BROADBAND COMPETITION THROUGHOUT THE UNITED STATES AND THE IMPACT ON PRICING

Prepared for

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By

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Executive Summary:

An intense policy debate is raging under the rubric of "Network Neutrality." Much of that debate hinges on a crucial question: How much competition exists in the market for broadband service? If the answer is very little, then the potential for price discrimination by monopoly service providers may indeed be high. If the answer is a great deal, then the potential for a single broadband provider to discriminate against any service valued by customers is dramatically reduced.

GuerillaEconomics, LLC has undertaken a study to measure the degree of competition in broadband markets in the United States. The study looks first at the number of broadband internet service options, both overall, but also far more importantly market-by-market. The study examines the impact of the number of providers on pricing – an important proxy for the level of competition. Our rationale was that even if the number of providers is high, if pricing is not impacted inadequate competition may still exist. On the other hand, if the number of providers is low but price is greatly affected by the presence of each marginal provider, adequate competition may exist.

Our report finds that a wide range of broadband internet service options are available throughout the United States. Data from a recent FCC report titled *High-Speed Services for Internet Access: Status as of June 30, 2005* demonstrates that in most geographic areas, there are multiple competing providers as well as multiple competing technologies.[1] In fact, according to the FCC, as of mid 2005, there were three or more broadband providers in about 75 percent of the country's ZIP Code areas and four or more providers in 60 percent of the Zip Code areas.[2]

Our report also finds interesting results with respect to price. Those results were based on a May 2006 GuerillaEconomics survey of entry-level broadband prices in hundreds of ZIP Codes. In short, we found that, not controlling for the service speed or other aspects of differentiation, it appears that telephone companies provide broadband service at a lower average monthly cost than do most cable operators or satellite providers; however, this differs by ZIP Code and region.[3] In addition, the existence of telephone broadband service into an area appears to put downward pressure on prices; however, the effect is small in the areas included in the cross-sectional pricing survey.[4] This is likely due to foot-print-wide pricing, or demographic and technical factors. Over time, prices for broadband internet service have fallen as additional providers entered the market, and the average speeds for broadband have risen substantially.

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1 *High Speed Services for Internet Access: Status as of June 30, 2005*, Federal Communications Commission, Industry Analysis and Technology Division, Wireless Competition Bureau, April 2006. Available on-line at: www.fcc.gov/wcb/state.

2 Including Puerto Rico. Population figures by ZIP Code from Caliper Corporation (2000). Interestingly, while satellite providers should in theory service nearly every location, there are still 495 ZIP Code areas included in the report that the FCC claims have no service - even through satellite service providers.

3 The Telecommunications Act of 1934, as amended, includes cable service in its definition of telecommunications. Throughout this report, broadband service offered by a telephone company in its information service provider role will be called "telephone broadband," while cable-company provided information service will be called "cable broadband."

4 Overall broadband prices fall by about 1.89 percent from the mean for each additional provider in a market. Note that most broadband providers compete with dial up Internet access by offering introductory prices which last 3 months, 6 months or more.

Looking ahead, it is likely that broadband quality differentiation will continue and prices may continue the downward trend. Competitive entrants driving this trend include: Mobile Wireless 3G broadband service that is now offered to only about half the U.S. population; 80,000 WiFi hotspots already in operation with more to come; fiber-optics already available to more than 3 million households; broadband via WiMAX wireless service; and broadband over power lines. Each is likely to expand in availability, enjoy success with some consumers, and add downward pressure to broadband prices in the near future.

Finally, we conclude that given the flourishing diversity of the marketplace, Network Neutrality concerns may be overblown, as they are especially reliant on assertions of monopoly or duopoly power on the part of broadband providers.

General:

According to the on-line encyclopedia, *Wikipedia* the term "Network Neutrality" is a focal point for regulatory policies, especially related to the Internet. It is often used by political groups to signify any of a wide-ranging collection of public policy goals. In general, there is debate regarding the degree to which the Internet can be said to be neutral in either design or practice.[5]

The Federal Communications Commission (FCC) adopted a policy statement on Network Neutrality on August 5, 2005, that states in part, *to encourage broadband deployment and preserve and promote the open and interconnected nature of public Internet:*

> *(1) consumers are entitled to access the lawful Internet content of their choice;*
> *(2) consumers are entitled to run applications and services of their choice, subject to the needs of law enforcement;*
> *(3) consumers are entitled to connect their choice of legal devices that do not harm the network; and*
> *(4) consumers are entitled to competition among network providers, application and service providers, and content providers.*[6]

Network Neutrality supporters are currently seeking further protections in Federal law, mainly through efforts to achieve legislation on Capitol Hill.[7]

A crucial aspect of the debate over Network Neutrality is the degree to which Internet broadband competition exists. A Network Neutrality supporter, Rep. Zoe Lofgren (D-Calif.), put this concern as such:

> Antitrust law is not regulation. It sets the standard for what monopolies can't do. It is not a regulatory approach; it is a set of laws that keeps monopolies from squeezing the little guys. And that is what's going to happen if we don't get real net neutrality in this bill.

Were Network Neutrality provisions to be defeated, she charged, "We will end up with the duopolies or the monopolies turning the internet into a kind of cable television outfit."[8]

In a similar vein, Rep. Dennis Kucinich (D-Ohio) argued in his response to the passage of recent legislation containing what he considered inadequate Network Neutrality provisions that, "By defeating attempts to create 'network neutrality' this bill will allow the telecommunication monopolies to control content, and access to content on the internet."[9]

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5 See *Network Neutrality*, on Wikipedia.com at: http://en.wikipedia.org/wiki/Network_neutrality

6 Federal Communications Commission press release, *FCC adopts policy statement: New Principles Preserve and Promote the Open and Interconnected Nature of Public Internet*, August 5, 2005, available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-260435A1.pdf. The FCC took pains to note that, "Although the Commission did not adopt rules in this regard, it will incorporate these principles into its ongoing policymaking activities," as well as that, "All of these principles are subject to reasonable network management."

7 See for example, S 2360, The *Internet Non-Discrimination Act of 2006*, available on-line at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_bills&docid=f:s2360is.txt.pdf.

8 See: *Lofgren Urges Protection Of Net Neutrality On House Floor*, Press Release, June 8, 2006. On-line at: www.house.gov/list/press/ca16_lofgren/060806_lofgren_net_neutrality_floor_statement.html

9 *Statement of Congressman Dennis J. Kucinich On The Telecommunications Bill,* Press Release, June 8, 2006. On-line at: http://kucinich.house.gov/News/DocumentSingle.aspx?DocumentID=45019

Likewise, Stanford law professor Lawrence Lessig and University of Illinois Urbana-Champaign professor Robert W. McChesney have argued that, "Without net neutrality, … a handful of massive companies would control access and distribution of content, deciding what you get to see and how much it costs…More than 60 percent of Web content is created by regular people, not corporations. How will this innovation and production thrive if creators must seek permission from a cartel of network owners?"[10]

Network Neutrality backer Vinton Cerf of Google, argues flatly that "Many people will have little or no choice among broadband operators for the foreseeable future, implying that such operators will have the power to exercise a great deal of control over any applications placed on the network."[11]

This report investigates the claim that "many people will have little or no choice among broadband operators for the foreseeable future." In sum, the analysis shows that affordable broadband Internet access is widely available. Now nearly all of the country has access to three or more reasonably priced broadband services.[12] In addition to traditional Digital Subscriber Line (DSL) from telephone companies and their competing local exchange carriers, and from cable broadband connections, American consumers in most markets can also access the Internet via connections from satellite, or 3G (Third Generation) mobile wireless networks, or WiFi fixed wireless, or over fiber optics, even over electric utility lines or WiMAX fixed wireless broadband service. The availability, speed and reliability of service are increasing while costs are falling.

This report, produced by GuerrillaEconomics LLC, for Verizon Communications, discusses some of the most recent developments in the broadband marketplace, and suggests that prices will continue to fall, and service availability will increase.

Broadband Availability:

The most recent data from the Federal Communications Commission (FCC) shows there are 1,439 providers of broadband internet service to residential customers in the United States.[13] This figure omits very small providers (often serving particular rural communities), and it excludes many of the public WiFi "hot spots" that are available throughout the country in coffee shops, parks, schools, community centers, libraries and even entire cities and counties. Broadband service is available to 76 percent of telephone line customers and to 91 percent of cable service customers[14].

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10 Lessig, Lawrence and Robert W. McChesney, No *Tolls On The Internet*, The Washington Post, June 8, 2006. Page A23. Available on-line at www.washingtonpost.com/wp-dyn/content/article/2006/06/07/AR2006060702108.html

11 Official Google Blog, http://googleblog.blogspot.com, Accessed January 12, 2006.

12 See for example: Rubner, Justin, *EarthLink expects decline of premium dial-up service*, Atlanta Business Chronicle, March 25, 2005; Shaw, Keith, *The end of dial-up?*, Network World, March 30, 2006; Wilson, Carol, *The death spiral of dial-up*, Telephony Online, October 10, 2005.

13 *Holding Companies Filing Form 477 (Reporting Data as of June 30, 2005)*, Federal Communications Commission, April 7, 2006. On-line at: www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/filers0604.pdf

14 Table 14: Percentage of Residential End-User Premises with Access to High-Speed Services, *High-Speed Services for Internet Access: Status as of June 30, 2005*, April 2006, FCC,

Table 1
Number of Broadband Services by ZIP Code
FCC, Reported Data as of June 30, 2005[15]

Serivces	Zips	Percent of Zips
0	495	1.7%
1	2,666	9.1%
2	4,030	13.8%
3	4,293	14.7%
4	3,726	12.8%
5	2,865	9.8%
6	2,000	6.9%
7	1,562	5.4%
8	1,177	4.0%
9	1,130	3.9%
10	951	3.3%
11	847	2.9%
12	835	2.9%
13	656	2.2%

Services	Zips	Percent of Zips
14	549	1.9%
15	479	1.6%
16	344	1.2%
17	245	0.8%
18	137	0.5%
19	92	0.3%
20	41	0.1%
21	30	0.1%
22	11	0.0%
23	7	0.0%
24	5	0.0%
25	1	0.0%
26	1	0.0%

The FCC reported that over the twelve month period ending June 30, 2005, the number of broadband connections increased by 10.4 million (32 percent). That rapid growth seems to have accelerated. A report by the Pew Internet & American Life Project states, "The number of Americans who have broadband at home has jumped from 60 million in March 2005 to 84 million in March 2006 – a leap of 40 percent.[16] This is a substantial increase in the rate of broadband adoption compared with the previous year. A significant part of the increase is tied to internet newcomers who have bypassed dial-up connections and gone straight to high-speed connections. This is a striking change from the previous pattern of broadband adoption.[17]

Based on the FCC analysis, broadband coverage ranges from under 3 providers to as many as 26 providers in ZIP Code 10022 (Manhattan's Upper East Side). At mid-year 2005, there were 3 or more broadband competitors in three-quarters of all ZIP Codes; 4 or more in 60 percent of all Zip Codes and there were 5 or more broadband competitors in almost half of all ZIP Codes. Table 1 above shows the breakdown of provider densities from the FCC's report.

The FCC reports data on 29,176 of the approximately 42,000 ZIP Codes in the United States (many of the remaining ZIP Codes are for individual establishments e.g. the White House or IRS and as such do not represent geographical areas). Of these 29,176 ZIP Code areas over 28,680 or 98 percent reported having at least one carrier. Conversations with staff at the FCC suggest that in all likelihood every ZIP Code area in the country has some access to a broadband service provider.[18]

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15 Note that the FCC does not provide counts for 1, 2 or 3 providers but rather aggregates them as 3 or less. These are estimates based on percentages presented in the report.
16 Horrigan, John, *Home Broadband Adoption 2006*, Pew Internet & American Life Project, May 28, 2008, page i.
17 Ibid.
18 Conversation with Jim Eisner in the Wireless Competition Bureau of the FCC, May 8, 2006 3PM.

Urban and Rural Broadband Coverage:

While major cities have had access to a wide range of different competing providers for some time, the most recent figures show that many rural areas are also gaining broadband access – often through the use of new technologies such as satellite or 3G mobile wireless. The FCC report was as of mid-year 2005, and thus lacked some of the most recent service quality and availability improvements. Nevertheless the report shows that nearly 98 percent of urban areas[19] have access to at least four service providers, while 44 percent of less populated areas are served by this many providers. The drop off in competition density is likely due to the lack of cable television franchises in more rural parts of the country. This disparity will likely be reduced over the next few years as more areas gain access to service such as 3G mobile wireless internet or WiFi and WiMAX wireless broadband.

Table 2
Number of Broadband Services by Area

Zips	No Service	1 - 3	4 - 7	Over 8	Total
Non Rural	0.0%	2.1%	26.3%	71.6%	100.0%
Rural	2.4%	53.4%	38.6%	5.6%	100.0%
Total	1.7%	37.7%	34.8%	25.8%	100.0%

Satellite Broadband:

There are two major satellite broadband providers offering service to residential customers - HughesNet, and WildBlue. AT&T announced that it will rely on WildBlue for broadband service in hard to reach areas in 13 states within its footprint. DirecTV and Echostar each announced that they would henceforth rely on WildBlue to supply broadband services for their satellite TV subscribers.[20] Still, satellite broadband is not available to 100 percent of homes. There are technical reasons that satellite service is unavailable in some ZIP Code areas, such as lack of a local installer arrangement, blocking of the line of sight to the satellite that occurs in some "concrete canyons" or valleys, and geographic distance from the continental United States. Currently satellite broadband service from HughesNet has 275,000 subscribers and is priced at about $59.99 per month.[21] The FCC reported 377,291 satellite broadband subscribers at mid-year 2005.[22] The subscriber count for WildBlue is not stated, but the broadband service is priced as low as $49.95 per month[23] and its agreements with AT&T, Echostar and DirecTV should help it gain subscribers. Both WildBlue and HughesNet offer download speeds in the 500Kbps to 1.5Mbps range.

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19 In this case urban areas are those ZIP Codes with populations above the average (9,725 persons).

20 *EchoStar, DirecTV Enter Separate Rural Web Deals,* WSJ.com, June 10, 2006, Page A5. According to the article, "Even though DirecTV and EchoStar together have more than 27 million subscribers, they have concluded it is too complicated and expensive to provide broadband service using their own satellites"

21 McCarthy, Ellen, *Hughes Satellite Looking at Rural Internet*, Washington Post, March 27, 2006. Available on-line at: https://freepress.net/news/14643

22 op. cit, *High-Speed Services for Internet Access: Status as of June 30, 2005,* Table 1.

23 See pricing on HughesNet website www.hns.com. Note that the monthly price does not take into account substantial start up costs, including installation charges of $199.99 and $399.99 in equipment charges. In this analysis we added them in for an average monthly cost of $119.96.

Mobile Wireless Broadband:

Since it was introduced in the United States in 2003, 3G mobile wireless broadband has spread to nearly 200 metropolitan areas throughout the country. According to the website *3G Today*, there are now eight providers of 3G service in the United States. Verizon and Sprint each say their 3G broadband service is available to a population of 150 million in the U.S. Cingular will provide its BroadbandConnect service in most U.S. major markets by the end of 2006.[24] Cingular, Verizon, and Sprint each cite an average download speed of 400Kbps to 700Kbps. Each prices its service at about $60 per month. Worldwide, over 273 million customers subscribe to 3G mobile wireless service.[25] 3G mobile service also provides for TV, music, video, and location-based applications as well as conventional Internet access.

WiFi Broadband:

There are over 80,000 WiFi hotspots in operation[26] with more areas being made WiFi-accessible every day. The WiFi Internet Service Provider directory[27] on *WiFi411* lists 366 WiFi service providers. One of the larger providers, T-Mobile, offers unlimited WiFi service in any of its 6,978 T-Mobile HotSpot locations in the U.S. for a monthly fee of $29.99.[28] In addition, there may be at least 300 cities that have begun offering broadband as a municipal service or in affiliation with a commercial provider.[29] Strategic Analytics estimates that Municipal Broadband services will be available to 6 million households by 2010.[30] But Municipal broadband is just one of the WiFi provider types. Pew Internet & American Life reports the current number of WiFi users is already 6 million adults.[31]

One popular WiFi service locator, jWire provides locator maps for some of the WiFi hot spots associated with ZIP Codes or place names.[32] jWire lists the connection charges or whether service is free for each HotSpot. Appendix II, presents WiFi sample locator maps for parts of large cities (Washington DC and New York City), for small cities (Topeka Kansas, and Greer South Carolina), and for Pahrump Nevada, a small town in the desert.

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24 See *Laptop Connect, at* www.cingular.com/midtolarge/laptop_connect. According to Cingular, the company will deploy BroadbandConnect in 15 to 20 markets in 2005, and will expand availability in most major markets by the end of 2006

25 See: www.3gtoday.com.

26 Carlton, Jim, *Secrets of the Tech-Savvy Traveler*, Wall Street Journal - Eastern Edition; , Vol. 247 Issue 77, April 3, 2006, pR1.

27 See: www.wifi411.com/networks/index.php

28 See: https://selfcare.hotspot.t-mobile.com

29 See: *Wi-fi and the Cities*, The New York Times, editorial for June 6, 2006. Available on-line at: www.nytimes.com/2006/06/06/opinion/06tue3.html

30 Gonsalves, Antone, *Public Broadband An Unlikely Threat To Commercial Offerings, Researcher Says*, TechWeb.com, June 12, 2006. On-line at: http://news.yahoo.com/s/cmp/20060613/tc_cmp/189400458

31 op, cit. *Home Broadband Adoption 2006*, "Fixed wireless as a means to go online at a high-speed at home is starting to have a presence in the market; 8 percent of home high-speed users, or about 6 million American adults, have wireless broadband connections."

32 See: www.jiwire.com/

WiMAX and Broadband over Power Lines:

In the next few years, WiMAX, a fixed wireless broadband service that reaches further than WiFi is expected to become very popular. The market research firm In-Stat estimates that WiMAX will gain between 4.1 million (conservative) and 16.0 million (aggressive) subscribers by 2010. [33] Even at the midpoint, 10 million subscribers, WiMAX will be a substantial competitor that has yet to enter the market.

Beyond the wireless services, providers of broadband over power lines (BPL) are working out the kinks in their platforms and may soon be adding to consumer choices. One of the first markets where BPL was offered was Manassas, Virginia. BPL was offered to more than 10,000 electric power costumers for a monthly charge of $28.95. Duke Power in North Carolina deployed another early BPL network,[34] and another 30 electric utilities were studying deployment. In fact, some of the major players in the internet communications arena, including Google, are investing in this technology.[35]

This new technology could be just the beginning of offerings by a wide range of different types of network providers including television and radio broadcasters, water and natural gas transmission companies, even gasoline service stations, all of which have a broad network reach that can easily serve and connect to millions of customers nationwide.

Broadband over Fiber Optics:

There is often fiber optics in the local loops of Cable TV and Telephone companies that reach out toward customer premises. There are far fewer instances where the fiber optics is pushed all the way to the consumers' premises. That use of fiber optics is usually called fiber to the premises or FTTP. FTTP can support speeds far higher than are typical for other broadband platforms, e.g. 30 Mbps or higher. Render Vanderslice & Associates reported that 2.7 million homes were passed by fiber to the premises (i.e. fiber is available to them) as of September 2005. This figure is no doubt low for today, as Verizon alone had passed 3 million homes with Fiber by the end of 2005 and intends to pass an additional 3 million in 2006. Fiber optics is not the low price option for Internet access, but it seems to be priced competitively with high end cable broadband. For example, in early 2006, Verizon was offering FiOS data (5 Mbps download, 2 Mbps upload) for $34.95 per month. The cable competitors were offering their closest speed-match (premium products) for: $30 in Herndon VA (Cox); $29.99 in Keller TX (Charter); and $36.33 in Temple Terrace FL (Brighthouse). The cable prices were lower than they advertised elsewhere by $8 to $10 per month.[36]

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[33] Lundgren, Kent and Norm Bogen, *WiMAX: Challenging the Status Quo*, In-Stat, Scottsdale, Arizona, December 2005, page 42.

[34] Reardon, Marguerite, *Broadband's power-line push*, CNET News.com, July 11, 2005

[35] Ibid.

[36] Barden, David, et. al., *Battle For The Bundle: Consumer Wireline Services Pricing Industry Pricing Environment Shows Signs Of Moderating in 4Q05*, Bank of America Equity Research Report, January 23, 2006, page 10

Broadband Pricing:

Along with wider availability, Cable, DSL, and wireless technologies are increasing service speeds and features available to the market. Rivalry among the providers helps keep down average prices and the practice of offering service at a uniform price across a provider's service area (footprint-pricing) keeps prices lower in fringe areas where costs incurred might otherwise merit higher prices. The practice of combining voice, data and entertainment into a discounted bundle puts further downward pressure on the costs consumers bear. According to a recent Bank of America equity research report, the average advertised, entry-level bundle (local and long distance voice service plus internet access) in the fourth quarter of 2005 was priced at $101 for the telephone companies versus $120 for cable. Prices for the telephone companies' bundles were down by 7 percent for the year, while cable pricing was mostly flat.[37]

In order to better understand the price of basic broadband service (outside of bundles) to consumers, GuerrillaEconomics, LLC constructed a dataset containing the number of broadband providers (by ZIP Code), and the prices charged by those cable, telephone (includes DSL but not 3G mobile wireless), and satellite companies serving a sample of ZIP Codes.[38] The data set used in this analysis was constructed by examining individual phone numbers and addresses in ZIP Codes throughout the country.[39] Prices were obtained for a sub-sample of the ZIP Codes reported to have between 1 and 3 providers,[40] 4 and 8 providers, or 9 and more providers.[41]

We explored several methods to obtain prices and found that the data from the cable broadband providers was easier to access than that for telephone broadband. Eventually we settled on using pricing comparison services (such as *BroadBandBuyer.com*) to generate sample prices.[42] We used the lowest available broadband service price from each broadband provider,[43] provided that if it was a "special price" the price would be in effect for a period of *at least* 6 months. Short duration specials (say first 3 months for $9.95) were excluded from the analysis.

The analysis focused on the lowest available price. Higher prices are usually charged for faster speeds. Recent broadband price levels and wide availability of broadband service means that broadband competes directly with dial-up internet access in many cases. This rivalry is particularly relevant to dialup and users who are new to the Internet. Many existing broadband subscribers are likely happy with their current service and may prefer to avoid the disruption of changing email accounts or service providers, and are thus likely to be reluctant change

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37 Ibid.

38 3G mobile wireless service was not included as it is only available in a limited number of areas and the service "footprint" does not mesh well with ZIP Codes. In addition, 3G mobile wireless tends to be slightly more expensive than basic DSL.

39 Phone numbers and addresses were generated by "Googling" the State and Zip combination.

40 The minimum reported by the FCC.

41 In order to develop a model of broadband pricing across the country, GuerrillaEconomics, LLC selected a random sample (Confidence Interval 95%), of ZIP Codes with 3 or fewer providers, 4 to 8 providers or over 8 providers. The sample was checked to ensure that a range of urban to rural areas were represented and to ensure that each state was included. From this sample a sub-sample of 379 ZIP Codes were selected (with replacement) to be analyzed. If prices for at least one provider (other than a satellite provider) could not be found for a given zip, an alternate ZIP Code was selected.

42 http://partner.getconnected.com/123/v_internet/i_common_geography.asp

43 In other words we did not differentiate by service quality or speed, but simply selected the lowest monthly price available for each provider.

providers merely to take advantage of a “special offer.” In contrast, customers new to broadband service will be either converting from slower dial-up connections, or living in areas just now receiving broadband service, or they may be new to the Internet.

Table 3
Summary Statistics

	Cable	Telephone	Satellite	All
Zip Codes	334	109	379	379
Average Price	$ 28.63	$ 19.23	$ 49.95	$ 24.92
Average Number of Providers	8.446	7.624	8.140	8.140
Lowest Price	$ 9.95	$ 12.95	$ 49.95	$ 9.95

The summary results of the pricing survey are shown above in Table 3. The lowest price is at a level typical for economical dial up Internet services. There was not a great deal of variation in price across ZIP Codes, with access to the lowest priced carrier (indifferent to service quality or speed) ranging from a low of $9.95 per month to a high of $49.95. In fact, the availability of satellite service from AT&T at under $50 per month placed a cap on the lowest priced service. We were able to generate pricing information for at least one cable operator in 334 ZIP Codes, at least one telecommunications operator in 109 ZIP Codes, and for the two major satellite providers throughout the country. The average lowest priced service from cable providers was $28.63 per month, from telephone companies $19.23 per month, and from satellite operators $49.95 per month. Overall the average price for broadband service was $24.92 per month.

In fact, as shown in the table, average entry level pricing for basic broadband service is approaching that charged by the major dial-up Internet access companies. This is likely one more reason that dial-up service is on the decline.

Although the number of providers was smaller in more rural areas, the price of the lowest cost broadband service was lower. This is partly explained by the lack of cable broadband service in many of the more rural areas; however, nationwide broadband pricing plans by major telephone companies seems to be keeping prices down in rural areas. (See table 4 below)

Table 4
Rural vs. Non-Rural Pricing

	Percent of Total Sample Zips				
	Under $20	$20 - $29.99	$30 - $39.99	$40-$49.99	Average Monthly Price
Non Rural	43.6%	45.6%	5.9%	4.9%	$ 24.34
Rural	32.6%	49.1%	10.3%	8.0%	$ 22.25

Since most broadband service is provided by cable or telephone companies, most households actually pay less than the averages reported above. According to the FCC, in mid-2005, about 40 percent of the broadband connections in the country are provided via DSL - either ADSL (asynchronous) or SDSL (synchronous). About 56 percent of service is provided through cable modems, and about 1 percent via satellite. In addition, 2 percent of service is provided via direct fiber connections or T-1 and other connections including 3G wireless connections.[44] Data for T-1 is not included in this analysis as it is a much more expensive broadband alternative and is mostly used in workplaces and institutions. Internet access via 3G mobile wireless is available to about one-half of the total US population, but it was not included in the pricing analysis. It is highly valued by people who need mobile Internet access, but its price (typically $60 per month) is unlikely to be the lowest price available in a ZIP Code. Therefore, based on weights of 41 percent for DSL service, 58 percent for cable modem, and about 1 percent for satellite connections, a customer signing up for the lowest price broadband service would spend approximately $25.00 per month. Table 5 below presents these calculations.

Table 5
Broadband Connections by Type

Type	Total Lines	Percent	Pct. of Price Instances Obtained	Average Lowest Price	Weighted Average Minimum Pricing
DSL	17,087,724	39.9%	41.3%	$ 19.23	
Cable	23,938,908	55.8%	57.8%	$ 28.63	
Satellite	377,291	0.9%	0.9%	$ 49.95	
Fiber	864,831	2.0%			
Wireless	592,842	1.4%			
Other	4,872	0.0%			
Total	42,866,468				$ 24.94

Price and its Relationship to Number of Providers:

Further analysis of the price data shows that, as expected, there is a negative relationship between price and the number of providers.[45] In other words, as the number of providers rises, the lowest available monthly price falls. However, this effect is weak.[46] The practice of state-wide or footprint-wide pricing by providers can explain some of the sluggishness in price response to additional broadband competitors.

Table 6 on the following page shows how the minimum monthly price for broadband service reacts to the number of providers. The chart shows that as the number of providers rises, minimum prices tend to fall, however, there is a bump upward in those ZIP Codes with the most providers. This is associated with ZIP Codes are located in the most densely populated urban areas in the country (the ZIP Code with the most providers nationwide is located in midtown Manhattan), which are often subject to higher costs of doing business than those in more rural and suburban areas.

44 Like that available from Verizon Wireless for $59.95 per month in specific service areas. According to Verizon Wireless, wireless broadband is currently available in 181 major metropolitan areas covering over 148 million people, and is expanding coast to coast.

45 Each satellite provider's monthly recurring pricing is flat across the nationwide service area.

46 In fact, the R-squared statistic, which measures the percentage of price variation accounted for by the number of providers, is below 3 percent

Table 6
Minimum Prices By Number of Providers

Minimum Price	1 - 3	4 - 7	8 - 14	15+
Under $20	34.0%	40.0%	44.5%	33.3%
$20.00 - $29.99	46.8%	51.2%	51.4%	54.5%
$30.00 - $39.99	19.1%	8.8%	4.1%	12.1%
$40 and over	10.6%	10.4%	3.4%	3.0%

Beyond the competitor count, there are price-influencing factors outside of the control of the service providers, such as infrastructure costs, tax rates and fees charged by various governments and demographic factors that will lead to some of the variability across states and regions.

The FCC suggests that areas with higher population density are positively associated with a propensity toward high-speed broadband usage, and low population density has an inverse association. High median household income also has a positive association with reports that high-speed subscribers are present.[47] Those with higher income may prefer faster connections than supported under the lowest price broadband options. In some cases convenience (e.g. 3G wireless broadband) or transmission symmetry (i.e. Symmetrical DSL instead of Asymmetrical DSL), or special content (e.g. broadband access to AOL's rich content) may weigh heavily in some customers' selection of a broadband vendor.

Broadband Prices and Competitor Counts Over Time:

Under a footprint-wide price strategy, a provider is unlikely to adjust its price as each new competitor enters a ZIP Code. Instead, adjustments in price are more likely to reflect the average competition intensity across the footprint and the administrative and promotional costs of making new prices known. Those price adjustments are therefore more likely seen in time-series data and driven by average competition intensity.

The FCC tabulated the increase in broadband providers by ZIP Code over time.[48] In Table 7 below, the mid-year broadband competitor density is shown.

Table 7
Broadband Competition by ZIP Code, Mid-Year Percentages

Pct. of ZIP Codes With	2000	2001	2002	2003	2004	2005
2 or Fewer Providers	76.7	59.2	50.7	42.3	36.3	25.4
3 Providers	9.2	13.2	13.3	14.0	14.9	15.0
4 - 7 Providers	12.5	19.5	24.3	27.6	30.5	34.4
8 or more Providers	1.6	8.0	11.6	16.1	18.2	25.3

Graphically, the increase in competition intensity is even more dramatic as shown in Figure 1 on the following page.[49] By mid-2005, the norm had become 4 or more broadband competitors in a ZIP Code. This is reflective of the development of almost any new technology. For example,

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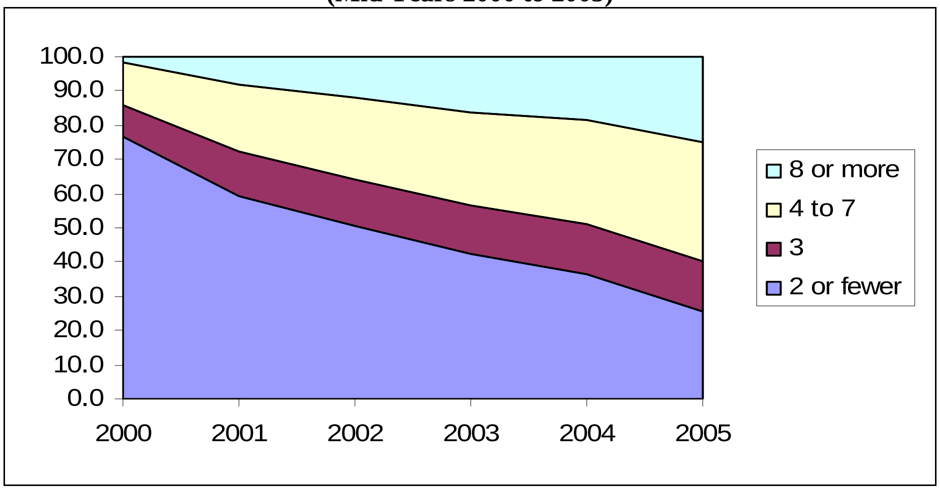
47 Op cit. *High-Speed Services for Internet Access*

48 op, cit. *High-Speed Services for Internet Access*, Table 15.

49 Ibid.

even though telephone service existed in 1877, by 1937, 50 years later, there was only about 1/6th of a telephone per person in the US.[50]

Figure 1
Percentage of ZIP Codes with Multiple Broadband Providers
(Mid Years 2000 to 2005)



Access to reasonably priced broadband internet service is advancing much faster. In 2000, broadband was either non-existent or available from just one provider in 59 percent of ZIP Codes. That limited-choice condition persisted for 43 percent, 34 percent and 25 percent of ZIP Codes over the 2001 to 2003 period. By mid 2005 just 11.3 percent of ZIP Codes had zero or one broadband providers. When a broadband provider faced no competition, pricing was likely constrained only by the customers' willingness to pay and the specter that excessively high pricing would induce a competitor to enter that broadband market. Early on, cable broadband had a big coverage lead over telephone DSL. But DSL's geographic coverage approached par, and the overlap of cable and DSL footprints became substantial in the 2003-2004 period.

As the number of broadband rivals increases in a service footprint, the competitive reaction has been both differentiation in quality (e.g. speed, reliability, security), and in pricing of the several broadband services a provider offers. The pricing trends are shown in an analysis by JP Morgan.[51] Note that these figures are higher than those presented in this analysis as they represent average prices from a financial model of the industry and this paper examines the lowest cost of entry.

Table 8 on the following page, presents JP Morgan's estimates which show a steady decline in average price for the many grades of broadband within DSL, within Cable broadband and within the other broadband competitors. JP Morgan notes; "There are two drivers of share shift between cable broadband and DSL in our view. First, DSL should continue to increase its addressable footprint, narrowing the gap with cable. Second, DSL should continue to increase its

[50] *Statistical Abstract of the United States: 1940*, Table 432. On-line at: ww2.census.gov/prod2/statcomp/documents/1940-01.pdf

[51] Chaplin, Johnathon, et. al., *Telecom Services / Wireline State of the Industry: Consumer*, JP Morgan North America Equity Research, January 13, 2006

share of net adds in the overlapping footprint by cutting price and improving speed and service"[52]

Table 8
Expected Average Revenue per Subscriber
from Different Broadband Technologies[53]

Service	2004	2005	2006	2007	2008	2009	2010
DSL	$ 41.71	$38.64	$ 35.50	$ 33.50	$ 31.80	$ 30.15	$ 28.64
Cable broadband	$ 40.56	$40.09	$ 39.39	$ 37.92	$ 36.27	$ 34.68	$ 33.26
Other broadband	$ 59.57	$55.78	$ 50.14	$ 45.03	$ 40.46	$ 36.37	$ 32.72

Conclusions:

Based on data from the FCC, broadband service is widely available throughout the United States. There are multiple competing providers and multiple competing technologies in most geographic areas. Satellite broadband service may become available to most of the country and most urban or suburban areas are served by cable broadband, 3G mobile wireless, and telephone DSL services.

Based on our analysis, the introduction of telephone broadband into specific geographies appears to put downward pressure on prices; however, the difference in the total number of providers does not explain much of the variability in broadband prices across areas. We anticipate that continuing price and speed rivalry is likely between telephone and cable broadband providers, and competition is likely to become more intense as new fixed- and mobile-wireless platforms, fiber optics, and broadband over power lines beginning to compete with today's broadband providers.

Overall, as competition intensity increased over time, prices declined. The outlook is for continuing price decreases in average price with average prices of cable, telecom, and emerging broadband technologies tightly clustering at levels well below today's average broadband prices.

Given the overall proliferation of Internet broadband providers, and the strongly down-trending minimum average prices, we can only conclude that Internet broadband competition is both relatively strong and increasing. In that context, the prospect for discrimination by powerful market leaders is currently and increasingly remote, removing one argument for Network Neutrality-style regulation of Internet broadband service.

Further pricing data collection could further document how individual providers react to competitors' market entry, and might point the way toward a better proxy for and analysis of broadband competition in individual markets. However, this initial analysis reveals a strong

52 Ibid.

53 The Other category includes; satellite, 3G mobile wireless broadband, fiber-optics, WiFi, and soon WiMAX and Broadband over power lines. These new technology-based entrants are likely to increase the intensity of competition substantially. By 2010, JP Morgan forecasts all of the different technologies' average revenue per user clustered near the $30 mark.

trend in consumer choice in broadband options available to American consumers in the high-speed Internet market.

Appendix I
Regression Equations Examining Price and Other Factors

Based on simple regression analysis, the lowest price for broadband internet service is estimated to fall by about 4-cents per month for each additional provider that enters the market. Cable broadband provider prices fall by 42-cents per month for each additional competitor in the market, and telephone broadband prices (starting from a lower average level) fall by about 22-cents per month.[54]

In order to better understand how broadband service prices are influenced by changes in the number of providers, we developed a more sophisticated regression analysis that controlled for a number of economic and demographic variables across the sampled ZIP Codes. While this analysis produced a result that was statistically significant (with an F-statistic of 17.187), it explained only a quarter of the variation in prices. The standardized national pricing or footprint-wide pricing of large providers will dampen price variations, and do so most dramatically when only a small number of providers are present. It is also possible that price observations from too few smaller providers were obtained. Further research is necessary to test to see if this were the case.

Even so, once some basic economic and demographic factors are controlled for, the impact of competition within the broadband sector begins to appear in the equations.

The basic equation tested was as follows:

$LP = C + a_1Population + a2Professional + a_3Age + a_4EmpPct + a_5Services + a_6I + a_7Phone + a_8Cable$

Where the variables are defined as:

- **Population** is the total population living within the ZIP Code boundaries as of the 2000 Census.[55] We expect that service price would fall in more densely populated ZIP Codes.
- **Professional** is the number of persons employed in managerial and professional occupations within the ZIP Code boundaries. This is assumed to be an indicator of whether the ZIP Code is located within a central business district and therefore more likely to have a wide range of available broadband services and therefore the lower the price
- **Age** is the median age of the population. We expect that younger people will demand more broadband options; therefore price should fall along with median age.
- **EmpPct** is equal to the percentage of the population that is employed. We expect that areas with larger employed populations would have more access to broadband options and likely lower service prices.
- **Services** is the number of broadband service providers operating within the ZIP Code as per the FCC. We expect the sign on this coefficient to be negative reflecting cheaper prices in areas with more service providers.
- **I** is equal to median household income. We suspect that prices will increase along with income reflecting higher costs in (for example) New York City.

54 Lowest Available Broadband Price = \$24.1758 – 0.4288(Number of providers)
55 Note that ZIP Code data are provided by Caliper Corporation and are based on the 2000 US Census.

- **Phone** is equal to the annual cost of the lowest cost telephone broadband provider divided by annual income. While this variable is autocorrelated to the dependant variable we included it as a measure of the overall cost of service. We expect a negative coefficient.
- **Cable** is equal to the annual cost of the lowest cost cable broadband provider divided by annual income. While this variable is autocorrelated to the dependant variable we included it as a measure of the overall cost of service. We expect a negative coefficient.

The results of the regression equation are presented on the following page. Interestingly, while the equation itself was statistically significant[56] the only variable that was significant was the number of providers. In other words, while factors such as population or income may be important in setting the overall price level of broadband service nationwide, they do not have a significant impact on variation in prices across areas as small as ZIP Codes.[57] In addition, many of the coefficients appear to have the wrong sign.

Most importantly for this analysis, overall prices for broadband service appear to fall by about 47-cents for each additional provider in the marketplace. This is equal to just under 1.89 percent of the average lowest price. Considering that most prices are set on a nationwide basis, this is a fairly significant finding.

In addition, the analysis shows that telephone companies account for a large part of the decrease. In other words, DSL prices fall faster as the number of competitors rises. This is understandable since satellite companies have nationwide (relatively high) prices, and cable providers have monopolies where they operate. In fact, as the percentage of DSL prices rise relative to income, the lowest price for broadband service falls – suggesting that telephone companies provide lower priced service in lower income areas. The opposite is true for cable companies (their broadband service is more expensive in low income areas).

Table 7
Regression Results

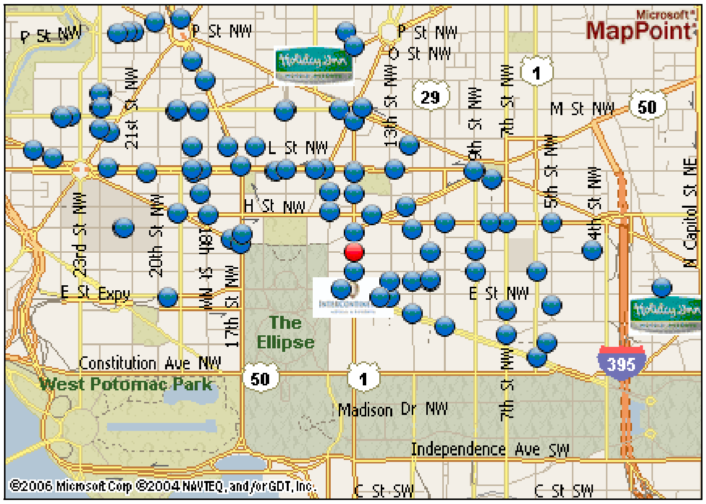
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	14.32415	4.56016	3.14115	0.00182
population	(0.00000)	0.00006	(0.05303)	0.95774
professional	0.00035	0.00032	1.08366	0.27922
age	0.10950	0.08515	1.28594	0.19927
emp pct	7.77324	6.00928	1.29354	0.19663
Services *	(0.47150)	0.12693	(3.71469)	0.00023
med fam inc	0.00002	0.00002	0.79139	0.42922
phone pct inc *	(463.68287)	164.33831	(2.82151)	0.00504
cable pct inc *	838.84333	91.21985	9.19584	0.00000

56 F-Statistic value 17.187

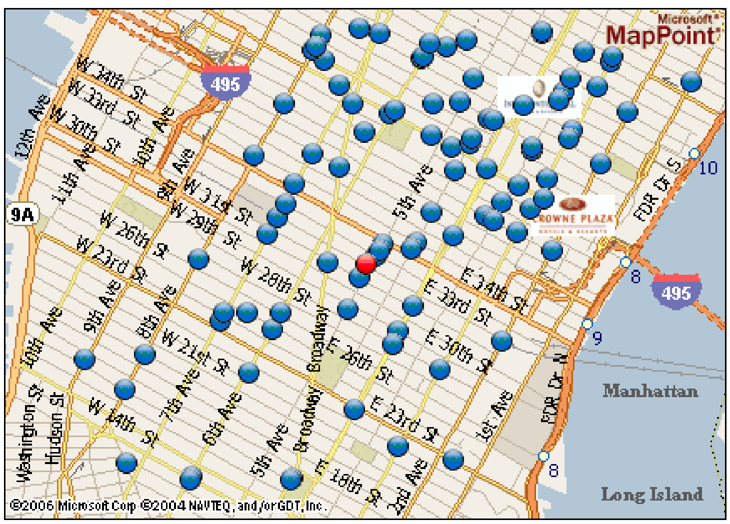
57 This is likely because most of the major companies have statewide or national pricing across their entire service area.

Appendix II
Sample WiFi Location Maps

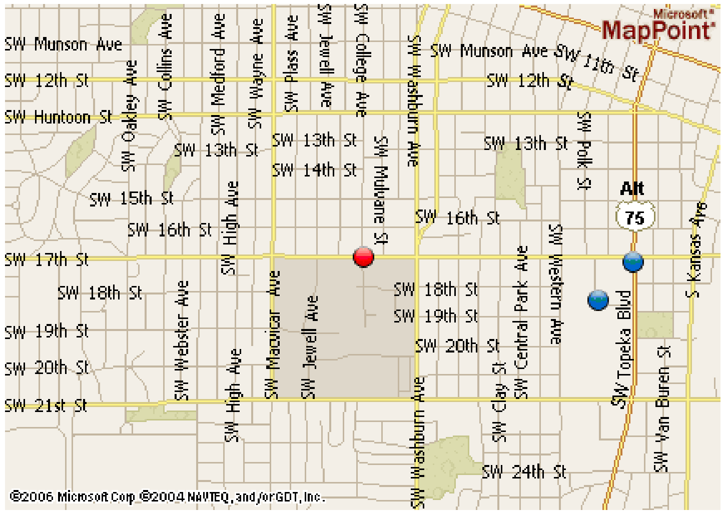
WiFi Hot Spots listed in jWire.com for ZIP Code 2005, central NW Washington DC



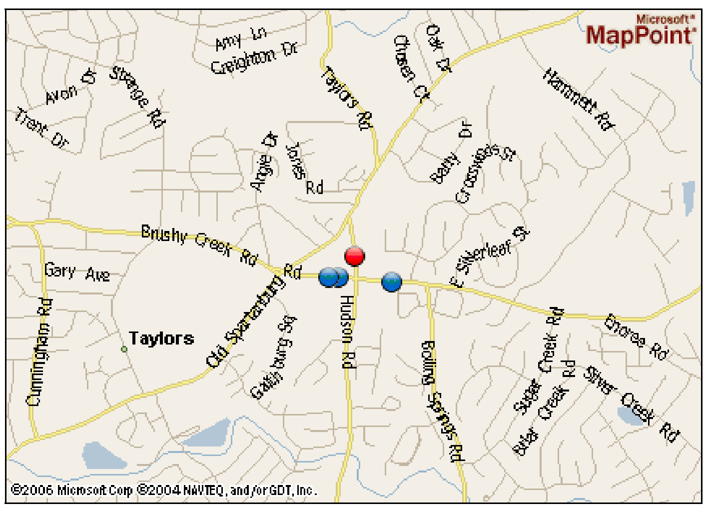
WiFi Hot Spots listed in jWire.com for ZIP Code 11201, New York



WiFi Hot Spots listed in jWire.com for Topeka Kansas (Pop. 122,400)



WiFi Hotspots listed in jWire.com for Greer, SC (Pop. 16,800)



WiFi Hot Spots listed in jWire.com for Pahrump NV (Pop. 24,631)