Achieving Universal Broadband:

Policies for Stimulating Deployment and Demand

Alliance for Public Technology

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The Alliance for Public Technology would like to thank everyone who contributed to the collaborative process that produced this report. We began by conducting a series of informal discussions on broadband policies with a number of other public interest groups. A policy options paper was then prepared and circulated to a broader group of public interest advocates, policy experts, and representatives of various segments of the telecommunications industry. On May 18, 2006, the draft options paper formed the basis of a roundtable discussion that APT hosted at the headquarters of the Communications Workers of America. This discussion yielded a number of valuable comments and recommendations, which helped shape the policy recommendations outlined in this report.[1]

The Alliance is indebted to APT Board members and other reviewers for their unique and valuable insights. In addition, we would like to thank John Windhausen of Telepoly Consulting for conducting the basic research and writing the initial drafts and Dan Phythyon, former APT Public Policy Director, for coordinating the project and completing the report. We are also indebted to APT Program Associate Maytal Selzer for the layout of the paper and the Communications Workers of America for the production of the report.

The goal of *Achieving Universal Broadband: Policies for Stimulating Deployment and Demand* is threefold: to spark a re-evaluation of our nation's broadband policies; to examine options for more pro-active approaches to broadband deployment; and, to identify the most effective policy solutions that can be advocated in the current political landscape. We continue to welcome comment and support.

[1] APT wishes to emphasize, however, that the opinions and recommendations contained in this paper are those of APT, and should not be attributed to any of the roundtable's participants, who are listed in Appendix E.

About the Alliance for Public Technology

The Alliance for Public Technology (APT) is a nonprofit membership organization based in Washington, D.C., which was founded in 1989 to foster public policies that ensure access to advanced telecommunications technologies for all Americans. For more information about the organization, visit APT online at www.apt.org.

TABLE OF CONTENTS

Executive Summary……6

I. Introduction……7
II. Why Broadband Services are so Important……9
III. The United States is Falling Behind……11
IV. Why Current Policy Has Failed……16
V. APT'S Policy Recommendations……23

Appendix A……29
Appendix B……31
Appendix C……38
Appendix D……41

EXECUTIVE SUMMARY

The Alliance for Public Technology (APT) believes that our nation cannot reap the potential benefits created by advances in telecommunications technology unless everyone has full access to broadband networks and services. Broadband services are no longer a convenience but an essential part of life. They are critical to American competitiveness, educational infrastructures, economic development and innovation, and our quality of life.

Unfortunately, policy-makers have failed to put into place comprehensive telecommunication policies that promote broadband networks and services throughout the country, especially to underserved communities. Inefficient programs, outdated legislation and piecemeal policies have resulted in a disturbing void in broadband access among some sectors of our society.

In addition, the United States trails its global competitors in broadband adoption, telecommunication investments and the speed and price of broadband services. The United States is ranked 16th in the world in broadband penetration, falling from its 11th place ranking in 2002, a trend that foreshadows further slippage in America's future economic competitiveness. As the inventor of the Internet, the United States should develop polices that will encourage broadband deployment to ensure its role as the world leader in advanced technologies for years to come.

To reverse the current course, we must commit to implementing telecommunications reforms on a fast track. After careful analysis and thoughtful discussion with a broad array of policy experts and representatives from industry, consumer, labor and public interest groups, APT developed the following recommendations:

- **Establish clear national goals for broadband deployment.**
- **Require accurate reporting of broadband deployment, speeds and prices.**
- **Continue to foster private investment and marketplace competition.**
- **Require Universal Service Fund recipients to offer broadband services.**
- **Provide tax incentives, low interest loans, and grants for broadband deployment.**
- **Create an Office of Broadband within the Federal Government.**
- **Utilize non-traditional, non-telecommunications programs more effectively.**

APT hopes that this report not only will spark a re-evaluation of our nation's broadband programs but also the adoption of a comprehensive national policy promoting greater broadband deployment across our entire nation.

I. INTRODUCTION

The Alliance for Public Technology was founded in 1989 to foster public policies that ensure access to advanced technologies and their life-enhancing benefits for all Americans, regardless of income, age, ethnicity, location, or functional limitation. Our goal is to accelerate the deployment of broadband technologies, which can offer enormous benefits to our society. High-speed connections to every home and business in our nation will help to bring better and more affordable healthcare to all citizens; expand educational opportunities for lifelong learning; enable people with disabilities to function in ways they otherwise could not; create opportunities for jobs and economic advancement; make government more responsive to all citizens; and, simplify the way we access communications technology.

Despite the unmistakable benefits of broadband technologies, its deployment in the U.S. is being undermined by the failure of American policymakers to develop a coherent national policy supporting widespread access and affordability. The U.S. is the only advanced industrial country without an explicit national plan to promote broadband.[1]

As a result, the U.S. is falling behind other countries in both broadband penetration and deployment. While we rightly laud the success of the "E-Rate" program in wiring classrooms and libraries throughout our nation, we are failing to confront the next challenge: directly tying these vital institutions to our citizens through high speed connections. Instead, we are investing relatively less on telecommunications than other leading nations; we are charged more for slower speeds; there is a significant digital divide among our citizens based on income, geography and ethnicity; and high paid telecommunications jobs in the U.S. are disappearing. These shortcomings reduce our quality of life and inhibit the ability of our citizens to participate in a global economy increasingly based on high-speed communications.

The disappointing U.S. broadband market stems from the failure of our nation's leaders to articulate a comprehensive broadband program. For example, both Presidential candidates in the 2004 election voiced their support for bringing broadband to every home by the year 2007, yet neither set forth a specific plan to achieve that goal. Congress, too, has taken a piecemeal approach to articulating a broadband policy. Pending legislation deals only with limited policy reforms, and the future is not encouraging. This policy vacuum creates uncertainty, chills innovation, and depresses both the demand and supply of broadband services.

Ideally, our nation's commitment to the universal deployment of broadband connections would mirror the Eisenhower Administration's support for the Interstate Highway System and the Kennedy Administration's commitment to putting a man on the moon. Even if an all-out intensive effort is not feasible in the current political and economic climate, there still are a number of key steps our nation can and should take to stem our broadband slide.

In an effort to identify the most important elements of a pragmatic broadband policy framework, APT began a series of informal discussions on broadband policies with a number of other public interest groups. A policy options paper was prepared and circulated to a broader group

[1]Thomas Bleha, Down to the Wire, Foreign Affairs, May/June 2005.

of public interest groups, policy experts, and representatives of various segments of the telecommunications industry. On May 18, 2006, APT hosted a roundtable discussion on these topics at the headquarters of the Communications Workers of America. This discussion yielded a number of valuable comments and recommendations, which have helped to shape the policy recommendations outlined below.[2]

APT's goal is threefold: to spark a re-evaluation of our nation's broadband policies; to examine options for more pro-active approaches to broadband deployment; and, to identify the most effective policy solutions that can be advocated in the current political landscape.

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II. WHY BROADBAND SERVICES ARE SO IMPORTANT

Broadband technologies provide more than a faster way to surf the Internet. Access to broadband can significantly improve our education, health care, and commerce as well as our social interactions, thereby improving our economy and our quality of life. In short, virtually every aspect of our lives can be significantly enhanced with access to connections with high-speed capability in both directions, as the following examples demonstrate.

***Integrated Learning*:** Broadband access in homes will allow teachers and students to connect to each other from remote locations, which will enrich learning experiences and better prepare students for the future. For example, small rural high schools are using fiber optic networks to pool faculty resources and link remote classrooms, which allows the schools to offer all students advanced courses in subjects such as calculus, economics and foreign languages.

***Worker Training*:** Workers must be lifelong learners to keep up with changing technology and to advance in their careers. Broadband connections allow workers to overcome the barriers of time and distance to take training courses from all over the country that allow them to develop new work-place and technology skills. Some workers are using broadband connections to take on-line courses leading to associate and bachelor's college degrees, while other programs provide on-line networking certification training in Telecommunications.

***Telehealth*:** Using broadband connections, patients can check their pulse, screen their vision, monitor blood pressure, blood oxygenation, temperature, glucose levels and heart function and send this information in real-time to the medical staff. Patients and providers also can interact online through a videoconference activated by touching the appropriate icon. Once connected, a clinician can use a stethophone to expand the examination of a patient. Some states have developed telemedicine systems for prisons, which can significantly reduce the costs and risks to public safety of physically transporting prisoners to medical treatment locations.

Public Safety: Broadband can also improve the public safety capabilities of our police, fire and rescue authorities. For instance, firefighters can be equipped with the information they need before they get to fires. They can arrive faster, be informed of the layout and structure of buildings and have rapid communications with the other emergency vehicles involved. Broadband connections can give firefighters better opportunities to reduce casualties and minimize damage.

***Sign-Language Interpreting*:** Sign language interpreters can avoid the time and expense of traveling to their clients' locations by using videoconferencing over broadband connections to provide interpretation services for deaf and hard of hearing persons. Interpreters can work from a central office and the clients can be anywhere, so long as their locations have video conferencing devices and high speed connections, while interpreters can serve more clients by avoiding travel time between sites.

***Community Networking*:** Connecting local centers of activity is an important step in accelerating universal access to advanced services and delivering a wide range of services to local residents. Equipping community access points with broadband is also an effective way to provide training and instruction to community members who

might otherwise not have the skills to utilize the applications made possible by advanced telecommunications services.

Independent Living: Broadband connections can help senior citizens and people with disabilities to live independently, improving their quality of life and reducing the costs of care. Among other things, it levels the playing field for people with physical disabilities at job sites, sales establishments, and other types of businesses.

Connecting Remote Communities: Broadband can be especially effective in transforming life in isolated, remote communities. Wireless broadband services can connect communities that have no telephone service, let alone broadband services, and provide residents with their only connections to the rest of the Internet world.

***Economic Growth*:** Broadband services can effectively ''prime the pump'' of our nation's economy. Efficient information age infrastructures enhance productivity by providing intelligent networks that can handle converging voice, data and electronic commerce applications. These infrastructures provide a comparative advantage in ''knowledge-based'' industries, such as data processing, banking, insurance, management and technical consulting, travel planning, customer relations management, business logistics, etc.

***All* American citizens should have the rights to these broadband benefits.**

III. THE UNITED STATES IS FALLING BEHIND

The U.S. – the country that invented the Internet – has fallen behind our economic rivals and many other smaller countries in broadband adoption and deployment. We invest relatively less on telecommunications; we are charged more for slower speeds; we encounter a significant digital divide based on income and geography; and we lose high paid telecommunications jobs to foreign rivals.

Many of the existing U.S. broadband providers maintain that these other countries have unique characteristics that make broadband deployment easier – geography, population density, faster economic growth. Yet many nations ahead of the U.S. in broadband activity have more rural areas (i.e. Canada), more difficult terrain (i.e. Sweden) and less robust economies (i.e. Iceland) than the U.S. The true differentiating factor is that almost every nation except the U.S. has identified the promotion of broadband as a national priority and has actively taken steps to promote it.

The International Divide – the U.S. Compared to Other Nations.

The U.S. has fallen behind our major economic rivals in almost every measure of broadband – subscribers, price, speed and investment:

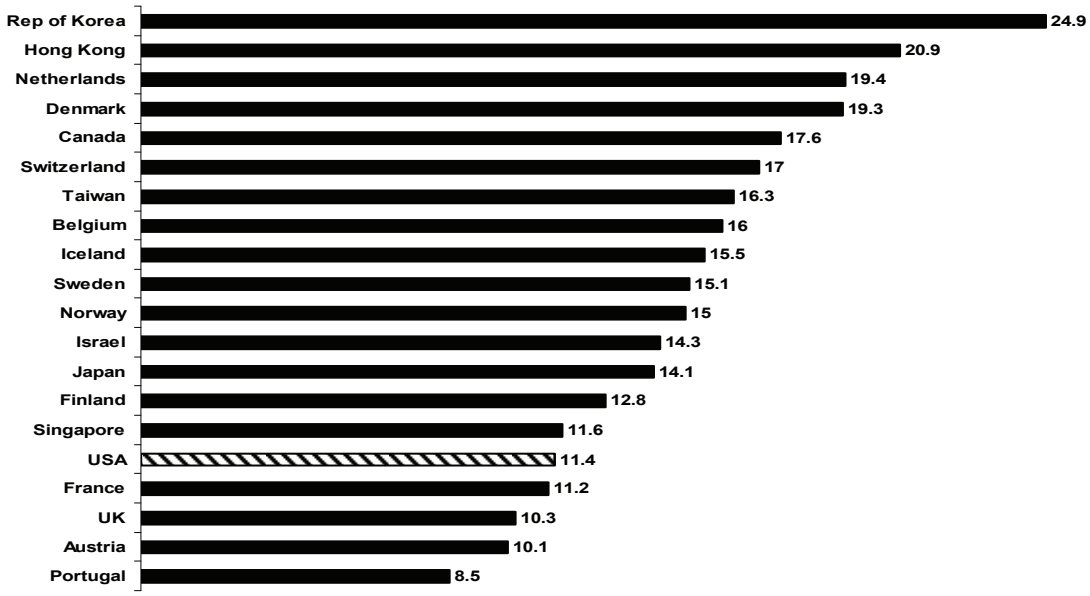
What passes for entry-level broadband service . . is downright sluggish in the U.S. compared with that in many other countries; and not just in tech-crazed locales like Korea and Japan, but also in the likes of France. The inferior value of U.S. broadband service becomes clear when you calculate the monthly "cost per megabit" of Internet access, or how much you pay to get a megabit's worth of download capability. In France, households can sign up for a $36 monthly service that promises download speeds of up to 20 megabits per second. Not only is that far faster than the Net access available to a typical American home, but it's also stunningly cheap at a cost of about $1.80 per megabit.[3]

The following discussion compares U.S. performance in these criteria with those of other countries from 2004 to 2006:

Broadband Adoption: The U.S. is 16th in the world in the percentage of inhabitants with broadband subscriptions. The countries ahead of the U.S. include South Korea, Japan, Canada, Iceland, Hong Kong, Israel and Iceland to name but a few. Moreover, we are falling behind at an alarming pace: in 2002 the U.S. was ranked 11th according to the International Telecommunications Union.[4] According to the Organization of Economic Cooperation and Development the U.S. fell from 4th to 12th from 2001 to 2005. From 2004 to 2005, the U.S. net growth ranked 15th out of the 30 countries surveyed. At this pace, other countries such as France, the United Kingdom and Austria will soon overtake U.S. in terms of per capita broadband penetration and we will fall further down the list – and in terms of competitiveness.

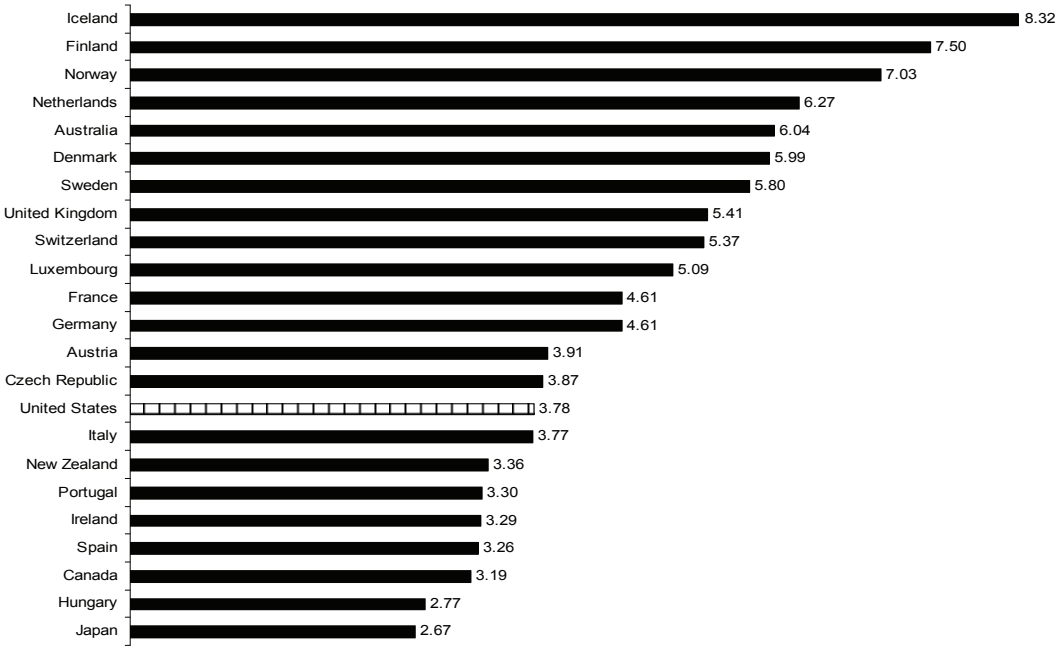
[3] For U.S. Consumers, Broadband Service Is Slow and Expensive By JESSE DRUCKER (WSJ) Nov. 16, 2005; Page B1 http://online.wsj.com/article/SB113210060413998328.html?mod=technology_main_promo_left.
[4] International Telecommunications Union, World Telecommunications Indicators Database.

Broadband Subscribers per 100 Inhabitants



Source: International Telecommunications Union, January 2005.

Net Increase in Broadband Subscribers per 100 Inhabitants, 2004 to 2005



Source: Organization for Economic Cooperation and Development, OECD Broadband Statistics, January 2005.

These rankings are significant because they provide an important measure of our potential economic competitiveness. The higher-ranking nations will be able to roll out products in a timelier manner, conduct commerce more efficiently and share information more effectively.[5]

Some critics argue that America lags behind other nations because our population is less dense; consequently, it is more expensive to deploy broadband infrastructure for a more spread out population. However, the population densities of Iceland and the Scandinavian countries are lower than ours while their per capita broadband deployment is higher.

The experience of other nations provides two valuable lessons. First, the deregulatory policies that we have relied upon for the past several years have not been enough to stem our descent in the international rankings. Second, there is no inherent technological reason for our low broadband penetration rates. The problem has been the lack of a coherent national policy to address the financial barriers of providing broadband in areas that are too expensive to serve profitably.

***Speed & Price Gap*:** The U.S. also lags behind other countries in relation to the speed and price at which broadband is offered. We pay more for less speed than subscribers in other countries. One recent analysis concluded that the average cost of 1 mbps of residential broadband in the U.S. is six times as expensive as in Japan or South Korea and four times higher than in France.[6] And as the chart below illustrates, while broadband prices are dropping in the U.S., prices have dropped faster in many other countries around the globe.

Average Cost* of 1Mbps of Residential Bandwidth per Month in Select Countries Worldwide, February/March 2005 vs. May/June 2006

	February/March 2005	May/June 2006
Australia	$8.85	$3.79
Canada	$7.00	$6.09
France	$3.05	$1.51
Germany	$46.32	$6.29
Hong Kong	$7.69	$7.69
Italy	$6.17	$2.34
Japan	$0.66	$0.75
South Korea	$1.79	$0.73
Spain	$52.11	$13.44
UK	$14.21	$2.86
US	$7.87	$6.10

Note: *Based on a representative selection of broadband offers of leading access providers in each country. Does not include short-term promotional offers (under 12 months) and the value of bandwidth equals download speed + upload speed/$ per month and does not include download caps; converted to dollars at the annual average exchange rate.
Source: eMarketer analysis from company reports,. June 2006

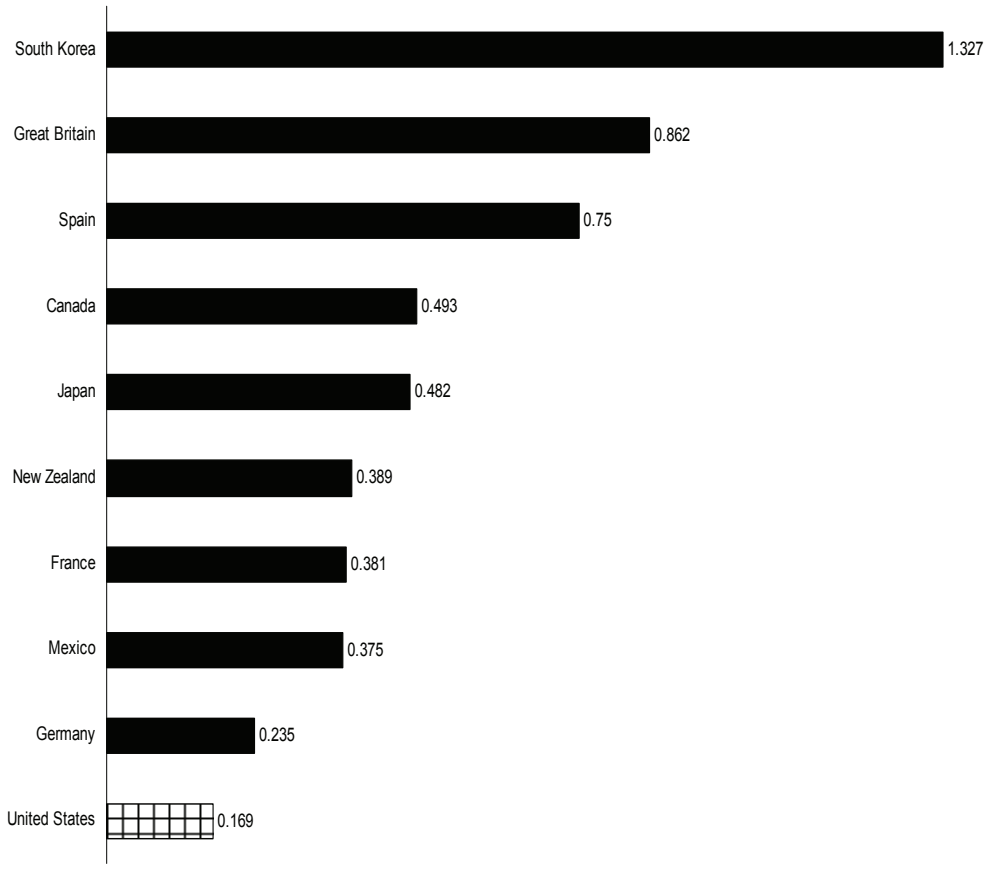
[5] According to the Economist magazine: ". . . America's internet leadership [has been] stolen by Japan and South Korea, where governments vigorously promoted the roll-out of very high-speed broadband connections—up to 40 megabits per second, compared with 1.5mbps or less in America." *Prophet of American Technodoom*, The Economist, Apr 21st 2005.
[6] Broadband Prices & Bundles: International Trends, eMarketer Reports, August 2006.

The U.S. even has an inadequate standard with which we measure broadband. The FCC defines a "high speed" connection as one capable of transmitting data at greater than 200 kilobits per second (kbps) in one direction – upload or download. Canada defines broadband as a connection capable of transmitting data at greater than 1.5 Mbps in both directions.[7]

Investment Gap: The U.S. also invests relatively less on telecommunications. The relative lack of telecom investment as a percentage of GDP is especially surprising given the relatively high rate of ownership of computers in the U.S. According to ITU statistics, the United States ranks second worldwide (Switzerland is first) in the percentage of personal computers per 100 inhabitants.[8]

Jobs & Service Quality Gap: Some communications carriers take the low road to competition by replacing good career-oriented and well compensated jobs with jobs – often provided by contractors – with less pay, little or no benefits and no job security. The result is high worker turnover and low customer service quality.

Telecommunications Investment as a Percentage of GDP



Source: ITU, Connect the World Database, 2006.

[7] S. Derek Turner, Broadband Reality Check, August 2005.
[8] ITU: Internet indicators: Hosts, Users and Number of PCs; available at http://www.itu.int/ITU-D/ict/statistics/at_glance/Internet04.pdf.

The U.S. Digital Divide

Our current universal service policies provide assistance for consumers of basic telephone services but not broadband. Not surprisingly, the majority of our population does not subscribe to high speed broadband. For example, more than 68% of households with incomes over $100,000 subscribe to high speed broadband at home, but less than 12% of households with incomes below $30,000 subscribe.[9]

The digital divide also separates urban/suburban from rural areas of the country: only 25% of adults in rural areas purchase broadband compared to 44% in urban and 46% in suburban areas.[10] The General Accounting Office (GAO) found that this difference is caused largely by the unavailability of broadband networks in the area, rather than by lack of interest by the rural households.[11]

Furthermore, the absence of a broadband policy has led to lower access among minority consumers. Broadband connections continue to trail in Black (31%) and Hispanic households (41%) compared to White households (42%), even though the take rate in minority households is increasing more rapidly than in White households.[12] The National Telecommunications and Information Administration (NTIA) found that adoption of broadband services was in large part limited because the prices for broadband services are unaffordably high. According to the NTIA, "Too Expensive" was the second leading reason why consumers do not subscribe to broadband, after "Don't Need/Not Interested."[13]

[9]"Broadband Deployment Is Extensive throughout the United States but It Is Difficult to Assess the Extent of Deployment Gaps in Rural Areas," May 2006, GAO-06-426, (hereinafter "GAO Report"), p. 30.

[10]Home Broadband Adoption 2006, Pew Internet and American Life Project, May 28, 2006, p. 3. Similarly, the GAO found that seventeen percent of rural households subscribe to broadband service, while 28 percent of suburban and 29 percent of urban households subscribe to broadband service. GAO Report, p. 30.

[11]GAO Report, p. 30.

[12]Pew, p. 3.

[13]See, "A Nation Online: Entering the Broadband Age, September, 2004, U.S. Department of Commerce, Economics and Statistics Administration and the National Telecommunications and Information Administration (NTIA), available at http://www.ntia.doc.gov/reports/anol/index.html.

IV. WHY CURRENT POLICY HAS FAILED

The United States' Reliance on Free-Markets Is Not Enough.

Universal telephone service has traditionally been a bi-partisan policy objective. There have been few disagreements among Republicans and Democrats about the need for programs to ensure that basic telephone service is available and affordable. For instance, after the divestiture of AT&T in the early 1980's, the Republican Chairman of the FCC, Mark Fowler, implemented plans to create a high-cost fund for rural telephone companies and established the Lifeline and Link-Up programs for low-income consumers. In 1996, when the Republican Congress and the Democratic Clinton Administration joined together to enact the Telecommunications Act, they agreed to codify the universal service program and expand it to include subsidies for schools and libraries and rural health care.

The parties also agreed upon the need to improve the country's broadband status. Both candidates for President in 2004 spoke of the importance of expanding broadband deployment. Republican and Democratic policy-makers in Congress and at the FCC frequently bemoan the poor state of the U.S. broadband marketplace.

Unfortunately, U.S. policy-makers have done little more than issue grand rhetorical calls for greater broadband. As demonstrated above, while a light regulatory touch for broadband can maximize the use of private capital in deploying broadband and will help to minimize the costs of other solutions, simply relying on the marketplace to answer our broadband needs has failed to produce the benefits that are being more widely achieved by other countries. This section reviews the efforts of the federal government to date and discusses why relying entirely upon the marketplace is simply not adequate.

A. Congress and the Administration

In enacting the Telecommunications Act of 1996, Congress and the Clinton Administration largely focused their attention on narrowband services. The major issues involved whether the Regional Bell Operating Companies (RBOCs) would be allowed to provide long distance service, whether competitors could enter the local telephone market, and how basic cable service would be regulated. The only provision addressing advanced services specifically was section 706, which directs the FCC and states to "encourage" the deployment of advanced services. Congress specifically rejected calls to require carriers to deploy specific broadband facilities by a certain date.

Since 1996, Congress and the Clinton and Bush Administrations have largely focused on removing the barriers to entry by broadband competitors, hoping that competitors come forward to spur greater broadband deployment. For example, on March 26, 2004, President Bush endorsed the goal of universal broadband access by 2007. Then on April 26, 2004, President Bush announced a broadband initiative, which included promoting legislation to permanently prohibit all broadband taxes, making spectrum available for wireless broadband, creating technical standards for broadband over power lines, and simplifying rights-of-way processes on federal lands for broadband providers.[14] This "hands-off" approach has yielded some new investment in the long-haul market and the local business market.

[14] See White House, *A New Generation of American Innovation*, April 2004. Available at [http://www.whitehoU.S.e.gov/infocU.S./technology/economic_policy200404/innovation.pdf].

Nonetheless, there has been less investment in broadband facilities for local residential consumers than in other countries where pro-active government policies provide financial and other incentives for broadband investment.

B. The Federal Communications Commission

Similarly, the FCC has generally taken a light-handed approach to broadband, hoping that the market would stimulate greater investment without government involvement. It has not utilized its authority under Section 706 to take more pro-active steps to promote broadband deployment. Instead, in its required reports on deployment, the FCC has concluded that no further action to stimulate broadband is necessary. The FCC's definition of high-speed service (any service over 200 kbps) is extremely slow compared to most other nations' broadband speeds,[15] which allows the FCC to conclude that broadband services are being deployed in a timely manner without the need for any further direct action. Instead, the FCC has focused on removing barriers to entry to new broadband technologies, such as spectrum-based Wi-Fi and Wi-Max services and broadband over power lines. Unfortunately, it is not certain whether or when these technologies will be commercially viable.[16]

As the U.S. slips further behind our economic competitors in international rankings of deployment, it is evident that the U.S. cannot simply rely upon market forces alone to achieve our broadband goals.

How Other Nations Have Pro-Actively Promoted Broadband.

Broadband telecommunications network development has become a national priority for many nations. Governments in many developed and developing nations, including Canada, South Korea and Japan, have organized a cohesive and comprehensive strategy for stimulating capital investment in broadband infrastructure in ways United States public and private sector stakeholders have yet to embrace.[17] Some of the successful strategies pursued by these nations include:[18]

- Developing a vision and strategy
- Investing in infrastructure, aggregating demand and serving as an anchor tenant;
- Promoting digital literacy, i.e., the ability to use digital technologies to pursue information, communications and entertainment interests;
- Fostering facilities-based competition;
- Creating incentives for private investment and disincentives for litigation and other delay tactics;
- Offering electronic government services, including healthcare, education, access to information, and licensing;
- Promoting universal service through subsidies and grants; and,
- Revising and reforming governmental safeguards to promote a high level of trust, security, privacy, and consumer protection in broadband services, including electronic commerce.

[15]FCC defined "advanced service" as exceeding 200 Kbps both upstream and downstream and "high-speed" service as exceeding 200 Kbps in at least one direction, in order to distinguish these from existing data services based on widely available analog telephony and ISDN technology.

[16]Total households derived from data in "The Couch Potato Wars," Bernstein Research, May 2005.

[17]"Those countries that have done well [in promoting broadband subscribership], have done well because of active government policies for the development of broadband," said Lara Srivastava, telecom policy analyst for the Geneva-based ITU, which is part of the United Nations. "In the U.S., they don't have active policies like Korea or Singapore, or Japan." Quoted in Technology Daily, "U.S. Drops Further Behind in Broadband Race," by Drew Clark, April 26, 2005, available at http://www.njtelecomupdate.com/lenya/telco/live/tb-QGBX1114459808856.html.

[18]APT has long supported many of these strategies to promote the deployment of advanced telecommunications facilities. One other factor that has improved other nations' broadband performance relates not to investment incentives but to pricing policy. Unlike in the United States, telecommunications consumers in many nations must pay per-minute rates for access to voice telephone and dial-up Internet services. With the onset of broadband services, charged on a flat-rated monthly basis, even moderate World Wide Web surfers could opt for unlimited access at a slightly higher rate.

According to one report, successful broadband incubation appears to require government involvement, albeit with a light hand, that stimulates and rewards investment, reduces unneeded regulatory scrutiny, and promotes global marketplace attractiveness without "tilting the competitive playing field" to favor a specific technology or company.[19]

Current Federal Programs Cannot Fill the Gap.

Congress has adopted two subsidy programs. Unfortunately, neither of those programs has effectively addressed the market failures discussed above.

A. The USDA's Broadband Program

In 2002, Congress enacted the Rural Broadband Access Loan and Loan Guarantee Program in the Farm Security and Rural Investment Act of 2002. This program authorizes about $2 billion in loans and loan guarantees for broadband facilities annually. These loans are extremely difficult to obtain, however. In many cases, the existing RUS borrower (usually the local telephone company) has a preference. Because grants cannot be awarded to more than one broadband provider in a market, some telephone companies have applied for a broadband loan even if it is not needed, simply to block any other competitor from receiving funding to serve that market. Indeed, in many cases an approved applicant does not draw upon the funds it is awarded in part because the applicant does not really need the funding.

The RUS program also has been criticized because its loans are often used to subsidize additional broadband deployment in areas already served by companies that received no government subsidies, rather than access for consumers living in heretofore unserved areas.[20]

The GAO confirms that a number of RUS requirements make it particularly difficult to acquire funding for rural areas. The RUS requires applicants to prove beforehand that their business will be capable of repaying the loan, but proving profitability can be difficult in rural areas which have fewer subscribers per square mile. The RUS rejects applications that do not demonstrate beforehand that they will be commercially successful. As a result, the agency has been unable to distribute all of its loan program funds. RUS appropriations could support just over $2 billion in loans in 2005, but only 5 percent—or $112 million—was awarded to broadband projects in 2005.[21] Industry participants have complained about the opacity of RUS rules as well, alleging that RUS rules make it difficult for all parties, including the RUS staff, to assess the status of existing broadband service in markets that applicants propose to serve, whether applicants' assertions about such broadband are accurate, and whether, given the level of competition and service already in the market, the requested loan is likely to be repaid or is otherwise an appropriate use of taxpayer funds.[22]

B. The FCC's Universal Service Fund Program

The federal Universal Service Fund (USF) program does not directly promote broadband deployment. The FCC has specifically refused to expand the list of services provided by the USF program to include broadband. High-cost telephone companies that receive funding from the USF are not expressly permitted to use those funds to deploy broadband services (although they are permitted to use these funds for their general network expenses). Furthermore, small

[19]Frieden.
[20]Testimony of Tom Simmons, Midcontinent Communications, before the Senate Committee on Agriculture on the RUS Broadband Loan Program, May 17, 2006, at pages 2-3 . See http://www.ncta.com/DocumentBinary.aspx?id=380.
[21]GAO Report, p. 35.
[22]Simmons testimony, p. 3.

rural telephone companies receive most of the high-cost funding, even though larger telephone companies (such as the RBOCs) actually serve more rural consumers. Finally, low-income consumers who qualify for subsidies under the Lifeline and Link-Up programs cannot receive such subsidies for broadband services.

Background

In the early 1900s, AT&T recognized that promoting universal service using internally generated financial subsidies also supported the "benevolent" view of the monopoly Bell System. When AT&T President Theodore Vail articulated his vision of "one policy, universal service," he sought "the unification of telephone service under regulated local exchange monopolies."[23] The subsidy policy helped the Bell System ward off competition by allowing it to argue that competition would undermine universal service.

When AT&T was broken up in 1984, the FCC continued the universal service policy by requiring the long distance companies to pay funds (called "access charges") to the local companies. The FCC also created an identifiable universal service fund for the first time. Together the access charge payments and universal service fund contributed to the costs of providing local service in order to keep local service rates low. While the FCC stated that these decisions would serve universal service needs, consumers remained relatively oblivious because there was no specific line item on the consumer's bill.

Congress also relied on the FCC's universal service obligation for its very first piece of legislation mandating access to the telephone network by people with disabilities: the Telecommunications for the Disabled Act (TDA) of 1982.[24] Prior to the AT&T divestiture, some local exchange companies had begun subsidizing the costs of this expensive equipment with revenues received for their telephone services. Although both the terms of the AT&T divestiture and the FCC's Computer II ruling banned the continued use of such subsidies for equipment sold to the general public (so as not to give an unfair competitive advantage to telephone companies that wished to begin selling equipment), Congress realized that the prohibition on cross-subsidization could produce significant increases on the high-priced teletypewriters (TTYs) and other specialized customer premises equipment (SCPE) needed for telephone access by people with disabilities. In the TDA, the legislature relied upon the universal service obligation to allow local telephone companies to continue subsidizing the costs of providing SCPE with rates received from general telephone subscribers. This also was the first of two laws to ensure the availability of hearing aid compatible telephones. If specialized equipment were to lose access to telephone service, it would "disserve the statutory goal of universal service [and] deprive many individuals of the opportunity to have gainful employment. The costs of such lost access, including impairment of the quality of life for disabled Americans, far exceed the costs of maintaining service that the current system allows telephone companies to include in their general revenue requirements." [25]

Reliance on the universal service obligation can also be found in other pieces of federal regulations designed to ensure access by people with disabilities. For example, Title IV of the Americans with Disabilities Act incorporated this obligation into the mandate to provide nationwide relay services: "In order to carry out the purpose established under section 1, to make available to all individuals in the United States a rapid, efficient nationwide communication service, and to increase the utility of the telephone system of the Nation, the Commission shall ensure that interstate and intrastate telecommunications relay

[23]Milton L. Mueller, Jr., *Universal Service: Competition, Interconnection, and Monopoly in the Making of the American Telephone System* 92 (1997).
[24]P.L. 97-410, 94 Stat. 2043 (1982), codified as amended at 47 U.S.C. §610 (1988).
[25]H. Rep. No. 888, 97th Cong., 2d Sess. 3-4 (1982).

services are available, to the extent possible and in the most efficient manner, to hearing-impaired and speech-impaired individuals in the United States."[26]

The Telecommunications Act

The Telecommunications Act of 1996 (1996 Act) expanded and clarified the universal service system. The Act codified the universal service mission and established specific requirements for the FCC to implement, such as requiring that rural consumers have access comparable to that of urban consumers, and that elementary and secondary schools and classrooms, health care providers and libraries have access to advanced services (commonly called the "E-rate" program). The 1996 Act also codified the Universal Service Fund (USF) and directed the FCC to collect and distribute money to meet these goals. The Act required universal service subsidies to be "explicit." The FCC created the Universal Service Administrative Company (USAC) to administer the USF.

Collections

The 1996 Act requires "every telecommunications carrier engaged in interstate communications" to contribute to the Universal Service Fund. The FCC currently uses a "revenues-based" system – each carrier contributes a percentage of its interstate and international, end user, telecommunications revenues into the USF.[27] Most telecommunications companies pass this charge onto the consumer by placing a surcharge on each consumer's telephone bill. The contribution factor has risen from 5.7% in 2000 to 10.9% for the second quarter of 2006.

Distributions

The USF has grown from $3.3 billion in 1998 to an expected $7.1 billion in 2006. The USF consists of four separate programs. The High-Cost fund takes up the largest portion of the USF at 58%, the Schools and Libraries program second at 28%, the Low-Income program third at 12%, and the Rural Health program than 1%. (estimated for 2006):

	Est. 2006 Funding	Percentage of Total USF
Low-Income	$856 Million	12%
High-Cost	$4.1 Billion	58%
Schools & Libraries	$2 Billion	28%
Rural Health	$57 Million	1%
TOTAL	**$7.1 Billion**	**100%**

Based on Federal Universal Service Support Mechanism Fund Size, Projections for the 2nd Quarter, 2006, filed by the Universal Service Administrative Company with the FCC, Jan. 31, 2006 (Numbers may not add due to rounding.)

[26] 47 U.S.C. §225 (b). See also *Access to Telecommunications Equipment and Services by the Hearing Impaired and Other Disabled Persons.* Order Completing Inquiry and Providing Further Notice of Proposed Rulemaking, CC Dkt. No. 87-124, FCC 89-242, 4 FCC Rcd. 6214 (1989) (July 27, 1989), in which the FCC relied in part upon its general obligation under the Communications Act to ensure universal telephone service for all Americans to mandate the provision of interstate relay services. This order came before the ADA's broader mandate for both inter and intrastate relay services.

[27] The telecommunications relay services fund uses the same funding mechanism. One difference is that under the FCC's rules, interstate companies are not permitted to list a surcharge for relay services on subscriber bills.

Lifeline/Link-Up Program

The Low-Income program reimburses local wireline and some wireless telephone companies for providing service discounts to qualifying low-income consumers. The Link-Up America program offsets one-half of the initial installation (hook-up) fee, up to $30.00. The program also encourages carriers to offer a deferred payment schedule for the initial installation fee. The Lifeline Assistance Program provides a discount of up to $10 per month for basic telephone service. Residents of American Indian and Alaska Native tribal communities may qualify for up to an additional $25 in support beyond current Lifeline support levels and expanded Link-Up support of up to $70 in additional support beyond current levels. The program also provides support for toll (long distance) limitation services and (until mid-2007) support for people suffering from the effects of hurricane Katrina. Approximately 95% of all low income funding goes to support the Lifeline Assistance program.

High-Cost Program

The High-Cost Program of the Universal Service Fund ensures that consumers in all regions of the Nation have access to and pay rates for telecommunications services that are reasonably comparable to those services provided and rates paid in urban areas. Without high cost support, residents of some areas of the country would have to pay significantly more for telephone services than those living in other areas because of factors such as dense terrain, low populations, or the high fixed costs of building a telecom network.[28] The High-Cost program provides financial support to local wireline and some wireless telephone companies that offer telecommunications services in areas where the cost of providing service exceeds a national or state average by between 115% and 135%.

Carriers operating in high-cost areas are divided into rural and non-rural. For the smaller, rural carriers, high-cost support is determined by their embedded (what the carriers often call their "actual") costs. For larger, non-rural providers, the FCC uses a cost model to determine per-line costs for local line support for their rural exchanges. The model compares the statewide average cost of telephone service to the national average, and provides funding only to carriers that exceed a certain percentage of the national average. This statewide averaging method may deny support to a large carrier if a low-cost-of-service area exists anywhere in their service territory within a state. A better approach, some reformers believe, would be to provide funding to non-rural carriers based on more localized cost measurements to ensure that eligibility is better linked to actual needs.

Of the $3.8 billion in high-cost funding awarded in 2005, $2.7 billion was awarded to rural telephone companies, and $1.1 billion was granted to non-rural telephone companies. Also, $3.2 billion was awarded to incumbent local exchange carriers (ILECs) and $600 million was awarded to competitive eligible telecommunications carriers (CETCs). [29]

Schools and Libraries Program

The Schools and Libraries "E-rate" Program provides discounts of 20-90%, based on the percentage of students eligible for subsidized lunches, for access to basic, local and long distance telecommunications services, including voice, data, video and wireless services, Internet access and the cost for installing and maintaining internal connections including switches, hubs, routers and wiring. A maximum of $2.25 billion is available annually.

[28]The GAO found that "it is more costly to serve areas with low population density and rugged terrain with terrestrial facilities than it is to serve areas that are densely populated and have flat terrain. It also may be more costly to serve locations that are a significant distance from a major city. As such, these important factors have caused deployment to be less developed in more rural parts of the country." GAO Report, p. 19.

[29]2005 Annual Report, Universal Service Administrative Company.

Rural Health Care Program

The Rural Health Care Program ensures that health care providers located in rural areas pay no more than their urban counterparts for telecommunications services, including those "telemedicine" services needed to access advanced diagnostic and other medical services available at urban medical centers. The Rural Health Care mechanism is not fully utilized by potential recipients, and spending for that program does not approach its cap of $400 million per year.

USF Has Not Expanded to Cover Broadband

Although the 1996 Act explicitly allows the FCC to amend its universal service policies over time to incorporate new services, it has declined to do so. Section 254(c)(1) states that:

Universal service is an evolving level of telecommunications services that the Commission shall establish periodically under this section, taking into account advances in telecommunications and information technologies and services.[30]

In 1997, in the FCC's first effort to interpret its universal service mandate, the Commission chose not to include "advanced" services or dial-up Internet access in its definition of the "core" services eligible for universal service support.[31] The FCC re-affirmed this decision in 2003. The Commission found that "high-speed and advanced services currently do not meet the Act's criteria for inclusion on the list of supported services" because they "are not subscribed to by a substantial majority of residential consumers." It concluded that "although advanced and high speed services are useful for educational, public health and public safety purposes, they are not essential for these purposes."

The Commission expressed significant concern about the cost of adding advanced services to the definition of universal services:

If advanced or high-speed services were added to the list of supported services, it could drastically increase the financial burden placed on carriers and, ultimately, consumers because all eligible telecommunications carriers would be required to offer such services in order to receive support. We agree with the Joint Board that the public interest would not be served by substantially increasing the support burden by expanding the definition of universal service to include these services.

Nevertheless, the Commission avowed its determination not to erect barriers to broadband deployment. It noted that:

Even though advanced services are not directly supported by the federal universal service, "[Commission] policies do not impede the deployment of modern plant capable of providing access to advanced services." We recognize that the network is an integrated facility that may be used to provide both supported and non-supported services. [footnotes omitted].

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[30]In establishing the definition of services that are eligible for USF support, Section 254(c)(1) directs the Commission to consider "...the extent to which such telecommunications services—
(A) are essential to education, public health, or public safety;
(B) have, through the operation of market choices by customers, been subscribed to by a substantial majority of residential customers;
(C) are being deployed in public telecommunications networks by telecommunications carriers; and
(D) are consistent with the public interest, convenience, and necessity.

[31]The FCC found that the following nine "core" services would be eligible for USF support: single-party service; voice grade access to the public switched telephone network; local usage: Dual Tone Multifrequency signaling or its functional equivalent; access to emergency services; access to operator services; access to interexchange service; access to directory assistance; and toll limitation services for qualifying low-income consumers. *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Report and Order, 12 FCC Rcd 8776, 8807-25, para. 56-87 (1997) (*First Report and Order*) (subsequent history omitted).

V. APT'S POLICY RECOMMENDATIONS

The U.S. broadband market is clearly struggling to keep pace with our international competitors, and our current policies are inadequate. From top to bottom, the federal government has failed in its responsibility to ensure that all Americans benefit from broadband services. The policy vacuum chills investment and reduces consumer demand for broadband services. As a result, the U.S. is in danger of losing its position as world leader in high-technology industries.

Our current approach to broadband simply does not appreciate that broadband services are no longer a convenience; they are increasingly an essential part of quality of life and economic growth in present day society. Broadband services are a critical infrastructure need, as vital as transportation, for consumer welfare and overall economic strength. Commercial transactions over the Internet are growing to the point that retail stores are being threatened. Workers are increasingly able to telecommute over broadband connections.[32] E-government is providing important public services on line, and seniors were able to register for the Medicare Part D prescription drug benefit over the Internet. Consumers are posting blogs, watching movies and making phone calls over broadband lines that are replacing traditional delivery mechanisms. Those consumers who do not have access to broadband services could well be left behind in the growing digital society. In fact, in the event of a natural disaster, a man-made emergency or a pandemic, broadband may be indispensable to our national security.

Almost every other developed nation has taken steps to ensure that broadband service is widely deployed in rural areas and available to the general public at affordable rates. For instance, Canada, which has more rural areas than the U.S., has specific broadband grant programs for rural communities and local governments are signing onto local broadband networks as "anchor tenants" in order to encourage broader deployment. Other countries have subsidized computers and promoted the use of specialized content to make broadband services more attractive. While U.S. policy-makers have issued rhetorical calls for greater broadband, there has been no organized or systematic broadband plan.

To address this void, which threatens the U.S. world leadership in high-technology industries and applications, we should adopt the following policies, which are discussed in more detail below:

- **Establish clear national goals for broadband deployment.**
- **Require accurate reporting of broadband deployment, speeds and prices.**
- **Continue to foster private investment and marketplace competition.**
- **Require Universal Service Fund recipients to offer broadband services.**
- **Provide tax incentives, low interest loans, and grants for Broadband Deployment.**
- **Create an Office of Broadband within the Federal Government.**
- **Utilize non-traditional, non-telecommunications programs more effectively**.

[32]This is especially true of people with disabilities and a growing population of senior citizens who are remaining in the workforce longer than ever before.

Establish clear national goals for broadband deployment.

Our goal should be to have at least 50% of our citizens, regardless of their location or demographic status, connected to broadband services with 10 mbps downstream and 1 mbps upstream capacity by the end of 2010. As technology improves and consumer demand evolves, we should adjust the speed and percentage of penetration targets upward.

Require accurate reporting of broadband deployment, speeds and prices.

While the FCC collects information on broadband deployment from providers twice yearly, this process is inadequate. As noted above, the FCC's definition of high-speed services (200 kbps in at least one direction) is out of date, and under the FCC's standards, a zip code is considered to have broadband service if there is a *single* broadband subscriber residing within it. Furthermore, advertised broadband download or upload speeds are not always reliably available to customers.

To permit us to more accurately access the success of our nation's deployment efforts, and to ensure that consumers can make accurate, informed decisions about the broadband choices available to them, broadband providers should distribute, and the government should regularly collect, more accurate information about broadband deployment, speeds, and prices.

Continue to foster private investment and marketplace competition.

Although the vast share of the broadband marketplace is currently held by a duopoly comprised of incumbent telephone providers and incumbent cable operators, competition is driving these two industry sectors to invest in upgrading their networks and to attempt to differentiate their services by offering higher speeds, lower prices, or both.[33] We should continue to maximize incentives for private investments in broadband services and promote marketplace competition, by:

- streamlining the video franchising process;
- encouraging the provision of wireless broadband services by making additional licensed and unlicensed spectrum available;
- promoting the availability of affordable satellite broadband services;
- facilitating Broadband over Powerline ("BPL") technologies;
- allowing municipalities or other government entities to provide broadband services, directly or in partnership[34] with private entities.
  - -the facility's government status should not afford them with an unfair competitive advantage over those of private providers; and
  - -the facility should not be allowed to undercut prevailing wage and benefits standards in the region.

[33]According to the Wall Street Journal, AT&T recently raised its highest speed for residential consumers in April 2006, from 3 mbps to 6 mbps. Verizon recently raised its fastest connections in the New York City area from 30 mbps to 50 mbps, shortly after Cablevision Systems raised its standard offering in that region from 10 mbps to 15mbps, and added a 30 mbps tier. Such competition is also causing phone and cable systems to increase the upload speeds of their offerings. Options Expand For High-Speed Internet, by Shawn Young and Dionne Searcey, (WSJ), July 25, 2006; Page D1.

[34]The GAO found that one of the ways that communities have addressed the lack of broadband in rural areas has been to gather community leaders to work together to enhance the likely market success of private providers' entry into rural broadband markets. Some community leaders have helped to coordinate the Internet needs of various users – aggregating demand – so that a potential entrant would be guaranteed enough traffic to support a business plan. The GAO noted that the state government of Kentucky, and local leaders in Alaska and Massachusetts, have been particularly successful in stimulating interest from broadband providers to serve their rural communities.

Require Universal Service Fund recipients to offer broadband services.

The high costs of providing broadband service in rural areas delays deployment and contributes to the rural/urban divide. The high-cost portion of the current USF fund indirectly supports some broadband purposes, since improvements to older local loops and running fiber closer to customers' homes are included in the historical costs that are the basis for rural companies' high-cost loop support.[35] It is time to make deployment of broadband services an explicit priority for the USF program.

APT supports transforming the existing USF fund, rather than attempting to create a new fund or a new program.[36] The high-cost program has worked relatively well for the subset of rural areas in which carriers receive such support. Furthermore, in many respects, broadband technologies can be viewed as an evolution of the existing telecommunications infrastructure. Just as local exchange carriers used USF funds to upgrade from mechanical switching to electronic switching, and party line service to single-line service, carriers now should explicitly be obliged to use USF to upgrade their copper-based plant to fiber and IP switching.

Wider availability of broadband services does not guarantee that the rates for these services will be affordable for low-income consumers. While DSL rates are dropping, DSL does not offer the speeds or capacity that consumers will need for many desirable services, and even DSL prices at $20-25 per month may be beyond the reach of many low-income consumers. Thus, a subsidy program for low-income Americans is likely to be necessary to ensure that these consumers can afford broadband services.

A. Distributions.

i. Fund recipients must offer broadband services.

- Carriers that receive universal service support must offer broadband services to all of their customers. Within 3 years, such carriers must offer their customers broadband access to a minimum of 1.5 mbps (with exceptions for customers in truly remote, low density areas). The minimum speed required of supported carriers will evolve upward, as technology improves and consumer capacity demands increase.
- USF support should be used to promote consumer access and connectivity to broadband services, not to promote competition among carriers.
- Eligibility requirements for broadband providers should be neutral with respect to technology, but should include carrier of last resort obligations, standards for E911 connectivity, service quality, sustainability during periods of emergencies, etc.
- The USF system should make support available to eligible carriers that serve high-cost rural areas, regardless of the size of the carrier.
- Carriers that receive USF support should be required to demonstrate their progress in deploying and improving broadband services as a condition of funding.

[35]Factors That May Increase Future Spending from the Universal Service Fund, Congressional Budget Office, June 2006, p. 25.

[36]An alternative to amending the existing USF rules is to create a new broadband program within the USF structure. The existing fund already consists of 4 different programs; there would be few administrative costs to creating a 5th program specifically for broadband underneath the USF umbrella. This would permit the fund to take advantage of the existing administrative efficiencies of the current program (the USAC), while setting forth new criteria for determining eligibility requirements for funding that are more appropriate to a competitive marketplace.

A different option would be to establish a new fund, totally separate from the existing USF. This would give policy-makers the opportunity to think anew about the most efficient structure or programs to accomplish their broadband goals. Such a fund could focus on the particular technologies designed to give the most efficient broadband services, and support the most efficient technology in each particular market, depending on the particular geography, income and mix of residential and/or business populations.

ii. Support for Low-Income Consumers.

The existing Lifeline and Link-up programs help make telephone service affordable for low-income persons. Lifeline provides a discount off monthly phone rates; Link-Up provides a discount for the initial connection charge.

These programs should be revised to provide support for broadband connection charges and monthly charges for low-income consumers.

- Applying Lifeline and Link-up support to broadband connections will be particularly helpful for deaf and hard of hearing consumers, who are becoming increasingly reliant on broadband technologies for point to point video, video relay, and Internet-based relay services. These individuals are discarding their PSTN-based TTYs and rapidly moving exclusively to broadband technologies to meet their communication needs. If USF funds remain available only for narrowband technologies, individuals with hearing disabilities who have low incomes will not derive any benefit from the existing Lifeline and Link-Up programs.

B. Contributions -- broaden the funding base

Currently, contributions to the USF are based on "interstate and international, end user, telecommunications" revenues.

- The funding mechanism for broadband support should be expanded to include interstate and intrastate revenues from all "communications services," defined to include telecommunications services, broadband access services, and IP-enabled voice services. [37]
- Our USF policies should not foreclose the use of appropriated funds, if additional revenues are needed to achieve the goal of universal, affordable broadband services.

Provide tax incentives, low interest loans, and grants for broadband deployment.

- Congress should provide companies that deploy broadband facilities in unserved or underserved communities (rural or urban) with tax incentives (either tax reductions, or "expensing" of broadband investments).
- The Rural Utilities Service (RUS) program should be improved. Currently, the RUS implements two programs specifically targeted at providing assistance for broadband deployment in rural areas: the Rural Broadband Access Loan and Loan Guarantee Program and Community Connect Broadband Grants. These loans are extremely difficult to obtain, however.
- A new program (similar to RUS) should be created to provide assistance for broadband deployment in unserved and underserved urban areas.
- Federal government block grant programs should be expanded. For example, within the Department of Commerce, the Economic Development Administration's "Public Works" program has awarded broadband grants to communities with economically distressed areas, to upgrade or expand their economic infrastructure to support the next generation of industry or commerce, such as telecommunications infrastructure and other sustainable development activities including eco-industrial parks.[38]

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[37]The FCC recently moved current USF policy closer to this goal by making several "interim" modifications to its contributions mechanisms, most notably by requiring providers of interconnected VoIP service to contribute based on actual calculations of their interstate revenues or "safe harbor" estimates. *Universal Service Contribution Methodology,* Report and Order and Further Notice of Proposed Rulemaking, WC Dkt. No. 06-122, June 21, 2006.

[38]The Southside Virginia Broadband Project is an example of an EDA Public Works program investment to promote broadband. EDA invested $6 million to help construct approximately two hundred ninety-four miles of fiber optic backbone to initiate broadband internet access to a wide area of rural southern Virginia. EDA's assistance brought broadband access, for the first time, to thirty-five business, commercial and industrial parks, and through nine counties and three independent cities. The new and expanding businesses are expected to create more than one thousand five hundred jobs and to generate over $140 million in private investment.

Create an Office of Broadband within the Federal Government.

An Office should be established within the Department of Commerce to coordinate all federal activities and resources devoted to the deployment of broadband technology in unserved and underserved areas. This Office would highlight the importance of broadband to the national economy and ensure that it receives a high priority within the Administration.

Utilize non-traditional, non-telecommunications programs more effectively.

Leverage the capital streams within non-traditional, non-telecommunications programs.

Broadband should be viewed as a subset of other program priorities, such as housing or community development. For example, One Economy Corporation's Bring IT Home campaign recognized that the Low-Income Housing Tax Credit helped develop approximately 70% of all new housing development targeted to low-income Americans. The Low-Income Housing Tax Credit (LIHTC), section 42 of the Internal Revenue Code, provides a per-capita grant to states, who in turn administer a competitive process which essentially inverts the debt to equity ratio in multi-dwelling housing construction. Private sector corporations provide more than $12 billion annually in investment funds in return for the internal rate of return that goes with the LIHTC tax credit. Placement of the tax credit devolves from the treasury to the fifty individual states and, because of the debt to equity inversion, is highly competitive, often oversubscribed to three and four to one.

Thus, the competitive criteria set forth by the state act as an instrument for social and economic policy. One Economy's Bring IT Home campaign, for which Senator Bill Frist and Senator Harry Reid served as honorary co-chairs, inspired 42 states to amend their competitive allocation of Low-Income Housing Tax Credits to ensure that broadband networks were considered universal design standards with any LIHTC projects and, further, that the monthly recurring cost of the broadband service itself was an eligible operating expense and should be rolled into the housing operating expense as is done for such functions as security, landscaping, and garbage collection. The net effect of this was that in 2005 alone, 200,000 low-income Americans got broadband in their homes and, because the tax credits are awarded annually, this adds approximately 200,000 new people each year who traditionally could not afford broadband in their homes.

Similarly, alternatives could be viewed within other programs and departments such as the United States Department of Housing and Urban Development's public housing programs. It is currently the case that a majority of new expenditures within the Department of Housing and Urban Development are administered within the "Capital Fund" which allows for upkeep and refurbishing of public housing properties administered by more than 3,200 public housing authorities nationally. Currently, public housing authorities may not use capital fund resources for broadband infrastructure because Department of Housing and Urban Development regulations classify broadband as an entertainment rather than information or economic livelihood service. Options include: 1). Allowing for broadband infrastructure and service as an allowable expense under the Capital Fund and/or 2). The issuance of a regulation or executive order setting forth that any and all newly developed or substantially rehabilitated public housing shall have within the living area of every unit the infrastructure that allows for broadband connectivity and, further, that service provided as an amenity.

No fewer than eight programs exist within the U.S. Department of Housing and Urban Development, U.S. Department of Treasury, and U.S. Department of Agriculture which could be

similarly amended in a legislative or regulatory act to catalyze broadband deployment, and the precedent of Bring IT Home suggests that there is ample cause for such exploration.

Subsidize computers for low-income consumers.

Another hindrance to broadband adoption is that many consumers do not have computers in their homes. About one-quarter to one-third of American homes do not have a computer,[39] and the growth of homes with computers has leveled off over the last 5 years. Because broadband adoption continues to grow among those who have a computer, the lack of a computer is the single biggest reason why consumers do not purchase broadband. Currently, the USF does not subsidize the cost of equipment (telephones, fax machines, etc.) Of course, the price of telephones (at $20-$50) is much lower than the cost of the most basic computer ($300-$500), and the high cost of computers could be one reason why residential consumers do not have one in the home. Thus, the government could assist consumers' purchases of computers through a low-interest loan program or even direct subsidies.

Congress recently decided to subsidize high-definition television sets for consumers as part of the transition to HDTV, so a subsidy for home equipment is not without precedent. Similarly, since the 1980s, various states have sponsored programs for the free or low-cost distribution of TTYs, amplifiers and volume-control telephones, light signalers, and other types of SCPE. Most of these states impose strict income and disability eligibility requirements for the recipients. The programs are generally funded through state surcharges on telephone subscriber bills, state appropriations, or contributions from telephone companies.

[39]NTIA Report ; GAO Report, p. 11.

APPENDIX A

Additional Facts Regarding the U.S. Broadband Market

1. Broadband Subscribers

According to the FCC, the U.S. had 50.2 million installed broadband connections at mid-year 2006, an increase of 18% from the end of 2005.[40] Of this number, 42.9 million were designed to serve primarily residential end users. Assuming approximately 113 million residential households in mid-year 2005,[41] 44% of American households currently purchase broadband access.

The provision of broadband services is dominated by the cable and telephone companies. Of the 42.9 million total high-speed lines, 57.5% were provided by cable companies (cable modems), 41.3% were provided by telephone company technologies (ADSL, SDSL or fiber), and 1.2% used other technologies (satellite, fixed wireless, mobile wireless and power lines).

2. Broadband Availability

As a nationwide average, the FCC estimates that high-speed DSL connections were available to 78% of the households to whom ILEC's could provide local telephone service and that high-

Table 5

High-Speed Lines by Information Transfer Rates [1]

As of December 31, 2005

Technology [2]	Exceeding 200 kbps in only one direction	Exceeding 200 kbps in both directions, and:				
		Greater than 200 kbps and less than 2.5 mbps in the faster direction	Greater than or equal to 2.5 mbps and less than 10 mbps in the faster direction	Greater than or equal to 10 mbps and less than 25 mbps in the faster direction	Greater than or equal to 25 mbps and less than 100 mbps in the faster direction	Greater than or equal to 100 mbps in the faster direction
ADSL	3,598,843	11,849,654	4,058,918	6,805	*	*
SDSL	48	365,791	381	*	*	0
Traditional Wireline	4,666	477,802	10,727	3,853	9,448	3,414
Cable Modem	342,524	2,943,546	20,410,400	1,885,234	*	*
Fiber	1,206	208,225	166,629	46,850	14,263	11,023
Satellite	390,597	36,331	0	0	0	0
Fixed Wireless	36,341	*	10,162	*	*	*
Mobile Wireless	3,075,600	*	*	0	0	0
Power Line and Other	788	3,781	*	0	0	*
Total Lines	7,450,613	16,133,345	24,658,687	1,943,161	34,882	16,451

* Data withheld to maintain firm confidentiality.
See notes following Chart 9.

[40]FCC Press Release: HIGH-SPEED SERVICES FOR INTERNET ACCESS; Status as of December 31, 2005, Issued July 26, 2006.
[41]Total households derived from data in "The Couch Potato Wars," Bernstein Research, May 2005.

speed cable modem service was available to 93% of the households to whom cable system operators could provide cable TV service.[42]

3. Broadband Pricing

On average, American consumers pay about $35-$40 per month for broadband service.[43] According to UBS-Warburg, the average revenue per unit (ARPU) for DSL is at $35.50 per month. Some telephone companies have recently dropped their prices to boost subscription. Verizon and AT&T, for example, offer an entry-level broadband plan for $14.95 for an average 768 kilobits per second speed. According to the Leichtman Research Group, these low-cost broadband offerings helped the Bell companies add more broadband customers than the cable companies for the first time in 2005.

[42]FCC, July 2006.
[43]4Q 2005 Note, (www.leichtmangroup.com).

APPENDIX B

The Telecommunications Act of 1996 and the Current USF Program

The Telecommunications Act of 1996 (1996 Act) expanded and clarified the universal service system. The Act codified the universal service mission and established specific requirements for the FCC to implement, such as requiring that rural consumers have comparable access as urban consumers. The 1996 Act also codified the Universal Service Fund (USF) and directed the FCC to collect and distribute money to meet these goals. The FCC created the Universal Service Administrative Company (USAC) to administer the USF.

There are important issues concerning both the collection and distribution of these funds, so a brief description of each is provided below:

1. Collection

The 1996 Act requires "every telecommunications carrier engaged in interstate communications" to contribute to the Universal Service Fund. The FCC currently uses a "revenues-based" system – each carrier contributes a percentage of its interstate and international, end user, telecommunications revenues. The FCC imposes USF fees on landline voice service, mobile telephone service, digital subscriber line (DSL) service, and high-capacity lines.

Landline telephone service is assessed USF fees in two ways: 1) interstate and international long-distance revenues (i.e. from long distance telephone calls) are subject to fees that increase in direct proportion to the amount spent on the service. 2) the revenues collected from consumers' local phone service that is regarded as "interstate" (i.e. the subscribe line charge) are also assessed USF fees.

Mobile phone operators pay USF fees on 28.5 percent of their total revenues, unless they can provide evidence that their interstate share is less than that "safe harbor" percentage. The FCC adopted this approach because of the difficulty of determining separating "intrastate" from "interstate" mobile calls.

DSL has been classified as an interstate service, and providers pay USF assessments on the telecommunications portion of the service. (The portion of DSL revenues that pays for Internet access is exempt from USF contributions.)

Large-capacity leased telephone lines that large institutions use for Internet access and other data services also incur USF fees.

The following revenues are not assessed for universal service:

1) wholesale revenues (i.e. revenues a carrier receives from another carrier),
2) revenues from "information services" (such as Voice Over the Internet phone calls and any other Internet-based services), and
3) "intrastate" revenues (the FCC initially tried to assess intrastate services, but this effort was rejected by the courts because the language of the 1996 Act is restricted to "interstate").

To determine the amount each carrier must pay, the USAC first determines the total amount of funding needed for the USF for that quarter. It then divides that amount of funding by the total sum of expected interstate and international end user revenues from all carriers for that quarter (the contribution base). The result is the percentage (the contribution factor) it assesses on each carrier's revenues. The USAC sends each carrier an invoice for this amount each quarter.

Most telecommunications companies pass this charge on to the consumer by placing a

surcharge on each consumer's telephone bill. The surcharge assessed on each consumer's bill may not be any larger than the contribution factor.

The contribution factor has risen from 5.7% in 2000 to 10.9% for the second quarter of 2006. Because carriers generally pass this charge to its consumers, each consumer pays this surcharge on all of his/her interstate telecommunications services each month. The rise in the contribution factor is due both to a decline in the contribution base of all interstate and international revenues and an increase in the size of the USF. The base of revenues that funds the USF has been declining in absolute terms since 2000. Before that time, that revenue base had been on the upswing, but a decline in long-distance revenues —due in large part to a decrease in long-distance prices— reversed that trend.

Quarterly Contribution Factors:

	1st Q	2d Q	3d Q	4th Q
2000	*	5.7	5.5	5.7
2001	6.7	6.9	6.9	6.9
2002	6.8	7.3	7.3	7.3
2003	7.3	9.1	9.5	*
2004	8.7	8.7	8.9	8.9
2005	10.7	11.1	10.2	10.2
2006	10.2	10.9		

*Not known at this time

The Contribution Base for the Universal Service Fund in Relation to Telecommunications Revenues, 1997 to 2004

(Billions of dollars)

	1997	1998	1999	2000	2001	2002	2003	2004
End user Telecom's Services	188.4	200.4	215.8	229.1	235.5	232.4	230.7	228.3
Contr'n Base for USF	69.3	74.9	79.9	80.6	79.2	77.0	76.6	76.3
Percentage of Total Revenues	36.8	37.4	37.0	35.2	33.6	33.1	33.2	33.4

Source: Congressional Budget Office based on Federal Communications Commission, Trends in Telephone Service (May 2004), Table 15.1,
and Telecommunications Industry Revenues (various years), Tables 1, 6, and 8.
Notes: To avoid double taxation, the contribution base includes only revenues from services to end users.
To be consistent with previous years, 2003 and 2004 data include revenues declared uncollectible.

In addition, the USF has grown from $3.3 billion in 1998 to an expected $7.1 billion in 2006. (see chart below). Thus, the contribution rate's growth in recent years can be attributed more to increased USF spending than to the decline in the revenue base.

	1999	2000	2001	2002	2003	2004	2005	2006 (est.)
High Cost	1.7	1.9	2.6	2.8	3.3	3.4	3.8	4.1
Low Income	0.5	0.5	0.6	0.7	0.7	0.8	0.8	0.9
Sch & Lib	1.0	1.6	1.7	1.6	1.6	1.5	1.9	2.0
Rural Health	0.1	*	*	*	*	*	*	0.1
Total	**3.3**	**4.0**	**4.9**	**5.1**	**5.6**	**5.7**	**6.5**	**7.1**

Sources: CBO Report and USAC 2005 Annual Report and USAC Quarterly FCC filings.

Many parties, including Chairman Martin, support changing the current "revenue-based" collection mechanism to one based on telephone numbers and/or connections. They maintain that the decline in the contribution base of revenues threatens the long-term viability of the USF. Furthermore, they maintain that it is unfair for VOIP companies to avoid paying any USF fees (because they are not "telecommunications services"), that the percentage "contribution factor" is likely to continue to rise, and that determining which revenues are subject to the fund is increasingly difficult for carriers and for the USAC. These parties believe a number-based assessment, in the neighborhood of $1 per phone number, would be easier to administer, would capture VOIP companies, and would prevent the surcharge on consumers' bills from continuing to rise.

Many consumer organizations, however, are opposed to a number-based charge. They maintain that the charge would increase phone bills for people who make few or no interstate phone calls and therefore would be regressive. They believe VOIP companies should also pay based on their revenues to remove the disparity in treatment. They do not believe there is any crisis in the current USF funding mechanism that should require any change to the existing revenue-based system.

2. Distribution

Outlays from the USF grew from $3.3 billion in fiscal year 1999 to an estimated $7.1 billion in 2006. The High-Cost fund takes up the largest portion of the USF at 58%, the Schools and Libraries program second at 28%, the Low-Income program third at 12%, and the Rural Health program at less than 1%. (estimated for 2006):

	Est. 2006 Funding	Percentage of Total USF
Low-Income	$856 Million	12%
High-Cost	$ 4.1 Billion	58%
Schools & Libraries	$ 2.0 Billion	28%
Rural Health	$57 Million	1%
TOTAL	**$7.1 Billion**	**100%**

Based on Federal Universal Service Support Mechanisms Fund Size, Projections for the 2d Quarter, 2006, filed by the Universal Service Administrative Company with the FCC, Jan. 31, 2006. (Numbers may not add due to rounding.)

A. The Low-Income Program

Since its inception, Lifeline/Link-Up has provided support for telephone service to millions of low-income consumers.[44] Nationally, the telephone penetration rate is 94.7%, in large part due to the Lifeline/Link-Up program and other universal service programs.[45] Independent research has also found that these subsidies have increased low-income access to basic telephone service.[46] Nevertheless, only one-third of households currently eligible for Lifeline/Link-Up assistance actually subscribe to this program.[47] As a result, both the FCC and the states have been taking steps to increase outreach and education to make Lifeline/Link-Up services more widely available.

The Low-Income program reimburses local wireline and some wireless telephone companies for providing service discounts to qualifying low-income consumers. The Link-Up America program offsets one-half of the initial installation (hook-up) fee, up to $30.00. The program also encourages carriers to offer a deferred payment schedule for the initial installation fee. The Lifeline Assistance Program provides a discount of up to $10 per month for basic telephone service. Residents of American Indian and Alaska Native tribal communities may qualify for up to an additional $25 in support beyond current Lifeline support levels and expanded Link-Up support of up to $70 in additional support beyond current levels. The program also provides support for toll (long distance) limitation services and (until mid-2007) support for people suffering from the effects of hurricane Katrina. Approximately 95% of all low income funding goes to support the Lifeline Assistance program.

Individual states set the eligibility criteria to determine which low-income consumers qualify for these programs. In states that rely solely on the Federal Low Income Program, a customer must have an income no greater than 135 percent of the poverty level or participate in public assistance programs, including Medicaid, food stamps, supplemental security income, federal public housing assistance, low-income home energy assistance, temporary assistance to needy families and the national school lunch program.[48] Lifeline customers are asked each year to certify that they still meet the income guidelines and other requirements. Most carriers use a self-certification system in which customers simply complete a form attesting to their low-income status. However, carriers can spot check Lifeline customer and request proof of that status at any time.

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[44] *See* Wireline Competition Bureau, Federal Communications Commission, *Trends in Telephone Service Report*, Tables 20.2, 20.4 (August 2003) (*2003 Trends Report*) (estimating that 6.6 million people paid reduced rates under the Lifeline program in 2002 and 13.7 million people paid reduced charges under Link-Up since 1991).

[45] *See* Wireline Competition Bureau, Federal Communications Commission, *Telephone Subscribership in the United States Report*, Table 1 (rel. May 14, 2004) (*Telephone Subscribership Report*) (data through Nov. 2003).

[46] Michael Riordan, Gregory Rosston and Bradley Wimmer, "Low Income Demand for Local Telephone Service: The Effects of Lifeline and Linkup," Telecommunications Policy Research Conference, September 20, 2003.

[47] *See* Commission Staff Analysis set forth in Appendix K at Table 1.B. These projections were based on March 2000 and March 2002 Current Population Survey of Household data (CPSH data), and adjusted for growth.

[48] Federal Communications Commission, Universal Service Program for Low-Income Consumers, 2006.

ESTIMATED INCOME REQUIREMENTS FOR A HOUSEHOLD AT OR BELOW 135% OF THE FEDERAL POVERTY GUIDELINES

Size of Family Unit	48 Contiguous States and D.C.	Alaska	Hawaii
1	$ 12,123	$15,134	$13,946
2	16,362	20,439	18,819
3	20,601	25,745	23,693
4	24,840	31,050	28,566
5	29,079	36,356	33,440
6	33,318	41,661	38,313
7	37,557	46,967	43,187
8	41,796	52,272	48,060
For each additional person, add	4,239	5,306	4,874

Report and Order and Further Notice of Proposed Rulemaking, Released April 29, 2004: WC Docket No. 03-109; Appendix D.

The FCC does not require local exchange carriers to provide Lifeline or Link-Up discounts, although some states do require carriers to provide these discounts. Pursuant to the 1996 Act, Link-up and Lifeline support is only made available to carriers that qualify as Eligible Telecommunications Carriers.[49] As a result, some competitive local exchange carriers (CLECs) that are not ETCs often do not provide Lifeline or Link-Up discounts because they receive no reimbursement from the Federal USF.

B. The High-Cost Program

The High-Cost Program of the Universal Service Fund ensures that consumers in all regions of the Nation have access to and pay rates for telecommunications services that are reasonably comparable to those services provided and rates paid in urban areas. Without High-Cost support, residents of some areas of the country would have to pay significantly more for telephone services than those living in other areas because of factors such as dense terrain, low populations, or the high fixed costs of building a telecom network.

Currently, over 1,700 eligible telecommunications carriers receive High-Cost support. The primary participants in the High-Cost Program are incumbent local exchange carriers and competitors that serve customer lines in the service areas of incumbent carriers.

In order to participate in the High-Cost Program, a wireline or wireless telephone company must be an eligible telecommunications carrier (ETC). A telephone company can become an ETC by designation of its state utility regulator, or in some cases, the Federal Communications Commission.

[49]In 2004, the FCC declined to waive the ETC requirement for carriers to receive Lifeline or Link-Up support, maintaining that giving such support to carriers that are not ETCs may discourage ETCs from complying with the ETC requirements. *See*, *Report and Order and Further Notice of Proposed Rulemaking*, Released April 29, 2004: WC Docket No. 03-109.

The High-Cost program provides financial support to local wireline and some wireless telephone companies that offer telecommunications services in areas where the cost of providing exceeds a national or state average by between 115% and 135%. Carriers operating in high-cost areas are divided into rural and non-rural. There are several different high-cost support mechanisms, including:

1) loop support, which assists rural carriers recover the costs of the first and last mile connection, known as the local loop;
2) switching support, which helps carriers recover the costs of their switching facilities (distributed primarily to companies lacking optimal scale economies because they serve fewer than 50,000 telephone lines);
3) long term support, which helps small carriers, subject to rate of return regulation, that do not fully recover, through access charge fees imposed on long distance carriers, the costs incurred in originating and terminating long distance traffic;
4) interstate access support, which helps larger carriers subject to price cap regulation;
5) forward-looking high-cost support, which helps non-rural carriers operating in areas with costs exceeding 135 percent of the statewide average;
6) interstate common line support, which helps small rate of return carriers that do not fully recover their per line costs from telephone subscribers who now pay a monthly $6.50 subscriber line charge;
7) Safety Net Additive Support, which helps to encourage new investment in rural infrastructure, by granting support for rural carriers whose telephone plant in service per loop increased by over 14% in one year; and
8) Safety Valve Support, which is available for new investments in infrastructure made in the newly-acquired exchanges.

High-Cost Universal Service Support Amounts for 2004 (expressed in millions)

High Cost Loop Support[50]	$1,234.616
Local Switching Support	$469.783
Long Term Support[51]	$280.911
Interstate Common Line Support[52]	$768.862
Interstate Access Support Mechanism	$653.452
Forward-Looking High Cost Mechanism[53]	$274.601
Year-End Total	$3,499.690

[50]Now only available to rural carriers, this support mechanism is based on embedded costs.
[51]Long Term Support was merged with Interstate Common Line Support after 2004.
[52]Under the *MAG Order*, the ICLS mechanism was implemented beginning on July 1, 2002.
ICLS recovers any shortfall between the allowed common line revenues of rate-of-return carriers and their subscriber line charge revenues and gradually replaces the carrier common line charge.
[53]Forward-Looking high Cost Mechanism is provided by non-rural carriers based on cost models of forward-looking costs.

The formulas for determining the amount of high-cost support for each carrier are extremely intricate. For instance, each fall, the National Exchange Carriers Association (NECA) submits a filing to the FCC that details the costs to rural telephone service providers of providing local telephone lines. The NECA filing is used to determine per-line costs. A portion of those per-line costs that is above the national average for each carrier is multiplied by the number of lines each carrier serves: the portion is determined by the size of the carrier and the extent to which costs in a given area exceed the national average for local line costs. That figure becomes the carrier's subsidy for the first quarter of the next calendar year. Payments for the subsequent quarter are adjusted according to the line count for each provider. In addition to the local line support portion of the High Cost mechanism, there are other, smaller elements of the High Cost mechanism that are determined by different combinations of formulas and embedded costs, all of which are occasionally subject to caps.[54]

For larger, non-rural providers' local line support, the FCC uses a cost model to determine per-line costs. For the smaller, rural carriers, however, high-cost support is determined by their embedded costs (what the carriers often call their "actual" costs). Of the $3.8 billion in high-cost funding awarded in 2005, $2.7 billion was awarded to rural telephone companies, and $1.1 billion was granted to non-rural telephone companies. Also, $3.2 billion was awarded to incumbent local exchange carriers (ILECs) and $600 million was awarded to competitive eligible telecommunications carriers (CETCs).

C. The Schools and Libraries "E-rate" Program

The Schools and Libraries "E-rate" Program provides discounts of 20-90%, based on the percentage of students eligible for subsidized lunches, for access to basic, local and long distance telecommunications services, including voice, data, video and wireless services, Internet access and the cost for installing and maintaining internal connections including switches, hubs, routers and wiring. A maximum of $2.25 billion is available annually.

D. The Rural Health Care Program

The Rural Health Care Program ensures that health care providers located in rural areas pay no more than their urban counterparts for telecommunications services including those "telemedicine" services needed to access advanced diagnostic and other medical services available at urban medical centers. Subsection 254(h)(1) further specifies that "to the extent technically feasible and economically reasonable" health care providers should have access to advanced telecommunications and information services. Under FCC established rules only public or nonprofit health care providers are eligible to receive funding. Eligible health care providers, with the exception of those requesting only access to the Internet, must also be located in a rural area.

The Rural Health Care mechanism is not fully utilized by potential recipients, and spending for that program does not approach its cap of $400 million per year.

NOTE: In the High-Cost and Low-Income support programs, the USAC disburses funding directly to telecommunications companies that provide local telephone service to high-cost areas or low-income individuals, which allow them to offer services to targeted markets and individuals at a lower price than would otherwise prevail. By contrast, in the Schools and Libraries and the Rural Health programs the USAC awards grants to schools and libraries for the purchase of advanced telecommunications equipment and services.

[54]The Federal-State Joint Board is currently considering a number of plans to revise significantly the high-cost fund, including the possibility of issuing block grants to the states for distribution to its carriers. See, FEDERAL-STATE JOINT BOARD ON UNIVERSAL SERVICE SEEKS COMMENT ON PROPOSALS TO MODIFY THE COMMISSION'S RULES RELATING TO HIGH-COST UNIVERSAL SERVICE SUPPORT, CC Docket No. 96-45; FCC 05J-1; Released: August 17, 2005.

APPENDIX C

Description of Broadband Technologies

Consumers can receive a broadband connection to the Internet through a variety of technologies. These technologies include, but are not limited to, the following[55]:

Cable modems

Cable television companies first began providing broadband service in the late 1990s over their hybrid-fiber coaxial networks. When provided by a cable company, broadband service is referred to as cable modem service. Cable providers were upgrading their infrastructure at that time to increase their capacity to provide video channels in response to competition from direct broadcast satellite (DBS) providers such as DirecTV® and Dish Network. By also redesigning their networks to provide for two-way data transmission, cable providers were able to use their systems to provide cable modem service. Cable modem service is primarily available in residential areas, and although the speed of service varies with many factors, download speeds of up to 6 Mbps are typical. Cable providers are developing even higher speed services.

DSL

Local telephone companies provide digital subscriber line (DSL) service, another form of broadband service, over their telephone networks on capacity unused by traditional voice service. Local telephone companies began to deploy DSL service in the late 1990s— some believe, in part, as a response to the rollout of cable modem service. To provide DSL service, telephone companies must install equipment in their facilities and remove devices on phone lines that may cause interference. While most residential customers receive asymmetric DSL (ADSL) service with download speeds of 1.5 to 3 Mbps, ADSL technology can achieve speeds of up to 8 Mbps over short distances. Newer DSL technologies can support services with much higher download speeds.

Satellite

Currently, three providers of satellite service can offer nearly ubiquitous broadband service in the United States. These providers use geosynchronous satellites that orbit in a fixed position above the equator and transmit and receive data directly to and from subscribers. Signals from satellites providing broadband service can be accessed as long as the user's reception dish has a clear view of the southern sky. Therefore, while the footprint of the providers' transmission covers most of the country, a person living in an apartment with windows only facing north, or a person living in house in a heavily wooded area might not be able to receive Internet access via satellite. Earlier Internet services via satellite could only receive Internet traffic downstream—that is, from the satellite to the subscriber—and upstream Internet traffic was transmitted through a standard telephone line connection. Currently, however, satellite companies provide both upstream and downstream connections via satellite, eliminating the need for a telephone line connection and speeding the overall rate of service. Transmission of data via satellite typically adds one-half to three-fourths of a second, causing a slight lag in transmission and rendering this service less well-suited for certain applications over the Internet. While satellite broadband service may be available throughout the country, the price for this service is generally higher than most other broadband modes; both the equipment necessary for service and the recurring monthly fees are generally higher for satellite broadband service, compared with most other broadband transmission modes.

[55]With the exception of BPL, these descriptions of broadband technologies appear in the GAO Report, pp. 7-9.

Wireless

Land-based, or terrestrial, wireless networks can offer a broadband connection to the Internet from a wide variety of locations and in a variety of ways. Some services are provided over unlicensed spectrum and others over spectrum that has been licensed to particular companies. In licensed bands, some companies are offering fixed wireless broadband throughout cities. Also, mobile telephone carriers—such as the large companies that provide traditional cell phone service—have begun offering broadband mobile wireless Internet service over licensed spectrum—a service that allows subscribers to access the Internet with their mobile phones or laptops as they travel across cities where their provider supports the service. Such services are becoming widely deployed and are increasingly able to offer high-speed services. A variety of broadband access technologies and services are also provided on unlicensed spectrum—that is, spectrum that is not specifically under license for a particular provider's network. For example, wireless Internet service providers generally offer broadband access in particular areas by placing a network of antennae that relay signals throughout the network. Subscribers place necessary reception equipment outside their homes that will transmit and receive signals from the nearest antenna. Also, wireless fidelity (Wi-Fi) networks—which provide broadband service in so-called "hot spots," or areas up to 300 feet—can be found in cafes, hotels, airports, and offices. Some technologies, such as Worldwide Interoperability for Microwave Access (Wi-MAX), can operate on either licensed or unlicensed bands, and can provide broadband service up to approximately 30 miles in a line-of-sight environment.

Broadband over Powerline ("BPL") [56]

BPL systems provide high speed digital communications capabilities by coupling RF energy onto medium voltage power delivery lines ("Access BPL") to deliver high speed Internet and other broadband services to homes and businesses. In addition, electric utility companies can use Access BPL systems to monitor, and thereby more effectively manage, their electric power distribution operations. Because Access BPL capability can be made available in conjunction with the delivery of electric power, it may provide an effective means for "last-mile" delivery of broadband services and may offer a competitive alternative to digital subscriber line (DSL), cable modem services and other high speed Internet access technologies.

Access BPL systems carry high speed data signals to neighborhoods from a point where there is a connection to a telecommunications network. The point of network connection may be at a power substation or at an intermediate point between a substation and network terminations, depending on the network topology. Within a residential neighborhood, some system implementations complete the connection between the medium voltage lines and subscriber homes or businesses by using wireless links. Other implementations employ a coupler or bridge circuit module at the low-voltage distribution transformers to transfer the Access BPL signals across (thereby bypassing) these devices. In such systems, the BPL signals are brought into homes or businesses over the exterior power supply cable from the coupler/bridges, either directly, or via Access BPL adaptor modules. Typically, the medium voltage lines are carried overhead on transmission poles or tower mountings; however, in a large number of locations, and in newer subdivisions and neighborhoods, these lines are enclosed in underground conduits and the distribution transformers are mounted above ground on a pad, inside a metal housing.

[56]This description is taken from the FCC's Report and Order, ET Docket No. 04-37, released October 28, 2004.

Broadband Applications and Download Speeds		
Download Speed	**Application**	**Technology**
56 kbps	Low Quality, Streamlining Audio	Dial Up
200 kbps	FCC Definition of High Speed	DSL Lite: (256 kbps)
1 mbps	Streaming Video	Satellite
		DSL
		Cable
4 mbps	Standard TV	DSL
6 mbps	Videoconferencing	
20 mbps	High Definition TV	ADSL
Source: S. Derek Turner, Broadband Reality Check, Free Press, August 2005.		

More speed means savings in terms of time – and productivity. For example, to download a 4 giga-byte video file over the Internet will take the following amounts of time:[57]

Japan: ADSL (26mbps)	20 min
Korea: VDSL (20mbps)	26 min
U.S.: cable or ADSL (1.5mbps)	6 hours
U.S.: dial up	7.5 days

[57]Eric Lie and Taylor Reynolds, Birth of Broadband: ITU Internet Reports, September 2003.

APPENDIX D

Participants in May 18, 2006 Roundtable[1]

Robert Atkinson, *Information Technology and Innovation Foundation*
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Ellen Blackler, *AT&T*
Lynne Bradley, *American Library Association*
Kelby Brick, *National Association of the Deaf*
Kathy Brown, *Verizon*
Rick Cimerman, *National Cable & Telecommunications Association*
David Cohen, *United States Telecom Association*
Brian Fontes, *Cingular*
Larry Goldberg, *WGBH Center for Accessible Media*
Debbie Goldman, *Communications Workers of America*
Kathleen Grillo, *Verizon*
Juliana Jones, *Consortium for School Networking*
Karyne Jones, *National Caucus and Center for Black Aged*
Carrie Lowe, *American Library Association*
Christopher McLean, *eCopernicus*
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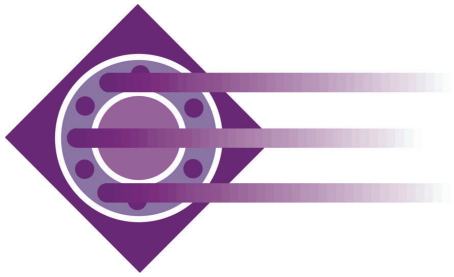
Amy Wolverton, *T-Mobile*
Lisa Zaina, *Independent Telephone & Telecommunications Alliance*

[1]The recommendations in this paper were informed by the policy roundtable; however, they do not reflect the views of all the participants.



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