Broadband Reality Check II

The Truth Behind America's Digital Decline

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Table of Contents

Executive Summary

With every passing month, the United States falls further behind the global leaders in broadband Internet access thanks to a combination of market and policy failures. Our markets lack the competition to bring lower prices, higher speeds, and universal access. Our policies lack the imagination and potency to create real change. Meanwhile, Americans pay more money for less service than a dozen other nations. A third of U.S households are still stuck with dial-up, and another third lack Internet access of any kind. Our broadband problem is becoming a crisis.

Yet major telecommunications legislation now moving through Congress lacks a comprehensive vision for how to bring multiple competitive broadband providers to each market offering truly high-capacity connections at affordable prices. Cable and telephone companies hold a cozy duopoly over broadband services with a 98 percent share of the residential market. Not only have we failed to craft policies to bring competitive pressure, we are poised to strip away the nondiscrimination rules that keep network owners from engaging in anti-competitive activity in the Internet content market. Scrapping so-called Network Neutrality rules will not bring us better broadband. But it will guarantee noncompetitive broadband markets for a generation.

To make matters worse, the Federal Communications Commission seems content to ignore the broadband problem and pretend we are moving forward. While the FCC is crowing about an uptick in 1 megabit per second (Mbps) DSL connections, Japanese consumers are paying the same price for 100 Mbps. How long can we afford to be 100 times slower than the rest of the world?

In April, Federal Communications Commission Chairman Kevin Martin published an op-ed in the *Financial Times* claiming that the United States is "closing in on President George W. Bush's goal of providing broadband access to every US household." But Martin failed to mention that President Bush's stated goal was universal and *affordable* broadband access by 2007. The United States is nowhere near reaching this target, and the biannual reports generated by the FCC twice a year to monitor progress in the broadband market obfuscate more than they enlighten.

This report by Free Press, Consumers Union and the Consumer Federation of America comes one year after our first report on the state of the U.S. high-speed Internet market. *Broadband Reality Check II* updates our previous publication and details new empirical research in this area. Among its key findings:

The United States is falling behind the rest of the world in broadband penetration.

- The United States remains 16th in the world in broadband penetration, according to the International Telecommunications Union, and places 21st in the U.N. rankings of "digital opportunity."
- Fourteen other OECD nations saw higher overall net growth in broadband adoption than the United States from 2001 to 2005.
- The United States has the fourth-highest level of students who have never used a computer among OECD nations — exceeded only by Turkey, Slovakia and Mexico.
- Population density is not a significant determinant of broadband penetration. The most important factors explaining the digital divide among nations are household income and poverty.

- Other countries' broadband successes can be largely attributed to their successful implementation and use of non-discriminatory, open access policy.

The United States trails the rest of the world in broadband speed and price.

- Consumers in other countries enjoy broadband connections that are far faster and cheaper. U.S. consumers pay nearly twice as much as the Japanese for connections that are 20 times as slow.
- U.S. prices show no real signs of dropping. Cable modem prices are holding constant or rising, and DSL customers on average are getting less bandwidth per dollar than they did just a year ago.
- Increased capacity abroad has made available "triple-play" services — fast broadband bundled with TV and phone service — for less than the cost of most standalone U.S. broadband connections.
- The threat of competition — not government regulation — is the most important factor behind broadband infrastructure investment decisions.

The U.S. broadband market is dominated by regional duopolies of cable and telephone companies that face little competition.

- Despite claims of "fierce competition," Cable modem and DSL platforms account for 98 percent of the residential broadband market.
- The top 10 broadband providers, each a regional monopoly in cable or DSL, made up over 83 percent of the entire U.S. broadband market.
- A recent Government Accountability Office (GAO) report on broadband shows that the median U.S. household has only two terrestrial broadband services providers available.
- According to the GAO, nearly 1 in 10 consumers don't have access to any broadband providers.
- FCC data show that over 40 percent of U.S. ZIP codes have one or zero DSL and/or cable modem provider reporting service.

'Third platform' alternatives like wireless and broadband over powerline don't offer viable competition.

- Satellite accounts for approximately one-half of 1 percent (0.5%) of all advanced service residential broadband connections.
- Mobile wireless accounts for roughly one-hundredth of 1 percent (.01%) of all advanced service residential broadband connections. Fixed wireless comprises less than one-half of 1 percent (0.5%).
- 99.8% of mobile wireless broadband connections are used by businesses, not consumers. And nearly all of these exceed 200 kilobits per second in only one direction.

- Broadband over powerline (BPL) accounts for about one-hundredth of 1 percent (.01%) of all advanced service residential broadband connections.
- The combined market share for all of these alternative technologies has *decreased* over the past five years.

America's digital divide — between rich and poor and urban and rural areas — shows no sign of closing.

- Those living in urban areas are nearly twice as likely to have home broadband access as their rural counterparts.
- Rural broadband deployment continues to lag behind urban deployment. U.S. farm households have home broadband access at nearly half the level of all U.S. households nationwide.
- Approximately one out of 10 households with incomes below $30,000 reported having broadband access, while broadband connections were in six out of every 10 households with incomes above $100,000.
- The price of broadband service, and not necessarily the lack of a home computer, is the key barrier to broadband adoption by low-income households.

The FCC uses misleading and meaningless measures of broadband coverage and competition.

- The FCC's low standard for "high-speed" connections (200 kbps) is barely fast enough for users to receive low-quality streaming video.
- The FCC counts a ZIP code as covered by broadband service if it contains just one broadband subscriber, inflating estimates of broadband availability and competition.
- Chairman Martin and major newspapers have used the misleading FCC ZIP code data to justify their claims that consumers have numerous choices of broadband providers

New Policies Are Needed for Real Broadband Competition and Deployment

U.S. broadband connections are slow, expensive and not available to everyone. Congress and the FCC have the power to reverse these disturbing trends, but they need to take an honest look at the lack of meaningful competition in the broadband services market. Faith-based policy and wishful thinking will not bring broadband to rural areas, and the repeated use of misleading data will not help low-income consumers afford broadband.

This report recommends that Congress and the FCC consider the following policy options to reach the goal of universal, affordable broadband access:

- Restore the non-discriminatory, open-access principles — such as Net Neutrality — that enabled the birth and historic proliferation of the Internet.
- Remove existing barriers to entry to encourage the development of "Community Internet" systems by municipalities, public-private partnerships and local groups.

- Make more "unlicensed spectrum" available for broadband Internet and other innovations by opening up unused TV "white spaces" — the vacant portions of the public airwaves between TV channels.
- Enhance competition by prohibiting the owners of wireline broadband systems from bidding on new licenses to the public airwaves for wireless broadband.
- Modernize the Universal Service Fund programs to support broadband deployment.
- Require the FCC to improve its broadband data collection and analysis. The FCC uses a low standard for broadband and employs meaningless metrics for coverage and competition.
- Encourage and facilitate state efforts to better monitor broadband markets, so they can act where the federal government has failed.

Moreover, we must engage in a serious policy debate going forward that will generate the big ideas necessary for systemic changes that address the slow adoption rates, high cost, low capacity, and lack of competition in American broadband markets. U.S. broadband policy needs a vision for how to bring truly big broadband (50-100 Mbps) from multiple, competitive providers to every community. Absent such goals, we will never regain our position as the world leader in technology.

Introduction

In April, FCC Chairman Kevin Martin published an article in the *Financial Times* touting the successes of the American broadband marketplace.[1] As he did in a very similar article published eight months earlier in the *Wall Street Journal*[2], Martin attempted to paint a positive picture about the state of U.S. broadband, saying "we are closing in on President George W. Bush's goal of providing broadband access to every U.S. household."

But when the president set forth this goal, he emphasized universal, *affordable* broadband access, deployed in a competitive marketplace with a choice of a wide array of providers. Speaking in New Mexico in 2004, Bush declared:

> *We ought to have a universal, affordable access for broadband technology by the year 2007, and then we ought to make sure as soon as possible thereafter, consumers have got plenty of choices when it comes to purchasing the broadband carrier. See, the more choices there are, the more the price will go down. And the more the price goes down, the more users there will be. And the more users there will be, the more likely it is America will stay on the competitive edge of world trade*.[3]

But in his latest assessment of the U.S. broadband market, Chairman Martin ignores the connection between competition, affordability and broadband use. Martin's optimism is belied by the actual data on the U.S. broadband market. In fact, this country is nowhere near reaching the president's goal of universal, affordable access by 2007. And the hope of meaningful competition is disappearing as the market becomes increasingly concentrated in the hands of regional cable-telecom duopolies.

This report updates *Broadband Reality Check*, a report released in August 2005 by Free Press, Consumers Union and the Consumer Federation of America.[4] In the year since that report was published, the telecommunications sector has seen massive consolidation and further vertical integration. While consumers continue to switch from dial-up Internet service to broadband, the overall rate of growth is slowing, and the United States continues to be outdone by many other advanced nations. Consumer prices remain high, and the gaps in broadband use between rich and poor and urban and rural Americans show no signs of closing.

The pace of adoption of broadband and Internet technologies has been impressive when compared to other technological innovations, and millions of American homes and businesses are reaping the benefits of the broadband economy. But this report shows that the United States — birthplace of the Internet and one of the world's richest nations — is not living up to its potential. Internationally, we continue to fall behind other counties in broadband deployment, adoption, speed and price. And here at home, the poor and those living in rural areas continue to find themselves on the wrong side of the digital divide.

These results are due to market and policy failures. This report diagnoses these problems and offers solutions that will enable the United States to regain its status as the world leader in broadband. Policymakers should stop trying to gloss over the shortcomings and instead focus on real solutions that will bring advanced communications technologies to every American.

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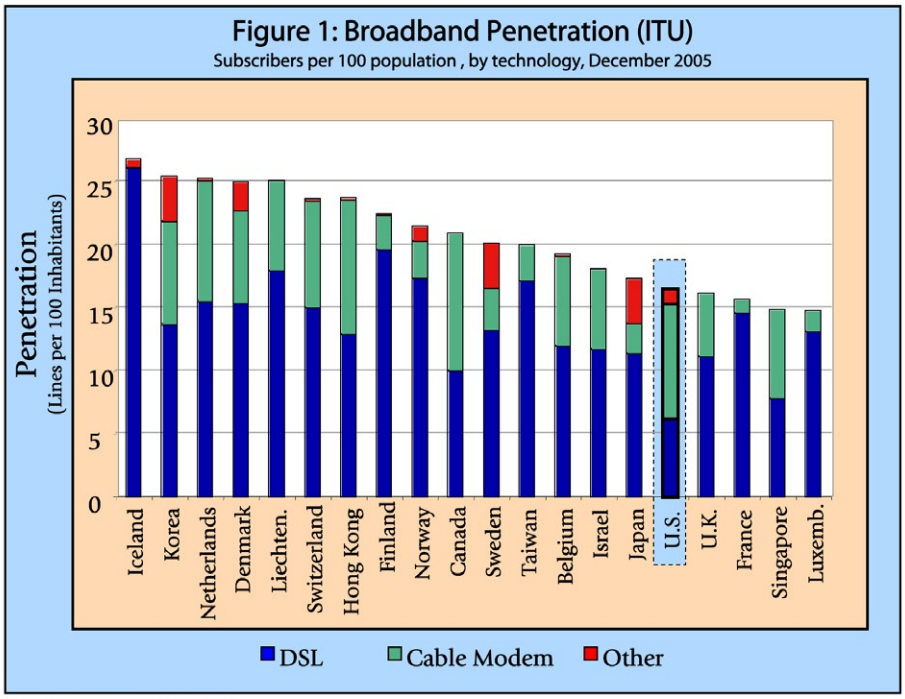
[1] Kevin Martin, "Why Every American Should Have Broadband Access," *Financial Times*, April 2, 2006.
[2] Kevin Martin, "United States of Broadband," *Wall Street Journal*, July 7, 2005.
[3] Remarks by President George W. Bush, March 26, 2004, Albuquerque, N.M. Available at http://www.whitehouse.gov/news/releases/2004/03/20040326-9.html.
[4] http://www.freepress.net/docs/broadband_report.pdf

The United States Lags Behind the Rest of the World in Broadband Penetration

In 2004, as President Bush outlined his broadband goals, he spoke about the U.S. international ranking in broadband penetration, which at the time was 10th overall. "That's not good enough for America," he said. "Tenth is 10 spots too low as far as I'm concerned."[5]

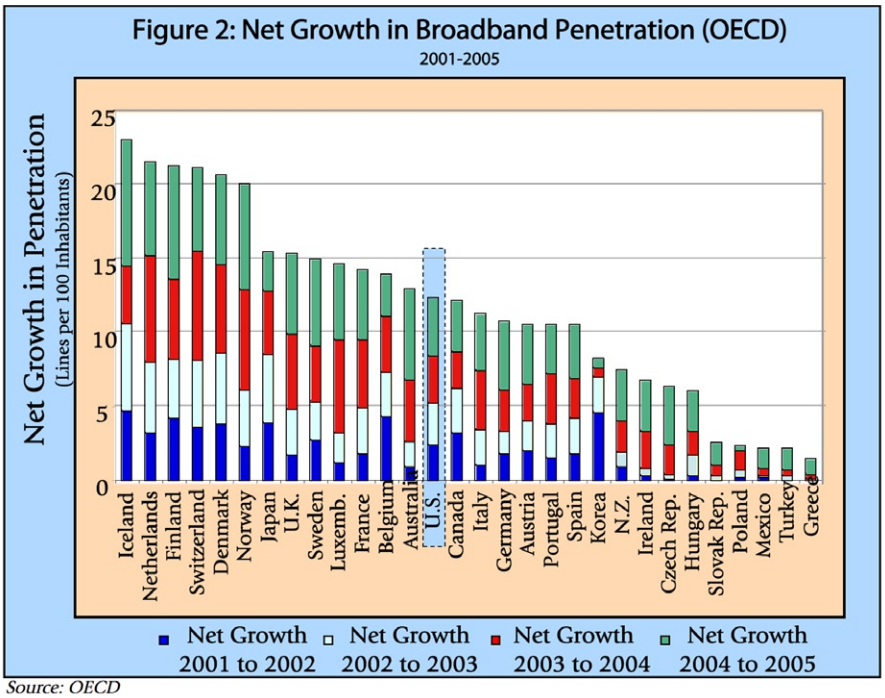
Since then, the United States has fallen to 16th place in the International Telecommunications Union's (ITU) broadband penetration rankings (see Figure 1).[6] This slide is also seen in broadband penetration measures from the Organization for Economic Cooperation and Development (OECD), where the United States dropped from fourth to 12th place among the 30 member nations during the 2000-2005 period.[7] Furthermore, in the latest U.N. rankings of "digital opportunity," the U.S. ranks 21st — just behind Estonia.[8]



Source: ITU, December 2005

OECD data also indicates that the overall U.S. growth rate in broadband adoption is far behind other developed nations. From 2001 to 2005, 14 other OECD nations saw higher overall net growth in broadband penetration than the United States (see Figure 2).

[5] Remarks by President George W. Bush, March 26, 2004, Minneapolis. Available at http://www.whitehouse.gov/news/releases/2004/03/20040326-9.html.
[6] International Telecommunications Union (ITU), http://www.itu.int/ITU-D/ict/statistics/at_glance/top20_broad_2005.html.
[7] Organization for Economic Cooperation and Development (OECD), http://www.oecd.org/sti/ict/broadband.
[8] Delphine Strauss and Frances Williams, "S. Korea Leads Digital World," *Financial Times*, July 6, 2006.



Source: OECD

Furthermore, the pace of broadband adoption in some of these countries was far higher than that seen here. Nine countries exceeded the four-year U.S. growth rate (2001-2005) in just three years (2002-2005), and five of the nine exceeded the U.S. rate in just two years (2003-2005; see Figure 3).

Figure 3: Broadband Net Growth Leaders (OECD)

Net Growth in penetration, lines per 100 population, 2001-2005

Country	4 Year Period	3 Year Period	2 Year Period
	Net Growth in Penetration 2001 to 2005	Net Growth in Penetration 2002 to 2005	Net Growth in Penetration 2003 to 2005
Iceland	23.0	18.3	12.4
Netherlands	21.5	18.3	13.5
Finland	21.2	17.0	13.0
Switzerland	21.1	17.5	13.0
Denmark	20.6	16.8	12.0
Norway	20.0	17.7	13.9
Japan	15.4	11.5	6.9
U.K.	15.3	13.6	10.5
Sweden	14.9	12.2	9.6
Luxembourg	14.6	13.4	11.4
France	14.2	12.4	9.3
Belgium	13.9	9.6	6.6
Australia	12.9	12.0	10.3
United States	12.3	9.9	7.1

Source: OECD

Data from a recent OECD study on youth exposure to computers and information technology reveals a troubling finding that has implications for the future of U.S. competitiveness in the global information economy. Of the countries studied, the United States had the fourth-highest level of students who have never used a computer, exceeded only by Turkey, Slovakia and Mexico (see Appendix B).[9] This is especially problematic because the study also found that students without access to computers at home are, on average, one proficiency level below the OECD average in measures of

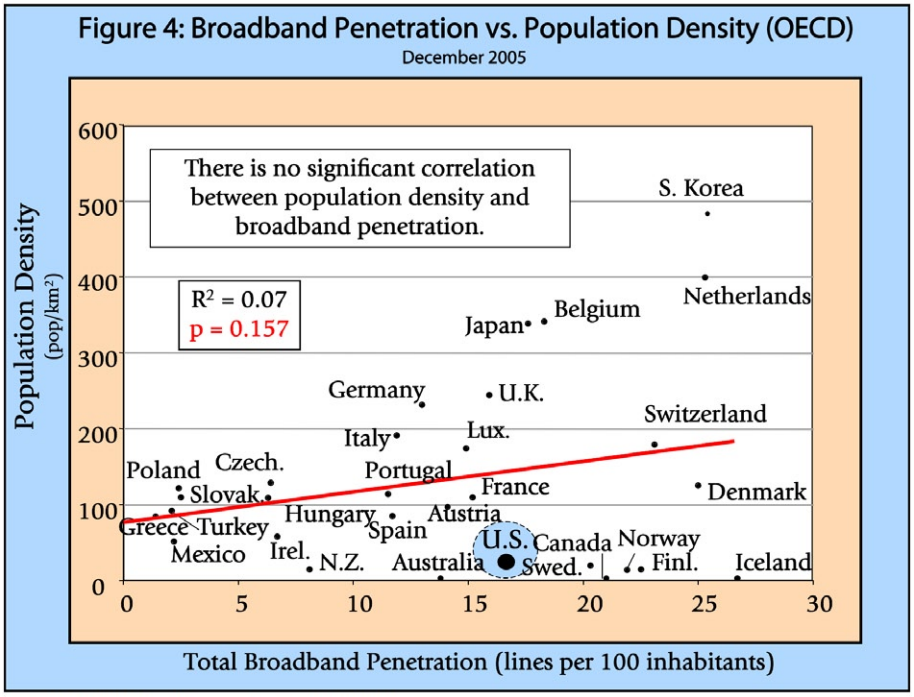
[9] "Are students ready for a technology-rich world?" OECD, January 2006.

mathematic ability. In most countries, including the United States, this gap in performance remains even after controlling for students' socio-economic backgrounds.

Population Density Does Not Determine Broadband Penetration

Apologists for the poor U.S. broadband numbers are quick to attribute the low penetration level to this country's relatively low population density. In Martin's *Financial Times* article, he states: "Given the geographic and demographic diversity of our nation, the U.S. is doing exceptionally well. Comparing some of the 'leading' countries with areas of the U.S. that have comparable population density, we see similar penetration rates."

Martin blames U.S. geography for our poor broadband performance, but the facts tell a different story. For the 30 nations of the OECD, population density is not significantly correlated with broadband penetration (see Figure 4). Indeed, the leading broadband nation in the OECD, Iceland, has one of the lowest population densities in the world.

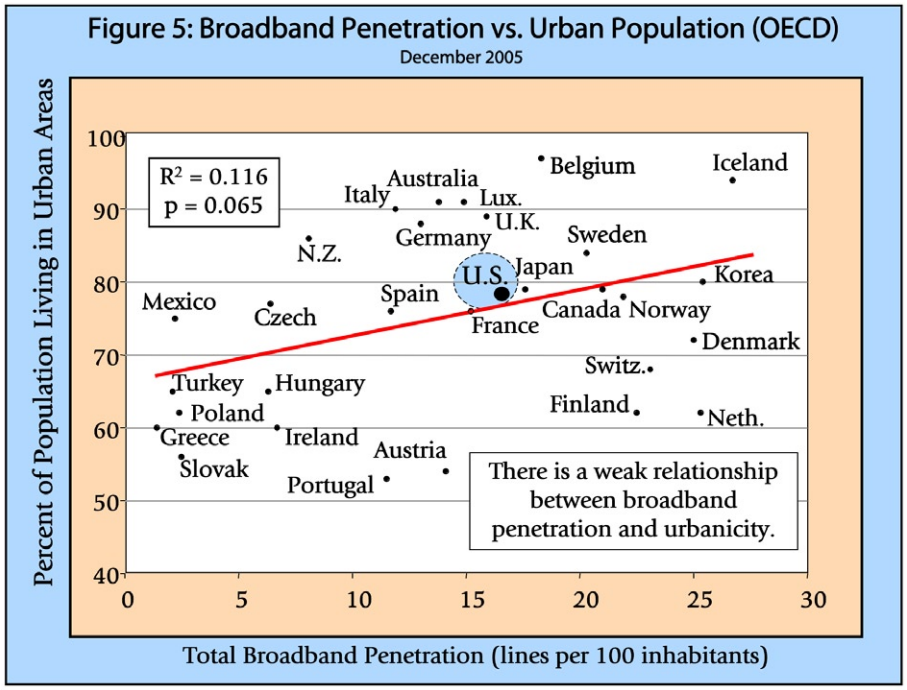


Source: OECD; Free Press analysis of OECD data

There is no valid theoretical reason why population density should be correlated with broadband penetration. What Martin is likely trying to convey is the phenomenon of "economies of density." In theory, it should be less costly on a per-line basis to deploy broadband to an area that is highly populated than one that is sparsely populated — all other things being equal.

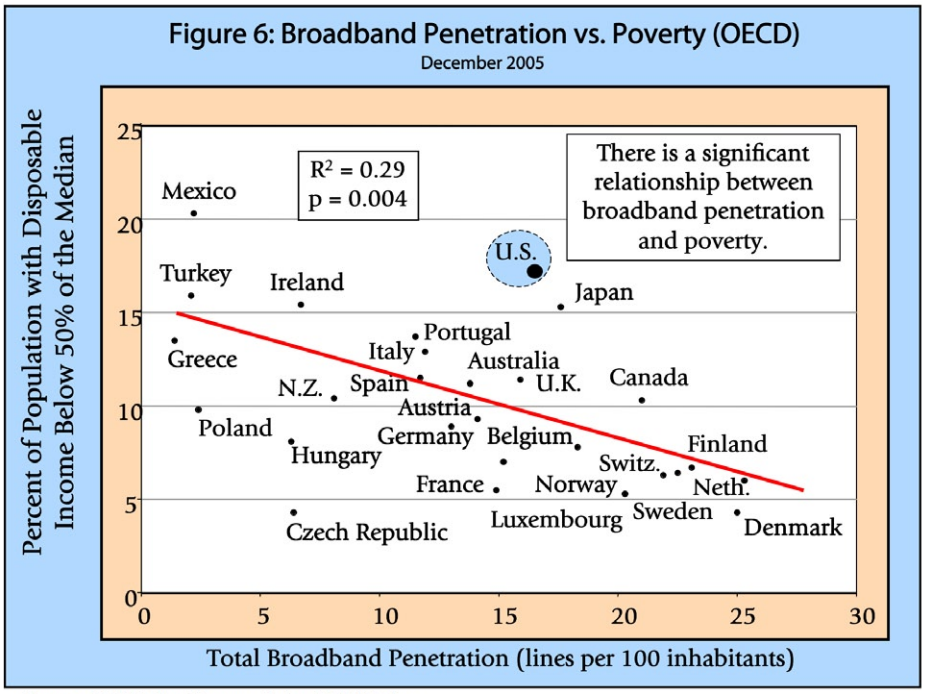
But population density is not the relevant metric to capture this phenomenon — as people tend to cluster in cities, regardless of the overall geographical area of a particular country. The relevant metric is "urbanicity," or the percentage of a nation's population living in urban areas or clusters.

When the relationship between urbanicity and broadband penetration is examined, there's only a very weak, statistically insignificant correlation (see Figure 5). Countries like the Netherlands and Switzerland have lower percentages of their population living in urban areas than the United States yet have higher broadband penetration rates. Similarly, countries like New Zealand and Germany have higher percentages of urban population than the United States but lower broadband penetration levels. Geographic factors alone cannot explain why the United States lags behind.



Source: OECD; Free Press analysis of OECD data

Appendix A details an econometric study examining the differences between the broadband penetration rates of various OECD nations. The results of this study show that median household income and poverty rate are by far the most important factors explaining the difference in broadband penetration rates between OECD member nations (see Figure 6). When income, poverty, education and average service price are held constant, urbanicity has no effect at all on broadband penetration.



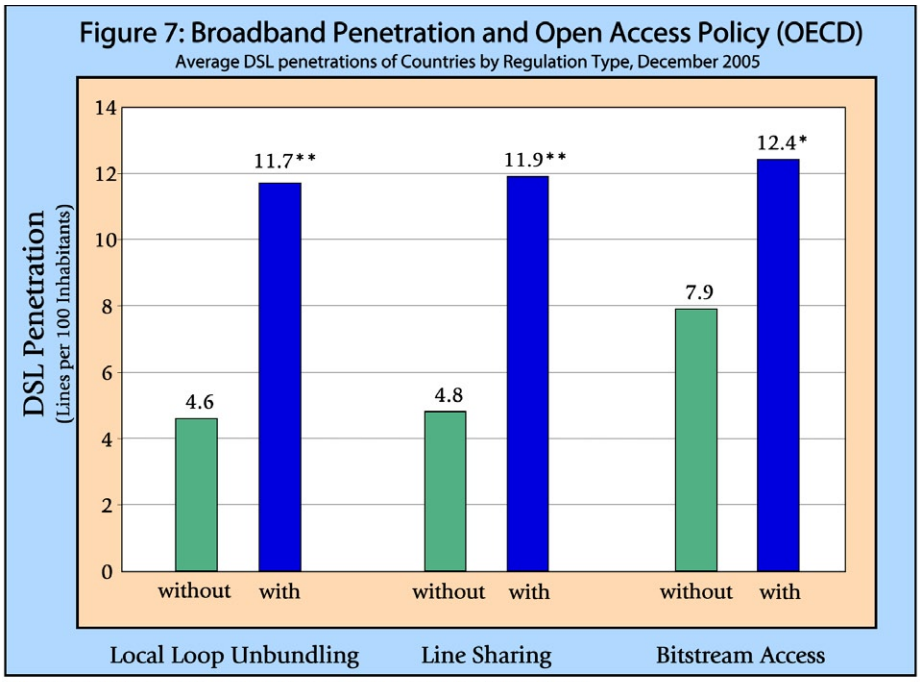
Source: OECD; Free Press analysis of OECD data

These findings suggest that it is the unusually high U.S. poverty level, and not geographic factors like population density or urbanicity, that helps explain the gap in broadband penetration between the United States and other OECD nations. But these leading broadband nations have something else the United States lacks: coherent broadband policies.

Open Access Policy Promotes Competition

Better broadband policies in the rest of the world have led to much higher levels of market competition, which in turn has resulted in lower prices, better service and higher overall adoption rates. As Figure 7 shows, countries with the open access policies of local-loop unbundling, line-sharing, and bitstream access have significantly higher DSL penetration levels than countries without these policies.[10]

[10] Figure 7 data is for DSL penetration only as these policies most often apply to telecommunications networks. "Local-loop unbundling" is a policy instrument that requires the incumbent operator to provide competitors with wholesale access (at rates set by regulators) to the "local-loop" – the infrastructure that is between the incumbent's switching office and the customer. In local-loop unbundling, the competitor leases the entire loop – the infrastructure that carries both the broadband signal as well as traditional voice data. In contrast, "line sharing" is a policy instrument that requires the incumbent to provide wholesale access to just the broadband portion of the local loop. In both cases, the competitor must install its own broadband equipment (DSLAMs) at the shared central office facility. Bitstream access is similar to line sharing, but the incumbent installs its own broadband equipment (DSLAMs) and leases access to competitors. In all of these cases the competitor must provide or arrange for its own connection to the Internet backbone.



Source: OECD, regulations as of 2005; Free Press analysis of OECD data
** = statistically significant at p < 0.05; ** = statistically significant at p < 0.01*

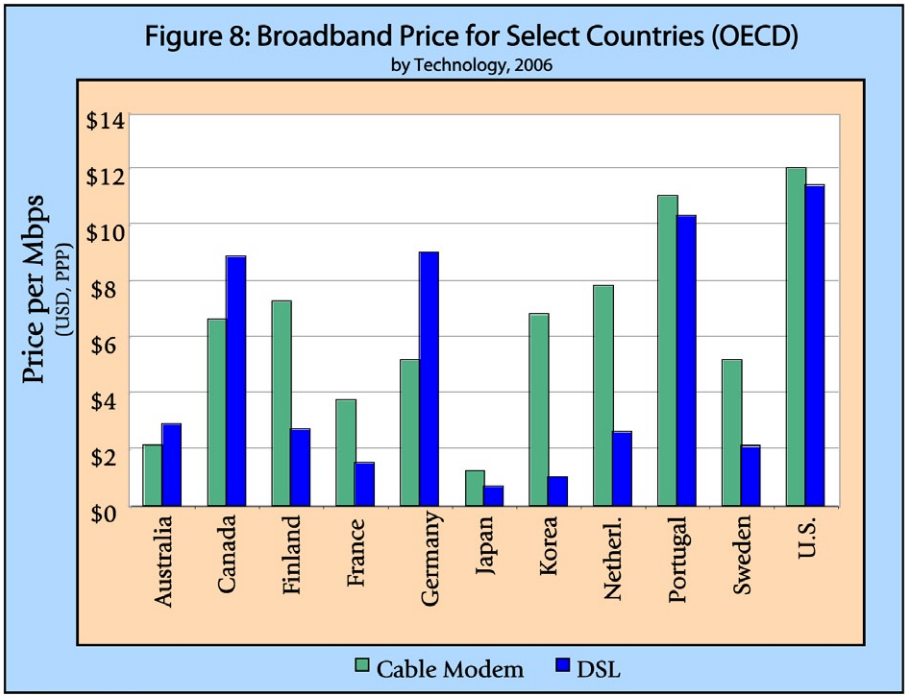
Unfortunately, in August 2005, the FCC abolished the open access rules governing DSL, a move that is likely to further decrease competition within this sector of the broadband services market.[11] The large telecom companies that pushed for the elimination of open access claimed that doing so would remove regulations that discouraged them from investing and competing in the broadband marketplace. But this tired refrain simply does not withstand closer scrutiny.

[11] "In the Matters of Appropriate Framework for Broadband Access to the Internet over Wireline Facilities," CC Docket No. 02-52, 02-33, 01-337, 95-20, 98-10, *Report and Order and Notice of Proposed Rulemaking*, FCC 05-150, released Sept. 23, 2005.

The United States Lags Behind in Broadband Speed and Price

With so little competition in American broadband markets, there is no strong incentive for network operators to build high-capacity lines throughout the country. Consequently, most U.S. consumers are stuck using the same slow and expensive broadband connections, while consumers in other countries enjoy connections that are far faster and cheaper (see Figure 8).

Japanese consumers can get a connection that is 100 megabits per second (Mbps) for both download *and* upload for less than $35 per month — or more than 30 times faster (in the download direction) than the typical U.S. broadband connection for about the same price.[12] South Korean users also enjoy these inexpensive connections, with 100 Mbps fiber optic connections retailing for around $32 per month.[13] This phenomenon is not limited to Asia. The British company "Be" offers customers a 24 Mbps DSL connection (more than 10 times faster than the typical U.S. DSL connection) for around $50 per month.[14]



Source: OECD

When these prices and speeds are contrasted with the offerings from the top U.S. broadband providers, the difference is stark (see Figure 9). American consumers are paying nearly twice as much as Japanese consumers for connections that are more than 20 times slower.

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[12] Online Reporter, http://www.onlinereporter.com/archive/articles/5579.html. See also "World Information Society Report 2006," International Telecommunications Union, p.49.

[13] "Broadband Wars Speeds Up in South Korea," *Asia Times*, Aug. 30, 2005. Available at http://www.atimes.com/atimes/Korea/GH30Dg01.html.

[14] Users can purchase a 24 Mbps DSL connection for £14 per month. This has a 1,000 Gigabyte per month download limit, but for an additional £10 per month (or about $50 in total) users can purchase a 24 Mbps connection with unlimited downloads. See http://bethere.co.uk.

Figure 9: Broadband Basics - Speed and Price (U.S.)

Published Offerings of Top 10 Providers

Service Type	Provider	National Marketshare Rank	Monthly Fee	Maximum Download Speed	Maximum Upload Speed	Must Bundle or Bundle for Rate?	Average Reported Monthly Price*	Average Reported Actual Download Speed*
Cable Modem	Comcast	1	$42.95	4.0 Mbps	384 Kbps	Yes	$58	5.9 Mbps
	TimeWarner	4	$44.95	5.0 Mbps	384 Kbps	Yes	$55	3.4 Mbps
	Cox	5	$54.95	5.0 Mbps	768 Kbps	Yes	$51	4.1 Mbps
	Charter	7	$42.99	3.0 Mbps	256 Kbps	Yes	$63	2.6 Mbps
	Adelphia	8	$42.95	4.0 Mbps	384 Kbps	Yes	$52	3.8 Mbps
	Cablevision	9	$44.95	10.0 Mbps	1000 Kbps	Yes	$48	7.2 Mbps
DSL	AT&T	2	$39.99	3.0 Mbps	512 Kbps	Yes	$27	2.1 Mbps
	Verizon	3	$37.95	3.0 Mbps	768 Kbps	Yes	$30	3.3 Mbps
	BellSouth	6	$37.95	3.0 Mbps	384 Kbps	Yes	$41	2.5 Mbps
	Quest	10	$39.99	1.5 Mbps	896 Kbps	Yes	$43	1.7 Mbps
Satellite	HughesNet	N/A	$99.99^	700 Kbps	128 Kbps	N/A	N/A	700 Kbps
	WildBlue	N/A	$69.95^	1.0 Mbps	200 Kbps	N/A	N/A	961 Kbps

Source: Published offerings of companies as of 6/28/2006; broadbandreports.com
** Data reported by users at broadbandreports.com for period of 6/21/06 to 6/27/06. Data reported by users with various tiers of service, and thus represents an average for all residential service by a particular provider*
^ Promotional rate w/ $99.99 installation fee. Standard rate is $59.99 with $599.98 installation fee. Both require 15 month contract
^^ Requires a $299 equipment fee, $179.95 installation fee may be waived under certain promotions

High speeds that are available throughout Europe, such as the 24 Mbps DSL connections offered by companies like Sweden's Glocalnet or Finland's Sonera, are nearly nonexistent in America. Less than one-tenth of 1 percent (0.1%) of U.S. connections are faster than 25 Mbps, and only 4 percent of all U.S. connections are faster than 10 Mbps (see Figure 10).[15]

Figure 10: Broadband Speed (U.S.)

High-Speed Lines by Technology, FCC Form 477, December 2005

Technology	Percent of lines exceeding 200 Kbps in only one direction	Percent of lines exceeding 200 kbps in both directions and speed in the faster direction:			
		Between 200 Kbps and 2.5 Mbps	Between 2.5 Mbps and 10 Mbps	Between 10 Mbps and 25 Mbps	Greater than 25 Mbps
ADSL	18.4	46.3	15.9	0.0	0.0
Cable Modem	1.3	11.5	79.8	7.4	0.0
Satellite	91.5	8.5	0.0	0.0	0.0
Mobile Wireless	98.4	1.6	0.0	0.0	0.0
All Technologies	14.8	33.6	49.1	3.9	0.1

Source: FCC

U.S. broadband prices show no real signs of dropping. According to a recent report from the Pew Internet and American Life Project, the reported monthly price for cable modem service held constant at $41 from 2004 to 2005.[16] Recent earnings reports from the largest U.S. broadband provider, Comcast, refute the myth of a broadband "price war." Over the past year, the average revenue Comcast made from each broadband customer rose to $43.78 from $43.35.[17]

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[15] "High-Speed Services for Internet Access as of December 3, 2005," Industry Analysis and Technology Division, Wireline Competition Bureau, Federal Communications Commission, July 2006.
[16] John B. Horrigan, "Home Broadband Adoption 2006," Pew Internet & American Life Project, May 28, 2006.
[17] Aline van Duyn, "Comcast Reaps as Price War Fails to Materialise," *Financial Times*, July 27, 2006.

Over this same period, Pew reported that the monthly price of DSL dropped from $38 to $32. However, much of this decrease is due to the "DSL-lite" introductory offerings that typified the market in 2005. These offerings, aimed at capturing dial-up users, offer consumers connections that are half as fast as a typical DSL connection. In fact, DSL consumers are on average getting less bandwidth per dollar than just a year before.

At the speeds available in Asia and Europe, consumers can easily navigate flash-animation pages on the Web, quickly download large data files, make a clear Internet phone call, and receive high-definition-quality streaming video — all at the same time — something virtually unheard of in U.S. markets.

High-capacity and robust competition in other nations' networks have made the debate over nondiscrimination (or Network Neutrality) moot in these countries. Congestion issues have been met with greater bandwidth, and any temptations to distort the content market are undercut by competition between multiple broadband providers.

The increase in capacity has led to the proliferation abroad of so-called triple-play services — fast broadband connections bundled with video and telephone service — for less than the cost of most standalone U.S. broadband connections (see Figure 11).

Figure 11: Broadband Triple-Play Prices for Select Countries (OECD)

By Company and Technology, 2005

Country	Company	Type	Price USD (PPP)	Download (Mbps)	Calling Plan	TV Channels
Japan	Yahoo! BB	Fiber	$29.27	100	Per Minute	24
France	Free Telecom	DSL	$32.50	20	Unlimited	93
Netherlands	Casema	Cable	$48.43	10	Unlimited	42
Finland	Welho	Cable	$48.59	6	Per Minute	12
Finland	Elisa	DSL	$50.62	8	Per Minute	12
S. Korea	KT	Fiber	$62.81	100	Per Minute	44
Germany	Kabel Deut.	Cable	$68.77	6.2	Unlimited	38
Sweeden	Com Hem	Cable	$73.49	8	Per Minute	35
Sweeden	TeliaSonera	DSL	$75.00	24	Unlimited	23
Iceland	Simmin	DSL	$78.29	6	Per Minute	10
Denmark	Dansk Breband	Fiber	$78.87	10	Unlimited	30
Canada	Aliant	DSL	$90.14	5	Per Minute	70
Canada	Bell Canada	DSL	$92.17	5	Per Minute	53
Belgium	Telenet	Cable	$99.33	10	Per Minute	43
U.K.	Homechoice	DSL	$129.89	8	Unlimited	55
U.S.	Comcast	Cable	$149.79	6	Unlimited	70

Source: OECD; "PPP" stands for purchasing-power parity

For example, customers of the French DSL competitor "Free" can get a 20 Mbps DSL connection, 93 TV channels, and unlimited telephone service for around $33 per month. Contrast this with a triple-play offering from the U.S. company Comcast, where a 6 Mbps cable-modem connection, 70 TV channels, and unlimited telephone service cost nearly $150 per month.[18]

While triple-play bundles have been popular in Europe, consumers in the United States have been reluctant to sign up.[19] A key factor behind this slow adoption is the price. The U.S. triple-play offerings (where available) are just too expensive for most consumers.

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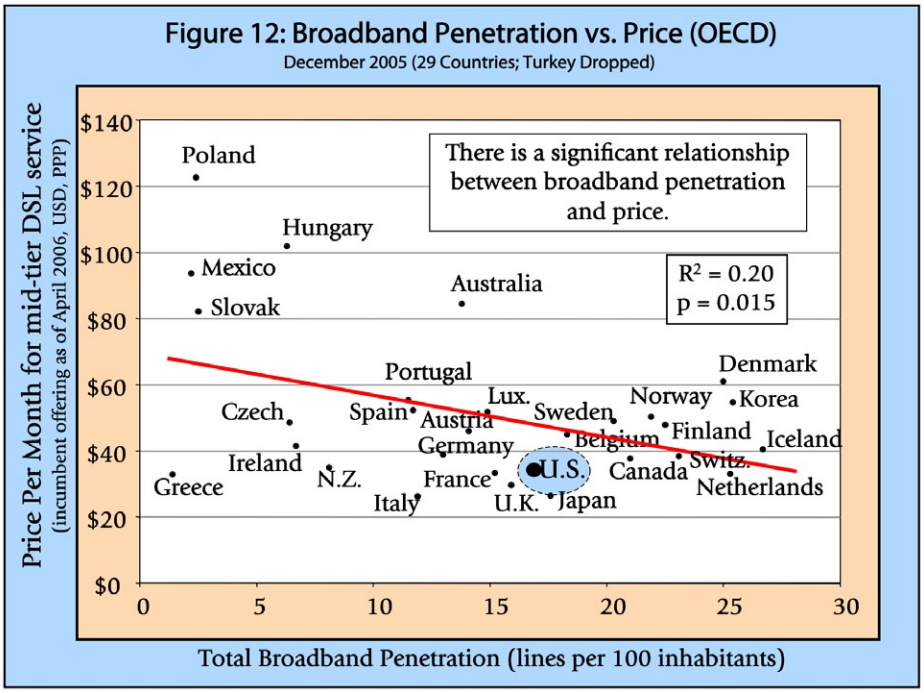
[18] Yoshikazu Okamoto and Taylor Reynolds, "Multiple Play: Pricing and Policy Trends," Directorate for Science, Technology and Industry, Committee for Information, Computer and Communications Policy, Working Party of Telecommunication and Information Services Policies, Organization for Economic Cooperation and Development, April 7, 2006.

[19] Yuki Noguchi, "No Bundle of Joy," *Washington Post*, March 22, 2006.

Open Access Policy Promotes Lowers Prices and Faster Speeds

The relationship between price and broadband adoption is apparent in the OECD: Countries with lower monthly costs for broadband have significantly higher levels of broadband penetration (see Figure 12).[20]



Source: OECD; incumbent company published offerings; Free Press analysis of OECD and incumbent data

The best broadband offerings in many of the countries shown above do not come from the traditional telecom incumbents, but from competitors who have entered historically monopolistic markets. This new competition was made possible by good public policy — specifically the successful implementation of "open-access" or "unbundling" requirements.

The current European marketplace, as well as the aftermath of the 1992 Cable Act and the 1996 Telecom Act in the United States, illustrates that the threat of competition — not government regulation — is the most important factor behind infrastructure investment decisions.

For example, France Telecom, the French incumbent operator, was somewhat slow to deploy broadband technology. But once they were faced with fierce competition from open-access enabled competitors like Free, they quickly moved to upgrade their network. France Telecom is now offering some customers an amazingly fast 2.5 gigabit per second (Gbps) fiber connection for just $85 per month.[21]

In the United States, the 1992 Cable Act's program access rules led directly to the rapid growth of the satellite industry. Satellite's ascension then put pressure on cable operators to invest in their network, allowing them to differentiate their product by offering digital video service and cable broadband.

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[20] Data based on published incumbent company offerings as of March 2006. The DSL platform was used, as in many European countries deployment of cable modem service is very low or non-existent.
[21] Slashdot.org, http://slashdot.org/articles/06/07/26/127205.shtml.

And cable broadband in turn stimulated telecom providers to invest in network upgrades to allow them to use DSL offerings to compete with cable modems.[22]

After the 1996 Telecom Act went into effect, incumbent telecom operators' capital expenditures rose significantly, even though they were subject to new open-access regulations. But after legal challenges significantly weakened some of these rules, the amount of capital investment declined.[23]

The incumbents often warn that onerous "regulations" will hinder their investment in new technologies and disrupt the magic of the free market. But in reality, their fierce opposition to open access and non-discriminatory policies is driven by their *fear* of new competition.

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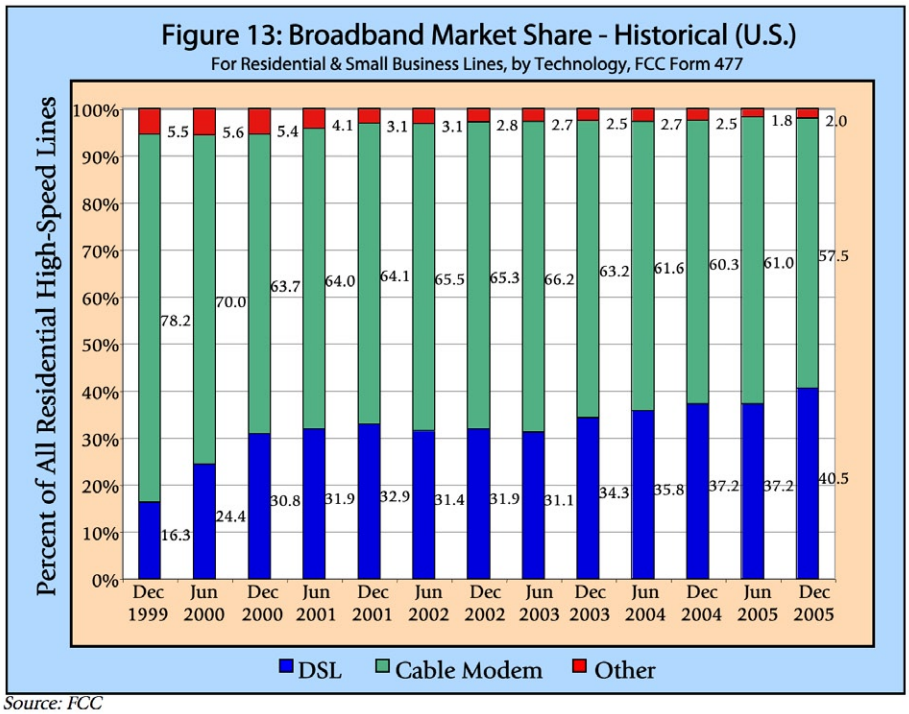
[22] Testimony of Blair Levin, Stifel Nicolaus & Company Inc., Judiciary Committee Hearing on Net Neutrality, June 14, 2006.
[23] Ibid.

The U.S. Broadband Market Is Dominated by Regional Duopolies and Little Competition

In Kevin Martin's July 2005 *Wall Street Journal* op-ed, he tried to portray the U.S. broadband market as healthy: "Broadband platforms are engaged in fierce competition," he wrote. "In addition to telephone and cable providers, broadband access is increasingly being delivered to consumers via satellite, wireless, and fiber or powerline providers. ... This competition is leading to broadband providers offering customers faster and faster connections at lower and lower prices."

Martin's claims about "fierce competition" were wrong then, and the picture is even worse a year later. The share of residential lines controlled by cable and DSL companies has increased over the past several years, and these two platforms now dominate 98 percent of the market (see Figure 13). According to FCC data, cable modem continues to be the dominant platform, accounting for 58 percent of all residential and small business lines.[24]



Source: FCC

Consumers across the nation have relatively little choice in broadband services. The top two cable companies and the top two DSL companies together controlled over half of the entire U.S. broadband market (see Figure 14). The top 10 broadband providers, each a regional monopoly in cable or DSL, made up over 83 percent of the broadband market. The U.S. broadband market is essentially a series of regional duopolies. The largest non-incumbent provider is Sprint, accounting for less than 2 percent of the entire market.

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[24] Other recent survey data show a near equal marketshare between cable and DSL For example, according to the May 2006 Pew broadband report, 50 percent of users with high-speed Internet claimed to have DSL, while 41 percent of users reported cable modem connections. The discrepancy likely could be attributed to the inherent differences in FCC methodology (which relies on reporting from all broadband providers) and Pew's methodology (which relies on self-reports from users reached by telephone survey).

Figure 14: Top Broadband Providers (U.S.)

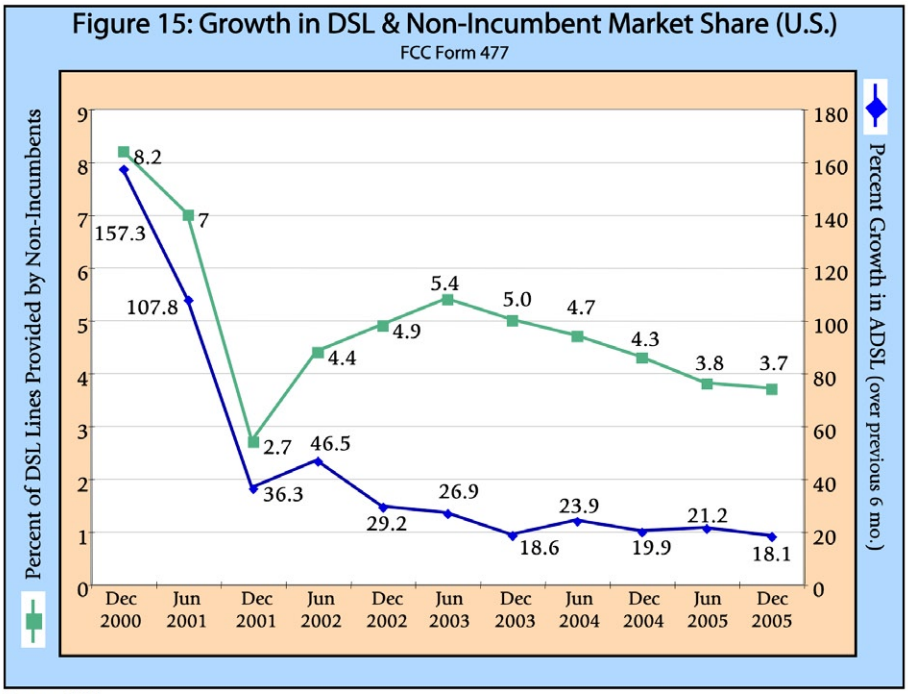
Leichtman Research Group, 2006

Rank	Broadband Internet Provider	Subscribers at the end of 1Q 2006	Percent of all U.S. Broadband
1	Comcast	8,957,000	18.4%
2	AT&T	7,432,000	15.3%
3	Verizon	5,685,000	11.7%
4	Time Warner	5,168,000	10.6%
5	Cox, BHN	4,190,000	8.6%
6	Bell South	3,145,000	6.5%
7	Charter	2,322,400	4.8%
8	Adelphia	1,808,623	3.7%
9	Cablevision	1,806,623	3.7%
10	Qwest	1,678,000	3.5%
11	Sprint	777,000	1.6%
12	Covad	556,950	1.1%
13	Insight	514,800	1.1%
14	Mediacom	504,000	1.0%
15	ALL TEL	441,475	0.9%
16	Century Tel	285,791	0.6%
17	Cable One	253,059	0.5%
18	Cincinnati Bell	171,000	0.4%
	Total (Top 18)	45,696,721	94%
	Total (All U.S.)	48,613,533	100%

Source: Leichtman Research Group, May 2006

The FCC's August 2005 decision to remove DSL service from open access requirements will further reduce the already paltry competition in local telecom markets. Competitive carriers like Covad have relied on unbundling to make their business viable. Without open access requirements, their ability to compete and discipline DSL prices will be drastically diminished.

This is more worrisome because the growth in DSL lines tracks closely with the percentage of lines provided by competitive carriers. Over the past five years, the percentage of DSL lines controlled by non-incumbent carriers decreased from 8.2 percent to 3.7 percent. Over this same period, the DSL semi-annual growth rate fell from 157 percent to just under 20 percent (see Figure 15).



Source: FCC

A recent study by the Government Accountability Office (GAO) confirms that the U.S. broadband market is indeed a series of regional duopolies. The GAO concluded that the median number of providers available to consumers was just two, with nearly one in 10 consumers having access to no providers at all.[25] The GAO's realistic estimates expose the absurdity of the FCC reports. According to the FCC, the median number of broadband providers available to consumers is eight.

In many parts of the country, there are one or less options for terrestrial broadband service. The FCC's own data shows that over 40 percent of U.S. ZIP codes have one or less providers reporting a subscriber living within those ZIP codes (see Figure 16). But the GAO noted in its May 2006 report that "the number of providers reported in the ZIP code overstates the level of competition to individual households."

This is undoubtedly true. Any ZIP code with a single subscriber for DSL or cable modem will be registered as fully covered by the FCC. But many households in that ZIP code (particularly if it is a large geographic area) may lack available service from one or both providers.

[25] "Broadband Deployment is Extensive throughout the United States, but it is Difficult to Assess the Extent of Deployment Gaps in Rural Areas," Government Accountability Office, Report to Congressional Committees, GAO-06-426, May 2006.

Figure 16: Gaps in Broadband Coverage (U.S.)

High Speed Lines by Technology, FCC Form 477, December 2005

Technology	Percent of Zip Codes *	
	With Zero Providers	With One or Less Providers
ADSL	17.9	58.6
Cable Modem	42.9	91.0
Satellite	11.5	57.8
Mobile Wireless	47.6	96.0
ADSL and/or Cable Modem	13.5	40.5

Source: FCC; a ZIP code is counted if a provider reports serving at least one customer within that ZIP code

Cable and DSL companies clearly dominate the "last-mile" broadband infrastructure, the wires that deliver broadband to the home. These companies are using their dominance over the last mile to boost their revenues in their traditional markets — cable television and telephone service — via a practice of "forced bundling."

For example, Verizon's standard month-to-month rate for their 768 kbps DSL service is $29.95 if you also purchase a Verizon landline with Verizon long-distance service. Without the telephone bundle, the monthly price for DSL increases to $37.95.[26]

Comcast customers who also subscribe to Comcast video programming can get cable modem service for a standard rate of $42.95 per month. But those who do not wish to subscribe to video service must pay $57.95 per month, $15 above the bundled Internet rate.[27]

As a condition of the merger between SBC and AT&T, the new company was mandated to stop the practice of forced bundles in California. Prior to the merger, SBC's California DSL customers were required to also subscribe to SBC's telephone service, which turned a $30-per-month basic DSL connection into a minimum $47.99 package for the DSL service plus a no-frills local telephone line. But instead of giving customer more choice, now AT&T now offers standalone (or "naked") DSL for $44.99 per month, a $1 savings over the bundled service.[28]

Bleak Broadband Market for Small Businesses

While residential consumers have only two practical choices for broadband access, with cable the dominant platform, the situation is quite different in the market for business broadband services. According to FCC data, DSL clearly dominates the business advanced service Internet market, accounting for nearly 48 percent of all lines (see Figure 17).

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[26] Offering detailed on http://verizon.com as of July 6, 2006.
[27] Offering detailed on http://comcast.com as of July 6, 2006.
[28] Ryan Kim, "AT&T Offers Broadband by Itself: Unpublicized DSL Service Won't Save Subscribers Much," *San Francisco Chronicle*, June 17, 2006. See also Jessie Seyfer, "Stand-alone DSL Gains Favor Over Bundle with Phone Line," *San Jose Mercury News*, June 25 2006.

Figure 17: Broadband Market Share (U.S.)

Advanced Service Lines by Technology, FCC Form 477, December 2005

Technology	Market Share (percent of all lines)	
	Residential	Business
ADSL	36.2	48.0
Cable Modem	62.4	20.9
Satellite	0.06	0.3
Mobile Wireless	0.01	1.3
ADSL and Cable Modem	98.6	68.9

Source: FCC

However, the business market is not nearly as competitive as these numbers suggest. Cable and DSL do account for nearly 70 percent of the business advanced service market, but the remainder is made up of other telecom-provided technologies such as SDSL and traditional wireline services like T-3. Taken as a whole, telephone companies provide approximately 80 percent of all business high-speed lines.[29]

In the "special access line" market, which is critical to very large businesses, the situation is even worse. Regional Bell Operating Companies (i.e. Verizon, AT&T, BellSouth and Qwest) operate as regional monopolies, with competitors like Sprint accounting for less than 1 percent of all special access lines.[30]

For American small business owners, the broadband market is quite bleak. According to a recent study by Hughes Network Systems, 60 percent of all U.S. small businesses with 10 or fewer employees said they didn't have access to cable or DSL service.

In rural areas, 76 percent of small businesses (with 100 or fewer employees) reported no access to terrestrial broadband service. In addition, of those small businesses that did not subscribe to broadband, 43 percent reported that no broadband was available. A full 50 percent of all small business owners reported that without cable and DSL service, their only option was dial-up.[31]

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[29] "High-Speed Services for Internet Access as of December 31, 2005," Industry Analysis and Technology Division, Wireline Competition Bureau, Federal Communications Commission, July 2006.
[30] Testimony of Robert S. Foosaner, Sprint Nextel Corporation, United States Senate Committee on Commerce, Science and Transportation, June 13, 2006.
[31] "Small Businesses in the Dark with Dial-up Internet Access," Hughes Network Systems, September 20, 2005.

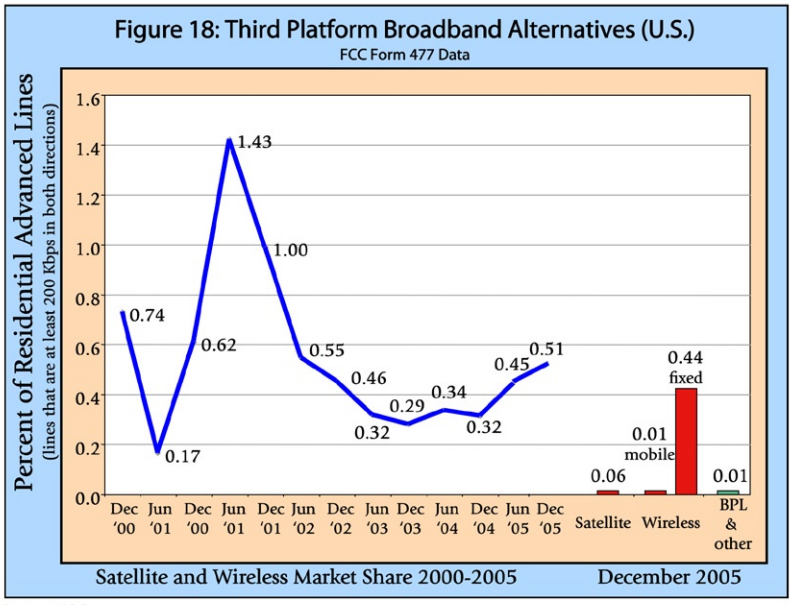
'Third Platform' Alternatives Won't Compete with Regional Duopolies

Some observers look to technologies like mobile Internet and broadband over powerline (BPL) as the answer to the problem of the cozy cable-DSL duopoly. But these are at best niche technologies that won't be viable for quite some time, if ever, without a new direction in broadband policy.

The period from 2000 to 2005 saw much hype about BPL, as funding for the technology increased and test programs went online. In February 2004, then FCC Chairman Michael Powell declared BPL to be the "great broadband hope for a good part of rural America."[32] In March 2006, Kevin Martin characterized BPL as a serious competitive broadband technology.[33] However, more recent FCC data shows that BPL makes up less than one-hundredth of 1 percent (.001%) of all residential advanced service Internet connections (see Figure 18).

Wireless broadband technologies have also garnered much attention, with mobile Internet emerging as the latest cure to the duopoly headache. A July 2006 article co-written by a senior fellow at the American Enterprise Institute stated that "the vast majority of broadband connections are indeed DSL or cable, but they compete vigorously with one another and with new technologies like wireless broadband, whose share is growing steadily."[34]

This statement was made in a leading technology publication despite the fact that wireless technologies account for about one-half of 1 percent (0.5%) of all U.S. advanced service residential broadband lines — down from 1.4 percent of the market just four years earlier (see Figure 18).



Source: FCC

[32] Donny Jackson, "FCC OKs Pursuit of BPL Technology," *MRT*, May 1, 2004. Available at http://mrtmag.com/mag/radio_fcc_oks_pursuit/index.html.
[33] Rich Tehrani, "FCC's Kevin Martin Discusses Broadband Competition," *TMCnet*, March 21, 2006. Available at http://news.tmcnet.com/news/2006/03/21/1476014.htm.
[34] Seth Sacher and Scott Wallsten, "What U.S. Broadband Problem?" CNETNews.com, July 3, 2006.

One of the primary barriers to the development of wireless broadband is that the dominant wireless carriers and largest holders of spectrum licenses are themselves owned by the largest DSL providers. It seems unlikely that these companies will engage in any kind of meaningful competition with themselves.

The latest FCC Form 477 data does indicate a large increase in the total number of high-speed mobile wireless lines. However, only 1.6 percent of these lines provide speeds above 200 Kbps in both directions, indicating that this class of service is not "true broadband" as Congress defined it in the 1996 Act. Furthermore, 99.8 percent of mobile wireless lines are subscribed to by businesses, indicating that this expensive and slow service is not a viable option for residential consumers.

These mobile wireless connections were designed to be a complement to normal fixed-line access, and will never directly compete with cable modem or DSL. Though companies like Verizon advertise their mobile broadband service as "unlimited", users are in fact severely restricted in how they can use the near $80 per month connection. Verizon mobile broadband users are not allowed to watch streaming video or run VoIP telephone software, and downloads are capped at 10 gigabytes per month.[35]

Wireless has the potential to become a viable competitor, but only if smart public policy plays a role in fostering that competition. Communities across the country have begun to bypass the duopoly giants by building "Community Internet" projects. Many of these efforts use wireless technology operating in the "unlicensed" portions of the public airwaves and offer consumers low-cost Internet at comparable speeds to the incumbents.

However, 15 states currently have legal barriers that impede or prohibit municipalities from serving their citizens with low-cost wireless broadband alternatives. This is public policy at its worst: arbitrary rules designed to thwart competition to protect influential incumbent providers.

Communities should be free to provide their citizens with valuable communications technology, especially in areas where incumbents refuse to deploy service. Furthermore, Congress and the FCC should allocate more "unlicensed spectrum" for wireless broadband, particularly by making use of the empty "white spaces" in the broadcast television spectrum.

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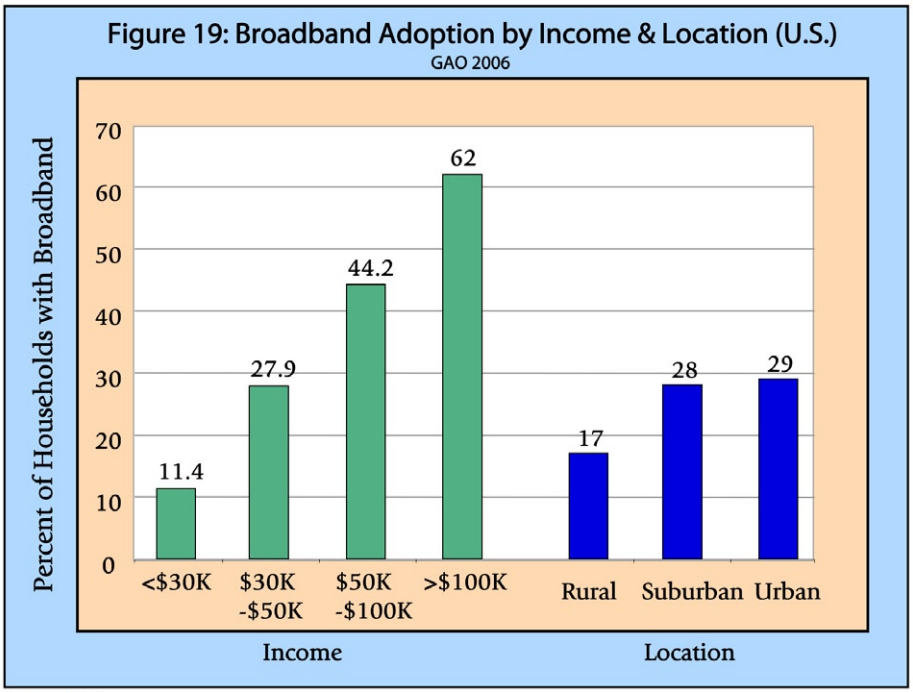
[35] Joseph S. Enoch , "Verizon Limits Its "Unlimited" Wireless Broadband Service", *Consumeraffairs.com*, July 25, 2006.

The Digital Divide Shows No Sign of Closing

Despite the increasing importance of broadband, many Americans don't have access to this vital technology. For millions of low-income Americans, the opportunities broadband can bring are unrealized because it remains far too expensive. Likewise, many rural families continue to fall on the wrong side of the digital divide when compared to their urban and suburban counterparts.

Since our last broadband report was released, several studies have been published that provide updated information about the digital divide. The news is not good. In 2005, Pew data showed that urban adults were 1.72 times more likely to report a home broadband connection than their rural counter parts. A year later this ratio has increased to 1.76.[36] Pew data also shows that adults living in homes with annual household incomes below $30,000 are more than three times less likely to report having a broadband connection as those with annual household incomes above $75,000.



Source: GAO

Other sources confirm these findings. A 2006 GAO study revealed that approximately one out of 10 households with incomes below $30,000 reported having broadband access, while broadband connections were in six out of every 10 households with incomes above $100,000.[37]

This study also showed that urban households had broadband connections at nearly twice the rate of rural households (see Figure 19). USDA data reveals that U.S. farms are half as likely to have broadband as the average American household (see Figure 20).[38]

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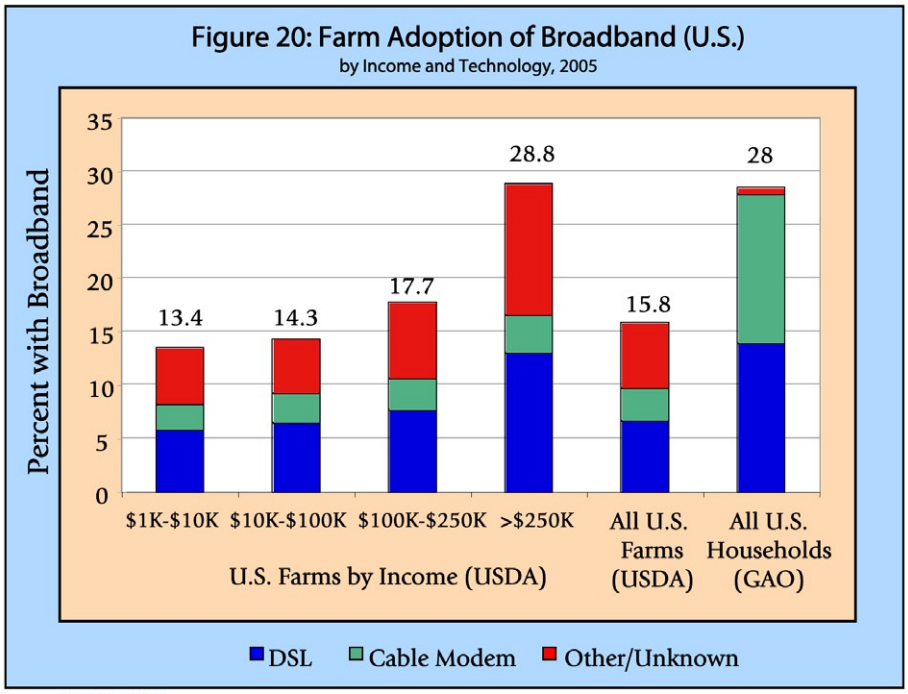
[36] In 2005, 18 percent of rural adults reported a home broadband connection, compared to 31 percent of urban adults. In 2006, 25 percent of rural adults reported a home broadband connection compared to 44 percent of urban adults. See John B. Horrigan, "Home Broadband Adoption 2006," Pew Internet & American Life Project, May 28, 2006.

[37] "Broadband Deployment is Extensive throughout the United Sates, but it is Difficult to Assess the Extent of Deployment Gaps in Rural Areas," Government Accountability Office, Report to Congressional Committees, GAO-06-426, May 2006.

[38] "Farm Computer Usage and Ownership," National Agricultural Statistics Service, Agricultural Statistics Board, U.S. Department of Agriculture, July 29, 2005.

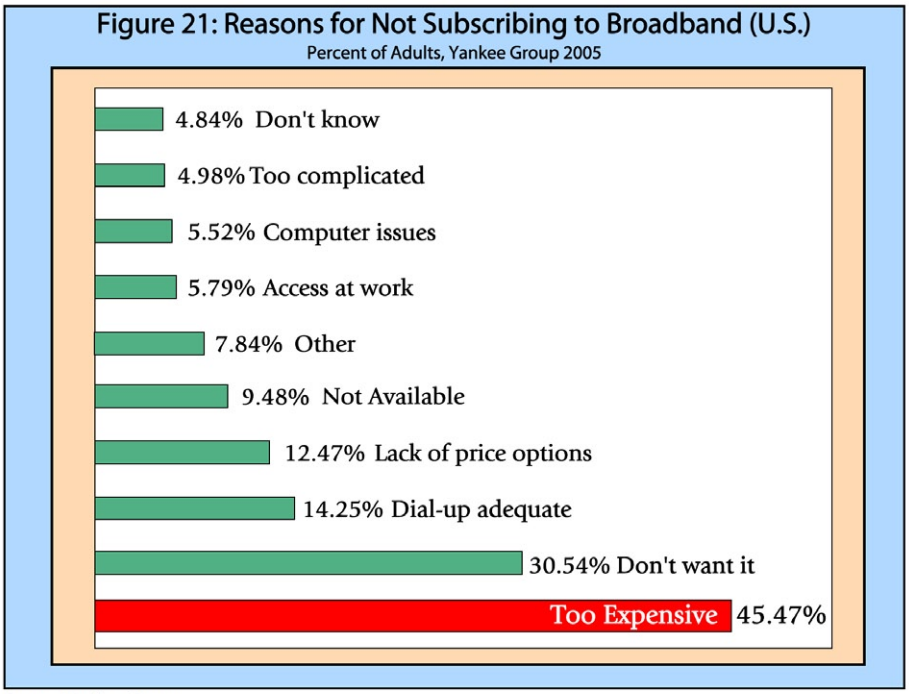


Source: USDA; GAO

Price and Availability Keep Broadband from Rural and Low-Income Users

The argument that the low-income and rural segments of society use information and communications technologies differently from their higher-income and urban counterparts is simply untrue. A recent survey by the Yankee Research group asked non-broadband users why they did not subscribe. Nearly half of the respondents indicated that broadband was just "too expensive." Nearly 10 percent reported that broadband service was unavailable where they lived, a result consistent with the latest GAO report (see Figure 21).[39]

[39] Yankee Group, February 2006, as published at http://www.emarketer.com/eStatDatabase/ArticlePreview.aspx?1003833.



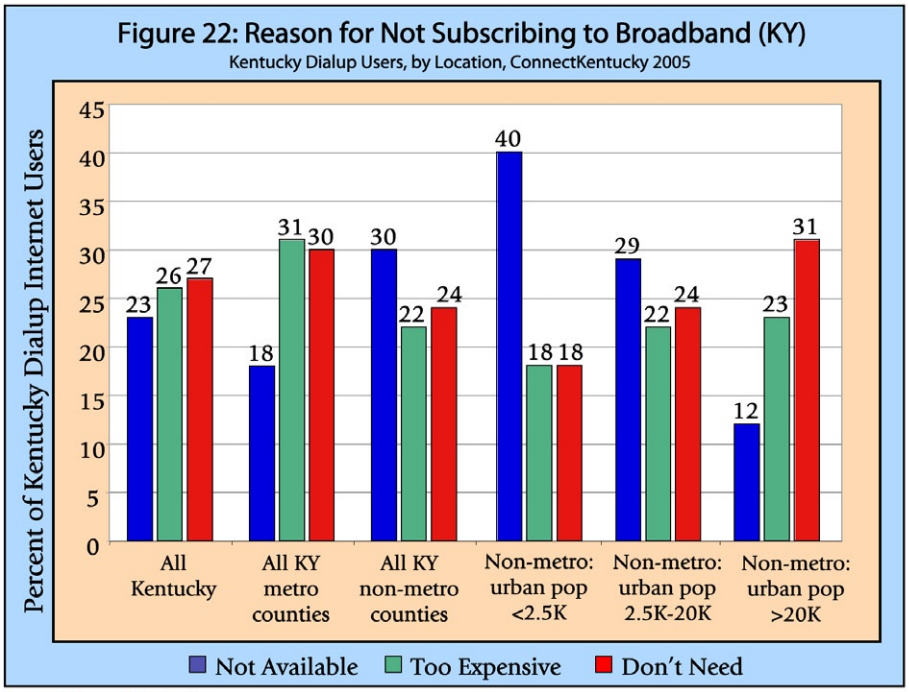
Source: Yankee Group

The data make it quite clear that the key barriers to broadband adoption by low-income and rural consumers are price and availability. This is not surprising, as high prices and limited deployment are the exact expected outcomes in a duopoly market. The results are supported further by recent studies of Internet users in Kentucky and California.

ConnectKentucky, a public-private alliance in that state, has undertaken the largest and most comprehensive broadband availability and use assessment effort to date. Its work demonstrates that in Kentucky, one of the lowest-ranking states in terms of broadband penetration, availability and price are the key barriers to broadband adoption.

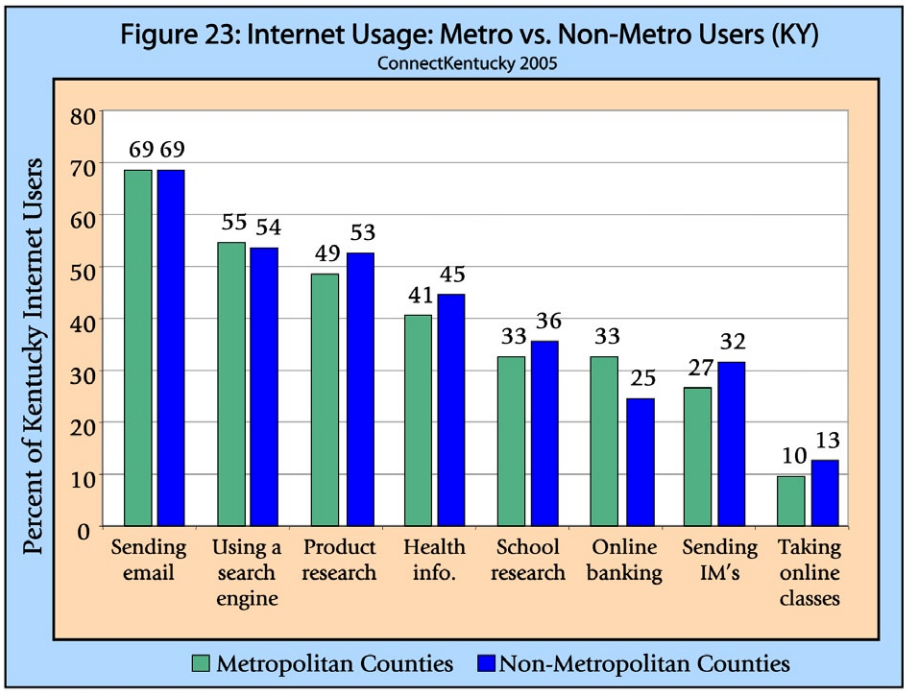
Of all Kentucky dial-up users, 23 percent report that no high-speed service is available, and 26 percent report that broadband is too expensive. In non-metropolitan Kentucky counties, 30 percent of dial-up users report broadband service is unavailable, while just 18 percent of dial-up users in metropolitan Kentucky counties reported no service. In metropolitan Kentucky counties, nearly one out of every three dialup users reported that broadband is too expensive (see Figure 22).[40]

[40] Technology Adoption and Barriers by Metropolitan and Non-Metropolitan Areas: Results and Analysis from the ConnectKentucky Technology Assessment Study," ConnectKentucky, 2005.



Source: ConnectKentucky

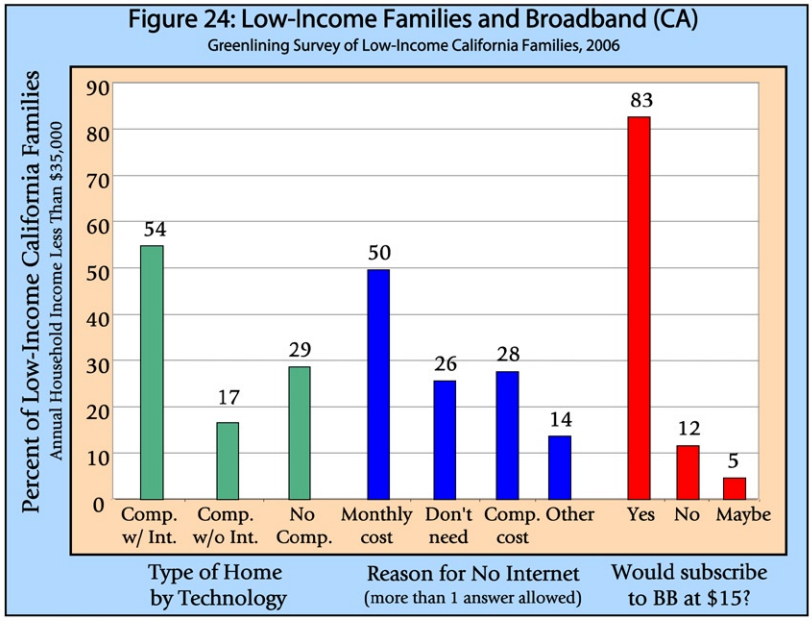
Responses to questions about patterns and habits of all Kentucky Internet users clearly demonstrate that non-metropolitan subscribers use the Internet in almost identical ways as their metropolitan counterparts, with significantly more non-metropolitan users reporting using the Internet for instant messaging and taking online classes (see Figure 23).



Source: ConnectKentucky

The results from this survey seem to confirm that price and availability are standing in the way of broadband adoption by rural users. If given the opportunity, rural users will use their broadband connection in ways that are identical to their urban counterparts.

In California, results from a recent survey of low-income families show that this segment of society uses information and communications technologies at a high rate — but they have not adopted broadband service due to its high price.[41] Cell phone usage is prominent in these low-income households, with 88 percent of homes reporting cell phone adoption. More than 70 percent of low-income California families have a computer in their homes, and 76 percent of these homes (or 54 percent of all low-income California families) are connected to the Internet (see Figure 24). By comparison, the GAO study found that 66 percent of all households nationwide have a home computer and that 59 percent of all households nationwide are connected to the Internet.



Source: Greenlining Institute

Of the families in the California survey who reported no home Internet access, 50 percent said that the monthly cost of Internet service was a barrier to adoption. When low-income respondents who reported no home Internet access were asked if they would subscribe to broadband at a price level of $15 per month, a whopping 83 percent said that they would. The results from this survey indicate that the price of broadband service, and not necessarily the lack of a home computer, is the key barrier to broadband adoption by low-income households.

Bringing higher quality and more affordable broadband products to underserved low-income and rural markets should be our No. 1 policy goal. Yet very little in the current political environment aims to produce the change necessary to achieve this result. Market forces will not be enough given the duopoly control of the cable and telephone companies. Even their most optimistic plans do not begin to approach the goals we must set, nor do they produce the competition we desperately need.

[41] Results of Greenlinings'"Low Income Twenty-First Century Technology Study" as filed with the California Public Utilities Commission, May 24, 2006.

The FCC Continues to Use a Misleading and Meaningless Measure of Broadband Coverage

One of the main purposes of the 1996 Telecommunications Act was to foster competition in voice and video services to speed deployment and adoption of broadband Internet technologies. The law directs the FCC to "determine whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion." If the FCC determines this isn't happening, then the agency is required to "take immediate action to accelerate deployment of such capability by removing barriers to infrastructure investment and by promoting competition in the telecommunications market."[42]

The 1996 Act also declared: "Consumers in all regions of the nation, including low-income consumers and those in rural, insular, and high cost areas, should have access to telecommunications and information services, including interexchange services and advanced telecommunications and information services that are reasonably comparable to those services provided in urban areas and that are available at rates that are reasonably comparable to rates charged for similar services in urban areas."[43]

Congress defined "advanced telecommunications" services as "high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology."[44]

To fulfill the monitoring requirements of the Act, the FCC implemented the so-called Form 477 reporting requirements.[45] Initially, all providers of high-speed and advanced services with at least 250 customers in a given state were required to report twice a year about their broadband deployment activities. This information included the total number of subscribers and type of technology to which they subscribed, as well as a listing of each 5-digit ZIP code where a provider had at least one subscriber residing.

But the FCC chose a truly incomprehensible definition of "high-speed service," setting the threshold at 200 kilobits (kbps) per second in one direction — upload or download. Similarly, the Commission defined "advanced services" as a connection capable of at least 200 kbps in both directions.

These standards do not meet the congressional mandate contained in the 1996 Act. At the thresholds set by the FCC, a user would be unable to receive, much less originate, high-quality video telecommunications, an activity which requires symmetrical connections 20 to 100 times faster than 200 kbps.

Why would the FCC set the bar for broadband so low? The only explanation is that they want to mask the poor quality of U.S. broadband connections. If the bar were set at 1 Mbps in one direction, still a very low standard compared to other nations, millions of DSL lines would not qualify, and neither would most satellite and wireless connections. If the bar were set at 1 Mbps symmetrical, virtually none of residential broadband products offered in America today would qualify as broadband.

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[42] Public Law 104-104, Section 706, "Advanced Telecommunications Incentives."
[43] 47 U.S.C. §254(b)(3).
[44] Public Law 104-104, Section 706, "Advanced Telecommunications Incentives."
[45] "In the Matter of Local Competition and Broadband Reporting" CC Docket N. 99-301, Report and Order, FCC 00-114, Released March 30, 2000.

Four years after implementing these reporting requirements, the FCC released an updated Order on Form 477.[46] All companies are now required to file a report, regardless of how many subscribers they serve. Also, companies now must report some limited information on the speeds and types of the connections to which their customers subscribe.[47] These are welcome changes, as they do provide the FCC and Congress with a more detailed understanding of the U.S. broadband market.

However, the only information that Form 477 provides on local broadband activity is the absolutely meaningless metric of ZIP code coverage. The FCC reports the number of providers in a given ZIP code that report serving *at least one* subscriber in that ZIP code. Given the large geographic size of ZIP codes, especially in rural areas, this metric provides no realistic measure of actual broadband deployment and adoption at the local level.

That's not the only shortcoming with the FCC data. If a ZIP code has zero providers, it is not even listed in the public releases of Form 477 data.[48] Also, if a given ZIP code has between one and three providers serving at least one subscriber each, the Commission reports this with an asterisk instead of distinguishing the actual number.

The 1996 Act clearly requires the FCC to determine the pace and extent of the *deployment* of broadband to *all* Americans. Yet the Commission itself admits that its ZIP code methodology is not meant to be a measure of broadband deployment.[49]

In a 2004 proceeding to revise Form 477 reporting requirements, the FCC was urged to make changes that would provide a better understanding of the true nature of broadband deployment. For instance, the FCC could ask providers to report the actual number of subscribers in a given ZIP code, or ask providers to list ZIP codes where their service is available at the more specific "ZIP plus 4" geographic level. The FCC also could have required the reporting of pricing data.

Currently, the Commission relies on a private database of ZIP codes that does not match up to the ZIP code Tabulation Area (ZCTA) geographical boundaries used by the Census Bureau. Several commenters asked the Commission to use the Census metric to facilitate accurate merging of data sets that would provide valuable information about the demographics of the areas where broadband subscribers lived. The Commission declined to implement any of these improvements.

In its May 2006 report on broadband deployment, the GAO chided the FCC on its use of the ZIP code metric. The GAO stated that "the use of subscriber indicators at the ZIP code level to imply availability, or deployment, may overstate terrestrially based deployment." The GAO added: "Based on our analysis it appears that these [ZIP code] data may not provide a highly accurate depiction of deployment of broadband infrastructures for residential service in some areas."[50]

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[46] "In the Matter of Local Competition and Broadband Reporting," W.C. Docket N. 04-141, Report and Order, FCC 04-266, Released November, 12 2004.
[47] The six mutually exclusive speed categories are: 1) exceeding 200 kbps in only one direction; exceeding 200 kbps in both directions, and: 2) greater than 200 kbps and less than 2.5 mbps in the faster direction; 3) greater than or equal to 2.5 mbps and less than 10 mbps in the faster direction; 4) greater than or equal to 10 mbps and less than 25 mbps in the faster direction; 5) greater than or equal to 25 mbps and less than 100 mbps in the faster direction; 6) greater than or equal to 100 mbps in the faster direction.
[48] This was the case up to the most recent data reported as of June 30, 2005. In the latest publicly available data, the Commission has reported ZIP codes with zero providers serving at least one subscriber. But unlike all previous data sets that were released in spreadsheet format, this data set is in a single pdf file that is copy protected, thus making it extremely difficult for researchers to use. Commission staff have indicated that this is because the ZIP code database used by the FCC is proprietary in nature.
[49] "Broadband Deployment is Extensive throughout the United States, but it is Difficult to Assess the Extent of Deployment Gaps in Rural Areas", United States Government Accountability Office, Report to Congressional Committees, GAO-06-426, May 2006.
[50] Ibid.

Chairman Martin and others, including the editorial boards of the *Washington Post* and *Chicago Tribune*, have used the ZIP code data to justify their belief that consumers have many choices among broadband providers.[51] However, the GAO concluded that "the number of providers reported in the ZIP code overstates the level of competition to individual households."

For example, according to the FCC's data, 95 percent of Kentucky households live in ZIP codes where broadband service has been reported. However, the results from ConnectKentucky's massive statewide assessment showed that only 77 percent of Kentucky households live in areas where broadband service is available.

The GAO also compared FCC ZIP code data to survey data they obtained from Knowledge Networks. According the FCC's ZIP code data, as previously noted, the median number of providers offering broadband was eight and only 1 percent of the survey respondents lived in ZIP codes where the FCC reported no service. However, after the GAO corrected for the shortcomings in the FCC's data, it found that the median number of providers fell to just two, and that nearly 10 percent of respondents had no service available whatsoever.

The inadequacy of the FCC's data is no small matter. The FCC's methodology overstates the true level of broadband deployment and adoption, and offers no information at all on the price to performance ratio of broadband connections. Thus the mandate of the 1996 Act goes unfulfilled, and policymakers are left in the dark about the true nature of broadband deployment in America.

The true state of broadband in America

As the various data above indicate, urban users have home broadband connections at nearly twice the level of rural users, a gap that has held quite steady over the years. We know that at least 10 percent of Americans nationwide report having no broadband service available where they live, and that in certain less-populated areas a quarter of households have no broadband service.

Even the FCC's own ZIP code data, which overstates the level of deployment, shows that nearly 14 percent of ZIP codes have no users reporting cable modem and/or DSL service, and that over 40 percent of ZIP codes have one or less cable modem and/or DSL providers. This same data shows that nine out of every 10 ZIP codes have one or less providers of cable modem service, and six out of every 10 ZIP codes have one or less providers of DSL service.

Nationwide, the FCC reports that DSL service is not offered on 22 percent of incumbent telephone companies' lines, and that cable companies do not offer modem service on 7 percent of their lines. In some states, these numbers are very high. In Louisiana, 44 percent of the cable lines are not modem-capable; nearly 40 percent of Vermont's telephone lines are not equipped with DSL (see Figure 25).

[51] "Hands Off The Internet", *Chicago Tribune*, June 26 2006. Also, "The Internet's Future: Congress Should Stay Out of Cyberspace", *Washington Post*, June 12 2006.

Figure 25: Percent of End-Users Premises Without Access to High Speed Services (U.S.)

FCC Form 477, December 2005 Data

DSL Not Available where Incumbent Offers Telephone Service (top 5 states)		Cable Modem Not Available Where Cable Systems Offer Cable TV Service (top 5 states)	
Vermont	39	Louisiana	44
West Virginia	39	Arkansas	33
Arkansas	37	New Mexico	25
New Hampshire	37	New Hampshire	18
Arizona	36	West Virginia	18

Source: FCC

Together, these data paint a very troubling picture. America appears to be a land of broadband haves and have-nots, where rural and low-income citizens are left behind in the information economy. This situation is the result of failed policy and a lack of imagination and vision from our policymakers.

Policy Recommendations for Fostering Real Broadband Competition and Deployment

The FCC has failed to adequately oversee the timely deployment of affordable broadband to every American, as they were mandated to do by the 1996 Telecommunications Act. So it is up to Congress, as well as state and local entities, to step in and solve this problem. So far, little in the legislative agenda indicates a forward-looking vision to address our broadband problems.

Our policymakers are standing by while a third of the country lacks Internet access of any kind, and another third remains on dial-up lines. American consumers pay more money for less broadband than any of the world's leading broadband nations. We have neither a competitive market nor a policy plan for making real broadband universal and affordable.

The following policy recommendations could help get the United States back where it belongs — at the top of the global broadband ranks:

Maintain the nondiscrimination and open access principles that enabled the birth and historic growth of the Internet. The principles of nondiscrimination and open access have a rich and successful history in communications policy. These vital principles have underpinned all communications policy and are directly responsible for fostering the innovation that led to today's global information economy. Nondiscrimination, open access and unbundling rules were key aspects of the 1996 Act and were intended to bring competition to local communications markets.

Similar open access policies were adopted by much of the rest of the developed world. Countries like Japan and France now have vigorous inter- and intra-platform competition in their broadband markets primarily because of the successful implementation of nondiscriminatory, open access policies. However, here in the United States, the principles contained in the 1996 Act were never properly implemented due to overzealous litigation by the incumbent network operators and a series of regulatory missteps by the FCC.

In August 2005, the FCC has completely removed these principles from the broadband sector, a move that promises to propel the U.S. further down the rankings of international broadband adoption. The Commission claims to have removed these principles in the name of creating incentives for infrastructure development. But history shows that it is the threat of competition, not its removal, which spurs innovation and investment. The principles of nondiscrimination and open access are fundamental ingredients for the successful deployment of communications technologies.

Inexplicably, Congress now threatens to permanently abolish nondiscrimination rules that protect content and applications on the Internet from the duopoly market power of the network operators. The end of so-called Network Neutrality would be a disastrous policy decision that would further cripple American competitiveness and set back progress immeasurably.

Remove barriers to Community Internet systems. More than 400 local governments across the country have taken the initiative, starting Community Internet projects that promise to make affordable, universal broadband access a reality. Local elected officials, often in partnership with private sector companies, have built state-of-the-art networks from Scottsburg, Ind., to Tempe, Ariz., to Philadelphia.

In many cases, these projects have overcome powerful lobbying by incumbent providers trying to stifle these efforts with legal obstacles on prohibitions on municipal broadband provision. Congress should specifically remove these anti-competitive barriers to entry for municipalities and other groups seeking to bring high-speed Internet services to local communities.

Furthermore, U.S. policymakers should create incentives for communities to build advanced networks, encouraging robust competition for communications services, assisting small entrepreneurs through public-private partnerships, and bringing opportunity to low-income urban neighborhoods and rural communities too often neglected by the incumbents.

Make more "unlicensed spectrum" available for broadband Internet by opening up the unused TV "white spaces." Wireless broadband operating in the unlicensed 2.4 and 5 GHz spectral regions has been a tremendous boon to the economy and could overcome some of the cost issues associated with last-mile broadband infrastructure deployment. However, these regions of spectrum are crowded and have physical limitations that prevent them from being optimal for widespread wireless broadband deployment.

However, significant portions of the 300 MHz of spectrum occupied by broadcasters will remain fallow and unused after the digital television (DTV) transition is completed in 2009. In some rural areas, over 90 percent of this valuable public resource goes unused, and in many metropolitan areas at least 50 percent of the over-the-air channels are empty "white spaces." This is a huge waste of public resources, considering that technology exists to use this spectrum in a manner that causes zero interference with existing TV stations.

Furthermore, the physical properties of this region of spectrum would enable wireless broadband signals to travel farther and through objects such as trees and hills. If the white spaces were used for wireless broadband, the infrastructure costs would decrease dramatically. If the FCC won't finish its stalled white spaces proceeding (04-186), Congress should take action.

Restrict owners of wireline broadband networks from bidding on licenses for next generation wireless broadband. If we are serious about seeking a legitimate "third pipe" into the home, the most promising technology is wireless. However, this intermodal competition will never emerge if we allow newly available spectrum (such as the 700 MHz band) to be auctioned to vertically integrated companies that already control wireline broadband markets. There is no incentive for a cable or telephone company to use this spectrum to offer a new service that competes directly with their existing services.

Modernize the Universal Service Fund to better reflect the realities of the digital age. Congress considered access to telephone services so vital that they created a fund to ensure universal, affordable access for low-income and rural consumers. But even though broadband has become an indispensable feature in the lives of millions of Americans, it remains out of reach for poor and rural citizens. The current Universal Service Fund has its problems and is in need of reform — something that is beyond the scope of this report. But it is time for policymakers to modernize the program to support the deployment of broadband services.

Require the FCC to improve its data collection on broadband markets. Policymakers cannot adequately assess the problems in the broadband market, nor identify the most appropriate solutions, if the FCC provides poor information. The starting point should be a more precise measure of which geographic areas have service (using a smaller unit than the ZIP code). Beyond that, carriers

should be required to report the percentages of households where broadband service is available in every service area, the percentage of households that subscribe, and the average cost per megabit of throughput. This evidentiary record will allow an accurate analysis of the problems we face and foster solutions that will achieve results.

Allow states to act where the federal government has failed. It is apparent that state governments cannot rely on the FCC to tell them where service is deployed in their states, much less rely on the Commission to foster competition within their states. State governments should look to the example set by ConnectKentucky and take on the task of bringing private actors and local governments together to tackle the broadband problem.

Conclusion: Making Universal, Affordable Broadband a Reality

While the consumer broadband experiences offered by DSL and cable technology are valuable, these technologies are only a stepping-stone along the path to higher-capacity networks using fiber-optics and next-generation wireless technologies. The backbone of the Internet and much of the middle-mile infrastructure consists of fiber-optic technology. But incumbents remain reluctant to extend that fiber all the way to the home, the way companies in Korea and Sweden have done.

The DSL and cable companies' chief excuse for not bringing fiber into the home is that it is too costly. But there is a more logical explanation: They don't want the competition. The cable incumbents do not want to create another video competitor, which fiber to the home would enable. Likewise, the telecom incumbents themselves are poised to enter the video market and have no incentive to cut off this new stream of revenue by rolling out fiber to the home. That's why the government needs to step in and help ensure real competition.

The government should recognize that communications infrastructure is just that — *infrastructure*. The government built the national interstate highway and paved city streets all across America. They then let private businesses use those highways and roads for commerce, and let citizens use them for work and leisure.

It may be time for the government to think boldly and build a true "information superhighway" by deploying "dark fiber" to American communities nationwide — rural and urban, rich and poor alike. With the pipes built, private companies would then be free to "light" the fiber and provide broadband and other services. Competitive companies could pay the government a nominal rental fee for use of the dark fiber lines.

Fiber-to-the-home or fiber-wireless hybrid networks would develop in competitive markets where multiple service providers compete on the basis of quality of service, rather than stifling competition through gatekeeper control over infrastructure.

A project on this scale wouldn't be cheap, with some estimates as high as $1,000 per home, $115 billion to wire the entire nation.[52] But the cost of not taking this path could be even higher. Some economists estimate the social surplus of a universally wired broadband nation at $350 billion.[53] Regardless of the path U.S. policymakers chooses, it is imperative that we guide the market toward some big ideas for our broadband future. Absent that vision, we will continue to fall behind.

Our leaders and policymakers should stop listening to the cable and telephone duopoly about what is best for America and start implementing policies that actually bring affordable advanced communications to all Americans. We will never realize the goals of the 1996 Act, nor President Bush's call for universal, affordable broadband, by ignoring reality and simply relying on hope to solve this problem. We can do better.

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[52] "Broadband: Bringing Home the Bits," U.S. Computer Science and Telecommunications Board, November 2001.

[53] Crandall et. al., "The Effect of Ubiquitous Broadband Adoption on Investment, Jobs, and the U.S. Economy," Criterion Economics, L.L.C., September 2003.

Appendix A:
Comparative Statistical Analysis of Broadband in the OECD

Cross-sectional econometric analysis methods were employed to better understand the differences between the broadband performances of the 30 OECD nations. The results presented below are preliminary observations intended to serve as the basis for further study. All data presented in this appendix (unless otherwise noted) comes from the OECD, in particular the 2005 "OECD Communications Outlook."

This appendix begins with an examination of the individual correlations between certain factors and broadband penetration followed by the construction of a single model based on a full set of predictors. OECD data on student computer use is examined using similar methods. Interpretation of data gathered at such a large aggregate level is certain to raise concerns about the "ecological fallacy." Thus, the conclusions here are indicative of probable trends rather than certain causalities.

What factors are correlated with broadband penetration?

A starting point in the attempt to characterize and understand America's "broadband problem"[54] is determining what factors are correlated with broadband penetration.

Likely factors include:

- Median household income
- Population density
- Percentage of population living in urban areas
- Education attainment (measured as years of formal education)
- Poverty rate
- Broadband price

Other factors that could possibly be important include regulatory conditions, market competition, as well as government investment and incentives for infrastructure development.

Figure A1: Broadband Penetration & Population Density in the OECD

OECD, December 2005

Country	DSL	Cable	Other	Total	Population density (pop/km²)
Iceland	25.9	0.1	0.6	26.7	3
Korea	13.6	8.3	3.4	25.4	483
Netherlands	15.7	9.6	0.0	25.3	399
Denmark	15.3	7.2	2.5	25.0	125
Switzerland	14.7	8.0	0.4	23.1	179
Finland	19.5	2.8	0.1	22.5	15
Norway	17.8	2.9	1.2	21.9	14
Canada	10.1	10.8	0.1	21.0	3
Sweden	13.3	3.4	3.6	20.3	20
Belgium	11.3	7.0	0.0	18.3	341
Japan	11.3	2.5	3.8	17.6	338
United States	6.5	9.0	1.3	16.8	31
United Kingdom	11.5	4.4	0.0	15.9	244
France	14.3	0.9	0.0	15.2	110
Luxembourg	13.3	1.6	0.0	14.9	174
Austria	8.1	5.8	0.2	14.1	97
Australia	10.8	2.6	0.4	13.8	3
Germany	12.6	0.3	0.1	13.0	231
Italy	11.3	0.0	0.6	11.9	191
Spain	9.2	2.5	0.1	11.7	85
Portugal	6.6	4.9	0.0	11.5	114
New Zealand	7.3	0.4	0.4	8.1	15
Ireland	5.0	0.6	1.1	6.7	58
Czech Republic	3.0	1.4	2.0	6.4	129
Hungary	4.1	2.1	0.1	6.3	109
Slovak Republic	2.0	0.4	0.2	2.5	110
Poland	1.6	0.7	0.1	2.4	122
Mexico	1.5	0.6	0.0	2.2	52
Turkey	2.1	0.0	0.0	2.1	92
Greece	1.4	0.0	0.0	1.4	84

Free Press examined the correlation between broadband penetration and the geographic factors of population density and "urbanicity" (the percentage of the population living in urban areas). At first glance, the population density seems significant (see Figure A1). Two of the top countries in terms of broadband penetration — South Korea and the Netherlands — are also the two most densely populated nations in the OECD. But Iceland, one of the most sparsely populated OECD nations, has the highest level of broadband penetration.

[54] This phrase was popularized by Charles H. Ferguson; see "The Broadband Problem: Anatomy of a Market Failure and a Policy Dilemma," 2002.

A close examination of the relationship between population density and broadband penetration reveals no significant correlation between these two variables (see Figure 4 in the main section of this report). This result is not surprising, as the theoretical basis is weak for why population density would affect a country's broadband adoption level. Countries like Iceland and Canada have vast stretches of unpopulated land, but also have high percentages of their population living in urban areas. This suggests the relevant factor is not number of persons in a given total area, but may be the proportion of the population living in close proximity.

The percentage of a country's population living in urban areas does appear to play a more significant role than population density, but the relationship is still very weak. Approximately 12 percent of the observed variation in broadband penetration is explained by urbanicity, and this relationship is weakly statistically significant ($p = 0.065$; see Figure 5 in the main section of this report).

Median household income is significantly correlated with broadband penetration. In this bivariate linear model, median household income explains 32 percent of the observed variation in broadband penetration, and the result is highly statistically significant ($p = 0.001$).

There is also a significant negative relationship between poverty and broadband penetration.[55] In this bivariate model, the poverty rate explains 29 percent of the observed variation in broadband penetration, and the result is highly statistically significant ($p = 0.004$, see Figure 6 in the main section of this report).

Education is also moderately correlated with broadband penetration. Approximately 27 percent of the observed variance in broadband penetration is explained by differences in years of formal education in this bivariate comparison. This relationship is highly statistically significant ($p = 0.001$).

Broadband penetration also is significantly negatively correlated with price, in units of U.S. purchasing power parity ($R^2 = 0.20$, $p=0.015$; see Figure 12 in the main text of this report).[56]

Modeling Broadband Penetration

To better understand how the United States is performing relative to the other countries of the OECD, Free Press constructed an econometric model based on the predictive factors discussed above. The model is specified as:

$$penetration_i = \beta_0 + \beta_1\ (price) + \beta_2\ (mhhinc) + \beta_3\ (urban) + \beta_4\ (yreduc) + \beta_5\ (poverty) + \varepsilon_i$$

Where:
penetration = total broadband penetration as of June 2005
price = the price (in U.S. purchasing power parity dollars) of the leading DSL providers middle-tier offering, excluding any taxes
mhhinc = median household income
urban = percentage of the population living in urban areas

[55] The OECD data used for this analysis defines poverty rates as "the share of individuals with equivalised disposable income less than 50% of the median for the entire population." See "Income Distribution and Poverty in OECD Countries in the Second Half of the 1990s," Michael Forster and Marco Mira d'Ercole, OECD Social, Employment, and Migration Working Paper #22, March 10, 2005.
[56] Due to data limitations and the low presence of cable modem in Europe, DSL prices were used. Prices are for mid-tier DSL service from leading service provider within each country, not including taxes, as of March 2006.

yreduc = years of formal education
poverty = the share of individuals with equivalised disposable income less than 50 percent of the median for the entire population

Results are presented below.

Figure A2: Results of Regression Model - Broadband Penetration

N = 27, R^2 = 0.58	Coefficient	t	p
med HH inc.	0.19	2.26	0.03
poverty	-0.64	-2.23	0.04
urban	-0.01	-0.14	0.89
years education	0.46	0.48	0.63
price	-0.01	-0.48	0.63
constant	8.94	0.7	0.49

This model suggests that a country's average median household income and proportion of population living below the poverty level are two important determinants of broadband penetration for countries in the OECD. Holding poverty, urbanicity, education and price constant, a $1,000 increase in median income results in a 0.19 point increase in broadband penetration. Holding income, urbanicity, education and price constant, a 1 percent increase in poverty results in a 0.64 point decrease in broadband penetration.

This model was also investigated as the (natural) log-log form, specified as:

$$logpenetration_i = \beta_0 + \beta_1\ (logprice) + \beta_2\ (logmhhinc) + \beta_3\ (logurban) + \beta_4\ (logyreduc) + \beta_5\ (logpoverty) + \varepsilon_i$$

Figure A3: Results of log-log Regression Model Broadband Penetration

N = 27, R^2 = 0.58	Coefficient	t	p
log med HH inc.	0.93	3.09	0.01
log poverty	-0.65	-2.33	0.03
log urban	0.46	0.70	0.49
log years education	0.05	0.04	0.97
log price	0.08	0.24	0.81
constant	-1.81	-0.46	0.65

The results of this log-log model confirm the results discussed above. Income and poverty remain two important determinants for broadband penetration. Holding poverty, urbanicity, education and price constant, a 1 percent increase in median income results in a 0.93 percent increase in broadband penetration. Holding income, urbanicity, education and price constant, a 1 percent increase in poverty results in a 0.65 percent decrease in broadband penetration.

Regression diagnostics were performed on both the linear model and the log-log model. Both models appear to be homoskedastic according to the results of hettests. Variance inflation factors

(VIFs) indicate that there is a low possibility of multicolinearity bias. Results of linktest and ovtest diagnostics indicate no omitted variables.

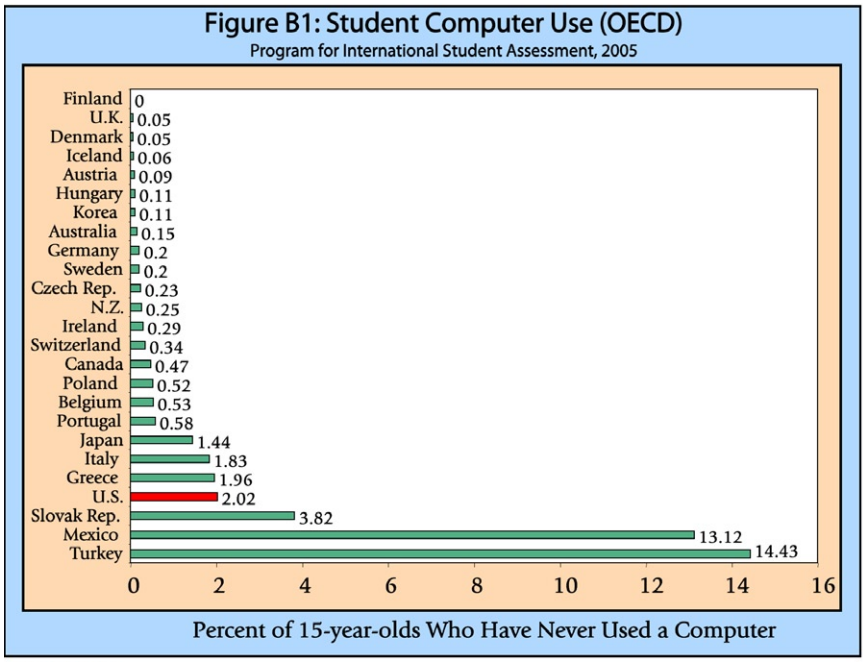
These models seem to indicate that the high poverty rate in the United States (relative to other OECD nations) may be contributing to the overall poor broadband penetration level, given the high median U.S. income level. Also, it seems that the geographic proximity factor of urbanicity is not a significant determinate of broadband penetration at the national level. These results largely concur with other investigations of broadband performance at the national level.

Appendix B:
Student Access to Information Technologies

A recent study by the OECD based on data from the "Programme for International Student Assessment" explored the relationship between student (15-year-olds) academic performance and access to computers, both at home and at school.[57] The results of this study highlight the importance of computers and information technology in adequately preparing students for the future. Highlights of the study include:

- Students who have only limited access to computers performed below the OECD average on measures of academic performance.
- Students without access to computers at home are, on average, one proficiency level below the OECD average, even after accounting for students' socio-economic background.
- Students with the least experience of using computers scored poorly on average. Those with less than a year's experience can typically perform only the simplest mathematical tasks.

A striking finding is the number of U.S. students reporting never having used a computer. The United States has the fourth-highest level of students who have never used a computer, exceeded only by Turkey, Slovakia and Mexico (see Figure B1).



Source: OECD

To investigate the relationship between poverty and student home computer access, Free Press constructed a model similar to that used for broadband penetration. The model is specified as:

$$homeacess_i = \beta_0 + \beta_1(mhhinc) + \beta_2(urban) + \beta_3(yreduc) + \beta_4\ poverty + \varepsilon_i$$

[57] "Are students ready for a technology-rich world?" OECD, January 2006.

Where *homeaccess* equals percentage of students reporting access to a home computer.

Results are presented below.

Figure B2: Results Regression Model
Student Home Computer Access

$N = 27, R^2 = 0.58$	Coefficient	t	p
med HH inc.	0.61	4.64	0.000
poverty	-1.75	-3.66	0.002
urban	0.20	1.37	0.189
years education	0.60	0.37	0.716
constant	58.86	2.89	0.01

This result, like the one discussed in Appendix A, seems to indicate that the high U.S. poverty rate is a significant factor for explaining the high percentage of students reporting no home computer access. Taken together, these results suggest that policies aimed at closing the digital divide, such as extending the USF to broadband, may help improve U.S. standing relative to the other countries of the OECD.