

Unleashing the Potential of the High-Speed Internet

Strategies to Boost Broadband Demand

Progressive Policy Institute
Technology & New Economy Project

Robert D. Atkinson, Shane Ham, and Brian Newkirk

September 2002

Contents

Introduction	3
The Broadband Demand Gap	6
Table 1: Broadband Demand Gap	7
Table 2: Differences in broadband and dial-up households' use of computers and the Internet	8
Encouraging General Internet Usage	10
Eliminate Regulatory Protection for Middlemen	10
Foster E-Transformation in Key Sectors	12
Boost E-Government	13
Provide Protections for Internet Users	14
Encouraging Digital Content	17
Determine Fair Music Royalties	17
Encourage Public Broadcasting to Take the Lead in Putting Content Online	19
Build Online Libraries	20
Build Digital Museums	22
Encouraging Transformative Applications	24
Promote Telework	24
Support and Expand Distance Learning	26
Transform Health Care with Telemedicine	28
Conclusion	31
Endnotes	32

Introduction

As recently as 10 years ago, it would have been hard to imagine the phenomenal growth of the Internet. The Internet has led to a host of new and exciting applications—email, the World Wide Web, instant messaging, digital file sharing, e-commerce, and many more. Yet for all the changes that the digital economy has brought, the potential of the Internet is greater still. The Internet has yet to fulfill its promise of a true revolution as more ubiquitous use and the development of powerful new applications and services are limited by a lack of bandwidth.

Bandwidth, simply put, is the size of the “pipe” or cable feeding data into a computer. While most workplaces have high bandwidth connections and fast data transfer rates, most home computers still connect to the Internet through low bandwidth connections that use a modem connected to a telephone line. The bandwidth of a dial-up connection is a fraction of high-speed broadband connections, such as cable modems, digital subscriber lines (DSL), or the T1/T3 connections used by office buildings. At the slow speeds offered by dial-up connections, for instance, it can take an hour to download an email with a few photos attached. Visiting what some people jokingly refer to as the “World Wide Wait” can become a frustrating exercise in patience, and the poor quality of the streaming audio and video accessed by telephone Internet connections renders these applications useless.

While greater bandwidth is key to the future development of the Internet, most people who are able to subscribe to a home broadband connection choose not to do so. The reason is simple: Most Americans feel that the current offerings on the Internet do not justify paying two or three times more for a broadband connection than they do for a dial-up connection. Because of the low take-up rate, providers of advanced broadband connections have little economic justification to engage in the large-scale rollout that could drive

prices down. Likewise, providers of services requiring broadband connections have little incentive to roll these out, given the low take up rate of broadband.

Solving this chicken-or-egg conundrum limiting broadband needs to be a key goal of public policy. The slowdown in the technology sector is at least partly attributable to the fact that Internet applications have “hit the wall” at current connection speeds. Without demand for high-speed online services, there is little demand for increasingly powerful hardware and software to deliver these services. Getting broadband connections into U.S. homes will be a major boost to the flagging economy. That, however, is not to say that the goal of expanding broadband use is simply to sell more telecommunications services or even computing devices; that is merely the means. The ultimate goal is to take full advantage of the promise of the Internet: greater productivity and economic efficiency, empowered consumers, and a better-educated and more open society. In particular, the economic impact of broadband deployment—in improved productivity, new jobs, and so on—will be hundreds of billions of dollars annually.¹

While this report focuses on the demand side of the broadband equation, the supply side is also important. Though increasing demand for broadband services is key to deployment of high-speed data networks to residential areas, the fact remains that even the most compelling application or service is of no use to a household that cannot subscribe to bandwidth because there are no companies that provide service to the area. Moreover, most households can only get low-speed broadband, and not the high-speed broadband that would enable services like streaming video. The supply question is therefore a key piece of any broadband deployment policy.

There are currently intense debates over this in Washington and in the states, particularly the conditions under which incumbent telephone

companies provide access to their advanced broadband infrastructure. In addition to this regulatory debate, there are proposals for stimulating broadband supply, including tax credits to broadband deployment, particularly to rural areas. Finally, there are several technology policy issues relevant to broadband, including funding for next generation Internet research projects like Internet2 and deployment of wireless “last mile” broadband technologies. While these issues are important, and in fact reinforce the market as more demand leads to more robust supply and vice-versa, the focus of this paper is on the demand side.

While the main responsibility for developing compelling Internet services falls to the private sector, public policy can play a key role in facilitating the process. **As a result, to stimulate broadband demand, governments at all levels should pursue policies that:**

Encourage greater Internet penetration and more robust use by expanding e-commerce and e-government.

- ▶ Oppose actions designed to protect the status quo against e-commerce competition and resist efforts to prevent consumers from capturing the savings realized by online transactions.
- ▶ Support digital transformation of industries by calling for government agencies to examine how their procurement, regulatory, and other functions can speed the digitization of the sectors they influence while working with both technology developers and users to devise technology reinvention roadmaps. In addition, Congress should pass the Driver’s License Modernization Act to encourage deployment of technologies that limit identity theft and credit fraud.
- ▶ Foster e-government transformation by passing the E-Government Act of 2002, and create a \$50 million challenge grant fund for states or cities to significantly transform their governments by using the Internet.
- ▶ Increase trust in the Internet by passing appropriate federal privacy and spam

legislation while encouraging technologies that empower users, such as the Platform for Privacy Preferences (P3P) and the Internet Content Rating Association (ICRA) rating system.

Encourage the availability of digital content.

- ▶ Harmonize the royalties paid by terrestrial broadcasters and webcasters and simplify the process for collecting and distributing royalties.
- ▶ Allocate \$50 million to PBS to develop and deploy webcasts of the programs that are already broadcast over the air.
- ▶ Establish the National Digital Lending Library.
- ▶ Fund a grant program for development of online museums, including science museums.

Encourage the development and deployment of transformative applications:

- ▶ Promote working from home via telecommuting by passing telework incentive legislation; ensure that home offices are not subject to workplace regulations; and develop telework programs for government employees.
- ▶ Promote distance learning by creating a portal for digital learning materials; eliminate the “in seat” requirements for higher education, extend the Lifelong Learning tax credit to cover broadband access; develop an expanded online tutorial within AmeriCorps; and provide funding to the Department of Education to support the creation of online curricula for basic skills assessment and acquisition.
- ▶ Promote telemedicine by altering Medicare to allow for payments for telemedical expenses, provide more funding to the Department of Health and Human Services to develop telemedicine, and address medical licensure rules that inhibit the cross-state practice of telemedicine.

Accomplishing these goals involves myriad legal and regulatory issues, many of which seem unrelated to the task of furthering broadband deployment. However, not only will taking these actions be useful steps in their own right, they will also boost broadband demand, which in turn will boost productivity—the key to the economic well-being of Americans. Some of the proposals made here can be carried out by state and local governments. Others will require congressional action or an executive order. In fact, there is a considerable amount the Bush administration can do on its own, including fostering telecommuting

and broadband use by federal employees, development of e-learning and e-health initiatives, and aggressive adoption of e-government efforts. In this regard, PPI supports legislation, such as S. 2582 introduced by Sen. Joe Lieberman (D.-Conn.), that requires the administration to develop a national strategy to speed the deployment of high-speed Internet service.

This report describes the connections between a variety of policy issues and broadband deployment, and sets forth a detailed agenda for addressing those issues with an eye toward stimulating consumer demand for broadband services.

The Broadband Demand Gap

Nearly 60 percent of U.S. households have a home computer, and of those, roughly 90 percent have some kind of Internet access.² Clearly, home computer owners find Internet access to be valuable. However, despite the fact that 70 percent of computer owners live in an area that is served by at least one type of broadband service, only about one-fifth choose to subscribe to a high-speed service. As Table 1 shows, this gap between supply and demand is likely to continue for the foreseeable future.

There are several reasons for this “demand gap,” including dissatisfaction with broadband service and difficulty of installation,³ but the primary reason is the high cost relative to the value. Many Internet users do not believe that the things they can do with a broadband connection are worth the expense of subscribing. Most of the activities people engage in when connected to the Internet at home—email, online shopping, checking sports scores, visiting chat rooms—can be done with a low-speed connection. There simply are not enough compelling high-speed applications to justify upgrading the connection.

Those who have chosen to get broadband connections at home have telling differences in their online behavior, as demonstrated in Table

2. Internet users perform common activities with roughly the same frequency whether using a broadband or dial-up connection. Broadband users, however, are far more likely to use the Internet for telecommuting, distance learning, and multimedia applications such as television, movies, and music. These represent the pressure points of broadband demand. By expanding these kinds of offerings on the Internet, more users will find the Internet valuable enough to justify acquiring a broadband connection.⁴

All of these online applications of broadband are “one-way” uses—that is, content or services are pushed from a provider to the end user.⁶ As more people adopt broadband connections, however, the network effects will give rise to more “two-way” utilities. Just as fax machines became more useful as more offices acquired fax machines, broadband connections will become more useful as more homes acquire broadband connections. Exchanging high-quality digital photos, live videoconferencing in place of telephone calls, online gaming, and other uses will expand as more people get connected. For the immediate future, however, the focus should be on the “one-way” services because they can be deployed irrespective of the number of broadband subscribers and therefore stimulate demand.

Table 1: Broadband Demand Gap

	Actual			Projected						
	1999	2000	2001	2002	2003	2004	2005	2006	2007	
Total U.S. household (in millions)	103,874	105,480	106,535	107,600	108,676	109,763	110,861	111,969	113,089	
Broadband enabled households (in millions)	41,103	63,766	68,841	75,487	81,464	85,642	88,757	91,034	92,815	
Broadband households (in millions)	1,596	5,594	10,803	16,019	21,259	26,726	32,043	37,010	41,726	
Households that are broadband enabled	40%	60%	65%	70%	75%	78%	80%	81%	82%	
Home broadband subscribers	2%	5%	10%	15%	20%	24%	29%	33%	37%	
Home broadband subscribers (as percent of broadband-enabled households)	4%	9%	16%	21%	26%	31%	36%	41%	45%	
Broadband as percent of total online access	4%	9%	16%	23%	28%	33%	37%	41%		
Demand gap (broadband enabled households - broadband user households)	35.7%	51.7%	48.9%	48.9%	48.9%	46.8%	44.0%	40.6%	37.1%	

Source: The Yankee Group, 2002

Table 2: Differences in Broadband and Dial-up Households' Use of Computers and the Internet

Question	Dial-up households answering "yes" (Column A)	Broadband households answering "yes" (Column B)	Difference (B - A)	Proportionate difference (B - A)/A
This year, have you used the Internet...				
To work from home?	40.30%	52.00%	11.7	29.00%
To look for a job?	17.40%	19.80%	2.4	13.80%
To complete school assignments?	78.50%	79.90%	1.4	1.70%
To take a course online?	4.30%	7.20%	2.9	67.40%
For email or Instant Messaging?	90.60%	92.20%	1.6	1.70%
To get news, weather, or sports?	72.30%	78.50%	6.2	8.60%
For TV, movies, or radio?	16.80%	29.80%	13.0	77.40%

Source: Andrew Leigh, Harvard University, based on the Bureau of the Census, *Current Population Survey, Computer Ownership Supplement* (2001).⁵

Skinny or Fat Broadband?

One problem that policymakers face when discussing broadband demand is that there is a wide variety in what is called “broadband”—ranging from skinny (lower speed) broadband to fat (higher speed) broadband. Skinny broadband is a connection that meets the Federal Communications Commission definition of broadband service, which is 200 kilobits (kbps) per second,⁷ and is the typical connection speed achieved in most homes. (Though services like cable modems and DSL often advertise “speeds up to 1.5 megabits (mbps) per second,” the actual data transfer rates experienced by users are often in the 100 to 300 kilobits per second range.⁸) Fat broadband is much faster, reaching 10 to 100 megabits per second. These speeds are generally available only to those connected directly to the fiber optic “backbone” of the Internet, such as universities, research institutions, and large corporations.

Though skinny broadband services operate at a small fraction of the speed that is possible with a full fiber optic network, they are still considered broadband because they are much faster than the dial-up services that most home users employ for Internet access and they are “always on.”⁹ On the other hand, many of the applications and services that are likely to stimulate demand for broadband access will be relatively useless on skinny broadband connections. For instance, watching a streaming video program over a DSL or cable modem is a great improvement over dial-up connections. However, the high-quality video must be viewed in a small box, no more than a few inches on a side. Even enlarging the image to the full size of the computer monitor (between 13 and 21 inches on the diagonal) will vastly degrade the video quality. Display on a 54-inch high-definition television is impossible. Similarly, two-way video services (such as virtual classrooms where students can ask questions) are effectively unworkable on a skinny broadband service.

The problem with deploying fat broadband to the home is cost. The skinny broadband services rely on existing neighborhood and home wiring (television cable or phone lines) or over-the-air solutions (satellite) to reach the last mile. Running fiber optic cable into the home, or even deep enough into the neighborhood to achieve higher speeds, is expensive.

Some of the demand-stimulating recommendations in this report will require fatter broadband connections to work optimally. Given that, it is possible to draw two conclusions: It is a waste of effort to deploy skinny broadband because we should “skip a generation” and go directly to fat broadband, or it is a waste of effort to deploy fat broadband applications until all homes can be wired for fat broadband. These conclusions are both incorrect, for a number of reasons.

First, deployment of skinny broadband is not necessarily incompatible with deployment of fat broadband. Deploying broadband in a neighborhood requires extension or reconditioning of the current network infrastructure. In other words, bringing skinny broadband to the home brings fat broadband to the neighborhood. This kind of incremental deployment of high-speed data networks is the most efficient way to bring broadband to the nation, and it is heavily dependent on demand.

Second, moving straight to deployment of fat broadband is not a workable solution. Wiring every home in America with fiber optic cable is an extremely expensive proposition, one made prohibitive now by the high cost of capital for the financially strapped telecommunications industry. Because ubiquitous fat broadband is many years in the future, deployment of skinny broadband services is the only reasonable alternative for the residential market. However, there is no reason why new housing developments should not all be wired with fiber, since the incremental costs compared to telephone and cable are low. Federal housing officials at the U.S. Housing and Urban Development Department (HUD), Fannie Mae, and other agencies should consult with the housing industry to identify barriers to the use of fiber optic cable in new housing developments.

Most important, any advance in making the Internet easier to use is a step in the right direction. As this report will show, the power of the Internet to transform the way we work and live has barely begun to be tapped. Unfortunately, many Americans find it unpleasant to use the Internet for more than email and simple games, because slow data transfer rates and unreliable connections make Internet usage a frustrating experience. A marginal increase in the utility of the Internet still pushes us toward a more digital economy.

Despite the differences between fat and skinny broadband services, development of applications and services that are best used over fat broadband connections nonetheless drives demand for broadband in general. In this report, therefore, we will not distinguish between those demand-driving applications that can be used today and those that will be more useful in the next generation of broadband networking.

Encouraging General Internet Usage

Most broadband proponents focus on how “killer apps” like telecommuting or streaming video will drive broadband demand. Clearly, applications that depend on fast connection speeds are important, but we should not overlook the potential of Plain Old Internet Service (POIS) to drive broadband demand. If only 55 percent of the population is online, then by definition, at most only 55 percent of the population can subscribe to broadband. Therefore, working to achieve nearly universal home Internet penetration is an important step in boosting broadband use.

Boosting broadband use is also dependent upon people using the Internet more than they do currently. In spite of the fact that over 55 percent of Americans are online, many do not engage actively in e-commerce or e-government. According to the National Technology Readiness Survey conducted in 2001 by the University of Maryland’s Center for E-service, only 15 percent of Americans paid a credit card bill online and only 21 percent conducted a government transaction online in 2001.¹⁰ People who use the Internet more, even for applications that do not require higher speeds, are more likely to get broadband. Active users are more likely to value the “always on” connection that broadband provides, enabling them to avoid the time-consuming wait to log onto their Internet Service Provider (ISP) every time they want to be online. Moreover, faster broadband speeds make the average Internet user’s experience more enjoyable, with faster Web page and email downloads. **As a result, to the extent government and business can continue to take steps that encourage more people to do more online, this will boost broadband demand.**

One key to increasing demand for Internet connections in general, therefore, is to increase the number of applications that use lower-speed

connections. As the past few years have shown, the ease of online transactions with businesses and government is a tremendous incentive to Internet adoption. Though the Internet has already come a considerable way in transforming the way Americans conduct their daily business, there are still many issues that need to be addressed to encourage those that are not yet online to regularly use the Internet.

Eliminate Regulatory Protection for Middlemen

A central aspect of the e-commerce revolution is economic “disintermediation”—the reduction or elimination of the role of middlemen. The Internet has enabled sellers and buyers to connect directly, without going through middlemen such as travel agents, car dealers, and other retailers. Some might argue that the collapse of some dot-com companies in the last few years has shown that this direct-to-consumer model is deeply flawed and that middlemen are secure in their position. The reality is that there are more dot-com domains in the United States than ever, e-commerce retail sales are growing approximately 10 times faster than all retail sales, and overall e-commerce continues to grow.

However, the direct resistance from middlemen threatened with disintermediation has not vanished; most are using all the judicial, regulatory, and legislative means at their disposal to thwart competitors who would like to use the Internet to sell a product or service. This “revenge of the disintermediated” represents perhaps the biggest threat to the rapid and widespread digitization of the U.S. economy.¹¹

The last few years have seen the middleman fight back on a host of fronts. The Texas state bar association brought suit against companies selling

software and, by extension, Internet-based legal services that prepare documents such as leases, wills, and contracts.¹² In perhaps one of the most outlandish cases of this “revenge,” the North Carolina Auctioneer Licensing Board, which considers people who sell on eBay.com or similar online sites to be auctioneers, sought to require them to be licensed by the state or face misdemeanor charges and a \$2,000 fine. Optometrists have backed laws making it more difficult for contact lens wearers to buy replacement lenses online, even though consumers can save as much as half the price.¹³ Travel agents have gotten into the fray as well. In 2000, the American Society of Travel Agents (ASTA) filed a complaint with the Justice Department to prevent a new online travel company, Orbitz.com, from launching its site. Orbitz.com was able to go forward, but both ASTA’s and Orbitz.com’s online competitors continue to lobby the government to shut it down or restrict it on antitrust grounds.

Unfortunately, it is not just the efforts of the middlemen that are holding back the advantages of electronic transactions. Even in those cases where disintermediation has worked, few companies (or governments) pass on the cost savings to consumers. In some cases, they even charge more to use lower-cost online channels. For example, as part of the airline industry’s continual effort to reduce the costs of commissions they pay, Northwest Airlines recently announced that it would stop paying commissions to online travel services. To make up for the lost commissions, Travelocity.com, one of three major online airline ticket sellers, responded by saying it would start charging consumers a \$10 surcharge whenever they bought a Northwest ticket. Yet, if consumers buy a Northwest ticket from a traditional offline travel agent, they will pay no extra surcharge, even though the travel agents typically receive a larger 10 percent or \$50 commission from the airlines for their services. Had Northwest not eventually backed down, the result would have been to drive consumers to offline travel agents, even though buying a ticket online often costs up to 75 percent less than purchasing through a travel agent. Luckily, the airline industry has moved to phase out commissions for travel agents.

However, most industries price goods and services the same, even when it costs significantly more to complete a transaction offline. Although it costs banks about one penny to conduct a

transaction over the Internet, but over one dollar when a teller provides it, many banks charge their customers a monthly fee to use electronic services. Music companies have largely refused to pass the savings along to customers when they purchase music online in digital format, even though of the approximately \$17 it now costs to purchase a music CD, more than \$9.50 of that is accounted for by distribution, shipping, and store markup. No wonder the free online music service Napster.com grew like wildfire, only to be replaced by Morpheus.com after the courts shut it down. The e-books available at Amazon.com are generally priced similarly to bound editions, and in some cases are more expensive, even though there is no investment to recoup in printing, binding, or shipping. Government does this as well. The U.S. Postal Service refuses to pass along the savings it realizes by not having to print and sell stamps to the consumers of e-stamps. As a result, users of e-stamps have to pay about 10 percent more than they would for traditional stamps.¹⁴ This is one of the reasons why E-stamp.com, one of the two vendors of e-stamps, recently went out of business. Similarly, because the Internal Revenue Service does not accept direct filing of taxes, users have to pay a fee to online tax preparation companies to have them file their taxes online.

When some industries tried to rectify the difference between offline and online costs by charging offline customers more, consumer groups have been quickly critical. Last year, Delta Airlines floated a new policy to charge a two-dollar fee for tickets purchased offline, but retracted when travel agents loudly protested. Travel agents have gone so far as to push for congressional legislation that would force airlines to provide them with cheaper Internet fares while still paying the traditional commission. The result would be that e-fares would vanish and consumers would have less incentive to buy online. Lowering the cost of Internet access by providing rebates and discounts for both government and commercial online transactions will not only encourage Americans to conduct more efficient online transactions, but will help get low-income Americans online, where they can save money.

The marketplace will solve many of these problems, but only if government does not create rules and regulations that prevent the market

from working. Therefore, policymakers at all levels should:

- ▶ **Resist protectionist pleadings and oppose actions designed to limit e-commerce competition.** We applaud the current efforts by the Federal Trade Commission to step up their investigations and advocacy against e-commerce protectionism, and encourage the Congress and the Bush administration to support and expand these efforts. Moreover, Congress and the states need to roll back some of the existing protections for middlemen, like those cited above.¹⁵
- ▶ **Resist efforts to prevent consumers from capturing the savings realized by online transactions.** The Internet is indisputably a lower-cost channel for the delivery of many goods and services, so businesses have an incentive to move their customers to online transactions. This would not constitute discrimination against offline consumers, and policymakers should not discourage migration to online transactions on that basis.
- ▶ **Encourage online transactions by giving discounts to citizens who interact with governments online.** For example, Massachusetts offers a five-dollar rebate on their driver's license fee for those who register online, since it saves the state much more. This should be the model for a wide range of e-transactions. At the very least, governments should not charge more for online interactions.¹⁶

Foster E-Transformation in Key Sectors

The application of Information Technology (IT) to information-intensive sectors that still rely largely on paper and person-to-person interactions holds the potential of increasing the volume of digital transactions, making it even more likely that people will use the Internet and broadband for an increasing share of functions. However, digital transformation has been slow to emerge in many sectors, such as health care, real estate, transportation, and education. There are a number of barriers to digital transformation, including the nature of the applications that require the development and adoption of IT by all parts of the industry at once.

The health care industry is an excellent example of a sector ripe for an e-transformation. Using IT to automate much of the information processes in the health care system could save tens of billions of dollars per year. Yet, as evidenced by the widespread use of paper forms—hand written prescriptions, manila file records, etc.—and the limited use of email and online transactions, health care has been surprisingly resistant to making these changes. The President's Information Technology Committee writes that health care organizations are not well prepared to adopt information technology and applications effectively: "Health care is largely a decentralized industry populated by diverse organizations with different motives, resources, and incentives."¹⁷ Fiscal constraints, coupled with a lack of reimbursement for many IT applications, limit the ability of some parts of the health care industry to make the investments needed to adopt new technologies. Lack of standards and protocols linking all information in an interoperable way hinders progress. And, in the face of high levels of uncertainty about future directions of technology and the supporting infrastructure, technology developers and providers are hard pressed to justify investments. Moreover, it is not in the financial interest of some players, such as insurers and HMOs, to give consumers and health care providers the ability to file electronically, since it speeds up payments and does not let the insurers earn interest from the money for as long.

Other fields face similar constraints. For example, in the real estate industry, buying a house involves numerous forms and dozens of fees for things like title searches, filing deeds, etc. There have been no efforts to streamline the purchasing process and move more of it online primarily because the industry is in fact made up of an amalgam of numerous separate industries, many with a financial stake in the current way of doing business. Additionally, realtors have resisted development of direct seller-to-buyer e-commerce sites.

To encourage the transformation of those sectors that have not yet taken full advantage of the IT revolution to do so, Congress should:

- ▶ **Pass legislation requiring federal government agencies to examine how their procurement, regulatory, and other actions can**

speed the digitization of the sectors that they influence. Because executive agencies do not have the same kind of stake in the sectors that private companies do, federal agencies are better able to objectively assess a given sector and identify e-transformation potential, even if it leads to disintermediation or otherwise goes against the business objectives of some players. Once identified, mandating those changes could be over-regulatory, unnecessary, and counterproductive, but government agencies may be able to restructure their own operations, including procurement policies, to encourage the private sector to make changes that would increase the development of e-commerce.

- ▶ **Require agencies to work with both technology developers and users to help cultivate technology re-**

invention roadmaps. For example, HUD and Fannie Mae should convene such a group to examine e-transformation in the housing industry, with an eye toward using IT to automate and streamline the process of purchasing a house. The Department of Health and Human Services (HHS) should do the same in health care,¹⁸ as should the Securities and Exchange Commission (SEC) in the securities industry. The federal agencies that regulate the banking industry could do the same. Once clear roadmaps are in place, the risks associated with early investment in digital transformation will be reduced.

- ▶ **Encourage deployment of digital signature technologies.** The inability to authenticate oneself to others online presents a significant barrier to the growth of e-commerce applications that require authentication and non-repudiation. Digital signature applications can solve this, but they are not often used because so few applications require them, and vice-versa. To help eliminate identity fraud, PPI has called on state motor vehicle agencies to issue digital signatures and driver's licenses or ID cards with smart chips and encrypted biometrics.¹⁹ To facilitate this,

Congress should pass the **Driver's License Modernization Act, introduced by Rep. Jim Moran (D.-Va.) and Rep. Tom Davis (R.-Va.).**²⁰

Boost E-Government

Using the Internet to make it easier for citizens to conduct business and get information from the government is an important step in reengineering government for the New Economy.²¹ While digital government can stimulate Internet use, progress toward robust and widespread e-government has been uneven. At the federal level, agencies have taken steps to move more content and transactions online, but more needs to be done, particularly in creating citizen-oriented e-government. States differ significantly on the extent to which

they have embraced e-government, with some making major efforts to digitize a wide range of transactions and functions, while others are just getting started. At the local level, progress has been much slower. In 2000, the National League of Cities reported that while 89 percent of municipalities had Web sites, only 58 percent allowed users to download forms and information, 31 percent provided for the completion of forms and applications, and just 8 percent permitted financial transactions to be conducted online.²²

While some governments need to reach the point of enabling citizens to conduct transactions online, in general, governments need to move to the next phase of e-government—breaking down bureaucratic barriers to create functionally oriented, citizen-centered government Web presences designed to offer self-service government. Most agencies remain organized according to political and bureaucratic imperatives, not what makes most sense to citizens. This is reflected in the fact that most governments use the Web to project their own internal self-images online, organizing their sites in ways that reflect how government personnel view their world, not how the average citizen views the world. As a result, customer-centered digital government requires a fundamental change

Government needs to move to the next phase of e-government—breaking down bureaucratic barriers to give citizens a self-service government.

in outlook on the part of government, with the focus being placed on the needs of ordinary citizens. This requires organizing governments' Web sites in ways that are intuitive and easy to use, without jargon, program names, and acronyms. It means focusing on information and transactions people want, rather than information government wants them to have (e.g., the latest departmental press release, or a photo of an official). It means putting people in touch with all the available solutions to their problems, not just giving them access to the agencies' public relations materials.

While the Bush administration is taking some steps to improve e-government, it needs to be doing much more. After adopting the PPI proposal for a federal Chief Information Officer (CIO) and a \$500 million inter-agency digital government fund (\$100 million in the Bush initiative) during the 2000 campaign, the administration ended up calling for only \$20 million for the fund last year (of which Congress allocated only \$5 million) and appointing a person to a mid-level position within the Office of Management and Budget to coordinate digital government efforts. The administration has identified 24 e-government projects, but it is not clear whether the administration will fund these projects at adequate levels or develop additional projects.²³ Overall, this effort is insufficient. E-transformation of federal, state, and local governments is imperative, and will result in an increased demand for broadband. To remedy the problem, Congress should:

- ▶ **Pass the E-Government Act of 2002.** Introduced by Sen. Joe Lieberman (D.-Conn.), the Act (S. 803) proposes, among other things, a \$200 million digital government fund and the creation of a federal CIO. A similar bill (H.R. 2458) has been introduced by Rep. Jim Turner (D.-Texas). The Senate passed S. 803 by voice vote in June 2002. The House of Representatives should quickly follow suit and President Bush should sign the legislation.
- ▶ **Create a \$50 million challenge grant fund that states or cities could compete for to significantly transform their governments using the Internet.** This initiative would pro-

vide seed funding to stimulate states and local governments to come up with the most innovative and cutting-edge digital government applications that could in turn be replicated by other governments throughout the nation.

Provide Protections for Internet Users

Another reason many Americans have chosen not to get Internet connections in their homes is fear. The Internet has been portrayed as a high-tech tool of Big Brother, allowing both power-hungry police to secretly spy on people and greedy corporations to harass them with a never-ending barrage of junk email and pornography. These fears have been stoked by the

exaggerated claims of privacy advocates and other interest groups, but at base there are legitimate concerns to be addressed. Internet adoption will not reach the near-ubiquitous usage levels of television and telephones unless Americans are assured that basic protections are in place when they go online.

One of the primary concerns of Internet users is privacy—ensuring that personal information will be protected.²⁴ While many practices that are viewed as privacy violations are merely longstanding direct marketing practices (such as selling mailing lists of customers to other businesses that market similar products), the ability of e-commerce companies to use computers to keep detailed records of consumer behavior does raise serious concerns. Those privacy concerns, however, must be balanced against the commercial viability of the Internet. For now, a vast amount of information is available for free, but Web site operators face tremendous difficulties in supporting their operations through advertising. The targeted advertising that the Internet enables—such as showing pet food ads to users who are thought to own a dog—helps make advertising more profitable and, in turn, allows Web site operators to continue their services without charging users to access their sites. More importantly, an over-regulated approach to Internet privacy may hinder a consumer's ability to barter something of value—their

While the Bush administration is taking some steps to improve e-government, it needs to be doing much more.

personal information—for discounts on goods and services. The goal must be to balance protection of user privacy with allowing legitimate business models to flourish on the Internet.

Another growing problem is unsolicited commercial email, more commonly known as spam. This phenomenon is reaching epidemic proportions, estimated to have grown sixteen-fold in just the last two years.²⁵ As we noted in our 1999 report on the subject, spam is a problem more akin to junk faxes (which were banned by Congress) than paper junk mail because the cost of receiving spam is shifted to the user and the user's ISP.²⁶ More egregiously, a tremendous amount of spam advertises pornography services, and often displays extremely explicit images without any warning to the recipient. Though a growing number of services offer to filter spam, there is not yet a marketplace solution in place that can effectively limit unsolicited email.

The problem of content inappropriate for minors is not restricted to spam. Pornography, violence, and hateful material is easy to find on the Internet and has become increasingly difficult to avoid. The growing practice of posting pornographic sites using names similar to other popular sites makes it easy for children to accidentally see explicit content. (The most famous example of this is familiar to any user who has typed "whitehouse.com" instead of "whitehouse.gov" and found not the president's Web site but display of sexually explicit content.) Without an assurance that parents will be able to protect their children from stumbling onto inappropriate content, or having such content forced into their children's Web browsers and email boxes, Internet and broadband adoption is likely to be slower than it otherwise would be.

To address these obstacles to broader Internet uptake, Congress should:

- ▶ **Pass federal legislation requiring labeling of spam.** The legislative approaches to the spam problem have varied widely, from de-

tailed proposals spelling out limits on commercial advertising advanced by Sen. Conrad Burns (R.-Mont.) and Rep. Heather Wilson (R.-N.M.), to a far more limited proposal that simply requires senders to provide truthful information about the source of the email.²⁷ Unfortunately, none of the bills contain the easiest solution to the problem, which would be to require senders to put a standard label in the subject line of unsolicited commercial email (such as ".adv"). With a standard identifier, as PPI proposed in 1999, Internet users can either set their mail software to automatically filter out such mail, or they can subscribe to ISPs that filter the email for them. Though such a labeling requirement will not affect spam messages sent from overseas, it will go a long way toward giving Internet users control over their emailboxes, and therefore encourage greater Internet adoption.²⁸

The Internet has been portrayed as a high-tech tool of Big Brother, allowing both power-hungry police to secretly spy on people and greedy corporations to harass them with a never-ending barrage of junk email and pornography.

- ▶ **Pass appropriate federal privacy legislation.** In the months after PPI released a report detailing a balanced e-privacy law, debate over Internet privacy legislation advanced considerably.²⁹ Because the Internet by its very nature crosses jurisdictional boundaries, it is important for online privacy legislation to be enacted nationally to prevent Web site operators from being forced to comply with 50 different privacy regimes. There are currently two main legislative proposals on the table—one offered by Sen. Fritz Hollings (D.-S.C.)³⁰ and the other offered by Rep. Cliff Stearns (R.-Fla.)³¹ While neither bill meets the criteria set forth in our report, the Stearns bill comes much closer to the mark. Sen. Hollings' bill sets mandates for consumer access to data and security of consumer data that are not only financially onerous to Web site operators, but could actually harm privacy.³² Stearns' proposal, with some minor but important changes, is a more appropriate bill.³³
- ▶ **Encourage technologies that empower users.** One of the greatest properties of IT in general

and the Internet in particular is that individual users are empowered to set policies for themselves rather than relying on governments to do it for them. This is true of the V-Chip for the television and is even truer with Internet technology. To protect privacy, for example, a standard called the Platform for Privacy Preferences Project (P3P) allows users to set their privacy preferences into their Web browser, and then automatically be told whether a Web site meets those preferences without having to read the lengthy, legalistic

privacy policies. **Congress should adopt P3P technology on their Web sites and should pass a resolution (H. Res. 159) encouraging other government and private sites to do the same.** Similarly, the Internet Content Rating Association (ICRA) allows users to automatically block sites that contain objectionable content, such as violence, hate speech, or pornography.³⁴ **Congress and the administration should encourage private and government Web sites to label their content to work with the ICRA filters.**³⁵

Encouraging Digital Content

Of all potential Internet applications that might tip consumers toward the purchase of broadband service, none has more potential than the delivery of audio, video, and other recreational content. Music, movies, television, radio, and books are all enormously popular, and broadband can add to the usefulness of such content to consumers. Digital technology has already transformed sound and picture quality, and the advent of the DVD has led to greater interactivity. Distributing music over the Internet, rather than burned onto CDs, could revolutionize the music industry. Web-based broadcasting can make a variety of niche radio formats (both music and talk) economically viable by reaching a wider audience than over-the-air broadcasting. Streaming video-on-demand could similarly revolutionize television by letting people watch what they want when they want. Wide availability of such content services will be a key factor in stimulating broadband demand, because high-speed connections are needed to access this content effectively.

Unfortunately, the promise to consumers of digital content technologies is matched by the risks to the artists who create the content and the companies who invest in it. The same digital technology that presents consumers with greater control over the purchase of content also presents greater dangers to the copyright holders. Before the rise of the Internet, unauthorized duplication was largely self-limiting—the quality of copies degraded with each successive generation and the distribution of the copies had to be done through a physical exchange of tape. Now, as Napster.com and its successors have proven, it is easy to make unlimited copies of a song or other digital content and to distribute it to millions of anonymous strangers. Not surprisingly, the possibility of losing control over the distribution of content, and

therefore the ability to profit from the investment, has made content companies reluctant to embrace the potential of widespread broadband. (Finding the right balance between protecting content creators and protecting consumers is complicated, and will be the subject of a forthcoming PPI policy brief.)

Resistance to broadband has also come from companies that see the Internet as a threat to their traditional ways of doing business. While the widespread adoption of broadband should not mean the end of the concept of copyright, it may very well mean the end of certain long-established business practices, such as selling songs in bundles (also known as “albums”) or limiting broadcasts by geographic area (as is frequently done with sporting events). Any public policy strategy for stimulating broadband demand by expanding content availability will have to rest on a new analysis of the balance between the rights of consumers and those of the content creators and copyright holders. We should not add into that mix any false analogies between the Internet and more traditional means of content delivery, nor should we build policy based on the goal of protecting the content distributors of the Old Economy.

Though there are myriad issues involving intellectual property and the Internet, the goal of stimulating broadband demand boils down to one overriding question: How can the creators and rightful owners of content be assured compensation for their work when it is available online? Resolving this question involves several key issues.

Determine Fair Music Royalties

At the heart of the debate over releasing music on the Internet is the issue of royalties. If

Internet users can access music in a way that decreases their willingness to pay for it, either by freely trading MP3 files on a peer-to-peer network or by listening to an interactive webcast that gives them control over what music they hear, artists and record companies will be unable to recover their investment in the creation and production of the music.³⁶ Though artists and labels need to be compensated, the current scheme developed to collect royalties over the Internet is unfair and unwieldy. To encourage the growth of webcasting, which in turn will stimulate broadband demand, Congress must create a royalty scheme that treats different broadcasting channels in the same way, while eliminating unnecessary barriers of entry for aspiring webcasters.

The current royalty procedure for webcasters is unfair, requiring them to pay two royalties, whereas terrestrial broadcasters (on-air radio stations) pay only one. Both pay royalty fees of about 4 percent of their revenue to composers and publishers of the song in question. But where traditional broadcasters do not compensate record labels for use of the recording other than the free promotion offered by airplay, the 1995 Digital Performance Right in Sound Recordings Act coupled with the 1998 Digital Millennium Copyright Act (DMCA) established a sound recording performance clause that entitled the holders of copyrights on sound recordings, generally record companies, to receive royalty fees for digital transmissions of their copyrighted material.³⁷ These licenses are statutory, meaning that anybody can have one if they comply with certain conditions.³⁸

Part of the justification for these differences is that webcasters allegedly cut into music sales, whereas traditional radio stations promote sales. This may be true, depending on the degree of interactivity or specificity on a Web site or "channel." If a webcaster allows users to play any song on demand for free, the service is effectively the same as Napster. However, webcasters can have degrees of interactivity and specificity. At the most basic are channels that are more specific than traditional broadcasters could afford to be, such as channels playing only jazz or dance hits

from the 1980s. Some services allow greater interactivity, for instance, by allowing users to customize the listening stream by selecting the amount or frequency of certain types of music. Of course, there are also simple rebroadcasts of terrestrial radio stations, which differ only in the medium through which the signal travels and presumably plays the same role in promoting record sales as the on-air version. It is impossible, therefore, to generalize the impact of webcasting on music sales and justify higher royalties on that basis. One can, however, make a plausible argu-

ment that all but the most interactive Web radio boosts sales not only because the listener can more easily identify the artist, but because on most stations purchasing a copy of the music (whether in CD or MP3 format) is only a click away. In addition, many stations play music that listeners might not have heard before, but

which they are likely to appreciate or even purchase. Moreover, the DMCA sets specific criteria for the degree of interactivity and specificity that webcasters can implement.³⁹

Webcasters also face an additional burden in reporting the songs they have played and their listenership to SoundExchange, the body charged with distributing royalties to copyright owners and other concerned parties. Broadcast radio, which distributes royalties only to publishers and composers, samples their broadcast at defined intervals and reports the contents of those samples to the appropriate royalty assessors. Internet radio offers a much more accurate assessment regime, which is particularly important for artists in niche genres that stand a reduced chance of being heard in samples. SoundExchange, an arm of the Recording Industry Association of America (RIAA), demands of webcasters certain pieces of information for each song they play, so that they may accurately identify those people who should be paid. But webcasters object that such census reporting will be overwhelming for small stations, and they favor the less cumbersome sampling technique.⁴⁰

Resolving the problem with royalties and establishing a reasonable digital rights management regime will enable Web radio to

Congress must create a royalty scheme that treats different broadcasting channels in the same way, while eliminating unnecessary barriers of entry for aspiring webcasters.

blossom. As a result, two basic actions should be taken:

- ▶ **Harmonize the royalties paid by terrestrial broadcasters and Internet webcasters.** Congress can do this either by eliminating the performance royalty on webcasts or by requiring on-air broadcasters to pay the same royalty. If the performance royalty is not eliminated, the rate for on-air broadcast and webcasting should be the same.⁴¹
- ▶ **Simplify the process for collecting and distributing royalties.** Yahoo! Music and others are calling for a unified and accessible database that assigns a unique identification number to every single recording that can serve in place of information such as artist, song title, and album title, making reporting and royalty payment far more efficient. This solution is the best for all parties, because it will place the minimum burden on broadcasters, while allowing comprehensive and accurate royalty payments to copyright holders and performers. However, neither the recording industry nor the webcasters are willing to take the lead and furnish the resources to establish such a database; it is a classic tragedy of a common problem. For this reason, **the Library of Congress Copyright Office should spearhead a collaborative effort between broadcasters and recording companies alike to create a universal song database.** There are software products available that can do just that, and bits and pieces of databases held by various bodies that the collaboration could draw on in their efforts. The outcome, however, should be a comprehensive database containing a unique identifier for each and every sound recording that may be broadcast, and information to allow royalties to be distributed equitably. This development will ease the burden borne by webcasters and the recording industry alike, and will clear the way to a more productive relationship between them.⁴² Such a complete database of songs could also be used by music companies to create a near complete library of songs for sale via download as well as to anyone who may want to add valuable information about songs to the database (such as date created, awards, key words, etc.).

Encourage Public Broadcasting to Take the Lead in Putting Content Online

Another problem facing efforts to deploy content online is the uncertainty of the market. Because it is unclear how the distribution of content over the Internet will work in the long run, rights holders are reluctant to make their content available online and without knowing what will happen to the content, it is impossible to make a fair guess as to the value of Internet transmission rights. In the television industry especially, this issue is complicated not only by the fact that viewers associate television programs with the networks on which the programs are broadcast, but also because, except in rare instances, the networks do not own the rights to the programs and therefore cannot make a unilateral decision to make the programs available over the Internet. Moreover, it is hard for most companies to justify investments in posting content online when the number of broadband subscribers is so low.

Given the recent experiences the music industry has had with releasing music online, and the increasingly hardened positions of the trade associations representing rights holders, it will be difficult for television rights holders to enter the online marketplace. The Corporation for Public Broadcasting (CPB) can play a role in boosting online content by creating “pump priming” pilot programs for Internet distribution. If public broadcasts are the first to take the plunge into Internet distribution, private companies can see how the experiments work and develop their own offerings accordingly. Moreover, as more CPB content is online, more consumers will subscribe to broadband, making the case more compelling for private providers to put their content online.

The efforts of the nation’s two public broadcasting companies, National Public Radio and the Public Broadcasting System, represent two models of government leadership on the Internet. NPR’s content is easily available online, of acceptable quality, and nearly comprehensive. NPR.org offers a live stream of their news and other programming, a searchable database of all of their programming, and the ability to listen on demand to almost any show the network or its affiliates produces. All of this is available for free over the Internet, in varying degrees of sound quality. The CPB has funded grants to companies such as PublicInteractive.com, which

in collaboration with Public Radio International streamline multimedia Web development and content provisions for local stations. While the sound quality of public radio's Internet offerings still lags behind FM radio, NPR can easily solve that by increasing the bandwidth of their broadcasts.⁴³

In contrast, PBS offers patchy Internet programming, with parts of some programs available on Web sites for individual shows, but without an interface dedicated to high speed, high quality, searchable video content.

The difference between the online successes of PBS and NPR is twofold. The first is simply file size; video files are many times larger than audio files, and the equipment investment necessary to stream high-quality video is far higher than doing the same for audio. The other problem is that PBS does not produce its own programming and therefore typically does not own the rights to its programs.⁴⁴ The shows that run on PBS are produced independently by individual public stations or by independent producers. Webcasting a PBS broadcast requires the negotiation and purchase of the copyrights.

To get around these problems, PBS has experimented with offering their content through Intertainer.com, a private, fee-based video-on-demand service.⁴⁵ This revenue model may be the easiest way to compensate the several owners of a single PBS show, however, it is inconsistent with the mission of public television—to provide educational, high-quality content to the general public free of charge and free of commercial advertising.⁴⁶

PBS lags in providing online video content because it views itself as a business, just like any other content provider. Through focus groups and surveys they have determined that their limited budgets can best serve their viewers in areas other than online broadcasting: Rather than diving into the uncertain broadband content market they have funded more traditional TV-based projects. If PBS were just another content provider tied to advertising revenue, then satisfying viewers in the short-term would be prudent. But PBS has a broader purpose and different revenue stream than network television, in that it provides free, high-quality, non-commercial, and educational television to U.S. citizens. One-third of PBS' revenue comes from federal, state, and local tax dollars, and a third of that comes from the federal government. Because

PBS exists to serve the public good, they are an appropriate vehicle to lead the way into the future of digital transmission of television programs and other content.

At the most basic level, the problems PBS faces with transmitting programs online can be resolved with adequate funding. The technology exists for making TV programs available online, although it requires a considerable front-end investment. Moreover, the owners of the programs broadcast on PBS are likely to sign over Internet transmission rights if they are fairly compensated. These two moves would be a wise investment that would help jump-start the digital distribution of other content and stimulate demand for broadband. To resolve these issues:

- ▶ **Congress should allocate at least \$50 million to PBS to develop and deploy webcasts of the programs that are already broadcast over the air.** The funds could be used not only for investment in technology, but also to acquire rights for webcasts of PBS shows.
- ▶ **PBS should negotiate aggressively to secure the webcasting rights for all programs broadcast over the air.** Though it may not be practical at first, the long-term goal of PBS should be to link webcasting rights to the broadcast license, so any producers that want their shows to be aired on PBS would be required to allow the shows to be posted to the Internet.

Build Online Libraries

The United States Congress has the largest library in the world. It houses more than 17 million books, as well as nearly 95 million maps, manuscripts, photographs, films, audio and video recordings, prints and drawings, and other special collections. Its volumes include more Arabic and Spanish texts than any library in Asia or Spain. Yet most of the books, documents, and recordings contained in the Library of Congress are inaccessible to all but those who happen to live in Washington D.C. Online access to these materials would prove invaluable resources to professional researchers, students, and teachers, as well as the casually curious everywhere.

Several government projects have been funded to do just this. The National Science Foundation (NSF), the Defense Advanced

Research Projects Agency (DARPA), and NASA funded the Digital Libraries Initiative in 1994, and were later joined by the National Library of Medicine, the National Endowment for the Humanities, and the Library of Congress. This initiative has been directed at establishing a comprehensive and user-friendly library of publicly-owned information. As the project advanced, several problems were identified: setting standards for meta-classification and searching of various media, creating useful interfaces for different types of users, archiving ephemeral Web pages, and storing vast amounts of data reliably and indefinitely, to name a few. This ambitious project is still in the development and testing phase, but some test sites have been developed. The American Memory Project, for example, is funded in part by the Digital Libraries Initiative and now contains over seven million digital items for over 100 historical collections.⁴⁷ The Library of Congress is playing a leading role in the national endeavor to put all public information online, and should continue and accelerate these efforts.

Getting public content online is a good start, but not the whole task. The President's Information Technology Advisory Committee (PITAC) called for "anytime, anywhere access to the best of human thought and culture, so that no classroom or individual is isolated from knowledge resources."⁴⁸ To meet this goal, it is necessary to make available not just content in the public domain, but also content held under private copyright, just as local libraries do.

The efforts of publishers and private parties to make books available in digital form have been lackluster at best. Unlike the "consumer-pirate" driven online music industry, the e-book industry was deliberately developed and controlled by corporations and copyright holders. While consumers made MP3 the standard format for digital music, competing e-book companies developed incompatible formats, providing content readable only by proprietary software and hardware. At least five different and incompatible formats for e-books emerged, however, with companies demanding content formatted specifically for their own reader. Today, that number has been reduced to two, Microsoft and Adobe's propri-

etary and incompatible formats. The publishing industry has adopted the Open e-book Publishing Structure Specification 1.0 (OeB) as a standard for digital publishing, but for use on an e-book reader, the book must be converted into one of the competing proprietary formats before being sold. While this is inconvenient for retailers such as Amazon.com who must supply books in different formats, libraries are especially hampered in their efforts to provide e-books to their patrons, as a variety of formats force them to either duplicate their collections or cease serving those patrons with incompatible e-book readers.⁴⁹ Without standardized electronic formats for books, the task of making a true digital library is greatly complicated.⁵⁰

Many local and state library systems are taking strides toward providing all types of content online for their patrons, spending countless hours programming links to resources they feel patrons will find beneficial. Many are partnering with Netlibrary.com, which licenses its limited collection of electronic books to public and academic libraries. Unfortunately, users of Netlibrary.com must read these books either in the library or in front of their computer screens, as the material cannot be downloaded to portable e-book devices. Making a concerted effort to bring content online is a difficult undertaking for cash-strapped municipalities and counties, but widespread availability of the wide breadth of human knowledge is a public good, providing a great social benefit. Valiant but struggling efforts of local libraries to offer high quality digital content satisfy only a portion of this public good, because in order to realize broad-scale public benefit, including jumpstarting broadband demand, an online digital library must be comprehensive.

- ▶ To this end, **Congress should establish the National Digital Lending Library (NDLL)**. This library, which would operate under the auspices of the Library of Congress, would act as a central repository and distribution center for public domain and privately copyrighted digital library materials. Its digitized materials would be available to any public library in the country in a manner

Getting all public content online is a good start, but not the whole task.

analogous to, but far more efficient than, the distribution system of bound books. The NDLL would acquire licenses from copyright holders for each work based on the number of requests from local libraries, and would collect the licensing fees from the libraries to remit to the rights holders, compensating copyright holders just as they would be for the bound editions of their books. It would then transmit the electronic text to be used by the local library in accordance with the license terms, limiting availability based on the number of copies purchased by the particular institution.

For example, the local library could buy the rights to “lend” two copies of a new book at a time; if two patrons checked out the two copies but have not yet “returned” either, then it would be unavailable to other patrons. The use of Digital Rights Management (DRM) technologies could streamline the lending process as well—rather than charging late fees, the electronic text could be programmed to become unreadable on the assigned due date. The DRM technology would also prohibit patrons from making electronic copies of the book.

Giving Americans electronic access to virtually every published book without having to visit the local library in person (and allowing local libraries to vastly expand their collections without expanding their bricks-and-mortar facilities) would be a valuable public good in itself, and as this is only possible with broadband connections, it would have the added benefit of stimulating demand for greater bandwidth. Some content holders argue that such a lending library is unfair and would lead people to not buy books. In contrast, some librarians argue that they should be able to buy one digital copy and lend it to multiple users at once. Neither view reflects the paper-book library analogy, where libraries buy individual copies and lend them out to one patron at a time. There is no reason why this model cannot and should not be applied in the digital world.

Build Digital Museums

Like libraries, museums contain a great deal of knowledge that is difficult for many people to access, particularly if they do not live near large cities where museums are clustered. Many in the museum community are excited about the possibility of bringing their collections to the Internet, but until recently, there was no means for online patrons to view content-rich exhibits. Consortia have convened to discuss digitizing museum collections, and the federal Institute of Museum and Library Services (IMLS) has funded more than 100 museum and library digitization projects.⁵¹ Many of these projects will come to fruition within the next year, in time to capture the lessons learned and apply them to the widespread development of online museum content.

Museums, particularly science museums, have embraced IT as enthusiastically as any other public institution. Unfortunately, much of their effort has been so far aimed at bringing computer kiosks into museums, rather than museums into people’s computers. Most of the current museum offerings online are limited and contain little more than snapshots of what is housed in their facilities. A better online museum would be searchable, interactive, and would take advantage of the speed and instant access to information afforded by the Internet. An exhibit on Monet’s *Water Lilies*, for example, could contain not only a high resolution, zoomable image of the painting, but historical information about the painting, the painter, and the subject matter; discussion threads and a chat group about impressionists; video and x-ray images from the scientific analysis of the painting; and even links to more information about Monet’s property at Giverny. An online museum should be able to instantly answer any question with an interesting presentation for every a curious child or adult.

Museumwow.com is a nonprofit organization currently working toward that goal, with sponsorship from private industry and the U.S. Department of Education.⁵² Their first exhibit presents the scientific, political, literary, and artistic

A better online museum would be searchable, interactive, and would take advantage of the speed and instant access to information afforded by the Internet.

history of the least digital medium of all—paper. Curated exclusively for the high-speed Internet, its contents will take full advantage of the video, audio, and real-time interactive capabilities of broadband. The Museumwow.com team has taken particular care in constructing content and tools that will be useful to educators, as well as fun activities that will serve the purposes of children and parents, alike. Museumwow.com is not only innovative in its online presence, its novel strategy for creating new content exemplifies synergistic, non-traditional thinking. Rather than employing a full-time staff of curators and content developers, Museumwow.com deliberately selects a team of experts to collaborate on constructing each new exhibit. The museum hopes that the opportunity will inspire the creative energies of these people, and lead to new and innovative content.

Museumwow.com hopes to one-day help smaller museums develop themselves into educational and entertaining online resources, donating their technology and experience to institutions that cannot develop it themselves. Museumwow.com is only one initiative, however, and much more needs to be done to bring the wealth of human knowledge and scholarship to

the Web in useful and forward-looking ways. While the IMLS is refocusing its grant efforts to encourage more museums to make content available online, museums are on their own when it comes to actually designing their online presence.

In addition to art museums, there is an opportunity to create digital science museums. Much of the content in science museums is already in digital form, and due to the conceptual nature of science museums, as opposed to the emphasis of art and history museums on physical artifacts, a science museum would be a particularly useful focus for a coordinated pilot effort.

- ▶ To develop a model for online museums, **Congress should fund a grant program for development of online museums.** For example, a grant for science museums could be overseen by the National Science Foundation's Directorate for Education and Human Resources, Division of Elementary, Secondary, and Informal Education, which oversees grants for "informal science education."

Encouraging Transformative Applications

Entertainment and other consumer-related content is largely the focus of most efforts to stimulate broadband demand, but there are many other ways that a ubiquitous broadband network could transform the way Americans work and live. Just as home computing devices started out in the consumer arena as video game machines and then transformed into productivity-enhancing devices, so too could a broadband network develop from an interactive television and radio service into a tool for enhancing productivity and improving our lives.

Encouraging these important transformative applications, such as telecommuting, distance learning, and telemedicine, will bring benefits far beyond improving the services themselves. Online consultations with doctors, for example, does more than simply save the patient a trip to the doctor's office; it reduces costs by efficiently using health care resources and improves care by linking patients to the doctors who are best able to treat them rather than the doctors who are most conveniently located. With an eye toward these larger goals, stimulating demand through these applications can help transform the entire society.

Promote Telework

The goal of telework, or telecommuting, has been pursued for many years, but the reality of working productively from home has been more difficult to achieve than anticipated. In 1999, the 19.6 million teleworkers nationwide typically worked nine days per month at home, with an average of three hours per week during normal business hours. This is partly because of

limitations in technology (e.g., conference calls are not as effective as meeting around a table; in spite of advances it is often still difficult to access corporate networks from a home PC) and partly because of the expense in distributing office resources into homes (e.g., equipping every home worker with a fax machine and computer is expensive, and allowing access to internal networks is risky). Technology is catching up to the challenges: Outfitting a home-based office worker with a full range of equipment can cost less than \$1,000.⁵³ One chokepoint, however, is in the speed of data transfer between the home and office.

Widespread availability of broadband can solve that problem. With the proper technology, the link between a home office and a central office can become transparent—virtual private networks, videoconferencing, electronic document transmission, and the like make it just as easy to work from home. The social benefits of doing so are clear, including reduced road congestion, improved air quality, and more free time to spend with family. Indeed, a part time teleworker that eliminates a commute of 30 minutes each way adds 10 full days of free time every year. Moreover, studies have shown that companies employing a telework policy have enjoyed a marked rise in productivity. The numbers are illustrative:

- ▶ Forty-seven percent of teleworkers surveyed reported an increase in productivity while working from home, and only 10 percent reported a decrease in productivity.⁵⁴
- ▶ Fifty-four percent of teleworkers reported that they work the same or more hours when they

work at home, while also managing personal and household matters that keep them out of the office.⁵⁵

- ▶ J.D. Edwards reported that teleworkers are 20 percent to 25 percent more productive than office workers.⁵⁶

The ability to take advantage of telework opportunities is a clear incentive to subscribe to a broadband service; indeed, 52 percent of broadband households have at least one telecommuter.⁵⁷ Despite the advantages, however, there are still serious obstacles to telework. Under current tax law, for example, employees who are given home computers by their employers as an incentive to telecommute must pay income taxes on the value of the gifted machines that are classified as taxable fringe benefits. Regulatory uncertainty regarding the status of home offices also acts as a disincentive to companies to formalize their work-from-home arrangements. To overcome these obstacles:

- ▶ **Congress should pass telework incentive legislation.** Several bills promoting telework are currently under consideration. Rep. Jerry Weller (R.-Ill.) has introduced a bill allowing employees to take a tax deduction for home computer equipment and Internet access used for telecommuting.⁵⁸ Rep. Frank Wolf (R.-Va.) has proposed a tax credit of up to \$500 annually to the purchaser of “furniture and electronic information equipment” for telework, whether that purchaser is the employer or employee.⁵⁹ Perhaps the most comprehensive proposal has been offered by Sen. John Kerry (D.-Mass.). The Teleworking Advancement Act (S. 1856) provides a tax credit of \$500 plus 10 percent up to \$500 of telework equipment and Internet access expenses, for a total possible annual credit of \$1,000 per teleworker.⁶⁰ Small businesses qualify for \$1,000 plus 20 percent up to \$1,000, for a total of \$2,000. Under the Kerry bill, teleworkers qualify if they telecommute at least 25 days per year, at which point the flat credit (\$500 for big business, \$1,000 for small business) is prorated to the percent of total days worked at home by the employee, while the equipment credit remains at 10 percent of equipment costs up to \$500 (20 percent up

to \$2,000 for small businesses). Quick action on these proposals will have an almost immediate impact on telework and broadband demand.

- ▶ **Home offices should not be subject to workplace regulations.** Current policy of the Occupational Safety and Health Administration (OSHA) holds that employers are not liable for the safety of an employee’s home office. However, some fear that OSHA could change that policy, as they tried to do in 2000. Extending the authority of OSHA into the homes of American workers would severely hinder the interest in telework. Workers are unlikely to make changes to their homes—such as removing pesticides or other hazardous chemicals from storage rooms—that will be necessary to meet OSHA standards. More importantly, companies will not be willing to accept responsibility for the safety conditions in their employees’ homes. OSHA’s mission is not necessary in home offices. Unlike traditional workplaces where cutting costs gives companies an incentive to skimp on worker safety, individuals setting up their home offices have much stronger incentives to make them safe, since that is where they and their families live. Regulating homes in the same way as workplaces will act as a fatal disincentive to telework.
- ▶ **The public sector should lead by example.** Government agencies should take the lead in establishing telework programs. This is especially true of the federal government, with its sizable workforce located in the Washington, D.C. region.⁶¹ Washington and its suburbs in Virginia and Maryland suffer from some of the worst traffic problems in the nation, and risk losing federal highway funds because of failure to comply with clean-air standards. A telework program for federal employees could help alleviate those problems in the Washington area, and would be just as useful for federal employees in other places as well. Congress mandated that home-based telework be made available to all federal employees by 2004. However, less than 4 percent of federal employees telecommute, lagging behind the pace of implementation anticipated in the original

legislation.⁶² **The Bush administration should set a clear goal to spur telework by federal employees, including supporting reimbursements of employee expenses for technology equipment and telecommunications costs.** State and local governments should also establish robust telework programs. A number of states have passed legislation or executive orders encouraging telecommuting and these should be adopted by all states. In addition, some states define telework too narrowly, in some cases requiring workers to telecommute at least two days a week in order to qualify for the program.

- ▶ **States should eliminate tax disincentives to telecommuting.** State tax laws present a growing threat to telework. It is not clear how state tax administrators will treat workers who telecommute with regard to establishing nexus for the purpose of requiring firms to collect sales taxes in the state the worker is in. Companies may find themselves subject to taxation in a jurisdiction where the telecommuter lives, even if the company has no other connection with that state.⁶³ In our view, telecommuting should not trigger nexus, unless a teleworker is a sales agent for the company. In addition, because of differing state regulations for taxing personal income, it is possible for telecommuters to be required to pay taxes in two states if their employer is one state and they live in another. For example, if a resident of Connecticut telecommutes to a New York organization from home for her convenience, both states will claim the right to tax her income. Connecticut will not allow a credit for taxes paid to New York because it will not recognize New York's right to tax the income. State tax administrators have recognized the problem, but have not devised a solution. We urge the Federation of State Tax Administrators to resolve this issue so telecommuters are free from double taxation.

Support and Expand Distance Learning

Of all the potential uses of broadband access in the home, perhaps distance learning is the most important. The rise of the New Economy

has made lifelong learning and skills upgrades essential, and the Internet has the potential to turn every home into a classroom. The Internet, with its real-time interactivity, is a quantum leap above the long-scorned "correspondence" courses that have shaped federal student aid policy in favor of bricks-and-mortar classrooms. Most importantly, the Internet can be used to reach children at the primary and secondary level who are unable to get an adequate education in the classroom. In the coming years, the availability of convenient, inexpensive, high-quality education over the Internet will greatly stimulate demand for broadband access in the home.

A number of Internet education projects have already been launched. At the K-12 level, online schools serve students in 12 states, with five others in development. Half of all states permit online charter schools, and all states allow districts to sponsor e-learning initiatives.⁶⁴ Such programs are revolutionizing K-12 education both by allowing bricks-and-mortar schools to expand their course offerings, and by providing students with an alternative to traditional schools. Most states have chosen to outsource their online offerings to private companies, such as Apex Learning or class.com, but Florida established their own online school with public dollars in 1997. The Florida Virtual School now serves more than 5,000 students in 65 counties. Likewise, the Pennsylvania Virtual Charter School provides students with an online alternative to traditional public schools, with their own teachers teaching a curriculum developed by a private company. Virtual High School (VHS) also has had great success with their innovative collaboration-based approach. As a private, nonprofit organization, VHS allows schools that develop and contribute a distance learning course to enroll students in their virtual school, greatly expanding the number of classes available to high school students.

At the postsecondary level, schools have realized that an online course involves more than merely digitizing an existing course's materials and lectures. Institutions that operate exclusively online, such as the University of Phoenix and Western Governors' University, have developed an effective and popular model for at-home, Web-based higher education. Students can attend lectures, participate in discussion groups,

conduct collaborative projects, perform research, and interact one-on-one with teachers and fellow students from their personal computers.

Continuing education is also getting a boost from the Internet. Private companies have been offering online corporate training for several years, and expanding broadband access is helping it to grow from a \$2.3 billion industry in 2000 to a projected \$18 billion operation by 2005. At the same time, the percentage of this training focused on IT occupations is expected to drop from 76 percent in 2000 to 46.2 percent in 2005, demonstrating the effectiveness of such training for a wide variety of occupations.⁶⁵ The public sector has played a pivotal role in advancing the state of the art in digital learning, as the Department of Defense's Advanced Distributed Learning initiative led the industry to adopt the Sharable Content Object Reference Model (SCORM) as the standard for online e-learning content.⁶⁶ Government agencies are quickly adopting e-learning services for internal use, and an OMB initiative aims to create a government-wide repository of such resources for use by government agencies.⁶⁷

Forward-looking government agencies are also developing Internet-based training programs for remedial education. California's Distance Learning Project offers English as a Second Language and adult literacy courses for free to anybody over the Internet, and many public and private universities are developing similar programs funded by public grants, including those provided by the 2002 Agricultural Appropriations bill. Canada's Alpha Route program provides free French and English literacy training to all Canadian citizens.⁶⁸ Such programs provide tremendous benefit for little cost relative to their in-person, classroom-based alternatives.

Beyond the "electronic classroom," high-speed Internet connections can make it much easier for students to find individualized instruction, since tutors from around the world can be connected with students in real time. Smarthinking.com is a private company that provides live, one-on-one tutoring at all educational levels. Idaho's Digital Learning Academy (IDLA), a public program called for by the state legislature, aims to pro-

vide "learning experiences for any Idaho students needing remediation and credit recovery, gifted talented enhancements, and concurrent enrollment in higher education options."⁶⁹ The No Child Left Behind Act requires school districts to offer supplemental tutoring to students in low-performing schools and includes provisions to ensure that distance learning is among the options available to students. Since low-performing schools are concentrated in low-income communities with few bricks-and-mortar tutoring options, distance learning is a potentially im-

More should be done to boost distance learning and make it available to all Americans at low or no cost.

portant tool to meet this new responsibility. The Internet can also be a pivotal tool for the use of "intelligent tutoring systems," adaptive computer programs that identify a student's strengths, weaknesses, and learning style and tailor a learning program to each individual. Carnegie Learning Systems' Cognitive Tutors have been adopted in 35 of the nation's 100 largest school districts, after trials demonstrated users' improvements of 15 percent to 25 percent on standardized tests and 50 percent to 100 percent on assessments of complex mathematical problem solving.

In addition to these and other advances in distance learning stimulated by the growth of the Internet, more should be done to boost distance learning and make it available to all Americans at low or no cost. In order to reach these goals, Congress should:

- ▶ **Create the Learning Media Resource as a portal for digital learning materials.** The concerted effort to push information technology into schools has brought many changes to the classrooms; in addition to chalkboards and posters, students are likely to see multimedia computer presentations and interactive software tools. Unfortunately, some of the best new learning materials are difficult for teachers to find. The Learning Media Resource could aggregate such materials through two Web sites: Teaching.gov, a searchable database of pictures, videos, audio presentations, and interactive demonstrations for use by teachers in the classroom, and Learning.gov, a site providing fun activities

for students and links to the materials they view in the classroom. To deal with the copyright issues involved in the creation of such a portal, **Congress should pass laws such as those sponsored by Rep. Rick Boucher (D.-Va.) and Sen. Orin Hatch (R.-Utah) that would extend the traditional fair use of copyrighted materials for educational purposes to such materials transmitted over the Internet.**⁷⁰

- ▶ **Eliminate the “in seat” requirements for higher education.** In response to the rise of low-quality educational institutions designed primarily to attract students that receive federal aid, the federal government required that 50 percent of education must be done in person. The requirement serves as a barrier to the delivery of high-quality online education. The Internet Equity in Education Act of 2001 (H.R. 1992), sponsored by Rep. Johnny Isakson (R.-Ga.), seeks to repeal that requirement for legitimate educational institutions that serve online students. H.R. 1992 has already passed the House and awaits action in the Senate.⁷¹
- ▶ **Extend the Lifelong Learning Tax Credit to cover broadband access.** One of the key obstacles most adults face when seeking additional career training is the inconvenience of getting to the classroom while working full-time and caring for a family. High-speed Internet connections can bring the classroom home, though the high costs (both for initial connections and monthly subscription fees) can be a significant barrier to those workers who would most benefit from lifelong learning programs online. Yet households with broadband are 68 percent more likely to have taken a course online. To help defray the cost of broadband access for adult students, the Lifelong Learning Tax Credit should be extended to cover broadband expenses for students who participate in an educational program that would otherwise qualify them for the credit.⁷²
- ▶ **Develop an expanded online tutoring program within AmeriCorps.** The benefits of connecting tutors and students over the Internet are obvious, but this untapped

potential is even greater than many imagine. An online tutoring division of AmeriCorps could serve not only elementary and secondary school students, but also teach adult learners the computer skills that are critical to career advancement in the 21st century. By expanding the program to serve as an umbrella for high school students who want to be online tutors as part of their volunteer programs at school, AmeriCorps could be a central location for low-cost online tutoring. This will stimulate demand for broadband not only in students’ homes, but also in the homes of the volunteer tutors.

- ▶ **Provide funding to the Department of Education to support the creation of online curricula for basic skills assessment and acquisition.** The Internet can play a key role in helping adults assess and upgrade their skills. Yet, there are few online resources for this, and even fewer that are free of charge. To remedy this, Congress should allocate funding to the Department of Education’s Office of Vocational and Adult Education to support the development of a comprehensive Web portal for basic skills and career preparation. This would include easily accessible and free online skills assessment; career aptitude testing and counseling; and self-paced computer-based learning in areas such as basic literacy, numeracy, GED preparation, and English as a Second Language.

Transform Health Care with Telemedicine

It is no surprise that the high-speed Internet has already made an impact on healthcare. A wealth of government initiatives have helped rural doctors consult with urban specialists, radiologists read X-ray films and CAT scans from remote clinics, and surgeons even perform surgery from afar.⁷³ Such applications were relatively easy to initiate, as many hospitals are connected to the Internet’s high-speed fiber optic “backbone.” But because few residential customers have the necessary high-speed Internet access, and because few policy makers grasp the importance of telemedicine, residential online healthcare applications have lagged. Once these problems are solved, instant communication,

personalized information, and the elimination of geographic limits to consultation and care will make the age of telemedicine more efficient and productive than what we now know.

The age of telemedicine will bring significant changes to the way we experience health care today. As a vast repository of medical information, the Internet can help to educate critical patients. By allowing patients to learn more about their diagnoses and digest the information at their own pace, these educational sites not only help patients through the emotional trauma that can accompany an illness but also connect them with others who have shared their experiences and empower them to participate in their own treatment by asking better questions and giving their doctors necessary information. Video demonstrations, live and confidential videoconferences with doctors, personalized information about treatment options, clinical trials, and the history of one's condition can assure patients that they are receiving the best possible care, or make them aware that there may be a better alternative available. Sites such as Nexcura.com are already offering scaled-down versions of these services, where patients may view personalized medical information and three-dimensional interactive diagrams of organs and systems, chat with people with similar conditions, and read about clinical trials. The system also offers a "parallel path" of information to caregivers, allowing for more effective treatment.⁷⁴ Empowering patients with information can have important medical benefits.⁷⁵

Telemedicine serves more traditional medical purposes as well. Home visits by doctors, which have become rare, could be revived through applications of videoconferencing technology. A recent survey found that 90 percent of adults wished to contact their doctor online to ask questions when visits are not necessary, arrange appointments, refill prescriptions, and receive test results.⁷⁶ Live, face-to-face video consultations between patients and doctors are an efficient and productive use of everyone's time. The pediatrics department at the University of Florida at

Gainesville, in partnership with the Florida Department of Health, has launched the Florida Initiative in Telehealth and Education (FITE) to deliver expert pediatric endocrinology/diabetology support to health clinics in outlying counties which have no pediatric endocrinology presence.⁷⁷ The Veterans' Administration and Department of Defense have had success with specific applications of videoconferencing such as teledermatology, where distant doctors examine skin conditions of soldiers in the field. Psychologists have been conducting online psychotherapy since 1998, stirring heated debate in their larger professional community. The gain in peace of mind and savings in travel and waiting time from easy, "telecommuting" doctors visits are a boon to patients and doctors alike.

With constant broadband connections, telemedical applications can also allow chronically ill or disabled patients to live at home while receiving the constant monitoring that currently requires nursing home care. Health Buddy, Philips, Panasonic, Becton-Dickenson, and others have developed home health monitoring systems that take advantage of high-speed communications to feed a breadth of information to nurses, doctors, monitoring stations, and even public health systems. Very simple solutions such as the Health Buddy are no more than a small box that asks questions of the patient such as "How are you feeling today?" and "How is your appetite?" Patterns of responses can alert doctors to deteriorating conditions, allowing preventative care and early interventions to be easily administered. At the other end of the spectrum systems such as those developed by NASA and DOD can monitor and transmit more than a dozen readings and even administer remote defibrillating shocks to patients who live outside the range of prompt ambulatory response. Loved ones can monitor elderly parents, children in day care, and premature babies from remote locations. These technologies improve the quality of life for patients and save countless dollars that would otherwise be spent on residential care, however, they require high-

Instant communication, personalized information, and the elimination of geographic limits to consultation and care will make the age of telemedicine more efficient, productive, and healthy than what we now know.

speed access to the Internet to be fully effective.

Aside from a lack of broadband access, telemedical applications face a number of other obstacles. By far the most prohibitive is the fact that Medicare and most health insurers do not cover the cost of telemedicine, such as email or videoconference consultations. A medical payment system that covers only face-to-face interaction stands as a nearly insurmountable barrier to the growth of telemedicine.⁷⁸ The deployment of telemedicine is also slowed due to the lack of a national strategy. The practice of medicine has traditionally been an entirely local phenomenon—the doctor and patient meet at a single physical location—and the regulatory regimes covering medicine reflect that scheme. Medical licensure, insurance payments, patient privacy rules, and a host of other regulatory issues must be dealt with on a national basis for telemedicine to realize its full potential.⁷⁹ To address these issues:

- ▶ **Congress should alter Medicare to cover payments for telemedical expenses that are comparable to face-to-face expenses.** Far from being a high-tech drain on our nation's health care resources, studies have shown that such coverage would actually save money in the long run.⁸⁰ Moreover, quick movement to establish a telemedicine infrastructure now will help ease the coming crush of aging baby boomers needing medical care. Under the current system, however, Medicare does not cover home nursing care; the burden is borne by Medicaid after patients either exhaust or shelter their assets. Because telemedicine is less intrusive for chronic patients and less expensive for the government than nursing home care, the Medicare program should become the primary driver of programs to build a broadband health information infrastructure. In addition, the federal government should require private health insurers that provide coverage to federal workers to reimburse doctors for appropriate

telemedicine consultations with federal employees.

- ▶ **The Department of Health and Human Services should commit more resources to developing telemedicine.** The National Committee on Vital and Health Statistics (NCVHS) created a working group on the development of a National Health Information Infrastructure (NHII), which released their recommendations in November 2001.⁸¹ The working group identified both the benefits of expanding telemedicine and the barriers to further deployment. Chief among the barriers, according to their final report, is a lack of federal leadership. The group specifically recommended the creation of a senior position within HHS to lead the NHII effort by developing a coordinated plan for deployment and increased funding, and encouraged interested parties such as health care providers, insurers, and consumer groups to actively contribute to the effort. HHS will be key in pulling together the diverse public and private organizations necessary to make telemedicine a reality. The establishment of an NHII "czar" and increased funding for the NHII initiative will greatly accelerate the adoption of telemedicine.
- ▶ **Congress should address regulatory barriers to telemedicine.** One of the most serious problems facing telemedicine is state-by-state licensure rules that prohibit a doctor in Idaho, for example, from treating a patient in New York. The reality is that medical training and medical licensure qualifications vary little among the states. As a result, Congress should investigate alternatives to state licensing, either through requiring reciprocity agreements among states (for recognizing out-of-state providers and performing interstate enforcement actions) or through the development of federal health care licensure and enforcement.

Conclusion

It is clear that despite everything the Internet currently has to offer, it is not enough to justify the immediate plunge into broadband access for most Americans. Taken alone, it is unlikely that any single recommendation in this report could change that cost-benefit calculus for those who have chosen not to get broadband connections in their homes. However, taken as a

comprehensive strategy, these efforts will increase the overall usefulness of high-speed Internet access and stimulate demand for the further deployment of broadband networks into every home. Once that is accomplished, the groundwork will be set for a more thorough transformation to the New Economy and sustained robust productivity growth.

Endnotes

- ¹ Estimates vary depending on methodology and variables considered. Robert Crandall and Charles Jackson refer to broadband deployment as “The \$500 Billion Opportunity”: http://www.criterioneconomics.com/documents/Crandall_Jackson_500_Billion_Oppportunity_July_2001.pdf.
- ² National Telecommunications and Information Administration: <http://www.ntia.doc.gov/ntiahome/dn/hhs/Charth1.htm>.
- ³ Many of the problems that once plagued home broadband services are being resolved as service providers gain more experience.
- ⁴ The Pew Internet and American Life Project came to similar conclusions. See John B. Horrigan and Lee Rainie, “The Broadband Difference: How online Americans’ behavior changes with high-speed Internet connections at home,” *Pew Internet Project*, June 23, 2002, <http://www.pewinternet.org>.
- ⁵ Andrew Leigh, Frank Knox Scholar at Harvard University’s Kennedy School of Government, conducted the analysis of the Census Bureau data.
- ⁶ Peer-to-peer file swapping is an exception to this rule.
- ⁷ “Deployment of Advanced Telecommunications Capability: Second Report,” Federal Communications Commission, August 2000, p. 6, http://www.fcc.gov/Bureaus/Common_Carrier/Orders/2000/fcc00290.pdf.
- ⁸ This could be due to a variety of factors, depending on the service. Cable modem users can experience slower speeds if a large number of their neighbors are simultaneously using the service. DSL users experience slower speeds the further they are from the switching equipment. All Internet users get slower speeds when the entire network is overwhelmed, which happened on September 11, 2001 when millions of Americans rushed to their computers to get updates on the terrorist attacks.
- ⁹ Though it is not part of any official definition, broadband services generally have two other key characteristics: they do not tie up a telephone line for voice calls while connected, and they operate in an “always on” mode rather than requiring a new connection to be established each time a user wants to use the Internet.
- ¹⁰ “2001 National Technology Readiness Survey,” the Center for e-Service at the Robert H. Smith School of Business, University of Maryland and Rockbridge Associates, Inc., <http://www.rhsmith.umd.edu/pr/charts.html>.
- ¹¹ Robert D. Atkinson, “Revenge of the Disintermediated: How the Middleman is Fighting E-Commerce and Hurting Consumers,” *Progressive Policy Institute*, 2001.
- ¹² James Johnston and Robert Atkinson, “Stopping the Regulatory Threats to the Emergence of Online Law,” *Progressive Policy Institute*, 2000.
- ¹³ Alison Young, “Lenses Users Pay High Prices,” *Detroit Free Press*, December 4, 1998.
- ¹⁴ Carol Pickering, “E-Stamp Business Goes Postal,” *Business 2.0*, November 28, 2000, p. 65, <http://www.business20.com/articles/mag/0,1640,14238,00.html>.
- ¹⁵ See Robert D. Atkinson and Thomas G. Wilhelm, “The Best States for E-Commerce,” *Progressive Policy Institute*, 2002.
- ¹⁶ For example, the Department of Commerce charges business for export trade leads even though they can get the same leads at their local Department of Commerce trade promotion office.
- ¹⁷ President’s Information Technology Advisory Council, “Transforming Healthcare Through Information Technology,” *PITAC Panel on Transforming Healthcare*, 2001, p.16, <http://www.hpcc.gov/pubs/pitac/pitac-hc-9feb01.pdf>.
- ¹⁸ The National Committee on Vital and Health Statistics has called for just such a collaborative program in HHS, the National Health Information Infrastructure. See “Information for Health: A Strategy for Building a National Health Information Infrastructure” November 15, 2001, <http://www.health.gov/ncvhs-nhii/>.
- ¹⁹ Shane Ham and Robert D. Atkinson, “Modernizing the State Identification System: An Action Agenda,” *Progressive Policy Institute*, 2002; Shane Ham and Robert D. Atkinson, “Frequently Asked Questions about Smart ID Cards,” *Progressive Policy Institute*, 2002.
- ²⁰ H.R. 4633
- ²¹ For additional discussion of e-government, see Andrew Leigh and Robert D. Atkinson, “Breaking Down Bureaucratic Barriers: the Next Phase of Digital Government,” *Progressive Policy Institute*, 2001.
- ²² T. Sander, “EGovernment Risks,” Presentation delivered at the 2000 NLC Congress of Cities, December 8, 2000 in Boston, Massachusetts, based on data from the National League of Cities.
- ²³ For a list of the 24 projects, see <http://www.egov.gov>.
- ²⁴ PPI has written extensively about privacy in the Internet era: Shane Ham and Robert D. Atkinson, “Online Privacy and a Free Internet,” *Progressive Policy Institute*, 2001; Shane Ham and Robert D. Atkinson, “DoubleClick and Online Privacy: The Risks of Overreaction,” *Progressive Policy Institute*, 2000; Randolph H. Court and Robert D. Atkinson, “On-Line Privacy Standards: The Case for a Limited Federal Role in a Self-Regulatory Regime,” *Progressive Policy Institute*, 1999.
- ²⁵ Lou Hirsh, “The Problem of Fighting Spam,” *E-Commerce Times*, March 26, 2002, <http://www.newsfactor.com/perl/story/16874.html>.
- ²⁶ Randolph H. Court and Robert D. Atkinson, “How to Can Spam: Legislative Solutions to the Problem of Unsolicited Commercial Email,” *Progressive Policy Institute*, 1999.
- ²⁷ The Wilson approach was reported by the House Committee on Commerce and Energy, but upon referral to the House Committee on the Judiciary, the bill was gutted and replaced with the “false header” provision and a clause requiring labels

- on pornographic spam only. An amendment requiring all spam to be labeled, proposed by Rep. Adam Schiff (D-Calif.) was rejected by the Judiciary Committee.
- ²⁸ For more details on what an appropriate spam bill would contain, see Randolph H. Court and Robert D. Atkinson, "How to Can Spam: Legislative Solutions to the Problem of Unsolicited Commercial Email," *Progressive Policy Institute*, 1999.
- ²⁹ Shane Ham and Robert D. Atkinson, "Online Privacy and a Free Internet," *Progressive Policy Institute*, 2001.
- ³⁰ S. 2201
- ³¹ H.R. 4678
- ³² For a more detailed explanation of how access and security mandates harm privacy, see Shane Ham and Robert D. Atkinson, "Online Privacy and a Free Internet," *Progressive Policy Institute*, 2001.
- ³³ One important amendment to the Stearns bill would be a strengthening of the "safe harbor" for web sites that participate in seal programs, which will give certainty to web site operators and share the enforcement burden among private organizations as well as government agencies. For more details about safe harbor, see: Shane Ham and Robert D. Atkinson, *Online Privacy and a Free Internet* (Washington, Progressive Policy Institute, 2001).
- ³⁴ Because Web sites voluntarily label their own content, this approach does not raise thorny free speech issues.
- ³⁵ Both the House and the Senate have resolutions pending that encourage use of ICRA (H. Res. 430 and S. Res. 184).
- ³⁶ Some cyber-libertarians have suggested that artists and record labels could make money by changing the music from the main product to a promotional tool for other products and services; that is, rather than selling music, use free music to sell items like concert tickets and t-shirts. We believe this is both unfeasible and disruptive of the intent of copyright law.
- ³⁷ The 1995 Act established such rights with regard to subscription based Internet digital radio services, while the 2000 Act extended it to all digital radio transmissions.
- ³⁸ Another unfairness faced by webcasters is that Internet services pay for the infrastructure (such as servers and bandwidth) to deliver music, whereas traditional broadcasters distribute music over public airwaves.
- ³⁹ For a summary of the provisions, see <http://www.riaa.com/Licensing-Licen-3a.cfm>.
- ⁴⁰ Webcasters are already operating today, but do not yet pay the royalties. Once the royalty scheme is settled, they will make payments retroactively, which makes the data reporting requirements even more burdensome.
- ⁴¹ In a June decision, the Librarian of Congress overruled a decision by the Copyright Arbitration Royalty Panel that would have set different performance royalty rates for "pure" webcasters and retransmitters of terrestrial broadcasts. This fairness principle should be extended to the application of the performance royalty itself to achieve evenhanded treatment between webcasters and terrestrial broadcasters.
- ⁴² PPI proposed a similar "database solution" to the problem of collecting state and local sales tax on e-commerce. See Robert D. Atkinson and Randolph H. Court, "Internet Taxation: A Software Solution," *Progressive Policy Institute*, 1999.
- ⁴³ Of course, listeners would also need broadband connections to take advantage of higher sound quality.
- ⁴⁴ Though NPR does produce its programs and is therefore free to post the shows on the Internet, when a segment of a radio show contains large amounts of material for which the copyright is held by another party (such as a retrospective of the work of a recently deceased musician), NPR typically chooses not to post the segment to the Internet rather than negotiate and pay for the Internet broadcast rights of the copyrighted material.
- ⁴⁵ <http://www.intertainer.tv>.
- ⁴⁶ Offerings over Intertainer would be fine, just like offering PBS over cable TV, were there a free alternative that shared the same content.
- ⁴⁷ The American Memory project is funded by a unique public-private partnership that has provided more than sixty million dollars since 1996: <http://memory.loc.gov/ammem/ammemhome.html>.
- ⁴⁸ The President's Information Technology Advisory Council, "Digital Libraries: Universal Access to Human Knowledge," *PITAC Panel on Digital Libraries*, 2001, p. 2, <http://www.hpcc.gov/pubs/pitac/index.html>.
- ⁴⁹ Many libraries have opted to subscribe to the netLibrary service (<http://www.netlibrary.com>), which supplies electronic copies of many books in HTML format. These books offer the same enhancements as other e-books, but they are not downloadable and must be read on a computer screen.
- ⁵⁰ Besides these issues, adoption of e-book technology has been hampered by technical issues, such as screen quality and battery life of reading devices.
- ⁵¹ <http://www.ims.gov>.
- ⁵² While Museumwvow.com has not yet requested a Congressional appropriation, they have recruited Reps. Honda, Matsui, Boucher, and Dunn and Sen. Cantwell as members of their advisory board.
- ⁵³ Powerful home computers and inexpensive peripheral devices such as printers and copiers have changed the calculus between true home offices and suburban "telework centers." The telework centers decrease commuting hours, but still require capital investment in real estate and infrastructure. This made sense when many devices were so expensive that they had to be shared by multiple workers, but IT costs have reached a point where home offices, and the full range of advantages they offer, are the best choice.
- ⁵⁴ *Ibid.*
- ⁵⁵ *Ibid.*
- ⁵⁶ Information Technology Association of America (testimony before the Maryland Senate), "Building a Positive, Competitive Broadband Agenda," *Positively Broadband*, April 3, 2000, <http://www.positivelybroadband.org/whitepaper.pdf>.
- ⁵⁷ *Ibid.*, Table 1.
- ⁵⁸ H.R. 1835
- ⁵⁹ H.R. 1012
- ⁶⁰ The equipment credit can go to either the employer or the employee, depending on who makes the equipment purchase.

Unleashing the Potential of the High-Speed Internet

⁶¹ The Office of Management and Budget has a telework program centered on telework centers, which are less effective for the reasons previously cited and which do nothing to stimulate demand for home broadband connections.

⁶² United States General Services Administration, "Analysis of Home-Based Telework Technology Barriers: Final Report on Technology Barriers to Home-Based Telework," 2002, http://www.telework.gov/IT_Report/exec.htm.

⁶³ Blank Rome Comisky & McCauley LLP, "State Taxes And Telecommuting: Can Presence Of Telecommuters Result In Nexus For Employers?," Tax and Fiduciary Update Newsletter, June 2001, http://www.blankrome.com/newsevents/newsletters/xfupdate_june01.asp#article1.

⁶⁴ "E-defining Education," *Education Week*, May 29, 2002, <http://www.edweek.org/sreports/tc02/chart.cfm?slug=35execsum-c1.h21>.

⁶⁵ "E-Learning Market Expanding Beyond IT Training," *Cyberatlas*, November 1, 2001, http://cyberatlas.internet.com/markets/education/article/0,,5951_914901,00.html.

⁶⁶ Ellen McCarthy, "Pentagon Commitment Helps Advance E-Learning Standard," *The Washington Post*, May 14, 2002.

⁶⁷ Gail Repsher Emery, "E-learning becoming E-ssential," *The Washington Post*, May 13, 2002.

⁶⁸ <http://alpharoute.org>.

⁶⁹ Idaho House Bill no. 534, 56th Legislature, 2nd regular session.

⁷⁰ Rep. Boucher's bill, H.R. 2100, specifically affirms copyright protection to materials that are developed specifically for use in distance learning applications, so innovation will not be stifled by the prospect of losing copyright protection. Sen. Hatch's bill, S. 487 has been passed by the Senate and is presently under debate in the House Judiciary Committee. S. 487 affirms copyright protection for any material produced for instruction, either online or in traditional classrooms.

⁷¹ H.R. 1992 passed the House in October 2001 by a vote of 354-70.

⁷² See IRS form 8863, "Education Credits (Hope and Lifetime Learning Credits)": General Instructions, for detailed description of what costs are covered by the credit.

⁷³ On September 7, 2001, doctors in New York performed a laproscopic cholecystectomy on a patient in France. More information can be found at: <http://www.stanford.edu/~zpogue/telemedicine/first.htm>.

⁷⁴ Nexcura also provides their services in partnership with third party sites such as the American Heart Association.

⁷⁵ Donald Kemper is the unofficial "father" of the information therapy movement, which holds that the right information delivered to the right patient at the right time can be an effective medical intervention. For more information, see <http://www.informationtherapy.org>.

⁷⁶ Robyn Greenspan, "Tech-Savvy Docs Resist Virtual Visits" *Cyberatlas*, April 11, 2002, http://cyberatlas.internet.com/markets/healthcare/article/0,,10101_1008311,00.html.

⁷⁷ The Florida Initiative in Telehealth and Education can be found online at: <http://fite.peds.ufl.edu/>.

⁷⁸ The advantages of telemedicine are so great, particularly for those patients who would otherwise require residential care, that private insurance may cover the expenses even though Medicare chooses not to do so, but because Medicare is such a major player in health care, telemedicine must be covered by Medicare if it is to reach its full potential.

⁷⁹ Many of these interstate issues may not apply if a patient consults a local doctor. However, to match patients to specialists in other states, or to transmit data over the open Internet (which can send data packets out of state even if sender and recipient are both in the same state) will require a national strategy.

⁸⁰ Evidence of these cost savings comes from ResourceLink of Iowa, a pioneering project in rural telemedicine that connects patients in 76 Iowa communities with doctors using videoconferencing technology. Patients in the program have chronic illnesses such as diabetes or mental health disorders. In the first three years of the program, total medical charges for participating patients decreased 28 percent, from \$3,002,631 to \$2,158,685, with clinic visits and hospital admissions decreasing 3 percent and 9 percent, respectively. See Michael Kienzle, MD and Mary Ann Murray, RN, Home Telemedicine. University of Iowa Health Care, April 3, 2002. See also, University of Iowa Hospitals & Clinics report to the Iowa state legislature on the use of "hometelemedicine" in the indigent patient care program. 2001 Iowa Acts, ch. 181, Sec. 8(2)(b).

⁸¹ "Information for Health: A Strategy for Building a National Health Information Infrastructure" November 15, 2001, <http://www.health.gov/ncvhs-nhii/>.

***“One person with a belief is a social power
equal to ninety-nine who have only interests.”***

—John Stuart Mill

The Progressive Policy Institute

The mission of the Progressive Policy Institute is to define and promote a new progressive politics for America in the 21st century. Through its research, policies, and perspectives, the Institute is fashioning a new governing philosophy and an agenda for public innovation geared to the Information Age.

This mission arises from the belief that America is ill-served by an obsolete left-right debate that is out of step with the powerful forces re-shaping our society and economy. The Institute advocates a philosophy that adapts the progressive tradition in American politics to the realities of the Information Age and points to a “Third Way” beyond the liberal impulse to defend the bureaucratic status quo and the conservative bid to simply dismantle government. The Institute envisions government as society’s servant, not its master—as a catalyst for a broader civic enterprise controlled by and responsive to the needs of citizens and the communities where they live and work.

The Institute’s work rests on three ideals: equal opportunity, mutual responsibility, and self-governing citizens and communities. Building on these cornerstone principles, our work advances five key strategies to equip Americans to confront the challenges of the Information Age:

- Restoring the American Dream by accelerating economic growth, expanding opportunity, and enhancing security.*
- Reconstructing our social order by strengthening families, attacking crime, and empowering the urban poor.*
- Renewing our democracy by challenging the special interests and returning power to citizens and local institutions.*
- Defending our common civic ground by affirming the spirit of tolerance and the shared principles that unite us as Americans.*
- Confronting global disorder by building enduring new international structures of economic and political freedom.*

The Progressive Policy Institute is a project of the Progressive Foundation.
600 Pennsylvania Avenue, SE, Suite 400, Washington, DC 20003
Email: ppiinfo@dlcppi.org ♦ www.ppionline.org
Phone: (202) 547-0001 ♦ Fax: (202) 544-5014

About the Authors

Robert Atkinson is vice president of the Progressive Policy Institute and director of the Technology & New Economy Project at PPI.

Shane Ham is senior policy analyst for the Progressive Policy Institute's Technology & New Economy Project.

Brian Newkirk is the project assistant for PPI's Technology & New Economy Project.

Acknowledgements

The authors would like to thank our colleagues at PPI and the DLC, including Will Marshall, Chuck Alston, Andrew Rotherham, Sara Mead, Dave Kendall, and Dr. Robert Levine, chair of PPI's Health Priorities Project. In addition, we would like to give special thanks to Andrew Leigh at Harvard's Kennedy School for his assistance on the broadband demand gap section of the report.