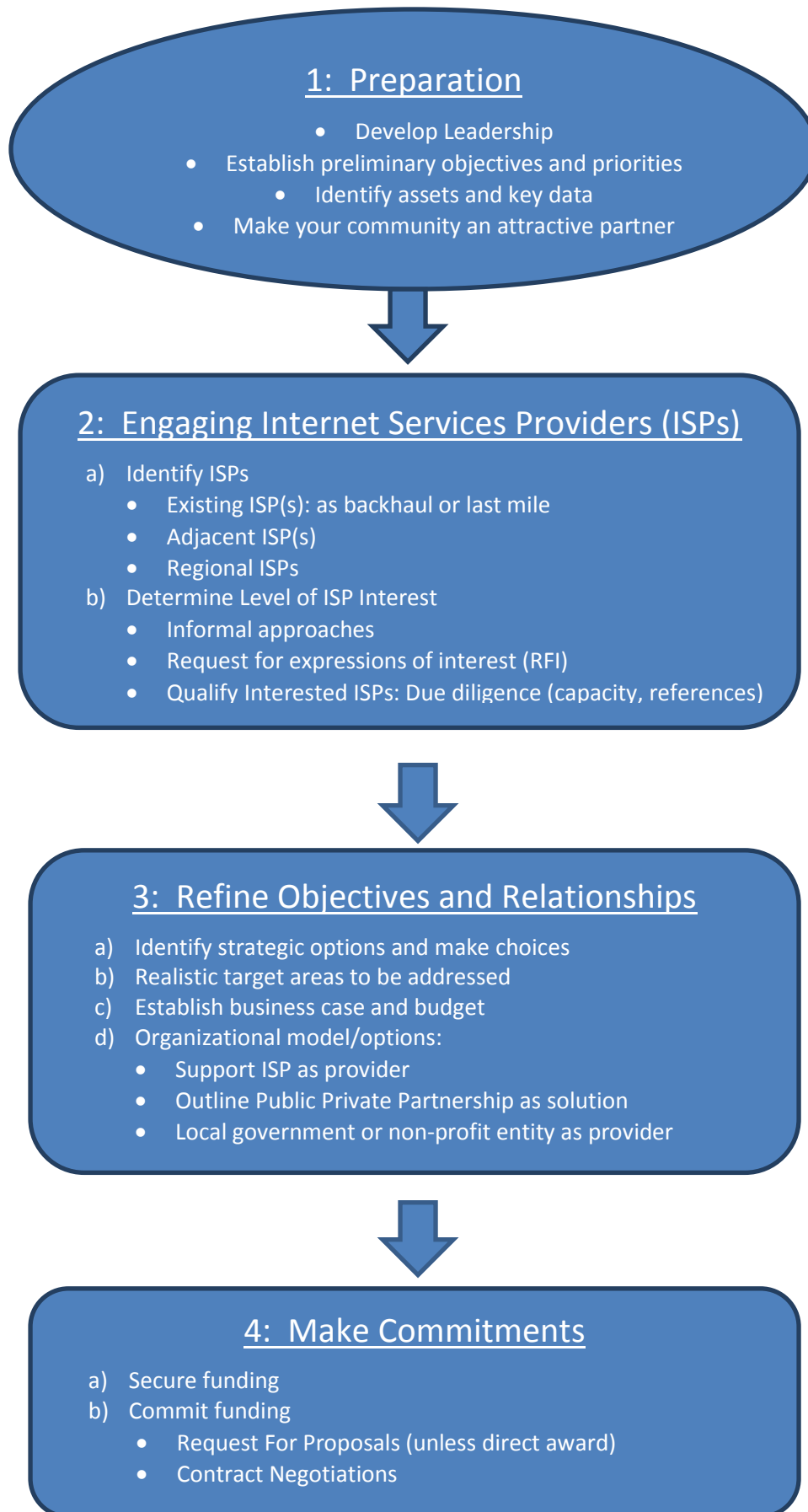
Before proceeding with a detailed review of the strategies and tasks recommended for improving Internet access at the local level, it is useful to review some basic starting points.

- ✓ ***Begin with needs and goals, rather than solutions.*** Local and regional initiatives should not begin by assuming what the eventual Internet solution will look like. Don't assume the

appropriate scale of “build out”, or type of technology, or type of ISP, or what the appropriate role of the local government should be. Rather, the process should lead to the best solutions.

- ✓ ***Look at Internet Service Providers (ISPs) as potential partners.*** A major complaint from Providers is that communities and local governments often see them as an “outsider” or potential source of revenues, rather than as a partner in achieving community goals. Providers are a lot more willing to spend time exploring options with friendly communities than with those who place obstacles in their path. While a community may or may not find an attractive ISP to partner with, they should start by considering potential ISP partners.

The diagram on the following page provides a visual representation of the stages and tasks that communities should typically follow during an Internet access initiative. The steps and tasks identified in the diagram are explored in greater detail on the subsequent pages.



Step 1: Preparation

- a. **Develop leadership:** This task is dealt with in Section 7.1. It is recommended that the local government or entity *not try at this stage* to define its specific role in delivering broadband access. The role of the local government should emerge from the process of exploring options.
- b. **Establish preliminary objectives and priorities:** A community's objectives and priorities regarding broadband will likely be in constant flux as the broadband infrastructure around them evolves. In past years, communities were likely to consider ambitious and larger scale initiatives, in part due to the availability of grants from federal and in-state sources and in part due to the significant portions of their area that were unserved or underserved. However, in many cases unserved or underserved areas are shrinking, resulting in a smaller group of target users. As a result, in some communities the scale of initiatives needed to address unmet needs may be smaller than in the past and require less resources. In addition, significant improvement to the quality and speeds of some technologies (notably fixed wireless) provides for options that may not have been attractive in the past.

Given these factors, an important early step in the planning process is defining the required scope of the Internet infrastructure initiative. Communities need to define the target or potential broadband users in specific terms that can be measured and mapped. Similarly, the level of broadband service desired for each group of users needs to be defined so that it can become part of a cost / benefit and business case analysis.

¹³ http://www.wired.virginia.gov/broadband_toolkit_determine_demand.shtml.

- c. **Collect important information and data** that is critical to engaging potential ISP partners and assessing options. The list of data to be collected during this step can be extensive, though the effort is not necessarily difficult:
 - **Target population or organization(s):** location (topography), number and age of households (rural residential), density, and income/budget.
 - **Current telecommunications expenditures:** building a business case for a broadband initiative is a great time for local government participants to perform an enterprise-wide “telecommunications audit” to determine exactly how much is actually being spent. Assimilating telecom cost information allows planners to determine how much funding can be made available to help “buy down” the cost of an impending deployment by transferring services (to the new network) to create an annual revenue stream.¹⁴

¹³ At its most basic level, an effective demand assessment categorizes the location and type of user, information on current broadband services (cost/type), types and bandwidth requirements of applications currently in use and applications being considered (and their bandwidth requirements). Other more comprehensive assessments such as the one included in the Virginia Department of Housing and Community Development's (DHCD) [Rural Broadband Planning Initiative](#) (pdf) also include questions on price sensitivity, satisfaction with existing service, and Information Technology training and workforce availability. In addition to DHCD, both the [Center for Innovative Technology](#) and Virginia Tech's [eCorridors Program](#) offer demand aggregation assessment planning assistance.

¹⁴ http://www.wired.virginia.gov/broadband_toolkit_reallocate_existing_spend.shtml.

- **Vertical Assets: Towers:** if municipally owned, lease payments can be reduced/suspended to spur deployment. **High Structures** – silos, water tanks, buildings for placement of wireless equipment. A web site is available to assist communities in identifying vertical assets in their area. <http://www.vait.gis.bev.vt.edu/>
 - **Pole access:** pole owner, pole type, attachment capacity, cost.
 - **Rights of Way:** can be used to expedite/reduce cost of conduit placement.
 - **Ongoing or Pending Capital Projects:** water, road construction, new subdivisions, main street revitalization, etc.
 - **Municipally Owned Utilities:** assets, customer base and back office operations can be leveraged for partnerships.
 - **Land:** that can be used for tower construction/locating points of presence, etc.
 - **Ongoing/Planned First Responder Communication Upgrades:** many of these projects involve the construction of infrastructure and upgraded communication services. If activities can be aligned it is often possible to achieve economies of scale.
 - **Existing Vendor Relationships:** existing relationships can often be leveraged to provide enhanced and expanded services.
 - **Existing Mapping (GIS) Resources:** to provide a visual representation of community attributes that can be used in the planning process, including prospective partners.
 - **Identification of Potential Funding Sources:** including funding levels, conditions and time lines.
- d. **Become an attractive partner**
- Develop leadership within local government to cultivate a corporate culture that understands and enables partnerships that assist the community in achieving its defined goals and objectives.
 - Ensure availability of Land Use Planning and Zoning documents.
 - Review zoning requirements for impediments to broadband infrastructure: **Does your community have (or are you willing to create) a process for expediting zoning and permitting processes?** Local zoning requirements, permitting fees, and processes are critical elements that can “make or break” the deployment of broadband services.
 - Consider an expedited permitting processes for installation of broadband infrastructure: Communities who take time (up front) to review and update their current policies and convert them into “fast-track,” broadband friendly formats stand to greatly reduce the amount of time, cost, (and frustration) it takes to move from network design to service availability.
 - Review fees and charges that may become an unnecessary barrier.
- e. **Communication to community:** keeping the community informed can be important in building public support for the local initiative.
- f. **Transparency:** Preparation includes developing a method of tracking progress so progress can be measured and outstanding tasks and timelines kept in full view.

Through the preparation phase, it is important that the community establish a sense of the scale of the initiative being considered. Some broadband infrastructures may be relatively modest in scope: reaching a few hundred rural households; or, providing very high quality broadband to one or a few specific institutions or businesses. Alternatively, the initiative may be much more ambitious, such as bringing ultra-fast broadband (usually fiber) to every business, institution and household. ***The level of preparation should reflect the anticipated scale of the project.***

Step 2: Engaging Internet Services Providers

At some point early in local broadband planning, a community will need to engage with one or more Internet Service Providers. Initially this will be to identify the current and planned state of broadband infrastructure within and adjacent to the community. Eventually, the community will need assistance of ISPs, whether it is as the providers of new local services or for connections to the global Internet (middle-mile and backhaul).¹⁵

The following tasks outline the steps suggested in engaging ISPs. As each step is addressed, it has major implications for the remaining planning process. If an issue is effectively addressed at an early stage, some tasks will no longer be required. If a satisfactory outcome is not achieved, additional tasks will need to be undertaken.

- a) Identify ISPs: ***In order to understand possible options it is recommended that communities identify current broadband services and infrastructure.*** Knowing where the closest middle mile project is located or if there is fiber-optic cable in or near one's community is important in the planning and assessment process. The Commonwealth has developed a web site to assist in the process¹⁶. ISPs can be classified in a couple of ways:
 - By their retail service footprint: There may be one or more ISPs within the community. In addition, there may be ISPs that serve adjacent areas and may be interested in serving additional areas; lastly, there may be regional ISPs that may not be adjacent, but who have services not too distant from the target community and may be convinced to expand to the target area. Communities should identify all ISPs that fit one of these descriptions.
 - By the type of service they sell: some ISPs may be focused exclusively on retail services (selling directly to the consumer). Other ISPs (e.g. the new middle mile projects) may exist to provide cost effective wholesale services to an existing or new ISP. Some retail ISPs may also sell wholesale Internet services.

¹⁵ Wikipedia: "Backhaul generally refers to the side of the network that communicates with the global Internet, paid for at wholesale commercial access rates ... Sometimes [middle mile](#) networks exist between the customer's own (*network*) and those exchanges. This can be a local [WAN](#) or [WLAN](#) connection, for instance [Network New Hampshire Now](#) and [Maine Fiber Company](#) run [tariffed](#) public [dark fibre](#) networks as a backhaul alternative to encourage local and national carriers to reach areas with [broadband](#) and [cell phone](#) that they otherwise would not be serving. These serve retail networks which in turn connect buildings and bill customers directly."

¹⁶ http://www.wired.virginia.gov/broadband_toolkit_determine_existing_broadband_services.shtml.

In identifying ISPs, it is important to include fixed wireless providers (WISPs). While this sector is still maturing, there is an increasing number of WISPs that are very agile and provide high speeds and good quality services. Mobile wireless, on the other hand, while a highly desirable service, at this point is not generally considered an alternative to a dedicated broadband service due to issues with reliability, costs and usage caps. Some of these limitations may be addressed in the near future. Due to issues with quality, cost, and technological limitations, satellite providers are not usually considered a preferred option when Internet activities require low latency (VOIP, virtual private networks, live video) or high volume data throughput.

- b) Determine Level of ISP Interest: ***once the list of ISPs that can potentially provide new or better broadband services has been established, it is recommended that communities begin the process of entering into exploratory discussions with one or more ISPs.*** Completing the previous steps will help community representatives in this engagement process by giving them a clear senses of purpose, information that allows them to convey specific objectives, an understanding of important broadband terminology, and the ability to communicate that the community is a willing and attractive partner.

At this point, the community needs to decide if it wishes to undertake a formal or informal process. Some communities have begun the engagement process by issuing a formal Request for Expressions of Interest (RFIs). These can be more or less detailed. Their primary objective is to identify interested ISPs, as well as the range of options that these ISPs may be able to offer. Generally it is preferred that the RFI not describe the technical solution desired, but rather should focus on goals and outcomes. Allowing the ISPs to propose different solutions will provide the community with a fresh perspective on how its broadband goals may be achieved. The RFI should convey the information that the community has collected during the preparatory phase, together with a statement that the community is willing to consider a broad range of solutions and is willing consider assisting or partnering with the ISP in a variety of different ways.

Some communities have preferred to start the engagement process with an informal approach to one or more ISPs, usually ones that already provide Internet services to the area. In some cases, the approach may be made to a local utility that does not currently provide Internet services but has the capacity to do so (e.g. a local or regional electrical utility or telephone cooperative). Depending on the level of interest expressed during the informal conversations, the community may choose to proceed with an RFI or alternatively to begin more detailed discussions with the interested ISP.

- c) Qualify Interested ISPs: ***regardless of whether an informal or formal process is used, the community should undertake due diligence of any ISP or utility that it wishes to explore partnering with.*** Due diligence would typically include confirming the organizational, technological and financial capacity of the possible partner, as well as its track record for installing infrastructure and delivering quality services.

Step 3: Refine Objectives and Relationships

Once a community or region has completed the preparation phase and collected information through the ISP engagement process, communities need to make decisions and develop concrete plans that have defined service areas, are cost effective, and are achievable within available resources. There are a number of critical key steps in this process. These steps are not necessarily sequential. Completing the following steps may be a fluid process that shifts back and forth until a satisfactory solution has been reached.

- a) ***Review strategic options and set priorities:*** At this point, the options should be relatively clear, though the decisions still difficult. Usually there is trade-off between costs and benefits. Hard decisions need to be made on which priorities matter most. The most attractive technology may not be the most pragmatic and cost effective solution. Alternatively, a relatively small increase in project costs may open the doors for future development. Having a longer term vision will help in setting priorities and making choices. Is the community setting itself up for a longer term involvement in a comprehensive and ambitious approach to developing broadband in the area? Or, are market forces felt to be largely effective, with the community stepping in only on the margins?
- b) ***Establish a business case and estimate of resources and budget required:*** before any decisions can be finalized, a business case must be made for any investments made by the local government, even if the investment is limited to making public assets available to an ISP.
 - Develop an analysis of the costs and benefits for any investments;
 - Ensure that any proposed service or infrastructure investment is financially sustainable: will projected revenues cover expenses? Are “take-up” rates realistic? Are there contingency plans for lower revenues or unexpected costs?
- c) ***Establish a partnership model:*** at this point it will probably be clear what the respective roles of local government, community institutions and ISP will be. Nonetheless, these need to be carefully considered and articulated. While there are numerous options and variations in partnership arrangements, the most common would flow from the following:
 - Community as facilitator of a service to be developed and managed by an ISP. This may include making community assets available for cost or for less than cost. This may also include becoming a long term purchaser of Internet services from the ISP (ensuring a revenue stream). Any commitments made or obtained by the community should be in the form of an enforceable contract that spells out all rights and obligations.
 - A public private partnership between a local government entity and an ISP. The local government may choose to subsidize the capital costs or build part of the infrastructure and lease it to the ISP. The best approach is to contact other local governments that have developed partnerships or are actively considering one.
 - Local government or local not-for-profit entity as provider: while this is the most ambitious approach, a number of communities have successfully gone down this road. There are opportunities and limitations established by the laws of the Commonwealth.

This document does not attempt to review these. However, Appendix 8.3 provides information on provisions of the **Virginia Wireless Service Authority Act**.

d) Other considerations:

- “Over-building” an existing ISP’s infrastructure is very costly and may be unnecessary. There should be a clear strategic advantage for this option to be considered. Such a strategic consideration could include bringing in competition, better pricing and a level of broadband that may otherwise not be developed.
- A different approach could consist of a modest extension or enhancement of the existing broadband infrastructure in the area. A community need not fix on high end solutions where more modest solutions may achieve its objectives.
- Communities should look for opportunities to piggyback lower priorities that may be very achievable at low cost and effort within the primary arrangement. An example can be found in communities that have negotiated the “free” provision of Wi-Fi hot spots in return for ISP access to vertical assets owned by the community.
- Demand Aggregation is a strategy for securing better or less expensive Internet services. Consolidating demand into a cluster of guaranteed contracts can also be used to attract ISPs or as a bargaining chip in negotiations. Demand aggregation opportunities vary greatly by community.
- To the extent that a community takes on formal responsibilities for provision of Internet Services, either within a partnership or as the sole provider, it is critical that a detailed plan be created for the operation and maintenance of the service and supporting infrastructure. This plan should lay out any ongoing responsibilities of all members within the partnership.
- Development of a marketing and communication plan to help generate both public support and (where appropriate) high levels of subscriptions (“take rate”). High take rates play an important role in generating initial cash flow as well as a financially sustainable broadband service.

Step 4: Make Commitments

Once a community or local government has decided on its course of action, the final steps of securing funding and negotiating contracts must be undertaken with due care.

- a) **Securing funding:** Funding may or may not be required to execute the planned Internet infrastructure project. In some communities, the facilitated process and access to public assets has been sufficient to entice an ISP to build the required infrastructure. To the extent that funding is required, a number of options exist:
- As noted above, existing telecommunications budgets of local governments, anchor businesses and community anchor institutions can be used as part of a long term financial arrangement with an ISP.

- **Evaluate grant opportunities:** granting programs for broadband are currently in flux. At a national level, stimulus funding for broadband infrastructure is coming to a close. However, opportunities continue to exist through the Rural Utilities Service (<http://www.rurdev.usda.gov/RUSTelecomPrograms.html>), initiatives from the Health Resources and Services Administration (for telehealth initiatives), the Schools and Libraries (**E-Rate**) Program of the [Universal Service Fund](#). The Universal Service Fund is also providing financial resources through its Connect America Fund (<http://www.fcc.gov/document/connect-america-fund-1>). The Connect America Fund is still in its early stages and its rules are not yet settled. These funding sources may be attractive to larger projects, especially for established ISPs. For smaller initiatives, the level of administration required by the funding sources may make them inappropriate.

At a state level, possible grant sources include the **Virginia Tobacco Commission**, <http://www.tic.virginia.gov/> which has assisted open access, high-speed connectivity to economic development sites in the tobacco-region counties of Virginia. Other possible funding sources would include the Appalachian Regional Commission (ARC) for its planning and development grants programs. **The Virginia Department of Housing and Community Development** offers block grants to communities for both planning and implementation of telecommunications efforts. Implementation grants focus on 'last-mile' installations. (<http://www.dhcd.virginia.gov/CommunityDevelopmentRevitalization/Telecommunications.htm>)

- **Funding mechanisms of the Virginia Resources Authority** (<http://www.virginiaresources.org/>): the Virginia Resources Authority tailors low-cost financing solutions that take advantage of unique capabilities to issue bonds backed by the moral obligation of the Commonwealth and to make revolving fund loans at below-market interest rates.
- **Commit funding:** The committing of any public funds must be done in a transparent, effective, and efficient manner. This document does not deal with this issue. Nonetheless, should public funds be required, the community must be ready to undertake either a Request for Proposals (RFP) or Direct Award. It may also require the skills to enter into complex contract negotiations with an ISP.

7.4 Adoption

While lack of access to the Internet is a pressing issue for some rural residential areas, a more broadly shared challenge is that of developing strategies to increase adoption rates among elderly, low income and rural populations. Section 4 has identified the consequences of low adoption on residents and communities. This section sets out strategies for substantially increasing adoption rates, both generally and among target populations.

Over the last decade many adoption initiatives have been undertaken across the US. Some initiatives have focused on providing free computers for school aged children. Others have aimed at skill building through formal digital literacy programs. Still others have targeted low income communities with both subsidized broadband service and low cost computers¹⁷. While a formal evaluation of these various efforts is anticipated in the next year, there are lessons that have been learned.

First and foremost, it is increasingly clear that there are very distinct segments within the non-adopting population, each of which faces a different set of barriers and has different motivations. The first strategy in non-adoption initiatives is to recognize these differences, target specific groups, and tailor initiatives to the characteristics of each group.

This report recommends that communities or regions target Internet adoption efforts at one or more of the following groups: low income households with children; under-employed individuals; and individuals over 65 years old.

This section on strategies for increasing Internet adoption does not specifically address school-aged children. It is assumed that their needs are being addressed by the K – 12 educational system. The main issue facing school aged children is not adoption, but rather after-school access to the Internet. That issue is addressed in the section on broadband availability.

Low income households with children: The primary barrier to adopting broadband within these households is cost, not lack of skills or interest. In a recent report that looked at non-adopters in Kentucky over 90 percent of non-adopters with children at home indicated that someone else in the household was already using the Internet. A number of distinct strategies can help non-adopters who cannot afford (or don't believe they can afford) a broadband connection and computer in their own house.

“Ultimately, neither race nor gender are themselves part of the story of digital differences in its current form. Instead, age (being 65 or older), a lack of a high school education, and having a low household income (less than \$20,000 per year) are the strongest negative predictors for Internet use.”

Pew Internet & American Life Project –
Digital Differences, April 2012 Page 6.

¹⁷Initiatives that offer discounted computers or broadband services can be of indeterminate duration. At the time when this document was created, one such program was offered by Comcast to areas that they serve: <http://www.internetessentials.com/>.

- Expanded hours and range of services at public access sites. Promotion of free Wi-Fi and Internet terminals may entice cost conscious non-adopters to their local library or community center. Including free training and/or one-on-one mentoring can make this option more attractive. Once people start using the Internet at a public access site, they are more likely to purchase the service at home. In rural areas, libraries and other public access centers may have limited hours, especially on evenings and weekends. Yet this is when many individuals would be most likely to use the Internet. Expanding hours of availability of connected computer centers is one area that deserves attention.
- Providing free or low cost computers can help and motivate low income families with children. These can be refurbished computers from regional organizations that have purchased newer models. This type of program has been successful in many areas and can be undertaken by a local service club.
- Subsidized rates for broadband service: in some areas providers have provided low income families with discounted rates. A number of national pilot projects have explored this approach (see section on Connect2 Compete and Broadband Adoption Lifeline Pilot). However, there is no reason why communities cannot approach local Internet Service Providers for a similar arrangement.

Pilot projects have been implemented through two national initiatives: the FCC's Broadband Adoption for Lifeline Pilot program and Connect2Compete (<http://www.connect2compete.org/>). The Lifeline pilots target any low income household. The Connect2Compete initiative is still evolving but has the stated intent of providing low cost computers, discounted broadband service and digital learning. Their initiative is slated to be rolled out in many communities across the US in 2013, though it is not clear if most rural areas will be able to take advantage of this program. Rural communities should keep up-to-date on these two initiatives.

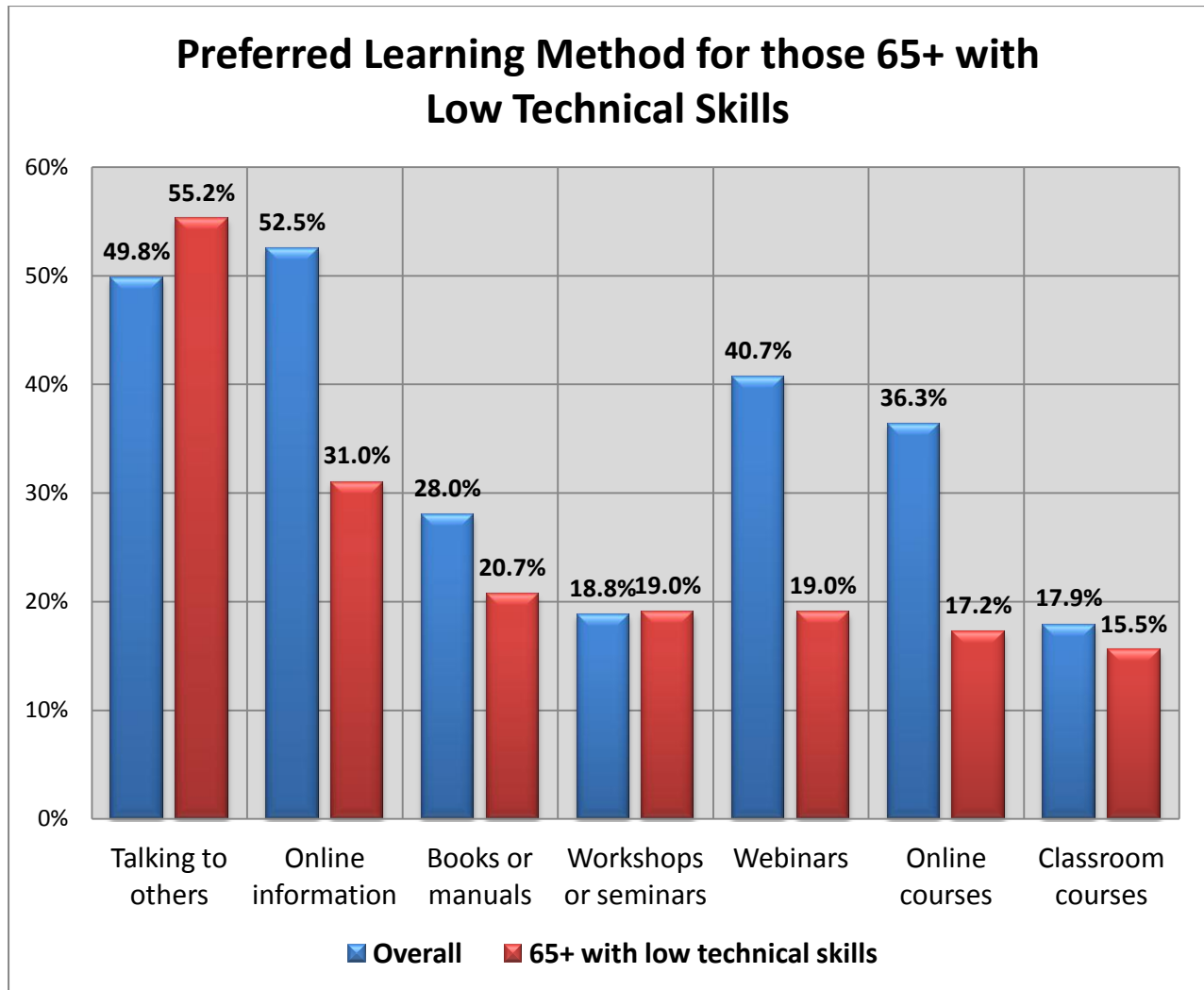
Unemployed Individuals: Unemployed individuals who are on lower incomes are an important group of non-adopters. Some of these individuals are part of households with children and would be covered by initiatives targeted at those households. However, a significant portion of unemployed individuals would not be covered by programs limited to households with children. For unemployed individuals, the primary vehicle for digital literacy would be through employment training centers and libraries.

Elderly Individuals and Households: The dynamics of Internet adoption by seniors are very distinct and require customized approaches that address the barriers, motivations and learning preferences of seniors. In terms of barriers, cost is still cited by many elderly households. However, *the most frequently cited barriers are lack of relevance and lack of digital literacy*. As for motivation, research in Virginia and elsewhere shows that seniors who have adopted the Internet value the Internet for accessing medical information and services, as well as communications with family members. Understanding this motivation is key to designing initiatives for this group. Lastly, as the chart on the following page illustrates¹⁸, seniors strongly prefer learning about the Internet in informal ways from people they

¹⁸ *An e-Strategy for Broadband Utilization in the Commonwealth of Virginia*: SNG, January 2012, page 37.

already know¹⁹. Taking classroom courses is the least attractive option. Providing inviting and informal settings seems to put many seniors at ease and minimize their anxieties about technology. The emergence of tablets and set-top television boxes as vehicles for accessing the Internet also provides an alternative to the often intimidating desktop computer with its complex operating programs. While there is still a place for formal classroom training for digital literacy, this document ***recommends that communities and organizations serving seniors consider more innovative outreach approaches for seniors. Serious consideration should be given to building on existing networks (e.g. seniors' centers, recreation centers, and churches) while focusing programming content on seniors interests rather than "digital literacy"***. Decades of experience in adult literacy have demonstrated that literacy training is most effective when embedded in activities that the adult already values or is comfortable with. Creative Internet programming for seniors can build on their interest in grandchildren, health, and cooking classes. Training sessions can be delivered in informal settings or seamlessly integrated into existing programs and services. Standalone classes on computer and Internet literacy are less likely to be successful than more subtle and integrated approaches.

¹⁹ Senior Navigator is a website for identifying local resources for seniors, including "free access and assistance with the website to our friends and neighbors without computers or internet access".
<http://www.virginianavigator.org/sn/>



As communities look to develop Internet adoption initiatives, an important consideration is where sponsorship of these efforts will come from. Fortunately, there are many locally based groups that provide support to seniors and low income households, such as the Ruritan Clubs, churches, veterans groups, and libraries. In developing community leadership (Section 8.1), consideration should be given to recruiting individuals from this group.

7.5 Utilization

The ability to utilize or leverage broadband varies significantly across businesses, organizations and households. In those industry sectors and communities that already have a large, diverse and modern economy and work force, building broadband infrastructure may be sufficient to enable them to realize the potential of broadband. However, many industry sectors, communities, businesses and households have limited skills and capacity concerning the Internet. For these groups, even with state-of-the-art connectivity, leveraging broadband often lags. The consequence is that many of these communities (and households and businesses) have been unable to turn the potential of broadband into measurable success in terms of jobs, company attraction and retention, increased tax base and revenues, and opportunities for home businesses and teleworking. This section draws on analysis of 2010 benchmark

data on Internet utilization in Virginia²⁰ and focuses largely on business sector, though strategies in support of telework and home based businesses are dealt with and form a bridge to household use of the Internet.

Key to any economic development initiatives that take advantage of broadband is an understanding of the dynamics of Internet utilization by commercial and non-commercial organizations. There are specific groups that underutilize the Internet, face identifiable barriers, and offer an opportunity for major contributions to local economies. These groups tend to be small in size (less than 50 employees) and based in non-metropolitan communities. They are also disproportionately found in the retail, public administration or health and social service sectors. ***It is recommended that non-metropolitan and otherwise marginalized urban communities take a pro-active approach to maximizing the benefits of the broadband infrastructure that they have.***

In recognition of the unrealized potential of small businesses to more effectively utilize the Internet, it is recommended that local and regional efforts focus on the small-medium enterprise segment, especially 1-19 employees, to increase Internet utilization.

Initiatives targeting increased Internet utilization by local businesses need to be based on an understanding of how organizations acquire the skills needed to become proficient in e-solutions²¹. As seen in the chart below, larger organizations, with their bigger resource base, are more proactive at acquiring new skills. Small organizations are more likely to feel that there is no skill shortage (even though they are on average lagging larger organizations). One lesson to be drawn from this data is that many ***small businesses need to be made more aware of the potential benefits of the Internet.*** Providing training opportunities to businesses that see little value in expanding their Internet presence will likely be a frustrating process. Awareness raising efforts can consist of outreach, free assessments and issue-specific presentations at meetings where small businesses already participate (Chambers of Commerce).

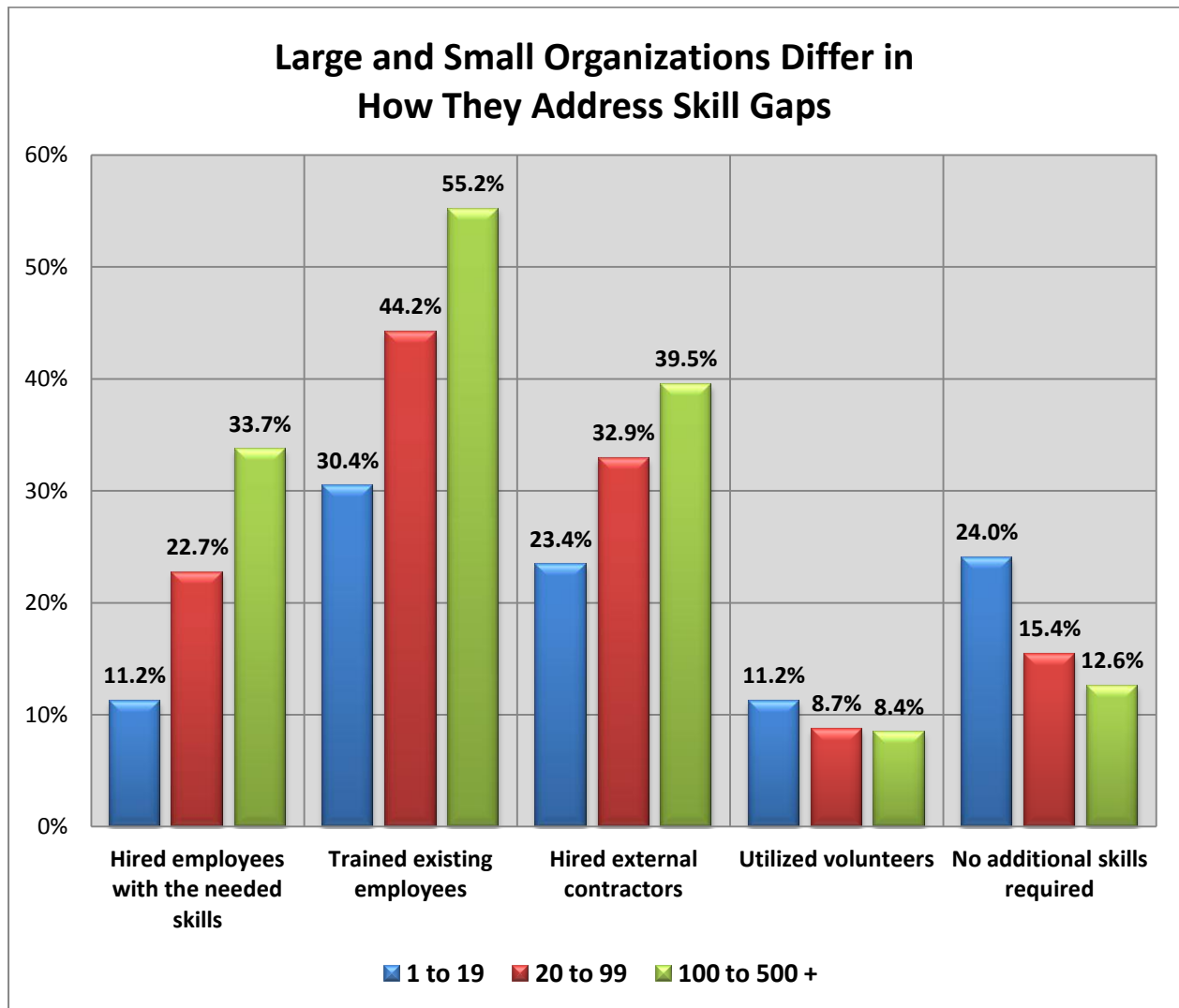
Small to medium enterprises are a major source of job growth and the segment with the greatest opportunity to increase utilization levels for productivity and competitiveness. Larger organizations in general have had access to Internet solutions for longer periods and have the internal resources to take advantage of these technologies.

Once a business has been motivated to explore ways to more productively utilize the Internet, it is important that skill enhancement efforts be designed to fit the preferences of the “student”. Larger businesses use hiring of appropriately skilled staff, hiring of external contractors, and training of existing staff. With less financial resources, smaller businesses rely more heavily on training existing staff. ***If***

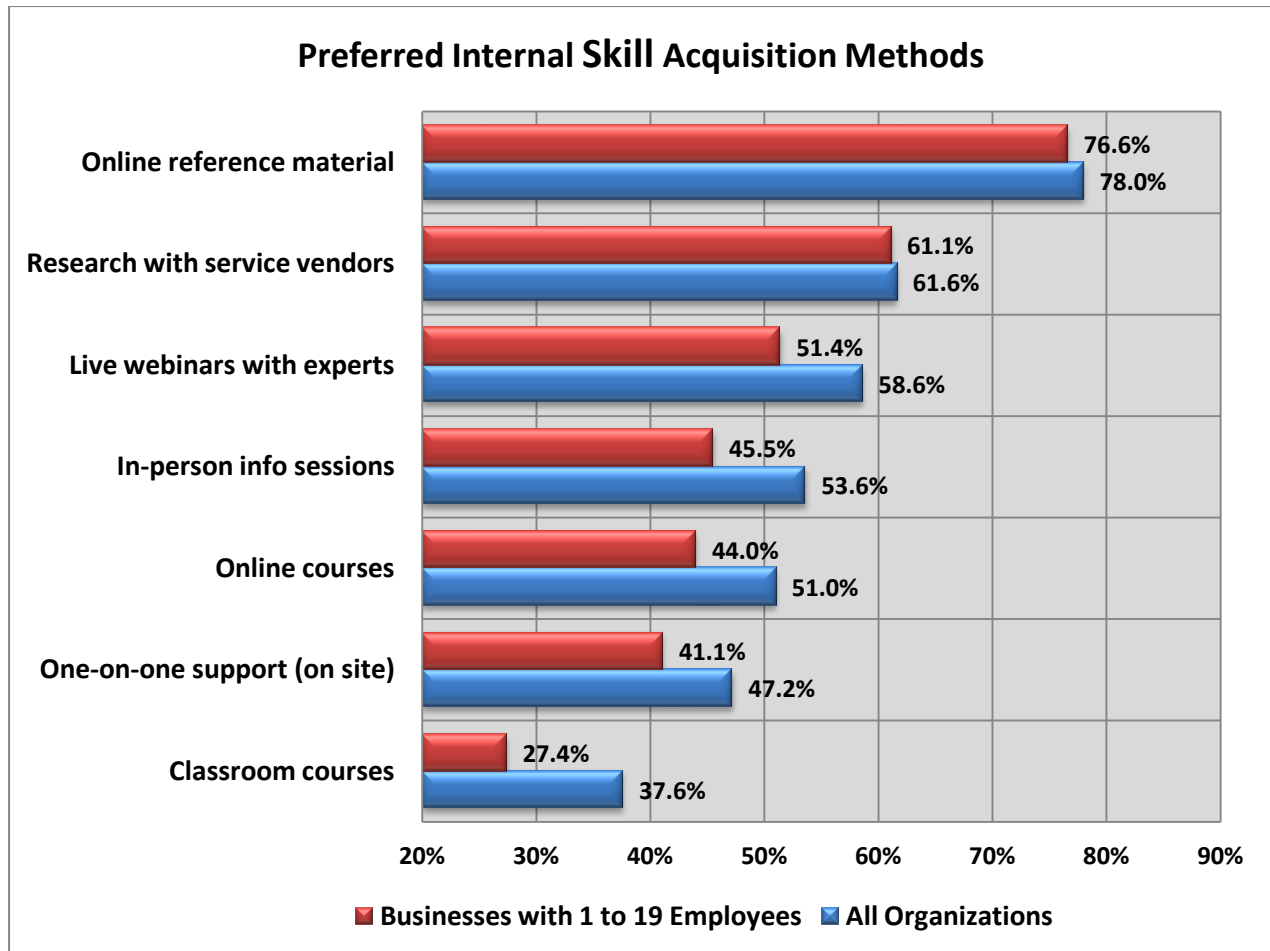
²⁰ ***An e-Strategy for Broadband Utilization in the Commonwealth of Virginia:*** Strategic Networks Group, January 2012. All charts and data in this section are taken from the ***e-Strategy Report.***

²¹ e-Solutions: refers to the integration of Internet technologies with the internal computer-based systems and applications within or among organizations for a variety of operational processes. e-Solutions encompass not only product delivery and payment transactions (e-commerce) but also all processes that may be facilitated by computer-mediated communications over the Internet.

small businesses are a main target group, then initiatives need to consider in-service training as a core feature.



If training existing employees is the preferred method of skill acquisition among small businesses, which learning methods are preferred? The chart below shows that self-directed learning methods are strongly preferred over classroom and even online courses. Access to service vendors, live webinars and in-person sessions are also attractive and emphasize the importance of the “personal touch” to many small business people.



The last piece of the design puzzle consists of the content of the learning opportunities. Much of the material on the Internet is targeted at individual consumers and usually relates to generic digital literacy and rarely deals with business applications. Moreover, those Internet resources targeted at businesses are highly fragmented and often consist of higher end services targeted at larger businesses. If utilization efforts are to be effective they need to speak to issues facing their target group.

Research in 2010 indicates that there are at least two distinct sub-groups that could be targeted with broadband utilization initiative: first, the novices and second, the experienced but not yet sophisticated. The novices have adopted the Internet but are still learning the basics (or have been stuck using only the most basic applications). The more experienced group has adopted many Internet applications but wants to learn more, especially in areas that promise to have a tangible impact on their business. ***For the novices, priority should be given to “quick and easy wins”: that is applications and activities that are quick and relatively easy to adopt, such as: research; electronic document transfer; accessing government information; building a basic website; and purchasing goods and services online. Activities and applications of potential interest to the more experienced user would include: selling online; delivering services or content online; teleworking; and, advanced website with rich media or service creation.***

Quick to adopt / adoption rates		Slow to adopt / adoption rates	
Research by staff	91.8%	Teleworking	34.4%
Electronic document transfer	91.8%	Selling goods or services	34.4%
Access government information	85.0%	Deliver services or content	20.8%
Web site	81.7%	Rich media or service creation ²²	18.0%
Purchasing goods or services	79.2%		

It is also recommended that learning materials and opportunities address the number one barrier cited by all businesses: concern over security and privacy.

It is notable that there is a strong linkage between the “easy to adopt” processes for businesses and those Internet based activities that households are most likely to adopt early. Therefore, developing skills in households is likely to benefit small businesses, especially micro businesses with less than 5 employees.

With insight into who is struggling to utilize the Internet, their motivations, barriers and learning preferences, it is possible to design a broadband utilization initiative that supports local economic development. The key elements that should be considered in designing local broadband utilization efforts are:

- a) Identify and understand the target group
- b) Priority to small businesses
- c) Increase awareness among target group through outreach, assessment, and presentations;
- d) Provide access to online resources that address the interests/needs of the target group;
- e) Provide personalized support in the form of one-on-one counseling, mentoring, and vendor trade shows.

Having looked at the possible design elements of a business oriented Internet utilization effort, the question arises as to who are the likely stakeholders or sponsors of such an effort? Considerations of efficiency and effectiveness suggest would indicate organizations already engaged with businesses generally and small businesses in particular. This would include Chambers of Commerce, Small Business Administration offices, community colleges, extension services and economic development agencies. Another possible stakeholder with a strong interest could be the Internet Services Provider(s), especially if the ISP is locally or regionally based. It is not uncommon for ISPs to provide or support awareness raising and assessments of Internet use as part of their marketing efforts. Which among these groups is likely to provide leadership will vary by community. Identifying leadership is dealt with in Section 8.2 and is critical to undertaking any initiative on this issue.

²² Rich media describes Web pages that use advanced technology such as streaming video, downloaded programs that interact instantly with the user for advertising.

Households: Before leaving this section, it is worth briefly exploring how households can increase their utilization of the Internet to improve their economic well-being. Both home-based business and teleworking allow households to earn a living in situations where they may otherwise be required to move in search of employment. This is particularly important in non-metropolitan areas where job opportunities can be scarce and telework and Internet facilitated home-based businesses are attractive options. Local economic development and labor-force training agencies can increase awareness and understanding of these options and the tools needed to become home-based business or teleworkers. A recent report released by the NTIA in December 2012 reviews fifteen Public Computer Center (PCC) and Sustainable Broadband Adoption (SBA) projects²³. The document provides a useful overview of current approaches being used to increase adoption and utilization among lower income individuals and households.

8. Conclusion

While taking responsibility for promoting broadband availability, adoption and utilization in a community is a daunting challenge, the potential payback is enormous. And the consequences of not keeping step with the emerging knowledge economy are grim. Many of the tools and resources needed to take action at the local level are available. What is needed is the commitment, skills and local knowledge of community stakeholders. While other priorities demand attention, there is a solid case for making broadband a local priority.

²³ http://www.ntia.doc.gov/files/ntia/publications/asr_interim_report_1_order_number_d10pd18645_-_submitted_on_2012-10-15.pdf

Appendices

The appendices provide resources and links to sites with potentially valuable information for local and regional stakeholders. Also included are sections on:

- the **Virginia Wireless Service Authority Act** - enabling legislation that provides local governments with a regulatory framework for taking an active role in delivery of local broadband services.
- and the **Community Broadband Toolkit**, an online resource with additional suggestions and links related to local broadband efforts.

I. Virginia Resources

eCorridors at Virginia Tech (<http://www.ecorridors.vt.edu/>)

Since 2000, eCorridors has conducted research on broadband availability, deployment, adoption, and usage in support of its mission to facilitate and promote the ability for every person, organization, and community in Virginia and beyond to have the capability, at a reasonable cost, to produce and access high volume information and services in the networked world. eCorridors creates competitive advantage by facilitating the deployment of advanced technology infrastructure and applications leveraging inter-regional connectivity for, and collaboration among, communities.

Accelerate Virginia (<http://acceleratevirginia.org/>)

In an effort to expand high-speed Internet access across the state, Virginia Tech's eCorridors program presents Accelerate Virginia, a new broadband mapping project. For the first time, users are being asked to provide information about Internet accessibility in their communities. Along with other sources, this data will be used to identify areas in need of affordable broadband infrastructure investment.

Virginia Department of Housing and Community Development: VDHCD offers block grants to communities for both planning and implementation of telecommunications efforts, allowing communities to identify and develop all elements necessary to create a successful community broadband network. Funds are distributed to eligible communities on a first-come, first-serve basis, and implementation grant focus on 'last-mile' installations.

(<http://www.dhcd.virginia.gov/CommunityDevelopmentRevitalization/Telecommunications.htm>)

Virginia Electronic Commerce Technology Center (VECTEC) – (<http://www.vectec.org/>)

Vectec is a non-profit eCommerce center partnered with the Virginia Industry Foundation. Our mission is to promote economic competitiveness and development by sponsoring, developing and implementing eCommerce activities for primarily small to medium sized businesses.

Virginia Geographic Information Network (VGIN) –

(<http://www.vita.virginia.gov/isp/default.aspx?id=12096>)

VGIN was established in 1997 in Virginia Code to "foster the creative utilization of geographic information and oversee the development of a catalog of GIS data available in the Commonwealth.

Virginia HIT Regional Assistance Center – (VHIT) (<http://www.vhitrec.org>)

VHIT offers affordable access to electronic health record systems, as well as a wide range of valuable consulting services, from assessing needs and selecting a vendor, to managing system implementation and implementing workflow changes that improve clinical performance and efficiency.

Virtual Virginia (<http://www.virtualvirginia.org/>)

As a program of the Virginia Department of Education, Virtual Virginia (VVA) offers online Advanced Placement (AP®), world language, core academic, and elective courses to students across the Commonwealth and nation. Virtual Virginia is committed to providing high-quality, rigorous course content with the flexibility to meet schools' and students' varied schedules. Virtual learning is the new frontier in today's educational institutions. The technology of the 21st century provides a unique opportunity for educators to reach students who want the experience of online courses.

Appalachian Regional Commission (<http://www.arc.gov/>)

The Appalachian Regional Commission is a federal-state-local partnership that works with the people of Appalachia to create opportunities for self-sustaining economic development and improved quality of life. Each year ARC provides funding for several hundred projects in the Appalachian Region, in areas such as business development, education and job training, telecommunications, infrastructure, community development, housing, and transportation. These projects create thousands of new jobs; improve local water and sewer systems; increase school readiness; expand access to health care; assist local communities with strategic planning; and provide technical and managerial assistance to emerging businesses.

Virginia Telehealth Network (<http://www.ehealthvirginia.org/>)

VTN devotes its resources to advancing the adoption, implementation and integration of telehealth and related technologies into models of healthcare statewide, and promotes the integration of health systems to support the delivery of care for all Virginians. In carrying out its work, the Virginia Telehealth Network is involved in many activities that are linked to priorities such as: resource-sharing, education, quality improvement via technology, development of model policies, procedures and protocols to address implementation barriers.

Interoperability in Virginia (<http://www.interoperability.virginia.gov/>)

The State Interoperability Executive Committee (SIEC) and Initiative Actions Teams (IAT) work on implementing the initiatives contained in the annually updated Statewide Strategic Plan for Interoperable Communications.

"Connecting Virginia: The economic benefits to expanding advanced broadband internet access."

(<http://www.thomasjeffersoninst.org/files/3/Connecting%20Virginia%20Policy.pdf>)

"Connecting Virginia" is a study released by the Thomas Jefferson Institute for Public Policy in November 2011.

"Broadband Coverage in the Commonwealth of Virginia" Estimates the percentage of the Virginia population falling into certain broadband internet service availability categories.

County/Regional Initiatives

The links below provide access to broadband analysis conducted by individual counties and/or broadband authorities located throughout the Commonwealth.

- Franklin County WISP Partnership (see Appendix IV)
- Eastern Shore Broadband Authority (<http://www.esvbroadband.net/welcome>)
- Orange County
(http://www.motorola.com/web/Business/Documents/static%20files/Orange%20County%20VA_HK-EN.pdf?localeId=83)
- Surry County
(<http://www.surrycountyva.gov/uploads/docs/Surry%20Co%20Broadband%20Implementation%20Plan%20Final%20Document.pdf>)
- Hanover County
(http://www.co.hanover.va.us/board/111010_BOS_ReportAdHocHighSpeedInternetCommittee.pdf)

II. Virginia Wireless Service Authorities Act

The Virginia Wireless Service Authorities Act (Code of Virginia, §15.2-5431.1 et seq.) was enacted by the Virginia General Assembly in 2003. The Act enables counties, cities and towns in Virginia to form their own Wireless Service Authorities to provide certain communications services, including but not limited to, high speed data and Internet access services.

Wireless Service Authorities are separate, legal entities from the localities that form them. They are similar to other local or regional authorities (waste and water authorities, regional jail authorities, economic or industrial development authorities, etc.).

Reasons for forming a Wireless Service Authority:

Financing: Wireless Service Authorities can borrow money and issue revenue bonds that do not constitute debt of the local governing body, to finance their projects. In 2007, the Virginia General Assembly added wireless broadband equipment and infrastructure to the definition of projects that may be entered into under the provisions of the Virginia Public-Private Education Facilities and Infrastructure Act (PPEA), and projects that can be financed through the Virginia Resources Authority.

Flexibility: In most instances, a Wireless Service Authority has the flexibility to provide services that the locality cannot provide on its own. Virginia localities are generally prohibited from providing Internet broadband services, with limited exceptions, including certain localities with "service gaps" who successfully petition the State Corporation Commission, and municipal

providers of electricity. Wireless Service Authorities under provisions of the Act do not appear to be subject to these limitations or conditions, and have wide discretion to acquire, construct, improve, enlarge, operate or extend any project providing qualifying communications services under the Act.

Facilities: Wireless Service Authorities can own and operate their own facilities. In addition, they are authorized under the Act to access state-owned lands for the placement of their facilities. A provision was added to state law in 2008 that requires the Commonwealth to lease available space on state tower facilities to qualifying Internet service providers in underserved areas. A Wireless Services Authority could presumably qualify for such access if it meets these conditions.

A Wireless Service Authority is not limited to providing "wireless" services: Wireless Service Authorities have wide discretion under the Act to provide "qualifying communications services", which include, but is not limited to high speed data and Internet access service (but excludes cable television or video programming).

For more information about Wireless Service Authorities, follow the link below:

http://otpba.vi.virginia.gov/broadband_toolkit_collect_responses-10_questions_about_wireless_service_authorities.shtml.

III. The Community Broadband Toolkit

The toolkit has been developed to serve as a roadmap for communities seeking to obtain affordable last mile broadband services through a community influenced model. The content contained in the toolkit is intended to provide general information and guidance but is not intended to serve as legal, technical or financial advice.

1. What does your community need?

- a. [Determine what you are trying to do](#)
- b. [Determine what applications are of interest](#)
- c. [Identify a "champion" to carry the ball](#)
- d. [Learn from what others have done](#)

2. How do you do it?

- a. [Determine Demand](#)
- b. [Inventory assets](#)
- c. [Determine existing broadband services](#)
- d. [Determine the type of technology](#)
- e. Issue RFP/RFI or initiate PPEA
- f. [Collect responses and evaluate options for structuring the deal](#)
- g. [Initiate negotiations/contract](#)

3. Business Case Analysis

- a. [Reallocate existing telecom "spend"](#)
- b. [Calculate "in-kind" contributions](#)

4. How do you pay for it?

- a. Use ["Buy-Down Worksheet"](#) to develop/experiment with models
- b. [Leverage federal funds already in play](#)
- c. [Evaluate grant opportunities](#)
- d. Contact the [Virginia Resource Authority](#) to find out how to leverage [VRA programs and funding](#)(.pdf) or other funding options
- 5. [How do you execute the process in a timely manner?](#)

IV. Franklin County WISP Partnership

Franklin County Virginia, April 2008

One Approach to Rural Broadband Deployment

Franklin County formed a partnership with a local wireless Internet service provider (WISP) to expand the County's local government wide-area network and provide broadband options for the citizens. The project leveraged County structures such as towers and water tanks for WISP transmitters and receivers. We were in the process of upgrading the public safety radio system at the same time, so the two efforts worked together to identify possible new tower locations that would improve radio coverage and meet broadband demand.

The partnership provided the WISP with a fast-path to business growth through additional funding and access to existing infrastructure. The County provided space on towers, tanks and poles in exchange for Internet service at County offices. This arrangement lowered deployment costs for the WISP, expediting business growth.

The partnership expanded the WISP customer base in Franklin County from 98 customers in early 2005 to approximately 1000 in early 2008. In addition, 15 fire and rescue stations were added to the County's wide-area-network (WAN) in addition to five other County offices. There are many advantages to moving remote offices onto the WAN, including reduced costs and improved communications and data sharing across County Administration. The wireless mesh network supports data and voice and the WISP is currently segmenting the County's voice traffic on their network to ensure quality of service (QoS).

The Challenge

Franklin County is a 721 square mile rural locality in the foothills of the Blue Ridge. The County lies just south of the Roanoke Valley and north of Martinsville, Virginia. Franklin County boasts the lowest tax rate in the area and is the fastest growing locality in the region. Citizens demand broadband for education, communications and business. The County's rural setting attracts many but presents challenges in broadband deployment. Citizens and businesses were calling on County Administration to bring broadband options to the County. The County's economic development team was being challenged that the County's broadband offerings were too limited and too expensive.

County Administration had several departments housed remotely. These departments included Parks & Recreation, Workforce Development, Public Safety, Animal Control and more. These remote facilities were not on the County's network and had no broadband options.

Education, business, communication and entertainment were all driving the need for bandwidth. The number of applications -- voice, video and data -- for Internet protocol (IP) based networks continue to proliferate.

The Options

The County holds a cable franchise that changed hands several times over the years and really did not address data communications. The cable build-out was limited to just the most densely populated areas as the franchise stipulated a minimum of 15 homes per mile before the company was required to build. To further complicate this build-out, densely populated areas existed but were too far from the cable end point to be connected. As such, the build out only covered about 1/3 of the County.

The local telco provides DSL and T1 connectivity but were limited to mostly in town limits and was too expensive for most residents. Even in areas where the telco was expanding these services out of town, they were limited to a 3-mile radius of a switching center or central office. Satellite providers were

available but the latency in those services would not support business demands. Telecommuters typically require access to the corporate network which demands broadband to support that type of connectivity (virtual private networks). Fiber build outs by the cable provider or the telco were limited due to the expanse of the County and the challenges of the terrain and the amount of rural area between communities.

Investigating potential solutions led us to wireless – relatively low cost and provides service across 15-40 mile distances depending on location and *line-of-sight* to a transmitter. The wireless solution provides interference resistant, scalable and state-of-the art services. The wireless mesh solutions can be designed to be redundant by providing multiple paths in network routes.

We wanted to leverage local assets such as County owned towers, water tanks and poles. We wanted to limit our financial liability by not being a business investor or publicly owned provider. Therefore, we wanted to locate an existing wireless Internet service provider (*WISP*) to partner with to deploy a wireless mesh network in the County. This network would service remote County offices and provide broadband Internet service to the citizens.

The Solution

The County wanted to assist in expanding the broadband options for citizens and connect the remote offices. However, the County had neither the resources nor the desire to become an Internet service provider. We did have infrastructure (towers and water tanks) that could be leveraged and public safety grant opportunities to support connecting fire and rescue stations.

We conducted the broadband assessment study in the winter of 2004/2005. The study identified all providers, their services and delivery methods, pricing structure and accessibility and reliability by geographic area within the County. We also created a layer in the County's geographic information system (GIS), mapping where broadband services existed. This mapping allowed us to easily identify most underserved areas.

In June 2005 the County issued an RFP to find a private-sector WISP to partner with to design, deploy and operate a wireless mesh network in the County. This work would include connecting all fire/rescue stations and government facilities, while also providing service to the citizens. The project would leverage County structures such as towers, water tanks, poles, etc. in exchange for wireless broadband service to County facilities. The County received only one response from B2X Online, Inc. of Salem, Virginia. That one response indicated that B2X was eager for the opportunity and well-versed on solid wireless technology (Motorola Canopy).

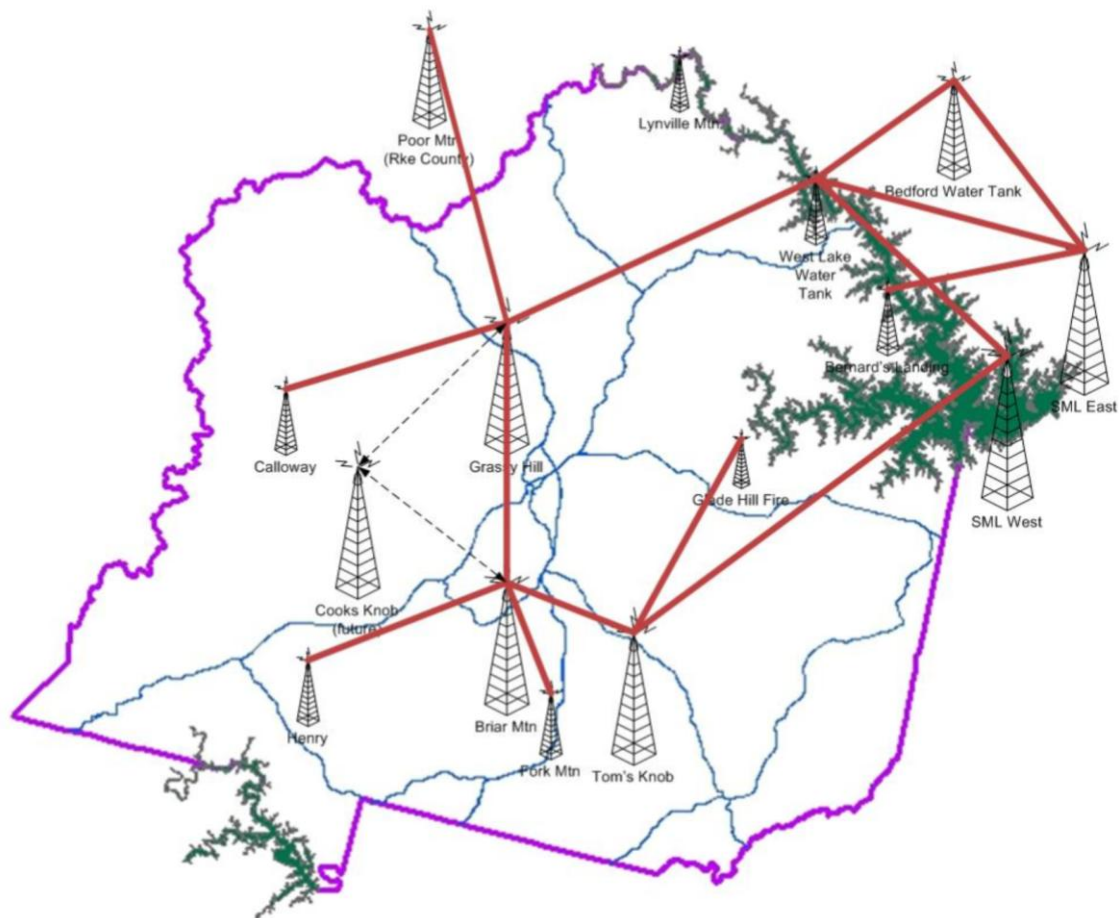
The County had approval for a Homeland Security grant and used \$50,000 from that grant towards this project as we would be connecting fire and rescue stations. Connecting these stations allowed the entire County fire and rescue staff to utilize a central system for reporting all the data associated with public safety. In addition, the County funded about \$38,000 the first fiscal year and approximately \$44,000 the second year. These general funds went towards the County's payment for Internet services (paid in advance), receiving equipment and development of some tower and tower sites.

The impact of this partnership is seen in the growth of the County's wide-area network connecting all remote offices, including all fire and rescue stations -- supporting data sharing and communications. This connectivity is bringing both cost reductions and efficiencies to the local government functions. The County has 24 facilities connected via the wireless mesh, including the County's data center. Response times for County facilities and communication over this network are excellent as there is no need for traversing beyond this local network.

B2X Online's business in Franklin County grew from presence on one tower serving 18 businesses to operating a wireless mesh network consisting of 10 towers and serving 143 businesses. This growth has occurred in just a little over two years and has been managed growth as B2X wanted to ensure reliable service and support to their customers.

The wireless network included space on one commercial tower. Since that tower would provide connectivity to several County facilities, the County paid B2X for services to those facilities in advance for the next five years. That money then funded the equipment required to provide service from that tower. In some areas of the County, citizens wanted service and did not have line of sight to any tower without erecting a pole. A few poles were erected and the land owner would come to agreement with B2X for reduced service costs in exchange for providing power to the pole and allowing B2X to then retransmit the service to other residents.

The partnership designed a network that includes WISP presence on 11 towers/tanks in the County including redundant network paths. The following diagram does not include all the smaller poles or structures setup to serve a limited area.



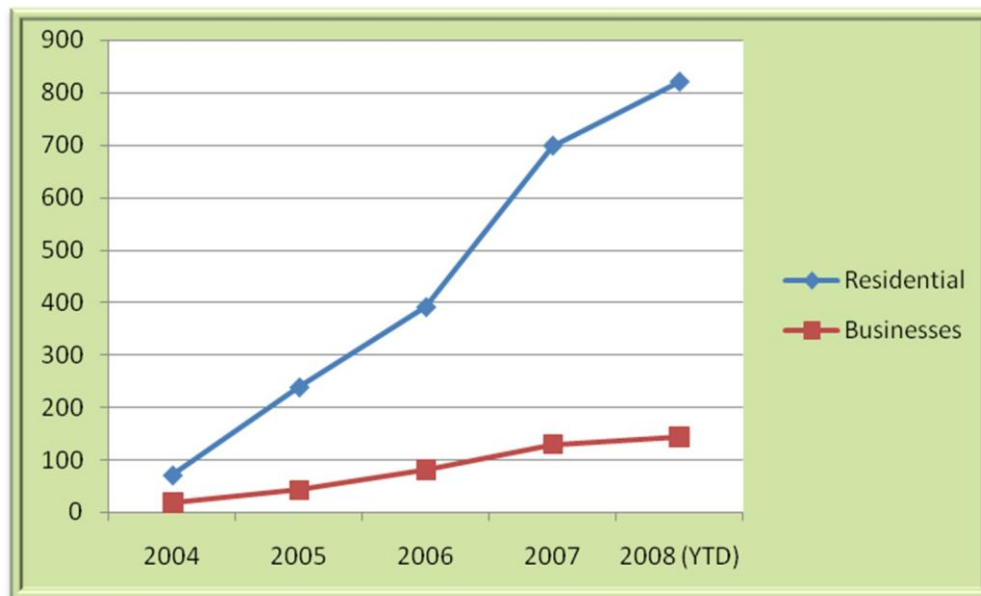
Business Benefits

Broadband is critical for communities to attract new development and businesses and for supporting the growth of existing business. It is quickly becoming considered a utility, the same as electricity and phone service -- citizens expect broadband to be available.

The process that Franklin County followed included an assessment to identify current services - pricing and coverage, available structures and identify the demand or under served areas. The County then found a partner -- a WISP that knows the technology and can operate the service. Then we worked together to expand the service area, meet citizen demand and connect the local government offices.

The partnership continues and B2X just recently added two additional back hauls providing redundant service feed into the County's data center. B2X is also provided routing and segmentation to ensure quality-of-service (QoS) to support the County's voice-over-IP (VoIP) system over the wide-area network. The service is solid and very reliable supporting data and voice communications. A tower in the southern section of the County was just recently (April 2008) put into service for both the County's public safety radio system and wireless broadband services. The local power company (AEP) is beginning construction on another tower in the western part of the County and agreements are already in place to provide B2X space on that tower as well.

The partnership has certainly been an enabler for improved local government efficiencies and for businesses and citizens to leverage the connectivity. In addition, B2X Online's business has grown considerably in the County.



Conclusion

It is true that broadband services are growing in our nation but in rural areas that growth is slow and limited. Technology is moving along to provide less costly and wider range coverage but wi-max is not yet main stream. Citizens, businesses and local governments need the connectivity today. If local governments partner with private providers, solid broadband services can become a reality for a fraction of the cost and in a much timelier manner. We have estimated the cost of this entire network build would have been approximately \$500,000. However, by leveraging local assets, a public safety grant and the partnership agreements, this network was built and deployed for just 24% of that estimated cost. Working together we were able to grow a wireless mesh network over Franklin County from one tower to 10 towers and another under construction in just over two years time. The County is currently moving all County facilities to one voice-over-IP system and is positioned to provide more efficient services because of this wide-area network. The WISP's business has continued to grow and expand well beyond the County into many neighboring localities. The WISP growth brings continued improvements to the network and more opportunities for the local government, the citizens and the businesses of the County to leverage this technology and improve their own communication and processes.

V: Maintaining the Community Broadband Planning Strategies

The strategies and mechanisms described below have the goal of maintaining the relevance and value of the Community Broadband Planning Strategies document. Without maintenance and updates, the resource will become dated, both in terms of its references as well as in its strategies and proposed actions. As a resource document becomes “dated”, it is not only less useful to the reader, but is also less likely to be circulated and passed on to those in need of such a resource.

The four key components to maintaining this resource as a “living document” are:

- Making appropriate modifications
- Maintaining version control
- Effective distribution and easy access
- Provision of feedback and input from readers

Making Appropriate Modifications

An important aspect of keeping a document or resource up-to-date is ensuring that modifications are both regular and relatively easy to carry out. With that consideration in mind, it is recommended that following types of modifications be made, with the level of modification subject to availability of staffing.

- a) Basic minimum modifications:
 - Objective: keep information accurate and document usable.
 - Frequency: annual, or as needed.
 - Actions: update hot links, list of programs, and contact information (on last page).
- b) Minor modifications:
 - Objective: keep document up-to-date with minimal staff resource requirement.
 - Frequency: as needed and subject to availability of staffing. Preferably every two years.
 - Actions: Same tasks as annual, plus changes to emphasis and minor adjustment of content.
- c) Major review and modification:
 - Objective: keep content current and in line with priorities and circumstances.
 - Frequency: as needed and subject to staff availability.
 - Actions: Review strategies and content based on consultation with key stakeholders. Maintain overall structure.

Maintaining Version Control

- All versions should be dated and numbered
- Suggested numbering system: Version 1.0 for initial public document. Version 1.1 (1.2, etc.) for Basic minimum modifications. Change to 2.0 (3.0 etc.) for Minor modifications and Major modifications.

Effective distribution and easy access

- Available primarily online in PDF format.

Provision of feedback and input from readers

- Provide online feedback format that provides for input on:
 - Errors or omissions.
 - Readers' assessment of usefulness of the resources.
 - Suggested changes, improvements or additions.



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