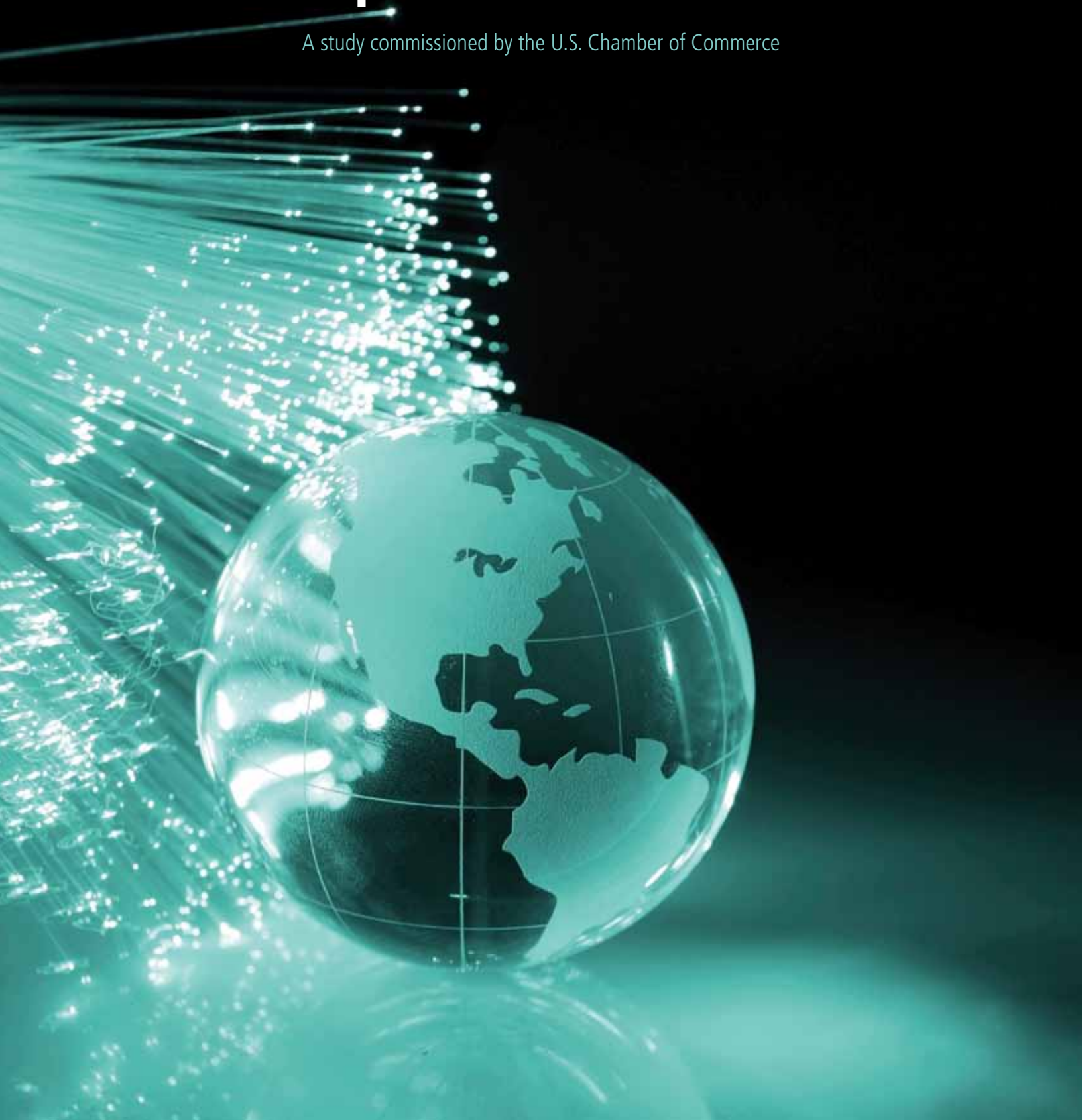
The Impact of Broadband on People with Disabilities

A study commissioned by the U.S. Chamber of Commerce



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A REPORT TO THE U.S. CHAMBER OF COMMERCE

THE IMPACT OF BROADBAND ON PEOPLE WITH DISABILITIES

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The views expressed herein are those of the authors and do not represent those of New York Law School.

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The Advanced Communications Law & Policy Institute ("ACLP") at New York Law School is a public policy program that focuses on identifying and analyzing key legal, policy, and regulatory issues facing the advanced communications sector. ACLP's mission is to promote robust and solution-focused dialogues amongst state and federal policymakers, academe, service providers, the financial community, and consumers concerning changes to the state and federal regulatory regimes governing wireline, wireless, broadband, and IP platforms.

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1. EXECUTIVE SUMMARY

Broadband is a transformative technology that is impacting the lives of its users in a wide variety of ways. In general, broadband:

- Facilitates convenient and cost-effective communication among family and friends;
- Enables a range of life-enhancing technologies;
- Encourages the creation of innovative products and services that can be delivered to users regardless of location;
- Allows senior citizens to reconnect with their communities;[1]
- Provides rural users with access to cutting-edge telemedicine tools;[2] and
- Creates a number of economic opportunities (e.g., telecommuting and small business creation) and cost-savings that have direct and measurable impacts on individual users and the wider economy.[3]

For people with disabilities, broadband is a flexible and adaptable tool that is being used to deliver affordable, convenient, and effective services, and that enables a range of social, economic, and health-related benefits. Moreover, broadband is poised to serve as a primary medium through which next-generation interactive assistive technologies are developed, deployed, and delivered. In short, broadband is having and will continue to have profound impacts on people with disabilities. However, a number of obstacles remain that could impede the full realization of these benefits.

This paper discusses the upward trend in broadband adoption and use among people with disabilities generally and focuses specifically on the numerous positive impacts that broadband is having on this very diverse segment of the population. This paper also highlights an array of user-specific issues raised by the emergence of broadband and articulates a set of policy recommendations for ensuring that, across the spectrum, people with disabilities have meaningful opportunities to benefit from broadband and broadband-enabled technologies.

1.1 Definitions

The Americans with Disabilities Act ("ADA") is the primary federal statute addressing people with disabilities in the United States. It was enacted in 1990 and originally defined a person with a disability as someone who (a) has a physical or mental impairment that substantially limits one or more major life activities, (b) has a record of

such impairment, or (c) is regarded as having such impairment.[4] In 2008, Congress amended the ADA in order to clarify and expand the definition of "disability" in light of a series of Supreme Court decisions that seemed to narrow it.[5] The Americans with Disabilities Act Amendments Act of 2008 ("ADAAA") expanded the original ADA definition to include disabilities that affect "one or more major life activity" and that include activities outside of work, such as communicating and reading.[6] These new definitions were implemented on January 1, 2009.

The U.S. Census Bureau employs a similarly inclusive definition of "disability" when gathering its population data. In particular, its American Community Survey ("ACS") identifies six broad classes of disability: (1) sensory (e.g., hearing or vision impairment); (2) physical (e.g., a condition that impairs one's ability to walk); (3) mental/emotional; (4) self-care (i.e. inability to care for oneself); (5) go-outside-home (i.e. inability to go out by oneself); and (6) employment (i.e. inability to work due to disability).[7]

For the purposes of this paper, use of the term "disability" will encompass the broad array of disabilities outlined in the definitions included in the ADAAA and used by the ACS.

1.2 Broadband & People with Disabilities

As an overview, broadband and broadband-enabled technologies provide people with disabilities access to a growing universe of products, applications, and services that enhance lives, save money, facilitate innovation, and bolster health and wellbeing. For example, broadband:

- Facilitates interactive communications via email, instant messaging, text messaging, and video relay services;
- Enhances the number and types of educational opportunities available to people with disabilities by enabling a growing universe of distance learning applications;
- Provides employment opportunities by enabling telecommuting and encourages entrepreneurship by providing a robust platform for conveniently launching and managing a home business; and
- Ensures access to cutting-edge health and medical applications by delivering a variety of in-home and remote telemedicine services.

Ensuring that these types of broadband-enabled technologies are available and accessible to people with disabilities is critical. The total number of Americans with disabilities is over 50 million[8] and is poised to increase as baby boomers age and develop disabilities in their later years. Thus, policies forged now will have a profound

impact on how people with disabilities access and use broadband in both the short-term and long-term.

1.3 Overview of the Paper

Section 2 provides a broad overview of the current population of people with disabilities. Understanding the diversity of this segment of the population underscores the many contours associated with broadband policymaking vis-à-vis people with disabilities. This section then analyzes current levels of broadband use among people with disabilities by focusing on four key topics:

- Availability of broadband;
- Awareness & demand for broadband;
- Adoption of broadband; and
- Usage of broadband.

As an overview, broadband is widely available across the United States, and people with disabilities are increasingly aware of and demanding it. *However, despite increasing adoption, a large number of people with disabilities remain offline for a variety of reasons*. Many perceive the Internet to be inaccessible or broadband to be prohibitively expensive or of little practical value. Others simply lack a computer or are unable to afford the cost of assistive technologies (e.g., a screen reader) that make a connection usable. This section highlights unique approaches to providing training and education to people with disabilities in order to promote the relevance of broadband, assuage fears regarding accessibility, and spur adoption.

Section 3 assesses the impacts of broadband on people with disabilities. Three broad areas are examined:

- The social impacts of broadband on the daily lives of people with disabilities;
- The economic impacts of broadband on people with disabilities, including individual and economy-wide welfare gains; and
- The effects of broadband on the health and wellbeing of people with disabilities.

To assess the impacts that broadband is having on people with disabilities, this section includes testimonials and case studies of people with a variety of physical, sensory, and cognitive disabilities; of service providers; and of organizations that specialize in disability issues. These real world stories illustrate the practical impacts of broadband

and highlight the types of challenges that remain for increasing adoption among a wider swath of this population.

Section 4 discusses the importance of greater broadband availability and technological innovation on people with disabilities. In the near term, innovation at the network level will ensure that advanced broadband infrastructure is available to all consumers regardless of geographic location. Moreover, these robust networks will spur innovation and the deployment of applications and services available via the Internet. As a result, people with disabilities will have more opportunities to consume an increasing amount of accessible and life-enhancing content. Successes in the near term will enable robust innovation in the long term, producing ever more useful services, devices, and applications, many of which will rely on broadband.

Section 5 articulates a set of policy recommendations that seeks to increase the adoption and use of broadband among the disabilities community, support efforts that demonstrate why broadband is of value to people with disabilities, enhance the availability of broadband, decrease the overall price of the service, assist public and private sector education programs, spur innovation by service and applications providers, and further incorporate broadband technologies into the lives of people with disabilities. In sum, there are a number of areas where government can and should play a key role in enabling further adoption of broadband, which include a focus on demand stimulation and encouraging investment and innovation at the network level and at its edge.

1.4 Foundational Principles

As discussed throughout this paper, a number of ***foundational principles*** should drive public policy for increasing broadband adoption and use among people with disabilities:

- Broadband is an interactive tool that enables a universe of useful applications and services for people with disabilities.
- Broadband facilitates an array of social, economic, and health-related welfare gains for people with disabilities, including the ability to stay in touch with family and friends, participate in their community, work from home, launch a small business, and access online medical services.
- Although the number of people with disabilities who subscribe to broadband continues to increase each year, a sizeable portion of the population remains offline for a variety of reasons, including lack of a home computer, the price of broadband and assistive technologies

required to effectively use a connection, and negative perceptions associated with the accessibility and utility of broadband.

- Once online, however, people with disabilities are avid and skillful users who participate in a wide array of activities.
- A number of models exist for increasing broadband use among people with disabilities and should be supported by policymakers at every level of government.
- Access to broadband is critical but is only the first step in helping more people with disabilities realize the full range of benefits enabled by this technology.
- The federal stimulus package is an important source of funding in the short-term for supporting education and awareness efforts that promote the value of a broadband connection and highlight the many positive impacts of broadband for people with disabilities.

2. AN OVERVIEW OF BROADBAND & PEOPLE WITH DISABILITIES

The U.S. broadband market is increasingly robust. The Federal Communications Commission ("FCC") recently reported that the total number of broadband connections in the United States was 132 million by the middle of 2008,[9] compared to only 6.7 million at the end of 2000.[10] Consumers have a wealth of options for getting online via broadband. The FCC reports that there are nearly 1,400 different broadband providers across the U.S., up from just 105 in 1999.[11] Competition in the broadband sector has led to a diversity of service offerings and lower prices.[12]

Broadband adoption and use continues to increase across all demographics. Senior citizens, for example, are increasingly ardent users.[13] *Similarly, as this section highlights, broadband adoption and use among people with disabilities is also increasing each year.* However, a significant number of people with disabilities remain offline for a wide variety of reasons. The numerous life-enhancing benefits associated with broadband use, which are discussed in Section 3, underscore the importance of spurring greater adoption and use of broadband and broadband-enabled technologies amongst people with disabilities.

Section 2.1 presents a demographic overview of people with disabilities. Understanding the many different types of disabilities provides essential context for appreciating the diverse array of challenges that people with disabilities encounter when trying to use broadband. Section 2.2 discusses four key features associated with broadband use amongst people with disabilities: availability, awareness and demand, adoption, and levels of usage.

2.1 A Demographic Overview of People with Disabilities

In 2006, the U.S. Census Bureau reported that there were 50 million people with disabilities in the United States,[14] 41.3 million of which were non-institutionalized people over the age of five.[15] Of those between the ages of 16 and 64, 7.1 percent reported an employment disability.[16] In the 2006-07 school year, 14 percent of school children – nearly 7 million – participated in some kind of disabilities program.[17]

The number of people with disabilities varies according to age group, with older seniors reporting the highest incidence of disabilities. According to a 2007 report, the prevalence of disability in the United States was 14.9 percent for all persons over age five, 12.8 percent for persons between the ages of 21 and 64, 29.7 percent for persons between the ages of 65 and 74, and 52.9 percent for those over the age of 75.[18]

In order to appreciate the various types of impacts enabled and challenges raised by broadband among people with disabilities, understanding the vast spectrum of individual disabilities is crucial. Snapshot 1 provides a broad survey of recent statistics regarding the number of people with physical, sensory, cognitive, developmental, and a number of other disabilities. This Snapshot is by no means exhaustive but is representative of the diversity in the current population of people with disabilities in the United States.

SNAPSHOT 1 - A Survey of Statistics re People with Disabilities

Physical[19]	Sensory[20]
▪ Nearly 26 million adults in the United States report some form of physical disability.[21] ▪ The number of people with spinal cord injuries was estimated to be 259,000 as of April 2009.[22] ▪ Over 33 million adults report some sort of physical functioning difficulty.[23] ▪ 16 million adults are unable to walk a quarter of a mile.[24]	▪ In 2006, 21.2 million non-institutionalized Americans reported "vision loss."[25] The number of noninstitutionalized adults over the age of 18 reporting "vision trouble" was over 25 million in 2008.[26] ▪ In 2006, 37 million adults in the United States reported being deaf or hard of hearing.[27]
Cognitive[28]	**Developmental, Learning, Speech, etc.**
▪ Over 20 million people in the United States have a cognitive disability.[29] ▪ An estimated 57.7 million people over the age of 18 suffer from a diagnosable mental disorder in a given year, while nearly 6 percent of the population suffers from a serious mental illness.[30] ▪ Over 5.3 million people in the United States have Alzheimer's disease. Ten million baby boomers will develop Alzheimer's.[31] ▪ Over 800,000 people in the United States have some degree of cerebral palsy.[32]	▪ Between 30 and 50 percent of the United States population has undiagnosed learning disabilities.[33] ▪ As many as 1 out of every 5 people in the United States has a learning disability, with nearly 3 million public school children (ages 6 through 21) having some form of a learning disability and receiving special education in school.[34] ▪ Over 14 million Americans have some sort of speech/communication disability not associated with hearing loss.[35] ▪ 1.5 million Americans are living with the effects of autism spectrum disorder.[36]

The number of people with disabilities is expected to increase significantly as the more than 78 million baby boomers age.[37] Indeed, the total number of seniors is expected to double by 2050.[38] Currently, those over the age of 65 account for 36 percent of all people with disabilities over the age of 5.[39] Age-related disabilities include hearing and vision loss or degradation and the development of a debilitating disease, such as Alzheimer's. One study estimates that the total number of adults experiencing hearing loss will double by 2030 due to the aging of boomers.[40]

As discussed in more detail below, broadband and broadband-enabled technologies have a number of positive, life-enhancing impacts on those people with disabilities who adopt and use this technology (see Section 3). However, a large number of people with disabilities remain offline for a variety of reasons even though broadband is often

readily available. *The primary challenge going forward will be bridging the gap between availability and adoption among this segment of the population.*

The sheer diversity of disabilities, however, underscores the fact that one overarching policy or approach for spurring awareness, demand, and adoption of broadband will not work for people with disabilities. As such, policymakers must craft policies to support an array of approaches that promote adoption and use amongst people with all types of disabilities. Enhancing the relevance and utility of broadband and broadband-enabled technologies amongst people with disabilities is thus paramount and will be discussed in greater detail below.

2.2 An Analysis of Broadband Use Among People with Disabilities

Technology has always played an important role in enhancing the lives of people with disabilities. Indeed, many people with disabilities use an assistive technology device or service at some point in their lives. An assistive technology is defined as "any item, piece of equipment, or product system…that is used to increase, maintain, or improve functional capabilities of individuals with disabilities."[41] Common examples include powered wheelchairs, assistive driving controls, and hearing aids. Broadband is quickly becoming an essential assistive technology, both as a medium for the delivery of critical services to a person with a disability and as a vehicle that enables a wide range of services and tools (see Sections 3 & 4).[42] However, broadband must first be adopted for it to be useful. Thus, it is critical to understand the contours of broadband adoption and use among this segment of the population before its actual and potential impacts can be assessed.

In analyzing the conditions under which people with disabilities begin to use broadband, four discrete issues play a prominent role. ***Availability*** of broadband is the first and perhaps most important factor. If broadband is not available, then a person with a disability does not have the option of using it. Even though broadband is widely available, where a person with a disability lives (e.g., a rural town or an urban center) often matters when assessing availability.

Awareness of and demand for broadband is the second factor. If broadband is available, are people with disabilities demanding it? A number of factors influence demand for broadband among people with disabilities, including perceptions associated with its accessibility, exposure to the technology, and an understanding of the real value of a broadband connection. If a person with a particular disability thinks that broadband is inaccessible by someone with a given disability, or if a person is not exposed to other people with disabilities using broadband, then demand may be low.

Adoption of broadband is arguably the most challenging issue. A number of factors (e.g., access to a computer, cost, and accessibility) contribute to a relatively low (but

increasing) adoption rate among people with disabilities even though awareness of broadband might be high. Bridging this gap is a challenge, but innovative approaches have been successful in spurring adoption.

Finally, the amount and types of ***usage*** will be discussed briefly here and more fully in Section 3. For an overview, please see Snapshot 2.

SNAPSHOT 2
An Overview of the Availability, Awareness/Demand, Adoption, and Use of Broadband by People with Disabilities

Availability	*Awareness & Demand*	*Adoption*	*Usage*
▪ Broadband is widely available across the United States. ▪ However, a number of unserved and under-served areas of the country remain, especially in rural America.	▪ People with disabilities are generally aware of broadband. ▪ Perceptions that broadband is an inaccessible technology, however, are fairly common. ▪ Programs that seek to educate people with disabilities about the benefits of broadband have succeeded in spurring demand.	▪ The broadband adoption rate among people with disabilities is increasing. ▪ Obstacles to a more robust adoption rate include lack of home computers, the price of broadband, and the costs associated with assistive technologies that make the connection usable.	▪ Once online, people with disabilities are avid users of their broadband connections. ▪ People with disabilities participate in a wide array of online activities and pursuits, including e-commerce, health-related research, telecommuting, and community participation.

2.2.1 Availability of Broadband

Broadband is widely available across the United States as network owners continue to invest billions of dollars in their physical infrastructure in order to deploy next-generation networks to every corner of the country.[43] However, for a wide variety of reasons, certain parts of the country remain unserved. Indeed, although the FCC has found that broadband is available in 100 percent of zip codes in the United States, service remains relatively scarce in those zip codes with very low population densities.[44]

Availability of broadband in rural areas is a key issue for people with disabilities, as they are more likely than most other groups to live in these areas. It is estimated that upwards of 20 percent of people with disabilities – roughly 11 million people – live in rural parts of the country,[45] compared with just 12 percent of the general population.[46]

Ensuring that broadband is available in unserved areas is a top issue for the current presidential administration. Economic stimulus legislation provides billions of dollars for spurring network build-out to these areas (see Section 5).[47] The FCC has issued a rural broadband strategy to spur deployment and adoption in these areas.[48] Market-driven efforts, combined with targeted policymaking, will remain important in expanding broadband availability. According to the National Telecommunications Cooperative Association's *2008 Annual Broadband/Internet Availability Survey Report*, 91 percent of customers in its 2008 Survey area had access to broadband,[49] up from 70 percent in 2007.[50]

Broadband enables a wide array of employment and healthcare opportunities for rural users generally and, more specifically, has the potential to transform the lives of people with disabilities (see below). But it has been observed that lack of demand and adoption, rather than lack of availability, is the chief issue of concern regarding rural broadband efforts.[51] More generally, a recent study by Pew concluded that, among those U.S. adults that are offline, only 16 percent cited lack of available broadband as their primary reason for not having broadband at home.[52] In addition, a significant number of adults said that they were either not interested in broadband or would not switch from their dial-up connection.[53]

In light of these findings and other data cited below, *raising the awareness of and demand for broadband, and increasing adoption rates among both rural and urban people with disabilities, are of paramount concern.* A central component of these efforts should focus on casting broadband and broadband-enabled technologies as relevant and essential to people with disabilities. A recent series of Pew studies found that only three percent of all non-Internet users reported being "physically unable" to use these types of technologies,[54] whereas 22 percent of non-users responded that they were not interested in getting online.[55] These and other findings discussed throughout the paper highlight the lack of clear value propositions for non-users across all demographics and user groups, including people with disabilities. Targeted efforts to educate people with disabilities on the relevance of broadband to their lives – and to enhance the utility of broadband for such users – are thus critical (as discussed further in this Section and in Section 3).

2.2.2 Awareness of & Demand for Broadband

Measuring the awareness of and demand for broadband among people with disabilities is more difficult than assessing its availability or adoption rate. However, a number of public and private initiatives have been launched recently to raise awareness of and spur demand for broadband at the state and local levels. Unfortunately, these efforts do not focus specifically on people with disabilities, but their general observations are helpful, nonetheless, in assessing current levels of demand for broadband among

people with disabilities and highlighting the wide variety of reasons why demand is generally lower relative to other groups.

For example, Connected Nation, a public-private partnership focused on spurring broadband deployment and adoption in the states that have implemented its model, has noted that a key factor in its successes over the years has been the creation of local eCommunity Leadership Teams to educate consumers on the benefits associated with broadband.[56] More than half of the residents who eventually adopted broadband did so after learning about the many benefits of broadband Internet access.[57] California's Broadband Taskforce has recommended a number of digital literacy programs and initiatives, including a statewide education campaign to notify all residents of the benefits of broadband.[58] Measuring the success of these and other endeavors is complex, but broadband adoption has consistently increased in each of the fifty states over the last few years.[59]

Among people with disabilities, a number of issues impact their awareness of and demand for broadband. First, people with disabilities are less likely to have a computer at home than many other segments of the population. Owning a computer is an essential prerequisite to using broadband, and those with a computer are much more likely demand broadband.[60] A 2000 study found that only 24 percent of people with disabilities had a computer at home, compared to nearly 52 percent for people without a disability.[61] By 2006, the number of people with disabilities who had a home computer had risen substantially, to nearly 40 percent, but this number was still lower than that for people without disabilities.[62] In 2008, slightly more than half of people with disabilities – 51 percent – reported having a computer at home.[63]

In light of a low rate of computer ownership, public computers are an important resource for some people with disabilities who wish to get online. Libraries, public computing centers, and other such places that offer free access to computers and the Internet may be "viable alternatives" for some people with disabilities who do not have a computer at home.[64] Frequently, however, access to public sites that provide public Internet access and computers are structurally inaccessible to people with certain types of disabilities, representing a significant barrier to computer use.[65] Despite accessibility mandates for places of public accommodation, many libraries, community centers, and other locations may still lack ramps or elevators leading to computer terminals.[66] And even when adequate physical access to public computers is provided, necessary assistive technologies and custom configurations to utilize computers and the Internet are often unavailable.[67]

Second, in addition to being less likely to have a computer at home or having limited access to public computers, people with disabilities are generally less exposed to, and thus less aware of, broadband. Exposure to the positive impacts of broadband tends to stimulate demand among potential users.[68] For example, a recent study found that 64 percent of people

without a disability access the Internet "anywhere," compared to only 31 percent of people with disabilities.[69] The reasons for why people with disabilities lack exposure to broadband are multiple and include having less physical mobility[70] and less access to the technology via work, since people with disabilities have a lower rate of employment than people without a disability.[71]

Third and perhaps most important, broadband demand among people with disabilities is generally lower than that of people without disabilities due to a fairly common perception that the technology is inaccessible. Indeed, a 2003 study found that 21 percent of people with disabilities remained offline because they thought it was confusing and hard to use.[72] Moreover, a variety of disabilities make it physically difficult to use a computer or broadband connection without using some kind of assistive or adaptive technology. To this end, a number of assistive technologies have been developed to enhance the accessibility of broadband for people with disabilities. These include screen readers for use by people who are blind, speech recognition technologies to facilitate navigation and writing (e.g., email), and mouse devices that are controllable by eye or head movements.[73] Yet many people with disabilities remain unaware that these and other assistive technologies can assist in accessing the Internet and broadband-based applications.[74] Anecdotal data suggest that such perceptions feed into a feeling among some people with disabilities that computer and broadband technologies are of little value because they are difficult to access and use.

However, the practical value of these technologies is real. For example, John, who is a quadriplegic broadband user, views his Dragon 9 voice recognition software as indispensible. "This AT allows me to use the computer for longer and in a more effective manner because I can only type with one finger. When I have to type, my shoulders get sore and my arms tire very easily. With voice-recognition [software], I do not have to type. I use this tool when typing long responses or participating in a chat room." Promoting similar success stories and highlighting the wide availability of these types of tools could further spur demand for broadband among people with disabilities. (See Snapshot 3 for additional information regarding the types of computer-related assistive technologies available to people with disabilities.[75])

SNAPSHOT 3
Assistive Technologies for Use With or Enabled by Computers

Physical Disability	*Speech Disability*	*Vision Impairment*	*Hearing Impairment*	*Cognitive Disability*
▪ Eye-tracking devices ▪ Voice-operated computer controls ▪ Sip and puff switches ▪ One-button access	▪ Natural voice software (text-to-speech) ▪ Voice recognition software ▪ Microphones & other input devices	▪ Screen readers ▪ Text magnifiers ▪ Instant Braille devices ▪ Braille printers ▪ Adaptive keyboards	▪ Video relay services ▪ Real-time captioning ▪ TTY/TDD via VoIP	▪ Large-key keyboards ▪ Touch screens ▪ Oversize mouse ▪ Planning software

Despite these challenges, awareness of and demand for broadband among people with disabilities has increased significantly over the last several years, due in large part to the efforts of programs that work directly with this segment of the population. As discussed in greater detail below, national efforts like the Alliance for Public Technology's "Broadband Changed my Life!" campaign[76] help raise awareness and spur demand for broadband generally, while more grassroots efforts like Closing the Gap (www.closingthegap.com) provide users, educators, and parents with information on how to adopt and use assistive technologies. A number of local organizations also provide people with disabilities access to and training on a variety of computer-related ATs (see Case Study 1).

CASE STUDY 1
Georgia Tools for Life

Georgia Tools for Life (www.gatfl.org) is a statewide program that seeks to increase access to assistive technologies for people with disabilities. The program offers assistive technology scholarships and donations in addition to training through hands-on demonstrations and workshops. In 2007, GATFL assisted over 3,000 people by providing them with training in how to use various assistive technologies. Via its ReBoot program, GATFL has placed refurbished computer equipment with over 7,000 people with disabilities since 1994.

GATFL supplements its work by partnering with Touch the Future (www.touchthefuture.us), which provides affordable, refurbished computer equipment and training to people with disabilities. Touch the Future offers AT demonstrations and other programs that seek to introduce people with disabilities to assistive technologies in the hope of spurring awareness and use of these essential tools.

Moreover, a number of companies and groups, ranging from broadband service providers to international standard-setting bodies, are focused on making the Internet more accessible for people with disabilities. For example, accessibility guidelines for Web 2.0 content were released by the World Wide Web Consortium ("W3C") in December 2008. These guidelines articulate "a wide range of recommendations for making Web content more accessible. Following these guidelines will make content accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these."[77]

Another trend regarding accessibility of content and devices for people with disabilities is an increased adherence to universal design principles by hardware and software developers. These principles provide guidance for ensuring that products are accessible and usable for as wide and diverse an audience as possible (see Section 4.2 for further discussion of trends regarding accessibility and universal design). These types of efforts have spurred demand and increased adoption of broadband among people with disabilities.

2.2.3 Adoption of Broadband

Adoption of broadband in the United States continues to increase each year. According to a recent report by the Pew Internet & American Life project ("Pew"), 63 percent of homes had adopted broadband by April 2009, up from 55 percent in April 2008 and 42

percent in March 2006.[78] *Adoption of broadband among people with disabilities, however, remains low relative to the general public.* According to one study, less than a third of people with disabilities – 24 percent – had adopted broadband by 2008.[79] A number of reasons account for this.

First, the cost of broadband is a barrier for some people with disabilities. Even though prices have remained flat over the past several years,[80] people with disabilities generally have lower incomes than most other demographics. A 2007 study found that working-age people with disabilities earn approximately $6,500 less per year than people without disabilities.[81] The same study also found that, in 2007, the poverty rate of working-age people with disabilities in the United States was 24.7 percent, compared to only 9 percent for people without disabilities[82] (the poverty rate for the entire U.S. population rose to 13.2 percent in 2008).[83] Moreover, the full-time employment rate for people with disabilities is much lower than that of people without disabilities.[84] However, as discussed below, broadband enables an array of employment opportunities for people with disabilities, which include telework options and the ability to launch small businesses from home (see Section 3.2). These and other economic gains (e.g., from online shopping, prescription drug savings, etc.) could help offset the price of a monthly broadband subscription.

Second, the total cost of broadband access is often higher for people with disabilities because many need to purchase add-on assistive or adaptive technologies as a result of their disability. These might include an adaptive keyboard to facilitate typing for people with motor disabilities, screen readers for people who are blind or visually impaired, speech recognition software, and a wide array of similar types of hardware that make navigation easier (see Snapshot 3).[85] Some of these technologies are relatively expensive. For example, the JAWS screen reader, a popular brand among people with a visual disability,[86] retails for almost $900.[87] A number of efforts seeking to enhance the accessibility of Web content for people with disabilities and implement notions of universal design[88] of Web pages and applications have successfully brought these issues to the attention of public and private sector stakeholders.[89] As described below, many service providers are beginning to implement universal design notions (see Section 4.2).

Third, as mentioned above, demand for and adoption of broadband remains low among people with disabilities relative to the general public because many people with disabilities perceive the Internet generally as either unusable or unnecessary.[90] Many often perceive that a particular disability makes it impossible to use a computer or the Internet[91] and are unaware of the many assistive technologies that are available to help them get online.[92] Others, including those who are offline altogether or who use a dial-up connection, often do not recognize or appreciate the many benefits associated with a broadband connection.[93]

Given these trends, it is critical to implement and support programs at the local and state levels that inform people with disabilities about the accessibility of the Web, the universe of assistive technologies available to them, and the benefits of broadband in order to help spur adoption and use. Educational efforts have been successful where carefully implemented. For example, in Kentucky, ConnectKentucky and its parent, Connected Nation, fostered demand and identified viable network solutions in order to bring broadband to unserved areas. Availability increased from 60 percent in 2004 to 95 percent in 2007, while adoption increased 83 percent between 2005 and 2007.[94] Moreover, as discussed in Section 5, policymakers should consider an array of approaches for making broadband access more affordable for people with disabilities, including tax credits for the purchase of computer- or Internet-related ATs, using stimulus funding to support the education, awareness and training efforts of local nonprofits, and a more concerted effort to promote the relevance of broadband and broadband-enabled technologies among this segment of the population.

2.2.4 Broadband Usage

A more thorough analysis of specific uses and impacts of broadband on people with disabilities will be provided in Section 3. As an overview, those people with disabilities who have adopted broadband are generally active and enthusiastic users.

Data indicates that the use of broadband by people with disabilities tracks, overall, that of the general public. For example, a 2000 study found that the top two Internet uses among people with disabilities were sending and receiving email and searching for information; these were also the top two activities for people without disabilities.[95] By 2006, these Internet uses remained the most popular, but people with disabilities tended to search for information on health topics and government services more often than people without disabilities.[96] A 2007 Pew report concluded that "once online, people with chronic conditions [which include people with disabilities] pursue most online activities at the same rate as other users."[97]

People with disabilities are also using wireless broadband to enable a number of services and applications (see Section 4 for specific examples). Generally, wireless technologies – especially cell phones – are of enormous value to people with disabilities. According to the Wireless Rehabilitation Engineering Research Center ("RERC"), an interdisciplinary policy group, "wireless information and communications technologies play an increasing role in education, employment, healthcare, and other aspects of independent living for people with and without disabilities."[98] In particular, "3G mobile wireless technologies make it possible to exchange information and perform activities anywhere and anytime."[99] A recent survey by RERC found that approximately 86 percent of people with disabilities have a cell phone.[100] This study also found that, after voice communications, text messaging, email, and Internet access were the most important uses of a cell phone among people with disabilities.[101]

Broadband is also facilitating the use of more interactive and multimedia services and applications among people with disabilities, including multiplayer games, video relay services, and a growing variety of applications discussed in more detail below. In short, people with disabilities are using their broadband connections to enhance their lives and to realize a number of social, economic, and health-related impacts.

2.3 Conclusions

Available data supports a number of conclusions:

- Broadband is widely available across the United States. However, there continue to be pockets of unserved areas scattered across the country.
- People with disabilities are demanding and adopting broadband in increasing numbers. Yet a number of obstacles impeding more robust adoption remain. These include correcting negative perceptions regarding broadband accessibility, increasing computer ownership, and demonstrating the utility and value of broadband to those people with disabilities who feel it is irrelevant or unnecessary.
- The total price of broadband access for people with disabilities remains a challenge because many require assistive technologies to effectively use their broadband connection. Once online, however, people with disabilities are active and avid broadband users who participate in a diverse array of activities.
- Enhanced public and private education and outreach efforts are likely required to spur awareness of and demand for broadband among people with disabilities and to quell any concerns regarding accessibility.
- Policymakers should experiment with policies that seek to reduce the total price of broadband, including tax credits for ATs and stimulus funding to support training and demand stimulation programs.

3. THE CURRENT ROLES & IMPACTS OF BROADBAND ON PEOPLE WITH DISABILITIES

Broadband is enhancing the lives of people with disabilities in a number of important ways. This section focuses on three primary areas that this technology has impacted.

First, this section examines the social impacts of broadband on people with disabilities. Broadband provides a robust, interactive communications medium that increases interactions with family and friends, promotes social inclusion, encourages participation in an array of activities, enables a number of cutting-edge communications services (e.g., video relay services) for use by people with a variety of disabilities, and generally empowers its users. Moreover, broadband provides family, friends, and caretakers with a medium for gathering and exchanging key health information and for establishing support groups and other care networks.

Second, broadband is enabling a number of economic benefits for people with disabilities. Broadband allows people with disabilities to supplement their education, which can in turn lead to better and more diverse employment opportunities, including the ability to launch a small business. Moreover, many employers now encourage employees to telecommute, providing people with disabilities a convenient and affordable option of procuring work. Broadband also enables a variety of e-commerce options. Taken together, these individual economic gains have a large impact on the wider economy and could increase productivity and output in the long run.

Third, this section highlights the increasing number of health-related benefits facilitated by broadband. In addition to providing access to relevant and useful health information, broadband is increasingly being built into a variety of healthcare options for people with disabilities. Broadband-enabled telemedicine services, for example, allow people with disabilities to visit their doctor or obtain certain types of care remotely, while an array of cutting-edge in-home telemedicine systems allow for remote monitoring of vital signs and other metrics.

Snapshot 4 provides a summary of these impacts.

SNAPSHOT 4
The Social, Economic, and Health-related Impacts of Broadband on People with Disabilities

Social Impacts	*Economic Impacts*	*Health-Related Impacts*
▪ Broadband increases connectivity with family and friends. ▪ Broadband provides people with disabilities an interactive outlet to the world. ▪ Family, friends, and caretakers use broadband for support and for the exchange of critical care information.	▪ Individual economic gains include: enhanced education opportunities; e-commerce; and enhanced employment opportunities. ▪ Economy-wide gains include increases in: small business creation; workforce participation; productivity; and innovation vis-à-vis tailored content, services, and applications.	▪ Broadband is generally enhancing the wellbeing of people with disabilities. ▪ Broadband enables life-enhancing telemedicine services like in-home monitoring and other remote services. ▪ The potential for broadband-enabled healthcare services and applications is tremendous.

3.1 The Social Impacts of Broadband on People With Disabilities

> ***"Broadband has made my life much, much easier."***
> ~ Lise

Lise, who is hard of hearing, uses her broadband connection for a variety of personal and professional tasks. For her, having a text-based medium that allows for the fast transmission of documents and written communications allows her to participate more fully in many aspects of her work and her life in general.

John, a quadriplegic who lives in Florida, uses his broadband connection for "just about everything." In particular, he uses it to shop, to look up health information, and to keep in touch with family and friends, either via email or "live" in chat rooms.

For Larry, of Hawaii, broadband has had a profound, life-altering impact. "It is my lifeline to the world, to my friends, and to my work," he says. Larry is deaf and uses his broadband to "do more work, be more productive, and have better self-esteem."

For the homebound, like Helen, of Logan, Utah, broadband is often the only viable means of communications. "It is my main contact with the outside world," says Helen, who is unable to get out of bed most days. "Broadband has been valuable to me in terms of time saved and stress reduced."

Broadband is having similar impacts on a range of people with disabilities because it enables tools and services that bolster communication capabilities, increases participation in a number of activities, and enhances personal empowerment (see Case Study 2 for a testimonial on how broadband impacts the life of a paraplegic user). This section analyzes how broadband connects the disconnected to their communities and empowers the isolated by focusing on three components of social engagement: communication, participation, and empowerment.

CASE STUDY 2
The Impact of Broadband on Flicka, who is a Paraplegic

I am a 57-year old woman who has been a T 4-5 paraplegic for 24 years. I live in Paso Robles, CA and began using the Internet in 1997. I first used dial-up to upload work-related data. At the time, my service provider was AOL, so I started investigating the Web with its user-friendly help. It was, however, a long distance call from our home, so I didn't spend much time getting familiar with the Web. Once our area got a local service provider, I moved to it to avoid the phone charges. We didn't get DSL to our rural area until about 3 years ago.

I use the Internet daily (I do not use an assistive technology to access it). I worked in legal research for several years. The Internet turned doing research into a snap! Now, I use it for everything—shopping, health info, banking, socializing. I am now used to looking up anything I have a question about—from recipes to word definitions. I have no idea how I survived prior to its invention.

Broadband absolutely helps me stay in better contact with family and friends. Living in a rural area, I had to travel at least 10 miles one way to interact with other people who are disabled.

I would just like to say that access to the Internet has changed my life more than any other invention during my life time. It's incredible!

3.1.1 Communication

People who have difficulty communicating orally (e.g., speech disabilities related to hearing impairments, brain injuries, paralysis, etc.) or via traditional methods (e.g., the basic telephone) benefit from broadband in a number of ways.

Broadband provides a text- and video-based medium that supports viable and affordable alternatives to traditional speech-based communication for people with an array of disabilities. Broadband facilitates the rapid exchange of information among family, friends, and caretakers by enabling email, chat services, and a number of video-based applications. These types of communications "allow [an] individual with a disability to encounter and interact with others to a degree that may not be possible offline."[102]

SNAPSHOT 5
Perspectives on Broadband-Enabled Communications

"TTYs are so last century!"
~ Lucy, Lihue, HI

"I use my video phone as often as hearing people use their telephones."
~ Larry, Philadelphia, PA

"It's a great way to keep in touch with family, friends, and community"
~ Sheila, Sacramento, CA

"As a visually impaired person, I can say that the Internet has been integral to my success as a professional and as an active member of my community."
~ Day, Washington, D.C.

Email is the most popular Internet service among people with disabilities. Indeed, a number of recent surveys have found that well over 80 percent of people with disabilities who are online use the Internet to send and receive emails.[103] Chat services (e.g., instant messaging programs) are also popular[104] and represent another important social outlet for people with disabilities, particularly those with speech and hearing disabilities, liberating them from dependence on a telephone.[105]

Broadband also enables more personal and interactive communications via video, which has recently emerged as a critical medium for people who are hard of hearing or deaf. In the past, people with hearing and speech disabilities used telecommunications relay services ("TRS") to place telephone calls. A TRS "allows people who are deaf, hard of hearing, or speech impaired to communicate through a communications assistant ["CA"] with people who use a standard telephone. A CA relays the TTY (text telephone or telecommunications device for deaf and hard of hearing people) input to the telephone user and types that person's response back to the TTY user."[106] The current generation of TRS services is compatible with mobile phones and computers.[107] However, Video Relay Services ("VRS") enhance traditional text-based telephone

communications by making interpreter services widely available and convenient for people who are deaf. A deaf person with a web-cam or other broadband-enabled video device calls an interpreter via the Internet, who then facilitates communication with a hearing person.

VRS is a booming industry that is supported by fees collected and administered by the FCC. The FCC's VRS funds total approximately $800 million each year and are used to support innovative providers like Viable (www.viable.net/vrs) and Sorenson (www.sorensonvrs.com).[108]

A similar service that is enabled by broadband is remote Communication Access Real-time Translation ("CART"). A person who is deaf or hard of hearing can log on to a CART provider's Website and receive instantaneous captioning of a telephone call directly on their computer. In the near-future, more advanced broadband-enabled services like telepresence will likely become common communications tools for people with disabilities (see Section 4.2).

These and other types of broadband-enabled communications services are very popular among users, especially those who use sign language to communicate (see Snapshot 4). In sum, broadband levels the communications playing field by facilitating the real-time delivery of written messages and video communiqués.

3.1.2 Participation

Some people with disabilities who are unable to effectively communicate or otherwise partake in community activities can become socially isolated. Broadband, however, is being used to facilitate more robust participation by isolated or detached individuals. Moreover, given the interactive and multimedia nature of broadband-enabled Internet access, broadband allows people with disabilities to participate in an array of activities that traditional telephone or dial-up Internet services are unable to support.

In general, high-speed broadband enhances the user experience for all consumers by ensuring the fast delivery of robust, multimedia content. For example, a fast Internet connection provides the opportunity to engage in real-time activities like chatting and conducting business (see Section 3.2). In particular, for people with certain mental or learning disabilities, broadband encourages more avid Internet use and participation by easing frustrations associated with slow connection speeds (e.g., decreasing the amount of time it takes to download an application or to access a Website).[109]

Broadband is also used by people with disabilities to participate in a number of social applications. These include social networking sites, self-help or support groups, and multiplayer online games, all of which represent the next-generation of social interactions.

Social networking sites, like Facebook and MySpace, provide a creative outlet for its users. These sites enable group socializing and networking among family and friends. These applications are also used by parents or caretakers of people with disabilities to provide support and to share information and advice. For example, a Facebook networking group titled "Special needs kids and the joy of raising them" offers a supportive space for parents, caregivers, and friends of children or adults with disabilities.[110] A variety of informative topics are posted on a discussion board for each of the 1,237 members to share and discuss. Facebook and other such networking sites provide people with disabilities a more convenient outlet for participating in social or therapeutic activities.[111]

Interactive online gaming is another popular means of social participation. According to one study, gaming is one of only a handful of Internet uses that people with disabilities participate in more actively than people without disabilities.[112] Moreover, in addition to providing entertainment and spurring critical brain functions like problem-solving, a variety of games have the ability to connect people with disabilities and, in some cases, provide treatment or critical resources that might be unavailable or difficult to access in the real world. For example, researchers at Rensselaer Polytechnic Institute recently developed a game called "Capable Shopper" to "help individuals with disabilities develop life skills and obtain increased autonomy."[113] The game simulates a food shopping trip and offers an interactive way for people with certain disabilities "to practice learning their way around the supermarket, identifying the appropriate aisles in which to find items on their shopping list, and selecting specific items off of shelves."[114] Immersive online multiplayer games like Second Life are also being used by people with certain disabilities to participate in social situations that might otherwise be difficult (see Case Study 3[115]).

CASE STUDY 3
Second Life & People with Disabilities

Second Life (www.secondlife.com) is a massively multiplayer online game that provides users with the opportunity to participate in the game by using an avatar. Players have the ability to own property, buy and sell goods, and engage in a number of "real world" activities like chatting and developing relationships. These types of games are played in real-time and require a broadband connection. By its nature, Second Life is an experimental medium, which is proving to be fertile ground for the development of unique and cutting-edge programs for people with certain types of developmental disabilities like autism. Examples include:

- The island of Brigadoon was created in 2003 by a doctor who used the space to help people with Asperger's Syndrome develop the social skills that they lack. Asperger's, which is a higher functioning form of autism, often hinders the development of social relationships. Brigadoon was established to provide people with Asperger's and their friends, family, and doctors with a place to develop robust social skills that could be used offline. Thus far, the results have been promising.
- "Naughty Auties" is a virtual resource center that disseminates information on autism and that provides people with autism a space for practicing social interactions.
- Contact a Family, a British nonprofit that provides support, advice and information for families with disabled children, recently launched a virtual contact center in Second Life to provide parents and children with another outlet for support and advice.

3.1.3 Empowerment

Broadband also empowers people with disabilities to pursue a range of social activities, including blogging, policy advocacy, and traveling that might otherwise be difficult, impractical or unaffordable.

Blogs are a popular and increasingly powerful medium for fostering a sense of community among people with disabilities, their friends, family, caretakers, and advocates. Blogging, which is greatly enhanced by a broadband connection,[116] helps to "bring new voices to the online world," particularly younger users who are among the most avid users.[117] These types of programs provide users with a forum for expressing opinions and posting information. Indeed, an increasing number of blogs dedicated to disabilities have been created over the last several years. For example, Disaboom.com is an online community for people with disabilities and provides them with a number of outlets for expression, including blogs, chat rooms, and other similar forums.[118]

Similarly, people with disabilities are using their broadband connections to participate in social discourse and public policy advocacy on a variety of issues. Bob, of Sacramento, California, has cerebral palsy and uses his broadband connection to promote his advocacy for people with speech disabilities. In particular, he helps run a Web-based nonprofit – Speech to Speech (www.speechtospeech.org) – that helps people with speech disabilities use the telephone more effectively. Lloyd, of Bowie, Maryland, is deaf and has benefited so greatly from broadband that he has begun to advocate in favor of increased rural access to this technology.

Across the board, broadband enables people with disabilities to live more independent and empowered lives. Lucy, who is deaf and lives in Hawaii, is using her broadband connection to train her puppy to become a hearing dog via instructional videos available online. Broadband also facilitates mobility by making travel more accessible to people with disabilities. Travel Websites such as Access-Able Travel Source (www.access-able.com) provide information for travelers with a variety of disabilities regarding the accessibility of various airports, cruise ships, and destinations. For the homebound or those who are unable to physically travel, sites like The Armchair Travel Company (www.armchair-travel.com) offer high-quality virtual tours of a number of international sites. These and other broadband-enabled services provide a number of tools for empowering people with disabilities and enabling them to participate more fully in social interactions.

3.2 The Economic Impacts of Broadband on People with Disabilities

That broadband has positive impacts on national, state, and local economic activity is undisputed. It has become a critical cog in economic development and currently serves as a key enabler of various forms of economic activity. Positive correlations have been found between broadband availability and job creation,[119] and between broadband use and productivity. Indeed, one recent study estimated that a seven percentage point increase in broadband adoption "could result in [direct annual income growth of] $92 billion through an additional 2.4 million jobs created or saved annually, $662 million saved per year in reduced healthcare costs…and $134 billion per year in total direct economic impact of accelerating broadband across the United States."[120] Another recent report estimates that a "stimulus package that spurs or supports $10 billion of investment in 1 year in broadband networks will support an estimated 498,000 new or retained U.S. jobs for one year."[121] Indeed, President Obama has cited broadband as being a key part of 21st-century economic growth and competitiveness.[122]

For people with disabilities, broadband provides a number of economic opportunities. The technology allows for many diverse uses like participating in e-commerce, enhancing one's education via online courses, telecommuting, and establishing a small business, each of which enables individual economic welfare gains for people with disabilities. In

the aggregate, these individual gains have the potential to provide a significant economic impact on the wider economy via gains in employment, consumer spending, and tax revenue from new businesses. This section analyzes both individual and economy-wide economic gains enabled by broadband.

3.2.1 Individual Economic Gains

The economic opportunities enabled by broadband are increasingly important to people with disabilities since they earn less, as a group, than people without disabilities. Indeed, in 2007 the median annual income of a person with a disability working full-time was $34,200, compared to over $40,000 for a person without a disability.[123] At a household level, the discrepancy between the earning power of people with a disability and people without is even greater. In 2007, the median annual income of households with at least one working-age person with a disability was $38,400, while households without a person with a disability earned over $60,000.[124]

Broadband facilitates a number of economic opportunities, including education, employment, and e-commerce, each of which is discussed below.

3.2.1.1 Education

Overall, people with disabilities have completed less schooling than people without disabilities. For example, according to one study only 12.5 percent of people with disabilities between the ages of 21 and 64 had a bachelor's degree in 2007, compared to nearly 31 percent for people without a disability.[125] Broadband is being used to close these gaps by providing enhanced, convenient, and affordable education to people with disabilities of all ages.

Broadband provides parents and children with a number of educational opportunities. Distance learning is increasingly popular and allows the homebound or those who are unable to travel long distances to enroll in classes. Many universities now offer online classes, enabling people with disabilities to earn college and advanced degrees. Moreover, parents with disabilities can use their broadband connections to monitor their child's progress in school, to stay in regular contact with teachers via email, and to participate in videoconferences with teachers.[126] Federal and state governments provide funding and other support for enhancing these types of educational opportunities.

Outside of the physical and virtual classroom, a number of unique organizations supplement broadband-enabled educational opportunities for people with disabilities. For example, an Iowa-based distance learning program called ASSIST (www.blind.state.ia.us/assist/assist-details.htm) offers digital computer training to people with visual impairments. This state-run, federally-funded program uses broadband-enabled distance learning courses to "provide instruction on Microsoft

Office software to blind and visually impaired individuals" in order to prepare them for careers in the IT field. Another program that uses broadband to spur education among people with disabilities is DO-IT, which is a project run by the University of Washington (www.washington.edu/doit). One of DO-IT's programs, AccessCollege, provides educators with information on how to make classrooms more accessible and helps prepare people with disabilities for college.[127] Another program – DO-IT Scholars – prepares high school students for college and career by providing them with information on the many facets of post-secondary education.[128]

These and other broadband-enabled educational programs facilitate the acquisition of job skills and, ultimately, boost employment among people with disabilities.[129]

3.2.1.2 Employment

Perhaps the most important immediate impact of broadband on people with disabilities is the increase in employment opportunities that this technology makes available. *Indeed, according to Jenifer Simpson of the American Association of People with Disabilities ("AAPD"), there is a direct correlation between education, employment, and broadband use.* "Almost half of people with disabilities are unemployed," she observes, "and if you're not working, you're less likely to be using broadband."[130] Conversely, using broadband at home facilitates a number of employment opportunities that otherwise might remain unavailable to people with disabilities.

Understanding the various ways that broadband impacts the employment opportunities available to people with disabilities is challenging because of the many different types of disabilities and the "multiplicity of barriers" faced by this very heterogeneous population.[131] However, across the entire demographic, employment is lagging relative to people without disabilities. In 2007, the employment rate of people with disabilities aged 21 to 64 was about 37 percent, compared to nearly 80 percent for people without disabilities in the same age range.[132] Moreover, the employment rate varies greatly depending on the type of disability. For example, people with sensory disabilities have a higher rate of employment (46 percent) than people with physical disabilities (31 percent).[133] Within the very diverse demographic of physical disabilities, employment rates differ according to the scope and severity of the disability. For example, approximately 57 percent of persons with spinal cord injuries reported being employed *at the time* of their injury, but 10 years post-injury, only 32 percent of persons with paraplegia and 24 percent of those with tetraplegia were employed.[134] Overall, the unemployment rate of people with disabilities reached 16.2 percent in September 2009, compared to 9.2 percent for people without disabilities.[135]

Broadband enhances employment opportunities for people with disabilities in several ways. First, as previously discussed, broadband provides an array of non-traditional educational opportunities. Increased formal education, coupled with computer training,

allows people with disabilities to be competitive for a wider range of jobs. In addition, broadband also allows organizations like YAI/National Institute for People with Disabilities Network (www.yai.org) to leverage the ubiquity of the Internet to "reach out to an even broader audience in order to fulfill [its] long time mission to build brighter futures for individuals with disabilities and their families" (see Case Study 4).[136]

CASE STUDY 4
YAI/National Institute for People with Disabilities Network

Founded in 1957, YAI provides career services, education, and training to people with a range of developmental and learning disabilities. YAI uses its Website to "further the impact of education and training by reaching individuals and communities who would not otherwise have access to this network of information that can make a difference in their lives." Increasingly, it bases its offerings and training around broadband Internet access, which facilitates faster, more consistent access to job postings and other employment opportunities.

YAI also utilizes the Internet to enhance its "greatest resource" – its employees. Via its Dream Careers site (www.yaidreamcareers.org), YAI has expanded its recruiting footprint in order to ensure that it is able to "promote understanding and respect for both developmentally and learning disabled individuals and all those who work with them."

Source: www.yai.org

Second, broadband provides access to a universe of job postings, career sites, and other employment resources that might otherwise be inaccessible to many. For example, in 2008, Disaboom, an online community for people with disabilities, partnered with online career resource JobCentral to launch Career Center 2.0.[137] This service provides "employment opportunities, resources, and services to the Disaboom community and corporations. Through this partnership, Disaboom will fully integrate JobCentral's advanced search engine technology into the Disaboom Career Center," allowing "registered Disaboom members to search and apply directly for employment opportunities from a database of currently over 500,000 open positions."[138] The federal government (www.usajobs.gov/ei11.asp) and many state governments also use the Internet to provide information on job openings for people with disabilities. In addition, broadband provides a text-based medium for the fast and convenient delivery of time-sensitive job information, which is essential to people with a variety of disabilities, like hearing impairments (see Case Study 5).

CASE STUDY 5
The Impact of Broadband on Garrison, who is Hearing Impaired

Garrison, 79, who lives in New York City, has a hearing impairment as a result of his service during the Korean War. Without his hearing aid, he finds it very difficult to participate in a conversation, both in person and over the phone. As an actor who depends on frequent interactions with his agent regarding casting calls and other business matters, the ability to communicate is essential. In addition, as one of the caregivers for his 102-year old mother, who still lives at home in West Virginia, Garrison must stay in constant contact with the nurses and other aides who provide her with essential medical services. For Garrison, the text-based and instantaneous nature of the Internet, facilitated by a fast broadband connection, has been life-changing. "It is extraordinary," says Garrison. "Broadband is my life and it has opened up a whole new world."

Curiosity first pushed Garrison to take a basic computer and Internet training course at his local library. "It was a good introduction but it was very basic. There is only so much you can learn in two half-hour classes." However, he soon noticed that a more intensive training program was being offered at his local SAGE center. Older Adults Technology Services (OATS) was offering free 10-week classes that provided seniors with comprehensive hands-on training. "OATS changed my life," says Garrison, who now volunteers at OATS and blogs at Senior Planet, which is affiliated with OATS (Garrison's blog—Everyday Strolls—can be found at www.seniorplanet.org/blogs/everydaystrolls).

Broadband provides Garrison with convenient access to casting calls and other items passed along to him by his agent. He is able to stay in more regular contact with his mother's nurses, and his blog has empowered him to opine on topics of personal and professional interest. In general, broadband "keeps me active." Having grown up in rural West Virginia, Garrison's newfound technological interests and prowess still amazes him. "I've gone from a horse and wagon on a farm to the Internet. It has been a remarkable journey."

Third, broadband increases access to a growing number of telecommuting jobs, which is an important option for some people with disabilities. Approximately 42 percent of employers currently offer employees a telework option, up from 30 percent in 2007.[139] Gartner, a consultancy, estimates that 12 million people telecommute more than eight hours per week, double the amount in 2000.[140] By the end of 2009, Gartner expects this number to reach 14 million.[141] These types of positions are especially attractive to workers with physical disabilities or those who are homebound. Telecommuting has the potential to enable dramatic cost-savings for employers, who are able to cut overhead costs; employees, who are able to work from home and save money and time by not having to commute; and consumers, who benefit from lower prices. Indeed, one

recent study found that a significant increase in telecommuting could lead to $228 billion in welfare-gains for consumers and $260 billion for employers.[142]

Fourth, and perhaps most importantly, broadband encourages entrepreneurship among people with disabilities. In general, people with disabilities have traditionally demonstrated a strong desire to work for themselves, and, over the last several decades, evidence suggests that people with disabilities "have a higher rate of self-employment and small business experience than people without disabilities."[143] As such, broadband is a boon to people with disabilities because it lowers the costs associated with starting and running a small business. Moreover, "VoIP, assistive technology devices, video services, and other [broadband-enabled technologies] expand employment opportunities and help people with disabilities be more productive."[144] To this end, the federal government provides a number of resources via its START UP/USA project for people with disabilities who wish to become self-employed (www.start-up-usa.biz), including resources for developing a business plan and access to case studies that provide best practices for launching a business. Anecdotal evidence suggests that many people with disabilities are using their broadband connections to run their own businesses from home (see Snapshot 6).

SNAPSHOT 6
Broadband, Employment & Small Business Creation

- Louis, who is deaf and lives in Florida, uses her broadband connection to run her financial planning business. According to her, "broadband is the reason for my business's success and growth." Among other things, Louis uses her broadband connection to communicate with clients and to manage their investments.
- Helen, of Logan, Utah, is self-employed as a consultant thanks to broadband. She is homebound due to a physical disability and uses her connection to communicate with customers and engage in research.
- CM is deaf and uses broadband to run a Web design business (www.spiralshell.com). His connection allows him to work from home everyday in Connecticut.
- Rick, of Northridge, California, is blind and uses his broadband to work from home everyday. According to him, "Without it, I would be unemployed." Broadband allows Rick to conduct all of his business and professional communications (e.g., marketing, sales, networking) from his home computer.

3.2.1.3 *E-Commerce*

E-commerce is an increasingly popular and affordable shopping option for all users. According to the most recent data available, even though e-commerce has slowed over the past few quarters, e-commerce sales as a percentage of total sales continue to increase.[145] Moreover, Pew has found that two-thirds of American Internet users had purchased something online in 2008.[146] However, participation appears to be linked to the type of Internet connection utilized by the user. Pew has observed that "people with broadband at home are more likely than dial-up users to have bought something online, by a 74 percent to 59 percent margin."[147]

Broadband greatly enhances the e-commerce experience by enabling users to make convenient purchases from home. Cost-savings often flow from e-commerce, due to the ability to comparison shop for a wide range of items. Part of these savings could offset the cost of subscribing to broadband. Moreover, for those with disabilities that make traveling to a store difficult or impossible, broadband-enabled e-commerce provides a wealth of home-delivery options for prescription drugs, groceries, and other essentials. *However, concerns persist regarding the accessibility of many e-commerce Websites. Many of these concerns vary depending on the type of disability*. For example, people who are blind often rely on screen readers to access and use a website. Some retail sites remain inaccessible. Even though federal and state laws require that retailers make accommodations for people with disabilities, these types of modifications are still being made in cyberspace.[148] However, as a result of state and federal law, most government sites are accessible to people with disabilities.

Structuring education, awareness and training campaigns around the potential cost-savings associated with shopping online could spur additional demand and use of broadband among those people with disabilities who remain offline by providing a tangible example of the utility of a broadband connection for them. Such efforts could also include information regarding the increasing accessibility of many e-commerce Websites, which could allay fears and correct misconceptions regarding the general accessibility of the Web and of broadband.

3.2.2 Potential Economy-Wide Gains

Broadband enables a wide variety of individual economic gains. As discussed above, a number of studies have found direct correlations between broadband use, job creation, and economic expansion. In the aggregate, the individual economic gains by people with disabilities facilitated by broadband could have a large impact on the U.S. economy.

As people with disabilities use their broadband connections to complete more schooling and acquire additional training, to telecommute or start their own businesses, and to

shop online, U.S. gross domestic product will likely rise. *For example, a 2005 study estimated that a one percentage point increase in the employment rate of people with disabilities would result in an increase of over $11 billion in total economic output between 2010 and 2030.*[149]

Realizing potential economic gains is essential to the entire population of people with disabilities and to the nation at large. People with disabilities, as a group, typically earn less than people without disabilities. Moreover, people with disabilities are much more likely to live in poverty than people without a disability.[150] One recent study observed that "[p]overty rates increase with the period of time that individuals experience work disability or limitation."[151] Broadband can and should be used to close this gap by enhancing educational opportunities and enabling an array of employment opportunities.

3.3 The Health-Related Impacts of Broadband on People with Disabilities

From the wheelchair to in-home monitoring devices, technology has long been used to enhance the lives of people with disabilities. As discussed above, broadband Internet access has had a similarly profound impact on people with disabilities, facilitating a number of social and economic gains. This section discusses the health-related impacts of broadband generally and analyzes how people with disabilities are using their connections to access robust health information online, receive more individualized medical treatments and services in their homes, and save money on a variety of healthcare items.

3.3.1 Broadband Enhances Access to Online Health Information

Accessing relevant and timely information online empowers all users. *For people with disabilities, accessing information related to their individual healthcare needs is particularly empowering because it increases a sense of independence and self-determination*.[152] Broadband significantly enhances the range of health information available to people with disabilities. While many text-based health Websites are accessible via slower dial-up connections, broadband connections facilitate faster delivery of more robust, multimedia content. For example, a simple search of the term "disability" on You Tube produces 32,000 videos, which range from personal videos by people with disabilities to snippets of seminars on providing disability-related health services.

In general, people with disabilities are more likely to search for health-related information while online than people without disabilities. Indeed, one 2006 study found that 57 percent of people with disabilities who regularly go online looked for health information, compared to only 48 percent of people without disabilities.[153] A study by

Pew in 2007 estimated these numbers to be 86 percent and 79 percent.[154] These numbers also vary according to the type of disability and demographic group. For example, it has been found that approximately 95 percent of people with psychiatric disabilities who use the Internet search for information on mental health treatments and medications.[155] In contrast, while over half of persons over the age of 75 report at least one disability,[156] only 28 percent of those over age 70 go online.[157]

Increasing broadband adoption among all people with disabilities, especially those over age 70, is essential in order to ensure that they have access to a growing universe of valuable health information. Indeed, a 2005 report issued by the Kaiser Family Foundation found that seniors have the most to gain from online health and medical resources because seniors "face a greater number of health conditions and use prescription drugs and healthcare services at a far higher rate than younger adults."[158] Overall, by gaining timely and reliable information regarding individual conditions, many people with disabilities or family members of people with disabilities are able to self-diagnose, self-treat in certain situations, and, increasingly, communicate more effectively with their healthcare providers.[159]

3.3.2 Broadband Enables an Array of Telemedicine Tools That Provide Remote Care to People with Disabilities

In addition to facilitating access to vital health information, broadband is also spurring the deployment and adoption of advanced telemedicine tools and services, which provide sophisticated medical services across long distances.

Telemedicine is a broad term that refers to "the use of electronic communications and health information technology to provide clinical services" for remote patients.[160] Examples include teleconsultations and telesurgery. Telemedicine also includes telehealth applications, which encompass a "broader application…of electronic communications and information technologies" that is used to "support healthcare services."[161] Examples include videoconferencing, transmission of images, and remote monitoring of a patient's vital signs.[162] Broadband-enabled telemedicine has the ability to extend effective medical care to remote parts of the country, provide patients with a variety of in-home services, and save billions of dollars in healthcare costs each year.[163]

In general, broadband-enabled telemedicine has a number of beneficial impacts on people with disabilities. First, telemedicine helps level the playing field between urban and rural healthcare facilities and ensures more uniform and enhanced healthcare for all Americans.[164] Broadband improves the quality of care and the quality of life of those not located near advanced facilities. These services are especially critical to the large number of people with disabilities who live in rural parts of the country, as the number

of doctors living in these areas is significantly less than the number of doctors in urban areas.[165]

Second, telemedicine reduces or eliminates travel time for people with disabilities. Via services like broadband-enabled videoconferencing, people with disabilities who are unable to travel long distances or who are homebound can consult with their doctors remotely. A number of innovative programs have been established to provide these types of local healthcare opportunities for people with disabilities by leveraging high-speed broadband networks. For example, the Flatlands Disability Network ("FDN") (www.ndcpd.org/fdn) is a "dedicated high speed data network linking the disability service providers, consumer groups, and disability advocacy groups of North Dakota."[166] FDN provides a "mechanism to provide training, therapy services, supervision, and coordination in the delivery of services to people with disabilities. Specific services [include] speech/language therapy, wellness training, nutrition counseling, and behavioral health monitoring."[167]

Third, telemedicine brings effective healthcare into the home and allows people with a variety of disabilities to easily access critical medical services. One such service that relies on broadband is remote patient monitoring. This encompasses a wide range of tools and services, including the use of sensors to record movements (e.g., ensuring that older disabled seniors get out of bed each day[168]) and the use of wireless devices to monitor vital signs and symptoms. While many of these systems are still in nascent stages of development, a number of organizations are experimenting with them to assess their value to people with disabilities. For example, in 2007, YAI/National Institute for People with Disabilities received a grant to develop a "telehealth program providing nurses, caregivers and healthcare professionals with accurate, easy-to-evaluate data on consumers' medical conditions via a 24-hour, Web-based system."[169] This program "place[s] computerized health monitoring systems in group residences and individual apartments, where individuals with autism, mental retardation, Down syndrome and other developmental disabilities live. These systems measure blood pressure and glucose levels, weight, pulse, and respiration. A camera can photograph a wound, infection, or other condition."[170] Feedback is in real-time and accessible remotely by nurses, who "can make an assessment and provide a recommendation for treatment based on the data."[171] In the near future, technologies like telepresence will dramatically enhance these types of in-home services.

Remote monitoring systems are not a panacea for people with disabilities. Indeed, the value of such systems varies greatly depending on the type of disability.[172] But, in general, these systems signal a shift in the way that healthcare is being provided and represent an important first step toward more individualized, convenient healthcare and medical treatment. Moreover, remote monitoring systems and other broadband-enabled telemedicine services will lead to vast cost-savings. Indeed, one study has estimated that "a full embrace of remote monitoring alone could reduce healthcare

expenditures by a net of $197 billion (in constant 2008 dollars) over the next 25 years with the adoption of policies that reduce barriers and accelerate the use of remote monitoring technologies."[173]

3.3.3 Broadband Leads to Healthcare Cost-Savings

According to one estimate, broadband-enabled health and medical services can save some $927 billion in healthcare costs for seniors and people with disabilities.[174] A large percentage of these cost-savings will be realized via the development and deployment of broadband-enabled telemedicine services, specifically the in-home health monitoring technologies and other remote care services discussed in the previous section.

These cost-savings encompass a variety of items. For example, various broadband services can reduce or eliminate costly travel for many people with disabilities. In addition, broadband-enabled telemedicine services can help detect the development of a disability. To this end, in-home monitoring systems are being tested to detect the early onset of Alzheimer's, a cognitive disability that affects millions of older adults.[175] Costs associated with treating these types of diseases total "more than $148 billion annually in Medicaid and Medicare services and in indirect costs to businesses that employ [Alzheimer's] and dementia caregivers."[176] Yet it is estimated that the early "interventions that could delay the onset of Alzheimer's disease by as little as one year would reduce prevalence of the disease by 12 million fewer cases in 2050," which could lead to dramatic cost savings for this disease alone.[177]

Any individual health cost-savings realized by people with disabilities who use broadband-enabled services help offset the cost of monthly Internet access or the price of a required assistive technology. In the aggregate, these cost-savings could provide some relief to an otherwise overextended system of public health entitlements.[178] However, in order for these cost-savings to be realized, people with disabilities must adopt and meaningfully use broadband and broadband-based services and applications. Thus, as described below, it is essential that efforts be made to boost the broadband adoption rate among people with disabilities in order to ensure that this segment of the population is able to fully reap the many benefits of this vital technology (see Section 5).

3.4 Conclusions

Broadband provides people with disabilities the opportunity to use an array of technologies, services, and applications that enable real social, economic, and health-related gains. In particular, broadband:

- Facilitates convenient and affordable communications between people with disabilities and their family and friends.
- Encourages active participation in community affairs and provides a number of options for socializing and making friends.
- Empowers people with disabilities to voice their opinions and advocate for issues of personal importance via blogs, chat rooms, list-serves, and other online forums.
- Increases the number and type of educational opportunities available to people with disabilities and provides more individualized learning vehicles.
- Enhances employment opportunities by enabling telecommuting and encourages entrepreneurship by providing people with a cost-effective medium for launching a business.
- Greatly improves and diversifies the healthcare options available to people with disabilities regardless of geographic location.
- Provides healthcare cost-savings via a variety of broadband-enabled telemedicine services.

4. THE IMPACT OF GREATER BROADBAND AVAILABILITY & TECHNOLOGICAL ADVANCES ON PEOPLE WITH DISABILITIES

Greater availability of broadband connections, continued innovation at the network level, and further development of robust and accessible online content over the next several years will have a number of impacts on people with disabilities.

4.1 Innovation at the Network Level

The wide availability of advanced broadband network infrastructure is essential to enable the welfare gains for people with disabilities outlined above and to the continued development of useful online content. As a result, innovations at the network level in the near-term are crucial to the long-term success of the broadband market generally and people with disabilities specifically.

Network owners are investing billions of dollars each year in order to provide users with enhanced and more widely available broadband connections. The FCC reported that, by June 2008, 100 percent of the U.S. population lived in 100 percent of zip codes in which there is at least one broadband provider.[179] Moreover, network owners have outlined plans for even further expansion and innovation. Traditional telephone and cable companies, for example, continue to deploy fiber-optic systems that currently

provide users with very fast connections and that will eventually transmit data at speeds above 100 megabits per second. Recent fiber deployments by Verizon,[180] AT&T,[181] and Comcast,[182] among others, signal that an increasing number of consumers will have faster, more reliable and more versatile next-generation connections.

Similarly, wireless carriers are leveraging their portions of spectrum to deploy third-generation ("3G") and fourth-generation ("4G") networks. 3G networks are already widely available[183] and provide broadband connectivity to a sizeable portion of the population. Indeed, according to the FCC, nearly 60 million consumers receive broadband via mobile wireless systems.[184] In the near future, wireless carriers will begin deploying more robust 4G network infrastructure, which will provide faster and more reliable broadband connections.[185] In addition, more advanced wireless networks, like those based on the Long-Term Evolution ("LTE") standard, and continued competition in the marketplace will enhance mobile broadband, helping it become a vehicle for the type of innovation that will make universally designed products commonplace (see Section 4.2.2).[186] *Moreover, public-private endeavors, like the Flatlands Disability Network, will continue to build out and bolster proprietary broadband networks, connect more users, and enable the delivery of next-generation telemedicine services and applications to people with disabilities.*

Innovation at the network level and at its edge will continue to thrive under a regulatory framework that promotes competition, innovation, and experimentation. In view of the nation's current economic crisis and credit crunch, policies at every level of government should strive to promote investment in networks, in cutting-edge applications, and in job creation. The build-out, maintenance, and management of advanced networks, along with the development of useful and accessible content for people with disabilities, cost billions of dollars. Thus, legislative and regulatory policies should continue to encourage these advances (see Section 5).

4.2 The Outlook for Broadband & People with Disabilities: Assessing Near- and Long-Term Trends

Over the next several years, it is expected that an increasing number of people with disabilities will subscribe to broadband as awareness of the many benefits of the technology increases, as broadband prices continue to fall, and as assistive technologies needed to get online become more affordable. Increased usage of broadband by people with disabilities should, in turn, spur demand for more diverse and accessible content. As a result, a number of trends will become evident in both the near-term and long-term regarding broadband and people with disabilities.

4.2.1 Accessibility

Concerns regarding accessibility will increasingly be addressed by the efforts of industry stakeholders, collaborative working groups, and formal standard-setting bodies as more people with disabilities go online.

Recent technological innovations tend to produce more complexity as devices and services continue to converge around the Internet Protocol.[187] *Yet as the National Council on Disability ("NCD") has observed, these new technologies are also increasingly adaptive and flexible, making it "more practical and cost effective to build accessibility directly into these products."*[188] For example, YouTube, the most popular online video Website,[189] allows users to embed closed captioning in its videos.[190] YouTube also recently announced the adoption of a new technology that allows for the automatic translation of speech into captions.[191] These efforts enable people with hearing disabilities to view more accessible video content on this site.

New devices are spurring the development of innovations focused on affording accessibility for people with disabilities. For example, a number of next-generation screen-readers are being developed for use with touch screen devices.[192] To this end, Apple recently introduced a new version of its screen-reader – VoiceOver – for use on the iPhone 3GS[193] and has built additional accessibility tools into this phone for people with disabilities.[194] Several ATs have also been developed to enhance use of touch screen devices for people with disabilities. The Pogo Stylus, for example, can be used on the iPhone to navigate the touch screen. This device "simulates a human finger's capacitance and can be held like a pencil or attached to a mouth stick."[195]

Companies are also working individually and collaboratively to address accessibility issues. In addition to adopting and incorporating universal design standards into a growing range of products (see Section 4.2.2), many companies, including service providers and content developers, have announced a commitment to making more accessible products available and to making existing products compatible with accessibility solutions. For example, Verizon Wireless recently announced the availability of a text-to-speech assistive technology for some of its smartphones. The AT – TALKS – "converts displayed text into highly intelligible speech for…customers who are blind or visually impaired."[196] AT&T offers a similar tool – Mobile Speak – for disabled users.[197] Verizon Wireless and AT&T have both incorporated other such elements into many of its products to enhance accessibility. These include voice commands, large fonts, and the availability of alternative media formats.[198] Similarly, Microsoft has devised a strategy for building accessibility into a wide range of its products. In addition to making its products more accessible by building solutions directly into offerings like Windows, Microsoft designs its products to be interoperable with third-party ATs and other products that enhance accessibility.[199] Android, the mobile operating system developed by Google and used in a growing number of cell

phones (e.g., the T-Mobile G2),[200] enables a number of accessibility solutions, including a built-in screen reader and a text-to-speech engine that makes it possible to use most applications without looking at the screen, among others.[201]

Industry stakeholders have also begun to work with each other and with disability advocates on more wide-ranging accessibility solutions. Recently, these stakeholders joined together to form the Telecommunications and Electronic and Information Technology Advisory Committee ("TEITAC"), which provided the federal government's Access Board with recommendations for enhancing accessibility of new and existing technologies.[202] Other efforts include working groups organized by the Telecommunications Industry Alliance to address a variety of accessibility issues (e.g., hearing aid compatibility). These efforts signify a recognition on the part of innovators that more needs to be done to enhance accessibility and that a number of solutions and approaches are being considered.

Another important trend regarding accessibility is the clout of standard-setting bodies like the World Wide Web Consortium ("W3C"). The W3C is "an international consortium where Member organizations, a full-time staff, and the public work together to develop Web standards."[203] Even though membership is voluntary and its standards are nonbinding, W3C has published a number of influential recommendations that have been widely adopted.[204] In 2008, W3C published its Web Content Accessibility Guidelines 2.0 for so-called Web 2.0 content.[205] These guidelines seek to make advanced Web content more accessible to people with disabilities by ensuring that all content is perceivable, operable (e.g., users must be able to operate or navigate interfaces), understandable, and robust (i.e., "Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies").[206] Organizations like NCD support these types of standard-setting efforts and see the guidelines as but one part of a larger strategy for ensuring equal access to new technologies.[207]

These and other collaborative efforts are critical to ensuring a comprehensive approach to the complex and dynamic issue of accessibility. Bringing together industry stakeholders, advocates, and consumer representatives for discussions regarding an appropriate approach to accessibility will help to produce effective policies that spur the use of broadband and broadband-enabled technologies among people with disabilities.

4.2.2 Universal Design

Universal design "intends that products – especially software and computers – provide an interface that is suitable for all potential users, including persons with disabilities."[208] In other words, universal design provides product developers with a core set of design principles for ensuring that their products are accessible to as many

users as possible. The Center for Universal Design, based at North Carolina State University (www.design.ncsu.edu), has outlined a set of seven widely accepted universal design principles to ensure that "products and environments [are] usable by all people, to the greatest extent possible, without the need for adaptation or specialized design."[209] These include: equitable use (i.e., "the design is useful and marketable to people with diverse abilities"), flexibility in use (i.e., "The design accommodates a wide range of individual preferences and abilities"), simple and intuitive, perceptible information (i.e., "the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities"), tolerance for error, low physical effort, and size and space for approach and use.[210]

Many broadband service providers have adopted and implemented universal design principles. For example, nearly 20 years ago Verizon became the first telecommunication company to "embrace a set of Universal Design Principles," which are now "part of [its] product design process."[211] Similarly, AT&T "supports universal design to make new telecommunications products and services accessible to and usable by individuals with disabilities."[212] In the wireless realm, universal design principles are also increasingly prevalent. AT&T, in 2008, released its Universal Design methodology "in an effort to encourage application developers and handset manufacturers to consider the needs of seniors and customers with disabilities when creating new mobile products and services."[213]

However, for a person with a disability to fully realize the many benefits of his or her broadband connection, the content online must be usable and relevant and the devices he or she uses must be properly designed. To this end, a number of examples of products and services that include universal design principles are illustrative. For example, Nokia, one of the world's largest producers of wireless handsets, has committed itself to universal design by including a number of such elements into its phones.[214] Apple has long been a leader in universal design by incorporating a range of services in its products to make them widely accessible.[215] All of Apple's Mac computers come with proprietary screen-reader software—VoiceOver—already installed.[216] In addition, Apple has built accessibility and universal design solutions into many of its products, including the iPod Nano (e.g., spoken menus and large font) and iTunes software (e.g., works with screen-reader technologies and makes available captioned movies).[217] Universal design also applies to online content. The efforts of groups like W3C are helping to disseminate universally-accepted standards for Web content (see Section 4.2.1).

4.2.3 Private-Sector Innovation & Adaptation

Key innovations that enhance the broadband user experience of people with disabilities will flow from the private sector for two reasons. First, a number of existing laws require many private actors to make their services and products accessible to all users (see Section 5.6).[218] As a result, these laws provide a minimum standard of accessibility for products and services offered by private companies.

Second, technological convergence and the use of broadband as the primary vehicle for delivering services will drive competition and spur innovation as companies compete for consumers, especially as market saturation increases. Such market dynamics will raise the minimum standard of accessibility as companies seek to maximize its customer base by providing as individualized a user experience as possible. For example, a number of home appliance manufacturers are designing a special class of products that appeal to aging baby boomers (e.g., ovens with easier-to-open doors), a very large segment of the population.[219] These types of strategies will increasingly be used for people with disabilities in a number of contexts, particularly in-home services enabled by broadband.

In addition to enabling a range of remote educational and employment opportunities, broadband also facilitates the delivery of critical in-home health-related services that are of enormous value to people with disabilities. In the future, these services will supplement the diverse array of health monitoring technologies discussed above. For example, OfCom, the British regulator of communications, released a report predicting that innovators will leverage the ubiquity of mobile handsets and the decreasing costs of wireless sensors to produce services that can monitor personal information in real-time and send emergency alerts when a person gets into an accident or suffers a sudden health event.[220] These types of broadband-enabled services will eventually be integrated into the architecture of the homes of people with disabilities, creating a sort of "smart" house that facilitates living by increasing automated functions (e.g., doors that automatically open or disabling an appliance[221]). In combination with similar "smart" technologies, like wearable and implantable devices,[222] people with disabilities will greatly benefit from a universe of innovative broadband-enabled services provided via the private sector.

4.3 Conclusions

With millions of people with disabilities still offline, and with their collective spending power equivalent to upwards of $200 billion, companies that deliver and use broadband will increasingly target their offerings to this very large segment of the population.[223] Indeed, as was discussed in this section, a number of trends are evident regarding broadband and people with disabilities. In particular:

- Innovation at the network level, in both the near-term and long-term, is critical to enabling the wide array of welfare gains described in Section 3 and the many next-generation services described in this section.
- As more robust broadband becomes more widely available, price competition should continue and the number of people with disabilities who use this technology for Internet access will increase exponentially.[224]
- Continued convergence around the Internet Protocol and the continued use of broadband as the means of delivering IP-enabled services will foster competition among providers and developers and spur innovation, all to the benefit of people with disabilities.
- Innovation will increasingly incorporate notions of accessibility and universal design as service and content providers seek to provide individualized services to people with disabilities.
- In the long-term, broadband will be an essential conduit for delivering life-enhancing and lifesaving tools, services, and applications to people with disabilities.

5. GOVERNMENT, PEOPLE WITH DISABILITIES & BROADBAND: RECOMMENDATIONS FOR MEANINGFUL POLICYMAKING

According to a recent Pew report, one in five American adults reported "a disability, handicap, or chronic disease that keeps them from participating fully in work, school, housework, or other activities."[225] Broadband provides a unique, interactive, and reliable medium for ensuring that people with disabilities are able to fully participate in their communities and enjoy a number of personal, social, and economic welfare gains.

However, a number of obstacles remain, many of which can be overcome via meaningful and careful policymaking at each level of government. This section articulates a set of policy recommendations that seek to maximize broadband adoption and use among people with disabilities. These recommendations include:

1. Careful policymaking, targeted allocation of stimulus funds for network build-out, and the continued use of public-private partnerships are necessary to ensure continued deployment of advanced broadband networks to rural, under-served, and unserved parts of the country.

2. Stimulus funding should be used to support meaningful education, outreach and training efforts that seek to raise awareness and spur further adoption of broadband among people with disabilities.
3. Education and awareness efforts should continue to focus on promoting the relevance and utility of broadband to people with disabilities.
4. Policymakers and other stakeholders should pursue a multifaceted strategy for ensuring that the total cost of broadband access and use is affordable for people with disabilities.
5. Low computer ownership rates and lack of awareness regarding assistive technologies that enable broadband usage by people with disabilities should be addressed in ways similar to those that seek to stimulate demand for and adoption of broadband.
6. Stakeholders should consider an array of tools and approaches to address issues related to the accessibility of new technologies and services.
7. Going forward, policymakers should bolster the current pro-investment and pro-competition regulatory framework in order to encourage further innovations and deployments that benefit people with disabilities.

* * * * * *

5.1 RECOMMENDATION #1

Careful policymaking, targeted allocation of stimulus funds for network build-out, and the continued use of public-private partnerships are necessary to ensure continued deployment of advanced broadband networks to rural, under-served, and unserved parts of the country.

A recent report by the U.S. Department of Agriculture observes that the "growth in broadband availability since 2000 has been rapid."[226] According to the FCC, over 90 percent of zip codes have four or more broadband providers in them.[227] However, with regards to broadband availability, rural areas still lag behind urban areas. The FCC observes that areas with low population density have lower broadband availability and adoption rates relative to areas with higher population densities.[228] This dynamic is particularly important to people with disabilities, as this segment of the population is more likely than most other groups to live in rural areas. It is estimated that upwards of

20 percent of people with disabilities – roughly 11 million people – live in rural parts of the country,[229] compared with just 12 percent of the general population.[230]

A number of policy solutions have been implemented to spur further deployment to unserved areas, including a provision in the recently adopted economic stimulus package that provides over $7 billion in grant funding for broadband build out to unserved areas and for other efforts aimed at spurring adoption and use.[231] While these funds provide another mechanism for ensuring universally available broadband, it is crucial that these provisions be carefully implemented and supplemented by other efforts in order to be of value to all users and particularly people with disabilities.[232]

Market-driven efforts have succeeded in making broadband available to the vast majority of users across the United States. These efforts have been enhanced by public-private partnerships, which pair the creativity and innovative spirit of the private sector with public sector resources. A number of successful organizations have emerged and should be looked to as models during the implementation and disbursement of stimulus funds. For example, ConnectKentucky and Connected Nation have succeeded in spurring broadband availability and adoption in Kentucky, raising broadband adoption in the state by 83 percent between 2005 and 2007.[233] This model addresses broadband availability from both the supply side, by recommending deployment strategies that best suit particular localities and topographies, and the demand side, by providing training and otherwise increasing awareness of the technology. To date, it has been adopted in Minnesota, Ohio, Tennessee, and West Virginia.[234]

Stimulus funds allocated for broadband could be used to support these types of successful models. Funding could also be used to enhance the efforts of organizations that provide broadband access and training to people with disabilities (see Section 5.2). Moreover, programs that provide additional services of value to people with disabilities via broadband (e.g., telemedicine) would also benefit from additional funding, both via stimulus funding and other federally-administered grant programs (e.g., the FCC's Rural Health Care Pilot Program).[235] In sum, the agencies responsible for implementing the broadband provisions of the stimulus package should recognize the diverse needs of people with disabilities vis-à-vis broadband and ensure that appropriate measures are taken to support the wide array of programs and initiatives designed to spur availability, demand, adoption, and effective use of broadband among this segment of the population.

5.2 RECOMMENDATION #2

Stimulus funding should be used to support meaningful education, outreach and training efforts that seek to raise awareness and spur further adoption of broadband among people with disabilities.

Even though the number of people with disabilities who have adopted broadband continues to rise each year, a large portion of this segment remains offline. Price remains an obstacle for some users (see Section 5.4), while many continue to perceive the Internet, computers, and broadband as inaccessible (see Section 5.6). However, as discussed above, once online, people with disabilities are avid and capable users. Indeed, Section 3 highlighted the universe of individual and society-wide benefits enabled by broadband. In order to maximize these benefits for people with disabilities, support must be given to efforts that seek to raise awareness and spur adoption among this segment of the population.[236] A number of approaches that have proven effective in raising awareness and spurring adoption should be supported and extended.

First, a number of nonprofit organizations that specialize in providing broadband training and other educational services to people with disabilities have been launched over the last few years. This report has highlighted Georgia Tools for Life and YAI/National Institute for People with Disabilities Network as two successful models for promoting broadband as a necessary and essential tool for people with disabilities. These organizations are also unique because they are scalable, meaning that their models could be easily replicated in a variety of contexts across states. Indeed, Georgia Tools for Life already has four affiliates based in four cities across the state, each of which provides technical assistance to people with disabilities in a wide geographic area.[237] In addition to using broadband to provide services, nonprofits are increasingly leveraging the wide availability and affordability of the technology to expand their services and geographic footprint.

Second, disability groups are using the Internet and broadband-enabled applications to provide key resources to people with disabilities, along with their families, friends, and caretakers. For example, the Family Center on Technology & Disability ("FCTD") (www.fctd.info) uses broadband to coordinate among some 3,000 organizations that "share a concern for the families of children with disabilities."[238] In particular, FCTD disseminates a number of multimedia resource documents that provide families with information on how to incorporate assistive technologies into the care they give to their children, access to online discussions among experts and other parents, and, in the near future, Web-casts of interviews with leading doctors and advocates. Similarly, Lighthouse International (www.lighthouse.org) uses its Website to provide numerous

Web- and video-based educational opportunities regarding the spectrum of vision disabilities. These are available to professionals and other interested stakeholders.[239]

Another example is the American Foundation for the Blind's Senior Site, which focuses exclusively on the issue of senior vision loss.[240] This site provides a range of resources on vision loss to seniors, their families, and their caregivers. Most critically, the site is "designed to encourage aging adults with eye diseases to live independently and productively. The site connects seniors, family members, and caregivers to local services and showcases a wide range of assistive living products available to people with vision loss."[241]

Third, broadband provides advocacy groups with a means of expanding the reach of their efforts. The Alliance for Public Technology ("APT") (www.apt.org), a nonprofit group that seeks to "promote deployment of advanced telecommunications services in order to foster improved and more affordable healthcare for all citizens,"[242] has drawn attention to the life-enhancing impacts of broadband via its "Broadband Changed my Life Campaign!".[243] One of the recent winners of the competition was a woman with Amyotrophic Lateral Sclerosis, who described her Internet connection as an enabling technology that enhances her ability to stay in touch with family and friends and that provides a critical lifeline to essential services.[244]

Each of these efforts provides information regarding the value and accessibility of broadband for people with disabilities. FCTD and Georgia Tools for Life assuage fears and allay doubts regarding the value of assistive and computer technologies among people with disabilities. Groups like APT and Lighthouse International use broadband to disburse critical information on a variety of topics and to highlight the key role that the technology can and should play in the lives of people with disabilities.

Going forward, these types of programs should continue to focus on promoting the value and relevance of broadband to those people with disabilities who remain offline or who perceive broadband as inaccessible (see Section 5.4). In the near-term, these efforts can be immediately enhanced through the targeted allocation of stimulus funding that is earmarked for these purposes. Indeed, some $250 million is allocated to support innovative demand stimulation and training programs that enhance adoption and use.[245] Since the vast majority of programs that raise awareness of broadband and provide training and other services rely on public funding and private donations, the infusion of funds via the stimulus package would greatly bolster their efforts and encourage new programs to emerge, all to the benefit of people with disabilities.

5.3 RECOMMENDATION #3

Education and awareness efforts should continue to focus on promoting the relevance and utility of broadband to people with disabilities.

In addition to supporting the services and programs described in Section 5.2, it is essential that resources be dedicated to highlighting the utility and relevance of broadband for people with disabilities. As discussed above, a significant number of adults, including people with disabilities, remain offline and cite a lack of interest in getting online as the primary reason for not having adopted broadband.[246] There continues to be a gap between those people with disabilities who recognize and appreciate the life-enhancing benefits of broadband and those who either are unaware of the benefits or who are dissuaded by the perception of broadband technologies being inaccessible or prohibitively expensive.

In addition to information regarding accessibility (see Section 5.6) and the cost of broadband (see Section 5.4), educational efforts should focus on how broadband can be meaningfully incorporated into the lives of people with disabilities. In particular, education and awareness efforts should focus on including:

- How people with disabilities can use their broadband connections to stay in touch with family and friends, participate in their communities, work from home or start their own business, use telemedicine services, and otherwise live healthier, more independent lives;
- Information regarding accessibility and how assistive technologies, coupled with training, enable all people with disabilities to access the Internet;
- Why broadband is a valuable tool that can be used to realize a number of economic and health-related gains; and
- The availability of local, state, and national programs to provide training and other resources that help people with disabilities get online.

These guiding principles, in combination with each of the other policy recommendations in this Section, will ensure a comprehensive approach to spurring demand and adoption of broadband among people with disabilities.

5.4 RECOMMENDATION #4

Policymakers and other stakeholders should pursue a multifaceted strategy for ensuring that the total cost of broadband access and use is affordable for people with disabilities.

In addition to perceptions that the Internet is inaccessible, many people with disabilities are also unable to afford broadband access. This is partly due to a higher unemployment rate and lower median incomes of people with disabilities, relative to people without disabilities. However, the total cost of broadband access is often higher for those people with disabilities who require assistive technologies to use a computer or to effectively use their Internet connection. Concerns regarding computer ownership and accessibility will be addressed in Section 5.5. The price/value ratio can be addressed from several vantages (including, as addressed above, by educating consumers on the relevance and utility of broadband to their lives).

First, policymakers should continue to support and expand the pro-competition and pro-investment framework that has resulted in steadily decreasing broadband prices. Pew has found that broadband prices have generally decreased over the last several years.[247] Moreover, Pew reports that broadband adoption rates continue to increase across most economic demographics.[248] This data suggests that broadband is becoming more affordable for most consumers. However, the broadband adoption rate among people earning less than $20,000 per year, which includes a number of people with disabilities, continues to lag behind all other income groups.[249] Yet, in general, price is not the primary reason for lack of broadband at home. Indeed, a recent Consumer Electronics Association report found that one of the main reasons among consumers for not subscribing to broadband is the lack of a home computer, not lack of available broadband.[250] Overall, market-driven competition continues to bring down the price of a broadband connection. As a result, policymakers should continue to support these organic efforts.

Second, for those consumers, including people with disabilities, who are unable to afford broadband, policymakers should optimize existing subsidy programs in order to spur adoption. The primary vehicle for this is the Universal Service Fund ("USF"), particularly its Lifeline/Linkup program. Like the USF generally, Lifeline/Linkup is a program that helps ensure that low-income individuals have access to basic telephone service only.[251] However, a number of public and private sector stakeholders support extending Lifeline/Linkup funds to include broadband access. For example, the National Association of Regulatory Utility Commissioners, whose members include state regulatory commissioners from every state, recently adopted a resolution calling on the FCC to launch a three-year pilot program that would extend Lifeline/Linkup

funding for broadband Internet access services and enabling access devices.[252] Legislation was introduced in the U.S. House of Representatives in September 2009 that would devote a percentage of Lifeline funds for broadband purposes.[253] Many companies in the private sector, including most broadband service providers, support similar measures to expand the Lifeline/Linkup program.[254] As Congress and the FCC consider USF reform, each should look to enhance *existing* mechanisms for the continued adoption and use of broadband, while avoiding new direct or indirect taxation on service providers.

Third, in addition to careful USF reform, policymakers should consider extending tax credits or other similar tax benefits to people with disabilities who purchase broadband and any assistive technologies that might be necessary to effectively use that connection.[255] Tax credits could provide instant savings (e.g., via a lower priced item) or a deferred savings via a tax refund on the purchase of a computer (i.e., a key reason for not subscribing to broadband) or an AT. A number of states have offered these types of tax breaks to service providers in order to spur the deployment of broadband.[256] Extending these credits or other tax benefits to individuals with disabilities, however, could stimulate broadband adoption among those who would not be able to afford it otherwise. Moreover, making these types of tax incentives readily available to individual users, in addition to or in lieu of providers, would greatly enhance the value proposition being offered to people with disabilities regarding the utility of getting online via a broadband connection.

Fourth, policymakers should support, and stakeholders should expand, efforts to educate people with disabilities about the cost savings and income-generating opportunities enabled by broadband. As described in Section 3 and in Section 5.3, broadband has the potential to facilitate a diverse array of cost savings, ranging from more affordable healthcare solutions (e.g., better prices on prescription drugs) to discount shopping. In addition, broadband provides opportunities to telecommute or launch a small business from home, each of which generates income. The money earned or saved via broadband each month could be used to pay for the physical connection and any assistive technologies that might be needed. However, these efforts will only be successful if the additional educational efforts described throughout Section 5 are effective and amply supported.

5.5 RECOMMENDATION #5

Low computer ownership rates and lack of awareness regarding assistive technologies that enable broadband usage by people with disabilities should be addressed in ways similar to those that seek to stimulate demand for and adoption of broadband.

A little more than half of people with disabilities have a computer at home.[257] While this represents a significant increase from the 24 percent reported in 2000,[258] the number is still below the rate among people without disabilities. Moreover, computers are sometimes inaccessible to people with certain types of disabilities, requiring the identification and purchase of additional hardware (e.g., a certain type of mouse or keyboard) and software (e.g., a screen-reader program). People with disabilities who are unfamiliar with these types of assistive technologies might be overwhelmed by the vast number of products available. In addition, price and a general skepticism of computers and the Internet may blunt the desire to fully explore broadband connectivity (see Section 5.4). Policymakers have a number of tools available to them to spur computer ownership and the use of assistive technologies among people with disabilities.

An array of nonprofits has successfully boosted computer ownership and overall technological awareness among the lower-income demographic, senior citizens, and other underserved communities. For example, computer recycling programs like Per Scholas (www.perscholas.org), which operates in New York City and Miami,[259] are effective in refurbishing used computers and making them available to seniors and low-income consumers at discounted prices. In addition, Per Scholas has teamed with Older Adults Technology Services (www.oatsny.org) in New York City to provide seniors with a free computer, installation, and a lifetime warranty upon completion of a training class on how to use the computer and the Internet.[260] One Economy (www.one-economy.com) has also been effective in spurring computer ownership and broadband use among lower-income individuals by providing training and information regarding the personal and economic gains enabled by the technology. It has developed programs like the Digital Inclusion initiative and trained volunteers via its Digital Connectors program to connect the unconnected.[261] These and other models could be adapted and applied to people with disabilities by, among other things, applying for funding via the stimulus package (see Section 5.2).

Funding is also available in the broadband stimulus package for the expansion and modernization of computer centers across the country. Indeed, the $200 million in available funding will help to increase the supply of computers in community centers, libraries, community colleges, and other public places.[262] As previously discussed, increased computer access, coupled with effective training, has succeeded in spurring broadband adoption and use.

With regard to assistive technologies, awareness of the availability of these tools is crucial. As recently as 2001, approximately 60 percent of people with disabilities reported having received little or no information on how to obtain or use assistive technology services.[263] However, over the past several years, a number of organizations have succeeded in raising awareness and adoption. Closing the Gap (www.closingthegap.com), via its online portal and print publication, "highlights

hardware and software products appropriate for people with [disabilities], and explains how this technology is being implemented in education, rehabilitation, and vocational settings around the world."[264] Another model is one developed by the Northern Virginia Research Center ("NVRC") (www.nvrc.org), which provides training and information regarding a wide array of technologies to people with hearing disabilities. In particular, NVRC uses its Assistive Technology Demonstration Center to "demonstrate equipment that will improve communication and accessibility, and assist those who want to know how to work more effectively with deaf or hard of hearing staff, coworkers, visitors, clients, students, and colleagues."[265] Additional organizations, like Assistive Technologies (www.assistivetechnologies.com), use the Internet, print publications, and other media to raise awareness and assuage any fears or doubts of using these technologies among people with disabilities. These efforts, coupled with tax credits that drive the cost of these devices down, could greatly spur the use of ATs generally and the use of computer-related ATs specifically.

These types of grassroots efforts have been effective in spurring computer ownership and the use of assistive technologies among people with disabilities and should continue to be supported by the public sector. Stimulus funding is available to support the deployment of additional computers to public institutions like libraries and to enhance the efforts of organizations that train people with disabilities to effectively use a broadband connection. Tax credits and other novel approaches are available to help bring down the total cost of broadband use. In sum, these various efforts can be effective in spurring demand and adoption of broadband amongst people with disabilities.

5.6 RECOMMENDATION #6

Stakeholders should consider an array of tools and approaches to address issues related to the accessibility of new technologies and services.

In the advanced communications arena, technological innovation and market forces generally move faster than policymaking. As a result, policies intended to address a particular issue oftentimes become outdated or redundant soon after they are implemented. In the context of the broadband market, the pace of innovation is swift and has proven to be responsive to changes in consumer preferences and tastes due to high levels of competition in many segments of the market. Intermodal competition and technological convergence create incentives for providers to carefully tailor their offerings and to address consumer complaints more effectively than their competitors.[266]

In the disabilities context, a growing number of network owners, hardware developers, and content providers are responding to demand for more accessible technologies by adopting universal design principles and pledging to make available more accessible products (see Section 4.2). However, technological innovation continues to be challenged by existing legal frameworks. Indeed, some existing policies do not provide disabled users with ample incentives to adopt and use new technologies since these innovations may be beyond the scope of established laws. An example is instructive.

The iPhone supports text-to-speech applications that are increasingly popular among people with speech impairments. In particular, many find the iPhone to be much more portable and affordable and less ponderous than many existing standalone text-to-speech devices.[267] However, despite this preference among disabled users, insurance companies and plans (e.g., Medicare) do not cover these devices. The reason cited for this lack of coverage is that the iPhone is not a medical device and can be used for a number of non-medical purposes.[268] As a result, many people with speech impairments have to "spend 10 to 20 times as much for dedicated, proprietary [text-to-speech] devices that can do far less."[269]

Insurance laws have generally been slow to recognize the impact of new technologies like broadband and smartphones on healthcare. Many agree that these laws need to be updated to reimburse for the use of efficient and effective new technologies.[270] With regard to accessibility laws, however, there is much disagreement over whether similar legislative change is required given the rapid pace of innovation and the market dynamics that are pushing innovators to build accessibility into new products.

Some have called for the adoption of formal legislation to accelerate the development of accessible products and services. To this end, a bill was introduced in Congress in 2009 that seeks to update a variety of laws related to accessibility.[271] Others have called for a more markets-based approach that allows service providers to address accessibility issues on their own. For example, in its report to the Access Board, TEITAC observed that "The pace of technological advancement in [information and communication technology] is rapid and the level of innovation is high. In this environment, a static standard consisting of design specification and fixed checklists would tend to stifle innovation and to delay the availability of technology advancements to people with disabilities."[272] In light of the uncertainty regarding the need for legislative change, policymakers should adhere to the following set of foundational principles as they consider new legislation. These principles outline a multifaceted strategy for enhancing accessibility and ensuring that all users are able to use new technologies and services. In particular, this approach calls on policymakers to:

Enforce existing accessibility laws. There is currently a wide variety of federal and state laws that require communications companies to make their services and content accessible. For example, Section 255 of the Communications Act requires

"telecommunications providers and manufacturers to make their services and equipment accessible to and usable by people with disabilities if readily achievable."[273] Further, the 1996 Telecommunications Act called on the FCC to develop a number of accessibility policies. For example, Section 710 of the Communications Act charged the FCC with implementing policies to "ensure reasonable access to telephone service by persons with impaired hearing."[274] Over the past several years, as wireless telephony has emerged as a substitute for traditional telephone service, the FCC has revisited its rules regarding hearing aid compatibility and "set benchmark dates by which digital wireless handset manufacturers and service providers had to gradually increase the number of hearing aid-compatible digital wireless phones available to consumers."[275] In response, the industry has developed and made available a number of phones that are interoperable with hearing aids.[276] The set of existing laws help provide an effective counterbalance against companies that do not provide adequately accessible products and services.

Undertake a careful cost-benefit analysis of new mandates. When analyzing the potential effectiveness of new legislation, policymakers should consider whether new mandates will increase compliance costs for providers and end-users. Moreover, policymakers should assess, to the extent possible, whether a new mandate would accelerate accessibility relative to the organic efforts of industry stakeholders. Given the increasing demand for broadband and broadband-enabled services among people with disabilities, network owners, equipment manufacturers, and content providers will likely continue to tailor their offerings to this large pool of potential customers.

Encourage continued cooperation and collaboration among industry stakeholders, disability advocates, and disabled users, and include these groups in the policymaking process. The National Council on Disability[277] has called on Congress to create a "national panel, with representatives drawn from government, industry, and the disability community, tasked with identifying and recommending specific measures to overcome barriers" for people with disabilities vis-à-vis new communications technologies.[278] Such a panel would be a natural extension of existing collaborations among industry stakeholders, disability advocates, and users (see Section 4.2.1), and would provide policymakers with a wealth of information regarding innovative approaches to enhancing accessibility. Collaboration and consultation will be essential to crafting an effective approach to these issues and one that is inclusive of the diverse interests of each stakeholder.

Support educational efforts to raise awareness of accessibility issues and solutions among people with disabilities. As previously discussed, many people with disabilities remain unaware of the availability of tools, ATs, and training programs that are designed to increase the accessibility of broadband-related technologies. As a result, education campaigns that are national in scale may help to raise awareness regarding the accessibility issues and solutions. A number of proposals have been offered,

including the creation of a national "clearinghouse of information on the availability of accessible products and services and accessibility solutions required under sections 255 [of the Communications Act]"[279] and a national "informational and educational program designed to inform the public about the availability of the clearinghouse, and the protections and remedies available under [current law]."[280] These and other campaigns could supplement the effective grassroots training programs described above.

Foster an environment that is conducive to continued experimentation and innovation. As previously discussed, a growing number of service providers are focused on offering more accessible products to consumers. An increase in the supply of such products should spur demand for related services, thus putting market pressure on providers to deliver more accessible products. In addition, policymakers should experiment with incentives to spur these efforts along. To this end, NCD has endorsed an approach for "economically rewarding service providers, software developers, and equipment manufacturers who incorporate accessibility into their products and services through adherence to principles of universal design and through support for interoperability of AT."[281]

Capitalize on the scope of accessibility solutions. While many service providers are building accessibility directly into new products, third-party hardware and software developers are playing a key role in enhancing accessibility. Assistive technologies like screen-readers and various navigation tools have made most computers and devices accessible to people with disabilities. Similarly, software plays a critical role in enhancing the accessibility of online content. For example, as previously discussed, YouTube currently allows its users to provide captions for its millions of videos.

In addition, many companies allow developers to create add-on applications that enhance the value, utility, and accessibility of products. Perhaps the most innovative example of this is the iPhone "App Store," which makes available third-party applications that cater to a variety of interests and needs. In the disability context, a range of applications have been developed for use by people with disabilities. For example, one application allows people who have difficulty communicating verbally – e.g., people with autism, Down syndrome, etc. – to download a "talker" application that lets them push buttons that voice basic phrases and requests.[282] Another cutting-edge application for people with disabilities is offered on cellphones that contain the Android operating system (e.g., T-Mobile's G1 and myTouch phones). The vOICe application uses the phone's camera to take snapshots of a blind user's surroundings and translates those images into text.[283] This application also includes a talking compass to help in navigation and a "talking locator that speaks street names and intersections in [the] immediate vicinity as determined from GPS satellites or local cell towers, for increased location awareness."[284]

The modularity of new devices and services allows for accessibility solutions to be added onto a range of products. Continued convergence around the Internet Protocol, which uses a broadband connection for the fast delivery of IP content, will facilitate the continued development of these types of innovative accessibility solutions. As such, policymakers should appreciate the value of these business models in providing alternative solutions for enhancing accessibility and should craft policies that foster an environment that is conducive to continued experimentation and risk-taking by service providers, content developers, and other innovators.

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In view of this multifaceted strategy and its demonstrated viability, it is incumbent upon policymakers to take a comprehensive approach to accessibility issues. In particular, policymakers should rely on the knowledge of innovators, industry stakeholders, disability advocates, and disabled users when crafting new policies. Policies that reflect the expertise of user groups and service providers, along with a general regulatory approach that provides innovators with continued freedom to experiment, are likely to be effective in enhancing accessibility.

5.7 RECOMMENDATION #7

Going forward, policymakers should bolster the current pro-investment and pro-competition regulatory framework in order to encourage further innovations and deployments that benefit people with disabilities.

In addition to policies that promote continued network deployment and further development of accessible innovations for people with disabilities, policymakers must also carefully develop policies that may directly or indirectly impact the various segments of the broadband market, including application development, network deployment, and adoption.

As described throughout this paper, people with disabilities are increasingly using broadband to access useful content, to stay in touch with family and friends, to participate in their communities, to work, to start businesses, and to stay healthy. As the number of people with disabilities who use broadband increases, so too will the number and type of broadband-enabled applications and services designed to enhance their lives. Demand for broadband and broadband-enabled services and applications will drive innovation at the edge of the network and within the network (see Section 4). As a result, policymakers should continue adhering to the pro-competition framework that has facilitated the development of a vibrant marketplace in order to assure continued innovation and investment across the sector.

The current regulatory framework includes a variety of policies that seek to provide all market participants with certainty that the government will not intervene in the market except under very limited circumstances. For example, the majority of the stimulus funds earmarked for broadband seeks to provide assistance for network deployment to those unserved parts of the country where a market failure has resulted in the unavailability of broadband.[285] In the wireless context, a national regulatory framework has provided competitors with ample certainty and latitude to innovate, deploy new networks, and provide consumers with a vibrant array of new handsets and services.[286] By classifying broadband as an "information service," the FCC has taken a decidedly minimalist regulatory approach to the growing variety of platforms that deliver broadband. There are some who advocate for a more assertive and intrusive regulatory approach,[287] but the successes of the current framework are clearly evident. Even though there are areas of the country that lack sufficient broadband access, and even though there are segments of the population (e.g., senior citizens, people with disabilities) that have low adoption rates relative to the general population, the organic efforts described throughout this paper support the notion that the current framework is sufficient to spur further innovation, investment, and competition. As such, policymakers must carefully balance the costs of reforming the current regulatory approach against the many benefits that continue to flow because of it.[288]

6. CONCLUSION

Broadband is impacting the lives of people with disabilities in a variety of ways. This interactive technology facilitates convenient and affordable communication, enhances employment opportunities, and provides life-enhancing health and medical information and services. Each of these benefits produces important welfare gains for people with disabilities and the general population. In the aggregate, these individual gains create the potential for the emergence of a large new class of active online users with ample spending power and the capacity to generate innovative ideas for new services, applications, and businesses. Indeed, a recent study by LECG estimates that the "addition of ten more broadband lines per 100 individuals across the U.S. (30 million new broadband lines) would raise U.S. GDP by over $110 billion."[289] Thus, it is essential that more people with disabilities subscribe to and use broadband in order to enable these economy-wide gains and to ensure that this segment of the population is able to enjoy the many other benefits facilitated by a broadband connection.

While this report has identified a number of obstacles that may slow adoption of broadband among people with disabilities – including lack of a home computer, affordability of broadband access and required ATs to make use of the connection, and negative perceptions associated with the accessibility and utility of broadband – those who are already online are avid and skillful users who have largely succeeded in using

their connections to enhance their lives. Going forward, it will be necessary to increase awareness of broadband by promoting the utility and value of a connection and to ensure that new users receive proper training on how to use this technology. To this end, one recent study that measured the positive impacts of broadband on economic development conditioned its estimates on "useful connectivity," which depends "not just on the number of people connected to a network or infrastructure, but how well those connected people utilize the network or infrastructure."[290]

Deployment and availability of broadband across the United States are only the first steps in realizing the vast economic and social potential of broadband. This report has offered policymakers a number of recommendations for the development and implementation of policies that will increase broadband adoption among people with disabilities and, more importantly, ensure that this segment is able to effectively use this technology. Focusing solely on network deployment raises the risk that an entire segment of users will be unable to participate fully in the global digital marketplace. As such, a more comprehensive approach to broadband, one that focuses on each aspect of use (availability, awareness, demand, adoption, etc.) and that is amply supported by an array of public and private sector efforts, is the only way to ensure that all users, particularly those people with disabilities who remain offline, appreciate the benefits of broadband and recognize the real value of incorporating it into their lives.

ENDNOTES

[1] *See generally* Charles M. Davidson & Michael J. Santorelli, *The Impact of Broadband on Senior Citizens*, U.S. Chamber of Commerce (Dec. 2008), *available at* http://www.uschamber.com/NR/rdonlyres/edp7qgdm6hxo6d7jm365ckwgynjgkihfk27obqr5csczpf3sgmd6vy2xut45vdljkdoz62wa7y55awtolulbkqr57ih/BroadbandandSeniors.pdf ("*Broadband & Seniors*").

[2] *See generally* Charles M. Davidson & Michael J. Santorelli, *The Impact of Broadband on Telemedicine*, U.S. Chamber of Commerce (April 2009), *available at* http://www.uschamber.com/NR/rdonlyres/ec5epgwk7vyanosellij36hyzht3udur5ceemxscfgfayigcrkyfuntto6adiwt7s2rw2g73epqddifjvykf7n6pj6h/BroadbandandTelemedicineApril2009.pdf ("*Broadband & Telemedicine*").

[3] For example, one recent study estimates that telecommuting could save consumers $228 billion and business $260 billion due to, among other things, a decrease in transaction costs and an increase in employee productivity. *See* Jesse Masai, *Widespread Telecommuting Could Save Consumers $228 billion, Businesses $260 Billion*, March 13, 2009, BroadbandCensus.com, *available at* http://broadbandcensus.com/blog/2009/03/widespread-telecommuting-could-save-consumers-228-billion-businesses-260-billion/ ("*Telecommuting Study*").

[4] 42 U.S.C. § 12102 (2) (a)–(c).

[5] The ADAAA reverses two Supreme Court cases – *Toyota Motor Manufacturing, Kentucky, Inc. v. Williams*, 534 U.S. 184 (2002) and *Sutton v. United Airlines, Inc.*, 527 U.S. 471 (1999) – and reflects an intent by Congress to broaden the Supreme Court's interpretation of the ADA and its definition of "disabled." S*ee* Renee Cullota, *ADA Amendments Act take effect January 1, 2009*, FRILO LLC, *available at* http://www.frilot.com/PDF/ADA%20Amendment%20Act2%20-%20Renee%20Culotta.pdf.

[6] ***See*** Suzanne Robitaille, *For the Disabled, More Power for Play*, TOP TECH NEWS, Dec. 26, 2008, *available at* http://www.toptechnews.com/story.xhtml?story_id=63727&loc=interstitialskip.

[7] *See, e.g., 2007 Disability Status Report – United States*, at p. 44, Rehabilitation Research and Training Center on Disability Demographics and Statistics, Cornell University, *available at* http://www.ilr.cornell.edu/edi/disabilitystatistics/StatusReports/2007-PDF/2007-StatusReport_US.pdf?CFID=7676403&CFTOKEN=73912389&jsessionid=f030ad698d2ccb1a9bcc34517277762361b1 ("The ACS definition of disability is based on three questions. (1) Does this person have any of the following long-lasting conditions: (a) blindness, deafness, or a severe vision or hearing impairment? [Sensory Disability]; (b) a condition that substantially limits one or more basic physical activities such as walking, climbing stairs, reaching, lifting, or carrying? [Physical Disability] (2) Because of a physical, mental, or emotional condition lasting six months or more, does this person have any difficulty in doing any of the following activities: (a) learning, remembering, or concentrating? [Mental Disability]; (b) dressing, bathing, or getting around inside the home? [Self-Care Disability] (3) Because of a physical, mental, or emotional condition lasting six months or more, does this person have any difficulty in doing any of the following activities [asked of persons ages 16 and older]: (a) going outside the home alone to shop or visit a doctor's office? [Go-Outside-Home Disability]; (b) working at a job or business? [Employment Disability]. A person is coded as having a disability if he or she or a proxy respondent answers affirmatively for one or more of these six categories.") ("*2007 Disability Status Report*").

[8] The exact number of Americans with disabilities is difficult to gauge, with current estimates varying from 40 million to 50 million. For example, the Rehabilitation Research and Training Center on Disability Demographics and Statistics at Cornell University, which employs a rather inclusive definition of "disability" reports that there are over 40 million people with disabilities in the U.S. over the age of 5. *2007 Disability Status Report.* The U.S. Census Bureau, however, reported in May 2007 that the number stood at over 50 million. *See* Press Release, *Americans with Disabilities: July 26*¸May29, 2007, U.S. Census

Bureau, *available at* http://www.census.gov/Press-Release/www/releases/archives/facts_for_features_special_editions/010102.html ("*2007 Census Stats*").

[9] *See High-Speed Services for Internet Access: Status as of June 30, 2008,* FCC Wireline Competition Bureau Report (July 2009), Table 1, *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-292191A1.pdf ("*FCC Broadband Stats - July 2009*").

[10] *See High-Speed Services for Internet Access: Status as of December 31, 2006,* FCC Wireline Competition Bureau Report (Oct. 2007), Table 10, *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-277784A1.pdf.

[11] *FCC Broadband Stats - July 2009* at Table 7.

[12] Pew reports that average broadband prices increased from 2008 to 2009, but have remained flat for the last five years. In addition, broadband prices tend to decrease in areas where there are multiple providers. *See* John Horrigan, *Home Broadband Adoption 2009*, Pew Internet & American Life Project, at p. 25-27 (June 2009), *available at* http://www.pewinternet.org/~/media//Files/Reports/2009/Home-Broadband-Adoption-2009.pdf ("*Home Broadband Adoption 2009*").

[13] *Broadband & Seniors*, section 2.

[14] *2007 Census Stats.*

[15] *See* Matthew Brault, *Disability Status and the Characteristics of People in Group Quarters: A Brief Analysis of Disability Prevalence Among the Civilian Noninstitutionalized and Total Populations in the American Community Survey*, U.S. Census Bureau, American Community Survey, 2006 Data (Feb. 2008), *available at* http://www.census.gov/hhes/www/disability/GQdisability.pdf ("*Census ACS 2008*").

[16] *Id.*

[17] *See* U.S. Dept. of Education: National Center for Education Statistics, Question: How many students with disabilities receive services? http://nces.ed.gov/fastfacts/display.asp?id=64.

[18] *2007 Disability Status Report* at p. 16.

[19] According to the ACS, a physical disability is defined as condition that substantially limits one or more basic physical activities such as walking, climbing stairs, reaching, lifting, or carrying." *Id.* at p. 44.

[20] According to the ACS, a sensory disability is defined as someone who experiences "blindness, deafness, or a severe vision or hearing impairment." *Id.*

[21] *Id.* at p. 7.

[22] *See* National Spinal Cord Injury Statistical Center, University of Alabama, Facts and Figures at a Glance (April 2009), http://images.main.uab.edu/spinalcord/pdffiles/FactsApr09.pdf ("*Spinal Cord Stats*").

[23] *See* National Center for Health Statistics, Disabilities/Limitations, http://www.cdc.gov/nchs/FASTATS/disable.htm.

[24] *Id.*

[25] *See Special Report on Aging and Vision Loss*, American Foundation for the Blind ("AFB"), Sept. 2008, *available at* http://www.afb.org/Section.asp?SectionID=15&DocumentID=4423 ("vision loss" includes "individuals who reported that they have trouble seeing, even when wearing glasses or contact lenses, as well as to individuals who reported that they are blind or unable to see at all") ("*Special Report on Aging and Vision Loss*").

[26] *See* National Center for Health Statistics, National Health Interview Survey 2008, www.cdc.gov/nchs/nhis.htm (the AFB definition of "vision loss" is the equivalent of the term "vision trouble" used in the National Health Interview Surveys, *Special Report on Aging and Vision Loss*).

[27] *See Health Status and Routine Physical Activities in Adults by Hearing Status*, Center of Disease Control, *available at* http://www.cdc.gov/Features/dsHearing-Disparities.

[28] The Coleman Institute for Cognitive Disabilities at the University of Colorado defines a cognitive disability as "a substantial limitation in one's capacity to think, including conceptualizing, planning, and sequencing thoughts and actions, remembering, interpreting subtle social clues, and understanding numbers and symbols. Cognitive disabilities include intellectual disabilities and can also stem from brain injury, Alzheimer's disease and other dementias, severe and persistent mental illness, and, in some cases, stroke." *See* David Braddock et al., *Emerging Technologies and Cognitive Disabilities*, at p. 1, J. SPECIAL EDUCATION TECH., Vol. 19, No. 4 (Fall 2004), *available at* http://www.colemaninstitute.org/article_braddock_1.pdf ("*Emerging Technologies & Cognitive Disabilities*").

[29] *Id.*

[30] Percentages are derived from using 2004 U.S. Census Bureau Data. *See* National Institute of Mental Health Website, *available at* http://www.nimh.nih.gov/health/statistics/index.shtml.

[31] *See* Alzheimer's Association, Facts & Figures, http://www.alz.org/alzheimers_disease_facts_figures.asp.

[32] *See* CerebralPalsy.org, The State of Cerebral Palsy – Facts and Figures, http://www.cerebralpalsy.org/what-is-cerebral-palsy/statistics (citing data from United Cerebral Palsy).

[33] *See* Community Partnerships for Adult Learning, *How Serious *are* Learning Disabilities? – How bad can it be?* Basics of Adult Literacy Eduction Module, *available at* http://www.c-pal.net/course/module1/pdf/LDstats.pdf (*citing* statistics from the National Institute for Literacy, http://www.nifl.gov/).

[34] *See* National Information Center for Children and Youth with Disabilities, *available at* http://www.nichcy.org/pubs/factshe/fs7txt.htm, *citing* 23rd Annual Report to Congress, Department of Education (2001).

[35] *See Criteria for Determining Disability in Speech-Language Disorders*, Agency for Healthcare Research and Quality ("AHRQ") Summary, Evidence Report/Technology Assessment, No. 52, AHRQ Publication No. 02-E009 (Jan. 2002), *available at* http://www.ahrq.gov/clinic/epcsums/spdissum.htm.

[36] *See* Autism Society of America, About Autism, http://www.autism-society.org/site/PageServer?pagename=about_home.

[37] *See* Press Release, *Oldest Baby Boomers Turn 60*, U.S. Census Bureau (rel. Jan. 3, 2006), *available at* http://www.census.gov/Press-Release/www/releases/archives/facts_for_features_special_editions/006105.html.

[38] *See* Jeffrey S. Passel and D'Vera Cohn, *U.S. Population Projections: 2005-2050*, at p. 20, Pew Research Center (Feb. 2008), *available at* http://pewhispanic.org/files/reports/85.pdf.

[39] According to the 2007 Disability Status Report issued by Cornell University's Rehabilitation Research and Training Center on Disability Demographics and Statistics, the total number of people over 65 with a disability is 14,730,000 while the total number of people over age 5 with disabilities is 41,306,000. *2007 Disability Status Report*.

[40] *See* Hearing Loss Association of America, Hearing Loss Stats for Adults, http://www.hearingloss.org/learn/factsheets.asp.

[41] Technology Related Assistance for Individuals with Disabilities Act of 1998, Pub. L. 100-407.

[42] *See generally* Frank G. Bowe, *Broadband and Americans with Disabilities*, Report of the National Association of the Deaf and the New Millennium Research Council (2002), *available at* http://www.newmillenniumresearch.org/archive/disability.pdf ("*Broadband & Disabilities - 2002*"); *see also* Albert M. Cook, *Future Directions in Assistive Technologies* in Assistive Technology: Matching Device and Consumer for Successful Rehabilitation 271-271 (Marcia J. Scherer, ed.) (2002) (discussing the role and impact of computers and the Internet on assistive technologies generally) ("*Future Assistive Technologies*").

[43] It is estimated that companies will have invested upwards of $60 billion in communications infrastructure in 2008. *See Statement of Jonathan Banks to the Subcommittee on Telecommunications and the Internet, Committee on Energy and Commerce, U.S. House of Representatives*, p. 2, July 22, 2008, *available at* http://energycommerce.house.gov/images/stories/Documents/Hearings/PDF/Testimony/TI/110-ti-hrg.072208.Banks-testimony.pdf (quoting a projection made by the Yankee Group).

[44] *FCC Broadband Stats – July 2009* at Table 18 (ranking high-speed subscribership by population density).

[45] *See* Diana Spas, *Update on the Demography of Rural Disability, Part One: Rural and Urban*, April 2005, Research and Training Center on Disability in Rural Communities, The University of Montana Rural Institute, *available at* http://rtc.ruralinstitute.umt.edu/RuDis/RuDemography.htm.

[46] *See* USDA Economic Research Service, Briefing, *Rural Population and Migration: Trend 6 – Challenges From an Aging Population*, *available at* http://www.ers.usda.gov/Briefing/Population/Challenges.htm.

[47] The 2009 American Recovery and Reinvestment Act "("ARRA") creates a new Broadband Technology Opportunities Program within the National Telecommunications and Information Administration ("NTIA") of the Department of Commerce. The new grant program will distribute $4.7 billion to fund the deployment of broadband infrastructure in unserved and underseved areas in the country, and to help facilitate broadband use and adoption. An additional $2.5 billion in loans and grants will be administered by the Rural Utilities Service." *See Bill Summary: Energy and Commerce Provisions on Healthcare, Broadband and Energy,* U.S. House of Representatives Committee on Commerce, Feb. 12, 2009, *available at* http://energycommerce.house.gov/Press_111/20090212/economiceecoverysummary.pdf ("*ARRA Summary*").

[48] *See* Michael J. Copps, *Bringing Broadband to Rural America: Report on a Rural Broadband Strategy*, FCC (rel. May 22, 2009), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-291012A1.pdf.

[49] The amount of unserved areas continues to decrease each year. According to the National Telecommunications Cooperative Association's 2008 Annual Broadband/Internet Availability Survey Report, 91 percent of customers in its 2008 Survey area had access to broadband, *NTCA 2008 Broadband/Internet Availability Survey Report*, p. 8, *available at* http://www.ntca.org/images/stories/Documents/Advocacy/SurveyReports/2008ntcabroadbandsurveyreport.pdf.

[50] *See NTCA 2007 Broadband/Internet Availability Survey Report*, p. 7, *available at* http://www.ntca.org/images/stories/Documents/Advocacy/SurveyReports/2007ntcabroadbandsurveyreport.pdf.

[51] *See* David P. McLure, *Deployment of Broadband to Rural America,* at p. 5, USIIA Report (rel. Mar. 4, 2008), *available at* http://www.usiia.org/pubs/Rural.pdf.

[52] *Home Broadband Adoption 2009* at p. 8.

[53] *Id.* at p. 7.

[54] *See* John Horrigan, *Obama's Online Opportunity II: If You Build It, Will They Log On*, p. 2, Pew Internet & American Life Project (Jan. 2009), *available at* http://www.pewinternet.org/pdfs/PIP_Broadband%20Barriers.pdf ("*If You Build It*").

[55] *Home Broadband Adoption 2009* at p. 7.

[56] *See, e.g., The Economic Impact of Stimulating Broadband Nationally*, at p. 16, A Report from Connected Nation (rel. Feb. 21, 2008), *available at* http://connectednation.com/_documents/Connected_Nation_EIS_Study_Full_Report_02212008.pdf ("*Connected Nation Report*").

[57] *Id.*

[58] *See The State of Connectivity*: *Building Innovation Through Broadband*, at p. 65-66, Final Report of the California Broadband Taskforce (rel. Jan. 2008), *available at* http://www.calink.ca.gov/pdf/CBTF_FINAL_Report.pdf ("*California Broadband Task Force Report*").

[59] *FCC Broadband Stats - July 2009* at Table 10 (providing data on the number of broadband subscribers in each state for the years 2003-2008).

[60] *See, e.g., Broadband in America: Access, Use and Outlooks*, Consumer Electronics Association, at 6, July 2007, *available at* http://www.ce.org/PDF/CEA_Broadband_America.pdf (finding that half of the U.S. households without broadband lack a computer. The other half has not adopted broadband for a wide variety of reasons.).

[61] *See* H. Stephen Kaye, *Computer and Internet Use Among People with Disabilities*, at p. 5, National Institute on Disability and Rehabilitation Research, U.S. Department of Education (Mar. 2000), *available at* http://dsc.ucsf.edu/pdf/report13.pdf ("*Computer & Internet Use – 2000*").

[62] *See* Kerry Dobransky & Eszter Hargittai, *The Disability Divide in Internet Access and Use*, at p. 322, INFORMATION, COMMUNICATION & SOCIETY, Vol. 9, No. 3, pp. 313-334 (June 2006) ("*The Disability Divide*").

[63] *See Consumer Insights to America's Broadband Challenge*, at p. 5, Connected Nation, *available at* www.nga.org/Files/pdf/0812broadbandchallenge.pdf ("*Consumer Insights*").

[64] *The Disability Divide* at p. 321.

[65] *See* Jenifer Simpson, *Comments of the Coalition of Organizations for Accessible Technology, In the Matter of A National Broadband Plan for Our Future*, GN Docket No. 09-51, COAT &American Association of People with Disabilities, June 8, 2009, at p. 8-9 ("*National Broadband Plan*").

[66] *Id.*

[67] *Id.*

[68] *Connected Nation Report; see also Broadband & Seniors* at p. 10-11 (discussing a unique program for spurring demand for and use of computers and broadband among senior citizens).

[69] *The Disability Divide* at p. 325.

[70] *Id.*

[71] In 2007, the percentage of working-age people with disabilities working full-time year-round was 21.2 percent. *2007 Disability Status Report* at p. 3.

[72] *See* John Horrigan et al., *The Ever-Shifting Internet Population: A New Look at Internet Access & the Digital Divide*, at p. 31, Pew Internet & American Life Project (April 2003), *available at* www.pewinternet.org/pdfs/PIP_Shifting_Net_Pop_Report.pdf.

[73] *See, e.g.*, Beth A. Loy, *Deciphering Access for People with Disabilities*, Oct. 1, 2001, Digital Divide Network, *available at* http://www.digitaldivide.net/articles/view.php?ArticleID=204.

[74] *Broadband & Disabilities – 2002* at p. 20.

[75] Please note that the categories and ATs used in this chart are illustrative and not meant to suggest that certain ATs are more useful to or meant only for certain types of disabilities. On the contrary, most ATs are of use to people with a range of disabilities. For example, quadriplegic users often use voice recognition software to navigate web pages and to produce text.

[76] *See* APT, Broadband Changed my Life!, http://www.apt.org/BB-changed-my-life/.

[77] *See* W3C, Web Content Accessibility Guidelines 2.0, http://www.w3.org/TR/WCAG20/#guidelines ("*W3C WCAG 2.0 Guidelines*").

[78] *Home Broadband Adoption 2009* at p. 9-10.

[79] *Consumer Insights* at p. 5.

[80] *Home Broadband Adoption 2009* at p. 25-27.

[81] *2007 Disability Status Report* at p. 30.

[82] *Id.* at p. 34.

[83] *See* Erik Eckholm, *Last Year's Poverty Rate Was Highest in 12 Years*, Sept. 11, 2009, N.Y. Times, *available at* http://www.nytimes.com/2009/09/11/us/11poverty.html ("*Last Year's Poverty Rate*").

[84] In 2007, the percentage of working-age people with disabilities that were employed full-time was 21.2 percent, compared to nearly 57 percent for people without disabilities. *Id.* at p. 28.

[85] *See, e.g.*, Web Accessibility in Mind (WebAIM), Assistive Technologies for Motor Disabilities, http://www.webaim.org/articles/motor/assistive.php; WebAIM, Introduction to Web Accessibility, http://www.webaim.org/intro.

[86] A recent survey by WebAIM found that 74 percent of respondents used the JAWS screen reader. Of the respondents, over 85 percent were blind or visually impaired. *See* WebAIM, Survey of Preferences of Screen Reader Users (Jan. 2009), http://webaim.org/projects/screenreadersurvey/.

[87] *See* Freedom Scientific, JAWS for Windows Screen Reader Software, http://www.freedomscientific.com/products/fs/jaws-product-page.asp.

[88] *Emerging Technologies & Cognitive Disabilities* at p. 4.

[89] *W3C WCAG 2.0 Guidelines*.

[90] *See, e.g.*, Charles M. Davidson & Michael J. Santorelli, *Barriers to Broadband Adoption*, p. 25-26, A Report to the Federal Communications Commission (Oct. 2009), *available at* http://www.nyls.edu/user_files/1/3/4/30/83/ACLP%20Report%20to%20the%20FCC%20-%20Barriers%20to%20BB%20Adoption.pdf (observing that "Lack of exposure to broadband, along with a number of other factors, contributes to a general perception among many people with disabilities that broadband and broadband-enabled technologies are inaccessible") ("*Barriers to Broadband Adoption*").

[91] *The Disability Divide* at p. 327.

[92] *Broadband and People with Disabilities – 2002* at p. 20.

[93] *See, e.g.*, Jack Gillum, *A Third of Adults Without Internet Don't Want It*, Feb. 3, 2009, *available at* http://www.usatoday.com/printedition/life/20090203/internetusage03_st.art.htm (noting that "A report last month by the Pew Internet & American Life Project finds that although price is a barrier for

dial-up users in switching to broadband, one-third of those without a Net connection simply aren't interested in e-mailing or exploring the Web.")

[94] *Connected Nation Report* at pp. 8-9.

[95] *Computer & Internet Use – 2000* at p. 11.

[96] *The Disability Divide* at p. 328.

[97] *See* Susannah Fox, *E-patients With a Disability or Chronic Disease*, at p. 3, Pew Internet & American Life Project (Oct. 2007), *available at* http://www.pewinternet.org/pdfs/EPatients_Chronic_Conditions_2007.pdf ("*E-Patients*").

[98] *See* Wireless RERC, Background: Addressing a Significant Need, http://www.wirelessrerc.org/about-us/background-addressing-a-significant-need.html ("*RERC Wireless Background*").

[99] *Id.*

[100] *See Second Report: Findings of the Survey of User Needs (SUN), 2007-2009,* at p. 5, Wireless RERC (March 2009), *available at* http://www.wirelessrerc.org/publications/SUN%20Second%20Findings%20Report_2009-03-25.doc.

[101] *Id.* at p. 9.

[102] *The Disability Divide* at p. 316.

[103] *E-Patients* at p. 3 (finding that 89 percent of people with disabilities and chronic diseases send and receive email); *see also The Disability Divide* at p. 328 (observing that in 2006 nearly 84 percent of people with disabilities used email or instant messaging services).

[104] *E-Patients* at p. 3 (observing that nearly 40 percent of people with disabilities and chronic diseases use their Internet connection to send instant messages.).

[105] *See, e.g.,* American Association of People with Disabilities, Summary Fact Sheet: High Speed Internet and People with Disabilities, www.aapd.com/TTPI/AAPD_CWA_High_Speed_Internet_Access_WORD.doc ("*High Speed Fact Sheet*").

[106] *See* National Institute on Deafness and Other Communication Disorders, Facts about TRS and National 711, http://www.nidcd.nih.gov/health/hearing/telecomm.asp.

[107] *See* Wikipedia: Telecommunications Relay Services, http://en.wikipedia.org/wiki/Telecommunications_Relay_Service.

[108] *See* Jonathan Blum, *Viable Helps Deaf Callers Connect,* Sept. 15, 2008, CNN Money, *available at* http://money.cnn.com/2008/09/11/smallbusiness/helping_deaf_callers_connect.fsb/index.htm.

[109] *High Speed Fact Sheet.*

[110] *See* Facebook, Group: Special needs kids and the joy of raising them, http://www.facebook.com/topic.php?uid=2480416749&topic=4767#/group.php?gid=2480416749.

[111] *The Disability Divide* at p. 315.

[112] *Id.* at p. 328.

[113] *See Gaining Independence For People With Disabilities Through Video Games*, May 15, 2008, SCIENCEDAILY, *available at* www.sciencedaily.com /releases/2008/05/080513191103.htm.

[114] *Id.*

[115] Sources for Case Study 2 include: Quin Parker, *Second Life: Disability Charity Sets Up Virtual Advice Service*, June 10, 2008, THE GUARDIAN, *available at*

http://www.guardian.co.uk/society/2008/jun/10/secondlife.disability; Nicole Saidi, iReport: 'Naughty Auties' Battle Autism with Virtual Interaction, March 28, 2008, CNN, *available at* http://www.cnn.com/2008/HEALTH/conditions/03/28/sl.autism.irpt/index.html; Scarlett Qi, *Researhc on Asperger's Syndrome Done in Second Life Shows Early Promise*, Jan. 18, 2008, SLNN.Com, *available at* http://www.slnn.com/article/aspergers-syndrome-brigadoon; Jessica Bennett and Malcolm Beith, *Alternate Universe*, July 30, 2007, Newsweek, *available at* http://www.newsweek.com/id/32824/page/1; Tom Loftus, *Virtual World Teaches Real-World Skills*, Fed. 25, 2005, MSNBC, *available at* http://www.msnbc.msn.com/id/7012645/; Contact a Family, About Us, http://www.cafamily.org.uk/about.html.

[116] *See* Amanda Leinhart and Susannah Fox, *Bloggers*, at p. 1-3, Pew Internet & American Life Project (July 2006), *available at* http://www.pewinternet.org/pdfs/PIP%20Bloggers%20Report%20July%2019%202006.pdf (finding that 70 percent of bloggers have a broadband connection while 20 percent of bloggers use dial-up).

[117] *Id.* (finding that 54 percent of bloggers are between the ages of 18 and 29).

[118] *See* Disaboom, About Us, http://aboutus.disaboom.com/About-Us.aspx.

[119] *See* Sharon E. Gillett et al., *Measuring the Economic Impact of Broadband Deployment*, at p. 3-11 , Final Report, Prepared for the U.S. Department of Commerce, Economic Development Administration (Feb. 2006), *available at* http://www.eda.gov/ImageCache/EDAPublic/documents/pdfdocs2006/mitcmubbimpactreport_2epdf/v1/mitcmubbimpactreport.pdf.

[120] *See The Economic Impact of Stimulating Broadband Nationally*, at p. 5, A Report from Connected Nation (rel. Feb. 21, 2008), *available at* http://connectednation.com/_documents/Connected_Nation_EIS_Study_Full_Report_02212008.pdf ("*Connected Nation Report*").

[121] *See* Rob Atkinson, Daniel Castro & Stephen Ezell, *The Digital Road to Recovery: A Stimulus Plan to Create Jobs, Boost Productivity and Revitalize America*, at p. 1-2, Info. Tech. & Innovation Foundation (Jan. 2009), *available at* http://www.itif.org/files/roadtorecovery.pdf.

[122] *See* Barack Obama, Issues: Technology, http://www.barackobama.com/issues/technology/.

[123] *2007 Disability Status Report,* at p. 30.

[124] *Id.* at p. 32.

[125] *Id.* at p. 42.

[126] *See* Jessica Rothschuh, April KirkHart & Wendy Lazarus, *Helping our Children With Disabilities Succeed: What's Broadband Got To Do With It?*, at p. 5, Digital Opportunity for Youth Issue Brief, No. 2, The Children's Partnership (July 2007), *available at* http://www.childrenspartnership.org/AM/Template.cfm?Section=Home&Template=/CM/ContentDisplay.cfm&ContentFileID=2284 ("*Helping our Children*").

[127] *See* DO-IT, AccessCollege, http://www.washington.edu/doit/Resources/postsec.html.

[128] *See* DO-IT, Programs: Scholars, http://www.washington.edu/doit/Brochures/Programs/scholars.html.

[129] *Helping our Children* at p. 5.

[130] Telephone interview with ACLP staff; s*ee also Barriers to Broadband Adoption* at p. 24-25 (discussing the impact of lower levels of exposure to broadband on people with disabilities).

[131] *See* Robert Silverstein, George Julnes & Renee Nolan, *What Policymakers Need and Must Demand from Research Regarding the Employment Rate of Persons with Disabilities*, 23 Behav. Sci. Law 399, 413-414 (2005), *available at* http://www.disabilitypolicycenter.org/docs/BSL_v23_2005.pdf.

[132] *Disability Status Report* at p. 25.

[133] *Id.*

[134] *Spinal Cord Stats.*

[135] *See* Bureau of Labor Statistics (August-September 2009), *available at* http://www.bls.gov/cps/cpsdisability.htm.

[136] *See* YAI, About Us, http://www.yai.org/about.cfm.

[137] *See* Press Release, *Disaboom and JobCentral.com Partner to Improve Unemployment Rate Among People Living With Disabilities*, Jan. 14, 2008, JOB CENTRAL, *available at* http://www.jobcentral.com/2008_Disaboom_Partnership.asp.

[138] *Id.*

[139] *See* Carol Wilson, *Telecommuting Interest Soars*, Aug. 28, 2008, TELEPHONY ONLINE, *available* at http://telephonyonline.com/access/news/telecommuting-increases-0828/.

[140] *See* Eve Tahmincioglu, *The Quiet Revolution: Telecommuting*, Oct. 5, 2007, MSNBC, *available at* http://www.msnbc.msn.com/id/20281475/.

[141] *Id.*

[142] *Telecommuting Study.*

[143] *See* U.S. Dept. of Labor, Office of Disability Employment Policy, Small Business and Self Employment for People with Disabilities, http://www.dol.gov/odep/programs/promotin.htm,

[144] *See* Frank Bowe, *Universal Service and the Disability Community: The Need for Ubiquitous Broadband Deployment*, at p. 12, Benton Foundation (undated manuscript), *available at* http://www.benton.org/benton_files/Bowe.doc.

[145] *See* Press Release, *Quarterly Retail E-Commerce Sales: 1st Quarter 2009*, U.S. Census Bureau (rel. May 15, 2009), *available at* http://www.census.gov/mrts/www/data/html/09Q1.html (finding that "e-commerce sales in the first quarter of 2009 accounted for 3.5 percent of total sales," up from 3.3 percent in the first quarter of 2008).

[146] *See* John Horrigan, *Online Shopping*, at p. 2, Pew Internet & American Life Project (Feb. 2008), *available at* http://www.pewinternet.org/pdfs/PIP_Online%20Shopping.pdf ("*Online Shopping*").

[147] *Id.* at p. 12.

[148] In 2006, blind users of the Target online retail store brought a class-action suit against the company for failing to make its website fully accessible to the blind. At issue was the inability of these users to effectively use screen-readers to navigate the site. *See, e.g.*, Bob Tedeschi, *Do the Rights of the Disabled Extend to the Blind on the Web?* Nov. 6, 2006, N.Y. TIMES, *available at* http://www.nytimes.com/2006/11/06/technology/06ecom.html?_r=1 ("*Blind on the Web*"). Target settled with the suit out of court in 2008. *See Target Settles Web Suit,* Aug. 27, 2008, ASSOC. .PRESS, *available at* http://www.nytimes.com/2008/08/28/business/28target.html?scp=1&sq=target%20blind%20settle&st=cse. Most other sites, like Amazon, are fully accessible, *Blind on the Web.*

[149] *See* Robert E. Litan, *Great Expectations: Potential Economic Benefits to the Nation From Accelerated Broadband Deployment to Older Americans and Americans with Disabilities*, New Millennium Research

Council (Dec. 2005), available at http://www.newmillenniumresearch.org/archive/Litan_FINAL_120805.pdf ("*Great Expectations*").

[150] *2007 Disability Status Report,* at p. 34.

[151] *See* Peiyun She & Gina A. Livermore, *Long-Term Poverty and Disability Among Working-Age Adults*, at p. 2, Research Brief, Cornell University Institute for Policy Research (June 2006), *available at* http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1224&context=edicollect.

[152] *The Disability Divide*, at p. 315.

[153] *Id*. at p. 328.

[154] *E-Patients* at p. 3.

[155] *See* Judith Cook et al., *Information Technology Attitudes Among Individuals with Psychiatric Disabilities who Use the Internet: Results of a Web-Based Survey*, Disabilities Studies Quarterly, Vol. 25, No. 2 (Spring 2005).

[156] *2007 Disability Status Report* at p. 16.

[157] *See* Susannah Fox, *Are Seniors Sitting Ducks?* at *p*.1, Pew Internet and American Life Project (April 2006), *available at* http://www.pewinternet.org/pdfs/PIP_Wired_Senior_2006_Memo.pdf.

[158] *See* Victoria Rideout et al., *e-Health and the Elderly: How Seniors Use the Internet for Health Information*, at p. 1, Kaiser Family Foundation (Jan. 2005), *available at* http://www.kff.org/entmedia/upload/e-Health-and-the-Elderly-How-Seniors-Use-the-Internet-for-Health-Information-Key-Findings-From-a-National-Survey-of-Older-Americans-Survey-Report.pdf.

[159] The use of email or other broadband-enabled communications services to interact with physicians is a very sparsely used method, but it is gaining in popularity. One government study found that in 2003, only 7 percent of Internet users had communicated online with a healthcare professional. That number rose to 10 percent by 2005. *See Online Patient-Provider Communication: Rare Despite Popularity of Internet and Email*, Health Information National Trends Survey ("HINTS"), HINTS Brief No. 8 (Nov. 2007), *available at* http://hints.cancer.gov/docs/HINTS_Briefs8-110607.pdf. In general, the use of broadband-enabled technologies among patients and healthcare providers is increasing. *Broadband & Telemedicine.*

[160] *See* Issue Paper, *Telemedicine, Telehealth, and Health Information Technology*, at p. 3, AMERICAN TELEMEDICINE ASSOCIATION (May 2006), *available at* http://www.americantelemed.org/files/public/policy/HIT_Paper.pdf ("*ATA HIT Paper*").

[161] *Id.*

[162] *Id.*

[163] *Broadband & Telemedicine*, at Section 3 (describing the various impacts of broadband on telemedicine).

[164] *See* Joint Advisory Committee on Communications Capabilities of Emergency Medical and Public Healthcare Facilities, *Report to Congress*, at p. 41 (rel. Feb., 2008), *available at* http://energycommerce.house.gov/Press_110/JAC.Report_FINAL%20Jan.3.2008.pdf ("*Joint Advisory Committee Report to Congress*").

[165] For example, the number of pediatricians in rural parts of the U.S. remains low relative to the percentage of the population that lives in these areas. A 2001 study found that only 8 percent of pediatricians are located in rural parts of the country. *See* Greg Randolph, et al., *Trends in the Rural-Urban Distribution of General Pediatricians*, Pediatrics, Vol. 107, No. 2 (2001), *available at* http://pediatrics.aappublications.org/cgi/reprint/107/2/e18.pdf.

[166] *See* Flatlands Disability Network, About, http://www.ndcpd.org/fdn/about.htm.

[167] *See* Flatlands Disability Network, Activities, http://www.ndcpd.org/fdn/activities.htm.

[168] *Broadband & Seniors*, at p. 23-24.

[169] See Press Release, Y*AI/National Institute for People With Disabilities Funded for Web-based "Telehealth" System to Serve Developmentally Disabled People*, Jan. 24, 2007, N.Y. State Health Foundation, *available at* http://www.nyshealthfoundation.org/content/article/detail/732.

[170] *Id.*

[171] *Id.*

[172] These types of in-home systems are extremely valuable to people with disabilities that severely limit or impair movement. For example, for people with spinal cord injuries who live in rural parts of the country, receiving specialized care for secondary conditions (e.g., autonomic dysreflexia) is made much easier by using broadband-enabled telemedicine. *Broadband & Disabilities – 2002*, at p. 5.

[173] *See* Robert Litan, *Vital Signs via Broadband: Remote Health Monitoring Transmit Savings, Enhances Lives,* at p. 2, White Paper of Better Healthcare Together (Oct. 2008), *available at* http://betterhealthcaretogether.org/SitesResources/bhctv2/Resources/Documents/VITAL%20SIGNS%20via%20BROADBAND%20FINAL%20with%20FOREWORD%20and%20TITLE%20pp%2010%2022.pdf ("*Vital Signs*").

[174] *Great Expectations.*

[175] The Oregon Center for Aging & Technology ("ORCATECH") is one institution that has launched a pilot program that uses in-home wireless sensors to monitor cognitive decline among older adults. For more information, *see* ORCATECH, Current Research, http://www.orcatech.org/research.php#etac.

[176] *See* International Conference on Alzheimer's Disease, *Highlights of Research Findings*, at p. 1, Alzheimer's Association, *available at* http://www.alz.org/icad/downloads/2008_ICADhighlights.pdf.

[177] *See* Press Release, *Alzheimer's Disease to Quadruple Worldwide by 2050*, June 10, 2007, Johns Hopkins University Bloomberg School of Public Health, *available at* http://www.jhsph.edu/publichealthnews/press_releases/2007/brookmeyer_alzheimers_2050.html (announcing a study by Ron Brookmeyer et al. entitled *Forecasting the Global Burden of Alzheimer's Disease*).

[178] U.S. healthcare costs are expected to increase to 20 percent of GDP by 2017, up from 16 percent in 2007. *See* Dept. of Health & Human Services, Centers for Medicare & Medicaid Services, National Health Expenditure (NHE) Fact Sheet, http://www.cms.hhs.gov/NationalHealthExpendData/25_NHE_Fact_Sheet.asp#TopOfPage. Moreover, the number of people covered by government-sponsored health plans (i.e., Medicare and Medicaid) increased from 80.3 million in 2006 to 83 million in 2007. *See* Carmen DeNavas-Walt, Bernadette D. Proctor, and Jessica C. Smith, *Current Population Reports*: *Income, Poverty, and Health Insurance Coverage in the United States: 2007*, at p. 21, U.S. Census Bureau (2008), *available at* http://www.census.gov/prod/2008pubs/p60-235.pdf.

[179] *FCC Broadband Stats - July 2009* at Table 18.

[180] Verizon will invest at least $23 billion dollars on its new FiOS system, *See* Peter Grant and Dionne Searcey, *Verizon's FiOS Challenges Cable's Clout*, WALL. ST. J., Oct. 24, 2007.

[181] AT&T will have invested upwards of $5 billion by the end of 2008 in its own fiber-optic network, *See* Todd Spangler, *AT&T Ups U-verse Spending Estimates by $500 Million,* MULTICHANNEL NEWS, Nov. 6, 2007.

[182] Comcast is currently deploying a new technology – DOCSIS 3.0 – which will boost broadband speeds that are comparable to fiber-optic speeds *See* Bob Wallace, *Comcast Details its First DOCSIS 3.0 Deployment*, XCHANGE, April 4, 2008, *available at* http://www.xchangemag.com/hotnews/comcast-details-its-first-docsis-3-0-deployme.html.

[183] *See, e.g., AT&T Increases 3G Wireless Network Speeds*, June 16, 2008, BROADBANDINFO.COM, *available at* http://www.broadbandinfo.com/news/att-increases-3g-wireless-network-speeds-214.html; Marguerite Reardon, *T-Mobile Launches 3G Network in NY*, May 5, 2008, CNET NEWS.COM, *available at* http://news.cnet.com/8301-10784_3-9936006-7.html.

[184] *FCC Broadband Stats - July 2009* at Table 9.

[185] There are two different 4G standards. The first, WiMAX, will be used by Sprint in collaboration with Clearwire, Intel, Google, Comcast, Time Warner Cable, and Bright House Networks. *See* Press Release, *Sprint and Clearwire to Combine WiMAX Businesses, Creating a New Mobile Broadband Company*, May 7, 2008, Sprint, *available at* http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=1141088. The other standard, Long-Term Evolution ("LTE"), will be used by AT&T and Verizon. *See* Press Release, *Verizon Selects LTE as 4G Wireless Broadband Direction*, Nov. 29, 2007, Verizon Wireless, *available at* http://news.vzw.com/news/2007/11/pr2007-11-29.html; W. David Garner, *AT&T Plans Fast 4G Wireless Rollout*, April 4, 2008, INFO. WEEK, *available at* http://www.informationweek.com/news/mobility/3G/showArticle.jhtml?articleID=207001878.

[186] *RERC Wireless Background.*

[187] *See, e.g.,* TEITAC, *Report to the Access Board: Refreshed Accessibility Standards and Guidelines in Telecommunications and Electronic and Information Technology* (April 2008), *available at* http://www.access-board.gov/sec508/refresh/report ("*TEITAC 2008 Recommendations*").

[188] *See Over the Horizon: Potential Impact of Emerging Trends in Information and Communication Technology on Disability Policy and Practice*, at p. 1-2, National Council on Disability (Dec. 19, 2006), available at http://www.ncd.gov/newsroom/publications/2006/pdf/emerging_trends.pdf ("*Over the Horizon*").

[189] According to comScore, YouTube had a 39 percent market share of the online video market as of June 2009. *See* Press Release, *Major News Stories Drive June Surge in U.S. Online Video Viewing to Record 157 Million Viewers*, Aug. 14, 2009, COMSCORE, *available at* http://www.comscore.com/Press_Events/Press_Releases/2009/8/Major_News_Stories_Drive_June_Surge_in_U.S._Online_Video_Viewing_to_Record_157_Million_Viewers.

[190] *See New Captions Feature for Videos*, Aug. 28, 2008, YouTube Blog, *available at* http://www.youtube.com/blog?entry=mi8D3ntPgFQ.

[191] *See* Miguel Helft, *Google to Add Captions, Improving YouTube Videos*, Nov. 20, 2009, N.Y. TIMES.

[192] *See, e.g.,* Miguel Helft, *For the Blind, Technology Does What a Guide Dog Can't*, Jan. 4, 2009, N.Y. TIMES (discussing the efforts of a blind engineer at Google who is developing screen-reading software for the G1 one, which runs Google's Android software).

[193] *See An iPhone the Blind can Get Behind,* June 8, 2009, ABLEDBODY.COM, *available at* http://abledbody.com/profoundlyyours/2009/06/08/an-iphone-the-blind-can-get-behind/.

[194] *See* Press Release, *Apple Announces the New iPhone 3GS – The Fastest, Most Powerful iPhone Yet*, June 8, 2009, Apple, *available at* http://www.apple.com/pr/library/2009/06/08iphone.html (other accessibility features include "The new universal Zoom function magnifies the entire screen, and the White on Black feature reverses the colors on screen to provide higher contrast for people with low vision. iPhone 3GS also supports Mono Audio which combines left and right audio channels so that they can be heard in both earbuds for those with hearing loss in one ear.").

[195] *See People with Disabilities or Long Nails Can't Use iPhone without Special Tech*, June 24, 2008, WIRELESS & MOBILE NEWS, *available at* http://www.wirelessandmobilenews.com/2008/06/long_nails_people_with_disabil.html.

[196] *See* Press Release, *TALKS For Verizon Wireless Offers Mobile Accessibility To Blind And Visually Impaired Customers*, March 12, 2009, Verizon Wireless, *available at* http://news.vzw.com/news/2009/03/pr2009-03-12a.html.

[197] *See* AT&T, Mobile Speak and Mobile Magnifier by Code Factory, http://www.wireless.att.com/learn/articles-resources/disability-resources/mobile-speak-magnifier.jsp ("Mobile Speak is a powerful full-fledged screen reader with an easy-to-learn command structure, intuitive speech feedback in several languages, and Braille support that can be used with or without speech. Unlike other screen readers for mobile phones, Mobile Speak automatically detects information that the blind user should know, just as a sighted user would easily find highlighted items or key areas of the screen at a glance.").

[198] *See* Verizon Wireless, Accessibility: Products & Services Overview, http://aboutus.vzw.com/accessibility/index.html.

[199] *See* Microsoft, Accessibility: Mission, Strategy & Progress, http://www.microsoft.com/enable/microsoft/mission.aspx.

[200] By the end of 2009, approximately 18-20 cell phones will include the Android operating system. *See* Matt Richtel, *Google: Expect 18 Android Phones by Year's End,* May 27, 2009, N.Y. Times Bits Blog, *available at* http://bits.blogs.nytimes.com/2009/05/27/google-expect-18-android-phones-by-years-end/.

[201] *See* T.V. Raman, *More Accessibility Features in Android 1.6*, Oct. 20, 2009, The Official Google Blog, *available at* http://googleblog.blogspot.com/2009/10/more-accessibility-features-in-android.html.

[202] *TEITAC 2008 Recommendations.*

[203] *See* W3C, About, http://www.w3.org/Consortium/.

[204] *See* W3C, History, http://www.w3.org/Consortium/history (listing its major accomplishments, including standards for HTML and XML, among many others).

[205] *W3C WCAG 2.0 Guidelines.*

[206] *See* W3C, Introduction to Understanding WCAG 2.0, http://www.w3.org/TR/UNDERSTANDING-WCAG20/intro.html#introduction-fourprincs-head.

[207] *See National Disability Policy: A Progress Report*, at p. 185, National Council on Disability (Jan. 2008), *available at* http://www.ncd.gov/newsroom/publications/2008/pdf/RevisedProgressReport.pdf ("*NCD Progress Report 2008*").

[208] *Emerging Technologies & Cognitive Disabilities* at p. 4.

[209] *See* Center for Universal Design, Principles, http://www.design.ncsu.edu/cud/about_ud/udprinciplestmlformat.html#top.

[210] *Id.*

[211] *See* Verizon, Universal Design Principles, http://responsibility.verizon.com/home/information/design-principles.

[212] *See* AT&T, Solutions for Customers with Disabilities: Universal Design Policy, http://www.att.com/gen/general?pid=10191.

[213] *See AT&T Opens Universal Design Methods to Developers,* Mar. 18, 2008, FIERCE DEVELOPER, *available at* http://www.fiercedeveloper.com/story/att-opens-universal-design-methods-to-developers/2008-03-18.

[214] *See* Center for Universal Design, Case Study: Nokia, http://www.design.ncsu.edu/cud/projserv_ps/projects/case_studies/nokia.htm.

[215] *See* Apple, Accessibility, http://www.apple.com/accessibility.

[216] *See* Apple, Accessibility: VoiceOver, http://www.apple.com/accessibility/voiceover/.

[217] *See* Apple, Accessibility: iPods & iTunes – Vision, http://www.apple.com/accessibility/itunes/vision.html; Hearing, http://www.apple.com/accessibility/itunes/hearing.html.

[218] The Coalition of Organizations for Accessible Technologies ("COAT) provides a good overview of the existing laws re AT. *See* http://www.coataccess.org/node/4 ("*COAT Laws Overview*").

[219] *See* Paul Glader, *Home Appliances to Soothe the Aches of Aging Boomers*, Dec. 3, 2008, WALL ST. J., *available at* http://online.wsj.com/article/SB122826077605073813.html.

[220] *See Tomorrow's Wireless World,* at p. 12, OfCom (rel. May 7, 2008), *available at* http://www.ofcom.org.uk/research/technology/overview/randd0708/randd0708.pdf; Adam Sherwin, *New Wi-Fi Devices Warn Doctors of Heart Attacks,* May 7, 2008, THE TIMES, *available at* http://technology.timesonline.co.uk/tol/news/tech_and_web/article3883082.ece.

[221] *Emerging Technologies & Cognitive Disability* at p. 5.

[222] *Over the Horizon* at p. 13-14.

[223] *See* Suzanne Robitaille, *For the Disabled, More Power for Play*, Dec. 26, 2008, TOP TECH NEWS, *available at* http://www.toptechnews.com/story.xhtml?story_id=63727&page=1.

[224] There is evidence that service providers are tailoring their offerings to specific user groups. For example, both AT&T and Verizon Wireless offer specially designed plans that cater to the needs of older users. Both offer seniors plans that include 200 anytime minutes, 500 night and weekend minutes, and unlimited in-network calling for less than $30 per month. *See* Verizon Wireless, Nationwide 65 Plus Plan, http://www.verizonwireless.com/b2c/store/controller?item=planFirst&action=viewPlanList&sortOption=priceSort&typeId=1&subTypeId=53&catId=1029; Press Release, *AT&T Introduces New Wireless Plan for Seniors,* Oct. 26, 2007, AT&T, *available at* http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=24612. With regard to people with disabilities, AT&T offers a text accessibility plan ("TAP") for people who are deaf, hard of hearing, have a speech disability and/or hearing loss. The TAP is available for the iPhone and provides unlimited texting and data and visual voicemail. *See* AT&T, Text Accessibility Plan for iPhone, http://www.wireless.att.com/about/disability-resources/text-accessibility-plan-for-iphone.jsp. Verizon Wireless offers a similar plan for use on its smartphones and PDAs. *See* Verizon Wireless, Accessibility: Nationwide Messaging Plans, http://aboutus.vzw.com/accessibility/nationwidemessaging.html (available to "those that do not use voice minutes to communicate.").

[225] *E-patients.*

[226] *See* Peter Stenberg & Sarah Low, *Rural Broadband At a Glance: 2009 Edition*, at p. 3, Economic Information Bulletin No. (EIB-47), USDA (Feb. 2009), *available at* http://www.ers.usda.gov/Publications/EIB47/EIB47.pdf.

[227] *FCC Broadband Stats - July 2009* at Chart 12.

[228] *Id.* at Table 18.

[229] *See* Diana Spas, *Update on the Demography of Rural Disability, Part One: Rural and Urban*, April 2005, Research and Training Center on Disability in Rural Communities, The University of Montana Rural Institute, *available at* http://rtc.ruralinstitute.umt.edu/RuDis/RuDemography.htm.

[230] *See* USDA Economic Research Service, Briefing, *Rural Population and Migration: Trend 6 – Challenges From an Aging Population*, *available at* http://www.ers.usda.gov/Briefing/Population/Challenges.htm.

[231] *See* Peter Svensson, *Skepticism Arises Over Rural Broadband Stimulus,* Feb. 19, 2009, Wash. Post, *available at* http://www.washingtonpost.com/wp-dyn/content/article/2009/02/19/AR2009021902473.html (observing that there are those who think such funds are unnecessary in light of organic deployment efforts and noting that "Because Internet access is already widespread and still being expanded even in a shrinking economy, injecting more money for broadband could simply equate to giving more coffee to someone who's already downed three cups.").

[232] *See, e.g.,* Robert LaRose et al., *Closing the Rural Broadband Gap*, Michigan State University (Nov. 2008), *available at* https://www.msu.edu/~larose/ruralbb (evaluating a number of local public-private broadband initiatives and observing that "Infrastructure deployment alone is an insufficient driver, so it would be wise to encourage programs that link investments in training and use.").

[233] Connected Kentucky, the predecessor to Connected Nation, helped increase broadband adoption in the state by 83 percent between 2005 and 2007. *See The Economic Impact of Stimulating Broadband Nationally*, at p. 15, A Report from Connected Nation (rel. Feb. 21, 2008), *available at* http://connectednation.com/_documents/Connected_Nation_EIS_Study_Full_Report_02212008.pdf ("*Connected Nation Report*"); *see also* Arik Hesseldahl, *Bringing Broadband to Rural America,* Sept. 18, 2008, BUSINESS WEEK, *available at* http://www.businessweek.com/technology/content/sep2008/tc20080917_797892.htm.

[234] *See* Connected Nation, State Programs, http://www.connectednation.com/state_programs/.

[235] *Broadband & Telemedicine* at p. 20-23 (discussing federal telemedicine programs).

[236] *Barriers to Broadband Adoption* at p .28-29 (noting that lack of training and expertise vis-à-vis computers and broadband is a major barrier to broadband adoption for many people with disabilities).

[237] *See* Georgia Tools for Life, Assistive Technology Resource Centers, http://www.gatfl.org/sites.shtml (centers can be found in Atlanta, Augusta, Conyers, and Macon).

[238] *See* The Family Center on Technology & Disability, About, http://www.fctd.info/show/about.

[239] *See* Lighthouse International, Professional Education, http://www.lighthouse.org/education-services/professional-education/.

[240] *See* AFB Senior Site, Home, http://www.afb.org/seniorsitehome.asp.

[241] *See* AFB, About, http://www.afb.org/seniorsite.asp?SectionID=68.

[242] *See* APT, About, http://www.apt.org/about/.

[243] *See* Press Release, *Broadband Changed my Life! Winners Announced by Nonprofit Technology Leader,* APT (Dec. 2008), *available at* http://www.apt.org/news/apt-press-releases/2008/2008_bbcml_winners_pr.html.

[244] *Id.*

[245] *See* HR – 1, The American Recovery and Reinvestment Act of 2009, p. 14, *available at* http://readthestimulus.org/hr1_final.pdf ("*Stimulus Text*").

[246] *If You Build It* at p. 2; *Home Broadband Adoption 2009* at p. 7.

[247] *Home Broadband Adoption 2009* at p. 25-27.

[248] *Id.* at p. 12-18.

[249] *Id*. at p. 14.

[250] *See Broadband in America: Access, Use and Outlooks*, Consumer Electronics Association, at 6, July 2007, *available at* http://www.ce.org/PDF/CEA_Broadband_America.pdf.

[251] *See* FCC, Lifeline & Linkup, http://www.lifeline.gov/welcome.html.

[252] *See* Committee on Telecommunications, *Resolution on Lifeline and Linkup Program Support for Broadabnd Internet Access Services and Devices*, NARUC (Feb. 18, 2009), *available at* http://www.naruc.org/Resolutions/TC%20Resolution%20on%20Lifeline%20and%20Link-Up%20Program%20Support%20for%20Broadband%20Internet%20Access%20Services%20and%20Devices.pdf.

[253] *See* H.R. 3646 – The Broadband Affordability Act of 2009 (introduced Sept. 24, 2009), *available at* http://thomas.loc.gov/cgi-bin/query/z?c111:H.R.3646: (charging the FCC to "to establish a broadband lifeline program that enables qualifying low-income customers residing in urban and rural areas to purchase broadband service at reduced charges by reimbursing providers for each such customer served.").

[254] For example, a coalition of wireless and telecom companies, which included AT&T and T-Mobile, submitted a letter to the FCC in December 2008 "in support of increasing lower-income consumers' access to broadband through the universal service Lifeline and Link Up programs and encourage the [Commission] to adopt a program with sufficient subsidies to achieve that goal." *See* Letter of AT&T et al., *In re Lifeline/Link-Up Support for Broadband Internet Access (CC Docket No. 96-45; WC Docket Nos. 05-337, 04-36, and 03-109; and WT Docket Nos. 07-195 and 04-356)* (Dec. 10, 2008), *available at* http://files.ctia.org/pdf/081210_Coalition_Letter_in_Support_BB_Lifeline_and_Link_Up__4___3_.pdf. Similarly, the National Cable & Telecommunications Association ("NCTA"), the principal cable industry organization, has expressed support for "Expansion of the FCC's Lifeline and Link-Up Programs to help ensure that broadband access is extended to low-income households." *See* Press Release, *McSlarrow Highlights U.S. Broadband Success Story in Letter to House and Senate Commerce Committees; Says Just Released OECD Report is Misleading*, April 23, 2007, NCTA, *available at* http://www.ncta.com/ReleaseType/MediaRelease/4154.aspx.

[255] The authors previously offered this idea for senior citizens. *Broadband & Seniors* at p. 35.

[256] This approach has been adopted in a number of states across the country. *See, e.g.*, Press Release, *New Commerce Program Encourages Broadband Availability*, Feb. 28, 2007, Wisconsin Dept. of Commerce, *available at* http://commerce.wi.gov/NEWS/releases/2007/034.html. It has also been endorsed by the National Telecommunications & Information Administration, which provides telecom advice to the President. *See* Report, *Networked Nation: Broadband in America*, at p. 3, National Telecommunications & Information Administration, U.S. Department of Commerce (Jan. 2008), *available at* http://www.ntia.doc.gov/reports/2008/NetworkedNationBroadbandinAmerica2007.pdf.

[257] *Consumer Insights.*

[258] *Computer & Internet Use – 2000* at p. 5.

[259] *See* Per Scholas, Recycling, http://www.perscholas.org/recycling/index.html.

[260] *See* Per Scholas, Comp 2 Seniors, http://www.perscholas.org/c2s/index.html; *Broadband & Seniors* at p. 11 (profiling OATS).

[261] *See* One Economy, Broadband/Hardware, http://www.one-economy.com/ourwork/broadband.

[262] *Stimulus Text.*

[263] *See* Dawn Carlson et al., *Assistive Technology Survey Results: Continued Benefits and Needs Reported by the Americans with Disabilities,* at p. 5, National Center for the Dissemination of Disabilities Research(Sept. 2001), *available at* http://www.ncddr.org/products/researchexchange/v07n01/atpaper/ATpaper.pdf. .

[264] *See* Closing the Gap, About, http://www.closingthegap.com/about_us.lasso.

[265] *See* NVRC, Technology, http://www.nvrc.org/content.aspx?page=22&section=6.

[266] *See, e.g.,* Charles M. Davidson, *Losing the Forest for the Trees: Properly Contextualizing the Use of Early Termination Fees in the Current Wireless Marketplace*, ACLP Scholarship Series (June 2009), *available at* http://www.nyls.edu/user_files/1/3/4/30/83/Early%20Termination%20Fees%20-%20June%202009.pdf (discussing this dynamic in the context of the wireless sector).

[267] *See* Ashlee Vance, *Insurers Fight Speech-Impairment Remedy*, Sept. 15, 2009, N.Y. Times, *available at* http://www.nytimes.com/2009/09/15/technology/15speech.html?_r=1.

[268] *Id.*

[269] *Id.*

[270] *Broadband & Telemedicine* at p. 41-42 (discussing the need for modernizing insurance reimbursement mechanisms); *Barriers to Broadband Adoption* at p. 37-38 (noting that outdated reimbursement mechanisms are a major barrier to further adoption and usage of broadband-enabled telemedicine tools).

[271] H.R. 3101 - Twenty-first Century Communications and Video Accessibility Act of 2009 – was introduced on June 26, 2009. Text of the law is *available at* http://www.govtrack.us/congress/billtext.xpd?bill=h111-3101 ("*Draft Accessibility Law 2009*").

[272] *TEITAC Report – 2008*.

[273] 47 U.S.C. § 255.

[274] 47 U.S.C. § 610.

[275] *Id.*

[276] *See, e.g.,* Larry Brethower, *Cell Phone and Hearing Aid Compatibility, 2008*, Sept. 3, 2008, The Hearing Review, *available at* http://www.hearingreview.com/issues/articles/2008-09_03.asp (observing that "the industry has quickly achieved and surpassed the [FCC's] standards. It currently offers more than 90 models of phones with an acceptable M-3 emissions rating.").

[277] NCD is "an independent federal agency composed of members appointed by the President of the United States, by and with the advice and consent of the U.S. Senate [that] provides advice to the President, Congress, and executive branch agencies to promote policies, programs, practices, and procedures that guarantee equal opportunity for all individuals with disabilities, regardless of the nature or severity of the disability and to empower individuals with disabilities to achieve economic self-sufficiency, independent living, and inclusion and integration into all aspects of society." *See* NCD, Home, http://www.ncd.gov/.

[278] *NCD Progress Report 2008* at p. 198.

[279] *Draft Accessibility Law 2009* at new section 717(d), *available at* http://www.govtrack.us/congress/billtext.xpd?bill=h111-3101&version=ih&nid=t0%3Aih%3A111.

[280] *Id.* at new section 717(e), *available at* http://www.govtrack.us/congress/billtext.xpd?bill=h111-3101&version=ih&nid=t0%3Aih%3A112.

[281] *NCD Progress Report 2008* at p. 185-186.

[282] *See* Greg Toppo, *iPhone Applications Can Help the Autistic,* May 28, 2009, USA TODAY, *available at* http://www.usatoday.com/tech/news/2009-05-27-iphone-autism_N.htm.

[283] *See* Seeing with Sound, Android, http://www.seeingwithsound.com/android.htm.

[284] *Id.*

[285] The exact mechanisms and processes for disbursing these funds remain unclear. However, NTIA and RUS will develop these processes in consultation with a variety of stakeholders. Moreover, the economic recovery package calls on the FCC to develop a national broadband policy within one year of enactment. *ARRA Summary*.

[286] *See, e.g.,* Tony Clark & Michael J. Santorelli, *Federalism in Wireless Regulation: A New Model for a New World,* ACLP Scholarship Series (Feb. 2009), *available at* http://www.nyls.edu/user_files/1/3/4/30/83/Clark%20%20&%20Santorelli%20-%20Wireless%20Federalism%20-%20February%202009.pdf (discussing the impact of a national regulatory framework on the wireless market and articulating a new framework for wireless consumer standards).

[287] *See, e.g.,* S. Derek Turner, *Dismantling Digital Deregulation*, Free Press (May 2009), *available at* http://www.freepress.net/files/Dismantling_Digital_Deregulation.pdf (arguing that the deregulatory policies implemented in the telecommunications market over the last decade have failed and that a new era of active regulation is required).

[288] *See generally* Charles M. Davidson & Michael J. Santorelli, *Network Effects: An Introduction to Broadband Technology & Regulation*, U.S. Chamber of Commerce (Dec. 2008), *available at* http://www.uschamber.com/NR/rdonlyres/ew4ahwhwxqx6rxs4vrjebfzdxqt46nw5a67qsor3pa5jcvdgiuw2mwrmns4xe6kua5ce63mhjdk7ykfbx4ioliesrsa/ChamberIntroBroadbandPaperFinal121708.pdf (discussing the current regulatory framework for broadband).

[289] *See* Economic *Impact of Broadband: An Empirical Study*, at p. 8-9, LECG (Feb. 2009), *available at* http://www.connectivityscorecard.org/images/uploads/media/Report_BroadbandStudy_LECG_March6.pdf.

[290] *See* Press Release, *Study Shows Significant Economic Benefits From Broadband if Overall ICT Access and Skills are High*, March 5, 2009, Nokia Siemens Network, *available at* http://www.nokiasiemensnetworks.com/global/Press/Press%20releases/news-archive/Study%20shows%20significant%20economic%20benefits%20from%20broadband%20if%20overall%20ICT%20access%20and%20skills%20are%20high.htm (citing LECG/Nokia Siemens Network's *Connectivity Scorecard 2009*, *available at* http://www.connectivityscorecard.org/images/uploads/media/TheConnectivityReport2009.pdf).

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