

The Reality of Competition in the Broadband Market

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The debate over “net neutrality” will determine the future of the Internet. Definitions of “net neutrality” differ -- different proponents see different dangers. Some believe broadband providers (primarily cable television companies and the telcos providers of DSL or fiber optic connections) will offer Internet website content providers different levels of speed and reliability, creating a “premium” Internet for those websites willing to pay for it, and second-class treatment for others. (Internet *users*, of course, can pick whatever level of service they desire by picking among the offerings of different access providers – this debate is not about their access.) Another concern is that broadband providers will allow some sites or content “exclusivity” on their system – for example, allowing one on-line music vendor the exclusive right to sell their service over the provider’s network (or, in an extreme version, that the broadband provider will only allow their *own* content on their system, much as AOL did at its inception).

All of these concerns are speculative, and examples of these dangers are hard to find today. But most importantly, all of them rest on a central proposition – that the broadband market is uncompetitive. Critics claim it is dominated by a “duopoly” of cable television companies and regional telephony companies that do not compete with each other, and that the state of competition in the broadband industry will get *worse*, not better, as time goes on. This is important because a competitive market would inevitably lead all of the “neutrality” concerns towards a resolution that serves consumers – whether it be the question of exclusive content, diverse types of service, or whatever else.

Thus, the question of the degree of competitiveness in the market for connectivity underlies the current debate over “net neutrality.” In this paper, we argue that the broadband

market is very competitive, with many different companies providing customers with many different approaches and technologies, and with many more on the way. And the evidence substantiating this view stands in contrast to the tenuous assumption that telephone and cable companies are a duopoly that restrains competition and innovation. Faced with the same contrast, the Federal Trade Commission summarized the matter best in a recent report, when it said: “*Policy makers should be wary of calls for network neutrality regulation simply because we do not know what the net effects of potential conduct by broadband providers will be on consumers.*”¹

Dimensions of Competition

The fact that telephony and cable television companies are large doesn't mean they cannot act competitively. Instead, they can be judged on their behavior in the market. We expect competition to restrain prices while providing a diverse range of products that meet a broad range of consumer needs, to lead to faster growing output, and to induce faster innovation. All of these should be examined in order to make a judgment regarding the state of competition in the market for connectivity.

Price, Quality, and Output. We expect competitive markets to deliver ever-improving value. That means measuring both prices and quality, in order to have some constant measure of what is being sold. A ton of steel is a ton of steel and a box of cereal is a box of cereal – it's easy to measure by how much their prices are falling. But other goods change dramatically over time. For example, a computer today and a computer ten years ago may both cost \$1,000, but today's computer is much better, meaning that its *effective* price is constantly falling – it's as if the same amount of money that used to buy hamburger now buys steak.

So the “price” of an internet connection has to be seen in the context of the speed and reliability of that connection; the price of “connectivity” and the quality of the connectivity offered must be considered side by side. For example, the average speeds offered to residential customers have grown rapidly in the last decade, and particularly in the last few years.

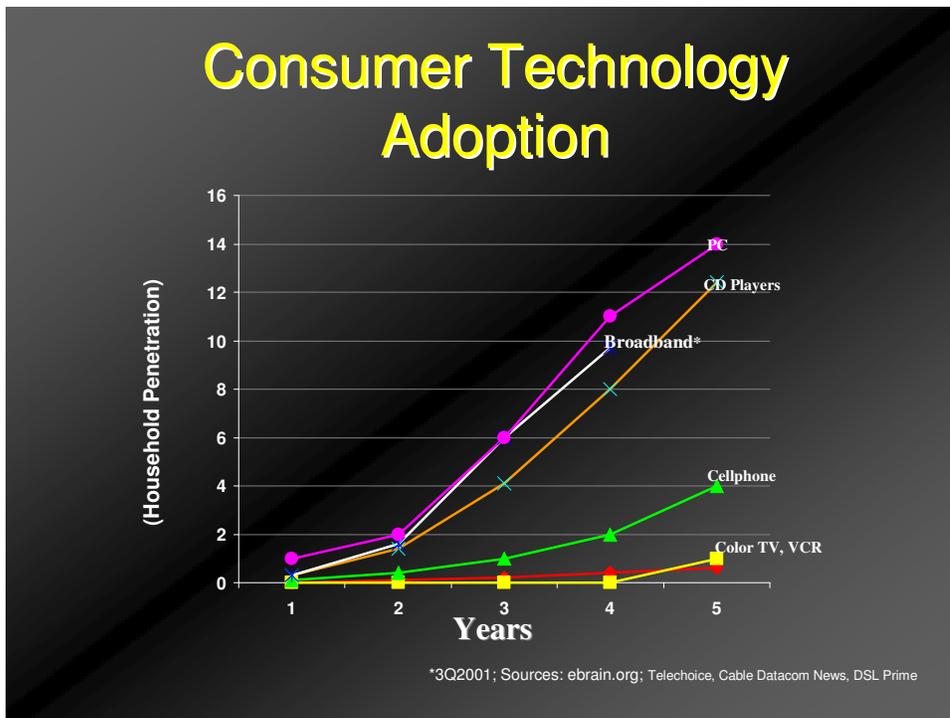
Consider, for example, the high-end speed of the connections found in the market over the past two decades. When these advances in speed are considered, the price of conductivity has declined substantially.

1981	Hayes Modem	- 300 kbps
1983	Hayes Modem	- 1200 kbps
1985	Watson Modem	- 2400 kbps
1991	U. S. Robotics	- 14,400 kbps
1994	U. S. Robotics	- 28,800 kbps
1995	U. S. Robotics	- 56,000 kbps
1995	ISDN	- 112,000 kbps
1996	Early Cable Modem	- 1.5 mbps
1997	Early ADSL	- 768 kbps/1.5 mbps
2003/4	Cable Modem Upgrades	- 3 - 6 mbps
2004/5	Cable Modem Upgrades	- 8 – 16 mbps
2004	FiOS	- 5 - 30 mbps
2007	FiOS	- 50 mbps

- The average cost of a 1 Mbps connection in 2006 was about \$7 per month; the same connection cost more than \$26 per month in 2002, and several years before that, did not generally exist in the commercial market².
- The price of connectivity via cable modem fell by 70 percent from 2003 to 2006³ before any discounts for bundling of other services.
- In other cases, prices have fallen absolutely; the average revenue paid by DSL customers fell from \$45 per month in 2002 to \$31 per month in 2006, a decline of over 30 percent.⁴

The converse of higher prices is reduced growth of output. Market power allows companies to hold output back to enforce higher prices. We would expect, therefore, the penetration of broadband to be slower if its provision was non-competitive. But the growth in connection speeds has been astronomical, in both the long and short term.

In the past few years, consumers have witnessed the greatest absolute progress in speeds, and the growth in speeds has been matched by the growth in connections. According to the FCC, there were 64 million “high speed lines” in the U.S. in June of 2006. Of those, half had been added in the previous two years alone. Of U.S. households with Internet access, broadband users outnumber dial-up users by a ratio of three-to-one, where as dial-up connections outnumbered broadband ones as recently as 2003.⁵ As the following below makes clear, broadband has been introduced into the US market at a rate commensurate with the most rapid penetrations of other innovations⁶. It is on par with the provision of such competitively-supplied products as the personal computer and the compact disc player, and considerably ahead of cell phones, color televisions, and VCRs.



The data, therefore, indicate that the broadband market has grown rapidly while innovating and maintaining price moderation. In reality, all of these phenomena are part of a single competitive dynamic, in which broadband providers have been forced to compete through

pricing and innovation to satisfy the public's desire for faster and more reliable connections. Even the allegedly anti-competitive members of the "duopoly" compete with each other to offer faster connections and to bring them to market at competitive prices. The claim that they are uncompetitive because their products end up similarly priced is outlandish⁷. Virtually *all* competitive products end up selling for the same price – if they didn't consumers would shift their purchases until they did. In fact, competition forces prices to converge – cable operators are already dropping prices, for example, in places where Verizon FIOS has been introduced.⁸ The reality is that those competitive prices represent ever-increasing values over time, as connection speeds increase. Consumers of broadband are now buying steak for the price of hamburger.

Supply Diversity. Neutrality advocates usually refer to a "cable-telco duopoly," meaning that there are only two ways to get broadband access in any one place – either through the phone company or the cable company. But this depiction doesn't square with the emerging reality of a diverse broadband market, and it will be even less relevant in the years ahead.

First, the dominating presence of broadband via cable modem and via DSL over phone company wires is itself only a recent affair. As recently as 2004, over half of all connections in the U.S. were dial-up⁹. The vision of an entrenched cable-telco "duopoly" is a reaction to those two segments' pioneering success in the past several years. And just as the broadband "duopoly" of cable modem and DSL (and now, fiber) challenged and supplanted dial-up connectivity, these new technologies will face their own challenges in the years ahead.

For example, the FCC estimates that technologies other than cable modem, DSL, or Fiber – specifically, satellite and both mobile and fixed wireless – already account for 18.4 percent of

what the agency terms “high-speed lines.”* Even more remarkably, these alternative technologies accounted for 49 percent of the *new* lines created over the year June 2005 to June 2006. Many of these lines are in the commercial, rather than residential sector, but Bernstein Research estimates that these alternative technologies will account for more than ten percent of additional broadband hook-ups in the residential sector by 2008, and almost 16 percent by 2010. And while the definition of “high-speed” used by the FCC is a lenient one – about 200kb/sec – the data illustrate the strong interest in wireless connections in the marketplace; if wireless users are interested in 3G connections at their current speeds (see below), imagine what the demand will be like when their speeds increase. The result may be similar to the manner in which mobile phones have displaced many landlines.

In fact, alternatives to the “cable/telco duopoly” are on the threshold of having an important presence in the U.S. market beyond the 18 percent for which they now account.

- “Third generation” (3G) wireless services already provide download speeds comparable to DSL (600kbps to 1.4 Mbps)¹⁰ and will soon achieve far greater speeds; a 3G service in Australia will soon offer peak network speeds of 14.4 Mbps¹¹.
- WiFi now offers 179,500 hotspots worldwide, with 72 percent in North America and Europe.¹² Many of these are in commercial establishments and hotels, but WiFi “towers” are also being imagined as a solution for access in rural areas. Various municipalities – among them Corpus Christi, Philadelphia, Portland, Oregon, and Ann arbor, Michigan -- are in different stages of providing WiFi access as a public utility.¹³
- Fixed wireless, or WiMax, at a speed of 2-4Mbps, will soon be made available to 100 million customers by Sprint, which has already invested \$3 billion in this project¹⁴.

* The FCC’s definition of these are lines with over 200 kbps in one direction.

Morgan Stanley views WiMax as soon reaching speeds of 10 Mbps and as having “the potential to disrupt both broadband solutions such as cable modems and DSL as well as 3G PC card solutions.”¹⁵

- Broadband over power lines (BPL), uses the electric grid to deliver speeds comparable to WiMax, with the potential to reach 100 Mbps in the next generation of technology; some analysts see it reaching 2.5 million subscribers by 2011¹⁶

Nor do these technologies exist in isolation. According to the FCC, 87 percent of U.S. Zip codes were served by 3 or more broadband providers in June, 2006, up from 58 percent just three years before. Over half of U.S. Zip codes had six or more such providers, with the logical assumption being that these accounted for a disproportionate share of the population, given the role of population density in making many of these technologies less expensive.¹⁷

The Special Nature of Broadband Competition

As discussed earlier, we usually think of competitive markets as having many, smaller firms, like mom-and-pop stores or family farms. Why, then, does the market for connectivity act competitively when there are typically only a limited number of companies that provide connectivity in any one local market?

Part of the reason is simply the need to expand and contest the market in order to introduce products in which companies have made a substantial investment. Part is also the high and rising expectations of consumers for speed and reliability, which creates a continuous stream of opportunities for competitors who offer better prices and services. But an added reason is that broadband, whether through DSL, cable, fiber, or any other means, has very high fixed costs for both the physical network and the underlying programming and engineering when compared to other businesses, and once those fixed costs have been borne, adding new customers allows those

costs to be amortized over a larger base. Fully one-third of the total cost of fiber broadband delivery is depreciation and amortization of capital investments. The pressure of managing fixed costs is true at every level of the network. That is, once a national transmission infrastructure has been set up, the incremental costs of running local loops off that transmission infrastructure are less formidable and additional utilization allows the costs of the network to be spread more widely. A similar situation exists between the local loop that brings service to neighborhoods and the costs of providing services to individual households passed by that loop. And once that connection has been made to the home, the costs of servicing that household are, again, relatively small, as the bandwidth of the service makes remote diagnostics and repair possible.

Given this cost structure, the broadband market is in some ways different from the markets of other important products. Price restraint can support profits by helping providers to amortize their capital costs over the full design capacity of their networks. In the broadband market today, different high fixed-cost systems compete with each other, and each is faced with the problem of amortizing their fixed costs. If a car purchaser decides to buy a Ford instead of a Chrysler, Chrysler can cut back production. But when a broadband customer switches from his cable company to a DSL provider, the cable company can't cut back its broadband "output." So broadband providers must "price to yield," that is, they must price their product to encourage maximum use of their network, which produces a higher level of competition than would otherwise be the case.

International Comparisons

The question of competition often leads to international comparisons of broadband penetration and speed. The tacit question asked is; if the U.S. isn't first among all nations in

broadband hook-ups, then don't we need more competition, presumably through regulation? A recent Washington Post article delved into these issues.¹⁸

The reality, though, is more complex. First, greater population densities in some other nations have allowed broadband to be provided along smaller local loops, which allows for less signal degradation and therefore higher quality and speed. In Japan's case, these copper wire loops are generally newer than those of other countries. Parallel logistical considerations are often found in nations with greater broadband access than that of the U.S.

There are institutional differences as well. Japan's monopoly telephone company, NTT, which is one-third government owned, was directed several years ago to allow other companies to rent space on its loops to competitors at a dramatically low price. This had two effects – it led competitors to take advantage of the government's willingness to let NTT to lose money, and it led NTT to move aggressively into fiber, where it would not face the same regulations and competition. Paradoxically, analysts now fear that after a period of competition in copper-line access to broadband, NTT will once again exert monopoly control over broadband through its fiber system. Or, as the Washington Post article made clear,

“The growing addiction to speed, ironically, is returning near-monopoly power in fiber to NTT, which owns and controls most new fiber lines to homes. Growth of new fiber connections exceeded DSL growth two years ago. Fiber is how all of Japan will soon be connected -- for phones, television and nearly all other services.

“'NTT is becoming dominant again in the fiber broadband kingdom,' (Harumasa) Sato (a professor of telecommunication economics at Konan University in Kobe) said.”

While different regulatory and logistical factors have allowed other countries to obtain a temporary advantage in such measures as top fiber speed available, the U.S., in fact, is ideally situated for the long term. Several different companies on several different platforms –

telephony and cable television – and using several different technologies – among them both land-line and mobile ones -- will all be involved in the competitive provision of broadband for the long-term.

The Competitive Future

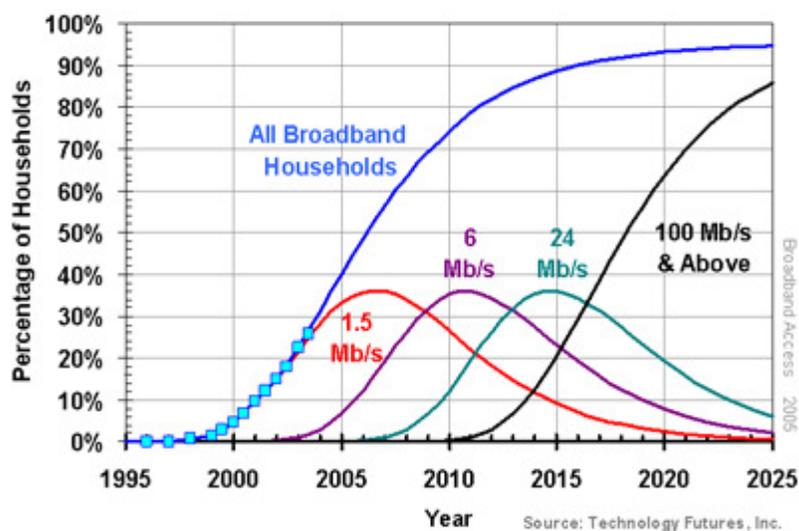
It's worth returning to two points made in the last section, those regarding, first, the prospect of new broadband technologies and, second, the rapid penetration of broadband, and consider what they mean for competition in the future.

The rapid penetration of broadband is significant not just because it demonstrates that there has been significant competition in bringing it to market, but also because it demonstrates that most further gains by broadband providers – including new technologies that seek to “leapfrog” existing broadband technologies – will not be made at the expense of outmoded dial-up service providers, but through competition with other broadband providers. That is because the pool of dial-up providers is quickly drying up.

The “end of dial-up” is very important in understanding the future of competition in broadband. As discussed, a broad range of competitive broadband technologies are emerging in the market. Here is a graph depicting one well-known set of projections, from Technology Futures, Inc.¹⁹ It predicts what connection speeds will be adopted by households in the future, and it estimates that in 2011, as many households will have connections at 6 megabits per second (Mbs) as now have 1.5 Mbs connections, and that as many will have 24 Mbs connections as now have 6 Mbs connections.

It also offers the following comparison. Between now and 2014, about 35 percent of the nation's households will switch to connections with speeds of 24 Mbs. But the percentage of all

households with broadband connections in the U.S. will rise by less than 20 percent. This means that the rest of the market share for the new technologies offering 24 Mbps – 15 percent of all U.S. households -- must come from other, *existing*, broadband customers. In fact, a parallel shift is occurring *right now* in the U.S. market, as a significant number of customers switching to fiber-based broadband are coming from DSL, not dial-up, meaning that speed (quality)-based competition is already underway among the forms of broadband at hand. This competition is now so active that some analysts say that “DSL is on a trajectory to be tomorrow’s dial-up.”²⁰



In short, the rapid saturation of broadband in combination with the emergence of new technologies assures an even *higher* future level of competition, regardless of how one views competition today. This is an important conclusion. The fear that the “cable-telco” duopoly will institute such anti-competitive practices as restricting the flow of content through exclusivity or some form of editorial control *at some point in the future*, because there is little evidence that they have done so or intend to do so. The jury is still out on the most prominent experiment with

“exclusivity” in modern communications – the tie-in between the iPhone and ATT/Cingular – but there are no clear signs of success yet, and the history of “exclusive” content providers, whether the original AOL or the dedicated ESPN mobile phone, has been one of failure. Yet if there were a moment when we would see these abuses from the “duopoly,” it would be now – before new competitors emerge and while dial-up customers are eager to get better connections. In fact, when all of these aspects of the broadband market are considered together, the prospect of a vigorously competitive market arises. Rapid technological progress will make greater speeds possible and new entrants will bring new technologies to the market. As they do, the pool of dial-up (or, more generally, not-broadband) customers will dry up, and these technologies and their providers will have to devote the energy they devoted to winning over dial-up customers to taking customers from each other. And, at the same time, they will all have parallel cost structures – high fixed costs that must be amortized over a large customer base in order to rationalize investments. Or, as this author argued over a decade ago;

“One day, capital intensive, fixed-cost systems will compete in a business defined by market penetration... pressures to price to gain share will be unrelenting... Signal carriers -- be they cables, telcos, Sky TVs, or whatever -- will be forced to innovate continually to cut costs and support their drive for share.”²¹

That world is now at hand. Cable companies and telcos are the first arrivals, but they will be followed by other competitors and technologies that satisfy the very visible desire of consumers for speed and mobility. Making policy on the assertion that the broadband market is both uncompetitive now and portends to be even more so in the future runs contrary to these realities, and risks burdening the Internet at precisely the moment that its full potential is beginning to flower.

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- ¹ FTC, *Broadband Connectivity Competition Policy*, June, 2008, p. 158.
- ² “More Bandwidth Than You Can Use?”, *Business Week*, May 29, 2007
- ³ Scott Cleland, NetCompetition.org, *Why Competition Obviates Net Neutrality*, presented to the Federal Trade Commission Internet Access Task Force, September 26, 2006.
- ⁴ See “Comments of Verizon...”, op. cit., p.4
- ⁵ Organization for Economic Co-operation and Development, “OECD Statistics to December 2006,” April 23, 2007
- ⁶ PowerPoint presentation by Robert Canon, Senior Counsel for Internet issues, FCC Office of Plans and Policy (undated, contact rcanon@fcc.gov)
- ⁷ Cite “New Duopoly” piece.
- ⁸ See “Wireline and Wireless Telecommunications Services,” Bank of America Equity Research, January 23, 2006, p.9
- ⁹ See, “US Cable & Media: The Need For Speed,” Bernstein Research, February 21, 2007, Table 13, p.12.
- ¹⁰ “Comments of Verizon and Verizon Wireless on the Notice of Inquiry,” WC Docket No. 57-02, Federal Communications Commission, June 15, 2007
- ¹¹ See, Telstra Media Release, *Telstra’s Turbo-Charged, Nation-Wide Mobile Broadband Network Goes Live* (Oct. 6, 2006)
- ¹² See “Wifi Market Hotspot Data,” ABIresearch, Oyster Bay, NY, 2007, at <http://www.abiresearch.com/abiprdisplay.jsp?pressid=845>.
- ¹³ Christopher, Swope, “Working Without Wires,” *Governing Magazine*, may, 2007, at <http://www.governing.com/articles/5wifi.htm>
- ¹⁴ See A. Sharma and Don Clark, *Sprint to Spend Up to \$3 Billion To build Network Using WiMax*, Wall Street Journal, August 9, 2006, p. B2.
- ¹⁵ *Cable \$ Telecom: As Broadband Matures, Speeds (and CapEx) Rise*, April 23, 2007
- ¹⁶ Parks Associates, “Growth of Broadband over Power Line to Outpace Cable and DSL,” *Business Wire*, January 18, 2007.
- ¹⁷ Federal Communications Commission, *High-Speed Services For Internet Access: Status as of June 30, 2006*
- ¹⁸ Blaine Harden, “Japan’s Warp-Speed Ride to Internet Future,” *Washington Post*, August 29, 2007, p.A1
- ¹⁹ Lawrence K. Vanston and Ray Hodges., *Transforming the Local Exchange Network: Third edition*, Technology Futures, Inc., Austin, Texas
- ²⁰ Bernstein Research: U.S. Cable and Satellite: The Dumb Pipes Paradox, March 2, 2007, p.17
- ²¹ The Economics Of Signal: What’s Ahead For The Information Superhighway? Remarks of Everett M. Ehrlich, Under Secretary for Economic Affairs, U.S. Department of Commerce, before the Computer and Communications Industry Association, Chicago, Illinois, September 14, 1994