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net neutrality issue

Network Neutrality: The Debate Evolves

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The network neutrality debate burst on political scene in late 2005-early 2006, centered on alleged incentives by broadband ISPs to act as Internet "gatekeepers," disadvantaging certain Internet applications toward anticompetitive ends. The debate is a continuation of an earlier debate on "open access" and was spurred by two high-profile events that appeared to presage such anticompetitive behavior.[1] Self-styled defenders of the Internet joined forces with interested parties such as Google, Yahoo! and Microsoft to demand legislation protecting the "neutrality" of the Internet, to ensure that broadband ISPs could in no way control the bits that passed between end-customers and application providers. Predictably, the broadband ISPs objected to any legislation, stating they had no intention of keeping their customers from the content they desired.

In the heat of this debate, exactly what net neutrality is has been subject to change as the debate has evolved. In this paper, I identify what appear to be the three major components of the net neutrality argument and analyze each in turn. Only one component (vertical foreclosure) of the net neutrality argument raises valid concerns; I discuss whether those concerns are best dealt with by *ex ante* laws or *ex post* enforcement of existing law/regulation. The paper closes with a discussion of how vertical foreclosure issues may become more serious with the advent of IPTV.

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[1] See *infra,* n.

Introduction

To understand the current intense debate regarding network neutrality, some historical perspective on the idea and its intellectual predecessors is relevant. Network neutrality is the latest instantiation of a policy position on the Internet called the "end-to-end" principle. Very briefly, the end-to-end principle was an Internet design standard in which the Internet itself was designed as a collection of "dumb" pipes that would carry any bits across the network regardless of the application they represented; the intelligence to encode and decode those bits into the relevant applications (such as e-mail) resided at the "ends" of the network (i.e., the users) and not inside the network (i.e., the network owners). Users could use any device and run any application they wished; as long as they conformed to the Internet protocols, their devices and applications would work, without requiring anyone's permission. This was in sharp contrast with the telephone network, in which the network owner controlled both the devices (telephone company telephones and switches) and applications (primarily voice traffic).

The lore of the Internet is that the end-to-end principle engendered the enormous wave of creativity associated with the Internet. Since anyone could innovate and immediately deploy their innovation over the Internet, barriers to entry for new firms were low and innovation flowered. Witness, say proponents, just how much innovation permeates the free and open Internet. A famous proponent[2] expressed it thus:

> "…as scholars and network theorists have extensively documented, the innovation and explosive growth of the Internet is directly linked to its particular architectural design. It was in large part because the network respected [the] 'end-to-end' principle that the explosive growth of the Internet happened."

While the proposition may be true, we have been unable to find any empirically-based peer-reviewed literature supporting this proposition. Lessig mentions several sources,[3] all which provide argumentation but none of which provide an evidentiary basis for this claim. In fact, some social scientists dispute this finding.[4] At least one of the scholars (David Clark) credited with articulating the end-to-end principle has suggested that the demands on today's Internet require a relaxation of the original principle to accommodate this new reality.[5] And experience suggests that other fields, such as biotechnology and wireless telephony, have seen enormous innovation over the past two decades without

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[2] Lawrence Lessig, 2006. TESTIMONY ON NETWORK NEUTRALITY before the Senate Committee on Commerce, Science and Transportation, Feb. 7, at <http://www.lessig.org/blog/archives/Lessig_Testimony_2.pdf>

[3] Lessig, *op. cit.* n. 4.

[4] See, for example, Christian Sandvig, (forthcoming). SHAPING INFRASTRUCTURE AND INNOVATION ON THE INTERNET: THE END-TO-END NETWORK THAT ISN'T. In D. Guston & D. Sarewitz (eds.), *Shaping Science and Technology Policy: The Next Generation of Research.* Madison: University of Wisconsin Press.

[5] Marjory Blumenthal and David Clark, 2001. RETHINKING THE DESIGN OF THE INTERNET: THE END-TO-END ARGUMENTS VS. THE BRAVE NEW WORLD *ACM Transactions on Internet Technology* 1(1), 70-109.

the benefit of end-to-end. The argument regarding the causal link between innovation and the end-to-end principle, while plausible, remains to be carefully demonstrated.

However, the end-to-end principle has been used to justify a number of policy initiatives. In 1999-2001, a number of scholars and policy analysts advocated that the providers of the then-nascent broadband service (principally cable companies (using cable modems) and telephone companies (using DSL)) be required to provide "open access," in which any Internet Service Provider (ISP) could request that they act as an ISP for customers of the broadband providers' customers.[6] Such access was mandated by the FCC for ILEC providers of DSL services. Resale of the DSL portion of the local loop was required as an extension of the unbundling provision of the local loop for voice. However, cable companies were not required to provide such access; advocates of open access called for cable companies to be required to similarly accommodate independent ISPs.

In the event, the FCC did not mandate open access for cable companies, and eventually removed the requirement that telephone companies were required to make available their DSL channels to other firms.[7] However, in its consideration of the AOL-Time Warner merger in 2000, the Federal Trade Commission imposed a limited form of open access on Time Warner as a condition of the merger,[8] a condition with very limited effect.

The latest incarnation of this principle is Network Neutrality, and concern that has its roots in the ability of broadband providers to be "gatekeepers" of the Internet for both customers and providers of content/applications. Cable and telephone ISPs have the ability and the incentive to disadvantage or advantage certain customers, applications or web content providers for their own gain, but at the expense of customers and Internet firms and innovators. Pernicious behavior could take the form of an ISP actually blocking some applications, or it could take the form of an ISP charging a customer or even a web content provider (such as Google or Amazon) for use of its network facilities. Proponents of network neutrality argue that ISPs have both the capability and the incentive to either block or price (or "access tier," as Lessig puts it) its services. Such restrictions, it is argued, not only limit customer and business freedom, they limit innovation, in that while existing web providers can afford such fees, new entrants with exciting new technologies cannot. Such restrictions, they argue, will stifle the innovation that characterizes the Internet, because it violates the end-to-end principle. Advocates call on the government to act: for Congress to empower and direct the FCC to regulate network neutrality.

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[6] For an early discussion on open access and FCC rules, see John Borland, 1999. FCC TAKES A STAND OVER CABLE OPEN ACCESS, *CNET News* (July 21), at <http://news.com.com/FCC+takes+a+stand+over+cable+open+access/2100-1033_3-228816.html>

[7] The requirement to unbundle a portion of the local loop so that competitive carriers could offer DSL was challenged in court by incumbents. The DC Circuit found for the complainants and remanded the case to the FCC (see http://www.fcc.gov/ogc/documents/opinions/2002/00-1012.pdf), which rescinded the rule rather than face further challenge.

[8] See Gerald Faulhaber, 2003. ACCESS AND NETWORK EFFECTS IN A 'NEW ECONOMY' MERGER: AOL-TIME WARNER in *The Antitrust Revolution*, 4th ed., eds. John Kwoka and Lawrence White, New York: Oxford University Press.

The outcry was prompted by two events that were widely reported in the media. The first occurred when Madison River Telephone Company in North Carolina blocked the port for its DSL customers that Vonage, a Voice over Internet Protocol (VoIP) telephone provider, was using to provide a telephone service over the Internet that competed with Madison River's main residential telephone business. Vonage complained to the FCC, which immediately directed Madison River to stop blocking the relevant port and to pay a fine.[9]

The second event was an interview[10] with Edward Whitacre, CEO of SBC (now AT&T), the largest incumbent telephone company, in which he declared: "What [Google, Vonage, and others] would like to do is to use my pipes free. But I ain't going to let them do that." The blunt message was that AT&T would charge web content and service providers for use of AT&T's last-mile broadband facilities, in addition to the customary charge levied on customers. The reaction from customers and providers of content and services was immediate and loud: We ain't gonna let him do that! The Madison River case, which was dismissed by many as a mistake by a very unsophisticated rural phone company, was enormously amplified by the CEO of the largest telephone company in the nation. Fearing precipitate action, several parties introduced network neutrality into the developing effort in the U.S. Congress to update the Telecommunications Act of 1996. In particular, a number of parties have called for regulation by the FCC to ensure that broadband ISPs do not violate network neutrality. The concern is that the present market structure of "last mile" providers suggests market power, and the proposed solution of net neutrality proponents is legislation/regulation. In the rush to thrust net neutrality onto the policy stage, even the protagonists are divided on what net neutrality means and what legislation/regulation they support.

In this paper, I consider three components of the network neutrality debate: (i) the "bit is a bit is a bit" Internet purist position: all Internet pipes, including broadband ISP facilities, should simply transmit all bits without discrimination or management. (ii) application providers should not have to pay broadband ISPs for delivering their services to the ISP's customers. Finally, (iii) the market power of the current broadband ISP incumbents (telcos and cable) will result in anticompetitive and monopolistic actions that will damage customers, application providers, and innovators. I show that the first two components are ill-founded, and attempts to regulate/legislate based upon them are likely to have ill effects on the Internet. The third component, vertical foreclosure, does hold some dangers, which I discuss. However, there is no empirical evidence that these threats have been or will be realized in the market. This suggests that regulation at this time is ill-advised; should actual vertical foreclosure problems arise in the future, antitrust law, either privately or publicly enforced, is sufficient to respond to such threats. Before concluding, I discuss how vertical foreclosure problems may arise in the context of IPTV.

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[9] See MADISON RIVER COMMUNICATIONS, LLC ORDER AND CONSENT DECREE, March 3, 2005, <http://www.fcc.gov/voip/>.

[10] 2005, INTERVIEW WITH EDWARD WHITACRE, *Business Week Online*, Nov. 7, at <http://www.businessweek.com/@@n34h*IUQu7KtOwgA/magazine/content/05_45/b3958092.htm>.

Parsing the Issue

The net neutrality argument can be grouped into three main components:

A bit is a bit is a bit. Firm believers in the end-to-end principle argue that the Internet should remain a collection of "dumb pipes," transmitting bits from user to user under a best efforts regime, treating all bits equally. Cable firms and telephone companies should simply be part of the "dumb pipes" and not in any way favor or disfavor one bit relative to any other bit.

As the Blumenthal and Clark[11] article makes clear, this particular vision of the Internet as pure end-to-end was probably never true in practice and if it were it would certainly be a bad idea, for at least two reasons. First, the bits that comprise a malicious e-mail or download with a worm or virus payload is certainly not the equal of the bits comprising the results of research for a student term paper or a request for medical information. In fact, we (as customers) expect our ISPs to reduce or entirely block unwanted e-mail (spam) or malicious e-mail (worms and viruses) and other malware. Indeed, ISPs make a point of advertising to potential customers how they will keep them safe by discriminating between the "good" bits and the "bad" bits.[12] Of course, strict adherence to a "bit is a bit is a bit" policy would preclude such discrimination, even if strongly favored by all customers. The purity of the end-to-end principle is thin gruel to customers compared to the safety and convenience of an ISP offering protection against such intrusions.

Second, all network managers must design their networks with capacity sufficient to meet most demands but expect that demands will exceed this capacity on a regular basis. During periods of congestion, a "best efforts" regime will result in delays and dropped bits. In an earlier era, Internet traffic such as e-mails and web surfing could tolerate such congestion delays and errors, and best efforts was good enough. Even then, network managers engaged in "traffic control," the practice of giving preference to certain traffic such as e-mail and telnet when other traffic such as massive ftp transfers overwhelmed network capacity. Large transfers waited while more urgent traffic received prompter service. Today, applications such as VoIP and streaming video are highly sensitive to delays and dropped bits. And the contending applications have far higher bandwidth needs, such as music downloading. Traffic control is even more important today, as the data demands of customers are very different: from the e-mailer/web surfer who is perfectly comfortable with an average data rate of 50 Kb/s to the power music or movie downloader demanding mega-Mb/s. And all ISPs engage in the practice, to the benefit of their customers.

Serious proponents of net neutrality recognize the validity of these arguments,[13] and have no objection to "good" discrimination (blocking the "bad" bits while letting the "good" bits pass unhindered) but are concerned with "bad" discrimination, in which the ability of ISPs to discriminate can be used

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[11] *Op. cit., supra.*

[12] AOL, a major dial-up ISP, offers an entire safety and security center as part of its service to customers. See <http://daol.aol.com/safetycenter/>.

[13] See Lessig, *op. cit., supra.*

anticompetitively. Indeed, Peha[14] states the problem quite well: "Can we limit how network operators can discriminate in a manner that prevents them from fully exploiting market power in ways that seriously harm users, and does not prevent them from using discrimination in ways that greatly benefit users?" I return to this quite important issue below. Suffice it to say that the extreme "bit is a bit is a bit" form of network neutrality has very few serious proponents.

Pricing and Services The issue of pricing broadband ISP services is sometimes referred to as "tiering," or "access tiering." Access tiering involves ISPs offering to application providers and website owners such services as speedier access to customers for which the application providers would pay a fee. In contrast, customer tiering involves an ISP offering customers different levels of service, such as data throughput or maximum bandwidth. Proponents of network neutrality may approve customer tiering, but generally not access tiering. One of the principal arguments against access tiering is that it would discourage innovation as new innovators would not have the resources of larger application providers and be unable to pay such fees. Another argument is that it would constitute a division of the Internet into a high-speed platform for the chosen few that could afford it and a "dirt track" for those who could not. Yet a third argument, favored by large application producers such as Google and Yahoo!, is that they already pay substantial fees to access the Internet from their home servers, and being charged by their customers' ISPs constitutes "double dipping."[15]

Analysis of pricing models[16] requires understanding that broadband ISPs are in a *two-sided market*. In a two-sided market, there are customers on both sides of the market[17] who wish access to the other side, and the firm plays the role of an intermediary. Dating services (such as night clubs) provide a venue for men and women to meet; auctions (such as eBay) are intermediaries between buyers and sellers; credit card networks (such as Visa and Mastercard) ensure payments from customers to merchants; and operating system vendors (such as Microsoft) that provide a platform on end-user computers for which application developers write software for use by end-users on that operating system. Two-sided markets are an active area of research for economists in the past few years; two recent papers

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[14] Jon M. Peha, THE BENEFITS AND RISKS OF MANDATING NETWORK NEUTRALITY, AND THE QUEST FOR A BALANCED POLICY, *Proceedings of 34th Telecommunications Policy Research Conference (TPRC)*, Alexandria, VA, September 2006, at <http://web.si.umich.edu/tprc/papers/2006/574/Peha_balanced_net_neutrality_policy.pdf>.

[15] In his Senate testimony, Vint Cerf referred to this as "double recovery." PREPARED STATEMENT OF VINTON G. CERF, Vice President and Chief Internet Evangelist, Google Inc. United States Senate Committee on the Judiciary Hearing on Reconsidering our Communications Laws, Wednesday, June 14, 2006, 7.

[16] The use of exotic terminology such as "access tiering" masks the fact that the issue is one confronting every business: structuring a service package and setting prices; for clarity, I use the terms price and services for the remainder of this paper.

[17] More generally, there may be more than two groups of customers involved in the market; I restrict my attention to the simplest two-sided market.

describing two-sided markets are Evans,[18] and Rochet and Tirole.[19] As is clear from these papers, economic theory cannot predict the prices that will obtain in an actual market, only that the sum of the prices (appropriately normalized) will cover costs. Market conditions and relative bargaining power will eventually lead to a stable price structure, often after much experimentation by market participants.

In practice, pricing structures in two-sided markets differ quite a bit, depending upon the nature of the market. Pricing must be designed to "get everyone on board," since both types of customers must be "on board" for the firm to deliver value. Thus, prices for either side of the market need not reflect marginal costs, which is the standard in one-sided markets. For example, in an eBay auction, buyers pay nothing and sellers pay eBay a fee if they sell their wares. Nightclubs often charge men a higher fee to enter than they charge women, to ensure that there is rough parity between the number of men and women; otherwise, neither would come. In cable TV, the firm charges customers a flat monthly fee (around $35-$40) for basic service, more for premium channels; however, it (usually) pays programmers (such as ESPN and Animal Planet) for the privilege of using their video feed. There are multiple parties involved in a credit card transaction besides the obvious buyer and merchant; there is the merchant's bank, the buyer's card-issuing bank, and the electronic network. Each of these parties gets paid for their role in completing the transaction, at the cost of the merchant.

Broadband ISPs also serve a two-sided market, with customers on one side and application providers and website owners on the other. The current pricing model for ISPs generally and broadband ISPs in particular is simple in the extreme: customers are charged a single monthly fee for "all you can eat" access to the Internet. Application providers and website owners who send content through broadband ISPs to their customers are charged nothing. In fact, the Internet as a whole involves multiple two-sided markets. As Vint Cerf correctly points out,[20] Google already pays handsomely for access to the Internet for its servers. But it also participates in a two-sided market at its customers' ISPs as well. Like the market for credit card transactions, there are multiple parties in an Internet transaction, from home ISP to destination ISP and including one or more backbone networks.

It seems unlikely that this pricing structure will endure. As the market evolves, I expect that pricing and services will also evolve to meet the needs of customers on both sides of the market as well as the needs of the broadband ISPs. While impossible to predict how pricing will evolve, the following scenarios are at least plausible:

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[18] Evans, D.S. (2003), THE ANTITRUST ECONOMICS OF TWO-SIDED MARKETS, *Yale Journal of Regulation* 20(2), 325-381. This paper is particularly helpful for the economist and non-economist alike, in drawing out examples and basic results.

[19] Rochet, Jean-Charles and Jean Tirole (2007), TWO-SIDED MARKETS: A PROGRESS REPORT, forthcoming, *RAND Journal of Economics*, available at <http://idei.fr/doc/wp/2005/2sided_markets.pdf>.

[20] *Op. cit., infra.*

Customer pricing

The "all you can eat" model has proved very successful with customers over the past decade, but probably cannot be sustained as is. On the *demand* side, some customers are demanding higher burst speeds and cable and telco firms are responding with a variety of advertised data speeds. Comcast, for example, offers both a 6 Mbps and an 8 Mbps service.[21] Verizon has similar packages, some more deeply discounted than Comcast's offerings.[22] Each option is an "all you can eat" option, with higher bandwidth priced higher.

However, customers have shifted their usage patterns over the past few years. Instead of customers having similar data rates, there is much more variation among customers. Some customers continue at fairly low data rates, checking e-mail and some web surfing. Others are downloading music or movie files or are "supernodes" for peer-to-peer websites. As a result, the latter customers can generate thousands of times more data traffic than the former. During peak hours, this can significantly slow down traffic for everyone, necessitating additional capacity additions by the broadband ISP (and elsewhere in the network) to cope with these higher loads. Although some within the industry refer to such users as "bandwidth hogs," a derogatory label is mis-applied. As long as the industry charges zero for additional data flow, then additional data flow is what they should expect. It is not the users who are at fault; it is the price structure. The *supply* side of the market suggests that pricing must change so that customers that press the limits of capacity for themselves and others face the costs of their capacity demands. There are various price mechanisms to achieve this; peak load pricing and volume pricing are two obvious means. Recently, cellular phone firms have had good customer acceptance using "buckets" of minutes, in which a flat rate per month is charged for usage up to a fixed amount of minutes per month. Customers may choose which bucket to buy; if one's usage is low, 300 minutes per month should be sufficient. A business person may want to purchase 1200 minutes per month for a higher rate. This pricing model could be exported to broadband, but with the units of total bytes per month rather than minutes per month.[23] For example, customers using less than 500 MB/mo could be charged $19.99, customers between 500 MB/mo and 1.5 GB/mo charged $29.99, and so forth, with customers using over 30 GB/mo charged $109.99. Customers are quite willing to accept such rate plans for their wireless service; its likely acceptance will be high for broadband as well. It would certainly help initial acceptance if the first bucket included, say, 75% of customers and resulted in a small rate *reduction* relative to today's "all you can eat" price.

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[21] See, for example, <http://www.comcast.com/shop/buyflow/default.ashx> for Comcast rates and service options.

[22] See, for example, <http://www22.verizon.com/ForHomeDSL/Channels/DSL/olo_landing_new.asp> for Verizon DSL rates and service options.

[23] The economic theory of pricing a congestible resource has a very long intellectual history. Peak load pricing, in which prices vary by time of day to reflect (stable) periods of congestion, has been successfully applied in both telephone and electric power. Vickrey pricing, in which prices vary in real time according to actual resource congestion, is the theoretically perfect solution but has never been adopted in any customer market. My suggestion of "buckets" pricing is based not on theoretical grounds but rather on actual customer acceptance of such price structures in a related industry.

Whether this price structure is adopted by the broadband ISP industry is pure speculation on my part. But it is a possible answer to a trend of concern to the industry (much higher variation among customer data flow rates) and it uses a price mechanism that has been used successfully in a closely related industry. And it also illustrates that the current price structure is not "forever"; there are options which can help solve existing capacity problems as well and it is likely we will see changes in the near future.

In discussions of the details of customer pricing, it is easy to lose sight of a fundamental principle of this market: broadband ISPs want to attract as many customers as possible (at positive margins), both for the direct revenue they produce as well as to be attractive to the other side of the market, the application providers and website owners. Actions which make their offering less attractive to customers hurts the profitability of the firm both directly (lost customer revenues) and indirectly (reduction in their attractiveness to application providers).

Application Provider Pricing. Formally, the pricing problem on the application provider side of the market is the mirror image of that on the customer side. However, the characteristics of providers differ markedly from that of customers, so I would expect quite different price structures to emerge. For example, some applications may fall into the "must have" category, such as Google, MSN, and Yahoo! These providers might well enter into negotiations with broadband ISPs in which they demand payment by the ISPs in order to give their customers access to them. This would follow the cable TV model, in which programmers such as ESPN demand large payments from cable companies to carry their product, which for many viewers is "must see" TV. A cable firm's offering (even in monopoly markets) is seriously deficient to customers without ESPN (and other "must see" networks). It could well be that Internet access without Google is similarly deficient, and the broadband ISPs will have to pay to carry it. While the most popular application providers may have sufficient bargaining power to command payments from ISPs, this practice is unlikely to extend to most application providers, which are likely to be carried without payments either from or to the broadband ISP.[24] While broadband ISPs have an incentive to carry these smaller application providers to enhance the value of their service, the providers do not have enough "clout" to command rents from the ISPs.

[24] Those familiar with the "terminating monopoly" in telephony make take exception. In brief, a customer's local exchange carrier constitutes a monopoly over that customer's terminating traffic; in certain situations, that carrier may charge very high terminating access fees to the originating local exchange carrier (or long distance carrier). In the telephone case, regulatory rules for rate averaging preclude the carrier charging either the originating or the terminating customer to reflect this very high terminating access fee; the carriers are required to average these costs and charge all customers based on this average rather than the actual terminating access fee. It is this latter feature which ensures that local carriers that impose high terminating access fees face no pressure from customers to lower their fees. In other industries with terminating monopolies such as cable TV this problem does not arise, and there is no reason to expect it to arise in the broadband ISP market.

It is possible that broadband ISPs may wish to charge application providers for the data flow they generate at the ISP. I see this as quite unlikely purely on the basis of transaction costs. The ISP has a billing relationship with each of its customers and can easily measure the monthly data flow.[25] In contrast, charging every possible website and application provider requires establishing a billing relationship and monitoring of data flow from each and every website/application provider. It is highly unlikely that a broadband ISP could keep up with every new application that appears on the web and is able to contact it and establish a billing relationship at a cost competitive with charging the customer. Charging the customer for data flow has much lower transactions costs than measuring and charging thousands of application providers for the data flow they generate.

There are at least two services which broadband ISPs could offer application providers that would enhance the providers' products to their customers. First, broadband ISPs could offer caching services, in which the opening pages of Google or Yahoo! or even Gerry's Cool Website could be stored on the broadband ISP's server so that when a customer requested the page, it would appear extremely quickly (relative to fetching the page from a distant location such as California or Philadelphia). Such services have been a familiar fixture of the Internet for at least a decade, but caching has been offered by third parties, such as Akamai. Akamai maintains server farms near large metropolitan areas and offers to cache websites of application providers close to their customers, and of course they charge for this service. Customers experience faster response times from the application provider when there website is cached. Additionally, application providers lower their transport costs to their own ISPs buy offloading content to Akamai. Any website owner can opt for Akamai's caching service, not just large users such as Google. But there is no reason that broadband ISPs cannot do this job more efficiently than a third party; after all, broadband providers are able to cache application providers' websites on servers that are the closest to their customer. The market for this service would be application providers for which that extra second of speed in appearing on their customers' screens translates into a competitive advantage. Gerry's Cool Website is an unlikely candidate for this market, but Google is a likely candidate, as are Google's competitors such as Teoma and Gigablast, large or small, new or old. Some have argued that charging for caching services favors large providers, and thus disfavors innovation by start-ups. This is highly unlikely; usage of caching services (pages stored and pages served) should scale with size, so smaller firms would naturally be charged less than larger firms.[26] New (small) firms with as yet unproven demand may not have their pages cached by broadband ISPs as a matter of course, but if they are able to pay the broadband ISP to cache their pages they could easily gain service and speed parity with more established competitors.

Net neutrality proponents have objected to broadband ISPs offering such services, claiming that this would establish a two-tier Internet, in which some pay to ride the freeway while other languish on the dirt road. In fact, many markets differentiate their services by quality and/or speed, offering to those who

[25] Wireless broadband providers already measure and report monthly data flow on customers' bills, even if the customer contract calls for unlimited data.

[26] Large application providers may be able to negotiate volume discounts for caching or other services that are not available to small providers and innovators. But this is true in virtually every industry, and is not generally considered a major barrier to entry or to innovation.

need it faster service at a higher price while those without the need for speed pay a lower rate. For example, the U.S. Postal Service offers Express Mail (fast) and First Class mail (slow) and none complain about a two-tier postal service, no pejorative references to "freeway mail" and "dirt road mail," and yet proposals to offer two or more Internet speeds is exactly the same as offering two mail speeds. There are no allegations that only large companies can afford Express Mail while small companies and innovators must content themselves with snail mail. Postal patrons of all sizes and incomes avail themselves of the faster service when they need it, and save money when they don't. Exactly the same will occur with the Internet, and despite protestations to the contrary it will not be "undemocratic."[27]

Second, broadband ISPs may be able to offer bandwidth to application providers on their own proprietary networks, sequestered from the vagaries of the "best efforts" Internet. Currently, some broadband ISPs are offering their own IPTV services over bandwidth segregated from their Internet pipes.[28] Streaming video is less sensitive to delay problems than, say, voice, but the very size and volume of video traffic requires that it be managed, preferably separately from other Internet traffic. Hence there is value in guaranteeing high quality video for customers. Similarly, many cable companies that offer VoIP telephony are not offering it over their best efforts Internet connection but rather over their own proprietary networks.[29] It would appear that cable and telco firms are using their non-Internet proprietary networks for their own services, but the ability to offer such services to others is clearly present and may be a valuable service on offer in the future. I return to this topic below.

In summary, pricing on the application provider side of the market has yet to evolve, and my personal prediction is that many will be surprised by the form it eventually takes. At this stage, economic theory cannot even predict the direction of payments, much less the size of payments, which may evolve in this market. Price recognition of the two-sidedness of the broadband ISP is not "double dipping"; it is simply one of many ways in which two-sided markets can price.

It is, however, likely that broadband ISPs will offer caching services in competition with Akamai. Indeed, it is surprising that they have not already done so. The market opportunity has been apparent for some time. And when it does happen, it will not be "undemocratic;" it will be a natural evolution of markets to serve customer needs.

As the Internet continues to evolve, it is likely that the price structure of this two-sided market will also evolve. The simple all-you-can-eat regime is unlikely to survive the trends and changes already manifest. Net neutrality proponents who seek to freeze current price regime and the current service

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[27] The assertion that paying for higher speeds in undemocratic was made by the otherwise sober *New York Times* on May 2, 2006, KEEPING A DEMOCRATIC WEB, Sec A, Col 1, p. 24.

[28] Kende, Michael (2006), SURVEY OF INTERNATIONAL BROADBAND OFFERINGS, Analysys Consulting Ltd., Washington, DC, available at <http://www.analysys.com/pdfs/BroadbandPerformanceSurvey.pdf>, 12.

[29] From Comcast's website: "Most Voice over Internet Protocol (VoIP) providers such as Vonage and AT&T CallVantage use the public Internet to transmit your calls. Comcast Digital Voice service does not. Your calls are transmitted over our private advanced broadband network, giving you the call clarity you expect." Viewed March 11, 2007.

regime are not helping this needed evolution of the Internet market, nor are they protecting Internet customers.

Vertical Foreclosure

Perhaps the most vexing issues surrounding net neutrality involve potential abuses by broadband ISPs of their power to foreclose or otherwise exploit vertical markets. The market for application providers on the Internet is very competitive and the barriers to entry are very low; as a result, there are thousands of such providers. However, in order to reach their broadband customers, application providers must use the services of broadband ISPs; typically, customers have a choice of at most two such broadband providers: their local cable company (cable modem) or their local telephone company (DSL). To the extent that the broadband ISPs have market power as the "gatekeeper" to their customers, net neutrality proponents are concerned about the ability and incentive of these ISPs to use their market power to disadvantage upstream application providers. The well-known case (discussed *supra*) of Madison River Telephone Company's ISP service blocking Vonage, the VoIP service that uses the Internet, is the model case. Madison River is not only in the broadband ISP business, it is also in the telephone business, and it sought to use its monopoly position as the broadband ISP to throttle competition from Vonage in the telephone market. In economists' terminology, Madison River engaged in *vertical foreclosure*, using its power in the ISP market to eliminate a competitor in the vertically-related telephone market.

Vertical issues have an interesting and varied history in U.S. antitrust and regulatory economics. In the mid-20th century, antitrust authorities generally viewed vertical relationships as likely to be pernicious and adopted *per se* rules (such as that outlawing resale price maintenance) against many vertical practices. A number of high-profile antitrust cases hinged on vertical issues; perhaps the most important was the AT&T case. During the 1970s, the Chicago School view became the dominant antitrust view. In this view, vertical relationships were efficiency-enhancing and attempts by firms to take advantage of vertical relationships (such as vertical foreclosure) were usually undone by the operation of markets. As a result of this view, antitrust authorities have largely abandoned *per se* rules associated with vertical practices and have brought very few vertical antitrust cases. But antitrust thinking continues to evolve, and in the 1990s, researchers showed that in the context of game theory vertical practices could indeed be deleterious. The difficulty of applying this new learning has been practical and empirical: proving that a vertical practice is on net deleterious is usually quite difficult and highly dependent upon the models assumed. Vertical antitrust cases brought by the government are still far and few between. An accessible and compelling analysis of economists' thinking on vertical relationships and access policy is

in Farrell and Weiser;[30] an up-to-date synopsis of the current literature on vertical foreclosure is in Rey and Tirole.[31] Farrell[32] analyzes exclusive dealing issues in light of Chicago School revisionism.

It would seem that Madison River makes the proponents' case. But net neutrality proponents go further, arguing that vertical abuses are both myriad and are likely to be the norm. Peha, in an otherwise quite sensible paper,[33] describes a litany of nasty and abusive practices that broadband ISPs *could* do, such as perfect price discrimination, blocking certain traffic or degrading its quality, and stifling free speech. Without explicitly demonstrating either theoretically or empirically that broadband ISPs would engage in such practices, the paper asserts (in some cases) or implies (in others) that firms *would* do all these things, to the detriment of customers, application providers and innovators. Proponents also argue that the current duopoly in the broadband ISP market is persistent; although alternative broadband pathways to the home exist in principle, they are not willing to consider that competition is at all likely to come to this market, thereby fueling their concerns of continuing vertical abuses.

Let's take these issues one at a time. It is certainly true that few areas of the U.S. are served by more than two broadband ISPs, cable or telco DSL. This suggests that these players are likely to have some degree of market power and may have incentives to take advantage of that power to the detriment of customers. But the concern of the net neutrality proponents is that this market power may be used in the upstream applications provider market to disadvantage these providers. Suggested laws and regulations to control this potential abuse accept the existing market structure in the broadband ISP market as fixed and seek solutions to the problem of vertical abuse. Perhaps a more productive approach is to encourage more competition in the broadband ISP market, such as that suggested by Christopher Yoo.[34] Policymakers can help reduce barriers to entry in this market, for example by making more spectrum available for wireless broadband ISPs and for expediting the rollout of Broadband over Power Line (BPL). But even without further regulatory assistance, alternatives to cable and DSL are already appearing in various geographic markets.

- Municipal WiFi was first proposed in Philadelphia in 2005, and is now scheduled to go into operation in Fall, 2007. Many other U.S. cities are planning WiFi networks, generally in conjunction with a private firm such as Earthlink or MetroFi. Such systems are either "free" (i.e., advertiser supported) or low cost.

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[30] Farrell, Joseph and Phillip Weiser (2003), MODULARITY, VERTICAL INTEGRATION, AND OPEN ACCESS POLICIES: TOWARDS A CONVERGENCE OF ANTITRUST AND REGULATION IN THE INTERNET AGE, *Harvard Journal of Law & Technology* 17(1), Fall 2003

[31] Rey, Patrick and Jean Tirole (2007), A PRIMER ON VERTICAL FORECLOSURE, forthcoming, *Handbook on Industrial Organization III,* eds. Mark Armstrong and Rob Porter, Elsevier.

[32] Farrell, Joseph (2005), DECONSTRUCTING CHICAGO ON EXCLUSIVE DEALING, *Antitrust Bulletin*, 50(3), Fall, 465-480.

[33] *Op. cit.,* 9-13.

[34] See Yoo, Christopher (2005), BEYOND NETWORK NEUTRALITY, *Harvard Journal of Law & Technology* 19(1).

- Wireless ISPs are a fast-growing segment of the market, including firms such as Clearwire and MobilePro. These firms use frequencies in both unlicensed and leased spectrum, and some are deploying new WiMax systems. Clearwire offers service in forty medium-sized cities in the U.S. as well as over 100 metropolitan areas overseas.

- Broadband over Power Line, in which broadband service is offered over electric power lines into the home, has developed rather slowly. Several radio user groups, such as American Radio Relay League (ham radio operators), have complained to the FCC that BPL radiates energy that interferes with their reception. Recently these issues appear to have been resolved. Whether or not BPL can deploy rapidly, especially as telcos raise the bar with deployment of fiber systems, is an open question.

- Cellular telephone companies such as Sprint, AT&T and Verizon Wireless offer a slightly anemic broadband using their cellular networks, typically at speeds near 400-500 Kbps. Given the very constrained spectrum space the firms must work with, it is amazing that any broadband is offered at all. As the FCC releases more spectrum for cellular use, it is likely that cellular broadband may become a factor in this market.

Both AT&T and Verizon are currently building out fiber optic networks that promise very large capacity networks for delivering video (on-demand as well as traditionally scheduled) and Internet access. It is likely that this service will supplant DSL as it becomes more widely available, and so should be considered an upgrade of an existing pipe rather than a new pipe.

All this activity has not altered the current duopoly in the broadband ISP market. However, it does suggest this market is still evolving, and adopting a policy based on the persistence of duopoly may be unwise.

In fact, “unwise” is an understatement. Should some form of net neutrality regulation be legislated, it would fall to a government regulator, either the FCC or the FTC, to actually regulate and enforce. This action would replace an industry in which the primary focus is on wooing customers by an industry with a government overseer, who can set rules and enforce regulations. A century of experience with telephone regulation is sufficient to show what occurs when there is a government overseer: the focus of competition shifts from pleasing the customer to manipulating the regulator, a game which strongly favors incumbents. The history of telephone regulation tells us the outcome: incumbents develop superb lobbying skills at all levels and branches of government while business and marketing skills are weak. In such a game, newcomers are at a distinct disadvantage and new entry is effectively foreclosed. If we have such legislation, then the duopoly assumption that net neutrality proponents adhere to will become a self-fulfilling prophecy. No one will want to enter an industry in which regulated incumbents rule the roost. If the objective is to turn the broadband ISP industry into the next regulated telephone-like industry, net neutrality is the perfect way to do it. Regulation of net neutrality is a solution that

virtually guarantees that the underlying problem – market power in the broadband ISP market – will never be solved.

But let us make the worst-case assumption that market power in the broadband ISP market will be with us for some time to come. What are the incentives of the ISPs to vertically foreclose a market to the detriment of an application provider?

We consider first the case of foreclosure by the ISP for its own business profitability, and second the case of foreclosure on behalf of another application provider who thereby gains an advantage over competitors by paying an ISP to foreclose.

We start from the basis that in a two-sided market, reducing the number of application providers available to customers via foreclosure reduces the value of the ISP to its customer base and is therefore costly. While there may be a benefit to the ISP of foreclosing, it must be at least as large as this cost. There are several cases to consider:

Broadband ISP does not have a product in the application providers' market. In this case, there is no possible benefit from foreclosure by the ISP. For example, no cable or telco firm offers a search engine service, so they have no incentive to block Google, and every incentive to increase the value of their offering to customers by ensuring Google's availability. Likewise, no broadband ISP is a serious competitor in the portal market, so there is no incentive to foreclose Yahoo! or MSN and every incentive to ensure their availability.

Broadband ISP has a product that competes with an application provider's product. The most obvious case is VoIP. Virtually all broadband ISPs have a voice telephony offering, either a classic telco-based telephony or a cable VoIP offering. Do they have incentives to foreclose non-affiliated VoIP providers? Generally, if the ISP's offering is sufficiently differentiated from the non-affiliate's offering, then it is unlikely to foreclose. It is particularly unlikely to foreclose if it can set a price, such as a transit fee, for the use of its network by the non-affiliated provider. This fee could be levied on the provider but more likely would be charged to the customer. An example is Skype, a VoIP provider using peer-to-peer technology to provide free or very low-cost telephone service, compared to, say, Comcast's Digital Voice VoIP offering, which promises carrier-grade transmission, access to E911, and low latency. It is unlikely that Comcast would find Skype a competitor for its higher quality product and therefore unlikely to attempt foreclosure.[35] If the cable company can make money charging Skype (or more likely its customers) for a product that doesn't compete with their high-end offering, they would be foolish to foreclose such a profit opportunity. Should this be their strategy, the cable or telco firms may charge Skype, but not so much as to drive them from the market; quite simply, putting an upstream customer out of business results in less profit for the ISP than capturing some of their return via appropriate pricing.

[35] At least one cable company, Shaw Communications (Canada) charges customers a C$10 "service enhancement fee" if they use a non-affiliated VoIP provider such as Skype or Vonage.

If the product sold by the non-affiliated application provider competes directly against the ISPs product, the situation grows more complicated. For example, Vonage is closer to Comcast Digital Voice than is Skype. It is certainly true that the ISP can also charge Vonage and realize a profit, but it is also likely to lose sales of its flagship VoIP product in doing so. In principle, if the ISP charged the non-affiliated VoIP provider a price for which its profit margin was the same as for its own VoIP product, the efficient solution would obtain. If the non-affiliated provider's product were actually less costly, then its price (equal to its cost plus the ISP fee) would be less than the ISPs product's price (equal to its cost plus its margin). The ISP would prefer to make its money from the non-affiliate rather than its own less efficient product. If however the affiliate were more costly, then the ISPs product would have the lower price and the more efficient supplier would prevail.

More likely is that the ISP may seek to differentiate its product in a way not available to its non-affiliated competitor. This appears to be what is currently happening in the VoIP market. Cable firms are offering VoIP service over their proprietary networks where they can guarantee low latency and few dropped bits, relative to the "best efforts" Internet. Comcast and other cable companies believe this strategy gives them a competitive advantage over otherwise close substitutes such as Vonage. In this case, the cable company is giving Vonage and its customers exactly what they advertise: VoIP telephony over the "best efforts" Internet. Cable and telcos are offering a service differentiated from that of Vonage or Skype by using their competitive advantage of network ownership, offering a higher quality of service. The ability of a firm to use its own resources to its own competitive advantage is at the very heart of the competitive process. The cable firms' use of their own networks to seek advantage in this market is in no way anticompetitive.[36]

But are there cases in which a broadband ISP with market power may seek to behave anti-competitively in application provider markets? Farrell and Weiser[37] mention eight possible ways in which the arguments above can fail. Several of them could possibly apply in this market:

> The broadband ISP could inefficiently integrate into application provision if this increased its ability to price discriminate and therefore raise its profits. This requires that combinations of broadband features and application features can be utilized to more effectively extract rents from customer markets; it is not enough that each market participant finds price discrimination profitable.
>
> If an application provider offers a service that may be a strategic competitor to the core business of the broadband ISP, then the ISP may wish to foreclose this opportunity. While this issue was an important one in *U.S. v. Microsoft*, it does not appear relevant here.

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[36] This highlights the fact that not all data networks are part of the Internet; indeed, many are proprietary and privately managed. I am not aware of any regulation or antitrust ruling suggesting that private data networks must be open to all, a la Title II regulation, and there is no such ruling pending.

[37] *Op. cit.,* see 105-119 for a complete list of conditions under which access might be foreclosed.

> Bargaining problems between ISPs and application developers may lead to lessened incentives to innovate. In theory, an ISP could demand an innovative application provider license its technology to it very cheaply, or risk being blocked by that ISP, thus chilling innovation. Since broadband ISPs have not entered into any complementary market save VoIP and show no evidence of wishing to do so, this risk appears extremely low.
>
> Incompetent broadband ISPs could make mistakes. If the tradition within an industry is to control every aspect of the business, then opening access may be difficult for such firms even if profitable.
>
> Incomplete complementarities could also lead to inefficient foreclosure; this could occur if an application can be used with the broadband platform or without it. However, since all Internet application need a platform to reach customers, this problem does not appear relevant here.

An application provider pays an ISP to gain an advantage in its market. Although cable firms do not compete in the search engine market and would have no incentive to disadvantage Google, Google itself might have an incentive to use the cable firms' abilities to advantage itself relative to its search competitors such as Teoma or Gigablast. In fact, Google already does this, but not with broadband ISPs. Google uses caching services to speed up its appearance on customer computers; it also pays an annual fee to Mozilla, the producer of the Firefox browser, to be the preferred search engine for Firefox. Other search engines are certainly accessible via the URL address bar as well as subsidiary choices under the search bar, but Google is the default choice (and first listed choice) for Firefox-initiated searches.[38] In fact, there is a long history of software firms selling "preferred provider" positions: AOL sold the rights to be AOL's preferred provider for news, sports and search on its client interface since the late 1990s, for example.

Of more concern is if an application provider contracts with a broadband ISP to be its *exclusive* provider in this market. For example, suppose Yahoo! offered a telco a sum of money for the telco to *block* all other Internet portals (such as MSN and AOL). In a competitive environment with several broadband ISPs, this is not likely to be a problem. Each broadband ISP could offer customers a package with exclusive application providers for each ISP. Customers could then choose the ISP package they prefer. Without such competition, exclusive dealing becomes more problematic. However, the price that an application provider would have to offer in order for the ISP to give up universal access for its customers and potential revenues from charging the other ISPs would be very considerable. It is not clear that it would ever be in any provider's interest or in the ISPs interest to strike such a bargain. Nevertheless, in a duopoly market this could be a concern.

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[38] See, for example, GOOGLE SEARCH BOX EARNS MILLIONS FOR MOZILLA, *ClickZNews* Jan. 4, 2007, at http://www.clickz.com/showPage.html?page=3624399

The Empirical Evidence: What Is Actually Happening

In any vertical chain in which there is market power at one or more industries in the chain, vertical issues can arise and cause inefficiencies. This is certainly true in the broadband ISP market. But antitrust theory and practice teaches us that vertical practices can be either efficient or inefficient, and only careful analysis can determine which is the case. The burden of proof of inefficiencies is substantial, as the discussion above indicates. While there are potential problems that I point out above, we cannot say without much further analysis if they really are problems.

That further analysis can take at least one of two forms: do the conditions under which inefficient foreclosure occur obtain in practice? This is essentially an empirical issue; for example, can it be demonstrated that broadband ISPs really have additional dimensions of price discrimination that are profitable if they integrate into applications and foreclose other providers? Do we see broadband ISPs today engaged in sophisticated price discrimination and vertical foreclosure? Currently, no such discrimination/foreclosure is in evidence, but perhaps proponents of net neutrality can produce such evidence. Second, and perhaps simplest of all, is there any evidence of foreclosure of any sort by broadband ISPs for anticompetitive reasons? The natural example, of course, is the Madison River case; however, there does not appear to be a second and third and fourth case. If so, perhaps the Madison River Telephone Company can be placed in the category of the incompetent, those whose business skills are so weak that they are unable to maximize returns to their shareowners.

The list of anticompetitive horrors catalogued by net neutrality proponents is in very stark contrast to the evidence thus far, which suggests only the most amateurish of failed pranks. If net neutrality is the solution, what exactly is the problem? What exactly is it that needs to be fixed? At this point, it would appear that the problems are all potential problems, not actual problems. This is not to say such problems may not appear in the future; they may well indeed, and public policy needs to be able to respond to any problems that may arise. But at this time, there is, quite simply, no problem.

Proponents of net neutrality have suggested the lack of evidence thus far is due to (i) the broadband ISPs are being on their best behavior while everyone is watching them; once the public eye is off them, they will engage in inefficient vertical practices; and (ii) only recently has the technology been available in routers and servers for "deep packet" inspection that would allow highly sophisticated blocking or service degradation of competitors. The first seems particularly naïve; telcos and cable firms have never been particularly bothered that academics and consumer advocates take exception to their practices; the public statement by Mr. Whitacre quoted above suggests a certain insensitivity to whether or not we are watching. This is schoolyard logic, that the bully is only mean when the teacher isn't watching, rather than any serious analysis of real-life firms. The second is factually incorrect. Cisco, the leading supplier of network routers, has been advertising to cable firms the capability of their routers to help cable firms control their traffic at the bit level, at least since 1999.[39] Cable firms have had the

[39] "Cisco White Paper: Controlling Your Network – A Must for Cable Operators," (1999) Center for Democracy and Technology, available at <http://www.democraticmedia.org/issues/openaccess/cisco.html> .

capability of detailed control and blocking for at least eight years, and yet there is no empirical evidence that they are doing so. In brief, cable firms *could* implement all sorts of anticompetitive practices over the past eight years, and apparently they have not done so. This is not, of course, out of the goodness of their hearts; rather, I conclude it is because it has not been a profitable exercise for them, and I see nothing in the future that suggests the profit calculation will be any different than it has been over the past eight years.

IPTV: A Testing Point

Internet Protocol Television (IPTV) is a much-discussed suite of TV applications delivered over an IP platform, either open (such as the Internet) or closed. Currently, a number of TV networks make shows already aired available over the Internet for viewing on PCs. This is an example of the broader concept of video on demand, in which a library of past shows and movies could be accessed by a customer to be watched on a TV screen, a computer screen, or even a mobile phone screen. Other applications promised are interactive TV, in which the viewer chooses the camera angles, may e-mail or voice call friends who are perhaps watching the same program, or respond to instant polls regarding the program. IPTV has been lauded as the marriage of TV and the Internet, and many view it as the next "killer app."

In fact, IPTV is a collection of old ideas, some of which have been tried and failed, and some of which are currently available via more traditional means. For example, interactive TV was tried by AOL (AOLTV) and Microsoft (Ultimate TV) in 2001 without much success. Perhaps this year will prove more propitious, but the ideas are certainly not new. Video on demand has been offered for some years by cable firms, with modest success. As more and more entertainment companies figure out how to time the release of their movies and shows to VOD (relative to pay TV and DVD), VOD becomes a more compelling service. But again, not a new service.

In fact, the video marketplace is a quite mature and stable market; changes in it will respond to changes in customer demand, and I see no reason to believe that such changes will be sudden and rapid. The existence of new delivery technology such as fiber to the home, currently being built out by Verizon, doesn't change the demand side of the market at all, unless a compelling new service is introduced which gets customers out of their chairs and involved with their TVs. Thus far, IPTV has not shown us that compelling new service. However, it is early in its development and it would be rash to prejudge its eventual market appeal.

So let us presume that IPTV really is the next big thing, and customers demand new forms of TV onto their various screens: TV, PC, and mobile phone. What will be the delivery mechanism? Evidence from Europe[40] suggests that broadband ISPs will provide IPTV via dedicated slices of their proprietary networks rather than use their public IP Internet channels. In fact, cable TV already does this with its core product: cable TV. Verizon and AT&T promise IPTV using the same mechanism. In both cases, this is an application operated by the broadband ISP and as such is subject to the vertical concerns discussed

[40] See Kende, *op. cit.*

above. Will the cable companies or telcos open up their proprietary networks to permit other IPTV providers use of their conduits? This seems very unlikely; the business model of cable TV is based on the cable company controlling their programming lineup and delivering entertainment packages that appeal to their customer base. Today this also includes VOD; there is no reason to expect that if VOD becomes more popular, cable firms will not expand their VOD capacity to meet that demand. Verizon and AT&T have already promised exciting new TV over their fiber pipes, likely controlled by them.

All this suggests that non-affiliated IPTV providers will use the public Internet to distribute their wares, much as the networks make available already aired shows today. However, should this become very popular, it is likely that the traffic could well overload cable's 6 Mbs IP channel, which is shared among 50-150 customers, causing substantial delays. The network solutions are : (i) expand the IP channel capacity considerably, and charge all customers accordingly; (ii) give priority to traffic other than video, thus slowing down video sufficiently to be unwatchable in real time; or (iii) set prices to customers for high data flows sufficient to finance capacity expansion of the IP channel. In any of these cases, the cost of the congestion resulting from high levels of video traffic will raise costs substantially to cable modem customers, along with accusations that the broadband ISPs are favoring their own IPTV offerings over those of their non-affiliated competitors.

Should IPTV become popular enough that traditional IP distribution channels become seriously congested, it will clearly be Round 2 of the net neutrality debate. As the broadband ISPs move their IPTV offerings off the public Internet and struggle to contain congestion on their IP distribution channels to the home, IPTV providers using the Internet will point to the "two-speed" Internet and demand better service at lower prices for their product. "Bad" discrimination will again be found and legislation/regulation demanded. Cable and telco firms will be accused of favoring their own services at the expense of others, and the FCC will be asked to force open the broadband ISP's proprietary networks to others. The outcome of this battle is not clear, but what is clear is that it will be far nastier than today's net neutrality battle, which will seem polite by comparison.

Conclusion: What Is To Be Done?

Several conclusions follow from my analysis. (i) The "bit-is-a-bit-is-a-bit" form of net neutrality has been blessedly abandoned by serious proponents as throwing out the baby with the bathwater, in favor of attempts to ban "bad" discrimination while keeping "good" discrimination. (ii) The price structure in the two-sided market of broadband ISPs is likely to evolve to meet market needs, as it has in every other two-sided market in the economy. This evolution may take some time, but attempts to freeze the current price regime are ill-advised in the extreme. (iii) Vertical practices are at least in theory an anticompetitive threat, although proving that such practices (a) occur and (b) are inefficient is likely a difficult empirical task. Nevertheless, on the basis of the current evidence, no such anticompetitive vertical practices are deployed. In theory, there could well be problems in the future; but we don't see any evidence of it now.

This suggests a course of action: Since we have no problem now, we need no solution now, and particularly one that runs the real risk of imposing heavy-handed regulation on a currently unregulated industry. However, vertical issues have the potential to cause problems in the future, and we must be alert to that possibility. But this is no different from any other industry in which there are problems that could occur in the future but haven't so far. We have in place a set of laws in the U.S. for dealing with such situations: antitrust law. Should broadband ISPs undertake anticompetitive vertical practices in the future, either the government or private parties can bring antitrust actions against the offenders, responding to the problem when there actually is a problem. Antitrust law, while certainly not perfect, has served this country well for over 100 years. It applies to all business, and is not specific to an industry that may not even exist in the next decade. The problems that net neutrality proponents suggest may occur are the same as problems that occur in other industries, and are problems which antitrust is designed to remedy. Should problems arise in the future, we have the tools to remedy the situation. New legislation is not required and is ill-advised.

The only flash point on the horizon is a highly popular IPTV service. Cable firms and telcos would be well advised to plan ahead for how to avert calls to open up their core networks to others, coupled with accusations of anticompetitive vertical practices.

But we should not lose sight of perhaps the most important policy action that we can take, and that is encouraging and enabling more competition into the broadband ISP market. It is unlikely that dozens of competitors can be supported, but surely more than two are feasible. As noted above, public policy does have an important role in removing roadblocks to competition, a role far more urgent and vital than extending regulation to yet another industry.