THE IMPORTANCE OF ISPS IN THE GROWTH OF THE COMMERCIAL INTERNET

WHY RELIANCE ON FACILITY-BASED COMPETITION WILL NOT PRESERVE VIBRANT COMPETITION AND DYNAMIC INNOVATION ON THE HIGH-SPEED INTERNET

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EXECUTIVE SUMMARY

THE UNDERPINNINGS OF THE DYNAMIC, CONSUMER-FRIENDLY INTERNET

In 1990, dial-up, online information services could be found in about 1 million American homes (see Exhibit ES-1). Within a dozen years, the number of dial-up (or narrowband) Internet service subscribers had grown to almost 50 million. This paper shows that this explosive growth was made possible by a ubiquitous, open communications network and thousands of Internet service providers (ISPs) who made a complex communications network technology into a mass-market product. Internet service providers grew from a few hundred in the late 1980s to around 7,000 at the turn of the century by:

- simplifying the technology for mass consumption and rendering a continuous flow of applications useful to the public, like the web and web browsers, e-mail, chat, streaming, file sharing, etc.,
- covering the nation with local calling area Internet service, and
- offering a number of service options with a range of pricing options.

The cornerstone of this dynamic development was an environment in which decision-making was decentralized and use of the network was unrestricted. Federal policy ensured that the owners of the telecommunications network, over which the information services traveled, could not manipulate the network to frustrate experimentation or hinder commercial services. The growth of the Internet provided a tremendous stimulus for the spread of computers to the public.

CLOSING THE INTERNET STIFLES COMPETITION AND HARMS CONSUMERS

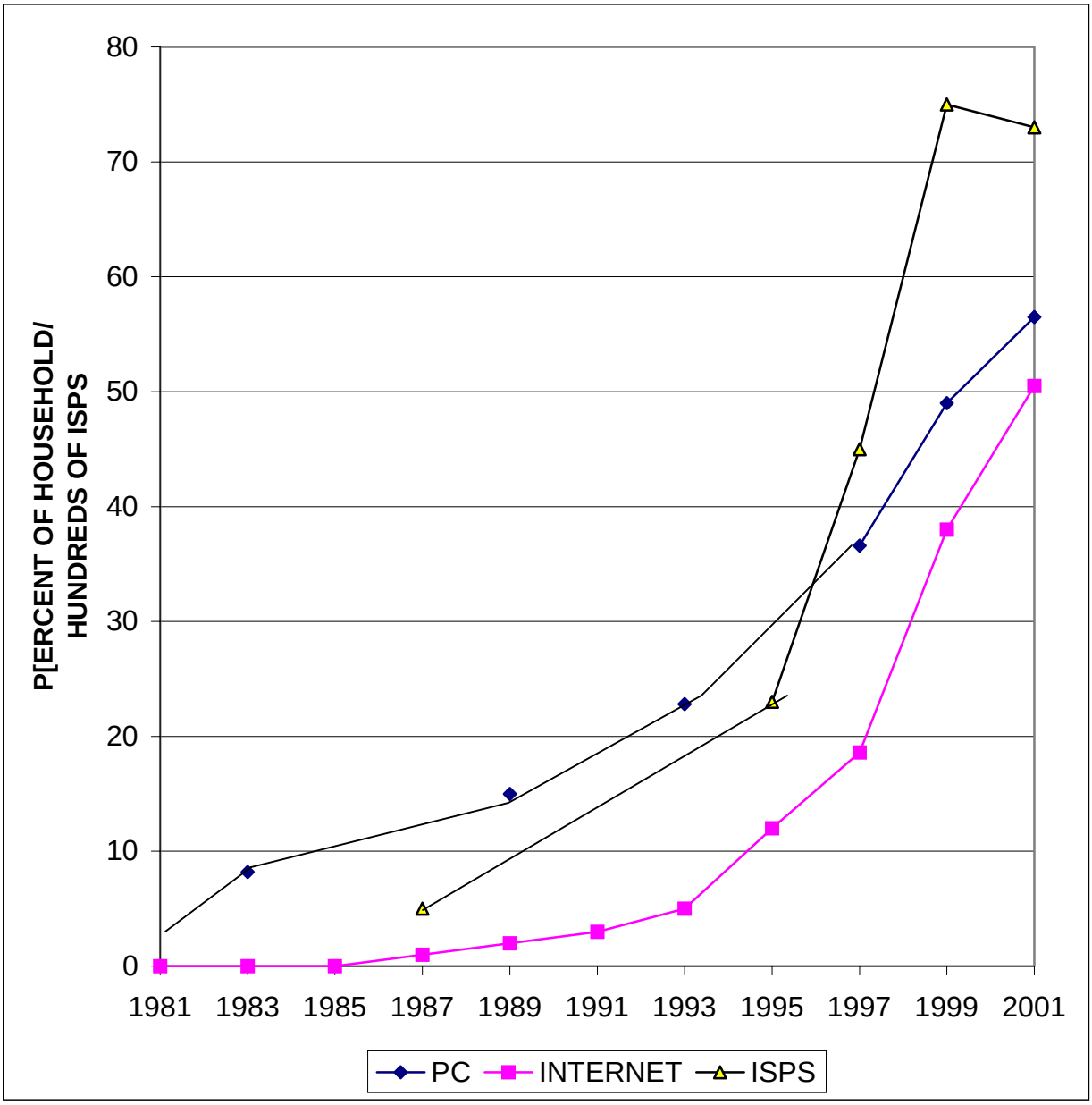
In spite of this remarkable success story, owners of advanced telecommunications networks are attempting to close down the next generation of the Internet – the broadband or high-speed Internet. Turning its back on past, procompetitive policies, the Federal Communications Commission has decided to allow cable and telephone companies to monopolize the sale of Internet access service to the public and foreclose independent ISPs. The results of these monopoly business practices and the FCC's policy are evident (see Exhibit ES-2).

- In the dial-up (narrowband) Internet market, there are about 15 ISPs for every 100,000 Internet subscribers. In the high-speed (broadband) Internet market, there are fewer than 2 ISPs for every 100,000 customers.
- Affiliates of cable and telephone companies have a 95 percent market share on the broadband Internet, where they can exclude competitors, but only a 5 percent market share in the narrowband market, where they must compete fairly.

Lacking competition, the broadband Internet has exhibited the classic signs of market failure.

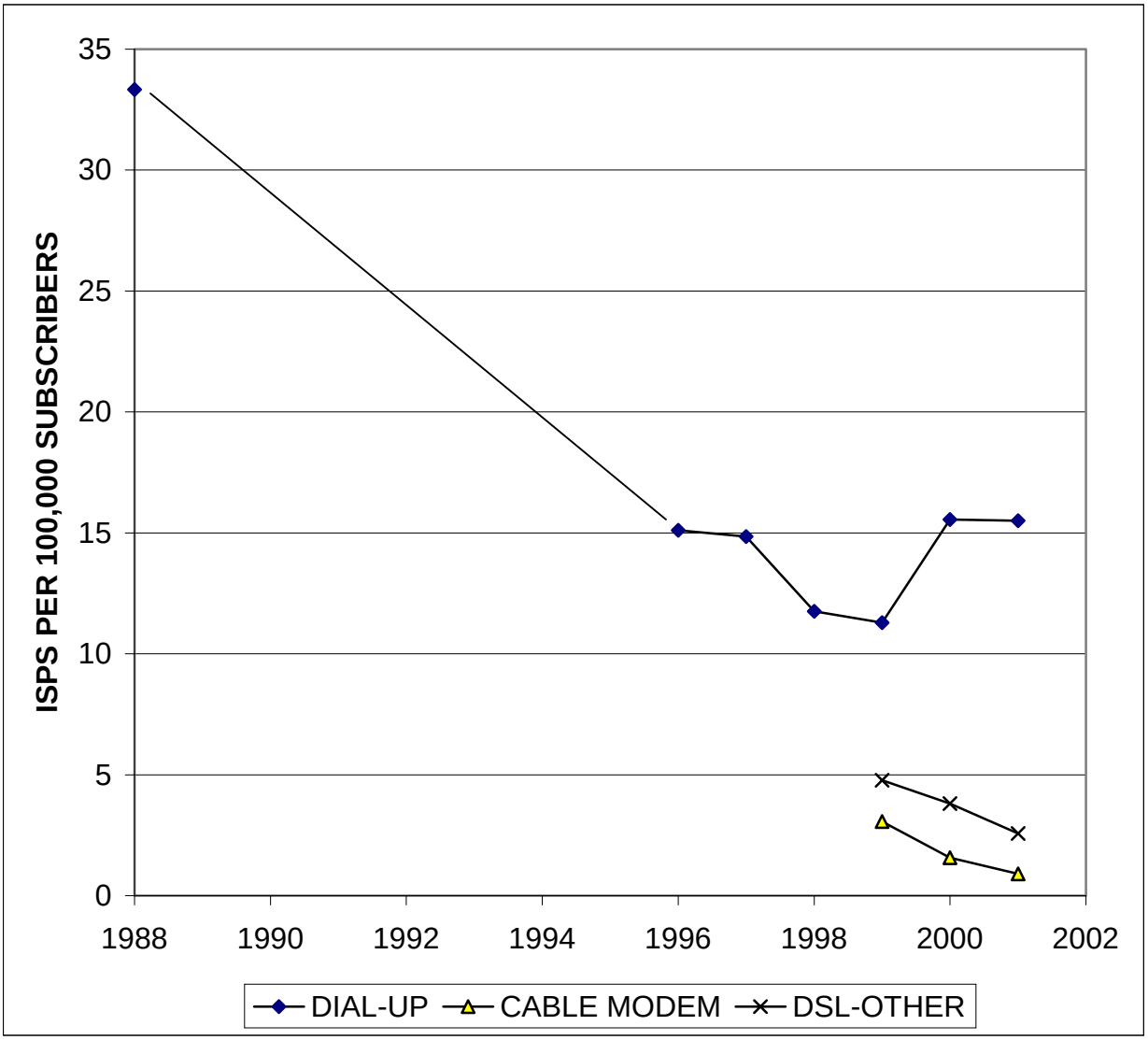
- Prices have been rising, in spite of declining costs.
- Adoption has been lagging.
- Innovation has been virtually nonexistent.

EXHIBIT ES-1:
ISPS, INTERNET SUBSCRIPTION AND HOME PC PENETRATION



Source: Carey, John, "The First Hundred Feet for Households: Consumer Adoption Patterns," in Deborah Hurley and James H. Keller (Eds.), *The First Hundred Feet* (Cambridge: MIT Press, 1999); National Telecommunications Information Administration, *A Nation Online* (U.S. Department of Commerce, 2002). Early ISP counts are discussed in Mark Cooper, *Expanding the Information Age for the 1990s: A Pragmatic Consumer View* (Consumer Federation of America, American Association of Retired Persons, January 11, 1990), see also Janet Abbate, *Inventing the Internet* (Cambridge: MIT Press, 1999) and Matos, F., *Information Service Report* (Washington, D.C.: National Telecommunications Information Administration, August 1988). Recent ISPS Counts are from *Boardwatch Magazine*, "North American ISPS," mid-year estimates.

EXHIBIT ES-2:
DENSITY OF INTERNET SERVICE PROVIDERS BY DATE



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A MISPLACED FAITH IN INTERMODAL COMPETITION BETWEEN CLOSED FACILITIES

To justify this policy shift, the FCC mistakenly relies on the theory of Intermodal competition—or competition between a small number of facility owners-- which is simply inadequate to achieve the outcome the FCC hopes for. Intermodal competition is an unproven theory that amounts to competition without competitors.

- The majority of consumers and businesses do not have a choice of technologies.
- Each of the possible technologies is suited to a different market segment – business are unlikely to use cable modem service, DSL service is ill-suited to residential, interactive video applications.

The record of anti-competitive behavior within and across cable and telecommunications markets is a stunning indictment of the theory of intermodal competition. The best evidence of what will and will not happen, should the FCC pin its hopes on Intermodal competition, is what did and did not happen over the past six years.

In telecommunications markets:

- Wherever telephone prices for local service were deregulated, they immediately shot up, even in markets that were purportedly competitive.
- Telephone companies have refused to compete head-to-head by entering each other's territory, instead, they choose to buy one another out.
- Telephone companies have refused to enter the long distance business in a significant way, except in their monopoly local service areas.
- They failed to compete in the video market.

In cable video markets:

- When cable prices were deregulated, they shot up, notwithstanding claims that markets are competitive.
- Cable companies have refused to compete with each other, choosing instead to buy each other out.
- Cable companies have been extremely slow to enter the telephone business.

What did happen is that incumbent cable and telephone monopolists put forth a strenuous effort to foreclose their markets to competitors. The strategy is identical in both cases:

- Withhold strategic inputs from potential competitors (i.e. blocking access to required equipment)
- Create an artificial scarcity of capacity (bandwidth)
- Control the technology and functionality to protect the core monopoly product and dictate the pace and type of innovation (i.e. configuring networks to prevent activities at the network owner's discretion)
- Control the customer relationship (i.e. offer a restricted set of services to ISP thereby interfering with the customer relationship)
- Squeeze the competitors by driving wholesale rates close to retail prices.

ANTI-COMPETITIVE PRACTICES IN ADVANCED TELECOMMUNICATIONS NETWORKS

Cable and telephone companies have used a variety of explicit and implicit strategies to eliminate competition. The FCC's has declared cable's exclusionary practice to be legal, notwithstanding the fact that cable operators prevent 99.9 percent of ISPs from selling Internet access over cable's advanced telecommunications networks.

In addition to explicit exclusion, cable and telephone companies engage in a range of other practices that undermine competition.

- Policies of Exclusion: To prevent competitors from getting a head start, the incumbent who controls the network refuses to make the underlying wholesale service available to competitors, until it has fully developed its own retail offering even though the wholesale components are clearly available.
- Architectural Barriers: The technical capabilities of the network controlled by the proprietor are configured and operated to disadvantage independent ISPs by preventing certain types of activities the network owner simply does not want to allow or by restricting an independent ISP while not restricting an affiliated ISP.
- Restrictions on Service: The network owner places restrictions on how non-affiliated service providers may use the network. For example, preventing independent ISPs from delivering services to consumers by restricting speed, duration of transmission, or other operational characteristics.
- Business Leverage: By imposing onerous terms and conditions on information, pricing, product bundling and customer relationships, network owners insert themselves in the relationship between the customer and the independent ISP in such a way as to ensure that its affiliated ISP has a price, product or customer care advantage.

PERMANENT HARM TO VIBRANT COMPETITION ON THE INTERNET

Even without intentional anticompetitive behavior, closure of the communications platform imposes a cost on society. It distorts incentives for innovation and undermining institutional options. Restricting the range of experimentation and shifting incentives reduces the quality and quantity of innovation and innovators because it shifts the balance between incumbents and disruptive entrants. Incumbents behave rationally by developing their core competence and seeking structures that reward it. The dominant commercial firms have incentives to expand by commercializing, concentrating, and homogenizing information space.

The irony is that Congress understood this well. It supported three modes of entry, required competition before deregulation, and set out specific, rigorous conditions under which regulation could be relaxed. The correct public policy is to stimulate small numbers competition in physical facilities and preserve large numbers competition in applications and content. Congress clearly intended this outcome and gave the FCC the tools to accomplish it. The FCC's shift to a reliance on intermodal competition at the expense of intramodal competition would contradict Congressional intent and subject consumers to great risk of the abuse of market power, slowing innovation and strangling competition.

I. INTRODUCTION

After percolating at universities, research laboratories and government installations for about a quarter of a century, commercialization of the Internet in the 1990s led to an explosive consumer revolution.[1] As shown in Exhibit 1, from little penetration in the general public in 1990 (1-2 million households connected) the Internet reached into about half of all homes in America just over a decade later (over 50 million households connected in late 2001).[2] Indeed, one can argue that the Internet was the "killer application" for the PC, since PC penetration in the household market accelerated rapidly after the advent of the Internet and its premier applications the web and the web browser.

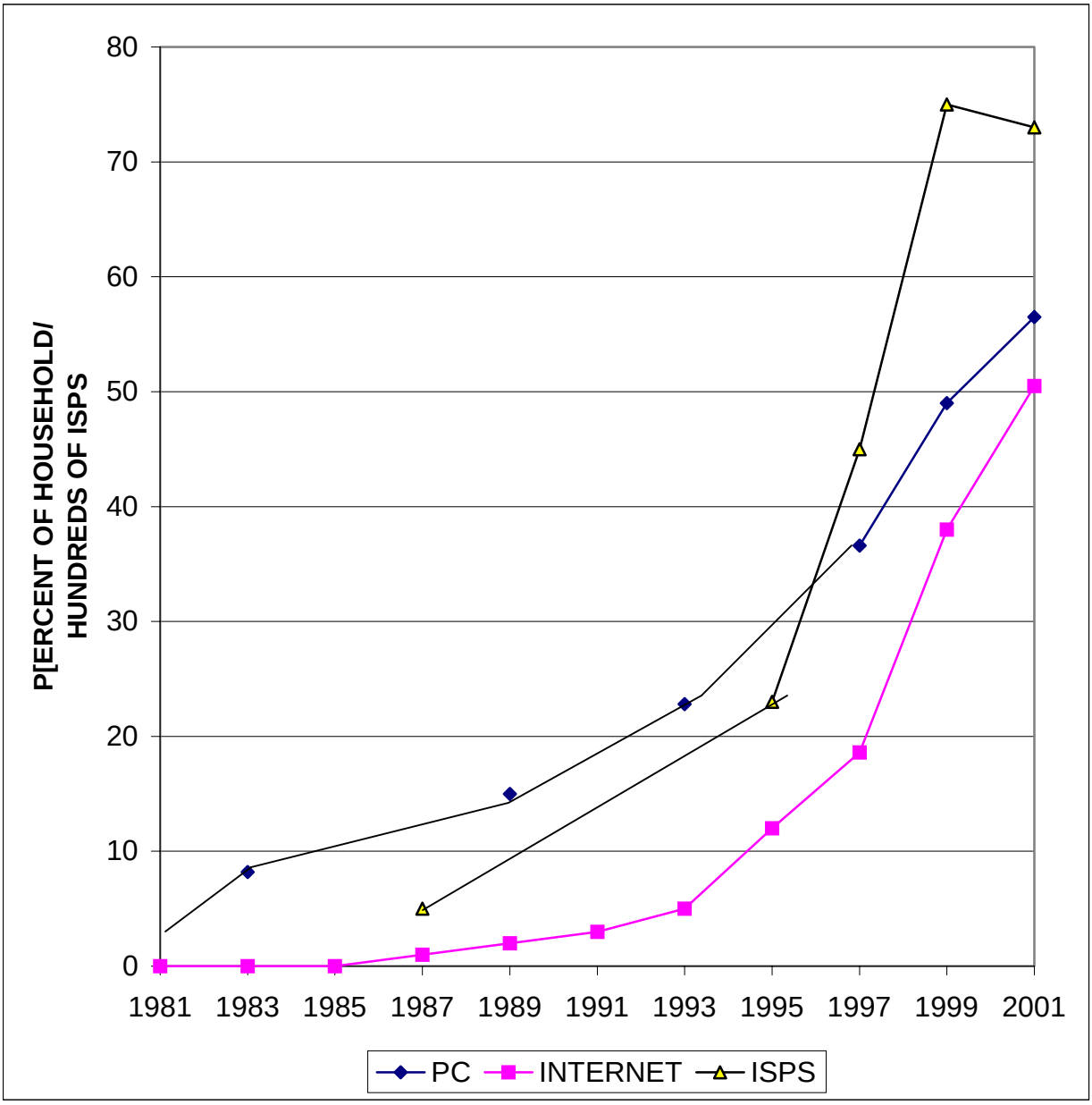
Getting 50 million households to use a new, technologically sophisticated device (the PC) to interconnect on a regular basis with a network of millions of other devices was no mean feat. Understanding what made the extremely successful commercialization of the Internet possible is obviously a matter of intense interest.[3] The Internet has become the centerpiece of the information economy. In spite of the recent the stock market troubles of Internet, technology and communications companies and the economic recession, the use and importance of the Internet continues to grow.[4] Preserving and harnessing the dynamic development of the Internet is an important goal of public policy.

Some argue that notwithstanding the dramatic spread of the Internet through the population, a fundamental change in the architecture of the Internet and the business relationships that grew out of it will not change its dynamic nature.[5] They advocate allowing facility owners to exercise much greater control over operation of the Internet.[6] The current efforts to centralize control are the third round in an ongoing struggle between dominant communications companies and the decentralized Internet structure.

In the late 1970s, as the Internet was being created, telecommunications companies sought to impose their centralized architecture upon it.[7] Again in the late 1980s, as the Internet was transitioning to commercial operations, the telecommunications giants wanted to change its structure.[8] Policymakers were pressed by telephone companies to allow them to play a much larger role in dictating the development and use of the network, just as cable and telephone companies are arguing today. Policy makers resisted the earlier arguments for closure of the network and chose to keep it open. The result was a remarkable decade of widespread commercial innovation and development. The third effort to impose centralized control on the Internet appears to be succeeding. The Federal Communications Commission has issued a series of orders and rulemakings that would essentially allow owners of network facilities to control the deployment of services and access to facilities for ISPs and consumers.[9]

Open communications networks were the essence of the Internet as conceived by its founders and decentralized experimentation and innovation were its objectives.[10] The beneficial effects of this design on innovation and economic activity have been well documented.[11] This paper argues that an essential element in the success of the commercial Internet was the role played by Internet service providers (ISPs), who were provided an environment for the vigorous and unfettered development of consumer-driven services. Internet service providers will be the first victims of the policies that allow network owners to favor affiliated entities and foreclose independent ISPs. The outcome will be disastrous for the dynamic nature of the Internet. Experimentation at the ends of the network will be stifled and agents to popularize new services will disappear.

EXHIBIT 1:
ISPS, INTERNET SUBSCRIPTION AND HOME PC PENETRATION



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We make the case by presenting a multifaceted view of the successful development of the Internet. In Section II we begin by looking forward from 1990, at the start of commercialization of the Internet. Here we re-examine the view taken by consumer advocates at that time showing, in essence, that it was possible to understand why the Internet would succeed based on the principles of its organization.[12] We then look back from 2002 and reaffirm those principles.

In Section III we consider the likely impact of the centralized, closed approach, which allows the companies that own the communications infrastructure to dictate and control the nature of its use. Looking at activity on the broadband Internet today, which is being rolled out under much less open conditions of the late 1990s, we find little support for the notion, on which Federal policy makers propose to base the next generation of the Internet, that "intermodal" competition will preserve the dynamic nature of the Internet.[13] The record of actual behaviors in the past half-decade refutes the claim that the enlightened self-interest of dominant communications companies, responding to pressures generated by a very small number of competing technologies, will induce facility owners to allow unfettered use of the network to recreate the dynamic environment of the Internet. We discuss the anticompetitive tactics and foreclosure strategies that network owners have been using since the passage of the Telecommunications Act of 1996 to undermine competition from Internet service providers and stifle innovations that threaten their core monopoly products and services.

Finally, Section IV we examine the effects of closing the network on Internet service providers and market performance. We the structure of the high-speed Internet access market, focusing on the small number of service providers and their ability to avoid competing. Price increases and a lack of innovation support the view that the market sorely lacking in competition.

II. UNDERPINNINGS OF THE DYNAMIC, CONSUMER-FRIENDLY INTERNET

A. LOOKING AHEAD FROM 1990

In January 1990, two leading consumer groups published an evaluation of the competing information age policy options before Congress.[14] The Regional Bell Operating Companies (RBOCs) were pushing hard to be allowed to move beyond their role as pure transmission companies.[15] They sought to expand their role from providing regulated transmission services into the provision of unregulated information services.

The consumer groups believed that there was a critical choice to be made between a centralized and a decentralized approach.[16] The consumer groups' analysis warned that the approach advocated by the communications companies "could set the information age development back by undermining the diversified, innovative process of the current decentralized approach."[17] The characteristics of the decentralized approach that the consumer analysis singled out proved to be the essential characteristics of the Internet.

> Pragmatic: Most of these new, innovative services have close substitutes. Why not give individuals maximum flexibility in the choice of equipment and services allowing them to develop applications at the periphery of the network?
>
> Decentralized: Decentralized decisions will select the most cost-effective technologies with specific applications.
>
> Periphery: Intelligence is more concentrated in homes and business and on the premises of service providers who connect their services through a local transmission network.
>
> Applications: Specific applications will be required to be cost effective. There will be successes and failures, but the process of trial and error driven by profit will generate lowest cost and minimize public cost risks of network applications.
>
> Individualized: Costs are more highly individualized, borne by those who develop the applications and those who choose to subscribe to them, either through or around the public network.[18]

The consumer analysis argued that fundamental changes in technology had created the basis for a dynamic information environment. In particular, "the fact that a great deal of the necessary intelligence is currently located on the periphery of the information age network has led to a pragmatic, decentralized pattern of development."[19]

At a time when those arguing for a centralized approach were advocating the need to "jump start" adoption, the consumer analysis argued that the development of consumer-friendly applications would attract demand and play a critical role in stimulating the penetration of information services.

> To date, use of these capacities has been concentrated among larger businesses and individuals with the resources and desire to invest in the necessarily specialized equipments and/or to seek out service providers.

> Increasingly, however, as prices and equipment costs come down, the number of services available increases and their ease of use is enhanced, more and more businesses and households will enter the information age.[20]

The role of Internet service providers as the glue to pull together the available elements to spur adoption was clearly identified.

> All of these services exist because the service providers saw a need that was cost-effective for them to fill. The equipment, including telephones, personal computers and televisions, was in place and the provider saw a way to create a market for an information service provider.[21]

The criticism of centralized model stressed the distorting effect that it could have on competition and the damage it would do to service providers.

> The insistence that content must be combined with the conduit raises difficult questions of open access and fair marketing. In an industry with a long history of anti-competitive behavior, third party content providers believe that allowing the telephone companies to provide content means the end of competition.
>
> Remonopolization raises problems of both cost and inefficiency… Because that provider plays such an important role and has such a large stake, it will attempt to protect its interests. Instead of imposing the best solution, the market may become distorted by the market power of the dominant firm.
>
> The monopoly position of the telephone companies could also be used to the disadvantage of non-telephone company service providers. They would simultaneously be forced to rely on the telephone company for access to customers and meet the telephone company in the marketplace as a competitor for sales to those same customers.[22]

B. LOOKING BACK FROM 2002

The Regional Bell Operating Companies did not get their way at the start of commercialization of the Internet. Communications networks remained opened and the telephone companies' ability to leverage control over the communications infrastructure remained constrained by public policy. A review of the developments in the past decade reaffirms the importance of open communications networks and unrestricted service development by Internet service providers.

We believe that a convincing argument has been made that among the most critical conditions for the success of the Internet was an open, ubiquitous, high quality communications network.[23] The network was interconnected and accessible to producers and consumers, free from the domination of centralized network operators and not Balkanized by proprietary standards. Decentralized activities and widespread experimentation were encouraged by very few restrictions on use. This underlying condition opened the door to the growth of a whole new industry -- Internet service providers – that played a key role in the successful commercialization of the Internet.

Online service providers numbered about 400 to 500 in the late 1980s when the commercialization began.[24] That number grew to between 7,000 and 8,000 Internet service providers in the late 1990s.[25] Buying wholesale telecommunications service from telephone companies and selling basic Internet access combined with a variety of additional services to the public, they translated the complex technologies that had to be combined to use the Internet into a mass market service.[26] Once the Internet was commercialized, they rapidly covered the country with dial-up access and translated a series of innovations into products and services that were accessible and useful to the public. Throughout the history of the commercial narrowband Internet, the number of service providers was never less than 10 per 100,000 customers (see Exhibit 2). At present, and for most of the commercial history of the industry, there have been 15 or more ISPs per 100,000 subscribers

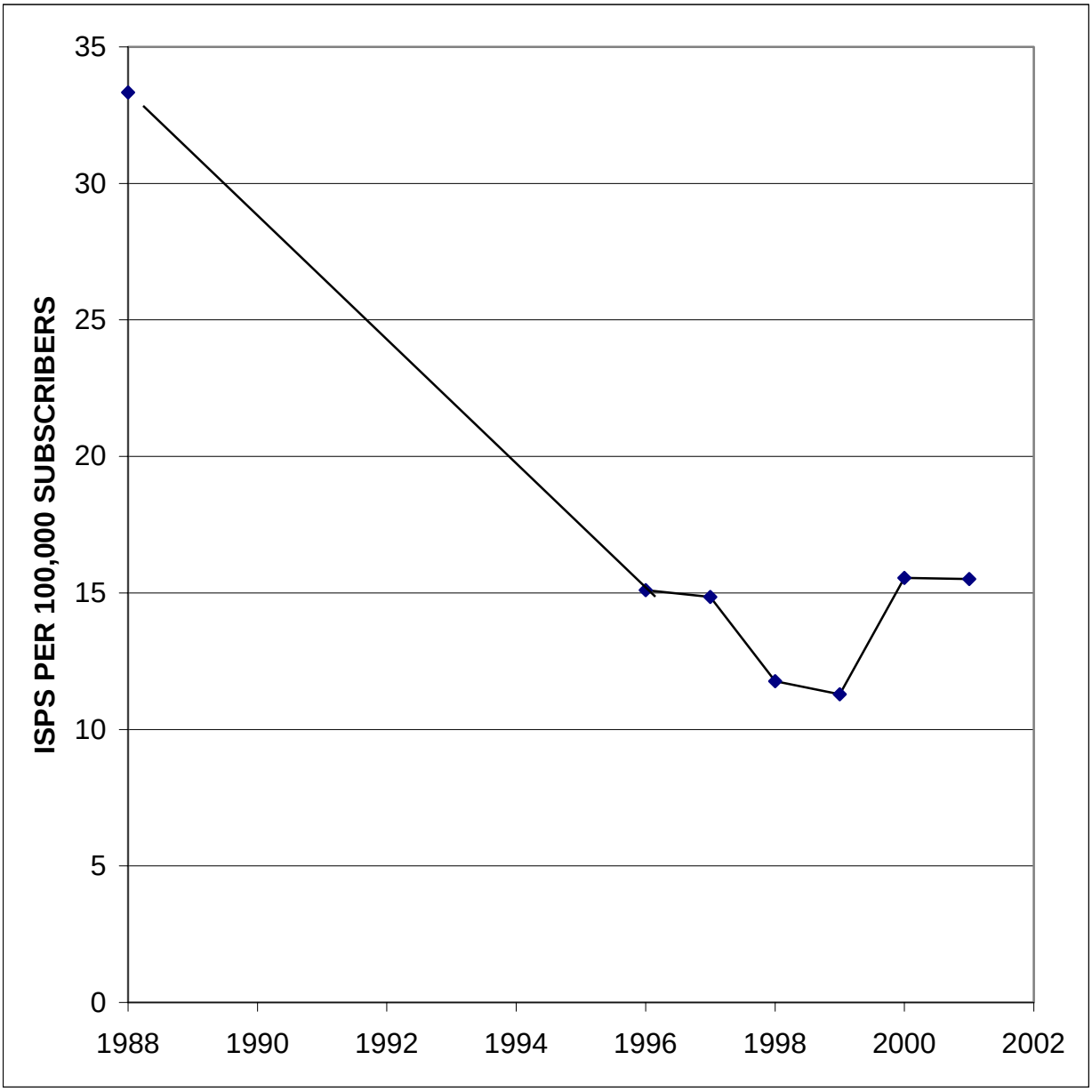
Some of the underlying innovations that the ISPs adapted and popularized had been around for a while like the Internet protocol itself, e-mail, file transfer and sharing, and bulletin boards. Some of the innovations were very recent, like the web, the browser, instant messaging and streaming. Thousands of ISPs tailoring services to customer needs supported the rapid spread of Internet subscription and use.

The growth of usage in the late 1990s was stunning. Exhibit 3 shows the growth of use over the course of the 1990s, contrasting a projection made in 1996 for the end of the decade with the actual use. Usage reached 100 hours by 1999, from virtually zero in 1990.[27] By 1999, Internet usage had surpassed time spent on home video games, movies, home videos, consumer magazines and books. It equaled time spent on pay-per-view TV shows. The growth of usage of the Internet did not come at the expense of other activities.[28] The increase in Internet use was registered as an increase in media use but most other uses of the media were stable. Internet time was "stolen" from – was a more efficient way of undertaking – other activities like communications (e-mail, chat) and shopping.[29] Browsing – short visits to a large number of web pages or sites – is a different activity than most other media uses.[30]

Interestingly, a close look at the data suggests that there is a real sense that the Internet, delivering access to the World Wide Web rendered accessible by the development of web browsers, became the killer application for the PC (see Exhibit 4). Although the PC had enjoyed success prior to commercialization of the Internet, it was only after the advent of the business of selling Internet access service to the public that PC sales exploded.

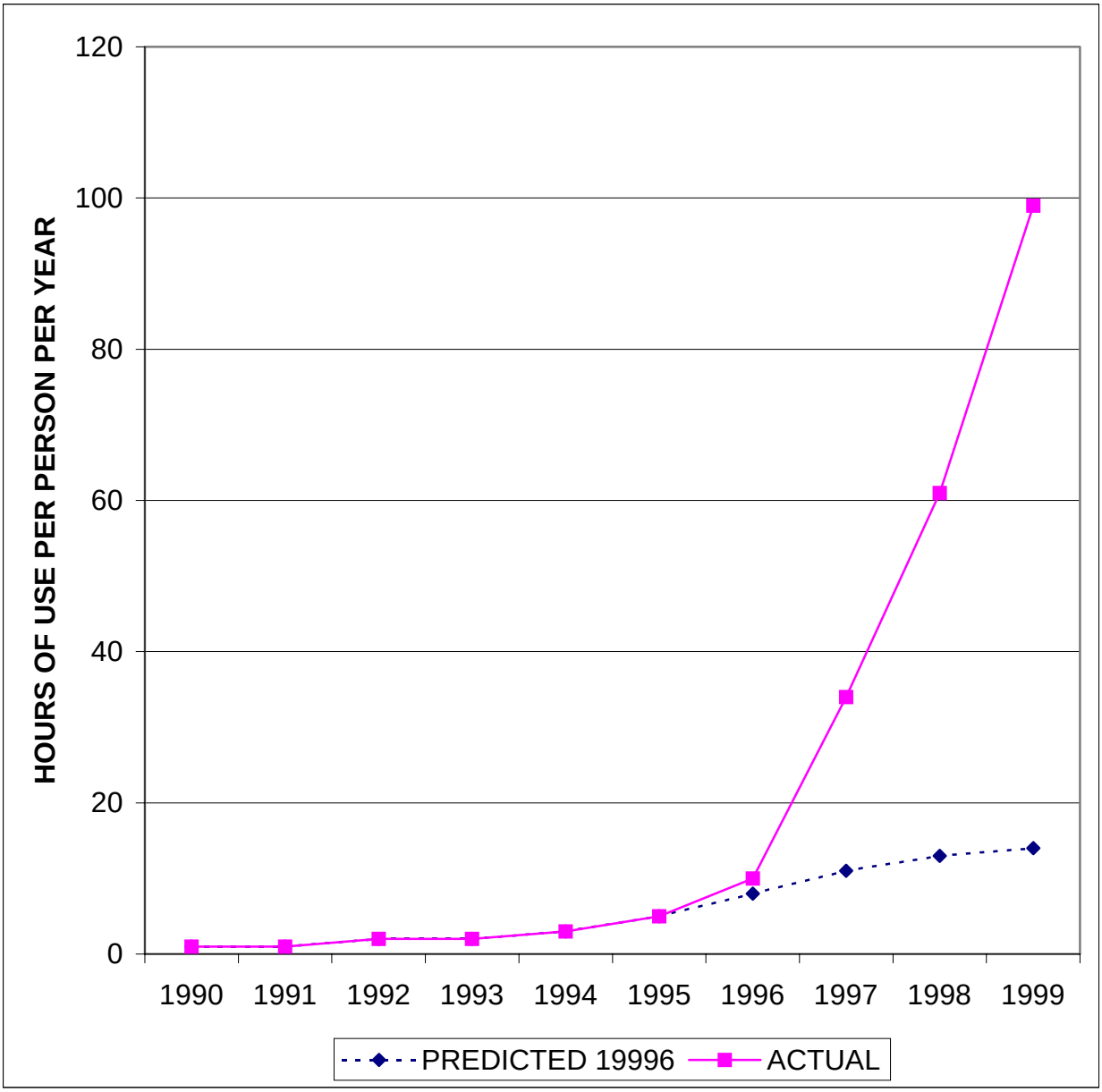
PC prices played a role as well, but it can be argued that the demand stimulation created by the killer application laid the groundwork for the price reductions (see Exhibit 5). The initial PC price reduction of the mid-1980s sustained the moderate growth of the PC for about a decade. In the mid-1990s PC prices were stable, as Internet use escalated. In the late 1990s, PC prices came down, although the sharp increase in demand came first. Thus, in an important way, the application that triggered demand contributed the cycle of economies of scale that is so important in the computer industry.

EXHIBIT 2:
DENSITY OF INTERNET SERVICE PROVIDERS BY DATE



Source: Subscriber counts: Carey, John, "The First Hundred Feet for Households: Consumer Adoption Patterns," in Deborah Hurley and James H. Keller (Eds.), *The First Hundred Feet* (Cambridge: MIT Press, 1999); National Telecommunications Information Administration, *A Nation Online* (U.S. Department of Commerce, 2002). Early ISP counts are discussed in Mark Cooper, *Expanding the Information Age for the 1990s: A Pragmatic Consumer View* (Consumer Federation of America, American Association of Retired Persons, January 11, 1990), see also Janet Abbate, *Inventing the Internet* (Cambridge: MIT Press, 1999 and Matos, F., *Information Service Report* (Washington, D.C.: National Telecommunications Information Administration, August 1988). Since the mid-1990s, annual counts of ISPs have been published in Recent ISPS Counts are from *Boardwatch Magazine*, "North American ISPS," mid year estimates. For high speed ISPs see Federal Communications Commission, *High-Speed Services for Internet Access,*" various issues.

EXHIBIT 3:
GROWTH OF INTERNET USAGE



Source: U.S. Department of Commerce, *Statistical Abstract of the United States,* 1996, Table 878, 2001, Table 1125.

EXHIBIT 4:
THE INTERNET AND THE WEB WERE THE 'KILLER APPS' FOR THE PC

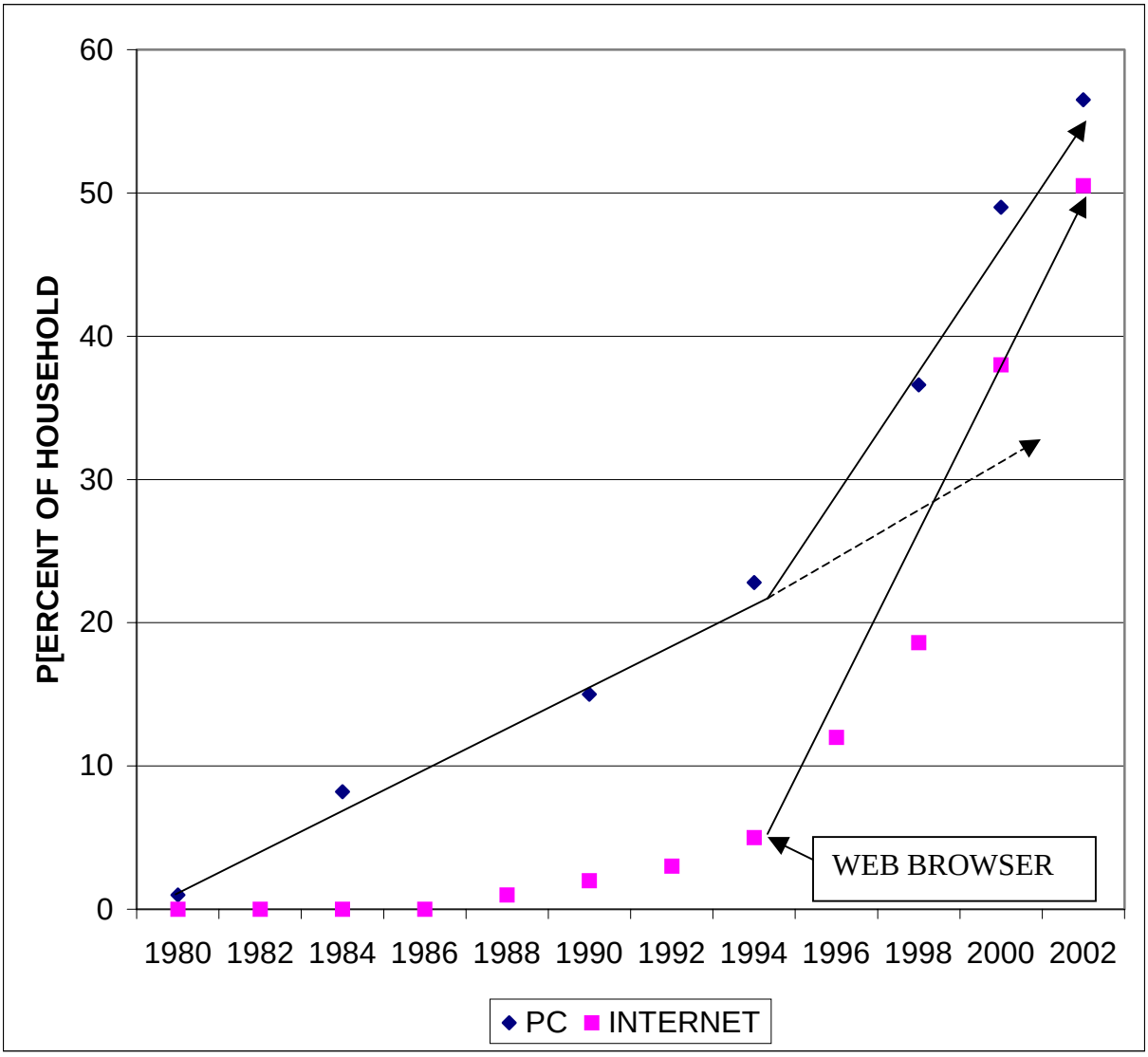


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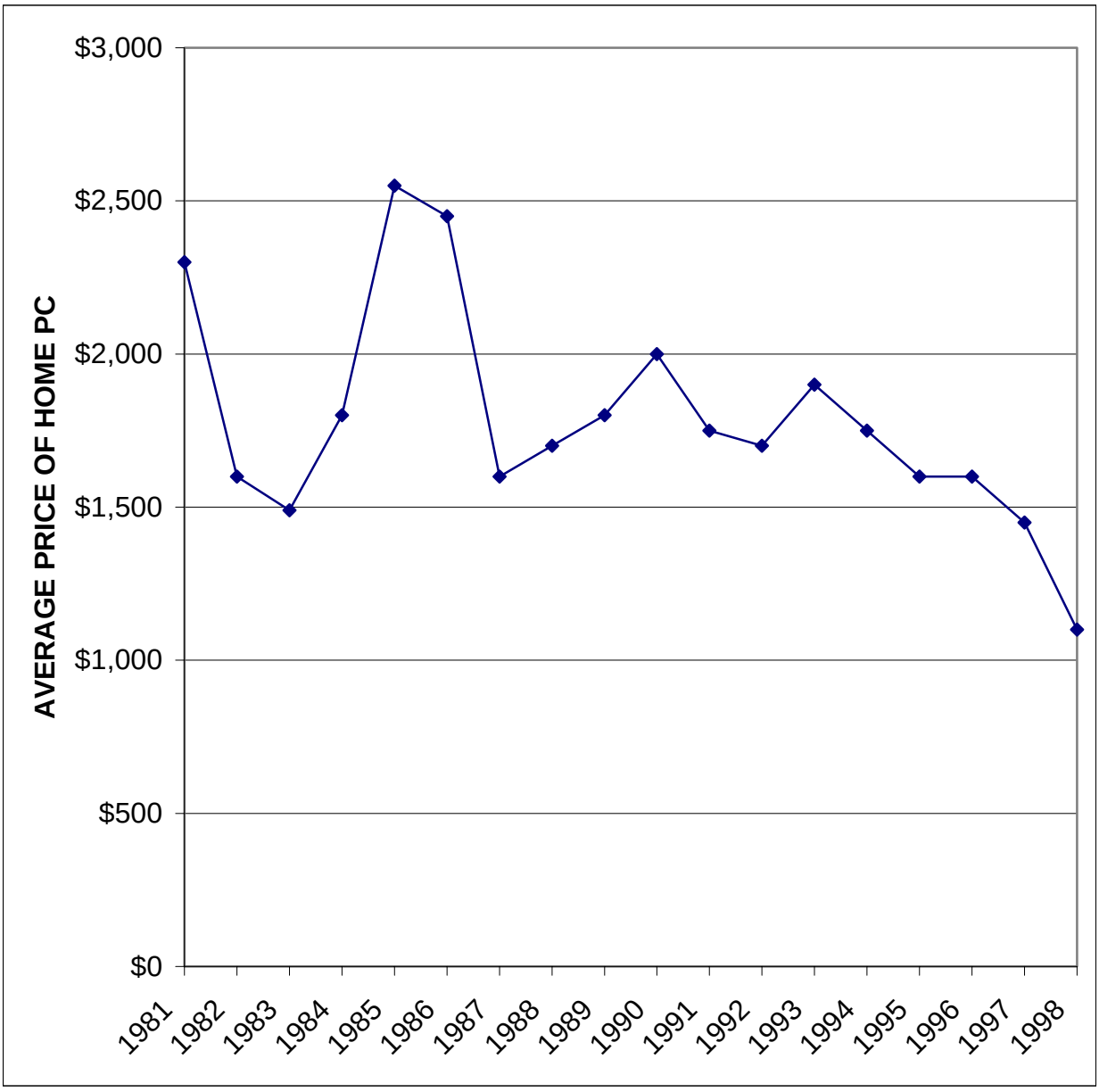
EXHIBIT 5:
AVERAGE PRICE OF HOME PERSONAL COMPUTERS



Source: Carey, John, "The First Hundred Feet for Households: Consumer Adoption Patterns," in Deborah Hurley and James H. Keller (Eds.), *The First Hundred Feet* (Cambridge: MIT Press, 1999), p. 41.

C. THE DYNAMIC ENVIRONMENT OF OPEN DIGITAL COMMUNICATIONS PLATFORMS

In order to appreciate the interaction of technological developments and public policy in the process of the development and commercialization of the Internet, it is useful to apply the concept of a communications platform, which provides an environment in which information or content is produced. Four layers – the physical layer, the logic or code layer, the applications layer and the content layer – define the communications platform.[31] It is a platform because there are strong complementarities between the layers.[32] They must fit together closely and smoothly in order to deliver service.

The physical layer is composed of three parts: a transmission medium (e. g. wires), communications equipment and display devices. In the contemporary cable network, the transmission medium is primarily hybrid fiber coaxial cable that provides the last-mile connection to the residence. In the telephone network the transmission medium is copper cable. Fiber optic cables are found in the backbone of both networks. For cable operators, network communications equipment involves a head-end for video and a CMTS for data and routers and switches for the Internet. The communications equipment on the customer premise for video is the set top box and the cable modem for data. It connects the display device, the TV or PC, to the network for information services. For the telecommunications network a Digital Subscriber Line Multiplexar (DSLAM) is located in the central office. The modem is the communications equipment that connects the PC, the information display device, to the network.

The logic (or code) layer involves the codes and standards with which communications equipment and display devices interconnect, interoperate, and communicate. Protocols interpret the signals. Operating systems allocate and coordinate the resources of the system. The operating systems and communications protocols can be resident in communications equipment and devices or network equipment.

Applications constitute the third layer. Applications are programs that execute a sequence of steps to solve a problem or perform a task for the user. Well-known Internet examples are e-mail, instant messaging, and file sharing.

The content layer is made up of the specific task or problem solved in a given execution of an application. The end-user or a service provider can provide content.

Public policy to promote open communications platforms interacted with major developments in technology to produce a uniquely dynamic communications platform in the last two decades of the 20th century. The growth of the Internet and its underlying technologies changed the fundamental economics of information production.[33]

At the physical layer, cheap, powerful computers[34] and sprawling fiber-optic networks allow communications at rising speeds with falling costs.[35] In the computer hardware industry positive feedback loops, or virtuous circles sustain change and productivity growth that are orders of magnitude larger than typified the industrial age.[36] Advances in computing technology support more advances in computing technology with much greater intensity than in other industries. The positive feedback effects stimulate much more dynamic economic development than simple efficiencies.[37]

In the code layer of the network, increasingly sophisticated software enables messages to be routed, translated, and coordinated.[38] In the applications layers, a software revolution of standardized and pre-installed bundles of software appear to have allowed the rapidly expanding capabilities of computer hardware to become accessible and useful to consumers with little expertise in computing.[39]

At the content layer every sound, symbol, and image can now be digitized.[40] The more complex the sound or image, the more data has to be encoded and decoded to accomplish the digital representation.[41] But, when computing speeds, storage capacity and transmission rates become big enough, fast enough, and cheap enough, it becomes feasible to move huge quantities of voice, data, and video over vast distances. As computers got cheaper and cheaper and applications became more abundant and user-friendly, computers ceased being merely a workplace or laboratory tool and became a consumer electronic device.

Overlaid on this dramatically expanding technological base was the architectural design principle of the Internet – the end-to-end principle.

> The "End-to-End" principle organizes the placement of functions within a network. It counsels that "intelligence" in a network be located at the top of a layered system— at its "ends," where users put information and applications onto the network — and that the communications protocols themselves (the "pipes" through which information flows) be as simple and general as possible. (16)
>
> While the End-to-End design principle was first adopted for technical reasons, it has important social and competitive features as well. End-to-end expands the competitive horizon, by enabling a wider variety of applications to connect and use the network. It maximizes the number of entities that can compete for the use and applications of the network. As there is no single strategic actor who can tilt the competitive environment (the network) in favor of itself, or no hierarchical entity that can favor some applications over others, an End-to-End network creates a maximally competitive environment for innovation, which by design assures competitors that they will not confront strategic network behavior. (18)[42]

This design principle and a fierce dedication to decentralized development lay at the core of the dominant application of the Internet, the web. The inventor of the web describes the threat by the developer of similar applications to impose centralized control as a seminal event in moving the web into the public domain.[43] Lessig argues that

> [t]he birth of the web is an example of the innovation that the end-to-end architecture of the original Internet enabled. Though no one quite got it – this most dramatic aspect of the Internet's power – a few people were able to develop and deploy the protocols of the World Wide Web. They could deploy it because they didn't need to convince the owners of the network that it was a good idea or the owners of computer operating systems that this was a good idea.[44]

The resulting change in the information environment arises not only because of the intensity of use of the factors of production, [45] or even its speed, but a fundamental change in relationships between the factors of information production. Users of the communications network become producers embedded in an interactive process through instantaneous feedback.

> It is a proven lesson from the history of technology that users are key producers of the technology, by adapting it to their uses and values, and ultimately transforming the technology itself, as Claude Fischer demonstrated in his history of the telephone. But there is something special in the case of the Internet. New uses of the technology, as well as the actual modifications introduced in the technology, are communicated back to the whole world, in real time. Thus, the time span between the process of learning by using and producing by using is extraordinarily shortened, with the result that we engage in a process of learning by producing, in a virtuous feedback between the diffusion of technology and its enhancements.[46]

This makes it possible for a wholly new form of collaborative information production to exist on a sustainable basis,[47] while it transforms existing organizations. The new thrust of corporate organization, based on distributed intelligence and flat structure, reflects these forces.[48] Hierarchy is out, horizontal is in.[49] The ability to coordinate at a distance dramatically alters the nature of centralized control, transferring much decision-making to dispersed management. A Harvard Business School Press publication, graphically titled *Blown to Bits*, summarized the dramatic change compelling corporate adjustment as follows:

> Digital networks make it possible to blow up the link between rich information and its physical carrier. The Internet stands in the same relation to television, as did television to books, and books to stained glass windows. The traditional link between the economics of information and the economics of things – is broken.[50]

This development in information space is extremely procompetitive. The Internet unleashed competitive processes and innovation exhibiting the fundamental characteristics of audacious or atomistic competition.[51]

> Experimentation by users and competition among providers, across the range of segments that constitute the Internet, generated a surge of self-sustaining innovation… This network openness and the user-driven innovation it encouraged were a distinct departure from the prevailing supply-centric, provider-dominated, traditional network model. In that traditional model a dominant carrier or broadcaster offered a limited menu of service options to subscribers; experimentation was limited to small-scale trials with the options circumscribed and dictated by the supplier. [52]

The end-to-end principle had a dramatic effect in the communications environment of the late twentieth century.

> Diversity of experimentation and competition on an increasingly open network were key, since nobody could foresee what would eventually emerge as successful applications. Openness allowed many paths to be explored, not only those which phone companies, the infrastructure's monopoly owners, would have favored. Absent policy-mandated openness, the Regional Bell Operating Companies (RBOCs) and monopoly franchise [cable television] networks would certainly have explored only the paths of direct benefit to them. It is doubtful that without such policy-mandated openness the Internet Revolution would have occurred.[53]

As in traditional areas of economics, procompetitive economics of open communications platforms reinforces the fundamental principle of civic discourse.[54] There is close symmetry between the end-to-end principle of the Internet and the institutional principles of our democracy,[55] which seek to promote "the widest possible dissemination of information from diverse and antagonistic sources"[56] in civic discourse. These Internet is ideally for populist forms of democracy.

> Relative anonymity, decentralized distribution, multiple points of access, no necessary tie to geography, no simple system to identify content, tools of encryption – all these features and consequences of the Internet protocol make it difficult to control speech in cyberspace. The architecture of cyberspace is the real protector of speech there; it is the real "First Amendment in cyberspace," and this First Amendment is no local ordinance…
>
> The architecture of the Internet, as it is right now, is perhaps the most important model of free speech since the founding. This model has implications far beyond e-mail and web pages.[57]

The observation extends to communications platforms with particular force. Lessig points out that at the time of the framing of the Constitution the press had a very atomistic trait.

> The "press" in 1791 was not the *New York Times* or the *Wall Street Journal*. It did not comprise large organization of private interests, with millions of readers associated with each organization. Rather, the press then was much like the Internet (within reason) could become a publisher – and in fact an extraordinary number did. When the Constitution speaks of the rights of the "press," the architecture it has in mind is the architecture of the Internet.[58]

D. THE ROLE OF PUBLIC POLICY IN CREATING OPEN COMMUNICATIONS PLATFORMS

There must be no mistake about the critical role that government policy played in the process of creating this new information environment. The flexibility and fluidity we have achieved in the information age is in part a result of severing the link between the physical layer and the code and content layers.

It has long been recognized that the economic characteristics of communications facilities render it highly unlikely that communications markets will be made up of numerous networks competing vigorously (atomistically competitive).[59] Rather, they tend, at best, to be tight, differentiated oligopolies or monopolistically competitive,[60] or, more likely, natural monopolies. There are clear indications that this remains as true today as it has been for the past century.[61]

Public policy has been centrally concerned with preventing the abuse of the market power stemming from these small numbers that typify these markets. At various times and in different layers, this policy has included structural regulation of ownership, setting standards, requiring interconnection and carriage, public interest obligations for content, regulation of rates, and the like. In the last several decades, promoting competition at all layers of the communications platform through a wide range of mechanisms has become a focal point of policy.

Although an obligation to provide nondiscriminatory access to communications networks have been a long standing principle in the U.S., the most recent iteration of this policy had a particularly powerful effect because it interacted with the spreading technology and architectural principle of the Internet (end-to-end) to create a uniquely dynamic environment.

In a sense we find that the deeper and more pervasively the principle of openness is embedded in the communications network, the greater the ability of information production to stimulate innovation.

> The government's activism imposed a principle analogous to [end-to-end] design on the telephone network. Indeed, though it masquerades under a different name (open access), this design principle is part and parcel of recent efforts by Congress and the FCC to deregulate telephony... By requiring the natural monopoly component at the basic network level to be open to competitors at higher-levels, intelligent regulation can minimize the economic disruption caused by that natural monopoly and permit as much competition as industry will allow.[62]

Thus, a determined commitment to open communications networks was critical to the widespread development of the Internet. It is clear that the communications platform of the Internet was founded and thrived on the principle that facility owners in the physical layer could not discriminate against innovators or speakers. This was accomplished through government policy.

> The FCC allowed specialized providers of data services, including Internet Service Providers (ISPs) and their customers, access to raw network transmission capacity through leased lines on cost-effective terms. Regulatory policy forced open access to networks whose monopoly owners tried to keep closed. The resulting competition allowed the FCC to free the service providers from detailed regulation that would have kept them from using the full capabilities of the network in the most open and free manner.
>
> Thanks to the enduring FCC policy of openness and competition, specialized networks and their users could unleash the Internet revolution. Open network policy assured the widest possible user choice and the greatest opportunities for users to interact with the myriad of emerging new entrants in all segments of the network. To be sure, the FCC strategy emerged haltingly but its direction never changed. Indeed, the Commission consistently backed cost-based access to the network (initially through leased lines and later through unbundled network elements). The de facto result of this policy, and of more conscious choices symbolized by the *Computer III* policies, was to prevent phone company monopolies from dictating the architecture of new data-related services. The Commission thus supported competition and innovation, time and again, by unfailingly keeping the critical network infrastructure open to new architectures and available to new services on cost-effective terms. The instruments of FCC policy were to make leased lines (and, lately, network elements) available on cost-oriented terms and to forebear from regulating Internet and other data services. This steady policy set in motion, and sustained, a virtuous cycle of cumulative innovation, new services, infrastructure development, increasing network usage with evident economic benefits for the U.S. economy.[63]

Lessig is blunt about the government's role, claiming, "[p] hone companies…did not play… games, because they were not allowed to. And they were not allowed to because regulators stopped them."[64]

> We certainly do not claim that a communications network would have been impossible without the government's intervention. We have had telecommunication networks for over a hundred years, and as computers matured, we no doubt would have had more sophisticated networks. The design of those networks would not have been the design of the Internet, however. The design would have been more like the French analogue to the Internet--Minitel. But Minitel is not the Internet. It is a centralized, controlled version of the Internet, and it is notably less successful.[65]

Lessig's reference to Minitel is particularly apt in historical context. Centralized decision making along the Minitel model was the poster child of the network owners in the early debates over the information age.[66] Centralized decision-making was the wrong policy then and it is the wrong policy now.

III. MISPLACED FAITH IN INTERMODAL COMPETITION

A. EFFORTS TO CLOSE THE THIRD GENERATION OF THE INTERNET

The explosive commercial growth of the Internet put strains on the information environment.[67] The end-to-end principle kept the network simple and cheap so that applications developers at the end points could experiment and innovate with confidence that the network would not get in the way.[68] In a world of collegial collaboration and coordination, the ends of the network could be relied upon to support the seamless flow and interoperability of data. A world of commercial competition, spiraling technical complexity, and troubling human frailties created problems:[69]

- on the consumer side – hackers, viruses, and spammers;
- in the network – congestion and complexity; and
- on the producer side – sticky features, choke points and restrictions of movement.

The greatest threat to openness and dynamic innovation on the Internet has not come from technical glitches or even nefarious human actions, however.[70] The most damaging restrictions sought or imposed by the new dominant commercial network owners have little to do with the technical problems of managing a complex, increasingly congested network. [71] They are not motivated by efforts to solve the social problem of creating trust in cyberspace,[72] or to further the effort to fight new forms of cyber-crime. Business models intended to preserve market power in physical space and extend it into cyberspace drive the restrictions they seek to impose.[73]

By the late 1990s owners of advanced telecommunications networks were once again asserting a desire to change the terms and conditions of access. Cable operators, who had not been involved in telecommunications, refused to allow Internet service providers to sell Internet access over their advanced telecommunications networks. Telephone companies sought to convince regulators and the Congress that advanced telecommunications should not be kept open as traditional telecommunications had been. While legally bound to share their lines, they adopted a variety of strategies to make it difficult for ISPs to do so.

This most recent efforts to impose centralized restraints on the Internet were being initiated when the commercial Internet was in its early teens. Many technologists and ISPs, who were committed to and thrived under open communications networks and the end-to-end principle of the Internet, exhibited an attitude of invincibility frequently associated with youthful exuberance. They assumed that the power of the architectural principles of the Internet would inevitably prevail over attempts to control it. Consumer group veterans of the previous attempts to undermine the decentralized, open nature of the information environment took a different view. They were quick to take up the fight to preserve the Internet. By late 1998 they were intervening in proceedings at the FCC seeking to extend the principles of open access to cable modem service[74] and get effective implementation of nondiscrimination for wireline DSL.[75] Concerns were grounded in longstanding experience with cable[76] and telephone company anticompetitive[77] practices and the repeated failure of the dominant wire owners to compete.

B. THE FAILURE OF COMPETITION BETWEEN FACILITY OWNERS

1. Facility Deployment and Characteristics

Federal policymakers would never purposefully allow the goose that laid the golden egg to be slaughtered. They have simply accepted the old argument of facility-owners that they need more incentives to upgrade the infrastructure and will not do so unless they are allowed to offer their own services and control the services others can provide. The centralized control model has been adopted by the Federal Communications Commission under a theory that favors competition between facility-owners at the expense of competition between service providers.[78] Unfortunately, facility competition is simply inadequate to achieve the outcome that the FCC hopes for. We have shown that intermodal competition is feeble in the multichannel video product space[79] and the same is true for the high-speed Internet.[80] The number of facilities is small and the technological characteristics different, so that vigorous head-to-head competition is muted.

For advanced telecommunications service, a substantial part of the residential customer class (40 to 60 percent) and virtually all of the business customer class there is no intermodal competition.[81] The majority of customers in this country have only one technology available for advanced telecommunications services – either a cable wire or a telephone wire. Wireless technologies are simply not an economic option today for advanced telecommunications, and there is great uncertainty about whether they ever will be.[82]

For basic telecommunications services, the situation is about the same. Facilities-based competition remains in its infancy. Where competitors have deployed facilities, they remain dependent on the use of large parts of the incumbent's network to deliver service. Wireless is not a substitute for basic telecommunications service, or for a bundle of basic and advanced telecommunications services.

Looking carefully at specific product and geographic markets reveals little competitive overlap of different facilities.[83] It has been apparent from the beginning of high-speed service that technological differences give different facilities an edge in different customer and geographic markets.[84]

Businesses are disinclined to use cable.

> Cable modem service presents serious security and reliability issues that, while present for residential users, are of far greater concern when used to support business applications… In addition, service quality for cable modem service not equivalent to ILEC standards… Additionally cable modem transmission speeds are not consistent, due to the "shared platform" architecture… Finally, cable modem platforms do not offer business customers a sufficient level of security.[85]

DSL, as deployed is ill suited to multimedia video applications. For the next generation telephone network technologies "most experts agree that the VDSL business case isn't for everyone and won't realize its full revenue potential for decades."[86]

Low-density areas are not prime candidates for wired technologies,[87] but wireless is not here yet as a technology.

> Regarding "substitutability", wireless and satellite broadband capabilities are currently limited and suffer from geographic and climatic limitations. A customer seeking stable access still will choose a broadband capability supported over wires. Moreover, satellite and wireless broadband access is generally far more expensive than DSL. Second, cable modem access has sufficient drawbacks depending on a customer's needs. If a customer seeks a more secure connections or is a business that generally does not have cable access, cable is not a substitute, even if the ILEC maintains a price higher than what would h e existed if CLEC's continued to be viable competitors…
>
> Best-case scenario in many situations would approximate a duopoly with one dominant ILEC and one dominant cable providers. We have seen the results.
>
> As the number of competitive DSL providers has diminished, the prices charged by ILECs and cable companies for high-speed access has increased. For example, when SBC raised its residential rtes to approximately $50, cable modem providers raised theirs to $45. It is the price leadership mentality leading to higher prices that has lessened the number of consumers that have purchased broadband connections. And, there is no reason to expect that to change without a vibrant CLEC industry competing and scrapping for customers.[88]

2. An Anticompetitive Track Record

To make matters worse, the dominant facility owners have a thoroughly anticompetitive DNA. If the incumbent cable and telephone companies had behaved in a procompetitive and proconsumer manner consistent with the Telecommunications Act for the past six years, the Commission's hope that intermodal competition would rescue consumers might be at least a little plausible, but the real world behavior of these monopolists extinguishes any glimmer. The record of anticompetitive behavior within and across the telecommunications and video markets is a stunning indictment of the theory of intermodal competition. The best evidence of what will and will not happen, should the Commission abandon intramodal competition, is the experience of what did and did not happen in the past six years.

What did not happen is that cable and telephone companies did not compete. While public policy attention is frequently focused on the new entrants, it is the failure of the incumbents to compete with one-another that is the greatest failure of the Telecommunications Act of 1996. Cable and telephone companies were the best suited to attack each other's markets, but they failed utterly to do so.

In telecommunications markets we observe the following behaviors of telephone companies:[89]

- Wherever prices were deregulated, they immediately shot up, even in markets that were purportedly competitive.
- Companies have refused to compete with each other, choosing instead to buy one another out.
- They have refused to enter the long distance business in a significant way, except in their monopoly local service areas.
- They have failed to go into the multichannel video business.

- They have created an artificial scarcity of bandwidth.

In cable video markets, we observe the following behavior by cable companies:[90]

- Where prices were deregulated, they shot up, notwithstanding claims that markets are competitive.
- Companies have refused to compete with each other, choosing instead to buy one-another out.
- They have been extremely slow to go into the telephone business.
- They have created an artificial scarcity of bandwidth.[91]

Each of these industries has simply defended and strengthened its hold on the core monopoly service it provides, eschewing entry into established product and geographic markets where entrenched monopolists exists. They never go where the going would be tough.

In the one area where these two monopolists have bumped into one another – the market for advanced telecommunications services that delivers high-speed Internet access service – they have made a mockery of competition. What did happen is that incumbent cable and telephone monopolists put forth a strenuous effort to foreclose their markets to competitors. The strategy is identical in both cases

- Withholding strategic inputs from potential competitors
- Control the technology and functionality to protect the core monopoly product and dictate the pace and type of innovation
- Control the customer relationship.
- Squeeze the competitors by driving wholesale prices close to retail.

The effects of this lack of competition are apparent.

- Cable and telephone companies coincidentally increased prices.
- They have run parallel anticompetitive attacks on unaffiliated Internet service providers.
- They have both imposed severe supply disruptions on the public.
- Innovation has been absent.

C. ANTICOMPETITIVE PRACTICES IN ADVANCED TELECOMMUNICATIONS NETWORKS

The identification and description of anticompetitive practices was aided by a surprising source, comments filed by the largest cable operator AT&T,[92] AOL,[93] and telephone companies[94] in circumstances where they found themselves as unaffiliated service providers confronted with dominant wire owners intent upon keeping their networks closed. A rigorous analytic framework was developed by the consumer groups to organize a mountain of evidence of anticompetitive practices, which were then presented in academic papers and regulatory filings.[95] The focal point of past analysis has been on cable's exclusionary policies, although the complaints covered cable modem and wireline, DSL services. This analysis focuses on advanced telecommunications networks and does not repeat the extensive analysis of conceptual and empirical evidence on which the framework is based. [96]

1. Policies of Exclusion

Cable modem service has been rolled out under exclusive arrangements with an affiliated Internet service provider. The complete exclusion of the first six years of the service has now been replaced with a policy that excludes 99.9 percent of unaffiliated ISPs. As pressures mounted to provide access, the cable industry came forward with terms under which they would allow selected ISPs to use their networks.

During the review of its merger with MediaOne, AT&T put forward a loose set of promises and launched a slow, small trial.[97] During its merger with Time Warner, AOL made more detailed promises and Time Warner sent a Term Sheet to unaffiliated ISPs who had requested access to its network during the summer of 2000.[98] Commercial access lacks the essential elements of open communications platforms. The Time Warner Term Sheet gives troubling specificity to the threat to innovation. There in black and white are all the levers of market power and network control that stand to stifle innovation on the Internet. Time Warner demanded the following:

(1) Prequalification of ISPs to ensure a fit with the gatekeeper business model

(2) Applying ISPs must reveal sensitive commercial information as a precondition to negotiation

(3) Restriction of interconnecting companies to Internet access sales only, precluding a range of other intermediary services and functions provided by ISP to the public (e.g. no ITV functionality)

(4) Restriction of service to specified appliances (retarding competition for video services)

(5) Control of quality by the network owner for potentially competing video services

(6) Right to approve new functionalities for video services

(7) A large nonrefundable deposit that would keep small ISPs off the network

(8) A minimum size requirement that would screen out niche ISPs

(9) Approval by the network owner of the unaffiliated ISP's home page

(10) Preferential location of network owner advertising on all home pages

(11) Claim by the network owner to all information generated by the ISP

(12) Demand for a huge share of both subscription and ancillary revenues

(13) Preferential bundling of services and control of cross marketing of services

(14) Applying ISP must adhere to the network operator's privacy policy

Under these conditions, the commercial space left for the unaffiliated and smaller ISPs (where much innovation takes place) is sparse and ever shrinking.[99] Press accounts indicate that AT&T's approach was similar and indicate that there has been little change in the overall approach over the past three years.[100]

Telephone companies must execute their exclusion in a more subtle manner, since the Telecommunications Act of 1996 requires them to allow unaffiliated ISPs on their systems. The telephone companies manipulate the availability of capacity, denying unaffiliated ISPs access to their DSLAMs, which is the key network equipment located in the central office, while affiliated

entities find room.[101] The telephone companies are pressing hard to gain the legal authority to apply this strategy of exclusion to another key point in the network, the remote terminal, which would cut most competitors off from a large part of the residential market.[102] These explicit policies of exclusion are backed up with a host of other practical barriers to entry thrown up by incumbent local telephone companies.

> [Competitors] accuse Verizon of blocking required access to equipment, illegally stealing customers and stalling hook-ups. They say the company has sent multiple and unnecessarily erroneous bills to alienate or confuse their customers. They accuse Verizon of engaging in false advertising, price gouging, randomly cutting off service and other bullying tactics.[103]

Gaining a timing advantage in the offer of services appears to be the goal of some LECs in the provisioning of advanced services.[104]

> There are 50,000 ways of dragging one's feet when it comes time to really play the game to allow competition… if you can stall long enough and make it difficult enough, by the time the issue's resolved the companies have died and gone to CLEC heaven…
>
> There is no question that facilities have not always been made available, or in a timely way. Whether legal or not, it happens too often.[105]

The strategy involves multiple elements.[106] To prevent competitors from getting a head start, the incumbent who controls the bottleneck refuses to make the underlying wholesale service available to competitors, until it has fully developed its own retail offering even though the wholesale components are clearly available. In some cases, it appears that incumbents began accepting orders from its affiliate for wholesale service before the service was available to competitors. Even after the service is "generally" available, it appears that the incumbent delivers wholesale services to its affiliate more quickly than it is made available to competitors.[107] When the policy of exclusion cannot be explicit, exclusion can still be accomplished by practices in three other areas, architecture, service restriction and business leverage.[108]

2. Architectural Barriers to Competition and Service Development

A major source of potential discrimination lies in the architecture of the network. The technical capabilities of the network controlled by the proprietor, can be configured and operated to disadvantage independent ISPs by restricting activity in two ways. First, it can be configured to prevent certain types of activities that the network owner simply does not want to allow. Second, it can restrict the ability of the independent ISP, while not restricting the ability of an affiliated ISP. The latter will be considered as an issue in the discussion of service restrictions and business leverage.

Technology bias can take several forms. Interconnection allows ISPs to establish a connection between networks. Structure involves the deployment of physical facilities in the network. The ability to deploy facilities to ensure and enhance the quality of service will be particularly important in the third generation of Internet service development. Flow control involves the filtering of the flow of information. The proprietary network owner can seriously impair the ability of independent ISPs to deliver service by restricting the ISPs' ability to

interconnect efficiently and deploy or utilize key technologies that dictate the quality of service. Even though networks are interconnected, there is still the possibility of discriminating against some of the data that flows through the Internet. Forcing independent ISPs to connect to the proprietary network or operate in inefficient or ineffective ways, or giving affiliated ISPs preferential location and interconnection can result in substantial discrimination. The result is a sharp increase in the cost of doing business or degradation of the quality of service of independent ISPs'.

In the debate over cable modem service, attention focused on a number of potential practices like restricted backbone choice, restricted collocation, and restricted replication (or caching). The issue of flow control received considerable attention when a series of marketing documents used by Cisco, a leading equipment supplier, were published. The technical capabilities offered by the equipment can be referred to as "policy-based routing." Cisco makes the point quite clearly, in touting the technology of cable-based broadband Internet, that proprietary network operators can control traffic in very different ways than occurs on the Internet today.[109] The multimedia interactive applications that distinguish the next phase of the Internet are particularly sensitive to these aspects of quality, much more so than previous applications.[110]

ISPs have identified a range of ways the dominant telephone companies impede their ability to interconnect in an efficient manner. By refusing to peer with other ISPs, the telephone companies create a roadblock on the Internet and force ISPs to enter into expensive transport arrangements for traffic.[111] The network owners then add insult to injury by imposing numerous burdens on independent ISPs, such as forcing ISPs to buy bundles of redundant services,[112] preventing competitors from cross connecting to one another,[113] causing congestion by "deliberately overloading their DSL connections by providing them with insufficient bandwidth from the phone company's central offices to the Internet,"[114] restricting calling scopes for connection to ISPs,[115] and refusing to offer a basic service arrangement.[116] The effect is to undermine competition and restrict service offerings.[117]

Telephone companies have also restricted the ability of ISPs to deliver service by restricting functionalities. The have refused to guarantee quality of service to unaffiliated ISPs, which has the effect of restricting the products they can offer.[118] The most critical architectural decisions are to impose network configurations that prevent competition for the core monopoly service, voice.

The cable strategy for controlling applications by withholding static Internet addresses, discussed below as a business practice, has been hit upon by the telecommunications companies as a matter of architecture. The telephone company monopoly product is voice,[119] not video and they have taken steps to frustrate the potential for voice service to grow over the high-speed Internet.

> Some ILECs have initiated plans to unilaterally impose on ISPs a costly and counterproductive requirement to use Point-to-Point over Ethernet (POPPoE), a plan that is designed not to improve the product, but to protect the ILECs' voice services from competition from VOIP service, which is incompatible with PoPPoE. Voice over IP holds the promise not only of lower consumer prices, but also superior quality and innovative interactive options integrated with the consumer's video and Internet services.[120]

3. Restrictions on Service

The network owner can place restrictions on how nonaffiliated service providers may use the network. These limitations can be applied to either service providers or consumers. The network owner may prevent independent ISPs from delivering services to consumers by restricting speed, duration of transmission, or other operational characteristics.

Predictably, one of the first restrictions placed on Internet activity was the amount of time that streamed video could be downloaded by customers.[121] Cisco's marketing papers clearly suggest that the cable operators should gain control over the streaming video so that it does not undermine their control of the network and open the door to competing video services.[122] The restrictions imposed by the proprietary cable business model go well beyond limitations on ISPs moving data downstream to consumers. An 'acceptable use' contract forbids customers from undertaking many activities that were central to the dynamic nature of experimentation by users on the Internet. They restrict the ability of users to move data upstream, to establish local area networks, or create web sites.

The issue is not the technical ability to accommodate such uses; it is economic, since they will gladly sell the opportunity to undertake these activities. This presents problems for "a customer with only a mildly ambitious web site" because the customer "will exceed the parameters of the bundled service and fees for extra storage space and high traffic volumes add up rapidly."[123] The purpose of this strategy has become apparent, to control Internet addresses, as one early observer of the policy noted. "[i]n refusing to attach home networks, providers are actually protecting their ability to assign the network address of the customer. By refusing to carry traffic to Internet addresses they didn't assign, the access provider can prevent the customer from contracting for simultaneous service with any other Internet access provider."[124]

Because telephone companies are ostensibly required to provide access, the restrictions on service comes in the form of various product and geographic definitions. The essence of the Internet is *The Death of Distance*[125] and in a digital telecommunications network operated by high powered computer systems (System Signaling Seven, SS7) distance matter little, but by manipulation of calling scopes,[126] bundling of competitive and noncompetitive services,[127] imposition of speed limits,[128] and withholding of simple direct connections to the network,[129] incumbent telephone companies effectively restrict the services ISPs can offer to the public.

> From a technical point of view, neither cable modems nor MSN broadband powered by Qwest can be used as a "routed" service. Both services are "bridged" only. Both MSN and Comcast impose extra charges for multiple PCs using their service' both companies have extra charges for a static IP address; both companies prevent the use of domain names on their service. Both companies charge business, even home-based businesses, more than they charge residential customers, if they allow businesses to sue the service at all.[130]

4. Business Leverage

Notwithstanding the limitations and restrictions, ISPs still have the opportunity to offer a restricted set of services. Unfortunately, by imposing onerous terms and conditions the opportunity is stillborn and unaffiliated ISPs are prevented from competing effectively. The network owner inserts himself in the relationship between the customer and the independent ISP in such a way as to ensure that its affiliated ISP has a price, product or customer care

advantage. Four major issues have been identified in the context of the ongoing debate over open access: information, pricing, product bundling, and the customer relationships.

The detailed control of the network confers an immense information advantage on the system operator. The potential for competitive abuse of information is substantial.[131] Independent ISPs note that the affiliated ISP has been given access to network information in advance, thereby being assured preferential access to capacity.[132]

The squeeze placed on independent programmers and service providers by the closed business model is apparent. Controlling a bottleneck, network owners have places price conditions on independent content providers that undermine their ability to compete.[133] The price squeeze on competitors takes two forms.[134] The first concern is with very high prices charged for access to the network. This leaves little margin for the competitors to operate their business. The price squeeze may appear to be non-discriminatory, if the network owners charge its own affiliate the same high price. Since the network owner pockets the profit, it does not care that it is "losing money" on the retail product. It is implicitly cross-subsidizing the affiliated ISP. Unaffiliated ISPs do not have the source of cross-subsidy and go out of business. Once they are gone, the incumbent can raise prices, exactly what happened in 2001.

The price squeeze on unaffiliated ISPs is similar in the DSL and the cable modem worlds. The price for access to the network is far above costs and leaves little margin for the unaffiliated ISP.[135] The margins between the wholesale price ISPs are forced to pay and the retail price affiliated ISPs charge is as small as $1 on the telephone network.[136] For cable networks, the margins are as low as $5. In other words, independent ISPs are forced to look at margins in the single digits and never much above 20 percent. Cable and telephone company margins for these services are well in excess of 40 percent.[137]

The squeeze on unaffiliated ISPs is created not only by the price, but also by other terms and conditions of carriage. Minimum terms and volume discounts, which are not imposed on the affiliated ISP or are cross-subsidized by the parent company, place independent ISPs at a disadvantage.[138] Another troubling upshots of the discriminatory approach the local telephone companies have taken is that when they are not pushing their own ISPs, the enter into deals with the major ISPs that end up discriminating against small providers. By structuring volume discounts, smaller ISPs are placed at a substantial disadvantage. Although the rates are tariffed as required by law, the structure of the discounts is such that the largest suppliers have a substantial advantage.

Bundling has become a central concern. For an incumbent monopolist selling video "broadcast" services and planning to sell bundles of "broadband services," a fundamental issue arises concerning what services independent ISPs will be allowed to sell and how consumers will be allowed to buy services. If cable owners leverage bundles with Internet and cable service, independent ISPs will be at a severe disadvantage."[139]

A similar problem afflicts ISPs dealing with telephone companies. Ironically, Cox complains that it is being discriminated against when incumbent telephone monopolists bundle voice and data.[140] Independent ISPs have pointed out that their ability to offer voice is being frustrated by architectural decisions, which of course denies them the ability to offer the voice/data bundle.[141] Moreover, incumbents are reserving the right to offer additional services, like video, over lines for which independent ISPs are the Internet access service provider.[142]

Cable's approach to proprietary control of the network allows the facility owner to determine the relationship between the customer and the independent ISP. It demands the right to negotiate the most important business relationships between customers and service providers—marketing, billing, and product presentation.[143]

Telephone companies impose similar anticompetitive terms on unaffiliated ISPS. They are aggressively seeking to keep control of the customer.

> Internet Access Service Marketing Program. SBC has changed the nature of the arrangement, from one where the ISP purchases the service at wholesale to one where the ISP is "marketing" SBC's retail service. ISPs are now sales agents, and not SBC customers….
>
> Under the new contract, the end user will be receiving SBC service… the ISP must inform the user that the 'network portion" (undefined) of the service is being provided by SWBT. SBC reserves the right to demand a deposit from the end user. SBC will only pay commissions on DSL services billed to the ISP if the DSL is used only for non-telecommunications services. SBC may assert that if the user is using any software that offers Voice over IP, then the DSL is not being used for non-telecommunications service, and no commission is due.[144]

Telephone companies also leverage their control over the network into an abuse of the affiliate relationship. The use of corporate resources including logos and joint advertising has been a constant source of cross-subsidy.[145] Assets have been transferred to the advantage of the affiliated ISP including customer accounts, CPNI, bottleneck facilities and collocation space.[146] Employees, senior management and boards of directors have been co-mingled facilitating the cross-subsidization and anti-competitive advantage given to affiliates.[147]

Competitors and regulators maintain that incumbents have been guilty of unfairly steering customers to affiliated ISPs at the expense of competitors.[148] The affiliated ISP gets the preferential first spot in the list of options, and this gives it a huge advantage.[149] Joint marketing is a concern,[150] with suggestions that incumbents may offer only one option. Slamming has also been a constant problem.[151]

> CSD staff's investigative report and the accompanying victims' declarations demonstrate that Respondents' practices include the following: (1) billing consumers for DSL and/or Internet services that were neither ordered nor received; (2) billing consumers for DSL and/or Internet services that were ordered but not received; (3) billing consumers for DSL and/or Internet services after the consumer requested termination of the service(s); (4) billing by two Respondents for the same DSL and/or Internet service; and (5) billing consumers for services or products that Respondents promoted as free or as less expensive than the charges placed on the consumers' telephone bills.[152]

D. CONCLUSION: ONE CLICK IS TOO MANY, IF STRATEGIC ACTORS ARE GATEKEEPERS

In the context of these anticompetitive practices, cable and telephone companies promise to allow one-click access to the Internet as a 'guarantee' that their business models will not undermine the dynamic nature of the information environment. The promise is laughable.

One click access glosses over the fact the consumer must click through architectural principles, usage restrictions and business relationships that are anathema to innovation on the Internet.

- Wire owners monopolize the access business and leverage their market power to undermine competition.

- The click-through-only approach does not allow independent ISPs to compete for consumer dollars until after the cable and telephone companies have charged consumers between $30 and $40 for Internet access. The price is too high and allows the network owner to cross subsidize its own affiliated ISP.

- By putting the price so high, it undercuts any serious opportunity to compete because there is little discretionary income to compete for.

- It does not address architectural decisions that restrict bandwidth or undermine the development of disruptive services.

- It does nothing to address the problem that the wire owner is still in control of functionality. The network owner retains the right to impose restrictions on the products and functionalities that independent ISPs can offer to the public by imposing acceptable use policies as a business strategy.

IV. THE EFFECTS OF CLOSED NETWORKS

A. THE MONOPOLIZATION OF THE HIGH-SPEED INTERNET

The results of the closure of advanced telecommunications services are becoming clear. The independent business of buying telecommunications services and selling Internet access service has been all but eliminated from the high-speed Internet market by the withholding of advanced telecommunications services.

After five years there are no more than a handful of independent ISPs who have been allowed to sell high-speed Internet access over cable's advanced telecommunications network. The terms and conditions under which these few are allowed to do so are so onerous that the independent ISPs have virtually no ability to compete with the incumbent cable operators.

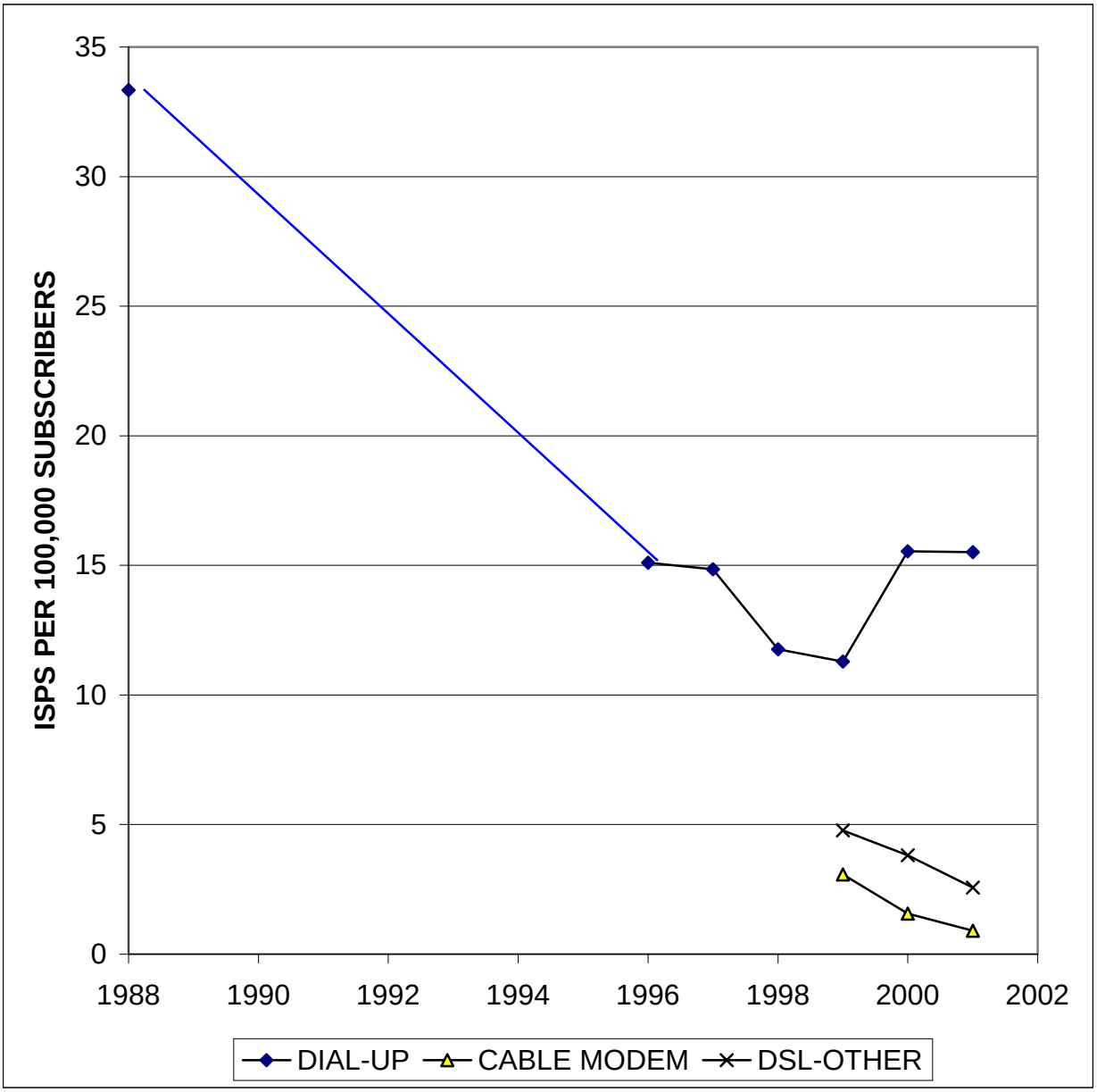
Although telephone companies have been ostensibly required to provide access to their advanced telecommunications networks, they have made life miserable for the independent ISPs. As a result, only about 100 have managed to fight their way onto the advanced telecommunications network of the telephone companies.

The impact of the market foreclosure on the high speed Internet access market has been devastating (see Exhibits 6 and 7). On the high-speed Internet there are now less than 2 ISPs per 100,000 customers. For cable modem service there is less than 1 Internet service provider per 100,000 customers. For DSL service, there are fewer than and 2.5 ISPs per 100,000 customers. This is in contrast to the dial-up world where the number is 10 to 15, an order of magnitude larger.

The foreclosure of the market to independents is even more profound than these numbers indicate. Approximately 95 percent of the high-speed Internet access service customers are served by ISPs affiliated with either cable companies or telephone companies.[153] This dominance is not the result of winning in a competitive market; it is the result of leveraging control of physical facilities.

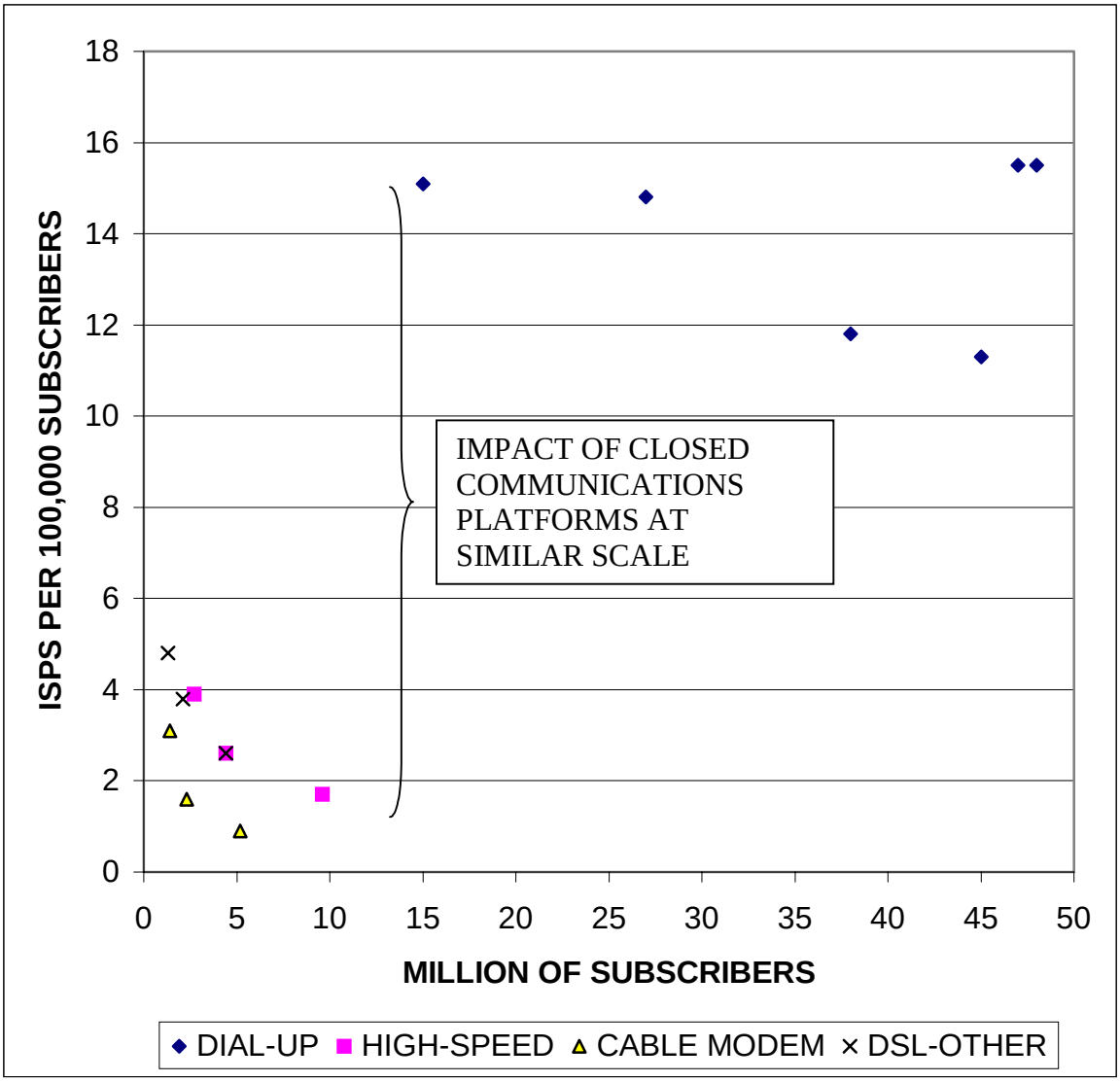
The fact that control over the wires is the cornerstone of this market foreclosure is demonstrated by the failure of the cable and telephone affiliated ISPs to have any success in the truly competitive narrowband Internet market. Cable companies have not sold Internet service in any product and geographic market where they do not control a monopoly wire. Telephone companies have done very poorly as ISPs in the dial-up market. Consequently, 95 percent of the customers in the dial-up market take their service from independent ISPs – treating AOL as an independent in the dial-up market. In other words, incumbent monopolists have a 95 percent market share where they can leverage their market power over their wires, and a 5 percent market share where they cannot.

EXHIBIT 6:
DENSITY OF DIAL-UP AND HIGH-SPEED PROVIDERS BY DATE



Source: Subscriber counts: Carey, John, "The First Hundred Feet for Households: Consumer Adoption Patterns," in Deborah Hurley and James H. Keller (Eds.), *The First Hundred Feet* (Cambridge: MIT Press, 1999); National Telecommunications Information Administration, *A Nation Online* (U.S. Department of Commerce, 2002). Early ISP counts are discussed in Mark Cooper, *Expanding the Information Age for the 1990s: A Pragmatic Consumer View* (Consumer Federation of America, American Association of Retired Persons, January 11, 1990), see also Janet Abbate, Inventing the Internet (Cambridge:MIT Press, 1999) and Matos, F., *Information Service Report* (Washington, D.C.: National Telecommunications Information Administration, August 1988), p. x. More recent numbers are from the Bureau of Labor Statistics; 2001b.Since the mid-1990s, annual counts of ISPs have been published in *Network World*.

EXHIBIT 7:
DENSITY OF DIAL-UP AND HIGH-SPEED SERVICE PROVIDERS BY MARKET SIZE



Source: Subscriber counts: Carey, John, "The First Hundred Feet for Households: Consumer Adoption Patterns," in Deborah Hurley and James H. Keller (Eds.), *The First Hundred Feet* (Cambridge: MIT Press, 1999); National Telecommunications Information Administration, *A Nation Online* (U.S. Department of Commerce, 2002). Early ISP counts are discussed in Mark Cooper, *Expanding the Information Age for the 1990s: A Pragmatic Consumer View* (Consumer Federation of America, American Association of Retired Persons, January 11, 1990), see also Janet Abbate, Inventing the Internet (Cambridge:MIT Press, 1999) and Matos, F., *Information Service Report* (Washington, D.C.: National Telecommunications Information Administration, August 1988), p. x. More recent numbers are from the Bureau of Labor Statistics; 2001b.Since the mid-1990s, annual counts of ISPs have been published in *Network World*.

It may well be that the Internet service market was due for some consolidation.[154] However, the staying power of the ISPs is impressive. One recent count found that after the largest 23 ISPs were taking into account, all of whom had 200,000 or more users, the "other U.S. ISPs" still accounted for 57 percent of Internet users in the U.S.[155] Focusing on the dial-up market, after the largest ISPs (ten in all) were taken into account, the "other U.S. ISPs" accounted for over 62 percent of the total. In the high-speed Internet, there are virtually no "other U.S. ISPs."

Thus, the process we observe on the high-speed Internet is more like strangulation through the exercise of market power. By cutting off access to advanced telecommunications service – the oxygen of the Internet market – facility-owners have eliminated the competition at the level of service.

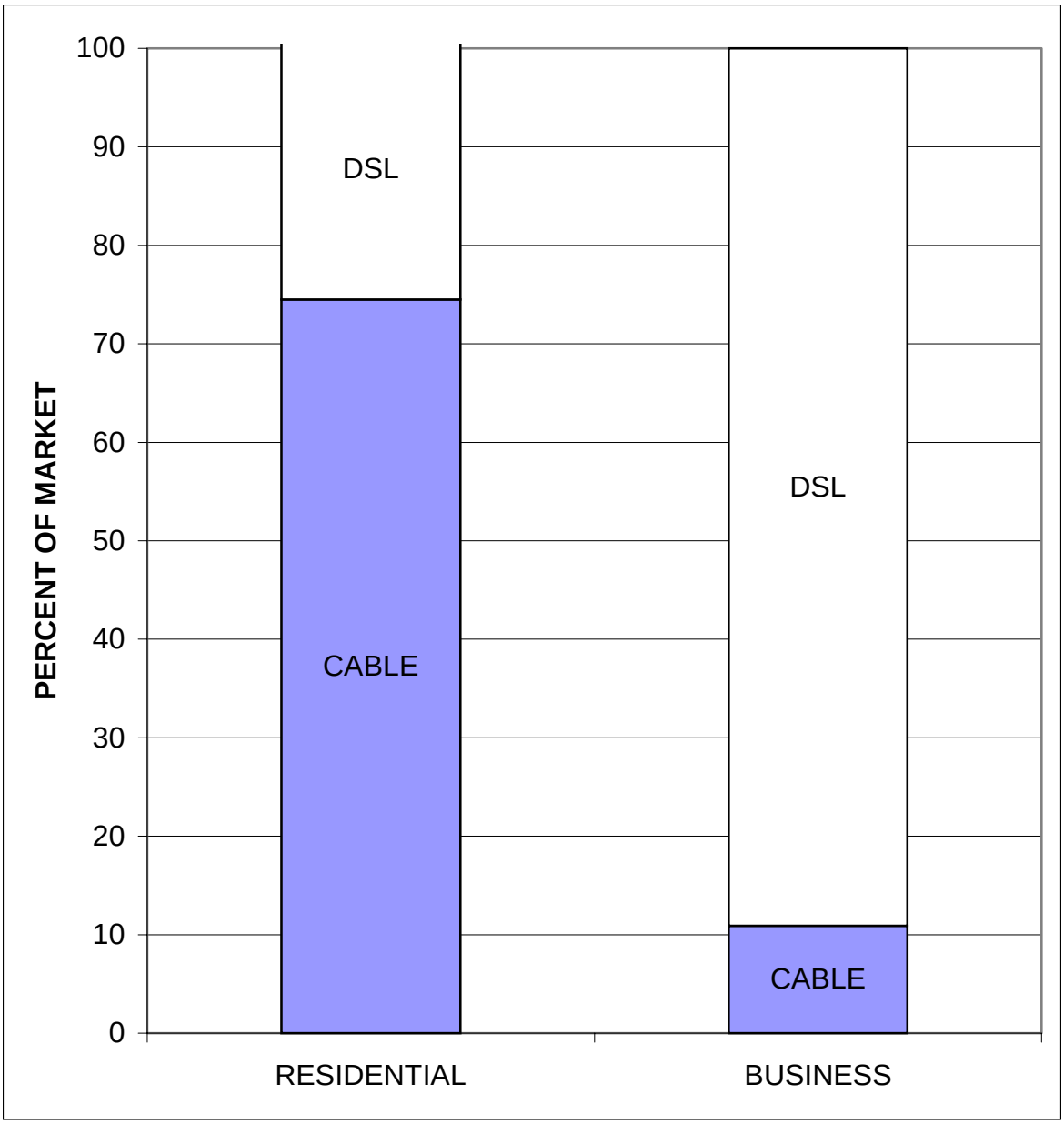
B. PATTERNS OF CONDUCT AND MARKET PERFORMANCE

Even where there are two technologies available, they are not well matched as competitors and they have not exhibited strong rivalry. One incident that drives home the failure of the rivalry between telephone and cable companies to discipline anticompetitive behaviors is the slow down decision by the telephone companies. As the Chairman of the Illinois Commerce Commission put it

> The ICC ruling requires the company to allow its competitors meaningful access to their network at reasonable prices…
>
> In a carefully worded letter to members of Congress last month, Whitacare [CEO of SBC] harshly criticized the ICC decision and said that SBC Ameritech has "been forced to halt indefinitely further deployment and activation of new DSL facilities in Illinois…
>
> As we all know, the competitiveness of a market easily can be measured by one player's ability to control the supply of a good. Whitacre's statement is clear: SBC Ameritech controls the market so completely that it can determine if more than a million consumers in Illinois will have access to broadband services…
>
> Whitacre wants to extend his monopoly over the local telephone network to high-speed Internet access. Maybe that is why SBC was able to reduce service and increase the price for DSL service by 25 percent last month.[156]

One of the key elements underlying this ability to avoid competition is a sharp segmentation of the market by technology. Business and residential markets are segmented and concentration is higher within each segment (see Exhibit 7). Cable dominates the residential high-speed Internet market, with a 65 percent market share for all "broadband" services. However, it has a 75 percent market share for the advanced services residential market. Digital Subscriber Line service (DSL), the telephone industry's high-speed offering, dominates the non-residential market with an 89 percent market share.

EXHIBIT 8:
SEGMENTATION OF CABLE AND TELEPHONE ADVANCED SERVICES



Source: Sources: Industry Analysis Division, *High-Speed Services for Internet Access: Subscribership as of June 30, 2001* (Common Carrier Bureau, Federal Communications Commission, February 2002), Tables 1-4.

As the quote suggests, more than statements indicate a competitive problem. While the CEO was complaining to policy makers, the CFO was touting the high profitability and bright prospects for DSL service.

> "SBC: DSL highly profitable
>
> CFO Stephenson: 40% EBIDTA margins, low investment needed
>
> The debate is over: DSL makes money. "Once we get to scale, DSL is very profitable, just like our other services. We've reached that volume in California and are approaching it in SWB territory as well. We cut our costs by 30% in 2001,and expect them to drop another 25-30% in 2002." CSFB calculates Deutsche gets payback in two years on DSL, while Korea Telecom is at 35% EBIDTA and rising. (I don't like EBIDTA numbers, but that's all I can get.) Stephenson also said capex has dramatically dropped since early in 200 1. (That was the Pronto halt, among other things) DSL Prime has reported equipment costs dropping fiercely, to between $150 & $250 per subscriber. I just got some backbone costs from Band-X; 45 meg of high quality transit is now $8,000 per month, half the price of a year ago. That's enough for 1,000-2,500 DSL consumer circuits. SBC, like other volume buyers, is presumably paying much less, or $2-4 per month per user."[157]

The incumbents had just executed a classic price squeeze on ISPs. They had dropped prices at retail for about a year and waited until the independent ISPs had gone under. As a result

> many competitive residential DSL providers have either gone bankrupt, sold out or ended the DSL portion of their business, leaving consumers in many U.S. regions as single choice for DSL service: the local phone company. The competitive fallout opened the door for price hikes.[158]

The pricing increases of 2001 led to a re-thinking on Wall Street as "long term pricing pressures may turn out to be pricing power."[159] With costs falling[160] and demand lagging in the midst of a recession, both cable operators and telephone companies raised prices. Cable companies imposed a severe interruption of service on their customers, which, in a highly competitive market, would have been suicidal.[161] Telephone companies continue to impose long installation times and service interruptions on DSL customers of their competitors.[162]

A small number of entities dominating the sale of high-speed Internet access and dictating the nature of use is the antithesis of the environment in which the narrowband Internet was borne and enjoyed such rapid growth. Changing the environment changes the nature of activity. One thing we never heard about the narrowband Internet was a complaint about the slowness of innovation. High-speed service is into its sixth year without a major innovation to drive adoption. Complaints about high and rising prices for high-speed Internet have come earlier and louder than they did for narrowband service. Having failed to develop appealing applications and choosing to increase prices with a low level of penetration has raised concerns about the rate of adoption of the new high-speed Internet service.

E. CONCLUSION: THE NEGATIVE EXTERNALITIES OF CLOSED COMMUNICATIONS NETWORKS

Even without intentional anticompetitive behavior, closure of the platform imposes a cost in two ways, by distorting incentives for innovation and undermining institutional options.

First, restricting the range of experimentation and shifting incentives reduces the quality and quantity of innovation and innovators because it shifts the balance between incumbents and disruptive entrants. The hand of incumbents, who shy away from disruptive innovation, would be strengthened.[163] Incumbents behave rationally by developing their core competence and seeking structures that reward it.[164] The incentives for innovators are also dampened.[165]

Second, the dominant commercial firms have incentives to expand by commercializing, concentrating, and homogenizing information space. As a result, "[n]oncommercial producers will systematically shift to commercial strategies and [s]mall-scale producers will systematically be bought up by large-scale organizations.[166] Potential sources of disruptive innovation would shrink.[167]

The implication here is that we cannot just wait for the platform to open. Doing nothing in the face of accelerating closure of the communications platform is doing harm.[168] Some of the harm cannot be undone.[169] Rectifying what can be fixed after the fact is immensely time consuming, costly and inevitably more intrusive.[170]

The irony is that Congress understood this well. It supported 3 modes of entry, required competition before deregulation, and set out specific, rigorous conditions under which regulation could be relaxed. The correct public policy is to stimulate small numbers competition in physical facilities and preserve large numbers competition in applications and content. Congress clearly intended this outcome and gave the FCC the tools to accomplish it. The FCC's shift to a reliance on intermodal competition at the expense of intramodal competition would contradict Congressional intent and subject consumers to great risk of the abuse of market power, slowing innovation and strangling competition at the higher layers of the communications platform

ENDNOTES

[1] Janet Abbate, *Inventing the Internet* (Cambridge: MIT Press, 1999); Lessig, Lawrence, *Code and Other Laws of Cyberspace* (1999); Grossman, Wendy, *From Anarchy to Power* (New York: New York University Press, 2001).

[2] Early numbers are from Abbate, 1999; Matos, F., *Information Service Report* (Washington, D.C.: National Telecommunications Information Administration, August 1988); and Carey, John, "The First Hundred Feet for Households: Consumer Adoption Patterns," in Deborah Hurley and James H. Keller (Eds.), *The First Hundred Feet* (Cambridge: MIT Press, 1999). More recent numbers are from National Telecommunications Information Administration, *A Nation Online* (U.S. Department of Commerce, 2002).

[3] Abbate, 1999; Lessig, Lawrence, *The Future of Ideas* ((New York: Random House, 2001), Chapters 3 and 4; Greenstein, Shane, *Commercialization of the Internet: The Interaction of Public Policy and Private Choices, or Why Introducing the Market Worked so Well* (NBER, N.D.), *Building and Delivering the Virtual World: Commercializing Services for Internet Access* (March 31, 2000), "The Evolving Structure of Commercial Internet Markets," Erik Brynjolfsson and Brian Kahin (Eds.), *Understanding the Digital Economy* (Cambridge: MIT Press, 2000).

[4] Atkinson, Robert and Thomas Wilheim, *The Best States for E-Commerce* (Washington, D.C.: Progressive Policy Institute, 2002), point out that e-commerce continues to grow at about twice the rate of the economy in general. Eisenach, Jeffrey, Thomas Lenard and Stephen McGonegal, *The Digital Economy Fact Book: Third Edition* (Washington, D.C.: Progress and Freedom foundation, 2001).

[5] The most obvious example here are the cable companies who claim that Internet service providers, who played a key role in the commercialization of the Internet are no longer important to its development. Cable operator comments in the Federal Communications Commission, "Notice of Inquiry," *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities*, 2000, leave no doubt that they are seeking to fundamentally change the innovative dynamic of the Internet, putting all the economic power in the hands of the network owners a the expense of Internet service providers. For example, the National Cable Television Association, p. 52, citing General Accounting Office, *Technology and Regulatory Factors Affecting Consumer Choice of Internet Providers*, October 2000, cites experts who "felt that "a highly competitive ISP market [is] not very important" and that a reduction of consumer choice at the ISP layer is not a concern as long as there is adequate competition among companies providing physical transport to the Internet." The cable industry trade association opines that "the 'plain vanilla' ISPs offering only a straight link to the Internet with no accompanying value added in the form of proprietary content are not likely to survive in the new environment." The essence of the Internet, thousands of ISPs competing for consumers, is deemed outmoded by the cable industry since "an environment preserving thousands of small ISPs may be unnecessary to ensure responsive customer service, technological advancements, and innovative content.

In this closed proprietary world, the cable companies decide what is important to the consumer. As Cox argued, "The openness that really matters to consumers – and what makes the Internet special and remarkable – is the ability to go anywhere, to access any information with a single click of a mouse." In this old economy model of facilities-based competition, the decision of which content gets to the public is left to the "cable operator-ISP relationships that are developing in the marketplace" since "cable operators would have every incentive to offer their cable modem subscribers those unaffiliated ISPs offering unique content and value, since customers would follow the ISP they prefer to another high-speed distributor that offered that ISP."

The effort of the cable industry to convince the Commission that vigorous ISP competition is not necessary rests on an interestingly selective citation from a recent General Accounting Office report. Since the policy of closed access it has imposed and is defending will inevitably destroy the current vigorous competition on the Internet, the NCTA chose to ignore a strong view reported by the GAO that this ISP competition is critically important to the development of the Internet.

> Others, however, expressed concern about potential concentration in the ISP market and suggested that consumers will be better served by having choices among both Internet transport providers and multiple ISPs. Several experts we spoke with also stated that ISP choice is important, in part, because of the changing nature of that industry. In particular, these experts noted that many ISPs are making a transition from providing only a simple "on-ramp" to the Internet to providing

> content and applications. A potential ramification of this transition is greater control by ISPs over what content is prominently displayed to consumers. Therefore, greater consumer choice among these "content aggregators" is seen by some as important because it can enhance consumers' access to varied content. Thus, these experts contend, if consumers dislike the content choices of particular ISPs, it is important that they have the option of "voting with their feet" by switching to any of several other ISPs that may provide alternative content choices.

If anything, the GAO gave much more prominence to the competing view. The GAO gives a good summary of how the policy of open access helped to create the vigorous competition on the Internet. There is no doubt that if the Commission allows high-speed access to continue on its closed, facilities-based path, the extent of competition on the Internet will be dramatically reduced.

[6] Lessig, 2001, Chapter 2; Lessig, 1999, p. 209; Lemley, Mark and Lawrence Lessig, *"The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era,"* 48 UCLA Law Review, 2001;"Written Ex Parte," *In the Matter of Application for Consent to Transfer Control of Licenses of MediaOne Group Inc. to AT&T Corp., Federal Communications Commission,* CS DOC. NO. C99-251, November 10, 1999.

[7] Abbate, 1999, pp. 159.

> [I]n the spring of 1976, *Datamation*, a magazine for data processing managers, reported that end-to-end protocols had become the focus of a power struggle between computer users and PTTs [post, telephone and telegraph administrations]. "There is a heated international argument over who will control packet switched communications networks – the carriers or the users…Data processing managers wanted to be able to tailor the network's behavior to their organization's needs, which meant having their own hosts do more of the work. These expert users tended to regard virtual circuits in the network as an expensive redundancy… Transmission delays would be especially burdensome in real-time applications, such as packet voice or video.
>
> To avoid unnecessary expense and delay, a number of computer users wanted the option of forgoing virtual circuits altogether in favor of unadorned datagram service, in which packets would be transmitted independently with no attempt to maintain an orderly sequence of data.

[8] Bell Atlantic, *Delivering the Promise: Avision of Tomorrow's Communications Consumer* (N.D.); Pacific Telesis, *The Intelligent Network Task Force Report* (October 1987); Lockton, J.D. Jr. (Senior Vice President, Pacific Telesis), "Information Age Developments in Telecummincations," in W.H. Dutton, J.G. Blumler and K.L. Kraemer (Eds.), *Wired Cities* (Boston: G.K. Hall, 1987); Geeslin, B.M. (Vice President Marketing and Technology, NYNEX), "Funding the Future Telecommunications Infrastructure," *IEEE Communications Magazine,* August 1988; Hanley, P.A. (Vice President of Regulatory and Industry Affairs, Bell Atlantic), "The Telecommunications Infrastructure Could Speed the Arrival of the Information Age," *Public Utilities Fortnightly,* August 17, 1989.

[9] *In the Matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities Universal Service Obligations of Broadband Providers Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer III and ONA Safeguards And Requirements,* Federal Communications Commission, CC Dockets Nos. 95-20, 98-10, February 15, 2002. *In the Matter of Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities Internet Over Cable Declaratory Ruling Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities,* GN Docket No. 00-185, CS Docket No. 02-05, March 15, 2002.

[10] Abbate, 1999; Lessig, 2001; Berners-Lee, Tim, *Weaving the Web: The Original Design and Ultimate Destiny of the World Wide Web by Its Inventor* (New York: Harper Collins, 1999).

[11] Lessig, 1999, 2001, Lemley and Lessig, 1999; Castells, Manual, *The Internet Galaxy* (Cambridge: Oxford University Press, 2001); Bar, Francois, et al., *Defending the Internet Revolution in the Broadband Era: When Doing Nothing is Doing Harm,* (1999).

[12] Cooper, Mark, *Expanding the Information Age for the 1990s: A Pragmatic Consumer View* (American Association of Retired Persons and Consumer Federation of America, January 11, 1990). This was the first in a series of reports that analyzed the effects of decentralized, open networks, prior to the dramatic commercial success of the Internet (see Cooper, Mark, *Developing the Information Age in the 1990s: A Pragmatic Consumer View,* (Consumer Federation of America, June 8, 1992,, "Delivering the Information Age Now," *Telecom Infrastructure*: 1993, Telecommunications Reports, 1993, *The Meaning of the Word Infrastructure* (Consumer Federation of America, June 30, 1994.

[13] Cooper, Mark, "Open Access To The Broadband Internet: Technical And Economic Discrimination In Closed, Proprietary Networks," *University of Colorado Law Review,* Vol. 69, Fall 2000; "Open Communications

Platforms: Cornerstone of Innovation and Democratic Discourse In the Internet Age," *The Regulation of Information Platforms*, University of Colorado School of Law, January 27, 2002 (to be published in *Journal on Telecommunications, Technology and Intellectual Property*).

[14] Cooper, 1990.

[15] Cooper, 1990, pp. 55, 83, 84.

> A number of telephone companies have published explicit policy statements about how they see the information age unfolding. All envision a large role for the telephone company with fiber optic telecommunications running to the home and highly intelligent switching capacity managing a fully integrated system with interactive communications…
>
> Many of the advocates of a centralize approach insist that the telephone company must be allowed to provide both the infrastructure for the information age and its content…. [T]elephone companies which are currently allowed to provide the software to create access to information services providers through gateways also want to be allowed to offer services through those gateways in competition with non-telephone company service providers. Without access to content, it is argued, the telephone companies will not risk the huge investments in transmission and distribution.

[16] Cooper, 1990. p. ES-1.

> The current approach in the U.S. is decentralized. The telephone company provides the transmission medium (the wire and access to it), but non-telephone companies develop services independently of the telephone company, frequently relying on the customer to supply his own computer terminal. The alternat5ive would have the telephone company provide both the transmission medium and the services, most likely by increasing the role of central office computers linked to "dumb terminals" on the customer premise

[17] Cooper, 1990, p. ES-6.

[18] Cooper, 1990, p. ES-5.

[19] Cooper, 1990, p. 12.

[20] Cooper, 1990, p. 1.

[21] Cooper, 1990, p. 19.

[22] Cooper, 1990, p. 85.

[23] Lessig, 2001, Chapter 3; Greenstein, *Commercialization,* pp. 26, 27, 30-32.

[24] Matos 1988; Abbate, 1999.

[25] Recent ISPS Counts are from *Boardwatch Magazine*, "North American ISPS." There are differences of opinion about the precise numbers. We use this source as an internally consistent set of numbers. While there are differences in details, the trends seem clear – rapid growth in the late 1990s and declines in the past couple of years.

[26] Greenstein, 2000, emphasizes the range of services offered,); "Comments of Earthlink, Inc," *In the matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 02-33, 95-20, 98-10, May 3, 2002, p. 6, offers the following list:

> ISPs offer a host of information functionalities under the rubric "Internet access" that includes, but is not limited to, email, web access, instant messaging ("IM"), chat rooms, content-based services (such as news, weather, music, stock quotes, etc.) web-hosting, access to software or games, and more.

[27] U.S. Department of Commerce, *Statistical Abstract of the United States,* (hereafter, Abstract) 1996, Table 878, 2001, Table 1125.

[28] *Abstract*, 2001, Table 1125.

[29] Stempel, Hargrove and Bernt, UCLA Center for Communications Policy, *Surveying the Digital Future,* November 2001, p. 78.

[30] Stempell, Hargrove and Bernt, p. 75 present the results of a unique longitudinal study that allowed for careful elaboration of research findings. They emphatically reject the notion that the Internet is stealing attention from other media.

> Our finding seem consistent with the speculation from many quarters that the Internet has taken people away form other media. However, [it], tells a different story. Almost exactly half of our

sample indicated they are using the Internet at least once a week, so we compared use of other media by those who use the Internet and those who do not. Users and non-users of the Internet both used network TV news to about the same extent. Those who use the Internet were slightly less likely to use local TV news, but the difference was not statistically significant. Those who use the Internet were more likely than those who don't use it to be regular newspaper readers and regular radio news listeners. So the Internet is not stealing readers from newspapers or listeners from radio.

[31] Benkler, Yochai, *From Consumers to Users: Shifting the Deeper Structures of Regulation Toward Sustainable Commons and User Access*, 52 *Fed. Comm. Law Journal*. 561 (2000); SeeYochai Benkler, *Intellectual Property and the Organization of Information Production*, (forthcoming in *International. Journal on Law and Economics*, and Lessig, 2001, p. 23, use three layers and note that Berners-Lee, 1999, identifies four layers, transmission, computer, software and content.

[32] Shapiro and Varian, *Information Rules* (Cambridge: Harvard Business School Press, 1999), pp. 9 – 15; also Richard N. Langlois, "Technology Standards, Innovation, and Essential Facilities: Toward a Schumpeterian Post-Chicago Approach," in (Jerry Ellig (Ed.), *Dynamic Competition and Public Policy: Technology, Innovations, and Antitrust Issues* (Cambridge: Cambridge University Press, 2001), p. 207, calls them system products – "Most cumulative technologies are in the nature of systems products, that is products that permit or require simultaneous functioning of a number of complementary components." Complementarities exist where standards knit the layers of the platform together.

[33] Benkler, Yochai, *Coase's Penguin, or Linux and the Nature of the Firm*, *Conference on the Public Domain*, Duke University Law School, (November 9-11), 2001, p. 1, points out that "As rapid advances in computation lower the physical capital cost of information production, and as the cost of communications decline, human capital became the salient economic good involved in information production."

[34] Baase, Sara, A *Gift of Fire: Social, Legal and Ethical Issues in Computing (*Upper Saddle River, N.J: Prentice-Hall, 1996).

[35] Gilder, George F., *Telecosm: How Infinite Bandwidth Will Revolutionize Our World* (New York: Free Press, 2000).

[36] Gaines, Brian, R., "The Learning Curve Underlying Convergence," *Technology Forecasting and Social Change* Jan./Feb. 1998, pp. 30-31.

[37] Arthur, W. Brian, "Positive Feedbacks in the Economy." *Scientific American.* Feb. 1990, p. 95; see also Arthur, W. Brian. 1989, "Competing Technologies, Increasing Returns and Lock-in by Historical Events." *Economic Journal. 1989:*99.

[38] Gaines, 1998, p. 23.

[39] Katz, Michael and Carl Shapiro, "Antitrust and Software Markets," in Jeffrey A. Eisenbach and Thomas M. Lenard (Eds.), *Competition, Innovation and the Microsoft Monopoly: Antitrust and the Digital Marketplace* (Boston: Kluwer. 1999).

[40] Owen, Bruce M., 1999, *The Internet Challenge to Television* (Cambridge: Harvard University Press.1999), p. 29.

[41] Owen, 1999, p. 151.

[42] Lemley, Mark and Lawrence Lessig, Written Ex Parte, numbers in parentheses refer to paragraphs.

[43] Berners-Lee, p. 72-73.

[44] Lessig, 2001, p. 43.

[45] Langlois, 2001, p. 206.

[46] Castells, 2001, p. 28. Note that the telephone is an industrial age communications platform with significant network effects, but does not exhibit the feedback loops or virtuous circles of information age communications platforms.

[47] Benkler, 2001b, p. 23.

[48]Whitman, Marina v. N., *New World, New Rules* (Boston: Harvard Business School Press, 1999), Chapter 2.

[49] Castells, 19996; Longworth, Richard, C., *Global Squeeze (*Chicago: Contemporary Books, 1998).

[50] Evans Phillip and Thomas S. Wurster, *Blown to Bits*: *How the New Economics of Information Transforms Strategy* (Cambridge: Harvard Business School Press, 2000), p. 17.

[51] Langlois, 2001, p. 207, offers this as a general proposition of system products.

[I]nnovation normally proceeds fastest when a large number of distinct participants are trying multiple approaches simultaneously. Because of the complexity that system products normally exhibit, and because of the qualitative uncertainty inherent in the process of innovation, multiple approaches and numerous participants provide greater genetic variety than would a simple innovator (or small number of innovators), which leads to more rapid trial-and-error learning.

[52] Bar, et. al., 1999.

[53] Bar, et. al., 1999.

[54] Scherer, F. M. and David Ross, *Industrial Market Structure and Economic Performance* (Boston: Houghton Mifflin, 1990), p. 18,

We proceed now to the principal question on our agenda. Why do statesmen and economists hold a competitive market system in such high esteem alike? Why is competition the ideal in a market economy, and what is wrong with monopoly?

We begin with the political arguments, not merely because they are sufficiently transparent to be treated briefly, but also because when all is said and done, they, and not the economists' abstruse models, have tipped the balance of social consensus toward competition. One of the most important arguments is that the atomistic structure of buyers and sellers required for competition decentralizes and disperses power. The resource allocation and income distribution problem is solved through the almost mechanical interaction of supply and demand forces on the market, and not through the conscious exercise of power held in private hands (for example, under monopoly) or government hands (that is, under state enterprise or government regulation). Limiting the power of both government bodies and private individuals to make decisions that shape people's lives and fortunes was a fundamental goal of the men who wrote the U.S. Constitution.

A closely related benefit is the fact that competitive market processes solve the economic problem *impersonally*, and not through the personal control of entrepreneurs and bureaucrats…

A third political merit of a competitive market is its freedom of opportunity. When the no-barriers-to-entry condition of perfect competition is satisfied, individuals are free to choose whatever trade or profession they prefer, limited only by their own talent and skill and by their ability to raise the (presumably modest) amount of capital required

[55] Lemley and Lessig, 1999, point out aspects of the convergence, at least by analogy.

The principle of End-to-End is not unique to computer networks. It has important analogs in American constitutional law and in other legal contexts. Vis-à-vis the states, for example, the dormant commerce clause imposes an End-to-End design on the flow of commerce: No state is to exercise a control over the flow of commerce between states; and the kind of control that a state may exercise over commerce flowing into that state is severely limited. The "network" of interstate commerce is to be influenced at its ends — by the consumer and producer — and not by intermediary actors (states) who might interfere with this flow for their own political purposes. Vis-à-vis transportation generally, End-to-End is also how the principle of common carriage works. The carrier is not to exercise power to discriminate in the carriage. So long as the toll is paid, it must accept the carriage that it is offered. In both contexts, the aim is to keep the transportation layer of intercourse simple, so as to enable the multiplication of applications at the end. (20)

[56] *Associated Press v. U.S.*, 326 U.S. 1, 20 (1945).

[57] Lessig, 1999, p. 166-167.

[58] Lessig, 1999, p. 183.

[59] Shapiro and Varian, 1999, pp. 22-23 address the issue of information production.

Information is costly to produce but cheap to reproduce.

Once the first copy of an information good has been produced, most costs are sunk and cannot be recovered.

Multiple copies can be produced at roughly constant per-unit costs.

There are no natural capacity limits for additional copies.

These cost characteristics of information foods have significant implications for competitive pricing strategy.

> The first and most important point is that markets for information will not, and *cannot,* look like textbook perfect competitive markets in which there are many suppliers offering similar products, each lacking the ability to influence prices.
>
> Baker, C. Edwin, *Media, Markets and Democracy* (Cambridge: Cambridge University Press.2002), p. 32, describes the impact on media.
>
> Monopolistic competition theory applies to media goods. They, like utilities, characteristically manifest the "public good" attribute of having declining average costs over the relevant range of their supply curves due to a significant portion of the product's cost being its "first copy cost," with additional copies having a low to zero cost. There are a number of important attributes of monopolistic competition that are relevant for policy analysis and that distinguish it from the standard model of so-called pure competition, the standard model that underwrites the belief that a properly working market leads inexorably to the best result (given the market's givens of existing market expressed preferences and the existing distribution of wealth). The first feature to note here is that in monopolistic competition often products prevail that do not have close, certainly not identical, substitutes. Second, this non-substitutability of the prevailing monopolistic product will allow reaping of potentially significant monopoly profits . . .
>
> . . .within this type of competition, products' uniqueness or monopoly status often permits considerable margin for variation while remaining profitable. The "potential" profit of the profit maximizing strategy can be realized and taken out as profit—which is what the corporate newspaper chains are accused of doing. However, the market itself does not require the profit maximizing response as it does in a model of pure competition. Rather the potential profit can instead be spent on indulging (or "subsidizing") the owners' choices about content or price.

[60] Shapiro and Varian, 1999, pp. 28, 54, 87-89.

[61] T. Randolph Beard, George S. Ford, and Lawrence J. Spiwak, *Why ADCo? Why Now: An Economic Exploration into the Future of Industry Structure for the "Last Mile" in Local Telecommunications Markets (*Phoenix Center, November 2001); Computer Science and Telecommunications Board, National Research Council, *Broadband, Bringing Home the Bits* (Washington, D.C.: National Academy Press, 2002) (hereafter, Bits), pp. 23; 152-154.

[62] Lemley and Lessig, 2001. The Lemley and Lessig piece is a direct response to Speta, 1999, 2000, and Weiser, 2000, which were responses to Lemley and Lessig, 1999.

[63] Bar, et. al., 1999. NorthNet, Inc., "An Open Access Business Model For Cable Systems: Promoting Competition And Preserving Internet Innovation On A Shared, Broadband Communications Network." *Federal Communications Commission, Ex Parte, In the Matter of Application of America Online Inc. and Time Warner, Inc. for Transfers of Control*. Federal Communications Commission, CS-Docket No. 0030. October 16.2000.

> Even if the Commission is not ready to embrace the proposition that the cable "pipeline" is a telecommunication facility, the essential point is that policy of open telecommunications networks, including the mandate for nondiscriminatory interconnection pursuant to ONA/CEI is what has largely allowed the "narrowband" Internet to be as vibrant and competitive as it is today. It is hard to see how closed cable networks can obtain the same result in a broadband environment
>
> Comstock and Butler, 2000.

[64] Lessig, 2001, p. 148.

[65] Lemley and Lessig, 2001, p. 7.

[66] Cooper, 1990.

[67] Clark, David D. and Marjorie S. Blumenthal, "Rethinking the Design of the Internet: The End-to-End Argument vs. The Brave New World," in Benjamin M. Compaine and Shane Greenstein (Eds.), *Communications Policy in Transition* (Cambridge: MIT Press, 2001); Reed, David P., Jerome Saltzer and David D. Clark, *Active Networking and End-to-End Arguments*, May 15.1998.

[68] Lemley and Lessig, 2001.

[69] Clark and Blumenthal, 2001 Clark, David D. and Marjorie S. Blumenthal, "Rethinking the Design of the Internet: The End-to-End Argument vs. The Brave New World," Telecommunications Policy , August 10, 2000 (hereafter Clark and Blumenthal), p. 18,

> [M]any forces are pushing to change the Internet today: a greater call (from various voices) for stable and reliable operation, even though we can place less trust in the individual users of the network; new sorts of sophisticated applications driven by new visions of consumer-oriented

experiences; the motivation of ISPs to develop into enclaves containing enhanced service to gain competitive advantage; the proliferation of third parties with a range of interests in what the users are actually doing; the proliferation of less sophisticated users for whom "innovation" is a mixed blessing; and new forms of computing and communications that call for new software structures. All of these forces have the consequence of increased complexity, of increased structure in the design of the Internet, and a loss of control by the user. Whether one chooses to see these trends as a natural part of the growing up of the Internet or the fencing of the West, they are happening. It is not possible to turn back the clock to regain the circumstances of the early Internet: real changes underscore real questions about the durability of the Internet's design principles and assumptions.

[70] Clark and Blumenthal, 2000. p. 23,

While there has been concern expressed in some quarters about increasing involvement of governments, the ISP may present the greatest challenge to the traditional structure of the Internet. The ISPs implement the core of the network and any enhancement or restriction that the ISP implements is likely to appear as new mechanism in the core of the network. As gateways to their customers they are an inherent focal point for others interested in what their customers do, too.

[71] Cooper, 2000.

[72] The instant messaging dispute between AOL and other ISPs has been cast by AOL as one involving privacy and security, but a *Washington Post* story revealed that its central threat to Prodigy and others who had "hacked" into the instant message space was to claim economic harm.

[73] Cooper, 1999, 2000b; Consumers Union, 2000; NorthNet, Inc., 2000.

[74] "Petition to Deny of Consumers Union, Consumer Federation of America, and Office of Communications, Inc. of the United Church of Christ," *In the Matter of Joint Application of AT&T Corporation and Tele-Communications Inc. for Approval of Transfer of Control of Commission Licenses and Authorities*, Federal Communications Commission, Docket No. CS-98-178, October 29, 1998.

[75] Consumer Federation of America, Texas Office of People's Counsel, and Consumers Union, "Reply Comments," before the Federal Communications Commission, *In the Matter of In The Matter Of Deployment Of Wireline Services Offering Advanced Telecommunications Capability, Etc.*, CC Docket Nos. 98-147, 98-11, 98-26, 98-32, 98-78, 98-91, CCB/CPD Docket N. 98-15, RM 9244, October 18, 1998.

[76] Cooper, Mark, *The Economics of Deregulation and Reregulation in the Cable Industry: A Consumer View*, (Washington D.C.: Consumer Federation of America, September 1992); "Statement of Dr. Mark N. Cooper, on Behalf of the Consumer Federation of America," before the Federal Communications Commission, *In Re: Petition of Consumers Union and the Consumer Federation of America to Update Cable TV Regulation and Freeze Existing Cable Television Rates*, MM Docket Nos. 92-264, 92-265, 92-266, September 22, 1997.

[77] Cooper, Mark, *Stonewalling Local Competition: The Baby Bell Strategy to Subvert the Telecommunications Act of 1996* (Consumer Federation of America, January 1998)

[78] The Commission has been presented with a mountain of specific evidence of anticompetitive behavior by wire owners. Notwithstanding the grant of entry into long distance, many of these problems still afflict the provision of DSL service, as recent testimony in Texas (the second state in which an incumbent RBOC was granted entry) attest; see Onramp; "Response of Cbeyond, Inc.," *Ten Questions to Begin the Committee's Inquiry Into State Broadband Policy*, Committee on State Affairs, April 3, 2002 (hereafter, Cbeyond); "Response of IP Communications," *Ten Questions to Begin the Committee's Inquiry Into State Broadband Policy*, Committee on State Affairs, April 3, 2002 (hereafter IP Communications); "Response of Hometown Communications," *Ten Questions to Begin the Committee's Inquiry Into State Broadband Policy*, Committee on State Affairs, April 3, 2002 (hereafter Hometown); "Response of Texas CLEC Coalition," *Ten Questions to Begin the Committee's Inquiry Into State Broadband Policy*, Committee on State Affairs, April 3, 2002 (hereafter TxCLEC); "Reply Comments of the California ISP Association, Inc., *Further Notice of Proposed Rulemaking in the matter of the Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 95-20, 98-10, April 30, 200 (hereafter, CISPA, 2001b); "Reply Comments of the Texas Internet Service Providers Association, .*Further Notice of Proposed Rulemaking in the matter of the Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 95-20, 98-10, April 30, 200 (hereafter, TISPA, 2001a); "Reply Comments of the Commercial Internet Exchange Association,

.*Further Notice of Proposed Rulemaking in the matter of the Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 95-20, 98-10, April 30, 200 (hereafter, CIX, 2001a); "Comments of the Information Technology Association of America," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002 (hereafter ITAA, 2002).; "Comments of the Information Technology Association of America," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002 (hereafter ITAA, 2002); "Comments of the IP Communications Corporation," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002 (hereafter IPCommunications, 2002); "Comments of the Public Service Commission of the State of Missouri," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002 (hereafter MOPSC, 2002); "Joint Comments of NASUCA, et al.," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002 (hereafter NASUCA, 2002); "Comments of Ad Hoc Telecommunications Users Committee," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002 (hereafter Ad Hoc, 2002); "Comments of the New Mexico Information Professionals Association of America," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002 (hereafter NMIPA, 2002); "Comments of Cox Communications, Inc.," *In the matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 02-33, 95-20, 98-10, May 3, 2002 (Hereafter Cox, 2002); "Comments of BrandX.," *In the matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 02-33, 95-20, 98-10, May 3, 2002 (Hereafter BrandX, 2002); "Comments of the New Hampshire ISP Association," *In the matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 02-33, 95-20, 98-10, May 3, 2002 (Hereafter NHISP, 2002); "Comments of Ruby Ranch Cooperative Association," *In the matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 02-33, 95-20, 98-10, May 3, 2002 (Hereafter Ruby Ranch, 2002; "Comments of Earthlink, Inc.," *In the matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 02-33, 95-20, 98-10, May 3, 2002 (Hereafter Earhtlink, 2002); "Comments of U.S. LEC Corp.," *In the matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 02-33, 95-20, 98-10, May 3, 2002 (Hereafter US LEC, 2002); "Comments of Big Planet, Inc.," *In the matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 02-33, 95-20, 98-10, May 3, 2002 (Hereafter Big Planet, 2002); "Joint Comments of Cbeyond and Nuvox," *In the Matter of Review of Regulatory Requirements*

for Incumbent LEC Broadband Telecommunications Services, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002 (hereafter CBeyond, 2002).

[79] Cooper, Mark, *The Failure of 'Intermodal' Competition in Cable and Communications Markets* (Consumer Federation of America and Consumers Union, April 2002).

[80] Comment of Arizona Consumer Council, et al, *In the Matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities Universal Service Obligations of Broadband Providers Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer III and ONA Safeguards And Requirements*, Federal Communications Commission, CC Dockets Nos. 95-20, 98-10, May 3, 2002.

[81] Jason B. Bazinet, *The Cable Industry* (J.P. Morgan Securities, Inc., November 2, 2001); Industry Analysis Division, *High-Speed Services for Internet Access: Subscribership as of June 30, 2001* (Common Carrier Bureau, Federal Communications Commission, February 2002), Tables 1-4.

[82] Mohney, Doug. 2002. "The Train Wreck Mess of Consumer Satellite Broadband." *ISP World*. April 24; Baumgartner, Jeff. 2002. "Not all Systems 'Go' for Satellite Broadband." *Communications Engineering and Design.* April.

[83] "Initial Comments of the California ISP Association, Inc.," *Further Notice of Proposed Rulemaking in the matter of the Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 95-20, 98-10, DA 01-620, April 16, 2001 (hereafter CISPA, 2001a), p. 7.); "Comments of DirecTV Broadband, Inc," *In the matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 02-33, 95-20, 98-10, May 3, 2002, p. 5; "Comments of Cbeyond, et al.," *In the matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 02-33, 95-20, 98-10, May 3, 2002 (Hereafter Cbeyond, et al, 2002), pp. 27-28.

[84] Bits, pp. 21, 152-154.

[85] Ad Hoc, pp. 18-19.

[86] Kuhl, Craig, "Writing the Business Case for VDSL," *CED,* April 2000.Extensive documentation of the technology difference is provided in Cooper, Mark, *Transforming the Information Superhighway into a Private Toll Road* (Consumer Federation of America, October 1999).

[87] *Bits*, p. 21.

[88] IPC, p. 3.

[89] Ad Hoc, stresses the failure to compete.

[90] Cooper, 2002.

[91] Thomas W. Hazlett and George Bittlingmayer, *The Political Economy of Cable "Open Access"* (Joint Center, Working Paper 01-06, May 2001.

[92] AT&T Canada Long Distance Services, "Comments of AT&T Canada Long Distance Services Company," before the *Canadian Radio-television and Telecommunications Commission*, Telecom Public Notice CRTC 96-36: Regulation of Certain Telecommunications Service Offered by Broadcast Carriers, February 4, 1997. The AT&T policy on open access after it became a cable company was first offered in a Letter to Chairman Bill Kennard, dated December 6, 1999, signed by David N. Baker, Vice President Legal & Regulatory Affairs; Mindspring Enterprises; James W. Cicconi, General Council and Executive Vice President, AT&T Corp.; and Kenneth S. Fellman, Esq., Chairman, FCC Local & State Government Advisory Committee. Virtually no commercial activity took place as a result of the letter, which was roundly criticized. Subsequently their policy was described in Goodman, Peter S., "AT&T Puts Open Access to a Test," *Washington Post*, November 23, 2000 (hereafter Goodman). AT&T continues to complain that the Regional Bell Operating Companies are continuing to impede competitors from gaining nondiscriminatory access to advanced services unbundled network elements, see, for example, "Affidavit of Al Finnell on Behalf of AT&T Communications of California," before the Public Utilities Commission of the State of California, *Notice of Intent to File Section 271 Application of SBC Communications Inc., Pacific Bell, and Pacific Bell Communications Inc., for Provision of In-region, InterLATA Services in California, August 11, 1999,* pp. 42-53.

[93] America Online Inc., "Open Access Comments of America Online, Inc.," before the Department of Telecommunications and Information Services, San Francisco, October 27, 1999 (hereafter, AOL). At the federal level, AOL's most explicit analysis of the need for open access can be found in "Comments of America Online, Inc.," *In the Matter of Transfer of Control of FCC Licenses of MediaOne Group, Inc. to AT&T Corporation*, Federal Communications Commission, CS Docket No. 99-251, August 23, 1999 (hereafter, AOL, FCC). America Online continues to reiterate these arguments (see "Comments of AOL timeWarner, Inc.," *In the matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket NO. 02-33, 95-20, 98-10, May 3, 2002; (Hereafter AOL, 2002);

[94] Jerry A. Hausman, J. Gregory Sidak, and Hal J. Singer, "Residential Demand for Broadband Telecommunications and Consumer Access to Unaffiliated Internet Content Providers," *Yale Journal on Regulation*, 18 (2001). John B. Hayes, Jith Jayaratne, and Michael L. Katz, *An Empirical Analysis of the Footprint Effects of Mergers Between Large ILECS*, April 1, 1999, p. 1; citing "Declaration of Michael L. Katz and Steen C. Salop," submitted as an attachment to *Petition to Deny of Spring Communications Company L.P*, in Ameritech Corp. and SBC Communications, Inc., for Consent to Transfer of Control, CC Dkt. No. 98-141 (filed Oct. 15, 1998) and *Petition to Deny of Spring Communications Company L.P*, in GTE Corporation and Bell Atlantic Corporation for Consent to Transfer of Control, CC Dkt. No. 98-184 (filed Nov. 23, 1998).

[95] The framework was first presented in "Petition to Deny of Consumers Union, Consumer Federation of America, Media Access Project and Center for Media Educations," *In the Matter of Application of America Online, Inc. and Time Warner, Inc. for Transfer of Control*, Federal Communications Commission, Docket No. CS 00-30, April 26, 2000. Academic development of the framework included Cooper, 2000, and Cooper, Mark and Christopher Murray, "Technology, Economics And Public Policy To Create An Open Broadband Internet," *The Policy Implications of End-to-End*, Stanford Law School, December 1, 2000.

[96] The framework for this section was developed in earlier comments in this docket filed by the Consumer Federation of America and Consumers Union, "Reply Comments," before the Federal Communications Commission, *In the Matter of In The Matter Of Deployment Of Wireline Services Offering Advanced Telecommunications Capability, Etc.*, CC Docket Nos. 98-147, 98-11, 98-26, 98-32, 98-78, 98-91, CCB/CPD Docket N. 98-15, RM 9244, October 18, 1998. Individual Comments in that proceeding on which this analysis relies include those filed by Federal Trade Commission, Staff Of The Bureau Of Economics (Hereafter FTC); Indiana Utility Regulatory Commission (Hereafter IURC); Technical Staff Of The Public Service Commission Of Wisconsin (Hereafter Wisconsin Staff); Public Utility Commission Of Texas (Hereafter TXPUC), New York State Department of Public Service (hereafter NYDPS); Minnesota Department Of Public Service (Hereafter MNDPS); New York, State Department Of Public Service (Hereafter NYDPS), Coalition Of Utah Independent Internet Service Providers (Hereafter UtahISP); Internet Service Providers' Consortium (Hereafter ISPC); Internet Access Coalition (Hereafter IAC); Rhythms; Netconnections, Inc.; America Online Inc. (AOL); Ad Hoc Telecommunications Users Committee (Hereafter Ad Hoc); Information Technology Association Of America (Hereafter ITAA); New Network Institute.

[97] AT&T's has made this offer in a number of venues with increasing publicity over time, see Goodman, Letter from David N. Baker, Vice President of Legal and Regulatory Affairs of Mindspring Enterprises, James W. Cicconi, General Counsel and Executive Vice President of AT&T Corp., and Kenneth S. Fellman, Chairman, FCC Local & State Government Advisory Committee, to William E. Kennard, Chairman of the Federal Communications Commission (Dec. 6, 1999) (on file with author) [hereinafter Mindspring Letter]. Letter from Andrew J. Schwartzman, Pres. & CEO, Media Access Project to William Kennard, Chairman, FCC (Dec. 6, 1999) [hereinafter Schwartzman Letter; *MediaOne, Town of Weymouth's Decision to Regulate Internet Service as a Condition of MediaOne's License Transfer to AT&T To Be Fought by Media One* (Oct. 26, 1999):

> Guarantee that cable modem customers will be able to configure the service to support the customers' own choice for a "first screen" on the Internet (i.e., provide immediate access to AOL, Yahoo, or any other Internet site with a single click on the user's PC).
>
> Guarantee that the cable modem service technology supports all generally accepted Internet protocols
>
> Guarantee that cable model service customers will have access to all Internet content and all online service providers and ISPs, subject only to reasonable technical limitation that may be

necessary to preserve a reasonable level of service for other customers that are also using the service (i.e., limitations on "bandwidth hogging").

Guarantee that cable modem customers will have the option to bypass proprietary content offered by any cable modem services that is affiliated with the cable operator.

[98] Northnet, Inc.

[99] Clark and Blumenthal, 2000, p. 24, speculate on a shift of innovation from small startups to much larger well financed ventures as a locus of innovation.

[100] Angwin, Julia, "'Open Access" Isn't So Open At Time Warner." *Wall Street Journal*. May 6, 2002.

[101] TISPA, pp. 22, 23, 31; CISPA, 2001a, pp. 10-14; DirectTV, p. 8.

[102] Tauzin Dingell.

[103] Keith Epstein, "Cheating or Competing?", *Washington Techway*, February 4, 2002, p. 28.

[104] Utah ISP, p.6; MNDPS, p. 9; ISPC, p. 6; IAC, p. 9; Rythms, pp. 2,3; AOL, pp. 6, 8; ITAA, p. iv.

[105] Epstein, p. 30.

[106] Minnesota, p. 9.

[107] Epstein, pp. 29-30.

[108] Lessig, 1999, Appendix.

[109] CISCO, *Controlling Your Network – A Must for Cable Operators*, 1999 (hereafter, Controlling), pp. 2–3. Saltzer, Jerome H., *"Open Access" is Just the Tip of the Iceberg* (Oct. 22, 1999), p. 3., notes "The ability to prioritize and control traffic levels is a distinguishing factor and critical difference between New World networks employing Internet technologies and "the Internet."

[110] Kevin Werbach, *The Architecture of Internet 2.0*, RELEASE 1.0 (Feb. 1999), Bar et al., *supra* note 14.

[111] Onramp, pp. 16-17.

For instance, if SBC or Time Warner peered with my company, I could sell web hosting services to customers wanting to deliver applications and information to SBC's or Time Warner's customers. That company would be able to deliver those applications and services as if they were directly on SBC's or Time Warner's network without having to actually be on their network. As an example, my company is a Certified Microsoft Applications Service Provider. We sell Microsoft Exchange services for $15 per month per seat (it costs over $5,000 for a small company to install this service for just 5 people). Exchange services require a reliable and fast connection to be usable. If people have to go all the way to Dallas and back to connect to my server, they won't buy the service. However, if my network was directly connected to SBC's network at a peering point, end users on SBC's network would have a nearly direct connection to my servers. This would result in lower costs for SBC, lower costs for Onramp Access and lower costs and better service for the end user. However, SBC doesn't itself currently offer these services, but may want to in the future. So, rather than reduce their expenses through peering, they would rather force me to pay a national backbone provider, like Sprint, to connect me to an end-user in the same city that I am in. As a result, I don't sell Exchange services to SBC's DSL customers. Since SBC doesn't sell that service, none of the 90% of the DSL market in Texas that SBC has captured can receive that service.

[112] TISPA, p. 18.

[113] IURC, p. 14; Utah ISP, pp. 8,9; ISPC, p. 7; IAC, p. 9; AOL, pp. 6,8; AdHoc, p. 26; ITAA< pp. 13, 15.

[114] Vaughn-Nichols, Steven J., "DSL Spells Trouble for Many ISPs," *Smart Reseller*, February 24, 1999.

[115] TISPA, p. 27.

[116] TISPA, p. 33.

[117] Onramp, p. 14.

Currently, SBC allows a DSL partner to use this one line to connect customers in one city. In other words, if an independent ISP wants to offer service in more than one city, they have to purchase a $1500 per month line for each city, in each city. Technology does not require this to be the case. My company sold DSL access throughout the United States through Covad and only had to purchase one $1500 per month line in one city (Austin) to do it. Just like the phone company can connect your local telephone line to a long distance call, the phone company can connect our DSL connection to a customer in another city. SBC is erecting artificial barriers to competition. Not having access to that one telephone line prevents me from offering enhanced Internet access, firewall configuration, network administration, remote application delivery, Voice over IP and a

host of other services that SBC doesn't offer. The market suffers as a result. The last mile DSL or cable line is only one small part of the entire service, yet the companies who control the line have been allowed to monopolize the rest of the service

[118] Onramp, pp. 5-6.

In addition, SBC does not offer complete Service Level Agreements for any of their DSL products. In effect, they guarantee that you will obtain the advertised speed only through the part of the telephone network that exists in your neighborhood. So, they advertise that you can connect to the Internet at a particular speed, but" then don't back that up with a guarantee to do so. As a result, many businesses or residences that could purchase a DSL line with a speed guarantee a few short years ago cannot now.

[119] Onramp, p. 14.

One of the prominent developing uses of the Internet is "Voice Over Internet Protocol" or VOIP. VOIP is simply a way to talk on the telephone while using the broadband connection to transmit the call rather than a traditional phone line. Of course, VOIP is a threat to both local telephone providers and long distance providers. That's because, among other things, VOIP could be used to provide local or long distance telephone service over a broadband connection which would, of course, obviate the need for another telephone line… However, the same companies who control over 90% of the DSL market would lose revenue if VOIP becomes popular. If you can replace five or six voice telephone lines with one DSL line, SBC will lose money. Monopolists tend not to deploy new technology that makes the technology they are already invested in obsolete.

[120] ITAA, pp. 10-11; CISPA, 2001a, pp. 27-28

BOCs currently require broadband ISPs to access last mile connections through the BOC's ATM cloud. A host of enhanced digital services include digital voice and streaming video services, require IP addressing and Private Virtual Circuits (PVCs) from the ISP's network through the ATM cloud to the consumer. Recently, two BOCs that have provided static IP addressing and PVCs through their ATM clouds have suggested that they will reconfigure their network so that static IP and PVCs to consumers will no longer be provided. **The proposed BOC architecture will materially alter the capability of the wholesale DSL circuits currently provided to competing broadband ISPs, and it will make it impossible for competing ISPs to utilize those connections to provide several important advanced services expected to be rolled out in the next eighteen months.** The proposed architecture will create a new BOC monopoly for advance services, covering every wholesale DSL connection purchased by competing ISPs, who will be forced to choose the BOC as vendor for any advanced digital services

[121.] See Saltzer,

Video limits. Some access providers limit the number of minutes that a customer may use a "streaming video" connection. Today, streaming video is not widely used, because it provides movies that are small and erratic, but one day streaming video is likely to become an effective way to watch television programs from many source--chosen by the customer, not the cable company--or to purchase pay-per-view movies. The technical excuse for this restriction is that the provider doesn't have enough capacity for all customers to use streaming video at the same time. But cable companies have a conflict of interest--they are restricting a service that will someday directly compete with Cable TV.

Cleland notes:

Cable's opposition to ISPs gaining equal access to the cable plant means that no Internet player can become a competing video programmer or packager on cable's extremely scarce facility . . . Cable's contracts with @Home/Road Runner expressly prohibit the broadcast of no more than 10 minutes of streaming video which means that no Internet video programming that could directly compete with cable programming can use the cable pipe

[122] *See* CISCO, *New Revenue Opportunities for Cable Operators From Streaming-Media Technology*, 1999, pp. 9, 12.

Cable operators need to design intelligent networks that can distinguish flows and treat them differently. They can design high-speed data networks that permit control of streaming-media content flow—the flow of incoming content from other networks (the Internet, for example) and flows within the network (to differentiate services). Committed access rate (CAR) is an example

of the technologies that are used to control the flow of content into and out of networks. Using CAR, a cable operator can define specific types of traffic and control how much bandwidth they consume.

The cable industry is in a state of rapid transition from the old-world, closed-system that offers broadcast television to a new world driven by competition and choice. Good planning and network design will ensure that streaming-media is not a threat to cable operators, but a new platform for the easy deployment of highly customized and valued on-demand content and services.

[123] Saltzer,

Some providers have adopted a more subtle approach: they refuse to assign a stable Internet address to home computers, thereby making it hard for the customer to offer an Internet service that others can reliably find. And some access providers have placed an artificial bottleneck on outbound data rate, to discourage people from running Internet services.

[124] Saltzer.

[125] Cairncross, Frances, *The Death of Distance* (Boston: Harvard Business School Press, 2001).

[126] TISPA, p. 25.

[127] TISPA, p. 17.

[128] ITAA, p. 11; DirecTV, p. 8-10.

[129] TISPA, p. 33.

[130] NMIPA, p. 5.

[131] CISCO, Streaming Media, p. 9; M.J. Richter, *Everything's Coming Up Convergence*, *Telephony*, June 28, 1999, at 30 (quoting Rich Aroian, vice president of marketing and strategic alliances, Saville Systems).

[132] TISPA, p. 22; CISPA, 2001a, pp-21-22, 31-32; New Edge, p. 6; NMIPA, p. 6.; TXPUC, p. 3, MNDPS, p. 3; Utah ISP, pp. 9,1 6; ISPC, p. 11; IAC, p. 9; AdHoc, p. 27, ITAA, p. 16.

133. Seth Schiesel, "Start-Up Leads Phone Cause in Battle for Internet Access," *N.Y. Times*, May 17, 1999, at C-4**.**

[134] IURC, p. 8; ISPC, p. 11; AOL, pp. 6, 8; AdHoc, p. 21.

[135] Onramp, p. 3.

[136] TISPA, p. 21, New Edge, p. 6; Brand X, p. 2, DirectTV, p. 8; CIX, P. 8.

[137] Telephone companies achieve the margin difference by offering high volume ISPs massive volume discounts that aggregate business across state lines, without any cost justification for such a discount (see TISPA, p. 37; MPIPA, p. 5; ITAA, p. 21; DirectTV, p. 9, CSIPA, p. 16.

[138] IgLou, "ADSL Tariff and Deployment.

[139] Cisco, Streaming Media, *supra* note 12, at 1.

Although Cisco is trying to sell systems to cable operators, this sharp difference between telephone company wideband and cable broadband has been noted by disinterested parties as well. For example, a much more "academic" document published by Cisco a couple of years earlier offered the following observation on the advantages of cable systems for residential broadband service.

See Lemley & Lessig, 1999,, ¶ 51.Abe, George, *Residential Broadband* (Cisco Press, Macmillan Publishing, 1997), pp. 155, 283.

Cable Networks have the early lead over telephone companies and other service providers in offering broadband services in the home. Cable TV networks have speed, ubiquity, and experience in offering residential services, especially television. These advantages make it possible to offer digital and high-speed Internet access to millions of consumers quickly over the existing network. . .

Unlike HFC, xDSL, and even VDSL, are not competitive with broadcast digital TV. ASDL does not have the bandwidth nor the coverage to compete for cable for video. The main use of video over DSL is for video on demand or near video on demand, neither of which has proven sufficient to justify massive infrastructure capital costs.

[140] Cox, p. 6.

[141] IURC, p. 5; TXPUC, p. 14; NYDPS, p. 7; Utah ISP, p. 13, 15; ISPC, p. 11; IAC, p. 9; AdHoc, p. 27; ITAA, p. 16.

[142] CISPA, Reply, p. 7,

> The new "wholesale" contract – in essence – provides a mechanism for SBC to retain a direct relationship with the independent ISP's end-users by giving SBC the right to sell enhanced services such as video on demand, videoconferencing, and e-commerce applications directly to those ISP customers. In short, SBC, by virtue of owning the "pipe" is reserving unto itself, the long-term, high-margin business. Were there anything remotely resembling competition, no ISP would ever give away the most lucrative revenue stream associated with its customers.

[143] Cooper, 2000, Northnet.

[144] TISPA, p. 36.

[145] FTC, pp. 5,7; IURC, p. 10, TXPUC, p. 2; MNDPS, p. 3; Utah ISP, p. 16, AdHoc, p. 24; ITAA, pp. 899.

[146] TXPUC, pp. 4,8; MNDPS, p. 16; IAC, p. 13; AdHoc, p. 22; ITAA, pp. 12,13.

[147] FTC, p. 6; IURC, p. 16; TXPUC, p. 5; IAC, p. 9; AdHoc, pp. 23; ITAA, p. 15.

[148] MNDPS, pp. 10, 11; Utah ISP, pp. 10, 11; ISPC, p. 9; IAC, p. 9; AOL, pp. 6,8.

[149] IgLou, Questionable Marketing Practices.

[150] FTC, p. 11; IURC, p. 10; MNDPS, pp. 8, 10; NYDPS, p. 7; Utah ISP, p. 10; ISPC, p. 7; IAC, p. 11; AOL, pp. 6, 8; ITAA, pp. 6, 15.

[151] IgLou, How BellSouth is Using the Internet to Rebuild its Monopoly.

[152] Investigation on the Commission's own motion into the operations, practices, and conduct of Pacific Bell Telephone Company (U 1001 C), Pacific Bell Internet Services, and SBC Advanced Solutions, Inc. (U 6346 C) to determine whether they have violated the laws, rules and regulations governing the inclusion of charges for products or services on telephone bills, California Public Utility Commission, January 23, 2002, p. 1

[153] Press accounts give detailed estimates of major ISPs. The number of subscribers to independent ISPs is put at 500,000 to 600,000 in a market that is in the range of 10,000,000 to 12,000,000, see Forrester.com/ER/Press/Release/0,1769,655,00.html; ISP-Planet.

[154] Greenstein, 2000.

[155] Fusco, Patricia, "Top U.S. ISPs by Subscriber: Q1 2002," *ISP-Planet*, May 29, 2002.

[156] Harvill, Terry, S. "ICC Commissioner Blasts SBC," *Chicago Sun Times*, April 23, 2001; see also, Young, Shawn, et. al., "How Effort to Open Local Phone Markets Helped the Baby Bells," *Wall Street Journal*, February 11, 2002.

[157] Cited in Onramp, p. 3.

[158] Ploskina, Brian and Dana Coffield, "Regional Bells Ringing Up Higher DSL Rates," *Interactive Week*, February 18, 2001; Braunstein, Yale, *Market Power and Price Increases in the DSL Market* (July 2001).

[159] "Cable Industry Comment," *Banc of America Securities*, May 7, 2001; Ames, Sam, "Study: Broadband Fees Climbed in 2001," *Yahoo News*, January 18, 2002.

[160] Onramp, p. 3.citing CFO Stephenson.

[161] Spangler, Todd, "Crossing the Broadband Divide," *PC Magazine*, February 12, 2002 (noting pricing and service quality problems); Banc of America; Plosinka and Coffield.

[162] Ashton, Doug, "The Future of Telecommunications Investment," *Columbia Institute for Tele-Information*, March 3, 2001 (noting lack of new services), Tim Horan, "Communications Services: Industry Restructuring," *Columbia Institute for Tele-Information*, March 3, 2001 (noting lack of competitors and lack of services), Bits, p. 15, 58, (noting service quality and lack of a killer application).

[163] Lessig, 1999, p. 91,

> But we can see in the Internet a strategy for dealing with the very same blindness… If the platform remains neutral, then the rational company may continue to eke out profit from the path it has chosen, but the competitor will always have the opportunity to use the platform to bet on a radically different business model.
>
> This again is the core insight about the importance of end-to-end. It is a reason why concentrating control will not produce disruptive technology. Not necessarily because of evil monopolies, or bad management, but rather because good business is focused on improving its lot, and disruptive technologists have no lot to improve

[164] Lemley and Lessig, End of End-to-End, pp. 7.8.

> Companies develop core competencies, and most of them tend to stick to what they know how to do. Companies faced with a potential for radical change in the nature of their market might recoil, either because they do not know how to adapt to changing conditions or because they fear that they will lose dominance in the old market as it becomes a new playing field. Their business

planning is, in short, governed by the legacy of their past success. These legacy business plans often affect a company's response to innovation. In a competitive environment, these plans will often disadvantage a company that fails to respond rapidly enough to changed circumstances. Companies that control proprietary architectural standards have an advantage over other vendors. Since they control the architecture, they are usually better positioned to develop products that maximize its capabilities; by modifying the architecture, they can discipline competing product vendors. In an open-systems era, the most consistently successful information technology companies will be the ones who manage to establish a proprietary architectural standard over a substantial competitive space and defend it against the assaults of both clones and rival architectural sponsors. A company in this position can and will resist change in order to keep doing what it knows best.

[165] Lemley and Lessig, End of End-to-End, pp. 5…12.

Innovation is most likely when innovators can expect to reap rewards in a fair marketplace. Innovation will be chilled if a potential innovator believes those that control the network and have the power to behave strategically will capture the value of the innovation. To the extent an actor is structurally capable of acting strategically, the rational innovator will reckon that capacity as a cost to innovation.

If that strategic actor owns the transmission lines itself, it has the power to decide what can and cannot be done on the Internet. The result is effectively to centralize Internet innovation within that company and its licensees. While there is a debate in the economic literature about the wisdom of centralizing control over improvements to any given innovation we think the history of the Internet compellingly demonstrates the wisdom of letting a myriad of possible improvers work free of the constraints of a central authority, public or private. Compromising e2e will tend to undermine innovation by putting one or a few companies in charge of deciding what new uses can be made of the network…

The point is not that cable companies would necessarily discriminate against any particular technology. Rather, the point is that the possibility of discrimination increases the risk an innovator faces when deciding whether to design for the Internet. Innovators are likely to be cautious about how they spend their research efforts if they know that one company has the power to control whether that innovation will ever be deployed. The increasing risk is a cost to innovation, and this cost should be expected to reduce innovation.

[166] Intellectual Property, pp. 28-28.

[167] Benkler notes two feedback effects that "amplify the direction and speed of the shift in strategies, and lock them in institutionally." First, "organizations invest in creating demand for their products." This rebounds to the advantage of dominant commercial firms. Second, dynamic adjustment of organizations will accelerate changes in behaviors. Expectations about commercial mass media actions will result in adopting such "strategies sooner than might otherwise be warranted by a static assessment of market conditions immediately following an increase in property rights. Moreover, expectations regarding the dynamic effects on institutional development will create particularly intense incentives to adopt" the dominant commercial strategy.

[168] Bar, et. al.

[169] Lemley and Lessig, End of End-to-End, p. 16, reject this on two grounds, first because it causes much greater costs when one decides to open the market after it has been deployed as closed and second because it is difficult to know what the costs of closure are. They argue that the prudent course to start with open platforms, given their clear superiority and wait and see.

[170] Lemley and Lessig, 1999,

The "wait and see" approach also discounts the cost of regulating ex post. In its present state, the ISPs that AT&T would rely upon are independent business units. If the merger were completed, they could easily be folded into the resulting entity. Once integrated, the regulatory costs of identifying non-discriminatory rates would be much higher than they would be under the existing structure. Rather than the complexity that DSL regulation involves, imposing a rule of open access now would be relatively less costly. The same is even truer of independent ISPs. If the vibrant market for ISPs in narrowband access is weakened or destroyed because they cannot provide broadband service, those ISPs and their innovative contributions will disappear. If they do, we

won’t magically get competition back by deciding later to open the broadband market to competition.